



SOLVING THE CLIMATE CRISIS

*The Congressional Action Plan for a Clean Energy Economy
and a Healthy, Resilient, and Just America*

Majority Staff Report



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SELECT COMMITTEE ON THE CLIMATE CRISIS
MAJORITY STAFF REPORT

116TH CONGRESS

PREPARED BY MAJORITY COMMITTEE STAFF PURSUANT TO H.RES.6

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KEY ACRONYMS

ACEP	Agricultural Conservation Easement Program
ATVM	Advanced Technology Vehicles Manufacturing
BIA	Bureau of Indian Affairs, Department of the Interior
BLM	Bureau of Land Management, Department of the Interior
CBO	Congressional Budget Office
CCS	Carbon, Capture, and Storage
CCUS	Carbon, Capture, Utilization, and Storage
CDBG-DR	Community Development Block Grants - Disaster Recovery
CDC	Centers for Disease Control and Prevention
CEQ	Council on Environmental Quality
CHP	Combined Heat and Power
CNCS	Corporation for National and Community Service
CRP	Conservation Reserve Program
CSP	Conservation Stewardship Program
DAC	Direct Air Capture
DHS	Department of Homeland Security
DOC	Department of Commerce
DOD	Department of Defense
DOE	Department of Energy
DOI	Department of the Interior
DOJ	Department of Justice
DOL	Department of Labor
DOS	Department of State
DOT	Department of Transportation
ED	Department of Education
EDA	Economic Development Administration
EERE	Office of Energy Efficiency and Renewable Energy, Department of Energy
EIA	Energy Information Administration
EISA	Energy Independence and Security Act
EJ	Environmental Justice
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
FWS	Fish and Wildlife Service
GAO	Government Accountability Office
GHG	Greenhouse Gas
GSA	General Services Administration
GSE	Government-Sponsored Enterprise
HHS	Department of Health and Human Services
HUD	Department of Housing and Urban Development
ICAO	International Civil Aviation Organization
IPCC	Intergovernmental Panel on Climate Change

LCFS	Low Carbon Fuel Standard
LNG	Liquefied Natural Gas
MARAD	Maritime Administration
MitFLG	Mitigation Framework Leadership Group
MPO	Metropolitan Planning Organization
MSA	Magnuson-Stevens Act
NASA	National Aeronautics and Space Administration
NDAA	National Defense Authorization Act
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NHPP	National Highway Performance Program
NHTSA	National Highway Traffic Safety Administration
NIH	National Institutes of Health
NIST	National Institute of Standards and Technology
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRC	Nuclear Regulatory Commission
NRCS	Natural Resources Conservation Service
NREL	National Renewable Energy Laboratory
NSF	National Science Foundation
OMB	Office of Management and Budget
OSHA	Occupational Safety and Health Administration
PHMSA	Pipeline and Hazardous Materials Safety Administration
RCPP	Regional Conservation Partnership Program
RD&D	Research, Development, and Demonstration
RDD&D	Research, Development, Demonstration, and Deployment
REAP	Rural Energy for America Program
RFS	Renewable Fuel Standard
RTOs /ISOs	Regional Transmission Organizations / Independent System Operators
SBA	Small Business Administration
SEC	Securities and Exchange Commission
SLTT	States, Local governments, Tribes, and Territories
USACE	U.S. Army Corps of Engineers
USAID	U.S. Agency for International Development
USCG	U.S. Coast Guard
USDA	U.S. Department of Agriculture
USGCRP	U.S. Global Change Research Program
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
USPS	U.S. Postal Service
VA	Department of Veterans Affairs
VMT	Vehicle Miles Traveled
WUI	Wildland-Urban Interface

KEY DEFINITIONS

Mitigation

Measures to reduce the amount and speed of future climate change by reducing emissions of heat-trapping gases or removing carbon dioxide from the atmosphere.¹

Resilience

The capability to anticipate, prepare for, respond to, and recover from significant multi-hazard threats with minimum damage to social well-being, health, the economy, and the environment.²

Adaptation

Adjustment in natural or human systems to a new or changing environment that exploits beneficial opportunities or moderates negative effects.³

Environmental Justice (EJ)

The fair treatment and meaningful involvement of all people regardless of race, color, culture, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies⁴ to ensure that each person enjoys (1) the same degree of protection from environmental and health hazards; and (2) equal access to any federal agency action on environmental justice issues in order to have a healthy environment in which to live, learn, work, and recreate.⁵

Environmental Justice Community

A community with significant representation of communities of color, low-income communities, or tribal and Indigenous communities, that experiences or is at risk of experiencing higher or more adverse human health or environmental effects.⁶

Disproportionately Exposed or Vulnerable Community

A community in which climate change, pollution, or environmental destruction have exacerbated systemic racial, regional, social, environmental, and economic injustices by disproportionately affecting Indigenous peoples, communities of color, migrant communities, deindustrialized communities, depopulated rural communities, the poor, low-income workers, women, the elderly, the unhoused, people with disabilities, or youth.⁷

Frontline Community

A low-income community, community of color, or tribal community that is already or could be disproportionately affected or burdened by climate change and its impacts.⁸

¹ U.S. Global Change Research Program, “Glossary,” <https://www.globalchange.gov/climate-change/glossary>. Accessed June 2020.

² Ibid.

³ Ibid.

⁴ Ibid.

⁵ H.R. 5986, Environmental Justice for All Act, Section 3. (hereinafter “Environmental Justice for All Act”)

⁶ Ibid.

⁷ Office of Rep. Rashida Tlaib, “Rep. Tlaib Leads Successful PFAS Amendment with Reps. Barragán & Ocasio-Cortez to Help Disadvantaged, Frontline Communities,” press release, January 20, 2020.

⁸ H.R. 4823, FEMA Climate Change Preparedness Act, 116th Congress.

PREFACE

At the time of this report’s release in June 2020, the nation was reeling. The COVID-19 pandemic had claimed more than 120,000 lives in the United States. Months of stay-at-home orders and business closures had put 40 million Americans out of work, upending the livelihoods of working families. More than one in four workers claimed unemployment benefits, and many more struggled to navigate an often-broken unemployment filing system. This economic crisis, which by many measures exceeded the worst of the Great Recession, exacerbated economic inequalities that existed before the pandemic, particularly for women and people of color. As some states began to slowly reopen at the end of May, the nation erupted in protest in response to yet another police killing of a defenseless African-American man, George Floyd. Throughout it all, President Trump failed to lead the country in a unified and compassionate response, instead choosing to fan the flames of discord and distrust.

Against this backdrop, one may wonder why Select Committee Democrats would choose to release this report with recommendations to solve the climate crisis.

We cannot wait. Atmospheric carbon dioxide concentrations in May 2020 exceeded the highest monthly average ever recorded. The planet suffered through the second hottest year ever in 2019, and May 2020 tied for the highest global May temperature in 141 years of recordkeeping. As the Earth continues to heat up, climate-related impacts, including heat waves, extreme storms, droughts, and flooding, are worsening. The country’s most vulnerable populations—low-income communities and communities of color that have been hardest hit by the COVID-19 pandemic—are most at risk, as underlying demographic, socioeconomic, and health factors act as threat multipliers for the dangerous impacts of climate change.

While the harmful human and economic costs of inaction continue to compound, the solutions to climate change—including building and rebuilding America’s energy, transportation, and manufacturing infrastructure to be cleaner and more resilient to climate impacts—offer an opportunity to propel the economy forward. Solving the climate crisis is hard work, but it provides a pathway to millions of good-paying, high-quality jobs that can fortify and expand America’s middle class. As Congress crafts legislation to help the country rebound from the pandemic and economic crisis, clean energy and climate investments can power short- and long-term economic recovery.

Building a resilient, clean economy affords us another opportunity: to acknowledge and commit to correcting past policy failures that created the climate crisis and the systemic economic and racial inequalities that plague our communities today. This report offers policy recommendations that address the urgency of the climate crisis and begin to repair the legacy of environmental pollution that has burdened low-income communities and communities of color for decades. Climate solutions must have justice and equity at their core.

The protests in response to George Floyd’s death are reminders of the consequences of past inaction, while responses to the COVID-19 pandemic demonstrate that Americans can mobilize en masse to save lives. Both underscore that there are no foregone conclusions. What we choose to do now shapes the future. What happens next—for racial equality, for public health, for the climate crisis—depends on us.

EXECUTIVE SUMMARY

American leadership and ingenuity are central to solving the climate crisis. With the devastating health and economic consequences of climate change growing at home and abroad, the United States must act urgently, guided by science, and in concert with the international community to provide a livable climate for today's youth and future generations. We must harness the technological innovation of the moonshot, the creativity of our entrepreneurs, the strength of our workers, and the moral force of a nation endeavoring to establish justice for all. Working together, we will avert the worst impacts of the climate emergency and build a stronger, healthier, and fairer America for everyone. The Climate Crisis Action Plan outlined in this report provides a roadmap for Congress to build a prosperous, clean energy economy that values workers, advances environmental justice, and is prepared to meet the challenges of the climate crisis.

A Framework for Congressional Action

In January 2019, House Resolution 6 created the bipartisan Select Committee on the Climate Crisis to "develop recommendations on policies, strategies, and innovations to achieve substantial and permanent reductions in pollution and other activities that contribute to the climate crisis."⁹ The resolution directed the Select Committee to deliver policy recommendations to the standing legislative committees of jurisdiction for their consideration and action.¹⁰ Over the last 17 months, the Select Committee has consulted with hundreds of stakeholders and scientists, solicited written input, and held hearings to develop a robust set of legislative policy recommendations for ambitious climate action.

In this report, the majority staff for the Select Committee lays out a framework for comprehensive congressional action¹¹ to satisfy the scientific imperative to reduce carbon pollution as quickly and aggressively as possible, make communities more resilient to the impacts of climate change, and build a durable and equitable clean energy economy. To succeed, Congress needs to put people and communities at the center of climate policy so they can see and experience the tangible benefits of climate action for their health and livelihoods.

In practical terms, this means building and rebuilding America's infrastructure, the foundation of the American economy and communities; reinvigorating American manufacturing to create a new generation of secure, good-paying, high-quality jobs; prioritizing investment where it is needed the most, including rural and deindustrialized areas, low-income communities, and communities of color; and beginning to repair the legacy of economic and racial inequality that has left low-income workers and communities of color disproportionately exposed to pollution and more vulnerable to the costs and impacts of climate change. By responding to the material harm of the climate crisis, Congress will also address the moral obligation to protect the most vulnerable and allow future generations to thrive.

⁹ H.Res.6, "Adopting the Rules of the House of Representatives for the One Hundred Sixteenth Congress, and for other purposes," Section 104(f), 116th Congress.

¹⁰ H.Res.6 directed the Select Committee to deliver policy recommendations by March 31, 2020. The COVID-19 pandemic delayed the Select Committee's report release until June 2020.

¹¹ This report focuses on what actions Congress should take to address the climate crisis rather than what the White House should do with its existing authority. Ideally, legislative and administrative action would be complementary.

The Climate Crisis Action Plan

To have a chance at limiting warming to 1.5°C and avoiding increasingly severe impacts from climate change, the Intergovernmental Panel on Climate Change (IPCC) concluded that global net anthropogenic carbon dioxide emissions must fall by 45% from global 2010 levels by 2030 and reach net-zero by 2050.¹² Hitting these targets will require a “rapid and far-reaching” transition across the economy that is “unprecedented in terms of scale.”¹³

The Climate Crisis Action Plan establishes a goal of reaching net-zero greenhouse gas emissions economy-wide in the United States by no later than 2050; directs the president to set ambitious interim targets to meet or exceed that goal; and calls for achieving net-negative greenhouse gas emissions during the second half of the century.

The Climate Crisis Action Plan will build an American economy that protects public health and values workers, families, communities, and current and future generations who are depending on Congress to tackle the existential threat of climate change in a just and equitable way. The Climate Crisis Action Plan lays out hundreds of recommendations for comprehensive congressional action and centers on 12 key pillars, as detailed below. These recommendations offer an array of policy solutions that can benefit communities across the country, whether they are rural or urban; create good, local jobs; and reduce pollution.

The majority staff for the Select Committee previewed its draft policy recommendations with the non-partisan think tank Energy Innovation: Policy and Technology LLC (“Energy Innovation”). Energy Innovation used their open-source Energy Policy Simulator¹⁴ to model the emissions reductions and co-benefits from implementing a subset of the Select Committee’s recommendations. According to Energy Innovation’s model, the Select Committee majority staff’s recommendations across the 12 pillars will set the country on a path to achieving net-zero greenhouse gas emissions by 2050. The subset of recommendations from the Climate Crisis Action Plan would:

- Reduce net U.S. greenhouse gas emissions by 37% below 2010 levels in 2030 and 88% below 2010 levels in 2050.¹⁵ The remaining 12% of emissions comes from the hardest to decarbonize sectors, such as heavy-duty and off-road transportation, industry, and agriculture.
- Lead the United States to reach net-zero carbon dioxide emissions before 2050, in line with the IPCC’s guidance on emissions reductions needed to limit warming to 1.5°C.
- Deliver significant health benefits, avoiding an estimated 62,000 premature deaths annually by 2050, primarily by reducing fine particulate matter pollution.
- By 2050, the cumulative estimated health and climate benefits are almost \$8 trillion (real 2018 U.S. dollars). In 2050 alone, the estimated health and climate benefits exceed \$1 trillion.

¹² Intergovernmental Panel on Climate Change (IPCC), *Special Report on Global Warming of 1.5°C* (October 2018) at 14.

¹³ Ibid. at 17.

¹⁴ Energy Innovation: Policy and Technology LLC, Energy Policy Simulator, <https://www.energypolicy.solutions/>.

¹⁵ This is equivalent to 40% below 2005 levels by 2030 and 89% below 2005 levels by 2050. We used the 2010 reference point because the IPCC uses 2010 levels when it describes near-term emissions reduction goals to limit warming to 1.5°.

In developing the policy recommendations under each pillar below, Congress should implement an inclusive stakeholder process that solicits early input and feedback from those most affected by the outcomes of the policy choices. In particular, Congress should “meaningfully involve and value the voices and positions of EJ frontline and fenceline communities”¹⁶ and labor organizations.

Pillar 1: Invest in Infrastructure to Build a Just, Equitable, and Resilient Clean Energy Economy

Congress needs to make a deep, sustained commitment to rebuild and modernize the nation’s infrastructure to reduce greenhouse gas emissions and withstand the unavoidable impacts of a warming climate. Doing so will create good-paying, high-quality jobs to expand America’s middle class and lay a solid foundation for an equitable economy.

Build a cleaner and more resilient electricity sector to achieve net-zero emissions from power generation by 2040

Decarbonization of the electricity sector is the linchpin of any national strategy to achieve net-zero emissions economy-wide by no later than 2050. Electrification of key end uses in the transportation, buildings, and industrial sectors will be essential to cut emissions from those sectors. Electrification only works as a decarbonization strategy, however, if the grid is as clean as possible as soon as possible. Energy efficiency can moderate the expected increase in electricity demand from electrification and reduce energy costs for consumers.

As the electricity grid becomes the central feature of a comprehensive climate strategy, its reliability and resilience to climate-related threats becomes even more paramount. Recent events have shown that the electricity grid is vulnerable to climate-related disasters, such as extreme storms that knock down power lines, but also can trigger disasters, such as wildfires sparked by power lines igniting vegetation in hot and dry conditions.

POLICY TOPLINES: Congress should enact a Clean Energy Standard to achieve net-zero emissions in the electricity sector by 2040 and an Energy Efficiency Resource Standard to smooth out rising electricity demand from electrification and save consumers money on their power bills. Congress should extend and expand clean energy tax incentives and grant programs, such as the Energy Efficiency and Conservation Block Grant Program, to maximize near-term deployment of energy efficiency, renewable energy, and zero-carbon electricity sources. For the longer term, Congress needs to invest in research and development across technologies, but particularly in energy storage. Congress should ensure that low-income communities and communities of color have equitable access to and benefit from these clean energy resources.

To fully harness the country’s vast renewable energy resources onshore and offshore, Congress must direct the Federal Energy Regulatory Commission (FERC) to develop a long-range transmission infrastructure strategy to site more interstate transmission lines in high-priority corridors. Congress also should direct FERC to remove roadblocks in power markets that slow the growth of electricity generation from clean sources.

¹⁶ Equitable and Just National Climate Platform, <https://ajustclimate.org/about.html>. Accessed June 2020.

To make the grid more resilient to climate impacts, Congress will need to partner with state, local, tribal, and territorial governments, utilities, workers, and communities to harden the electric grid's physical infrastructure; deploy new technologies to detect grid disruptions quickly; and facilitate community access to clean microgrids and distributed energy resources to make households less reliant on the centralized grid.

Build a cleaner and more resilient transportation sector

The transportation sector—including cars, trucks, buses, airplanes, ships, rail, and other modes—is the largest source of energy-related carbon dioxide emissions in the United States. Across modes, the story is similar: emissions are a function of the vehicle's fuel efficiency, the fuel's carbon intensity, and the number of miles traveled each year. Each part of the transportation sector, however, is at a different stage of zero-emission technological innovation and faces unique challenges to decarbonization and, as a result, may require a tailored policy approach. Well-designed policy should lead to new manufacturing and supply chain innovations that create good-paying jobs at home and bolster American competitiveness.

In addition to contributing to the climate problem, transportation infrastructure is heavily exposed to extreme weather and climate impacts, from floods that wash out bridges and roads to heat waves that ground airplanes. Without proactive action to build resilience, climate change will compromise the reliability and capacity of even the cleanest transportation systems.

POLICY TOPLINES: Congress should expedite deployment of zero-emission technologies in the sectors where they are already available while making new gasoline- and diesel-powered vehicles as clean as possible. This should include setting strong greenhouse gas emissions standards for cars, heavy-duty trucks, and aviation; enacting a national sales standard to achieve 100% sales of zero-emission cars by 2035 and heavy-duty trucks by 2040; and providing incentives to build out zero-emission fueling infrastructure across the country. Ambitious initiatives to ensure more domestic manufacturing of cleaner vehicles and their components must accompany these policies. At the same time, Congress should establish a Low Carbon Fuel Standard to reduce emissions from remaining gasoline-powered vehicles and transportation modes for which electrification may not be an option in the short to medium term, such as aviation, long-haul trucking, and shipping. Congress also should invest in aggressive research to develop and demonstrate new zero-emission technologies and fuels for these harder-to-decarbonize parts of the transportation sector.

Cutting pollution from passenger vehicles becomes a more challenging task if drivers must travel farther each year to access jobs and services. Congress needs to work with local communities and states to make housing, businesses, and critical services more accessible and double federal spending on public transit and other zero-carbon modes to provide households with more lower-carbon, convenient, and affordable transportation options. Federal policy should ensure that all transportation systems are designed, maintained, and repaired to withstand climate impacts.

Build and upgrade homes and businesses to maximize energy efficiency and eliminate emissions

Buildings account for 40% of U.S. energy use. To fully decarbonize the building sector, new and existing buildings must maximize energy efficiency, generate clean energy onsite or nearby where

feasible, electrify end uses as the grid decarbonizes, and eliminate emissions from building construction and materials. This transformation will require massive investments to reach all communities and the millions of U.S. buildings that vary in size, age, climate, purpose, ownership, and use. These investments will boost local economic development, create good-paying jobs, and improve quality of life in communities across the country. The federal government must work in partnership with state and local governments, as they largely have authority over the design and construction of residential and commercial buildings in their jurisdictions.

POLICY TOPLINES: Congress should incentivize states and cities to adopt updated model building codes, including net-zero-emission building codes, and establish tax incentives for the construction of net-zero buildings, with the goal of making all new residential and commercial buildings net-zero emissions by 2030. Congress should require new federal buildings to achieve net-zero emissions by 2030 as well. To reduce energy use and emissions from existing buildings, Congress should set benchmarking requirements for commercial buildings and encourage cities and states to adopt performance-based standards for buildings; provide incentives for energy efficiency improvements, onsite renewable energy generation, and electrification of end uses in buildings, such as space and water heating; invest in large-scale weatherization and efficiency in low-income and frontline communities; and require federal buildings to undergo deep energy retrofits, perform energy and emissions benchmarking, and meet ambitious energy use and emissions intensity targets. To reduce emissions from building construction, Congress should incentivize building reuse and require federal buildings to use lower-emission building materials.

Invest in water systems to provide clean water and prevent catastrophic flooding

Water systems across the nation are under stress due to chronic underinvestment and deferred maintenance, particularly in low-income communities and communities of color. The climate crisis threatens to increase public health and safety emergencies as conditions overwhelm water and wastewater infrastructure, levees, and dams. While the investment needed is substantial, the costs of continued neglect are far greater.

POLICY TOPLINES: Congress should establish new standards for water infrastructure resilience that account for climate impacts, including more frequent and damaging floods, droughts, and erosion. Congress also should ensure robust public engagement in water infrastructure projects, particularly for environmental justice communities whose input should inform decisions about how to reduce climate impacts. Congress will need to integrate nature-based strategies and apply innovative finance approaches to ensure safe and clean water supplies, efficient wastewater treatment, and dams and levees that are appropriately sited, designed, and maintained to last under increasingly extreme conditions.

Prepare the nation's telecommunications networks for climate impacts

The reliability of wireless and broadband networks is critical for climate resilience. Failures in wireless networks hamper disaster response and 9-1-1 services, and uneven access to broadband creates a “digital divide” that broadens existing inequities for frontline and rural communities most affected by the climate crisis.

POLICY TOPLINES: Congress should invest in Next Generation 9-1-1 and direct the Federal Communications Commission to ensure the reliability of wireless communications networks during disasters. Congress should expand broadband networks with the goal of achieving reliable and universal access and providing continuity of internet services for education, telemedicine, and other essential needs during disasters.

Plug leaks and cut pollution from America's oil and gas infrastructure

Leaky oil and natural gas infrastructure, from well pads to pipelines, allows methane, a climate super-pollutant, to escape into the atmosphere. Technology exists to detect these leaks and even capture the methane for profitable sale. Oil and gas production and transmission also pose risks to air and water quality but enjoy exemptions from cornerstone environmental laws.

POLICY TOPLINES: Congress should set a national methane pollution reduction goal for the oil and gas sector of 65% to 70% by 2025 and 90% by 2030, relative to 2012 levels, and phase out routine flaring of methane. For pipelines, Congress should direct regulators to set new standards for pipeline operators to detect and repair methane leaks; provide financial support for cities and states to eliminate methane leaks from natural gas distribution lines within 10 years; and update the Federal Power Act to ensure FERC considers climate science and public input when siting new natural gas infrastructure. Congress also should close exemptions for the oil and gas industry in the Clean Air Act, Clean Water Act, and Resource Recovery and Conservation Act.

Pillar 2: Drive Innovation and Deployment of Clean Energy and Deep Decarbonization Technologies

IPCC scientists have shown that the world needs to deploy clean energy technologies as quickly as possible to slash greenhouse gas emissions and limit warming to 1.5°C. Market forces and state and federal policies are driving some clean energy deployment already, but substantial public and private investment would accelerate this trend. Full decarbonization of the economy, however, may require new technologies that have yet to be invented. Robust innovation policy at all process stages—research, development, demonstration, and deployment—will be critical to the timely and widespread implementation of new clean energy and other decarbonization technologies.

POLICY TOPLINES: Congress should support all stages of climate-related innovation by recommitting to Mission Innovation—a global initiative working to accelerate global clean energy innovation—and boosting funding for federal clean energy research, development, and demonstration; prioritizing climate in the Department of Energy's (DOE's) mission and reorganizing DOE to meet this goal; facilitating technology transfer and commercialization through initiatives like regional energy innovation partnerships; and creating a national climate bank and expanding the DOE loan guarantee program to leverage private investment for deployment of decarbonization technologies and climate-resilient infrastructure. Congress should start a DOE Energy Justice and Democracy program to ensure environmental justice communities have access to innovations in energy efficiency and renewable energy and to reduce energy poverty. To shift private capital toward climate-smart investments, Congress should require corporate disclosure and federal analysis of climate-related financial risks.

Pillar 3: Transform U.S. Industry and Expand Domestic Manufacturing of Clean Energy and Zero-Emission Technologies

The world is on the cusp of a manufacturing and industrial transformation inspired by the need to deploy zero-emission technologies and build cleaner, more resilient infrastructure. The United States has an opportunity to establish itself as a global leader in this transformation and spur a new generation of good-paying, high-quality manufacturing jobs in the process.

Rebuild U.S. industry for global climate leadership

The industrial sector may be one of the most challenging to decarbonize, given its diversity and reliance on energy-intensive processes. Eliminating industrial emissions depends on the discovery of new technologies and the development and deployment of platform technologies, such as industrial efficiency, electrification, carbon capture, low-emission hydrogen, and materials recirculation and substitution. A comprehensive approach to achieve a net-zero-emissions industrial sector by midcentury would enhance U.S. competitiveness, create high-quality domestic jobs, and ensure clean, safe, fair, and equitable industrial development for workers and communities.

POLICY TOPLINES: Congress should establish performance standards to guarantee emissions reductions from industrial facilities and pair them with border adjustment mechanisms to level the playing field with foreign goods made with higher-polluting processes. To complement these standards, Congress should support research, development, and demonstration of breakthrough and platform technologies for industrial decarbonization, including carbon capture, utilization, and storage; provide firms in the industrial sector with access to revolving loan funds, grants, and tax incentives for efficiency upgrades, process changes, and retooling; develop infrastructure for key decarbonization technologies, including low- and zero-carbon hydrogen; and create markets for low-emission goods through a federal Buy Clean program. Congress should facilitate the transition to a circular economy that eliminates waste and pollution by supporting research and development, infrastructure, and standards for materials efficiency, substitution, and recycling.

Invest in domestic manufacturing of clean energy, clean vehicle, and zero-emission technologies

American innovation will be critical to solving the global climate crisis, but it is only one measure of U.S. leadership. American workers also should be the ones to manufacture these American ideas, creating high-quality jobs at home and robust export markets abroad.

POLICY TOPLINES: To spur more domestic manufacturing, Congress should create a tax credit to retool, expand, or establish domestic clean energy and grid technology manufacturing facilities; establish a production tax credit for clean energy, energy efficiency, and decarbonization technologies and products; expand DOE grant programs and loan guarantees to construct new or retool existing U.S. facilities to manufacture zero-emission vehicles; and develop national strategies for clean technology manufacturing and critical mineral supply chains. Congress should tie federal funding for innovation to domestic manufacturing of resulting technologies. Congress should also leverage federal procurement policies to build demand for domestic clean energy and zero-emission technologies and products.

Develop, manufacture, and deploy cutting-edge carbon removal technology

According to the IPCC, all pathways that limit global warming to 1.5°C require carbon dioxide removal, such as direct air capture, to achieve net negative emissions.¹⁷ The United States has the opportunity to lead the world in developing, deploying, and exporting this essential technology.

POLICY TOPLINES: To jumpstart a direct air capture industry in the United States, Congress should dramatically increase federal investment in carbon removal research and development; improve financial incentives for direct air capture technology; expand demonstration projects to safely store carbon below ground; and create markets for fuels made from carbon captured from the atmosphere.

Pillar 4: Break Down Barriers for Clean Energy Technologies

Clean energy technology faces several structural barriers to rapid and widespread deployment. At the top of the list is a tax code that benefits oil, coal, and other incumbent energy technologies over new technologies and an economic system that fails to account for the cost of carbon pollution from fossil fuel combustion.

POLICY TOPLINES: Congress should repeal tax breaks for large oil and gas companies as a first step toward building a fairer tax code that supports reaching net-zero emissions by 2050 at the latest. Congress also should put a price on carbon to correct the failure of the market to account for the costs of unmitigated pollution. Carbon pricing is not a silver bullet and should complement a suite of policies to achieve deep pollution reductions and strengthen community resilience to climate impacts. Congress should pair a price with policies to achieve measurable pollution reductions from facilities located in environmental justice communities and policies to ensure energy-intensive, trade-exposed industries do not face unfair competition from foreign competitors using dirty technologies.

Pillar 5: Invest in America's Workers and Build a Fairer Economy

Tackling climate change and reaching net-zero emissions as soon as possible offers a unique opportunity to rebuild the economy on a stronger foundation of equity and fairness for workers and their communities. Smart climate policy must provide tangible benefits to economically vulnerable communities, put working people front and center, and deliver good-paying, high-quality jobs and accessible career pathways into them for all Americans. Building a clean energy economy can help put unemployed Americans back to work and relieve the economic crisis sparked by the COVID-19 pandemic. Congress also needs to respect the contributions of coal miners and other fossil fuel workers and provide a comprehensive set of systemic supports for these workers and their communities.

POLICY TOPLINES: Congress should secure workers' right to organize a union and negotiate for higher wages, safer working conditions, and better benefits. As it reauthorizes and considers new investments in clean infrastructure, Congress should commit federal funding only to projects that meet strong labor standards. To support veterans of the coal industry and communities most affected by the economic transition away from fossil fuels, Congress should establish a National Economic

¹⁷ Intergovernmental Panel on Climate Change, *Special Report on Global Warming of 1.5°C* (October 2018) at 14.

Transition Office to coordinate, scale up, and target federal economic and workforce development assistance to communities and workers.

Pillar 6: Invest in Disproportionately Exposed Communities to Cut Pollution and Advance Environmental Justice

In the United States, communities of color, low-income communities, and tribal and Indigenous communities “are disproportionately burdened by environmental hazards that include exposure to polluted air, waterways, and landscapes.”¹⁸ These same communities are more vulnerable to the health impacts and escalating costs of climate change. Federal climate policy needs to “improve the public health and well-being of all communities while tackling the climate crisis and environmental racism head-on.”¹⁹ Engaging leaders from these communities early in the policymaking process and soliciting their expertise throughout is essential for ensuring the policies will work in their communities and benefit those most in need.

POLICY TOPLINES: Environmental justice must be at the center of federal climate and environmental policy. Congress should direct the Environmental Protection Agency to consider the cumulative pollution impacts of the facilities it permits; support federal and academic research of the cumulative and distributional impacts of federal climate, health, and environmental policy on environmental justice communities; prioritize these communities for new federal spending and projects to deploy clean energy and replace aging infrastructure; collaborate with USDA, tribes, environmental justice communities, and NGOs to address food insecurity; ensure meaningful federal engagement and consultation with environmental justice communities; and increase the capacity of environmental justice communities to participate in the policymaking process.

Pillar 7: Improve Public Health and Manage Climate Risks to Health Infrastructure

The impacts of climate change disproportionately affect the health of frontline communities and vulnerable populations who have fewer resources to cope with heat waves, degraded air quality, flash flooding, infectious disease, and other threats. People need a robust public health system to rely on for help when facing these threats or when hit with a natural disaster. Too often, health care systems are not prepared or equipped to respond to large-scale events, as demonstrated by the COVID-19 pandemic.

POLICY TOPLINES: Congress should direct the Department of Health and Human Services to develop a national strategic action plan to assist communities and health departments in preparing for and responding to climate-related health risks, including the health-related needs of frontline communities and vulnerable populations that are disproportionately harmed by extreme weather, pollution, food insecurity, and other effects of climate change. Congress also should increase U.S. support for global surveillance and response to potential health threats; strengthen supply chains for health commodities; expand the capacity of the Centers for Disease Control and Prevention to support state, local, tribal, and territorial health departments in their climate-related work; boost

¹⁸ Environmental Justice for All Act, Section 1.

¹⁹ Equitable and Just National Climate Platform, <https://ajustclimate.org/about.html>. Accessed June 2020.

funding for programs to make health systems more resilient to climate impacts; and increase support to address the mental and emotional health effects of the climate crisis.

Pillar 8: Invest in American Agriculture for Climate Solutions

America's farmers and ranchers are critical partners in solving the climate crisis, as many agricultural practices can provide valuable climate and ecosystems benefits. Climate stewardship practices such as no- and low-till farming, planting cover crops, diversified crop rotations, rotational grazing, and improved nutrient management, reduce emissions, enhance carbon sequestration, and make soils more resilient to extreme weather. Many farmers interested in adopting these practices would benefit from upfront financial and technical assistance from the Department of Agriculture, local conservation districts, extension services, and land-grant universities, including historically black colleges and universities and tribal colleges.

POLICY TOPLINES: Congress should dramatically increase investments to support the efforts of America's farmers and ranchers to employ climate stewardship practices. This federal commitment to farmers should include more funding for Farm Bill conservation programs and expanded financial and technical assistance to farmers and ranchers, with a focus on climate mitigation and resilience. Further, Congress should set climate stewardship practice goals across all U.S. farmland and expand Department of Agriculture resources, research, and partnerships to increase federal capacity to encourage widespread adoption of climate stewardship practices. To support the next generation of farmers and build a fair, equitable, and climate-friendly food system, Congress should embed climate mitigation and adaptation into programs for new, beginning, and socially disadvantaged farmers and ranchers and increase investments in these programs. Congress also should incentivize farmers and ranchers to incorporate energy efficiency and renewable energy on-farm and protect their farmland from development and other non-agricultural uses. As part of a comprehensive approach, Congress also should support local and regional food systems and develop initiatives to combat food waste.

Pillar 9: Make U.S. Communities More Resilient to the Impacts of Climate Change

The effects of climate change are already manifesting across the nation and are projected to intensify, including rising temperatures, increasingly severe storms, and damaging wildfires. While many communities are taking action to respond to these threats, the federal government needs to help them better manage land use, adopt robust building codes and development standards, and transition away from areas of growing risk to safer ground. Bridging the resilience gap will require substantial public and private investment and incorporation of climate risks into program design and priorities to ensure efficient use of funds.

Support community leadership in climate resilience and equity

State, local, tribal, and territorial leaders know firsthand the threats posed by the climate crisis to community wellbeing. Many have already taken steps to reduce emissions and prepare their communities to be more resilient. Federal action is needed to support communities that struggle with lack of information, guidance, and funding to build local capacities and capabilities and to confront the existential threats of rising seas, wildfires, and extreme weather.

POLICY TOPLINES: Congress should establish a National Climate Adaptation Program to deliver technical assistance to states, local governments, tribes, and territories (SLTT), support SLTT planning, and invest in community adaptation and resilience projects with meaningful public participation, especially for environmental justice communities. Congress should establish a Tribal Government Task Force to coordinate across the federal government to overcome barriers to assistance, build or augment tribal technical capability, and ensure equitable baseline funding. Planning and investments for climate resilience should build local workforce capabilities and provide good jobs for vibrant regional economies.

Build—and rebuild—based on actionable science, codes, and standards

Governments, businesses, communities, and households need reliable information to respond to climate-related risks. Building codes and standards should reflect the latest climate risk information to ensure greater resilience against floods, wildfires, tropical cyclones, and other hazards. Adoption of strong codes and standards can increase property values while reducing risks and insurance costs.

POLICY TOPLINES: Congress should establish a Climate Risk Information Service to develop localized climate risk information and embed climate risk projections in development of resilience codes, specifications, and standards. Congress should establish federal flood and wildfire resilience standards for federally supported activities, including investments in climate resilience and disaster recovery. Congress should revise the federal tax code to incentivize state, local, and private investments in resilience.

Reduce climate disaster risks and accelerate disaster recovery

Since 2005, the federal government has spent at least \$450 billion on disaster assistance. Weather disasters and related federal spending are expected to increase due to climate change. These impacts are hitting low-income households, farmers, and traditionally marginalized communities hardest, driving a downward trend in livability and social resilience.

POLICY TOPLINES: Congress must dramatically increase and provide stable federal investment in pre-disaster mitigation and resilient disaster recovery to strengthen infrastructure, support affordable and resilient housing, and help families, businesses, and communities that are seeking federal assistance to move out of the riskiest areas. Congress also must reform federal flood mapping and insurance programs to deliver forward-looking projections, help low-income households afford flood insurance, and expand coverage to reduce uninsured flood losses. Congress should call for a national wildfire mitigation strategy and increase federal investment in wildfire resilience to reduce the risk of loss of life, property, and natural resources to destructive wildfires. In all instances, Congress must prioritize investments to assure no one repeatedly suffers the impacts of climate change, including frontline communities, rural communities, and small businesses.

Make climate resilience planning an essential element of federal agency operations

Climate change is already affecting the operations of every agency in the federal government, and the impacts will continue to get worse as the planet warms. Federal agencies, from the U.S. Postal Service to the Department of Defense, need to plan for how they will deliver essential services amidst climate disruptions and coordinate that planning with state, local, tribal, and territorial partners.

POLICY TOPLINES: Congress should require climate adaptation planning and coordination to address the ways that the climate crisis can disrupt federal agencies and their missions and operations. Agency adaptation plans need to identify opportunities to address climate impacts on environmental justice communities and vulnerable populations. Congress also should require major government suppliers to disclose greenhouse gas emissions and climate risks to their supply chains and operations as a consideration for the award of federal contracts.

Pillar 10: Protect and Restore America's Lands, Waters, Ocean, and Wildlife

America's landscapes and natural resources have significant potential to sequester carbon, provide important habitat for wildlife, and make ecosystems and communities more resilient to the impacts of climate change. Ecosystems such as forests, grasslands, and wetlands are natural and efficient carbon sinks, capturing and storing carbon in roots, plants, and soils. To make America's public lands and ocean a net carbon sink and a central feature of a comprehensive climate strategy, U.S. land management agencies must limit new fossil fuel leasing on public lands and waters, increase renewable energy production, and maximize deployment of natural climate solutions such as reforestation and wetland restoration.

Capture the full potential of natural climate solutions

Storing carbon in natural systems is a proven and cost-effective way to deliver large-scale carbon dioxide reductions and improve community and ecosystem resilience. By expanding protections for America's lands, waters, and ocean, Congress can reverse decades of deforestation, bolster the capacity of nature to store carbon, and avert pollution from land disturbance and extractive activities.

POLICY TOPLINES: Congress should establish a national goal of protecting at least 30% of all U.S. lands and ocean areas by 2030, prioritizing federal and nonfederal lands and waters with high ecological, biodiversity, and carbon sequestration value. Currently, just 12% of U.S. lands and 26% of the U.S. ocean—primarily marine monuments in the remote Western Pacific or northwestern Hawaii—are permanently protected. To achieve this goal, Congress should conserve and restore landscapes, natural spaces, and America's treasured public lands through high-value protection designation and direct federal land management agencies to work collaboratively with tribes, state governments, private landowners, and local communities. Congress should also develop and fund initiatives to ensure equitable access to these natural spaces for individuals in environmental justice communities.

Forests and “blue carbon systems”—including ocean, wetland, and riverine ecosystems—are critical carbon sinks and provide important resilience services. Congress should protect mature and old growth forests; invest in forest restoration, reforestation, and afforestation on public and private lands, including urban areas to improve urban tree canopy; manage wildfire for community safety and ecological health; ensure forest management activities focus on climate and biodiversity benefits; and protect and restore native grasslands. To complete this natural resources restoration work, Congress should re-establish the Civilian Conservation Corps. Congress also should protect, conserve, and restore “blue carbon systems” to capture carbon and protect shorelines from flooding and storms; scale up responsibly-sited ocean-based renewable energy; address ocean acidification and biodiversity decline; incorporate climate adaptation into fisheries management; and prioritize natural infrastructure for coastal resilience.

Natural climate solutions also protect wildlife and endangered species, which face myriad challenges from climate change. Congress should create wildlife corridors to facilitate migration, range expansion, and mating; direct federal natural resources agencies to develop a coordinated landscape-scale conservation strategy to help species adapt to a changing climate; support efforts by private landowners to protect wildlife habitat on their land; and improve implementation of the Endangered Species Act in the context of climate change.

Make public lands and waters a part of the climate solution

Fossil fuel extraction on public lands is responsible for nearly a quarter of total U.S. carbon dioxide emissions, making public lands a net-emitter of greenhouse gas pollution. A comprehensive federal strategy should transform America's public lands and waters into valuable carbon sinks and a cornerstone of a successful climate plan.

POLICY TOPLINES: Congress should direct federal land management agencies to develop a comprehensive public lands climate plan to achieve net-zero emissions on public lands and waters by 2040 at the latest. To achieve this goal, Congress should impose a moratorium on all new fossil fuel leases on public lands while ensuring robust economic development and worker transition assistance for communities dependent on fossil fuel extraction; prohibit new offshore oil and gas leasing in all areas of the Outer Continental Shelf; reduce methane pollution from oil and gas extraction; and increase renewable energy production. Additionally, Congress should protect wild and special places and make them off-limits to drilling and mining activities, including America's last remaining wild landscapes, irreplaceable cultural sites, national parks and monuments, and important wildlife habitat and corridors. Congress should also eliminate unfair and expensive government subsidies for oil and gas drilling on public lands; establish and maintain robust environmental review of and bonding requirements for all proposed projects on public lands; and reclaim orphaned wells that pose a safety and environmental threat.

Pillar 11: Confront Climate Risks to America's National Security and Restore America's Leadership on the International Stage

The climate crisis is an urgent threat to our nation and to global security, as extreme conditions affect defense facilities, operations, and personnel. Catastrophes at home and abroad increase the need for humanitarian response and aid. The climate crisis amplifies geopolitical threats as resource scarcity and catastrophic events fuel conflict, mass migration, and social and political strife. Federal leadership requires coordination across the science, security, and defense enterprises to confront threats to military infrastructure and operations and global security.

At the same time, international engagement is crucial to addressing the climate crisis. The opportunity to advance climate solutions should be a priority for the United States in our multilateral, bilateral, international development, and humanitarian efforts. A future president committed to climate action likely will rejoin the Paris Climate Agreement, but Congress also must take steps to ensure that the United States continues to support global progress on climate change.

POLICY TOPLINES: Congress should require consideration of climate risks in defense procurement, logistics, and supply chains and ensure collaboration in climate adaptation and resilience planning among military installations and neighboring communities. Congress should direct agencies with

national defense, homeland security, and science missions to identify and confront climate security threats to the homeland to safeguard critical infrastructure, protect public health, and prepare for climate-driven internal and cross-border migration.

Internationally, Congress should deliver on U.S. financial commitments to the Green Climate Fund and should advance clean energy and climate resilience in international missions and aid, including supporting greater participation of women in economic development planning and climate solutions. Congress should expand support for stopping deforestation and reducing black carbon pollution, two important drivers of climate change. Congress also should improve Arctic engagement and diplomacy given the rapid environmental changes in the region.

Pillar 12: Strengthen America's Core Institutions to Facilitate Climate Action

Action on climate change requires robust science and strong democratic institutions to foster transparency, inclusion, and government accountability.

Strengthen climate science

Climate science is the foundation of national and international efforts to address the climate crisis. Scientists and educators need strong federal funding support to advance efforts to observe, monitor, model, and understand Earth's interconnected weather and climate system and to develop the next generation of climate scientists and a climate-literate public and workforce. Federal agencies also need safeguards to protect science from political interference.

POLICY TOPLINES: Congress should strengthen and sustain federal support for climate science, including national and international climate assessments, foundational Earth system science research, studies of climate impacts on human and natural systems, and governance approaches for the risks of atmospheric climate intervention. Congress should strengthen federal scientific integrity policies and ensure that federal agencies act on the best available science. Congress should expand and sustain federal support for climate literacy and STEM education, with an emphasis on removing barriers and broadening participation for underrepresented groups. Congress also should revive the Office of Technology Assessment to provide Members of Congress with nonpartisan scientific and technology expertise.

Assess the true value of federal climate action

Members of Congress have access to unique services, including the Congressional Budget Office (CBO) and Congressional Research Service, to help them understand the potential impacts of proposed legislation. Many of these services, however, are not equipped or resourced to assess the technological complexities of climate change solutions or calculate the intergenerational costs and benefits of climate-related legislation. The executive branch faces similar challenges when evaluating federal projects against the risks of climate impacts, such as flooding and wildfire.

POLICY TOPLINES: Congress should expand CBO's capacity to analyze the fiscal and economic impacts of proposed legislation related to climate risk. For the executive branch, Congress should establish an interagency working group to update the "Social Cost of Carbon" to reflect the best available climate science and direct OMB to work with the National Academies of Science,

Engineering, and Medicine to improve agencies' ability to assess the costs and benefits of projects to improve community climate resilience.

Strengthen the country's democratic institutions

All recommendations in this report will be more difficult to implement if entrenched interests—those that do not want to transition to a net-zero clean economy—continue to have a greater say in the political process than average Americans, the majority of whom support action to address climate change and advance clean energy. State voter discrimination policies attempt to suppress the vote of those who are most often burdened by pollution and face the greatest impacts from climate change—low-income communities and communities of color.

POLICY TOPLINES: In 2019, the House of Representatives passed two bills that illustrate the type of change that may be necessary to build a healthier, more responsive democracy. H.R. 1, the For the People Act, tackles three core issues: campaign finance reform, voting rights, and federal ethics laws. H.R. 4, the Voting Rights Advancement Act of 2019, restores the full protections of the bipartisan Voting Rights Act to block state and local voter discrimination policies.

Conclusion

The climate crisis touches every part of the U.S. economy and therefore demands a comprehensive legislative response in partnership with a president committed to science, the health of the nation, and climate action. Around the world, people responded to the challenge of the COVID-19 pandemic in a shared mobilization to save lives. The climate crisis requires the same commitment over decades. The U.S. government has a moral, scientific, and economic duty to serve as the standard-bearer for this commitment. As such, congressional climate action must equal the scale that science demands and adhere to core values of fairness, equity, and a shared sense of purpose. A clean and healthy economy that reflects these values will produce high-quality, good-paying jobs and lift up communities that have been left behind and underserved.

BACKGROUND: THE SELECT COMMITTEE ON THE CLIMATE CRISIS

In January 2019, the House of Representatives, led by Speaker Nancy Pelosi, adopted House Resolution 6, which created the Select Committee on the Climate Crisis and laid out the Select Committee's charge:²⁰

The sole authority of the Select Committee shall be to investigate, study, make findings, and develop recommendations on policies, strategies, and innovations to achieve substantial and permanent reductions in pollution and other activities that contribute to the climate crisis which will honor our responsibility to be good stewards of the planet for future generations. The Select Committee may, at its discretion, hold public hearings in connection with any aspect of its investigative functions. ...

The Select Committee may report to the House or any committee of the House from time to time the results of its investigations and studies, together with such detailed findings and policy recommendations as it may deem advisable.

This report contains the Select Committee majority staff's recommendations to Select Committee Democrats for legislative action in the relevant standing committees of the House of Representatives.

To develop these recommendations, the Select Committee staff and members have held more than a thousand meetings with stakeholders in Washington, D.C. and across the United States and reviewed hundreds of substantive stakeholder comments submitted in response to the Select Committee's formal Request for Information.²¹ Chair Kathy Castor (D-FL) and Ranking Member Garret Graves (R-LA) have each traveled to communities across the country to listen to local experts about the impacts of climate change and opportunities to build a cleaner, more resilient economy.

To date, the Select Committee has held 17 official hearings and 6 member-level roundtables or discussions, in which Committee members have had the opportunity to hear from a wide range of stakeholders, including elected officials, tribal leaders, scientists, business representatives, policy experts, public health advocates, youth activists, and individuals representing communities on the front lines of climate change. These opportunities include:²²

April 4, 2019: Generation Climate: Young Leaders Urge Climate Action Now

April 30, 2019: Solving the Climate Crisis: Drawing Down Carbon and Building Up the American Economy

May 22, 2019: Roundtable with Los Angeles Mayor Eric Garcetti

²⁰ H.Res.6, "Adopting the Rules of the House of Representatives for the One Hundred Sixteenth Congress, and for other purposes," Section 104(f), 116th Congress.

²¹ Select Committee on the Climate Crisis, "Climate Crisis Committee Requests Input on Climate Policy from Public and Key Stakeholders," press release, September 5, 2019.

²² Details for all hearings are available at <https://climatecrisis.house.gov/committee-activity/hearings>.

May 23, 2019: Creating a Climate Resilient America

June 13, 2019: Solving the Climate Crisis: Ramping Up Renewables

June 20, 2019: Roundtable on Electricity Transmission Infrastructure

June 26, 2019: Roundtable on Electricity Market Design

July 16, 2019: Solving the Climate Crisis: Cleaning Up Heavy Duty Vehicles, Protecting Communities

July 25, 2019: Creating a Climate Resilient America: Business Views on the Costs of the Climate Crisis

August 1, 2019: Colorado's Roadmap for Clean Energy Action: Lessons from State and Local Leaders (*Field Hearing in Boulder, CO*)

August 14, 2019: Roundtable on the Climate Crisis in the Great Lakes Region (*Chicago, IL*)

September 10, 2019: Solving the Climate Crisis: Manufacturing Jobs for America's Workers

September 18, 2019: Voices Leading the Next Generation on the Global Climate Crisis (*Joint Hearing with House Committee on Foreign Affairs*)

September 20, 2019: Roundtable on Nuclear Power

September 26, 2019: Solving the Climate Crisis: Reducing Industrial Emissions Through U.S. Innovation

October 17, 2019: Solving the Climate Crisis: Cleaner, Stronger Buildings

October 22, 2019: Solving the Climate Crisis: Natural Solutions to Cutting Pollution and Building Resilience

October 30, 2019: Solving the Climate Crisis: Opportunities in Agriculture

November 14, 2019: Member Day

November 20, 2019: Creating a Climate Resilient America: Reducing Risks and Costs

December 11, 2019: Creating a Climate Resilient America: Smart Finance for Strong Communities

February 5, 2020: Creating a Climate Resilient America: Overcoming the Health Risks of the Climate Crisis

February 13, 2020: Discussion with the National Congress of American Indians

Between February 2020 and the release of this report, the Select Committee met with and heard from experts to discuss the impact of the COVID-19 pandemic and economic slowdown on clean energy, climate resilience, and public health.²³

²³ See Select Committee on the Climate Crisis, "Select Committee Holds Bipartisan Briefing on Extreme Weather Threats Amid COVID-19 Pandemic," May 21, 2020; "Harvard Researchers Brief Committee Members On COVID-19, Air Pollution Study," April 21, 2020. Available at <https://climatecrisis.house.gov/news>.

THE CASE FOR CLIMATE ACTION

“By addressing the causes of climate change now, we can at once minimize risks and emerge stronger. Today we have the unique chance to create a future where things not only stabilize but actually get better. We can have more efficient and cheaper transportation resulting in less traffic; we can have cleaner air, supporting better health and enhancing the enjoyment of city life; and we can practice smarter use of natural resources, resulting in less pollution of land and water. Achieving the mindset needed to attain this improved environment would signal a maturation of humanity.”²⁴ – *Christiana Figueres, Former Executive Secretary of the UN Framework Convention on Climate Change*

“For me, the saddest thing about these recurring natural disasters that are exacerbated by climate change, is that the communities that are the most affected—like mine—are often the communities that have already been hit the hardest by all of society’s other problems. [...] You have communities that rely heavily on the farming industry just devastated by these storms, causing farmers, migrant workers and their families to lose income while the farms are underwater. And you have predominantly poor communities, black communities and housing projects that were built in the floodplains—because those were the only places they were allowed—that become completely submerged.”²⁵ – *Chris Suggs, Testimony at Select Committee Hearing Titled “Generation Climate: Young Leaders Urge Climate Action Now”*

The Challenge

According the Intergovernmental Panel on Climate Change (IPCC), human activities have caused approximately 1.0°C of global warming above pre-industrial levels, and the world is on track to reach 1.5°C of warming between 2030 and 2052 if it continues unabated.²⁶ More than half of all anthropogenic carbon dioxide emissions have occurred since 1990.²⁷

At 1.0°C of warming, the United States already is experiencing the harmful effects of unmitigated climate change. The *Fourth National Climate Assessment* concluded that “the impacts of climate change are intensifying across the country, and that climate-related threats to Americans’ physical, social, and economic well-being are rising.”²⁸ Looking globally, the *Fourth National Climate Assessment* warned:²⁹

High temperature extremes and heavy precipitation events are increasing. Glaciers and snow cover are shrinking, and sea ice is retreating. Seas are warming, rising, and becoming more

²⁴ Christiana Figueres and Tom Rivett-Carnac, *The Future We Choose: Surviving the Climate Crisis* (2020).

²⁵ Testimony of Chris Suggs, *Hearing on Generation Climate: Young Leaders Urge Climate Action Now*, Select Committee on the Climate Crisis, 116th Congress (April 4, 2019).

²⁶ Intergovernmental Panel on Climate Change, *Special Report on Global Warming of 1.5°C* (October 2018).

²⁷ Institute for European Environmental Policy, *Green Deal for All: How to Achieve Sustainability and Equity Between the People, Regions, Countries, and Generations of Europe in a Post-COVID-19 Era* (April 2020) at 23; See also Our World in Data, “Cumulative CO₂ emissions by world region, 1751 to 2017,” <https://ourworldindata.org/grapher/cumulative-co2-emissions-region?stackMode=absolute>. Accessed June 2020.

²⁸ U.S. Global Change Research Program (USGCRP), *Fourth National Climate Assessment* (2018) at 36.

²⁹ *Ibid.* at 37.

acidic, and marine species are moving to new locations toward cooler waters. Flooding is becoming more frequent along the U.S. coastline. Growing seasons are lengthening, and wildfires are increasing. These and many other changes are clear signs of a warming world.

In October 2018, IPCC released a report (the “1.5° report”) comparing the severity of climate-related impacts if the world allows the climate to warm beyond 1.5°C to 2°C above pre-industrial levels.³⁰ The IPCC found that this seemingly small amount of extra warming carries significant consequences. A world with 2°C of warming would experience more heat waves, heavy precipitation events, sea level rise, species loss, and ocean acidification and face a higher probability of drought.

To have a shot at limiting warming to 1.5°C and avoiding more severe impacts, the IPCC concluded that global net carbon dioxide emissions must fall by at least 45% from global 2010 levels by 2030 and reach net-zero by 2050.³¹ Hitting these targets will require a “rapid and far-reaching” transition across the economy that is “unprecedented in terms of scale.”³² At the same time, world leaders will need to invest in climate adaption and resilience to withstand the climate impacts already baked in at 1.5°C of warming. Such investments would save the United States \$6 trillion in avoided climate damages while the benefits globally would total tens of trillions of dollars.³³

In the United States, the existential threat posed by climate change demands a robust government response. Individuals and the private sector cannot achieve unprecedented pollution reductions on their own. Only through a coordinated national response can the United States deliver the urgent and systemic changes needed to avert the worst consequences of climate change, respond and adapt to the impacts we cannot avoid, and build a cleaner, healthier, more resilient economy that values workers and centers environmental justice.

The Economic Costs of Inaction

Climate change not only threatens our communities, ecosystems, and way of life but also poses risks to the nation’s economic vitality. The federal government faces fiscal exposure from climate risks in several areas, such as disaster aid programs that have to cover the rising number of natural disasters; federal insurance for property and crops that are increasingly vulnerable to climate change impacts; and the operation and management of federal property and lands that could be affected by a changing climate and more frequent extreme weather events. The federal budget, however, does not generally account for disaster assistance or the long-term impacts of climate change on existing federal infrastructure and programs.³⁴

Since 2005, the United States has experienced more than 150 billion-dollar events with more than \$1.1 trillion in economic losses, more than 7,500 deaths, and federal disaster assistance costs exceeding

³⁰ Intergovernmental Panel on Climate Change, *Special Report on Global Warming of 1.5°C* (October 2018).

³¹ Ibid. at 14.

³² Ibid. at 17.

³³ Marshall Burke, W. Matthew Davis, and Noah S. Diffenbaugh, “Large potential reduction in economic damages under UN mitigation targets,” *Nature* 557 (2018), 549–553.

³⁴ Government Accountability Office (GAO), Testimony before the Committee on the Budget, House of Representatives, *Climate Change Opportunities to Reduce Federal Fiscal Exposure* (June 11, 2019).

\$450 billion.³⁵ The climate crisis will only exacerbate these trends of heightened risk and cost, economic volatility, and falling property value in risky areas.³⁶ Families are already feeling the rising costs of extreme heat, flooding, and other climate impacts every day in their electric bills, insurance rates, and medical bills.

The Health and Environmental Justice Costs of Inaction

The 2018 *National Climate Assessment* describes how climate change already is affecting the health and well-being of the American people. The report notes that changes in “weather and climate can degrade air and water quality; affect the geographic range, seasonality, and intensity of transmission of infectious diseases through food, water, and disease-carrying vectors (such as mosquitoes and ticks); and increase stresses that affect mental health and well-being.”³⁷ These problems will continue to worsen as the climate warms.

Populations that are already vulnerable, including lower-income communities, communities of color, children, and the elderly, are more at risk to the health impacts of climate change. The 2018 *National Climate Assessment* agrees that health-related climate impacts will not be distributed equally, as changing weather patterns and other impacts “interact with demographic and socioeconomic factors, as well as underlying health trends, to influence the extent of the consequences of climate change for individuals and communities.”³⁸ In fact, climate change likely will exacerbate these entrenched inequalities, since vulnerable communities already have less capacity to prepare for and recover from extreme weather and climate-related events.³⁹

The most vulnerable communities often are those that face daily exposure to air and water pollution from industrial facilities. To solve the climate crisis in a just and equitable way, the United States must end the “perpetuation of systemic inequalities that have left communities of color, tribal communities, and low-income communities exposed to the highest levels of toxic pollution and the most burdened and affected by climate change.”⁴⁰

The National Security Costs of Inaction

Climate impacts threaten and can interfere with military infrastructure and operations while also fueling conflicts within and between nations. Extreme weather, food insecurity, and a melting Arctic operate as threat multipliers that can exacerbate sources of instability and conflict, such as ethnic tension and competition for resources.

³⁵ National Oceanic and Atmospheric Administration, National Centers for Environmental Information, *U.S. Billion-Dollar Weather and Climate Disasters* (2020).

³⁶ Galina B. Hale, Òscar Jordà, and Glenn D. Rudebusch, *The Economics of Climate Change: A First Fed Conference* (2019), <https://www.frbst.org/economic-research/publications/economic-letter/2019/december/economics-climate-change-first-fed-conference/>

³⁷ U.S. Global Change Research Program, *National Climate Assessment* (2018), Chapter 14. Available at https://nca2018.globalchange.gov/downloads/NCA4_Ch14_Human-Health_Full.pdf.

³⁸ Ibid.

³⁹ U.S. Global Change Research Program, *National Climate Assessment* (2018), Chapter 1. Available at <https://nca2018.globalchange.gov/chapter/1/>.

⁴⁰ Equitable and Just National Climate Platform, <https://ajustclimate.org/about.html>. Accessed June 2020.

U.S. military installations are already experiencing greater instances of floods, from coastal installations in the Hampton Roads region to inland bases affected by river flooding and flash flood events. In 2018, for example, Hurricane Michael caused \$3 billion in damage at Tyndall Air Force Base in Florida. One month earlier, the Marine Corps incurred an estimated \$3.6 billion in damage at Camp Lejeune from the impacts of Hurricane Florence.⁴¹ Droughts, heatwaves, wildfires, and desertification pose challenges to outdoor training and operations at installations in the arid West, and thawing permafrost threatens critical infrastructure for bases in the Arctic.⁴²

Climate impacts are already contributing to instability overseas as extreme conditions affect missions in the U.S. Africa and Indo-Pacific Commands.⁴³ Failure to act on the climate crisis would lead to higher levels of warming and expose all regions of the world to potentially catastrophic insecurity and destabilization that could cause a breakdown of economies, social systems, and political institutions in ways that are likely irreversible.⁴⁴

Faith Leaders' Call to Action on Climate Change

The climate crisis is not just a matter of science and economics; it is a moral issue. For years, faith leaders have urged action to address climate change and its detrimental effects on the well-being of people and the planet.

In 2015, Pope Francis issued his encyclical *Laudato si'* on care for our common home. Pope Francis wrote that the "climate is a common good, belonging to all and meant for all." He discussed the numerous challenges facing the world's people, including pollution and climate change, loss of biodiversity, and global inequality, and said that these "situations have caused sister earth, along with all the abandoned of our world, to cry out, pleading that we take another course." In urging global action, Pope Francis wrote that "responsibility for God's earth means that human beings, endowed with intelligence, must respect the laws of nature and the delicate equilibria existing between the creatures of this world."⁴⁵

Pope Francis is not alone. Faith leaders and organizations across religions and denominations have repeatedly called for action on climate change. At COP25 in Madrid in December 2019, the Interfaith Liaison Committee to the United Nations Framework Convention on Climate Change issued a declaration, stating: "As faith communities we seek to offer a positive and empowering voice of hope over fear, of compassion over indifference, and urgent and fair action as a moral obligation."⁴⁶ Melody

⁴¹ Government Accountability Office, GAO-19-157SP, *Limiting the Federal Government's Fiscal Exposure by Better Managing Climate Change Risks* (March 2019), "Federal Government as Property Owner."

https://www.gao.gov/highrisk/limiting_federal_government_fiscal_exposure/why_did_study.

⁴² National Security, Military and Intelligence Panel on Climate Change, Center for Climate and Security, *A Security Threat Assessment of Global Climate Change* (February 2020).

⁴³ Department of Defense, "Report on Effects of a Changing Climate to the Department of Defense," January 2019.

⁴⁴ National Security, Military and Intelligence Panel on Climate Change, Center for Climate and Security, *A Security Threat Assessment of Global Climate Change* (February 2020).

⁴⁵ The Vatican, *Encyclical Letter Laudato si'* of the Holy Father Francis, *On Care for Our Common Home* (May 2015), http://www.vatican.va/content/francesco/en/encyclicals/documents/papa-francesco_20150524_enciclica-laudato-si.html.

⁴⁶ World Council of Churches, "Faith communities demand climate justice - Interfaith Declaration on Climate Change for COP25 Madrid 2019," December 2019.

Zhang, co-chair of the Steering Committee for Young Evangelicals for Climate Action, testified before the Select Committee about the urgency of the climate crisis for the most vulnerable communities, citing Matthew 25:40, “whatever you do for the least of these brothers and sisters of mine, you do for me.”⁴⁷ The Jewish Climate Action Network notes that addressing “the human existential crisis of global climate change is our ultimate task of Tikkun Olam, repairing of the world, for which we are all responsible.”⁴⁸ The international humanitarian organization Islamic Relief has called for “bold and urgent action” on climate change, stating: “Our faith commands us to treat all things with care, compassion (rahmah) and utmost good (ihsan). We should look to the notion of harmony and ‘natural state’ (fitra) in respecting balance (mizan) and proportion (mikdar) in the systems of the universe. These notions provide an ethical dimension and a mandate for all humans to respect nature and all forms of life.”⁴⁹

Faith leaders and organizations have taken concrete action to respond to the climate crisis. For example, the Interfaith Power and Light network has helped more than 20,000 congregations in 40 states reduce carbon pollution with energy efficiency and renewable energy.⁵⁰ Dozens of faith organizations have signed the We Are Still In pledge to support the goals of the Paris Climate Agreement.⁵¹

Building on a Foundation of State and Local Leadership

On June 1, 2017, President Donald Trump announced plans to withdraw the United States from the Paris Climate Agreement. Quickly, cities and states across the country made a commitment to meet the agreement’s goals. As of December 2019, the coalition of states, cities, businesses, and others committed to climate action in support of the Paris Agreement—joined together as America’s Pledge—represented 68% of U.S. GDP, 65% of U.S. population, and 51% of U.S. emissions.⁵²

Numerous states have announced ambitious carbon pollution reduction goals, setting the groundwork for federal action. For example:

- **California** passed legislation requiring 100% zero-carbon electricity generation by 2045 and issued an executive order to achieve a carbon neutral economy by 2045.
- **Colorado** enacted legislation requiring 90% emissions reductions from 2005 levels by 2050 and established a goal to eliminate all emissions by 2050. Gov. Jared Polis announced a plan to reach 100% clean electricity by 2040.
- **District of Columbia** enacted legislation requiring 100% electricity generation from renewable energy by 2032.

⁴⁷ Testimony of Melody Zhang, *Hearing on Generation Climate: Young Leaders Urge Climate Action Now*, Select Committee on the Climate Crisis, 116th Congress (April 4, 2019).

⁴⁸ Jewish Climate Action Network, “Mission,” <https://www.jewishclimate.org/mission>. Accessed June 2020.

⁴⁹ Islamic Relief Worldwide, “After COP25, Islamic Relief Reissues Urgent Call to Cut Emissions,” December 2019, <https://www.islamic-relief.org/after-cop25-islamic-relief-reissues-urgent-call-to-cut-emissions/>.

⁵⁰ Interfaith Power & Light, “A Religious Response to Global Warming,” fast sheet, <https://www.interfaithpowerandlight.org/wp-content/uploads/2017/06/IPL-Fact-Sheet-June-2017.pdf>. Accessed June 2020.

⁵¹ We Are Still In, “Signatories,” <https://www.wearestillin.com/signatories>. Accessed June 2020.

⁵² America’s Pledge, *Accelerating America’s Pledge: Going All-In to Build a Prosperous, Low-Carbon Economy for the United States* (2019).

- **Hawaii** passed legislation requiring 100% electricity generation from renewable energy sources by 2045 and setting an economy-wide goal of carbon neutrality by 2045.
- **Maine** passed legislation establishing a goal of 100% electricity generation from renewable energy sources by 2050 and requiring economy-wide emissions reductions of 80% emissions reductions from 1990 levels by 2050.
- **Nevada** enacted legislation setting a non-binding goal of achieving 100% zero-carbon electricity generation by 2045.
- **New Jersey** enacted legislation to reduce emissions by 80% below 2006 levels by 2050.
- **New Mexico** enacted legislation requiring 100% zero-carbon electricity generation by 2045.
- **New York** enacted legislation requiring 100% zero-carbon electricity generation by 2040 and establishing an economy-wide goal of net-zero emissions by 2050.
- **Puerto Rico** enacted legislation requiring 100% electricity generation from renewable energy by 2050.
- **Rhode Island** issued an Executive Order establishing a goal of 100% electricity generation from renewable energy by 2030.
- **Virginia** enacted the Virginia Clean Economy Act, establishing a 100% carbon-free clean energy standard for Dominion VA Power (by 2045) and Appalachian Power (by 2050).
- **Washington State** enacted legislation requiring 100% carbon free electricity by 2045.

State leadership has been critical in continuing the transition to clean energy and in demonstrating to the international community that a significant percentage of the U.S. population remains committed to climate action. Congress should continue to respect state leadership and ensure that any federal climate policy preserves states' authority to adopt more ambitious measures to address climate change. States, local governments, tribes, and territories are also working to prepare for climate impacts and make their communities more resilient. For example:

- **More than 20 states and 1,500 communities** across the nation have adopted higher standards to reduce flood losses.⁵³
- **More than 50 tribes** have developed climate adaptation plans.⁵⁴ For example, the **Makah Tribe in Washington State** has engaged in a community-driven process to address climate threats to fisheries.
- **The City of Atlanta**'s Resilience Strategy promotes community resilience and environmental justice, driving projects like the Proctor Creek Greenway trail to address stormwater problems and connect isolated neighborhoods to schools and transit.
- **The City of Boston** established the Climate Ready Boston public-private partnership to protect infrastructure, property, and people from rising sea levels.
- **The City of Roseville, California**, achieved the highest rating under the National Flood Insurance Program (NFIP) Community Rating System for adopting robust floodplain management standards, resulting in a 45% discount on flood insurance premiums for the city's NFIP policyholders.
- **The Commonwealth of Virginia** adopted one of the nation's most robust coastal resilience master plans, including the Virginia Flood Risk Management Standard to help ensure the resilience of state-owned buildings against future sea level rise and flood conditions.

⁵³ Federal Emergency Management Agency, *NFIP Community Rating System Factsheet* (2020).

⁵⁴ University of Oregon, Tribal Climate Change Project, "Tribal Climate Change Guide: Adaptation Plans," <https://tribalclimateguide.uoregon.edu/adaptation-plans>. Accessed June 2020.

- **The State of Alabama** established the Strengthen Alabama Homes program to upgrade homes and provide insurance discounts for resilience against extreme winds and hurricanes.
- **Florida communities** are joining forces in regional resilience initiatives, including the Southeast Florida Climate Compact, the Tampa Bay Regional Resiliency Coalition, and the new statewide Florida Alliance for Climate & Resilience Collaboratives.
- **U.S. territories** are also advancing resilience. For example, **Puerto Rico** is working to leverage Hurricane Maria reconstruction investments to rebuild its infrastructure to better withstand future storms. **The Government of Guam**'s Reef Restoration and Intervention Partnership works to restore and protect the territory's coral reefs that help dissipate storm impacts.

State and local leaders need a strong federal partner to match their ambition with policies and initiatives that reward local innovation and leadership.

The Need for Congressional Action

As important as this bottom-up action is for climate progress, the United States—and the world—will not be able to reach net-zero by 2050 with a company-by-company, city-by-city, state-by-state approach. Given current policies, the Energy Information Administration forecasts that carbon dioxide emissions from U.S. energy use will stop declining and begin to grow again in the 2030s and that they will only be 4% below 2019 levels in 2050.⁵⁵ Carbon dioxide concentrations in the atmosphere in May 2020 were the highest monthly average value ever recorded.⁵⁶ During the COVID-19 pandemic, even though people around the world stayed at home and dramatically altered their regular lives, daily global carbon dioxide emissions only declined 17% in early April 2020 compared with 2019.⁵⁷ This underscores the need for systematic change to achieve net-zero emissions. The U.S. government must develop and implement a comprehensive strategy to squeeze pollution out of the economy while empowering workers, investing in communities, and guarding against the costly impacts of climate change.

Solving the climate crisis may be the challenge of our time, but it also presents a unique opportunity: to consciously reimagine the U.S. economy in a way that is healthier, more equitable, and prosperous. The United States—with all the ingenuity it has to offer—is in the best position to lead the world in responding to climate change while building a stronger, more resilient economy at home.

The President of the United States has significant authority under existing law to attain meaningful emissions reductions and help communities respond to the threats posed by climate change. A new president committed to climate action should explore all viable opportunities to tap existing statutory authority. Congress must also respond. Only through congressional action can the United States deploy the boldest suite of policies, achieve ambitious, urgent, and durable pollution reductions across the economy, and help the nation plan, adapt, and build resilience to climate impacts.

⁵⁵ U.S. Energy Information Administration (EIA), “EIA projects total U.S. energy-related CO₂ emissions to be relatively flat through 2050,” February 10, 2020, <https://www.eia.gov/todayinenergy/detail.php?id=42775#>.

⁵⁶ Andrew Freedman and Chris Mooney, “Earth’s carbon dioxide levels hit record high, despite coronavirus-related emissions drop,” *Washington Post*, June 4, 2020.

⁵⁷ C. Le Quéré, *et al.* Temporary reduction in daily global CO₂ emissions during the COVID-19 forced confinement. *Nat. Clim. Chang* (2020), <https://www.nature.com/articles/s41558-020-0797-x>.

THE CLIMATE CRISIS ACTION PLAN

In this report, the majority staff for the Select Committee lays out a framework for congressional action with a few key assumptions. First, the majority staff for the Select Committee offers these recommendations based on what is necessary to respond to and avoid the worst impacts of the climate crisis, not what is politically possible to pass through the House and Senate in the 116th Congress and get signed into law. Second, the majority staff assumes that a future president of the United States will be committed to using his or her existing statutory authorities to take executive action to cut carbon pollution and strengthen federal climate resilience policy. This report does not make recommendations for presidential action. Third, the policy recommendations in this report will have greater impact on pollution reduction and climate risk mitigation if adopted together rather than individually.

Key Components of the Climate Crisis Action Plan

To have a chance at limiting warming to 1.5°C and avoiding increasingly severe impacts from climate change, the Intergovernmental Panel on Climate Change (IPCC) concluded that global net anthropogenic carbon dioxide emissions must fall by at least 45% from global 2010 levels by 2030 and reach net-zero by 2050.⁵⁸ As the largest historic emitter of greenhouse gases, the United States must lead the world in confronting the climate crisis.

The Climate Crisis Action Plan establishes a goal of reaching net-zero greenhouse gas emissions economy-wide in the United States by no later than 2050; directs the president to set ambitious interim targets to meet or exceed progress toward that goal; and calls for achieving net-negative greenhouse gas emissions during the second half of the century. To achieve these goals, the Climate Crisis Action Plan will build an American economy that protects public health and values workers, families, communities, and current and future generations who are depending on Congress to tackle the existential threat of climate change in a just and equitable way. The Climate Crisis Action Plan calls for congressional action across the economy and is based on 12 key pillars.

- Pillar 1:** Invest in Infrastructure to Build a Just, Equitable, and Resilient Clean Energy Economy
- Pillar 2:** Drive Innovation and Deployment of Clean Energy and Deep Decarbonization Technologies
- Pillar 3:** Transform U.S. Industry and Expand Domestic Manufacturing of Clean Energy and Zero-Emission Technologies
- Pillar 4:** Break Down Barriers for Clean Energy Technologies
- Pillar 5:** Invest in America's Workers and Build a Fairer Economy

⁵⁸ Intergovernmental Panel on Climate Change, *Special Report on Global Warming of 1.5°C* (October 2018) at 14.

Pillar 6: Invest in Disproportionately Exposed Communities to Cut Pollution and Advance Environmental Justice

Pillar 7: Improve Public Health and Manage Climate Risks to Health Infrastructure

Pillar 8: Invest in American Agriculture for Climate Solutions

Pillar 9: Make U.S. Communities More Resilient to the Impacts of Climate Change

Pillar 10: Protect and Restore America's Lands, Waters, Ocean, and Wildlife

Pillar 11: Confront Climate Risks to America's National Security and Restore America's Leadership on the International Stage

Pillar 12: Strengthen America's Core Institutions to Facilitate Climate Action

Modeling Results: The Path to Achieving Net-Zero by No Later Than 2050

The recommendations offered in this report will set the country on a path to achieving net-zero emissions by 2050. The majority staff for the Select Committee previewed its draft policy recommendations with the non-partisan think tank Energy Innovation: Policy and Technology LLC ("Energy Innovation"). Energy Innovation used its open-source Energy Policy Simulator⁵⁹ to model the emissions reductions and co-benefits from implementing a subset of the Select Committee's recommendations. Some of the Climate Crisis Action Plan's recommendations that would help reduce greenhouse gas emissions are difficult to quantify. Energy Innovation only modeled recommendations that include quantifiable benchmarks or for which they could use existing literature to make reasonable assumptions about technology deployment and emissions reductions. See Appendix 1 for a detailed description of the methodology.

Key findings from the modeling include:

- The Climate Crisis Action Plan will set the country on a path to achieving net-zero greenhouse gas emissions by 2050. The subset of recommendations modeled would reduce net U.S. greenhouse gas emissions by 37% below 2010 levels in 2030 and 88% below 2010 levels in 2050.⁶⁰ The remaining 12% of emissions comes from the hardest to decarbonize sectors, such as heavy-duty and off-road transportation, industry, and agriculture.
- The Climate Crisis Action Plan will lead the United States to reach net-zero carbon dioxide emissions before 2050, in line with the IPCC's recommendations on emissions reductions needed to limit warming to 1.5°C.

⁵⁹ Energy Innovation: Policy and Technology LLC, Energy Policy Simulator, <https://www.energypolicy.solutions/>.

⁶⁰ This is equivalent to 40% below 2005 levels by 2030 and 89% below 2005 levels by 2050. We used the 2010 reference point because the IPCC uses 2010 levels when it describes near-term emissions reduction goals to limit warming to 1.5°.

- The Climate Crisis Action Plan would generate significant health benefits, avoiding an estimated 62,000 premature deaths annually by 2050, primarily by reducing fine particulate matter pollution.
- By 2050, the cumulative net present value of the estimated monetized annual health and climate benefits are equal to almost \$8 trillion (real 2018 U.S. dollars) at a 3% discount rate. In 2050 alone, the estimated monetized annual health and climate benefits of the policies exceed \$1 trillion (real 2018 U.S. dollars).
- Enacting a Clean Energy Standard to decarbonize the electricity sector, as recommended in this report, would create roughly 530,000 jobs annually.⁶¹

These emissions reductions should be considered a floor, not a ceiling, since Energy Innovation did not model all recommendations. For example, this report outlines principles for a federal carbon price, which would help achieve additional emissions reductions as a complement to other policies.

At the same time, the analysis confirms what experts have advised for years: eliminating greenhouse gas emissions economy-wide is a daunting task. As detailed in Appendix 1, industrial process emissions, heavy-duty and off-road transportation, and agricultural emissions are particularly challenging and account for the bulk of the remaining emissions in the system in 2050.

While we cannot predict which technologies will be widely deployed in 2050, we know how to create a policy environment today that will allow climate solutions to succeed tomorrow. Eliminating harmful emissions economy-wide by 2050 will require tackling the hardest-to-abate sectors with massive investments in research, development, and demonstration of climate solutions and moving quickly to implement this report’s broad portfolio of policy recommendations. Early action can set in motion virtuous cycles to accelerate learning by doing and cost reductions, allowing other technologies to emerge.

In the pages that follow, the majority staff for the Select Committee outlines the Climate Crisis Action Plan and offers policy recommendations that require ambitious action by every committee in the House of Representatives in partnership with continued leadership from state, local, tribal, and territorial governments, the private sector, and the broader public.

⁶¹ UC Berkeley Center for Environmental Public Policy, GridLab, and Energy Innovation: Policy and Technology LLC, 2035 Report: *Plummeting Solar, Wind, and Battery Costs Can Accelerate Our Clean Energy Future*, <https://www.2035report.com/>.

SET AN AMBITIOUS NATIONAL GOAL TO CUT CARBON POLLUTION

According to the Intergovernmental Panel on Climate Change (IPCC), human activities have caused approximately 1.0°C of global warming above pre-industrial levels, and the world is on track to reach 1.5°C of warming between 2030 and 2052 if it continues unabated.⁶² The IPCC has outlined a clear goal: to have a chance at limiting warming to 1.5°C above pre-industrial levels, the world needs to reduce net anthropogenic carbon dioxide emissions by at least 45% from global 2010 levels by 2030 and reach net-zero by 2050.⁶³

The United States currently is the second largest source of global greenhouse gas emissions, after China. Historically, however, the United States is the largest cumulative emitter of greenhouse gases, which linger in the atmosphere and continue to warm the planet.⁶⁴ As such, the United States has a responsibility to lead the global charge in meeting and aspiring to exceed these targets.

As a first step, Congress must establish a national goal of achieving net-zero greenhouse gas emissions by no later than 2050. To meet this goal, the United States needs to be solidly on a path to net-zero emissions by 2030. Congress should direct the President to set ambitious interim targets for 2030 and 2040 and frontload emissions reductions as much as possible.

In November 2019, Rep. A. Donald McEachin (D-VA) introduced the 100% Clean Economy Act of 2019 (H.R. 5221) with Reps. Deb Haaland (D-NM), Debbie Dingell (D-MI), Earl Blumenauer (D-OR), Paul Tonko (D-NY), Chellie Pingree (D-ME), and more than 150 original co-sponsors. This legislation sets a nationwide goal of achieving net-zero climate pollution across all sectors of the U.S. economy by 2050. In February 2020, Sen. Tom Carper, the top Democrat on the Senate Environment and Public Works Committee, and 33 Democratic senators introduced the Clean Economy Act of 2020 (S. 3269), which directs the Environmental Protection Agency to adopt and develop a plan to put the country on a pathway toward net-zero greenhouse gas emissions by no later than 2050.

When designing a national goal, the definition of ‘net-zero’ will be critical. The IPCC explains that net-zero carbon dioxide emissions are achieved when “anthropogenic CO₂ emissions are balanced globally by anthropogenic CO₂ removals over a specified period.”⁶⁵ Congress and a future administration will need to adapt this definition for the purpose of meeting a domestic goal for net-zero greenhouse gas emissions. To do so, federal policymakers should consult with scientists and a range of stakeholders, including environmental justice leaders, to ensure the definition of net-zero is based on sound science and reflects equity concerns.

The United States’ responsibility does not end in 2050, even if the world manages to limit warming to 1.5°C above pre-industrial levels. That level of warming remains dangerous, particularly for frontline and vulnerable populations, communities dependent on agricultural or coastal livelihoods, small

⁶² Intergovernmental Panel on Climate Change, *Special Report on Global Warming of 1.5°C* (October 2018).

⁶³ Ibid.

⁶⁴ Umair Irfan, “Why the US bears the most responsibility for climate change, in one chart,” *Vox.com*, Dec. 4, 2019.

⁶⁵ Intergovernmental Panel on Climate Change, *Special Report on Global Warming of 1.5°C* (October 2018).

island developing states, and least-developed countries.⁶⁶ The United States will need to develop a strategy for climate restoration; that is, continuing to lower the concentrations of carbon dioxide in the atmosphere to a safer level. Some scientists argue that the world needs to find a way back to the carbon concentrations of the mid-1980s to stabilize the climate.⁶⁷ The U.S. plan to achieve net-zero by 2050 needs to serve as an on-ramp to achieving net-negative emissions in the latter half of the century.

Given the short time frame to achieve deep pollution reductions, Congress and the President will need consistent and constant analysis of the country's progress toward meeting these 2030, 2040, and 2050 goals. Moreover, Congress and the President will need to understand and address any distributional impacts of policies to promote economy-wide decarbonization on low-income communities, communities of color, deindustrialized areas, and other vulnerable individuals and communities. For environmental justice communities, strategies to address climate change should alleviate the cumulative impacts of pollution they have experienced for decades.

Recommendation: Congress should pass legislation to:

- Establish a national goal of achieving net-zero greenhouse gas emissions by no later than 2050;
- Direct the President to set ambitious interim targets for 2030 and 2040 and frontload emissions reductions as much as possible;
- Develop a strategy for climate restoration and net-negative greenhouse gas emissions for the second half of the century; and
- Direct the National Academies of Science, Engineering, and Medicine to continually assess the country's progress toward meeting these climate goals; assess distributional impacts, including the impacts of climate policy on the cumulative effects of multiple pollution sources in environmental justice communities; and identify policy recommendations to remedy any unintended distributional impacts.

⁶⁶ Ibid.

⁶⁷ James Hansen et al., "Target Atmospheric CO₂: Where Should Humanity Aim?" 2 *Open Atmospheric Sci. J.* 217, 218 (2008).

INVEST IN INFRASTRUCTURE TO BUILD A JUST, EQUITABLE, AND RESILIENT CLEAN ENERGY ECONOMY

Infrastructure policy is climate policy. The infrastructure decisions the United States made decades ago—such as building coal-fired power plants and a transportation system that offers households few convenient alternatives to driving—reveal themselves in the country’s greenhouse gas emissions profile today. Similarly, the infrastructure decisions the United States makes from today onward will either help reduce the risks posed by climate change or make them worse.

The Intergovernmental Panel on Climate Change (IPCC) 1.5° report lays bare the infrastructure challenge:⁶⁸

Pathways limiting global warming to 1.5°C with no or limited overshoot would require rapid and far-reaching transitions in energy, land, urban and infrastructure (including transport and buildings), and industrial systems (high confidence). These systems transitions are unprecedented in terms of scale, but not necessarily in terms of speed, and imply deep emissions reductions in all sectors, a wide portfolio of mitigation options, and a significant upscaling of investments in those options.

To turn the tide on climate change, the United States needs to make different infrastructure choices than it has made in the past and do so at an enormous scale. The longer the U.S. government waits to make clean energy infrastructure investments, the harder it will be to limit warming. The IPCC warns that any delay increases the risk of cost-escalation, lock-in of carbon-intensive infrastructure, and stranded assets.⁶⁹

Since a certain amount of warming is already baked in, the U.S. government also needs to invest in making communities resilient to the impacts of climate change and improving communities’ ability to rebound after a climate-fueled disaster. The IPCC notes that “increasing investment in physical and social infrastructure is a key enabling condition to enhance the resilience and the adaptive capacities of societies.”⁷⁰

These massive infrastructure investments should benefit all communities. Too often, U.S. infrastructure policy has prioritized high-income communities over lower-income communities and neglected more rural parts of the country. Decisions to build a new highway or rail line near or even through a community of color often reflected and perpetuated societal racism.⁷¹ To avoid these outcomes, Congress must ensure the policymaking process values “the voices and positions of EJ frontline and fenceline communities.”⁷²

⁶⁸ Intergovernmental Panel on Climate Change, *Special Report on Global Warming of 1.5°C* (October 2018).

⁶⁹ Ibid.

⁷⁰ Ibid.

⁷¹ Emily Badger and Darla Cameron, “How railroads, highways and other man-made lines racially divide America’s cities,” *The Washington Post* (July 16, 2015).

⁷² Equitable and Just National Climate Platform, <https://ajustclimate.org/about.html>. Accessed June 2020.

Rebuilding America's infrastructure offers an opportunity to fix mistakes of the past by prioritizing clean energy; investing in communities that need it the most with the input of those communities; and creating millions of high-quality, good-paying jobs with strong worker protections. This section outlines legislative climate policy recommendations for key components of U.S. infrastructure: electricity, transportation, buildings, water, telecommunications, and oil and gas.

Build a Cleaner and More Resilient Electricity Sector

The electricity sector is the second-largest source of greenhouse gas emissions in the United States, accounting for 27% of U.S. emissions in 2018.⁷³ Once the largest source of emissions, the electricity sector has become less carbon-intensive as coal-fired power plants have closed and more renewables have come online. State and federal policies, such as renewable energy standards, and market forces, including the low price of natural gas in recent years, have driven this transformation.⁷⁴

Continued decarbonization of the electricity sector is the linchpin of any national strategy to achieve net-zero emissions economy-wide by no later than 2050. As detailed throughout this report, electrification of key end uses in the transportation, building, and industrial sectors will be essential to eliminating emissions from those sectors. Electrification only works as a decarbonization strategy, however, if the grid is as clean as possible as fast as possible.

Power sector carbon dioxide emissions are unlikely to fall as quickly and deeply as necessary without additional policy at the state and federal levels. The Energy Information Administration (EIA) predicts that power sector carbon dioxide emissions will fall by just 0.6% from 2019 levels by 2050 in the absence of additional policy action.⁷⁵ That is far off the path toward a net-zero electricity grid.

The 2020 COVID-19 pandemic slowed the deployment of renewable energy and energy efficiency projects, as mandatory business closures and social distancing requirements halted non-essential work. By the end of May 2020, more than 620,000 clean energy sector workers had lost their jobs due to the pandemic, representing more than 18% of the clean energy workforce.⁷⁶

The country has little time to waste to reinvigorate the clean energy sector and reduce pollution from electricity generation. A new president committed to climate action will be able to use existing authorities under the Clean Air Act and other statutes to clean up the grid. Congressional action remains imperative, however, to foster innovation and drive clean energy deployment and infrastructure investment, including modernization and expansion of the electricity grid; correct failures in electricity markets; and ensure that all communities, including low-income communities, communities of color, and deindustrialized communities, reap the benefits of a cleaner and more reliable and resilient power sector.

⁷³ Environmental Protection Agency (EPA), *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 – 2018* (2020).

⁷⁴ Energy Information Administration, "Carbon dioxide emissions from the U.S. power sector have declined 28% since 2005," *Today in Energy*, December 21, 2018, <https://www.eia.gov/todayinenergy/detail.php?id=37816>. Accessed June 2020.

⁷⁵ Energy Information Administration, *Annual Energy Outlook 2020*, "Table 18. Energy-Related Carbon Dioxide Emissions by Sector and Source," January 2020.

⁷⁶ E2, "Clean Energy & COVID-19 Crisis: May 2020 Unemployment Analysis," June 15, 2020, <https://e2.org/reports/clean-jobs-covid-economic-crisis-may-2020/>. Accessed June 2020.

Maximize Energy Efficiency and Deploy More Clean Energy

For its 1.5° report, the IPCC modeled global pathways to limit global warming to 1.5°C with no or limited overshoot. In those scenarios, the world significantly lowers its energy use through enhanced energy efficiency and expedites electrification of energy end use. In addition, in scenarios limiting warming to 1.5°C, renewables supply 70%–85% (interquartile range) of global electricity demand in 2050.⁷⁷ To meet a domestic goal of net-zero emissions by no later than 2050, the United States needs to follow suit. In this section, the majority staff for the Select Committee recommends Congress employ several tools to expedite the deployment of energy efficiency and clean energy technologies, including establishing national standards, extending and expanding tax incentives, and increasing investments in research and development and direct federal spending.

Several of the recommendations below call for extending, expanding, or creating new tax credits and offering “direct pay.” Clean energy project developers often have limited tax liability. With little or no tax liability, there is no immediate benefit to tax credits. Typically, project developers seek tax equity partners, often large financial institutions, that provide cash or working capital in exchange for tax benefits. Tax equity financing arrangements, however, involve substantial transaction costs. Allowing taxpayers to elect to treat an energy tax credit as a payment of tax would allow taxpayers with little or no income tax liability to receive energy tax credits as refunds. Thus, for taxpayers with little or no tax liability, tax credits are received directly by the taxpayer, as a payment from the Treasury (i.e., “direct pay”).

Federal clean energy tax policy already has launched new economic sectors and created thousands of jobs across the country. As a general matter, however, projects benefiting from clean energy tax incentives do not have to meet certain labor standards, such as Davis-Bacon prevailing wage requirements. The House Ways and Means Committee Democrats included a provision in Section 503 of their Growing Renewable Energy and Efficiency Now (GREEN) Act of 2020 (H.R. 7330) that provides additional tax benefits for certain renewable energy and efficiency projects and activities that adopt high-road labor practices and pay prevailing wages consistent with Davis-Bacon requirements for similar federal projects.

Congress should build on this work and continue to engage with stakeholders, including labor unions, clean energy companies, and advanced vehicle manufacturers, to identify a policy path to ensure that federal tax policy expedites the deployment of zero-carbon energy and vehicle technologies while continuing to create good-paying, high-quality jobs.

MAXIMIZE ENERGY EFFICIENCY

Energy efficiency is central to climate change policy for two primary reasons. First, energy efficiency policies flatten energy use and demand, and therefore emissions, while the electricity grid

⁷⁷ Intergovernmental Panel on Climate Change, *Special Report on Global Warming of 1.5°C* (October 2018).

decarbonizes. Second, energy efficiency is the most cost-effective option for reducing pollution.⁷⁸ Energy efficiency is also a strong driver of local jobs. In 2019, the number of energy efficiency jobs in the country reached 2.38 million.⁷⁹

This section outlines three policies to reduce electricity demand economy-wide. In the section of the report titled “Build and Upgrade Homes and Businesses to Maximize Energy Efficiency and Eliminate Emissions,” the majority staff for the Select Committee provides numerous additional recommendations to make new and existing buildings more energy-efficient.

Building Block: Establish National Energy Efficiency Targets

Twenty-six states require utilities to reduce energy use through energy efficiency resource standards (EERS), which direct utilities to meet a certain percentage of their electricity load or load growth through energy efficiency measures.⁸⁰ To comply with an EERS, a utility would typically establish energy efficiency programs for their customers, and some state laws allow compliance using market-based trading. A national policy would help consumers in every state achieve greater energy savings.

Sen. Tina Smith (D-MN) introduced the American Energy Efficiency Act of 2019 (S. 2288), which requires retail providers of electricity and natural gas to increase energy efficiency relative to their individual baselines and establishes uniform evaluation, measurement, and verification procedures. The legislation directs the Department of Energy (DOE) to set targets based on the maximum achievable level of cost-effective energy efficiency potential.

Recommendation: Congress should establish national energy efficiency targets based on the maximum achievable level of cost-effective energy efficiency potential. The term “cost-effective” should be defined to include the costs that greenhouse gas pollution imposes on society; it should not be read to require that every energy conservation initiative be cost-effective, and it should not discourage energy conservation investments in low-income communities. The policy should encourage increased electrification of the transportation, industrial, and building sectors. DOE should establish uniform and robust evaluation, measurement, and verification procedures. National energy efficiency targets should not preempt state initiatives; instead, they should allow states to set more ambitious standards.

Committee of Jurisdiction: Energy and Commerce

⁷⁸ National Action Plan for Energy Efficiency, *Energy Efficiency as a Low-Cost Resource for Achieving Carbon Emissions Reductions* (2009); McKinsey & Company, *Pathways to a Low-Carbon Economy: Version 2 of the Global Greenhouse Gas Abatement Cost Curve* (2009).

⁷⁹ Energy Futures Initiative and the National Association of State Energy Officials, *The 2020 U.S. Energy and Employment Report* (2020).

⁸⁰ American Council for an Energy-Efficient Economy, “Energy Efficiency Resource Standards,” <https://database.aceee.org/state/energy-efficiency-resource-standards>. Accessed June 2020.

Building Block: Reauthorize and Expand Funding for the Energy Efficiency and Conservation Block Grant Program and Expand It to Include Building Electrification

As established by the Energy Independence and Security Act of 2007 and funded through the Recovery Act, the Energy Efficiency and Conservation Block Grant Program (EECBG) enabled states, local governments, and tribes to develop innovative energy efficiency and renewable energy initiatives. The EECBG program generated lifetime cost savings of \$5.2 billion and created 63,000 jobs.⁸¹ Congress could reauthorize and improve the program to ensure funds reach communities that are most in need. EECBG funding for energy efficiency projects would drive down energy use, support compliance with a national energy efficiency standard, and facilitate displacement of polluting energy sources with zero-carbon sources.

Reps. Greg Stanton (D-AZ) and Marc Veasey (D-TX) introduced H.R. 2088 (“To amend the Energy Independence and Security Act of 2007 to reauthorize the Energy Efficiency and Conservation Block Grant Program”). This bill would reauthorize and increase funding authorization for the EECBG. In January 2020, Energy and Commerce Committee Chairman Frank Pallone (D-NJ), Chairman Paul Tonko (D-NY), and Chairman Bobby Rush (D-IL) introduced a discussion draft of the Climate Leadership and Environmental Action for our Nation’s (CLEAN) Future Act. Section 322 of the CLEAN Future Act discussion draft includes this provision.⁸² The House Democrats also included this provision in their infrastructure bill, Moving Forward Act (H.R. 2).⁸³

Recommendation: Congress should reauthorize and increase funding for the Energy Efficiency and Conservation Block Grant Program. Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant. Before allocating EECBG funds, states should identify the communities most in need of energy efficiency improvements, including low-income communities with high energy cost burdens, and distribute funds according to those needs. The program should allow cities to have financing flexibility. Tribes should be eligible to receive direct funding through the DOE Office of Indian Energy Policy and Programs.

Committee of Jurisdiction: Energy and Commerce

⁸¹ U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, “About the Energy Efficiency and Conservation Block Grant Program,” <https://www.energy.gov/eere/wipo/about-energy-efficiency-and-conservation-block-grant-program>. Accessed June 2020.

⁸² Title III, Section 322, Discussion Draft of Climate Leadership and Environmental Action for our Nation’s (CLEAN) Future Act, U.S. House Committee on Energy and Commerce, 116th Congress, available at <https://energycommerce.house.gov/newsroom/press-releases/ec-leaders-release-draft-clean-future-act-legislative-text-to-achieve-a-100>. (hereinafter “CLEAN Future Act discussion draft”)

⁸³ Unless otherwise noted, mentions of H.R. 2 refer to the version of the bill contained in Rules Committee Print 116-54, dated June 22, 2020. The House of Representatives was preparing to debate H.R. 2 when the Select Committee’s report went to print. The Rules Committee Print is available at <https://rules.house.gov/sites/democrats.rules.house.gov/files/BILLS-116HR2-RCP116-54.pdf> and will not reflect any amendments made to the bill after June 22, 2020.

Building Block: Increase the Energy Efficiency of Water Systems and Integrate Energy-Water Nexus Considerations into Federal Research

The energy-water nexus generally refers to the fact that the production of energy requires large volumes of water while the treatment and distribution of water is also dependent upon readily available energy. Delivering and treating water for residences, farms, and businesses demands considerable amounts of energy. For many city governments, drinking water and wastewater facilities account for up to 40% of their total energy consumption, a significant line item in already-stretched municipal budgets.⁸⁴ Water supplies are under stress in many parts of the United States, particularly in the southwest and western regions of the country. Climate change will further stress water systems by disrupting precipitation patterns and increasing the likelihood of drought.

A 2012 Government Accountability Office report recommended that DOE create an energy-water nexus program, with involvement from other federal agencies. DOE created the Energy-Water Nexus Crosscut Team in late 2012 and, in 2014, published *The Water-Energy Nexus: Challenges and Opportunities*, which outlined future energy-water nexus work for DOE.⁸⁵ However, the Trump administration eliminated coordinated support for this research area in 2017, leaving only a few related initiatives within DOE today, including the Water Security Grand Challenge and a funding opportunity announcement for an Energy-Water Desalination Hub.⁸⁶

Members of Congress have introduced bills to address issues related to the energy-water nexus. Rep. Jerry McNerney (D-CA) introduced the Smart Energy and Water Efficiency Act of 2019 (H.R. 2665). This bill directs DOE to establish a grant program for municipalities, water districts, and other water service providers that use advanced technology solutions to improve the energy and water efficiency of water, wastewater, and water reuse systems, prioritizing solutions that use automated systems or internet-connected technologies. In addition, Science, Space, and Technology Committee Chairwoman Eddie Bernice Johnson (D-TX) introduced the Energy and Water Research Integration Act of 2019 (H.R. 34), which requires DOE to integrate energy and water considerations into its research, development, demonstration, and commercial application programs. The House passed this bill in July 2019 on a voice vote. As of June 30, 2020, the Senate had not yet acted on this bill.

House Energy and Commerce Committee Chairman Frank Pallone (D-NJ) and Committee Democrats introduced the Leading Infrastructure for Tomorrow's (LIFT) America Act (H.R. 2741) in May 2019. Among other provisions, this bill extends and increases the authorization of appropriations for the Drinking Water State Revolving Fund and authorizes funding for sustainable infrastructure and environmental management of water systems. It also authorizes funding for a pilot program for energy-efficient water distribution systems.

⁸⁴ U.S. Environmental Protection Agency, "Energy Efficiency for Water Utilities," <https://www.epa.gov/sustainable-water-infrastructure/energy-efficiency-water-utilities>. Accessed June 2020.

⁸⁵ U.S. Department of Energy, "Energy-Water Nexus Crosscut," <https://www.energy.gov/energy-water-nexus-crosscut>. Accessed June 2020.

⁸⁶ U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, "Water Security Grand Challenge," <https://www.energy.gov/eere/water-security-grand-challenge>. Accessed June 2020; U.S. Department of Energy, "Department of Energy Announces \$100 Million Energy-Water Desalination Hub to Provide Secure and Affordable Water," <https://www.energy.gov/articles/department-energy-announces-100-million-energy-water-desalination-hub-provide-secure-and>. Accessed June 2020.

In September 2019, Rep. Dan Kildee (D-MI) introduced the Water Justice Act (H.R. 4033). This bill establishes a Water Efficiency and Conservation Block Grant Program to help states, local governments, interstate entities, and tribes reduce the energy required to pump, transport, treat, and heat water. It also finances and authorizes grant funding for water infrastructure projects, prioritizing communities at risk from climate change impacts.

Recommendation: Congress should establish a Water Efficiency and Conservation Block Grant Program to provide funding for states, local governments, tribes, territories, and water districts to use innovative strategies focused on the energy-water nexus. Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant. Before allocating Water Efficiency and Conservation Block Grant funds, states, local governments, tribes, and water districts should identify the communities most at risk of climate change impacts and most in need of water efficiency improvements, including low-income communities with high water and energy cost burdens, and distribute funds according to those needs.

Recommendation: Congress should require federal science agencies to incorporate energy-water nexus considerations in all relevant research activities, with a focus on reducing consumption of energy and water resources wherever practicable.

Committees of Jurisdiction: Energy and Commerce; Natural Resources; Transportation and Infrastructure; Science, Space, and Technology

EXPEDITE AND EXPAND DEPLOYMENT OF CLEAN AND RENEWABLE ENERGY SOURCES

Building Block: Pass a Clean Energy Standard to Achieve Net-Zero Emissions in the Electricity Sector by No Later Than 2040

Thirty states, the District of Columbia, and three territories have established a renewable portfolio standard, which requires electric utilities to procure a certain percentage of their electricity from renewable energy sources.⁸⁷ Several of these states also created a clean energy standard to achieve 100% carbon-free electricity over a longer period of time, which allows utilities to choose from a broader range of energy sources such as nuclear and fossil energy with carbon capture.⁸⁸ A national clean energy standard would provide market certainty for zero-carbon energy sources and would set the electricity sector on the ambitious path needed to achieve climate goals.

Assistant Speaker Ben Ray Luján (D-NM) and Sen. Tina Smith (D-MN) introduced the Clean Energy Standard Act of 2019 (H.R. 2597/S. 1359) establishing a national clean energy standard. The bill requires retail electricity providers to increase procurement of clean energy and incentivizes

⁸⁷ National Conference of State Legislatures, “State Renewable Portfolio Standards and Goals,” <https://www.ncsl.org/research/energy/renewable-portfolio-standards.aspx>. Accessed June 2020; Office of Virginia Governor Ralph Northam, “Governor Northam Signs Clean Energy Legislation,” Press Release, April 12, 2020, <https://www.governor.virginia.gov/newsroom/all-releases/2020/april/headline-856056-en.html>. Accessed June 2020.

⁸⁸ Center for Climate and Energy Solutions, *Clean Energy Standards: State and Federal Policy Options and Considerations* (2019).

deployment of innovative zero-emission technologies. Utilities may trade clean energy credits. The bill directs DOE to create a state energy efficiency, clean energy deployment, and electric consumer bill reduction program funded by alternative compliance payments and civil penalties for noncompliance. Anyone who applies to use the funds created by the clean energy standard would need to purchase American-made goods, products, and materials (“Buy American” requirements). The bill also directs DOE to enter into an agreement with the National Academies of Science, Engineering, and Medicine to evaluate methodologies to quantify lifecycle greenhouse gas emissions associated with generating electric energy and to determine the appropriate credit value for the clean energy standard.

Resources for the Future, a nonpartisan think tank, analyzed the Smith-Luján legislation and concluded that it would reduce greenhouse gas emissions in the electricity sector by 61% below business-as-usual levels in 2035, preventing the release of 10 billion metric tons of carbon dioxide equivalent between 2020 and 2035. The analysis also concluded that the legislation would prevent 30,000 premature deaths due to air pollution during that time period.⁸⁹

In this report, the majority staff for the Select Committee recommends a broad suite of policies, such as extending and expanding financial incentives for clean energy, moving toward a national supergrid, modernizing wholesale power markets, and investing aggressively in clean energy research and development. Complemented by these policies, a clean energy standard should be able to achieve even faster reductions in greenhouse gas emissions. A June 2020 report by the Goldman School of Public Policy at the University of California Berkeley concluded that strong clean energy and transmission policies can dependably deliver 90% carbon-free electricity nationwide by 2035, without increasing consumer electricity bills at all from today’s levels.⁹⁰ The infrastructure build-out needed to achieve a 90% carbon-free grid would support approximately 530,000 jobs each year and avoid at least \$1.2 trillion in cumulative health and environmental damages.⁹¹

In addition to ambition, a national clean energy standard needs to reflect principles of environmental justice. The framers of the Equitable and Just National Climate Platform note that to solve the climate crisis, “we will need to overcome past failures that have led us to the crisis conditions we face today. These past failures include the perpetuation of systemic inequalities that have left communities of color, tribal communities, and low-income communities exposed to the highest levels of toxic pollution and the most burdened and affected by climate change.”⁹² When designing a clean energy standard, Congress needs to consider how the design and implementation affects “legacy environmental and economic impacts on communities” and provide “support for climate research that assesses how policies affect overburdened and vulnerable communities.”⁹³

Recommendation: Congress should establish a national clean energy standard to achieve net-zero emissions in the electricity sector by no later than 2040. The clean energy standard should maximize near-term emissions reductions. It should cover zero-emission technologies, including wind, solar,

⁸⁹ Resources for the Future, *Projected Effects of the Clean Energy Standard Act of 2019* (2019).

⁹⁰ University of California Berkeley, Goldman School of Public Policy, *Plummeting Solar, Wind, and Battery Costs Can Accelerate our Clean Electricity Future* (June 2020).

⁹¹ Ibid.

⁹² Equitable and Just National Climate Platform (2019), <https://ajustclimate.org/index.html>. Accessed June 2020.

⁹³ Ibid.

energy storage, nuclear, hydropower, and fossil energy with carbon capture use and storage. The clean energy standard should consider the upstream emissions of all of these sources as part of an analysis of lifecycle greenhouse gas emissions. Any national clean energy standard should not preempt state regulation of retail electric utilities and tribal clean energy initiatives; instead, states and tribes should be allowed to set stricter standards.

Recommendation: Congress should direct DOE and the Environmental Protection Agency (EPA) to enter into an agreement with the National Academies of Science, Engineering, and Medicine to evaluate methodologies to quantify lifecycle greenhouse gas emissions associated with generating electricity and to determine the appropriate credit value for the clean energy standard.

Recommendation: Congress should direct DOE and EPA to enter into an agreement with the National Academies of Science, Engineering, and Medicine to assess the distributional impacts of the clean energy standard during implementation, including any impacts on environmental justice communities, and to develop recommendations to mitigate any unintended distributional impacts. The National Academies should conduct this assessment every five years.

Recommendation: Consistent with recommendations later in this section, Congress should direct the Federal Energy Regulatory Commission (FERC) to develop a comprehensive, long-range electric infrastructure strategy and implement such other rules and regulations as are necessary to achieve 100% net-zero electricity generation by no later than 2040 and support any state policies that establish more stringent standards.

Committees of Jurisdiction: Energy and Commerce; Science, Space, and Technology

Building Block: Extend the Production Tax Credit for Onshore Wind Energy Projects and Continue Investing in Research and Development

To achieve net-zero in the electricity sector by 2040 and economy-wide by 2050, deployment of wind energy must increase dramatically. The existing Section 45 Production Tax Credit (PTC) for onshore wind energy⁹⁴ has spurred \$143 billion investment in the United States over the last decade and helped reduce the cost of wind power by 70%.⁹⁵ In 2015, Congress agreed to phase out the PTC for onshore wind by 2020.⁹⁶ In December 2019, Congress passed, and the President signed, the Further Consolidated Appropriations Act, 2020 (H.R. 1865). This law extended the Section 45 PTC for onshore wind through 2021 at a 40% rate.⁹⁷

The COVID-19 pandemic slowed wind project development, permitting, and construction, leading to calls to extend the PTC for onshore wind. In June 2020, House Ways and Means Committee Democrats introduced the GREEN Act of 2020 (H.R. 7330), which the House Democrats included in the Moving Forward Act (H.R. 2). Section 101 of the GREEN Act would extend tax credits for a number of technologies. For onshore wind energy, the bill would preserve the Section 45 PTC at existing phaseout levels through 2020 but would extend the tax credit at 60% through 2025. Section 104 of the

⁹⁴ 26 U.S.C. § 45

⁹⁵ American Wind Energy Association, “Tax Policy,” <https://www.awea.org/policy-and-issues/tax-policy>. Accessed June 2020.

⁹⁶ P.L. 114-113, Section 301.

⁹⁷ Division Q, Section 127, Further Consolidated Appropriations Act, 2020.

bill would allow taxpayers to choose a lower tax credit value in exchange for the option to be refunded for any resulting overpayment (“direct pay”).

In addition to tax incentives to spur deployment, onshore wind energy technology would benefit from continued research and development to maximize its climate benefit. Reps. Paul Tonko (D-NY) and Jeff Fortenberry (R-NE) and Sens. Tina Smith (D-MN) and Susan Collins (R-ME) introduced the Wind Energy Research and Development Act of 2019 (H.R. 3609/S. 2660), which would reauthorize DOE research, development, and demonstration of onshore, offshore, and distributed wind technologies and grid integration. It would include a focus on reducing the soft costs of developing wind energy, such as permitting, construction, and grid integration. The Committee on Science, Space, and Technology passed this bill in July 2019.

Recommendation: Congress should extend the Section 45 PTC for wind energy. Congress should provide a direct pay option for clean energy tax credits.

Recommendation: Congress should reauthorize and expand DOE research, development, and demonstration of wind energy technologies.

Committees of Jurisdiction: Ways and Means; Science, Space, and Technology

Building Block: Create an Investment Tax Credit to Deploy More Offshore Wind Energy Projects and Continue Investing in Research and Development

Offshore wind energy along both coasts could provide electricity to major coastal cities. Despite the significant economic and environmental potential, however, the Section 48 Investment Tax Credit (ITC) for wind energy is scheduled to phase down before the offshore wind industry has had a chance to take off.⁹⁸

Multiple Members of Congress introduced bills to extend the ITC for offshore wind. Rep. Jim Langevin (D-RI) and Sens. Ed Markey (D-MA) and Sheldon Whitehouse (D-RI) introduced the Offshore Wind Incentives for New Development (WIND) Act (H.R. 3473/S. 1957), which would extend a 30% ITC for offshore wind energy through 2025. Rep. Bill Pascrell (D-NJ) and Sen. Tom Carper (D-DE) also introduced the Incentivizing Offshore Wind Power Act (H.R. 4887/S. 1988), which would extend the ITC for the first 3,000 MW of offshore wind projects.

Section 105 of the Ways and Means Committee Democrats’ GREEN Act of 2020 (H.R. 7330) would extend the ITC for offshore wind facilities until 2025 or until national offshore wind capacity reaches 3,000 MW above the national capacity in 2021. Section 104 of the GREEN Act would allow taxpayers to choose a lower tax credit value in exchange for the option to be refunded for any resulting overpayment (“direct pay”).

Select Committee Democrats have expressed support for offering a direct pay option but also extending construction and continuity safe harbor deadlines applicable under clean energy tax

⁹⁸ 26 U.S.C. § 48.

credits.⁹⁹ These deadlines determine which projects qualify for tax credits. In May 2020, the Internal Revenue Service provided some tax relief, primarily for wind projects. Offshore wind projects would benefit from further extensions of continuity safe harbor deadlines.

Offshore wind technology would also benefit from additional research and development. Reps. Paul Tonko (D-NY) and Jeff Fortenberry (R-NE) and Sens. Tina Smith (D-MN) and Susan Collins (R-ME) introduced the Wind Energy Research and Development Act of 2019 (H.R. 3609/S. 2660), which would reauthorize DOE research, development, and demonstration of onshore, offshore, and distributed wind technologies and grid integration. It would include a focus on demonstration projects for advanced offshore wind technologies, such as floating foundations. The Committee on Science, Space, and Technology approved this bill in July 2019.

In the report section titled “Protect and Restore Ocean and Wetland Ecosystems for Climate Mitigation and Resilience,” the majority staff for the Select Committee outlines policy recommendations to ensure that deployment of offshore wind projects protects the integrity of the marine environment, including sensitive species.

Recommendation: Congress should provide a long-term extension of the Section 48 ITC for offshore wind energy projects. Congress should provide a direct pay option for clean energy tax credits.

Recommendation: Congress should reauthorize and expand DOE research, development, and demonstration of offshore wind energy technologies.

Committees of Jurisdiction: Science, Space, and Technology; Ways and Means

Building Block: Extend the Investment Tax Credit for Solar Energy Production and Continue Investing in Research and Development

To achieve net-zero in the electricity sector by 2040 and economy-wide by 2050, deployment of solar energy must increase dramatically. The Section 48 ITC for solar technologies is scheduled to phase out even as the policy landscape has changed with the revocation of the Clean Power Plan, the imposition of solar tariffs, and the COVID-19 pandemic.

Rep. Joe Neguse (D-CO) introduced the Solar Expansion of Distributed Generation Exponentially (EDGE) Act (H.R. 476), which would increase the Section 48 ITC for solar property less than 20 kW and increase the Section 25D tax credit for residential solar energy projects. Rep. Charlie Crist (D-FL) introduced the Sunshine Forever Act (H.R. 2356), which would extend the Section 48 solar energy tax credit for 10 years.

Section 102 of the GREEN Act of 2020 (H.R. 7330) would extend the ITC for solar energy property and fiber-optic solar equipment at 30% through 2025 and then phase it down thereafter. Section 104 of the bill would allow taxpayers to choose a lower tax credit value in exchange for the option to be refunded for any resulting overpayment (“direct pay”).

⁹⁹ House Select Committee on the Climate Crisis, “Chair Castor, Committee Members Urge Climate Action in Coronavirus Package,” press release, March 20, 2020.

Select Committee Democrats have expressed support for offering a direct pay option but also extending construction and continuity safe harbor deadlines applicable under clean energy tax credits.¹⁰⁰ These deadlines determine which projects qualify for tax credits. In May 2020, the Internal Revenue Service provided some tax relief, primarily for wind projects.¹⁰¹ Solar projects would benefit from additional extensions of continuity safe harbor deadlines because the ITC, unlike the PTC, has a statutory placed-in-service deadline that can only be changed through legislative action.

In addition to tax incentives to spur deployment, solar energy technology would benefit from continued research and development to maximize its climate benefit. Rep. Ben McAdams (D-UT) introduced the Solar Energy Research and Development Act of 2019 (H.R. 3597), which would reauthorize DOE research, development, and demonstration of solar energy technologies, including photovoltaics, concentrating solar power, solar heating and cooling, and grid integration. The Committee on Science, Space, and Technology passed this bill in July 2019.

Recommendation: Congress should extend the Section 48 ITC for solar energy generation. Congress should provide a direct pay option for clean energy tax credits.

Recommendation: Congress should reauthorize and expand DOE research, development, and demonstration of solar energy technologies.

Committees of Jurisdiction: Ways and Means; Science, Space, and Technology

Building Block: Extend and Expand Tax Incentives for Qualified Hydropower, Small Wind Energy, and Other Renewable Energy Technologies

Qualified hydropower, small wind, and landfill gas are additional renewable energy technologies that could expand the portfolio of tools to help decarbonize the electricity, transportation, and building sectors.

The House Ways and Means Committee's GREEN Act of 2020 (H.R. 7330) would extend the PTC and ITC for a number of these technologies. Section 101 of the bill would extend the PTC through 2025 for qualified hydropower and landfill gas. Section 102 of the bill would also extend the ITC for fuel cell property, microturbine property, combined heat and power (CHP) property, and small wind energy property at 30% through 2025 and then phase it down over two years. In addition, the bill would expand the ITC to include qualified biogas property and linear generators, using the same phase-down schedule as for the other technologies. Section 104 of the bill would allow taxpayers to choose a lower tax credit value in exchange for the option to be refunded for any resulting overpayment ("direct pay").

Recommendation: Congress should extend the PTC for qualified hydropower and landfill gas. Congress should extend the ITC for fuel cell property, microturbine property, CHP property, and small

¹⁰⁰ House Select Committee on the Climate Crisis, "Chair Castor, Committee Members Urge Climate Action in Coronavirus Package," press release, Mar. 20, 2020.

¹⁰¹ Internal Revenue Service, "Treasury, IRS Provide Safe Harbor for Taxpayers that Develop Renewable Energy Projects," press release, May 27, 2020."

wind energy property and expand the ITC to include qualified biogas property and linear generators. Congress should provide a direct pay option for clean energy tax credits.

Committee of Jurisdiction: Ways and Means

Building Block: Deploy More Geothermal Energy for Electricity Generation

Geothermal heat radiates from the Earth's core and can be harnessed to provide zero-carbon electricity as well as energy to heat and cool buildings. According to DOE, the United States could install as much as 60 GW of geothermal energy capacity by 2050, and geothermal heat pumps could provide heating and cooling for as many as 28 million households.¹⁰² To achieve that potential, however, the U.S. government needs to invest in “improving the tools, technologies, and methodologies used to explore, discover, access, and manage geothermal resources” to reduce costs and risks associated with geothermal energy projects.¹⁰³

Rep. Steven Horsford (D-NV) introduced the Geothermal Energy Opportunity (GEO) Act of 2019 (H.R. 5154), which would make geothermal energy eligible for a 30% ITC. House Ways and Means Committee Democrats included this provision in Section 102 of the GREEN Act of 2020 (H.R. 7330). Section 101 of the GREEN Act would extend the PTC for geothermal energy through 2020, after which it would be eligible for the higher ITC. Section 104 of the GREEN Act would allow taxpayers to choose a lower tax credit value in exchange for the option to be refunded for any resulting overpayment (“direct pay”).

Rep. Frank Lucas (R-OK) and Chairwoman Eddie Bernice Johnson introduced the Advanced Geothermal Research and Development Act of 2019 (H.R. 5374), which would reauthorize the DOE’s research, development, and demonstration activities on geothermal energy. The Committee on Science, Space, and Technology approved this bill in February 2020.

In the section of the report titled “Build and Upgrade Homes and Businesses to Maximize Energy Efficiency and Eliminate Emissions,” the majority staff for the Select Committee outlines recommendations for increasing the use of geothermal energy in buildings.

Recommendation: Congress should make geothermal energy eligible for a higher ITC and extend the PTC for geothermal energy until it is eligible for a higher PTC. Congress should provide a direct pay option for clean energy tax credits.

Recommendation: Congress should reauthorize and expand DOE research, development, and demonstration of geothermal energy technologies.

Committees of Jurisdiction: Ways and Means; Science, Space, and Technology

¹⁰² U.S. Department of Energy, *GeoVision: Harnessing the Heat Beneath Our Feet* (2019).

¹⁰³ Ibid.

Building Block: Reauthorize Incentives for Existing Hydropower

Hydropower is a zero-carbon resource that accounted for 6.6% of U.S. electricity generation in 2019.¹⁰⁴ The United States is home to 80,000 dams, but only 3% generate electricity, and many are in need of modernization to maximize efficiency.¹⁰⁵

Rep. David McKinley (R-WV), Chairman Paul Tonko (D-NY), Rep. David Loebsack (D-IA), and others introduced the Reliable Investment in Vital Energy Reauthorization (RIVER) Act (H.R. 3361) to reauthorize Sections 242 and 243 of the Energy Policy Act of 2005. These provisions provide incentive payments to make efficiency improvements at existing hydropower facilities or to retrofit existing dams and river conduits with turbines or other devices to generate electricity. Title II, Subtitle E, Section 243 of the Energy and Commerce Committee Democrats' CLEAN Future Act also reauthorizes Sections 242 and 243 of the Energy Policy Act of 2005 and expands eligibility to hydropower facilities at existing dams with generating capacities of 10 MW or less.¹⁰⁶ The House Democrats included the reauthorization of Section 242 in Section 33171 of their infrastructure bill, the Moving Forward Act (H.R. 2).

Recommendation: Congress should reauthorize Sections 242 and 243 of the Energy Policy Act of 2005 to incentivize production and efficiency improvements at hydropower facilities. Hydropower projects should comply with all relevant environmental statutes, including the Endangered Species Act, and should operate in a way that does not harm fisheries or threaten recreational, tribal, and commercial fishing.

Committee of Jurisdiction: Energy and Commerce

Building Block: Research and Deploy Marine and Hydrokinetic Energy

Waves, tides, and currents contain energy that can be captured and converted to electricity.¹⁰⁷ Marine and hydrokinetic technologies are not as well-developed or well-supported as other forms of renewable energy. In the United States, no commercial-scale wave energy projects are operational. There is one operational tidal pilot project in Cobscook Bay, Maine.

The PTC for marine and hydrokinetic renewable energy facilities expired at the end of 2017. In December 2019, Congress passed, and the President signed, the Further Consolidated Appropriations Act, 2020 (H.R. 1865), which extended the PTC for marine and hydrokinetic energy resources through 2021.¹⁰⁸ Section 101 of the GREEN Act of 2020 (H.R. 7330) would extend the PTC for marine and hydrokinetic renewable energy facilities through 2025. Section 104 of the bill would allow taxpayers to choose a lower tax credit value in exchange for the option to be refunded for any resulting overpayment ("direct pay").

¹⁰⁴ Energy Information Administration, Electricity Data Browser, "Net generation, United States, All Sectors," <https://www.eia.gov/electricity/data/browser/>. Accessed June 2020.

¹⁰⁵ National Hydropower Association, "Converting Non-Powered Dams," <https://www.hydro.org/waterpower/converting-non-powered-dams/>, and "Modernizing," <https://www.hydro.org/waterpower/modernizing/>. Accessed June 2020.

¹⁰⁶ Title II, Section 243, CLEAN Future Act discussion draft.

¹⁰⁷ U.S. Department of Energy, *Powering the Blue Economy: Exploring Opportunities for Marine Renewable Energy in Maritime Markets* (2019).

¹⁰⁸ Division Q, Section 127, Further Consolidated Appropriations Act, 2020.

Despite the need for deeper work on marine and hydrokinetic energy, DOE's Water Power Technologies Office receives relatively little funding compared with other programs in the Office of Energy Efficiency and Renewable Energy (EERE). Rep. Suzanne Bonamici (D-OR) introduced the Water Power Research and Development Act (H.R. 6084) to reauthorize DOE's research, development, demonstration, and commercialization activities of water power technologies, including marine energy. The bill reauthorizes funding for existing and new National Marine Energy Centers. Similarly, Reps. Ted Deutch (D-FL) and Suzanne Bonamici (D-OR) introduced the Marine Energy Research and Development Act of 2019 (H.R. 3203), which would also reauthorize funding for National Marine Energy Centers.

Recommendation: Before it expires in 2021, Congress should pass a longer-term extension of the PTC for marine and hydrokinetic energy resources to provide greater certainty for potential investors. Congress should provide a direct pay option for clean energy tax credits. In the section of the report titled "Protect and Restore Ocean and Wetland Ecosystems for Climate Mitigation and Resilience," the majority staff for the Select Committee outlines policy recommendations to ensure that deployment of marine and hydrokinetic energy infrastructure protects the marine environment, including sensitive species.

Recommendation: Congress should expand research, development, demonstration, and deployment of marine and hydrokinetic energy by expanding funding for DOE's Water Power Technologies Office.

Committees of Jurisdiction: Science, Space, and Technology; Ways and Means

Building Block: Ensure That Utilities Provide Qualifying Facilities with Fair Contract Terms

Congress enacted the Public Utility Regulatory Policies Act (PURPA) to expand competition and reduce reliance on fossil fuels.¹⁰⁹ It requires utilities to purchase electricity from small Qualifying Facilities that have cogeneration or renewable energy projects. In states with regulated markets or that lack clean energy policies, PURPA has been a significant driver of renewable energy development. FERC establishes applicable rules, and states are required to implement them. This program helps keep electricity rates low and diversifies energy generation, which reduces risks for consumers. The Federal Power Act allows utilities to opt out of this program if Qualifying Facilities have nondiscriminatory access to wholesale power markets.

Stakeholders have raised several concerns about PURPA implementation, such as the need to improve avoided cost calculations and the need for a citizen suit provision to help ensure that states implement federal rules. They also raised concerns about a notice of proposed rulemaking in which FERC proposes to find that all Qualifying Facilities with a net capacity of greater than 1 MW have nondiscriminatory access to wholesale power markets in all Regional Transmission Organizations (RTOs) and non-RTOs, which would greatly limit the application of PURPA.¹¹⁰

¹⁰⁹ Federal Energy Regulatory Commission, "*Dissent in Part of Commissioner Richard Glick Regarding FERC's Notice of Proposed Rulemaking to Update PURPA Regulations*" (Sep. 19, 2019).

¹¹⁰ Federal Energy Regulatory Commission, *Notice of Proposed Rulemaking: Implementation Issues Under the Public Utility Regulatory Policies Act of 1978*, 168 FERC ¶ 61, 184 (Sep. 19, 2019).

The Energy and Commerce Committee's discussion draft of the CLEAN Future Act would amend PURPA to direct FERC to require that Qualifying Facilities have the option to enter a fixed-price contract whose term is at least as long as the term on which the incumbent utility recovers investments in new generation, whether self-built or in the form of a long-term power purchase agreement.¹¹¹

Recommendation: Congress should direct FERC to require that Qualifying Facilities have the option to enter a fixed-price contract whose term is at least as long as the term on which the incumbent utility recovers investments in new generation, whether self-built or in the form of a long-term power purchase agreement.

Committee of Jurisdiction: Energy and Commerce

Address the Potential and Risks of Nuclear Energy Technologies

Nuclear power is a zero-carbon source of electricity that made up 20% of the nation's electricity generation in 2019 and more than half of all zero-carbon electricity.¹¹² The nuclear power sector supported more than 70,000 jobs in the United States in 2019.¹¹³

Above, the majority staff for the Select Committee recommends that Congress establish a federal clean energy standard that would allow electricity generated from existing nuclear power plants to qualify for credits. Nuclear power plants, however, are not pollution-free. They generate radioactive waste that lasts for thousands of years and for which the United States has not developed a permanent disposal solution.

This section offers recommendations to ensure the safety and continued operation of the existing nuclear fleet and invest in the next generation of nuclear energy technologies.

Building Block: Ensure the Safe and Continued Operation of Existing Nuclear Power Plants

America's nuclear fleet is aging; the average U.S. commercial nuclear reactor is 38 years old.¹¹⁴ The Nuclear Regulatory Commission (NRC) licenses nuclear reactors for 40 years but can approve 20-year extensions and "subsequent license renewals" for an additional 20 years. NRC has approved a subsequent license renewal—that is, granted permission for the reactor to operate for a total of 80 years—to two units at the Turkey Point Nuclear Plant in Florida and two units at the Peach Bottom Atomic Power Station in Pennsylvania. One additional nuclear power facility—Surry in Virginia—has submitted an application for a subsequent license renewal.¹¹⁵

¹¹¹ Title II, Section 224, CLEAN Future Act discussion draft.

¹¹² Energy Information Administration, "Nuclear Explained: U.S. Nuclear Industry," <https://www.eia.gov/energyexplained/nuclear/us-nuclear-industry.php>. Accessed June 2020.

¹¹³ Energy Futures Initiative and the National Association of State Energy Officials, *The 2020 U.S. Energy and Employment Report* (2020).

¹¹⁴ Energy Information Administration, "Frequently Asked Questions: How old are U.S. nuclear power plants, and when was the newest one built?" December 26, 2019, <https://www.eia.gov/tools/faqs/faq.php?id=228&t=21>. Accessed June 2020.

¹¹⁵ Nuclear Regulatory Commission, "Status of Subsequent License Renewal Applications," <https://www.nrc.gov/reactors/operating/licensing/renewal/subsequent-license-renewal.html>. Accessed June 2020.

As these nuclear reactors age, NRC needs to increase its vigilance to ensure safe operations. In 2019, however, NRC began considering changes to its Reactor Oversight Process, which is NRC's "program to inspect, measure, and assess the safety and security performance of operating commercial nuclear power plants."¹¹⁶ House Energy and Commerce Committee Chairman Frank Pallone, Jr. (D-NJ), House Energy and Commerce Subcommittee on Energy Chairman Bobby Rush (D-IL), House Appropriations Committee Chairwoman Nita M. Lowey (D-NY), and House Appropriations Subcommittee on Energy and Water Development and Related Agencies Chairwoman Marcy Kaptur (D-OH) sent a letter to NRC Chairman Kristine Svinicki expressing concern that these changes would weaken safety oversight at a critical time for the industry.¹¹⁷ In addition, Reps. Mike Levin (D-CA), Andy Kim (D-CA), and Doris Matsui (D-CA) led a letter to NRC Chairman Kristine Svinicki highlighting concerns with proposed major cuts to inspections of Independent Spent Fuel Storage Installation pads.¹¹⁸

Moreover, if regulators maintain a strong inspection program, continued and new funding for federal research could further improve the climate benefits and safety of nuclear power plants currently in operation. Rep. Conor Lamb (D-PA) introduced the Nuclear Energy Research and Development Act (H.R. 6097), which would reauthorize a DOE sustainability program for existing light water reactors that focuses on improving their reliability, capacity, safety, physical security, operations and maintenance, ability to operate flexibly, environmental impacts, and resilience. The bill would also reauthorize DOE's used fuel research program to develop innovative solutions for spent nuclear fuel.

Recommendation: Congress should direct the NRC to increase inspections at aging plants and maintain a strong Reactor Oversight Process.

Recommendation: Congress should direct the NRC to use its existing authority under the National Environmental Policy Act (NEPA) to conduct a rigorous climate assessment of any nuclear reactors seeking license renewals, including thorough review of vulnerabilities to potential climate impacts.

Recommendation: Congress should strengthen DOE's sustainability program for existing light water reactors to improve their reliability and safety.

Committees of Jurisdiction: Energy and Commerce; Science, Space, and Technology

Building Block: Support Research and Development for Next-Generation Nuclear Technologies

Next-generation nuclear technologies could be a promising source of zero-carbon electricity, but many challenges remain, including safety, proliferation risks, and cost.

Small modular nuclear reactors (SMRs), by their design, limit complexity for construction and permitting and allow for incremental investments, which can reduce the costs of capital and financial

¹¹⁶ Nuclear Regulatory Commission, "Reactor Oversight Process (ROP)," <https://www.nrc.gov/reactors/operating/oversight.html>. Accessed June 2020.

¹¹⁷ House Committee on Energy and Commerce, "House Democrats Push Back Against Proposed Changes to Nuclear Regulatory Commission's Reactor Oversight Process," July 15, 2019, <https://energycommerce.house.gov/newsroom/press-releases/house-democrats-push-back-against-proposed-changes-to-nuclear-regulatory>.

¹¹⁸ Office of Rep. Mike Levin (D-CA), "Reps. Mike Levin, Andy Kim, and Doris Matsui Lead Congressional Letter Opposing Proposed Inspection Cuts to Nuclear Waste Storage, January 9, 2020, <https://mikelevin.house.gov/media/press-releases/reps-mike-levin-andy-kim-and-doris-matsui-lead-congressional-letter-opposing>.

risks. SMRs using existing water-cooled technologies are closer to commercial deployment than other advanced nuclear technologies. Some industrial sector companies see the potential for deployment of SMRs to provide process heat and help reduce industrial sector emissions.

Rep. Elaine Luria (D-VA) introduced the Nuclear Energy Leadership Act (H.R. 3306), which directs DOE to conduct several demonstration projects of first-of-a-kind advanced nuclear technologies. It also directs DOE to develop a pilot program for a long-term power purchase agreement for federal agencies for first-of-a-kind or early deployment nuclear power technologies, such as SMRs, that can provide power to high-value assets for national security purposes. The Energy and Commerce Committee's discussion draft of the CLEAN Future Act also includes this pilot program.¹¹⁹ An alternative strategy to deploy first-of-a-kind nuclear power technologies, such as SMRs, could be to provide federal financing, loan guarantees, or other forms of federal credit.

SMRs and other next-generation nuclear technologies would provide zero-carbon electricity but pose potential safety hazards, including radiological release, waste disposal, and potential proliferation. The NRC will need to play an active oversight role for these technologies. In December 2019, however, the NRC proposed a rule to weaken emergency planning for SMRs and non-light-water reactors.¹²⁰ Commissioner Jeff Baran called this proposed rule a "radical departure from more than 40 years of radiological emergency planning."¹²¹

Recommendation: Congress should direct DOE to provide support for first-of-a-kind or early deployment nuclear power technologies, such as small modular reactors, through R&D, federal financing, loan guarantees, other types of federal credit, or a pilot program for a long-term power purchase agreement for federal agencies, provided the technology meets high standards of safety, including cybersecurity, and minimizes proliferation risks.

Recommendation: Congress should direct the NRC to maintain stringent safety and emergency planning requirements for SMRs and other emerging nuclear technologies.

Committees of Jurisdiction: Science, Space, and Technology; Energy and Commerce

Building Block: Develop a Path Forward on Nuclear Waste

While nuclear energy is a zero-carbon technology, nuclear power plants generate radioactive waste that remains lethal for thousands of years. To date, the U.S. government has failed to produce a solution for the safe, long-term disposal of spent nuclear fuel and high-level waste currently stored at operating and decommissioned nuclear power plants across the country.

The primary challenge in siting a deep geologic nuclear waste repository, such as Yucca Mountain, is obtaining local consent. One potential solution is giving states more oversight authority over spent

¹¹⁹ Title II, Section 245, CLEAN Future Act discussion draft.

¹²⁰ Nuclear Regulatory Commission, "Proposed Rule: Emergency Preparedness for Small Modular Reactors and Other New Technologies," SECY-18-0103, December 17, 2019, <https://www.nrc.gov/docs/ML1935/ML19351C728.pdf>.

¹²¹ Commissioner Jeff Baran, Comments on SECY-18-0103, "Proposed Rule: Emergency Preparedness for Small Modular Reactors and Other New Technologies," November 14, 2019, <https://www.nrc.gov/docs/ML1935/ML19350A748.pdf>.

fuel and high-level waste by amending the Atomic Energy Act to remove exemptions from environmental laws such as the Resource Conservation and Recovery Act for radioactive materials, while maintaining federal minimum standards.¹²² More work needs to be done, however, to analyze the implications of such a significant change in environmental law for state and local governments and tribes.

As Congress continues to grapple with legislative solutions for long-term storage, Rep. Mike Levin (D-CA) introduced the Spent Fuel Prioritization Act of 2019 (H.R. 2995), which would direct DOE to prioritize accepting high-level radioactive waste or spent nuclear fuel from decommissioned civilian nuclear power reactors that are located in high population areas and high earthquake hazard areas.

In addition, Reps. Mike Levin (D-CA), Andy Kim (D-CA), and Doris Matsui (D-CA) led a letter to NRC Chairman Kristine Svinicki highlighting concerns with proposed major cuts to inspections of Independent Spent Fuel Storage Installation pads.¹²³

While these issues have been debated in Congress, it has become increasingly clear that spent fuel at existing reactors should be moved from pools to dry cask storage as soon as possible.¹²⁴

Recommendation: Congress should continue to pursue a legislative solution to America's nuclear waste problem, which should include consent-based siting for any permanent repository for nuclear waste.

Recommendation: Consistent with the Spent Fuel Prioritization Act, Congress should direct DOE to prioritize accepting high-level radioactive waste or spent nuclear fuel from decommissioned civilian nuclear power reactors that are located in high population areas and high earthquake hazard areas.

Recommendation: Congress should provide incentives for utilities to expedite the transfer of spent fuel at existing reactors into hardened, shipment-ready onsite dry casks. Congress should direct NRC to maintain a robust inspection program for spent fuel at existing reactors.

Recommendation: Congress should establish a task force comprised of federal, state, local, and tribal officials to study the implications of amending the Atomic Energy Act to remove exemptions from environmental laws for spent fuel and high-level waste, while maintaining federal minimum standards. The task force should develop a report for Congress with its findings.

Committee of Jurisdiction: Energy and Commerce

¹²² Testimony of Geoffrey Fettus, Senior Attorney, Natural Resources Defense Council, *Legislative Hearing on a Discussion Draft Bill, S. ___, Nuclear Waste Policy Amendments Act of 2019*, Hearing before the Senate Committee on Environment and Public Works, 116th Congress (May 1, 2019).

¹²³ Office of Rep. Mike Levin (D-CA), "Reps. Mike Levin, Andy Kim, and Doris Matsui Lead Congressional Letter Opposing Proposed Inspection Cuts to Nuclear Waste Storage, January 9, 2020, <https://mikelevin.house.gov/media/press-releases/reps-mike-levin-andy-kim-and-doris-matsui-lead-congressional-letter-opposing>.

¹²⁴ Union of Concerned Scientists, "Safer Storage of Spent Nuclear Fuel," <https://www.ucsusa.org/resources/safer-storage-spent-nuclear-fuel>. Accessed June 2020.

Building Block: Ensure Nuclear Power Plants Are Resilient to Climate Impacts

Because existing nuclear power plants require ample water supplies for reactor cooling, they are generally located near a water body. Consequently, nuclear power plants may be more vulnerable than other parts of U.S. energy infrastructure to flooding, a risk that will worsen as the climate continues to warm.

In 2011, the Fukushima Daiichi nuclear power plant in Japan suffered catastrophic damage after a tsunami flooded the facility. In the aftermath, the NRC Near-Term Task Force, tasked with reviewing NRC processes and regulations in light of the Fukushima disaster, recommended that the Commission “order licensees to reevaluate the seismic and flooding hazards at their sites … and if necessary, update their design basis and SSCs [structures, systems and components] important to safety to protect against the updated hazards.”¹²⁵ In March 2012, NRC directed nuclear licensees to complete the first part of this recommendation—a review of seismic and flooding hazards at their sites. This review found that two-thirds of U.S. nuclear plants face hazards beyond their original design basis, including flooding from extreme precipitation, dam failure, and storm surge.¹²⁶

NRC never implemented the second part of the recommendation. In early 2019, the NRC considered a proposed rule to require nuclear power plants to upgrade their facilities and safety plans to account for the most recent data on flooding and seismic hazards. The Commission voted along party lines, 3-2, to ignore expert staff recommendations and make preventive actions to address flooding and seismic risks voluntary rather than mandatory.¹²⁷ This leaves nuclear power plants unnecessarily vulnerable to natural disasters, including flood risks.

Recommendation: Congress should direct the Nuclear Regulatory Commission to reopen the rulemaking into “Mitigation of Beyond-Design-Basis Events” and require nuclear power plants to take action to address known seismic and flood risks. The rule should fulfill the requirements of current floodplain management standards (Executive Order 11988).

Recommendation: Congress should direct the Nuclear Regulatory Commission to perform a fleet-wide assessment of extreme weather and climate vulnerabilities of U.S. nuclear plants and spent fuel based on projected climate impacts.

Committee of Jurisdiction: Energy and Commerce

¹²⁵ Nuclear Regulatory Commission, Near-Term Task Force, *Recommendations for Enhancing Reactor Safety in the 21st Century* (2011).

¹²⁶ Scott Flanders et al, “Insights Gained from Post-Fukushima Reviews of Seismic and Flooding Hazards at Operating U.S. Nuclear Power Plant Sites,” Presentation to the 24th Conference on Structural Mechanics in Reactor Technology, August 2017, <https://www.nrc.gov/docs/ML1713/ML17138A169.pdf>.

¹²⁷ Nuclear Regulatory Commission, “Mitigation of Beyond-Design-Basis Events; Final Rule,” 84 Fed. Reg. 39684 (August 9, 2019).

Move Toward a National Supergrid

The costs of wind and solar energy have fallen dramatically, but some of the lowest cost resources are located far away from population centers. Moreover, much higher penetrations of variable-output renewable energy sources can be reliably integrated when the grid is able to draw from resources across wide geographic areas on an hour-to-hour basis. Modernizing and expanding the electric grid would allow more Americans to benefit from low-cost, zero-emission electricity. It would also boost the resilience of the power grid to climate change impacts.

For these reasons, Congress needs a comprehensive strategy to address key electric infrastructure challenges, including transmission line siting.

Building Block: Modernize the National Interest Electric Transmission Corridors Program

A complex web of overlapping federal and state laws and regulations makes it challenging to site new transmission lines in the United States. Building new transmission lines often takes as long as 10 years. To meet its climate goals, the country needs to build cross-state High Voltage Direct Current (HVDC) transmission lines to significantly ramp up renewable electricity generation. The five HVDC transmission lines Clean Line Energy Partners unsuccessfully tried to develop to deliver renewable energy across the country are high-profile examples of these challenges.¹²⁸

Congress tried to streamline the transmission line siting process in the Energy Policy Act of 2005, by directing DOE to periodically designate National Interest Electric Transmission Corridors, where FERC could step in and authorize construction of electric transmission facilities and the exercise of eminent domain under certain, narrow conditions.¹²⁹

This approach, however, splits authority for transmission line siting between two agencies, creating inefficiencies and competing priorities. In addition, requiring DOE to designate broad areas as corridors before project proponents have developed specific, narrow proposals can strain relationships with landowners and communities. Allowing project proponents to apply for corridor designation after having laid the groundwork with landowners and communities may be better.

Congress also left a notable gap. Under current law, when DOE designates transmission corridors, DOE is not required to consider where new or expanded transmission is needed to reduce greenhouse gas emissions from the electric power sector.

Implementation of the National Interest Electric Transmission Corridors program ran into legal challenges. Two court decisions limited its implementation by holding that a state's denial of an application to build an electric transmission facility does not trigger federal backstop siting authority and by invalidating DOE's transmission congestion study for inadequate consultation with states.¹³⁰ Due to the subsequent ambiguity about what constitutes appropriate consultation with states, DOE has not designated additional transmission corridors.

¹²⁸ Russell Gold, *Superpower, One Man's Quest to Transform American Energy* (Simon & Schuster, 2019).

¹²⁹ 16 U.S.C. § 824p.

¹³⁰ *Piedmont Envtl. Council v. F.E.R.C.*, 558 F.3d 304 (4th Cir. 2009); *Cal. Wilderness Coal. v. DOE*, 631 F.3d 1072 (9th Cir. 2011).

Recommendation: Congress should amend the Federal Power Act so that the goals of the National Interest Electric Transmission Corridors program are to help achieve national climate goals, including enhancing the development, supply, or delivery of onshore and offshore renewable energy.

Recommendation: Congress should direct FERC, working with DOE and the National Labs, to develop a comprehensive, long-range electric infrastructure strategy that would achieve 100% clean electricity generation by 2040 and any state policies that establish more stringent standards. In its analysis, FERC should identify where it would be possible to use existing rights of way, such as for railroads and interstate highways.

Recommendation: Congress should amend the Federal Power Act to direct FERC, rather than DOE, to designate National Interest Electric Transmission Corridors, upon application by developers of proposed projects.

Recommendation: Consistent with requirements under NEPA, Congress should amend the Federal Power Act to clarify that FERC may exercise backstop siting authority for an interstate electric transmission facility within a National Interest Electric Transmission Corridor if one or more states have approved the project, but one or more states have denied the proposed project or have withheld approval for more than two years.

Committee of Jurisdiction: Energy and Commerce

Building Block: Provide Funding to Help State and Local Governments Site Interstate Electric Transmission Lines

In many cases, state and local governments do not have the resources to conduct the economic and environmental analysis required to reach decisions about siting and permitting interstate electricity transmission lines that pass through their geographic areas. This can lead to lengthy delays. Federal funding and technical assistance from DOE and the National Labs could help alleviate this issue. Incentives for economic development could also help state and local governments experience tangible benefits from a proposed transmission project within their jurisdiction. Providing incentives and assistance to reach decisions quickly could prevent projects from stalling, and this could avert triggering federal backstop siting authority.

Recommendation: Congress should create a new program at DOE to provide federal funding and technical assistance for state, local, and tribal authorities to conduct transmission planning and review applications to site proposed interstate transmission projects. Congress should also authorize DOE to provide incentives for economic development to these state, local, and tribal jurisdictions. DOE should prioritize proposals to build interstate transmission lines that would deliver zero-carbon electricity. DOE and the state or local government could jointly select the public or private sector analysts who would work on the project. The analysts would have access to federal experts at DOE, the National Labs, FERC, EPA, and the federal power marketing administrations to help resolve any technical issues related to the application. Consistent with requirements under NEPA, to receive funding, state and local governments would have to agree to reach a decision on the application within two years.

Committee of Jurisdiction: Energy and Commerce

Building Block: Establish a National Policy on Transmission

Current law does not direct federal and state officials reviewing applications to site and construct interstate electric transmission lines to assess these projects within the context of national priorities, like the climate crisis. A statement of federal policy could provide evidence of congressional intent to guide the decision-making of government officials at all levels as well as reviewing courts, the private sector, advocacy groups, and the general public.

The Energy and Commerce Committee's discussion draft of the CLEAN Future Act establishes a "National Policy on Transmission." This National Policy on Transmission states that a modern transmission system should "facilitate a reliable, resilient, and decarbonized electricity supply and enable national greenhouse gas emissions reductions." In addition, the National Policy establishes that the "public interest is served by overcoming regulatory and jurisdictional barriers to coordinated and cost-effective investments in the Nation's electric grid system that enable deployment of cost-effective clean energy resources."¹³¹

Building on this concept, an additional way to focus state regulatory attention on the national importance of the bulk electric transmission system in the context of the climate crisis would be to amend Section 111(d) of Public Utility Regulatory Policies Act.

Recommendation: Congress should establish a National Transmission Policy to provide guidance to state and local officials and reviewing courts to clarify that it is in the public interest to expand transmission to facilitate a decarbonized electricity supply and enable greenhouse gas emissions. The policy statement should also encourage broad allocation of costs.

Recommendation: Congress should amend Section 111(d) of PURPA to require consideration of the national benefits outlined in the National Policy on Transmission in any proceeding to review an application to site bulk electric transmission system facilities.

Committee of Jurisdiction: Energy and Commerce

Building Block: Resolve Clean Energy Interconnection Backlogs

Before a new or increased source of electricity can connect to the Regional Transmission Organization/Independent System Operator (RTO/ISO system), the market operator will conduct an analysis to determine the impact of the additional electricity on the system and how to allocate the costs of any upgrades that will be required. Generators wait in a line (the generator interconnection queue) for the RTO/ISO to complete this analysis.

In areas where renewable energy resources are plentiful, generator interconnection queues lead to long delays that can slow or stop investment in wind and solar projects. In 2018, ICF International concluded that 286 GW of wind and solar energy were stuck in interconnection queues.¹³² This problem persists even when state policies aim to increase clean energy generation. The FERC policy of

¹³¹ Title II, Section 211, CLEAN Future Act discussion draft.

¹³² ICF International, "Is the Grid Ready for Tremendous Renewable Energy Growth," November 7, 2018, <https://www.icf.com/insights/energy/renewable-energy-next-generation>. Accessed June 2020.

assigning the costs of upgrades needed in the regional network (rather than just the interconnection facilities) and lack of resources to conduct the necessary analysis contributes to the problem.

Recommendation: Congress should direct FERC to work with market operators to improve generator interconnection queues, including by prioritizing projects that would fulfill state clean energy policies and providing additional technical resources and funding for market operators in exchange for establishing deadlines for project approvals.

Recommendation: Congress should direct FERC to end its policy of assigning costs of the regional network to individual interconnecting generators and instead incorporate such needs into the regional transmission planning and cost allocation.

Committee of Jurisdiction: Energy and Commerce

Building Block: Establish Incentives to Increase Electric Transmission Capacity and Efficiency

Over the last few years, the costs caused by transmission congestion have been increasing.¹³³ Commercial technologies are available to help improve the capacity and efficiency of the existing transmission system, but existing incentives for transmission owners and operators do not encourage their deployment.¹³⁴

Section 213 of the Energy and Commerce Committee's discussion draft of the CLEAN Future Act directs FERC to report to Congress of its progress in encouraging deployment of transmission technologies like dynamic line ratings, flow control devices, and network topology optimization to increase the capacity and efficiency of existing transmission facilities and improve the operation of the facilities.¹³⁵ The bill also requires the report to describe how the rule could be modified to encourage greater deployment of these technologies. The House Democrats included the reporting provision in Section 33113 of their infrastructure bill, the Moving Forward Act (H.R. 2).

Recommendation: Congress should direct FERC to report to Congress of its progress in encouraging deployment of advanced transmission technologies and describe how the rule could be modified to encourage greater deployment of these technologies.

Recommendation: Congress should direct FERC to provide performance-based incentives for investments that improve the capacity and efficiency of the bulk electric transmission system.

Committee of Jurisdiction: Energy and Commerce

¹³³ Jesse Schneider, "Transmission Congestion Costs in the U.S. RTOs," (Grid Strategies LLC, August 14, 2019 <https://wattransmission.files.wordpress.com/2019/08/transmission-congestion-costs-in-the-u.s.-rto.pdf>).

¹³⁴ T. Bruce Tsuchida and Rob Gramlich, *Improving Transmission Operation with Advanced Technologies: A Review of Deployment Experience and Analysis of Incentives* (Grid Strategies LLC and The Brattle Group, 2019).

¹³⁵ Title II, Section 213, CLEAN Future Act discussion draft.

Building Block: Improve Planning and Cost Allocation for Transmission Lines

Delivering clean electricity to consumers across the country will require building new transmission lines. Currently, each RTO/ISO region has a lengthy process to determine whether to build new transmission lines and, if so, how the costs will be shared among market participants.¹³⁶ Projects are frequently categorized based on their primary benefit, such as increasing reliability or meeting public policy goals, which is then weighed against the potential costs. Yet, even though a proposed transmission line would often achieve multiple benefits that together outweigh the potential costs, the RTOs and ISOs do not have planning systems that accommodate this scenario. When a proposed transmission line would connect two RTO/ISO regions, the process is even more complicated because the different regions use different planning models for their analysis.

Determining how to allocate the costs among market participants is contentious. Broadly allocating the costs would help ensure that the necessary transmission infrastructure will be developed.

Some states proactively plan for renewable energy development. For example, Texas developed Competitive Renewable Energy Zones and a transmission plan that enabled the development of 18 GW of wind energy. This proactive approach avoided transmission congestion and curtailment and led to widespread economic benefits for electricity consumers.

The Energy and Commerce Committee's discussion draft of the CLEAN Future Act directs FERC to conduct a rulemaking to increase the effectiveness of inter-regional planning by emphasizing assessment of the multiple benefits of a proposed project, harmonizing the planning processes and models of different regions, and encouraging broad cost allocation based on the multiple benefits of a proposed project.¹³⁷ The House Democrats included this provision in Section 33116 of their infrastructure bill, the Moving Forward Act (H.R. 2).

Recommendation: Congress should direct FERC to conduct a rulemaking to require effective inter-regional planning in line with the principles outlined in the CLEAN Future Act and the Moving Forward Act. In addition, when the planning entities evaluate the multiple benefits of a proposed project, they should consider greenhouse gas emissions and national climate goals.

Recommendation: Congress should direct FERC to conduct a rulemaking to increase the effectiveness of transmission planning within a region. Planning entities should analyze greenhouse gas emissions and national climate goals in transmission planning, and they should evaluate the multiple benefits of a proposed project. The cost allocation process should account for the widespread economic and environmental benefits for consumers of increasing renewable energy generation, including lower energy costs for consumers and reduced greenhouse gas emissions.

Recommendation: Congress should direct FERC to require transmission planning regions to proactively plan transmission lines in anticipation of renewable energy development. These areas can be identified by examining existing generation interconnection queues as well as assessments of clean energy generation potential conducted by the National Labs.

Committee of Jurisdiction: Energy and Commerce

¹³⁶ American Wind Energy Association, *Grid Vision: The Electric Highway to a 21st Century Economy* (2019).

¹³⁷ Title II, Section 212, CLEAN Future Act discussion draft.

Building Block: Create a High-Voltage Direct Current Backbone to Support a National Supergrid

The U.S. electric grid is made up of three major components: the Eastern Interconnection, the Western Interconnection, and the Electric Reliability Council of Texas. There are connections between them, but they cannot carry large volumes of electricity. A better-connected national grid would enable the country to maximize the use of the lowest-cost sources of renewable energy, which may be located far from population centers. More geographically diverse sources of renewable energy would help balance the variability of renewable energy from individual sources.

The National Renewable Energy Laboratory (NREL) researched and drafted a report (“the Interconnection Seam Study”), demonstrating that a national HVDC electric transmission backbone could enable the country to generate as much as 80% of total electricity from zero-carbon sources in a way that would save consumers more than \$47 billion.¹³⁸

These HVDC transmission lines would benefit the nation, but they would not rise to the top as priorities through existing RTO and ISO transmission planning processes because they would not address the localized reliability concerns on which RTOs and ISOs focus.

The federal government could designate National Interest Electric Transmission Corridors with these priority HVDC transmission lines in mind, building on the Interconnection Seam Study. Federal financial support through loan guarantees or access to the Section 48 tax credit could facilitate project development. Where feasible, these HVDC transmission lines could be buried to enhance their resilience to climate change impacts and mitigate local opposition.

Once the HVDC backbone is developed, a balancing authority would need to manage the exchanges of electricity across the nation. Currently, neither FERC nor the RTOs and ISOs have that responsibility. In the West and Southeast, numerous independent balancing authorities exist that are not part of RTOs and ISOs. Congress could pass legislation to provide FERC or a new federal agency with authority to manage the exchange of electricity between RTOs and ISOs and the independent balancing authorities in the West and Southeast.

Recommendation: Consistent with recommendations elsewhere in this report, Congress should direct FERC to designate National Interest Electric Transmission Corridors where HVDC transmission lines are needed to better connect the three interconnections, building on the Interconnection Seam Study.

Recommendation: Congress should provide financial support for priority HVDC transmission lines, such as through an ITC. Congress should provide an option for direct pay for the tax credit. Where feasible, the priority HVDC transmission lines should be buried to ensure resilience to climate change impacts.

¹³⁸ Aaron Bloom, NREL, “Interconnections Seam Study,” Presentation to TransGrid-X Symposium (2018), <https://www.terrawatts.com/seams-transgridx-2018.pdf>. Accessed June 2020. As of June 30, 2020, NREL had not yet released the final report.

Recommendation: Congress should direct FERC or a new federal agency to manage the exchange of electricity between RTOs and ISOs and the independent balancing authorities in the Western and Southeastern parts of the country.

Recommendation: Congress should direct FERC to consider whether larger macro RTOs spanning full interconnections or the country would complement the work of existing RTOs by performing planning and cost allocation for the larger area.

Committee of Jurisdiction: Energy and Commerce

Building Block: Expand Tax Credits for Grid-Scale Storage and Invest in Research, Development, and Demonstration

Grid-scale storage would allow the power system to save electricity when it is generated and store it for later use. To decarbonize the electricity sector, grid-scale storage will be needed to manage the variability of renewable energy resources like wind and solar energy. Grid-scale storage also presents the opportunity to replace gas-fired peaker plants, which are predominantly located in or near disadvantaged and low-income communities.¹³⁹

Currently, storage is not independently eligible for an ITC. Rep. Michael Doyle (D-PA) and Sen. Martin Heinrich (D-NM) introduced the Energy Storage Tax Incentive and Deployment Act of 2019 (H.R. 2096/S. 1142), which would create an energy storage ITC for batteries, compressed air, pumped hydropower, hydrogen, thermal energy storage, regenerative fuel cells, flywheels, capacitors, and superconducting magnets.

Section 102 of the GREEN Act of 2020 (H.R. 7330) would expand the ITC to include energy storage technology and extend the ITC so that energy storage technologies are eligible for a 30% ITC through 2025. The bill would phase down the ITC to 26% in 2026 and to 22% in 2027. Section 104 of the bill would allow taxpayers to choose a lower tax credit value in exchange for the option to be refunded for any resulting overpayment (“direct pay”).

In addition, several Members of Congress have introduced legislation to expand demonstration of grid-scale energy storage and to establish a cross-cutting national program on energy storage at DOE. For example, Rep. Sean Casten (D-IL) and Sen. Tina Smith (D-MN) introduced the Promoting Grid Storage Act of 2019 (H.R. 2909/S. 1593). This bill would direct DOE to create a cross-cutting national program on energy storage that establishes goals and cost targets and funds demonstration projects. The program would also provide technical assistance to entities that seek to use grid-scale storage to boost grid resilience and facilitate renewable energy integration. The Energy and Commerce Committee incorporated this bill as Section 235 of the discussion draft of the CLEAN Future Act¹⁴⁰ and as Section 33114 of the House Democrats’ infrastructure bill, the Moving Forward Act (H.R. 2).

¹³⁹ Clean Energy Group, “Improving Air Quality by Replacing Peaker Plants with Energy Storage,” <https://www.cleaneigroup.org/ceg-projects/energy-storage-peaker-replacement>. Accessed June 2020.

¹⁴⁰ Title II, Section 235, CLEAN Future Act discussion draft.

Rep. Bill Foster (D-IL) introduced the Better Energy Storage Technology (BEST) Act (H.R. 2986), which would establish a grid-scale storage research, development, and demonstration program. This bill passed out of the Committee on Science, Space, and Technology. In addition, Title II, Subtitle C, Section 222 of the discussion draft of the CLEAN Future Act would direct DOE offices within the Grid Modernization Initiative to coordinate energy storage research.¹⁴¹

Recommendation: Congress should make energy storage independently eligible for an Investment Tax Credit for energy storage. Congress should provide an option for direct pay for the tax credit.

Recommendation: Congress should direct DOE to create a national program focused on energy storage. DOE offices within the Grid Modernization Initiative should coordinate on energy storage research. Congress should direct DOE to provide greater support for demonstration of grid-scale storage, prioritizing the replacement of peaker plants as well as supporting health care infrastructure.

Committees of Jurisdiction: Ways and Means; Energy and Commerce; Science, Space, and Technology

Building Block: Maximize Non-Transmission Alternatives and Investments in Storage

In some cases, non-transmission alternatives (NTAs) like storage, demand response, and energy efficiency could provide a lower-cost solution than a proposed transmission project.¹⁴² Moreover, NTAs can help increase the electric system's reliability and help reduce wholesale power costs.¹⁴³ As greater electrification of transportation and buildings occurs, these benefits become increasingly important. While FERC Order 1000 created a mechanism through which NTAs can be proposed as a part of regional transmission planning processes, transmission providers are not currently required to proactively identify and evaluate NTAs.¹⁴⁴

In addition, utilities may have greater opportunities to invest in energy storage than they are currently considering and using. Title II Subtitle C Section 221 of the Energy and Commerce Committee's discussion draft of the CLEAN Future Act would amend PURPA to require states to consider mandating that, as part of a supply-side resource planning process, electric utilities demonstrate that they have considered an investment in energy storage systems.¹⁴⁵

Recommendation: Existing law already allows FERC to ensure that transmission providers identify all feasible non-transmission alternatives to transmission projects. To ensure FERC follows congressional intent, Congress should amend the Federal Power Act to: (1) allow recovery through a FERC-jurisdictional rate of non-transmission alternatives that are lower-cost than transmission alternatives; (2) clarify to FERC that regional transmission planning processes require consideration of feasible alternatives; and (3) direct FERC to designate entities to evaluate non-transmission alternatives, such as RTOs or independent evaluators in non-RTO regions.

¹⁴¹ Title II, Section 222, CLEAN Future Act discussion draft.

¹⁴² Scott Hempling, *Non-Transmission Alternatives: FERC's "Comparable Consideration" Needs Correction*, ElectricityPolicy.Com, 2013, www.scotthemplinglaw.com/files/pdf/ppr_nta_comparable_consideration_0513.pdf.

¹⁴³ Ibid.

¹⁴⁴ Ibid.

¹⁴⁵ Title II, Section 221, CLEAN Future Act discussion draft.

Recommendation: Congress should amend PURPA to require that each state consider mandating that, as part of a supply-side resource planning process, electric utilities demonstrate that they have considered an investment in energy storage systems.

Committee of Jurisdiction: Energy and Commerce

Building Block: Develop a National Offshore Wind Transmission Plan

A significant offshore wind resource lies along the Atlantic and Pacific Coasts that could help meet the electricity needs of major urban areas. Many states are enacting robust policies to create a demand for this zero-carbon source of electricity. Developing offshore wind energy could also create regional supply chains, including in the marine trades.

The 30 MW Block Island Wind Farm is the only offshore wind facility in operation in the United States, but more are in development. In most coastal areas, however, the existing electric grid both off the coast and into the network on land would need an upgrade to transmit the large amounts of electricity generated by new offshore wind projects.

More work needs to be done to identify where specific grid upgrades are needed. DOE could conduct this analysis to inform the development of a National Offshore Wind Transmission Plan, a long-range comprehensive electric infrastructure strategy, and the designation of National Interest Electric Transmission Corridors by FERC. The National Offshore Wind Transmission Plan also could integrate protections for the marine environment, including sensitive species.

Federal agencies also need to resolve issues related to the timing of offshore wind infrastructure development. As described elsewhere in this report, generator interconnection queues are leading to delays in bringing renewable energy online. Offshore wind adds complexity because the upgrades will be needed following identification of offshore wind lease areas but before specific projects are developed.

Recommendation: Congress should provide funding for DOE to analyze the existing onshore and offshore transmission system to identify what the requirements would be to connect 50 GW of offshore wind. DOE should identify the environmental and economic benefits of developing offshore transmission. Consistent with recommendations elsewhere in this report about a national electric infrastructure strategy, FERC should develop a National Offshore Wind Transmission Plan.

Recommendation: Consistent with the National Offshore Wind Transmission Plan, Congress should provide loan guarantees for public-private partnerships to upgrade coastal grid infrastructure for offshore wind projects by investing in transmission and interconnection facilities.

Recommendation: Congress should direct FERC to conduct a rulemaking to break down barriers to the interconnection of offshore wind facilities. Congress should also direct FERC to develop a cost allocation methodology for offshore wind transmission facilities.

Committee of Jurisdiction: Energy and Commerce

Ensure a Level Playing Field for Climate Solutions in Wholesale Power Markets

Building Block: Require FERC to Consider Greenhouse Gas Emissions in Reviewing Energy Prices

The Federal Power Act requires FERC to review rates for the transmission or sale of wholesale electricity to ensure that they are “just and reasonable and not unduly discriminatory or preferential.”¹⁴⁶ A growing area of concern is that non-emitting sources of electricity are competing with conventional fossil fuels that do not internalize the costs of greenhouse gas emissions. The New York Independent System Operator is exploring implementing a carbon price to level the playing field and harness market forces to deploy climate solutions faster.¹⁴⁷

Rep. Sean Casten (D-IL) introduced the Energy Prices Require Including Climate Externalities (Energy PRICE) Act (H.R. 5742), which would amend the Federal Power Act to direct FERC to find that rates for wholesale sale of electricity that do not incorporate the cost of externalized greenhouse gas emissions are unjust, unreasonable, unduly discriminatory, or preferential.

Recommendation: Existing law allows FERC to consider factors that affect whether rates are just and reasonable, including greenhouse gas emissions. To ensure FERC follows congressional intent, Congress should amend the Federal Power Act to direct FERC to find rates unjust, unreasonable, unduly discriminatory, or preferential if they do not incorporate the cost of externalized greenhouse gas emissions. Any amendment to the Federal Power Act should not preempt state clean energy initiatives and regulation of retail electric utilities; instead, states should be allowed to set stricter standards.

Committee of Jurisdiction: Energy and Commerce

Building Block: Modernize Wholesale Power Market Rules and Design

Policymakers created wholesale power markets before climate change was widely understood, and they delegated to RTOs and ISOs the ability to create market rules to ensure just and reasonable rates for the transmission and sale of electricity. RTOs and ISOs established the rules governing what products are for sale and how to buy and sell them with conventional coal and gas-fired power plants, nuclear power plants, and hydropower facilities in mind. Renewable energy, battery storage, distributed energy resources, and demand response are examples of newer technologies that cumulatively could help reduce electricity costs and decarbonize the electricity sector. Since “[m]arket rules can make or break the economics of an individual supply or demand resource, and the reliability and affordability of electricity,”¹⁴⁸ however, it is time to modernize wholesale power markets to maximize the capabilities of new technologies.

¹⁴⁶ 16 U.S.C. §§ 824d(a), 824e(a).

¹⁴⁷ New York Independent System Operator, “Carbon Pricing in Wholesale Energy Markets: Frequently Asked Questions,” February 13, 2020, <https://www.nyiso.com/-/carbon-pricing-in-wholesale-energy-markets-frequently-asked-questions>. Accessed June 2020.

¹⁴⁸ Michael Goggin, Rob Gramlich, Steven Shparber, and Alison Silverstein, *Customer Focused and Clean: Power Markets for the Future* (Wind Solar Alliance, 2018).

An overarching goal of modernizing wholesale power markets should be to better value flexible resources. In 2016, NREL concluded that it is technically possible for the Eastern Interconnection to exceed 50% renewable energy, but “the ability of the real system to realize these futures may depend more on regulatory policy, market design, and operating procedures.”¹⁴⁹ The potential market reforms are numerous, and range from ensuring energy market prices reflect the value of reliability to bringing self-scheduled resources into markets to the treatment of hybrid resources.¹⁵⁰ Appendix 2 lists several studies detailing some of the key reforms needed.

In addition, one of the most significant market barriers to a reliable and affordable decarbonized grid is the use of mandatory capacity markets to ensure resource adequacy. These markets favor resources with low upfront costs over those that, like renewables, have higher upfront costs but provide savings to consumers over their lifetime.¹⁵¹ Capacity markets also procure a single, undifferentiated product that ultimately does not reflect the services the grid will need in a high renewable future, such as fast and accurate responses to complement the variable output from renewable resources. FERC's evaluation of market reforms must extend beyond removing barriers to participation by carbon-free resources to include a holistic assessment of whether market operators have the right overall market structure to procure reliability services needed in a high-renewable future, rather than generic assurances of availability.

Recommendation: Congress should direct FERC to use its existing authorities to conduct a rulemaking that would review energy, reliability, and capacity market reforms that would better integrate renewable energy, battery storage, storage-as-transmission, hybrid resources, distributed energy resources, and demand response in wholesale power markets. The reforms this rulemaking should consider are described by experts in the studies listed in Appendix 2. At a minimum, FERC should consider allowing renewables and storage to provide all ancillary services, reduce self-scheduling of generators, and make demand more responsive to price.

Committee of Jurisdiction: Energy and Commerce

Building Block: Reject Wholesale Power Market Rules That Undermine State Clean Energy Leadership

In the absence of federal leadership on climate change, states have enacted ambitious policies to promote clean energy generation, from renewable portfolio standards to incentives for clean energy. Throughout this report, the majority staff for the Select Committee has recommended allowing states to set stricter standards than the federal baseline.

¹⁴⁹ National Renewable Energy Laboratory, NREL/TP-6A20-64472, *Eastern Renewable Generation Integration Study*, (2016).

¹⁵⁰ Michael Goggin, Rob Gramlich, Steven Shparber, and Alison Silverstein, *Customer Focused and Clean: Power Markets for the Future* (Wind Solar Alliance, 2018).

¹⁵¹ Jacob Mays, David P. Morton, and Richard P. O'Neil, *Asymmetric Risk and Fuel Neutrality in Capacity Markets*, *Nature Energy*, Oct. 28, 2019.

Some markets, like the PJM Interconnection, are pushing back against these state policies and have proposed rules that would set minimum offer prices for “subsidized” resources in capacity markets.¹⁵² While the original intent of these policies was to avoid market manipulation, FERC is now using the tool for a new purpose that raises utility bills for customers and frustrates state clean energy goals.¹⁵³

FERC Commissioner Rich Glick has emphasized that FERC “must ensure that wholesale market rules are not deployed to frustrate state policies.”¹⁵⁴ He has noted that some of the core principles that FERC espouses are “eliminating barriers to wholesale market competition” and “a commitment to cooperative federalism.”¹⁵⁵

Recommendation: Congress should amend the Federal Power Act to clarify that state authority over electricity generation includes the provision of financial incentives for clean energy and that FERC may not establish rates that discriminate based on these state policies. Specifically, Congress should clarify that FERC shall not mitigate a resource’s bid offer or proposed rate on the basis that the resource receives support from a state or local government. In addition, Congress should clarify that the Federal Power Act does not limit the ability of states to regulate or tax greenhouse gas emissions from sources located in their state or associated with the production of electricity consumed in their state.

Committee of Jurisdiction: Energy and Commerce

Building Block: Improve the Governance and Transparency of Wholesale Power Markets

Wholesale power markets have contributed to lower electricity prices for consumers and expanded deployment of clean energy. Greater participation in these markets could help accelerate the transition to clean energy, but their governance and transparency must be improved to ensure public confidence in the operation of these markets.

Membership in RTOs and ISOs is voluntary but typically includes generators, transmission owners, utilities, financial traders, and consumer advocates. Their meetings are often closed to the public and the press. Stakeholders, such as states, consumer groups, and public interest groups, have expressed concern about the power of incumbent generators and transmission owners because they often have greater resources than new entrants, they tend to have ongoing relationships with RTO and ISO staff, and some market rules limit participation to those with existing assets.¹⁵⁶ Incumbent generators and transmission owners also always have the ability to threaten withdrawal.¹⁵⁷

¹⁵² See, e.g., Jennifer Chen, “PJM Offers Two Proposals: A Rock and a Hard Place,” Natural Resources Defense Council, Apr. 11, 2018, <https://www.nrdc.org/experts/jennifer-chen/pjm-offers-two-proposals-rock-and-hard-place>; Michael Goggin and Rob Gramlich, *Consumer Impacts of FERC Interference with State Policies: An Analysis of the PJM Region* (Grid Strategies LLC, 2019).

¹⁵³ Ibid.

¹⁵⁴ Rich Glick and Matthew Christiansen, “FERC and Climate Change,” *Energy Law Journal* 40:1 (2019): 30.

¹⁵⁵ Ibid. at 5.

¹⁵⁶ Mark James et al, *How the RTO Stakeholder Process Affects Market Efficiency* (R Street Institute, 2017).

¹⁵⁷ Travis Kavulla, *Problems in Electricity Market Governance: An Assessment* (R Street Institute, 2019).

Legal experts have highlighted that “serious accountability problems” arise from the fact that RTOs and ISOs are quasi-autonomous nongovernmental organizations.¹⁵⁸

FERC does not review the rules governing the meetings and decision-making of RTOs and ISOs on an ongoing basis. In 2008, FERC did direct RTOs and ISOs to evaluate their stakeholder processes to ensure that they are inclusive, fairly balance diverse interests, allow for representation of minority positions, and maintain ongoing responsiveness, but in the subsequent 12 years, FERC has not conducted a comprehensive review of the RTO and ISO stakeholder processes.¹⁵⁹ Without ongoing oversight, when existing rules create a power imbalance for incumbents, they may be able to avoid changes to the rules that would disadvantage them.¹⁶⁰ A court decision has limited FERC’s ability to regulate ISO/RTO governance.¹⁶¹

Moreover, stakeholders have expressed concerns that RTO and ISO staff are advancing proposals that are not in the public interest because they do not prioritize consumer interests and overall market efficiency, but may be unduly influenced by incumbents.¹⁶² They have also expressed concerns that FERC is too deferential to proposals from RTOs and ISOs.¹⁶³ Since many climate solutions in the electricity sector are newer technologies, improving wholesale power market governance and transparency would help ensure that these newer technologies have a chance to compete with incumbent fossil fuel technologies.

In 1978, Congress authorized the Office of Public Participation and Consumer Advocacy at FERC, but this office has never been created or funded. This vulnerability presents a challenge to the transition to a clean energy economy by eroding public trust in the regulation of energy infrastructure development. If established, this office could afford the public greater opportunities to participate in the regulation of energy infrastructure. Elsewhere, this report describes how this office could enhance landowner and community protections related to natural gas infrastructure.

Rep. Jan D. Schakowsky (D-IL) introduced the Public Engagement at FERC Act (H.R. 3240), which would reauthorize the Office of Public Participation and Consumer Advocacy at FERC to ensure that the public can help shape the country’s energy future. The bill would authorize the office to intervene in all proceedings involving natural gas siting and rate-setting on behalf of energy customers.

The bill would also provide community and public interest groups with funding to intervene in FERC proceedings involving the siting of natural gas infrastructure to ensure consideration of their concerns. In general, when public interest groups intervene in proceedings, they seek to defend interests that would otherwise lack adequate representation. As nonprofit organizations, it can be difficult for them to find funding to pay for the filing fees and attorneys’ fees. Intervenor funding helps

¹⁵⁸ Michael Dworkin and Rachel Aslin Goldwasser, “Ensuring Consideration of the Public Interest in the Governance and Accountability of Regional Transmission Organizations,” *Energy Law Journal* 28:543 (2007).

¹⁵⁹ 125 FERC ¶ 61,071 (Oct. 17, 2008) (“Wholesale Competition in Regions with Organized Electric Markets”).

¹⁶⁰ Mark James et al, *How the RTO Stakeholder Process Affects Market Efficiency* (R Street Institute, 2017).

¹⁶¹ *Cal. Indep. Sys. Operator v. FERC*, 372 F.3d 395 (D.C. Cir. 2004).

¹⁶² Mark James et al, *How the RTO Stakeholder Process Affects Market Efficiency* (R Street Institute, 2017); Travis Kavulla, *Problems in Electricity Market Governance: An Assessment* (R Street Institute, 2019).

¹⁶³ Mark James et al, *How the RTO Stakeholder Process Affects Market Efficiency* (R Street Institute, 2017).

address these issues. Eight states authorize the provision of intervenor funding, with California providing the strongest example.

The reauthorized Office of Public Participation and Consumer Advocacy at FERC could provide intervenor funding for participation in wholesale power markets in addition to proceedings involving natural gas. The Schakowsky bill was also included in the discussion draft of the Energy and Commerce Committee's CLEAN Future Act.¹⁶⁴

Recommendation: Congress should reaffirm that large regional power exchange and planning are consistent with the public interest.

Recommendation: Existing law authorizes FERC to review the decision-making processes of RTOs and ISOs to the extent these processes affect rates. To ensure FERC follows congressional intent, Congress should amend the Federal Power Act to direct FERC to review the stakeholder governance processes of RTOs and ISOs on a periodic basis and make any changes needed to ensure that they are inclusive, fairly balance diverse interests, allow for representation of minority positions, and maintain ongoing responsiveness. Congress should direct FERC to establish minimum requirements for stakeholder processes at each RTO/ISO, such as ensuring that there is a meaningful opportunity for state policymakers to engage with leadership and eliminating financial barriers to small market participant and public interest group membership, participation, and voting.

Recommendation: Congress should direct FERC to conduct a rulemaking that imposes minimum transparency requirements on RTOs and establishes procedures for how stakeholders can access information, such as ensuring that customer cost information is reasonably available and stakeholder meetings are free of cost and open to public and press, subject to limitations necessary to protect critical energy infrastructure or confidential business information.

Recommendation: Congress should reauthorize the Office of Public Participation and Consumer Advocacy at FERC to review and resolve barriers to public participation and to provide intervenor funding before FERC and organizations with FERC-delegated authority.

Committee of Jurisdiction: Energy and Commerce

Make the Electric Grid More Resilient to Climate Impacts

IMPROVE PLANNING AND PREPAREDNESS FOR ELECTRIC GRID RESILIENCE

American homes and businesses depend on the reliable transmission and distribution of electricity, but climate change is increasing the number and severity of threats to the electric grid. Along the coasts, large, intense tropical hurricanes often down power lines, causing power outages for extended periods. Across the country, heavy rainfall and flooding damage key grid components, such as

¹⁶⁴ Title II, Section 214, CLEAN Future Act discussion draft.

electrical substations.¹⁶⁵ Severe weather is already the number one cause of power interruptions in the United States,¹⁶⁶ and climate change is expected to increase the severity of extreme weather events.

In fact, between 2009 and 2017, the number of reported power outages increased from 2,840 to 3,526 per year, and the number of people affected increased from 13.5 million to 36.7 million per year.¹⁶⁷ In 2017, Hurricane Maria knocked out 80% of Puerto Rico's electrical grid and caused the worst blackout in U.S. history and the second largest in the world.¹⁶⁸

In California, problems in the electric power sector, such as electrical equipment malfunctions or downed utility power lines, constitute the third leading cause of wildfires.¹⁶⁹ Proper maintenance of the electric grid in the context of hotter, drier conditions becomes increasingly demanding. As an example, the percentage of PG&E's territory with elevated wildfire risk increased from 15% in 2012 to 50% in 2019.¹⁷⁰ Climate change will cause these hotter, drier conditions to persist.

In the near-term, preventative electric power system shutoffs can reduce fire risks, but they also present major challenges for millions of local residents and businesses, forcing evacuations at significant cost and destabilizing individuals, families, and communities.

A comprehensive federal strategy is required to help utilities and grid operators plan for power interruptions, encourage investment in new technologies that can detect problems quickly, and invest in hardening the electric grid's physical infrastructure. The federal government can also help American homes, businesses, hospitals, and other crucial services withstand power interruptions through expanded deployment of microgrids and energy storage.

Building Block: Develop Federal Resilience Standards for Electricity Infrastructure

During the Obama administration, DOE launched a Partnership for Energy Sector Climate Resilience to create a dialogue between DOE and electric utilities about the risks associated with extreme weather and climate change. Members of this partnership identified climate-related vulnerabilities to power sector reliability, including hurricanes, sea level rise and storm surge, heavy downpours, and extreme

¹⁶⁵ Jupiter Intelligence, *Special Report: Uncovering New Risks from Extreme Floods to Electric Substations in Harris County, TX* (2020).

¹⁶⁶ Lawrence Berkeley National Laboratory, LBNL-2001164, *Estimating Power System Interruption Costs: A Guidebook for Electric Utilities* (2018).

¹⁶⁷ Eaton Corporation, “USA Blackout Annual Report” (2017), <https://switchon.eaton.com/plug/blackout-tracker>. Accessed June 2020.

¹⁶⁸ Abby Narishkin and Meranda Yslas, “Hurricane Maria caused the worst blackout in US history – here’s how one company survived the outages,” *Business Insider*, August 30, 2019.

¹⁶⁹ Levin Simes Abrams, “Electrical Power 3rd Most Common Cause of CA Wildfire,” April 24, 2019, <https://www.levinsimes.com/electrical-power-3rd-most-common-cause-of-wildfire/>. Accessed June 2020.

¹⁷⁰ California Public Utilities Commission, “CPUC Fire Safety Rulemaking Background” <https://www.cpuc.ca.gov/FireThreatMaps/>. Accessed June 2020.

heat.¹⁷¹ Extreme heat can make power lines sag and reduce their ability to transmit electricity, while at the same time increasing demand for electricity for air conditioning.¹⁷²

In addition, the Federal Power Act tasks the North American Electricity Reliability Corporation (NERC) with developing reliability standards for the bulk electric system that FERC reviews and adopts.¹⁷³ On an ongoing basis, NERC Regional Reliability Coordinators assess transmission reliability and coordinate emergency operations.¹⁷⁴

The U.S. government could improve the resilience of the nation's electricity infrastructure by developing resilience standards for components of the bulk electric system for hazards like wildfires, floods, extreme weather events such as hurricanes, and extreme heat. These standards could be tailored to local conditions but provide consistency across the nation and help drive down costs in developing resilient power systems.

Incorporating consumer perspectives would enhance public-private coordination on electric grid resilience. Consumers are best positioned to define the level of reliability that meets their needs and, increasingly, consumers can enhance the resilience of their access to electricity with clean resources.¹⁷⁵ By developing and applying a more consumer-centric model, federal agencies and grid managers alike can prioritize resilience investments and inform operations and maintenance to better respond to consumers' reliability concerns.

Rep. Mike Thompson (D-CA) introduced the Utility Resilience and Reliability Act (H.R. 7186), which would require the Electric Reliability Organization to propose a reliability standard for the bulk power system that addresses extreme weather resilience. The bill would also establish an electric grid resilience technical assistance program at DOE for states and utilities.

Recommendation: Congress should authorize funding for DOE to continue to identify and evaluate the climate-related risks to electric grid infrastructure in partnership with state and local governments and the private sector. DOE should incorporate the perspectives and priorities of consumers, facilitate the sharing of case studies and best practices, and develop consumer-facing resources to help inform the public.

Recommendation: Congress should direct DOE, FERC, and NERC, working with the Mitigation Framework Leadership Group, to develop federal resilience standards to apply to electricity infrastructure projects that are federally funded, permitted, and licensed. DOE should provide technical assistance to help states incorporate federal resilience standards into state-level policies and programs.

Committees of Jurisdiction: Energy and Commerce; Transportation and Infrastructure

¹⁷¹ Craig Zamuda, U.S. Department of Energy, "U.S. Department of Energy's Partnership for Energy Sector Climate Resilience," Presentation to EPRI-NYSERDA Resilience Workshop, April 16, 2017.

¹⁷² Matthew Bartos et al, "Impacts of Rising Air Temperatures on Electric Transmission Ampacity and Peak Electricity Load in the United States," *Environmental Research Letters* 11(11), Nov. 2, 2016.

¹⁷³ 16 U.S.C. § 824o.

¹⁷⁴ North American Electric Reliability Corporation, "Standard IRO-001-2 - Reliability Coordination - Responsibilities and Authorities" (2011).

¹⁷⁵ DeWayne Todd, *Consumer Perspectives on Grid Resilience* (Advanced Energy Management Association, 2020).

Building Block: Help States Harden Physical Grid Infrastructure and Improve Maintenance to Make the Grid More Resilient to Climate Impacts

To ensure the electric grid is more resilient to a broad range of climate-related risks, utilities can employ several strategies to harden physical infrastructure. These include coating or burying power lines and replacing wooden utility poles with utility poles made of steel or concrete.¹⁷⁶ Utilities can also follow best practices to maintain the electric grid, such as vegetation management and more frequent inspections of power lines.¹⁷⁷

The upfront capital costs of hardening grid infrastructure are likely to be significant, but so are the likely costs of failing to make the investments. Research indicates that American homes and businesses could bear as much as \$1.5 to \$3.4 trillion in cumulative costs by 2050 from power interruptions if utilities do not bury power lines and spend more on operations and maintenance.¹⁷⁸ Utility regulators are responsible for reviewing and approving utility proposals to harden electric infrastructure and maintain power lines, the costs of which the utilities pass on to ratepayers.

The Energy and Commerce Committee's discussion draft of the CLEAN Future Act would establish a competitive grant program for state and local governments, territories, and tribes to apply for funding to improve the resilience of the electric distribution system, including by hardening utility poles, wiring, cables, and other equipment.¹⁷⁹

Recommendation: Congress should establish a competitive grant fund for state and local governments, tribes, and territories to invest in technologies and strategies to improve the resilience of the electric distribution system. Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Committee of Jurisdiction: Energy and Commerce

Building Block: Develop and Demonstrate Technologies and Tools to Improve Grid Resilience

Increasing use of advanced transmission technologies and distributed energy resources to reduce greenhouse gas emissions and improve resilience to climate change impacts will require anticipating and resolving cybersecurity risks as well as threats posed by extreme weather and other climate impacts.

Rep. Ami Bera (D-CA) introduced the Grid Security Research and Development Act (H.R. 5760), which would direct DOE to develop a comprehensive research, development, and demonstration program to increase the resilience of both the bulk power and distribution grids to climate impacts and cyber and

¹⁷⁶ David R. Baker, "There's No Easy Way to End California's Bedeviling Blackouts," Bloomberg, Nov. 2, 2019.

¹⁷⁷ Levin Simes Abrams, "Electrical Power 3rd Most Common Cause of CA Wildfire," Apr. 24, 2019, <https://www.levinsimes.com/electrical-power-3rd-most-common-cause-of-wildfire/>. Accessed June 2020.

¹⁷⁸ Lawrence Berkeley National Laboratory, LBNL-1007027, *Projecting Future Costs to U.S. Electric Utility Customers from Power Interruptions* (2017).

¹⁷⁹ Title II, Section 232, CLEAN Future Act discussion draft.

physical attacks by developing technologies and tools. The bill would also direct DOE to develop a research, development, and demonstration program to increase emergency response and management capabilities.

Recommendation: Congress should direct DOE to develop a comprehensive research, development, and demonstration program to increase the resilience of both the bulk power and distribution grids to extreme weather and other climate impacts, cyber threats, and physical attacks by developing technologies and tools and increasing emergency response and management capabilities.

Committees of Jurisdiction: Science, Space, and Technology; Homeland Security

Building Block: Deploy Advanced Grid Technologies to Quickly Identify and Resolve Malfunctions in the Power System

Advanced grid technologies like sensors, advanced metering infrastructure, grid monitoring and control systems, and remote reconfiguration and redundancy systems can be used to detect problems remotely, such as power line damage because of lightning, tree branches, birds, or rodents. Some circuit problems can be resolved remotely. Many of these technologies can also help alleviate transmission constraints and better integrate distributed energy resources. In rural areas, deployment of these technologies may depend on the availability of broadband infrastructure. In the section titled “Prepare the Nation’s Telecommunications Network for Climate Impacts,” this report outlines recommendations to ensure urban and rural areas, including underserved and vulnerable communities, have access to broadband.

Section 31201 of the Energy and Commerce Committee Democrats’ LIFT America Act (H.R. 2741) would provide funding on a competitive basis to public-private partnerships to invest in deploying technologies that promote grid resilience or integrate distributed energy resources or communication and information technologies. This provision was also included in the Energy and Commerce Committee’s discussion draft of the CLEAN Future Act¹⁸⁰ and in Section 33111 of the House Democrats’ infrastructure bill, the Moving Forward Act (H.R. 2).

In addition, Section 232 of the CLEAN Future Act would direct DOE to establish a competitive grant program for states, local governments, and tribes to invest in technologies, upgrades, and measures that would improve the resilience of electricity delivery infrastructure; improve restoration time to reduce power losses; ensure continued delivery of power for essential services, such as hospitals, schools, and wastewater treatment plants; and facilitate greater incorporation of renewable energy into the electric grid.¹⁸¹ To implement these partnerships and programs, an expansive, skilled workforce is needed to build America’s modern and diversified grid. While some of these technologies are commercially available today, additional research and development could produce faster, more intelligent reclosers and improve downed line technologies.

Recommendation: Congress should provide funding on a competitive basis for state and local governments and public-private partnerships to upgrade the electric transmission and distribution system.

¹⁸⁰ Title II, Section 231, CLEAN Future Act discussion draft.

¹⁸¹ Title II, Section 232, CLEAN Future Act discussion draft.

Recommendation: Congress should provide funding for states, local governments, and tribes to invest in technologies, upgrades, and operational measures to improve the resilience of electricity delivery infrastructure; improve restoration time to reduce power losses; ensure continued delivery of power for essential services such as hospitals, schools, and wastewater treatment plants; and facilitate greater incorporation of renewable energy into the electric grid. Projects funded with federal assistance should include a cybersecurity plan and should meet high-road labor standards.

Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant. As part of their application, states, local governments, and tribes should include a summary of a gap assessment within their communities related to the resilience of electricity delivery infrastructure to ensure that grant funding will go toward communities most in need.

Recommendation: Congress should increase funding for DOE and National Lab research partnerships on advanced grid technologies, such as faster, more intelligent reclosers and improved downed line technologies.

Committees of Jurisdiction: Energy and Commerce; Science, Space, and Technology

Building Block: Establish a Strategic Transformer Reserve

Large power transformers are a key part of the electric grid because they increase and decrease the voltage of the electricity that is being transmitted, but they are not easy to replace if damaged. They can take as long as a year to build, and most manufacturing occurs outside of the United States. They are also difficult to transport because they may exceed the weight limits of roads. In a world with more extreme storms and weather events, these transformers are even more vulnerable. If several transformers were to go down because of a widespread event, power providers would have few easy solutions to restore the delivery of electricity quickly.

The 2015 Fixing America's Surface Transportation (FAST) Act directed DOE to study the need for a strategic transformer reserve, which would consist of spare large power transformers and emergency mobile substations in strategically located facilities to support critical electric infrastructure and defense and military installations.

In 2017, DOE released its report, concluding that the federal government should support industry-based approaches to ensure the resilience of large power transformers.¹⁸² Federal support could focus on a number of areas, such as assessing the resilience of critical large power transformers; developing impact and threat scenarios to inform federal reliability standards applicable to the transformers; supporting regional collaboration and coordination among utilities to enable access to spare transformers; providing technical support to small utilities and municipalities; and coordinating plans for the transportation of transformers and substations in the event of an emergency.¹⁸³

¹⁸² U.S. Department of Energy, *Strategic Transformer Reserve: Report to Congress* (2017).

¹⁸³ Ibid.

The Energy and Commerce Committee Democrats' LIFT America Act (H.R. 2471) would direct DOE to establish a program to reduce the vulnerability of the electric grid to extreme weather and attacks, including by ensuring that large power transformers and other critical electric grid equipment are strategically located to restore grid function rapidly, and establish a coordinated plan to facilitate transportation of large power transformers and other critical grid equipment. The bill would also authorize DOE to create one or more federal strategic equipment reserves. In addition, the bill would authorize DOE to provide rebates for energy-efficient replacement of transformers. These provisions were also included in the Energy and Commerce Committee's discussion draft of the CLEAN Future Act.¹⁸⁴ The House Democrats also included the provision authorizing DOE to provide rebates for energy-efficient replacement of transformers in Section 33112 of the House Democrats' infrastructure bill, the Moving Forward Act (H.R. 2).

Recommendation: Congress should authorize funding for DOE to continue working with the utility industry to deploy spare large power transformers and emergency mobile substations in strategically located facilities to support critical electric infrastructure and defense and military installations.

Committee of Jurisdiction: Energy and Commerce

Building Block: Help Grid Operators Prepare for the Impacts of Preventative Power System Shutoffs

In October 2019, California's largest utility, PG&E, announced Public Safety Power Shutoffs, which left millions of Americans without electricity. PG&E implemented these shutoffs in order to reduce wildfire risk in dry, windy conditions. Large-scale power shutoffs in one state have the potential to cause grid-wide impacts across the region. As dozens of independent grid operators serve the Western half of the country, increased coordination would help to mitigate the regional consequences of localized grid outages.

Recommendation: Congress should direct FERC to organize a technical conference to help Western grid operators plan for and minimize the regional grid impacts of preventative power shutoffs to reduce wildfire risks. Information from the technical conference should be provided to potentially affected communities to help them understand and prepare for those risks.

Committee of Jurisdiction: Energy and Commerce

EXPAND DEPLOYMENT OF DISTRIBUTED ENERGY RESOURCES

Distributed energy resources (DERs) can help reduce greenhouse gas emissions and enhance community resilience to physical climate impacts. Expanded deployment of DERs can facilitate a more flexible grid that can integrate a higher percentage of renewable energy. DERs also give consumers more choice in the type of energy they use and allow consumers to become part of the full set of resources on the electric grid.

¹⁸⁴ Title II, Sections 237 and 238, CLEAN Future Act discussion draft.

Increasingly, commercially available DERs like solar PV, small wind, battery and thermal storage, demand response, CHP, advanced energy management, and microgrids also contribute to community resilience to power losses.¹⁸⁵ If configured appropriately, they can provide backup power to help homes, businesses, and hospitals withstand power interruptions, whether they are caused by preventative power shutoffs or a downed power line. The section of this report titled “Support Community Preparedness for the Health Impacts of Disasters” further describes the value of distributed energy resources for helping vulnerable populations who depend on electricity for their medical needs.

In the 114th Congress, Rep. Kathy Castor (D-FL) introduced the Clean Distributed Energy Grid Integration Act, which emphasized the energy savings and reliability benefits of integrating customer-side or behind-the-meter technologies into the electric grid.¹⁸⁶ The bill would have directed DOE to review technical and regulatory barriers that are slowing the pace of deployment.

A comprehensive approach is needed to maximize the potential for DERs to help integrate higher levels of renewable energy, reduce household energy costs, and boost resilience to climate impacts.

Building Block: Provide Financial Incentives to Help Communities Deploy Distributed Energy Resources

As climate-related threats intensify, policymakers are paying greater attention to the need to provide communities with funding to prepare for power outages.

Rep. Jared Huffman (D-CA) introduced the Wildfire Defense Act (H.R. 5091), which would provide funding for communities to develop Community Wildfire Defense Plans that would implement a broad suite of strategies to improve preparedness, including deploying distributed energy resources such as microgrids with battery storage.

Chairman Frank Pallone (D-NJ) and Energy and Commerce Committee Democrats introduced the LIFT America Act (H.R. 2741) and released a discussion draft of the CLEAN Future Act. Both bills would create a Clean Distributed Energy Program to provide state and local governments, tribes, territories, utilities, and colleges with financing and funding for DERs. A national climate bank, discussed in the section of this report titled “Drive Innovation and Deployment of Clean Energy and Deep Decarbonization Technologies,” also could provide the financing for DERs.

In the LIFT America Act and the CLEAN Future Act, DERs include CHP, demand response, distributed generation, district energy systems, microgrids, renewable energy resources, battery storage, and thermal energy storage. The bills would establish a DOE loan program that could directly deploy DERs and fund state and local revolving loan funds to do the same. The bills would also direct DOE to establish a technical assistance and competitive grant program to help with planning, permitting, and financing DERs. Moreover, Section 236 of the CLEAN Future Act would direct DOE to establish a demonstration program to promote the development of microgrids incorporating renewable energy to help isolated communities and to increase the resilience of critical infrastructure.

¹⁸⁵ DeWayne Todd, *Consumer Perspectives on Grid Resilience* (Advanced Energy Management Alliance, 2020).

¹⁸⁶ H.R. 4393, “Clean Distributed Energy Grid Integration Act,” 114th Congress, <https://www.congress.gov/bill/114th-congress/house-bill/4393>.

Recommendation: Congress should provide funding for communities to develop Community Wildfire Defense Plans that would deploy distributed energy resources.

Recommendation: Congress should authorize DOE to provide funding through loans and grants for state and local governments, tribes, and territories to deploy DERs, including funding state and local revolving loan funds and credit enhancement programs to encourage deployment of DERs and providing technical assistance to aid in planning, permitting, and financing for DERs. Before allocating these federal funds, state and local governments, tribes, and territories should identify the communities most in need of DER improvements, including low-income communities, and distribute funds according to those needs. Hospitals should receive priority for these funds, as appropriate.

Recommendation: Congress should direct DOE to establish a demonstration program to promote the development of microgrids to help isolated communities and increase the resilience of critical infrastructure. The program should encourage hiring from the local workforce to operate and maintain the microgrids.

For each of these recommendations, federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Committees of Jurisdiction: Energy and Commerce; Natural Resources; Agriculture

Building Block: Direct Utilities to Consider Deploying Non-Wires Solutions

Greater use of DERs could in some cases avoid the need to build new substations to meet increasing electricity demand. For example, ConEdison developed the Brooklyn-Queens Demand Management Demand Response project made up of distributed resources, energy efficiency, and demand response to avoid investing \$1.2 billion to upgrade a substation.¹⁸⁷ Due to examples like this one, DERs are sometimes referred to as “Non-Wires Alternatives.”

Title II, Subtitle C, Sections 221 and 223 of the CLEAN Future Act would amend the PURPA to require electric utilities to consider investing in energy storage and to implement non-wires solutions when appropriate.¹⁸⁸ Non-wires solutions include distributed generation, energy storage, energy efficiency, demand response, microgrids, and grid software and controls.

Recommendation: Congress should amend PURPA to require state regulatory commissions to consider adopting rate designs that would require utilities to demonstrate that they have considered investing in energy storage and to require electric utilities to implement, where possible, cost-effective non-wires solutions such as distributed generation, energy storage, end-use energy efficiency, demand response, microgrids, and grid software and controls to promote grid resilience.

Committee of Jurisdiction: Energy and Commerce

¹⁸⁷ ConEdison, “Brooklyn Queens Demand Management Demand Response Program,” <https://www.coned.com/en/business-partners/business-opportunities/brooklyn-queens-demand-management-demand-response-program>. Accessed June 2020.

¹⁸⁸ Title II, Sections 221 and 223, CLEAN Future Act discussion draft.

Building Block: Establish a Voluntary National Standard to Permit and Inspect Distributed Energy Resources

Even as consumers grow increasingly interested in DERs like rooftop solar, they may have trouble obtaining the necessary permits for installation from local governments, which do not have the resources to keep up with new technologies.

Rep. Paul Tonko (D-NY) introduced the American Energy Opportunity Act of 2019 (H.R. 5335), which would establish a process to standardize permitting for distributed energy systems, including distributed renewable energy generation from solar, wind, hydrogen electrolysis and fuel cell systems, energy storage, electric vehicle (EV) chargers, and hydrogen fuel cell refueling. The bill would direct DOE to create a Distributed Energy Opportunity Board made up of representatives from federal agencies; state, local, and tribal governments; building code agencies and organizations; and companies and trade associations representing distributed energy generation and battery storage. The Board would establish a voluntary program for facilitating streamlined permitting of distributed energy systems and inspection of distributed energy system installers. The Board would be authorized to create an online permitting system, a model expedited permit-to-build protocol system, provide technical assistance, investigate the development of voluntary national certifications for distributed energy system installers and qualifying distributed energy systems, and develop a voluntary national inspection protocol.

The bill would also authorize DOE to award competitive grants to adopt the model expedited permit-to-build protocol, and direct DOE to designate communities that adopt the model expedited permit-to-build protocol as Distributed Energy Opportunity Communities.

This bill was included in the Energy and Commerce Committee's discussion draft of the CLEAN Future Act.¹⁸⁹

Recommendation: Congress should direct DOE to establish a Distributed Energy Opportunity Board to create a voluntary program to facilitate streamlined permitting and inspection of distributed energy systems and to provide technical assistance.

Committee of Jurisdiction: Energy and Commerce

Building Block: Develop Analytical Tools to Help Deploy Distributed Energy Resources

In several areas, DOE could help electric power providers and wholesale power market operators make better use of distributed energy resources.

Electric power providers may not have planning and modeling tools and mapping information that would allow them to examine how to deploy distributed energy resources to meet customer demand for electricity.¹⁹⁰ DOE could assess business models for the use of distributed energy resources that include customer participation, including through third-party aggregation, and identify any barriers to the use of the potential business models.

¹⁸⁹ Title II, Section 246, CLEAN Future Act discussion draft.

¹⁹⁰ Energy Systems Integration Group, *Toward 100% Renewable Energy Pathways: Key Research Needs* (2019).

Wholesale power market operators also need improved planning and modeling tools to integrate these resources into power markets. DOE could develop these tools in partnership with FERC and the National Labs.

Rep. Conor Lamb (D-PA) introduced the Grid Modernization Research and Development Act of 2019 (H.R. 5428), which would reauthorize DOE's electric grid research, development, and demonstration activities. The bill would extend and expand the Smart Grid Regional Demonstration Initiative to include a focus on integrating distributed energy resources and improving system resilience. It would also direct DOE to conduct activities to improve electric grid planning and modeling tools; enhance grid resilience and emergency response; and better integrate hybrid energy systems and distributed energy resources into the electric grid.

Recommendation: Congress should reauthorize and increase funding for the DOE's electric grid research, development, and demonstration activities related to distributed energy resources. DOE should develop planning and modeling tools and mapping information to inform utilities, consumers, third-party solution providers, and wholesale power market operators.

Committee of Jurisdiction: Science, Space, and Technology

Building Block: Eliminate Barriers to the Integration of Distributed Energy Resources in Wholesale Power Markets

Aggregating DERs allows many individual DERs to jointly meet the needs of the bulk electric system. While this is technically possible today, it only takes place where market rules have been updated. Across the country, current rules governing wholesale power markets do not uniformly allow DERs to offer their services and receive payment. The California Independent System Operator is a positive example of a wholesale power market that has started down this path with more than 7 GW of distributed energy resource capacity installed.¹⁹¹ Progress is not uniform across the country, however. Many ISOs and RTOs need to update their market rules. To direct them to do so, FERC initiated but has not finalized a rulemaking on enabling networks of DERs to aggregate and compete in wholesale power markets.¹⁹²

Recommendation: Congress should direct FERC to finalize the rulemaking to enable networks of DERs to aggregate and compete in wholesale power markets. The rule should allow consumer and aggregator participation in all states with FERC-jurisdictional markets.

Committee of Jurisdiction: Energy and Commerce

¹⁹¹ Federal Energy Regulatory Commission, Docket No. AD18-10-000, *Distributed Energy Resources: Technical Considerations for the Bulk Power System* (2018).

¹⁹² Jennifer Chen, "FERC Storage Rule a Win for a More Flexible Grid," Natural Resources Defense Council, Feb. 20, 2018, <https://www.nrdc.org/experts/jennifer-chen/ferc-storage-rule-win-more-flexible-grid>. Accessed June 2020.

Building Block: Allow Communities to Invest Federal Disaster Aid Funds in Clean Distributed Energy Resources

In the section of the report titled “Make U.S. Communities More Resilient to the Impacts of Climate Change,” the majority staff for the Select Committee outlines recommendations for disaster aid programs managed by the Federal Emergency Management Agency (FEMA) and the Department of Housing and Urban Development (HUD). These funds include the FEMA Pre-Disaster Mitigation grants and the HUD Community Development Block Grants – Disaster Recovery (CDBG-DR) Program. FEMA recently confirmed that in certain circumstances, grant recipients may invest Pre-Disaster Mitigation funds in clean distributed energy resources such as solar microgrids.¹⁹³ Similar questions may be asked about CDBG-DR funds.

Allowing communities to invest these federal funds in clean distributed energy resources could help improve their ability to withstand power losses due to extreme weather events and preventative power system shutoffs.

Recommendation: Congress should allow communities to use federal disaster aid funds to purchase clean distributed energy resources.

Committee of Jurisdiction: Transportation and Infrastructure

Make the Clean Energy Economy Work for All Americans

Building Block: Help Rural Communities Access More Renewable Energy

Rural communities often do not have the financial resources to invest in zero-carbon electricity. Many rural residents receive their electricity from nonprofit electric cooperatives, which are not eligible for federal tax credits. Rural cooperatives often rely on coal-fired power plants, for which they have taken on significant debt. As of 2010, 53 electric cooperatives had a total of \$8.4 billion in loan guarantees from the U.S. Department of Agriculture (USDA) Rural Utilities Service for coal infrastructure.¹⁹⁴

Rep. Earl Blumenauer (D-OR) introduced the Renewable Energy Investment Act of 2019 (H.R. 5157), which would allow an alternative method, direct payment, to claim the benefit of a renewable electricity PTC that would be helpful to nonprofit rural electric cooperatives. House Ways and Means Committee Democrats included a similar provision in Section 104 of the GREEN Act of 2020 (H.R. 7330).

Rep. Tom O’Halleran (D-AZ) introduced the Expanding Access to Sustainable Energy Act of 2019 (H.R. 4447), which would direct DOE to create a program to provide grants and technical assistance to rural cooperatives to develop storage and microgrid projects using renewable energy. The Energy and Commerce Committee’s discussion draft of the CLEAN Future Act and Section 33115 of the House Democrats’ infrastructure bill, the Moving Forward Act (H.R. 2), incorporates the O’Halleran bill. More

¹⁹³ Office of Sen. Kamala Harris, “As Shutoffs Continue, Harris Vows to Help California Cities Secure Federal Resources to Help Mitigate Future Outages,” Jun. 4, 2019.

¹⁹⁴ Erik Hatlestad et al, *Rural Electrification 2.0: The Transition to a Clean Energy Economy* (Center for Rural Affairs, 2019).

broadly, New Mexico and Colorado have created programs to use low-interest bonds to help refinance coal-fired power plants to accelerate the transition to cleaner sources of electricity. In New Mexico, some of the proceeds may go to worker training and developing new economic opportunities for communities in transition, while in Colorado funding for worker training and new economic development would come from the general fund.¹⁹⁵

Recommendation: Congress should provide an alternative method to help rural cooperatives capture the benefits of the renewable electricity PTC.

Recommendation: Congress should direct DOE to create a program to provide grants and technical assistance to rural electric cooperatives to develop storage and microgrid systems using renewable energy.

Recommendation: Congress should increase funding for loans and grants through USDA loan guarantee programs and Rural Utilities Service programs for clean energy investments. Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Committees of Jurisdiction: Ways and Means; Energy and Commerce; Science, Space, and Technology; Agriculture

Building Block: Expand Low-Income Residential Solar

Home and property owners who install solar PV on their rooftops save money on their energy bills by generating their own electricity rather than purchasing power from utilities. Low-income communities often cannot benefit from solar PV, as residents are less likely to own their homes or be able to afford the upfront installation costs.

Rep. A. Donald McEachin (D-VA) introduced the Low-Income Solar Energy Act (H.R. 4291), which would increase funding for the Low-Income Housing Energy Assistance Program (LIHEAP) and expand it so that states and tribes may use as much as 25% of the funds to invest in solar energy. The bill would also direct DOE to create new financing programs for residential solar geared toward low-income families and to provide interest-free loans for low-income access to community solar and other solar energy projects.

In addition, the legislation would allow public housing authorities to contract with solar energy companies and reinvest any savings to continue to help low-income families. It would clarify HUD's regulations so that lower energy bills from solar energy upgrades would not lead to rent increases for tenants. Finally, the bill would direct DOE to create a solar workforce program targeting veterans, women, unemployed energy workers, and formerly incarcerated persons.

¹⁹⁵ New Mexico S.B. 489, “Energy Transition Act,” (2019 Regular Session), Colorado H.B.19-1314, “Just Transition from Coal-Based Electrical Energy Economy,” (2019 Regular Session).

Recommendation: Congress should provide a comprehensive set of solutions to expand the access of low-income Americans to solar energy. Congress should increase funding for LIHEAP and expand the program so that more funds may be invested in solar energy. Congress should direct DOE to create financing programs to expand access for low-income Americans to residential and community solar energy projects, particularly in conjunction with affordable housing developments. In developing these policies, Congress should solicit early input from the communities they are designed to benefit.

Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Recommendation: Congress should direct DOE to work with DOL to establish a solar workforce program focused on veterans, women, displaced and dislocated energy workers, formerly incarcerated persons, and other individuals who have historically faced barriers to employment. Congress should direct DOL to engage representatives from these stakeholder groups to ensure the solar workforce program achieves its intended goal of inclusive participation.

Committees of Jurisdiction: Energy and Commerce; Financial Services; Education and Labor

Building Block: Expand Community Solar Initiatives

Many Americans are not able to install solar PV because they rent their homes or live in multi-family apartment buildings. Similarly, churches and other nonprofit neighborhood organizations have a harder time developing small solar projects because they are not able to take advantage of tax credits to defray capital costs.

Community solar projects allow neighbors to jointly finance a solar project and receive credit on their electric bills for the generation.¹⁹⁶ These projects also provide complementary benefits, including greater energy democracy, community self-determination and wealth-creation, grid resilience, and local construction jobs.

Assistant Speaker Ben Ray Luján (D-NM) introduced the Community Solar Consumer Choice Act of 2020 (H.R. 5968), which would direct DOE to provide technical assistance and expand community solar options for low-and moderate-income Americans and for nonprofit organizations. The bill would direct DOE to align the program with existing federal programs that serve low-income communities. The bill would also encourage the federal government to participate in community solar projects. In addition, the legislation would amend Section 111(d) of PURPA to require utilities to consider offering community solar programs.

Section 242 of the discussion draft of the CLEAN Future Act and Section 33131 of the House Democrats infrastructure bill, the Moving Forward Act (H.R. 2), would establish a competitive program to provide

¹⁹⁶ Solar Energy Industries Association, “Community Solar,” <https://www.seia.org/initiatives/community-solar>. Accessed June 2020.

loans and grants to state, local, and tribal governments and other organizations for community solar projects.¹⁹⁷

Recommendation: Congress should direct DOE to create a new Solar Communities Initiative that will establish by 2040 a national goal of generating 10% of electricity through distributed solar energy to help create an inclusive clean energy economy.

Recommendation: Congress should amend Section 111(d) of PURPA to require utilities to consider offering community solar programs.

Recommendation: Congress should provide loans and grants to state, local, and tribal governments and other organizations to develop community solar projects. To receive funding, developers must demonstrate stakeholder engagement and local support for the solar project.

Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Recommendation: Congress should authorize and encourage federal agencies to participate in community solar projects.

Committees of Jurisdiction: Energy and Commerce; Oversight and Reform

Building Block: Expand On-Bill Financing for Clean Energy and Clean Vehicle Technologies

Utilities in several states have explored using on-bill financing to help low-income Americans invest in energy efficiency upgrades. On-bill financing allows a utility or third party to lend capital to ratepayers to invest in upgrades that are repaid over time through savings on electric bills.¹⁹⁸ For low- and moderate-income Americans and small businesses, on-bill financing opens the door to investments that would otherwise be unavailable due to the high upfront and borrowing costs. Utilities can access capital at lower interest rates than consumers and small businesses.

Existing on-bill financing programs could be expanded to help accelerate the deployment of climate solutions, such as electric space and water heating appliances, distributed renewable energy, and electric vehicle supply equipment, in a way that is more accessible to low- and moderate-income Americans and small businesses than relying on traditional financing or incentives like tax credits.

Recommendation: Congress should direct DOE to provide utilities with technical assistance to expand on-bill financing for energy efficiency, distributed renewable energy, electrification of space and water heating, and electric vehicle supply equipment.

Committee of Jurisdiction: Energy and Commerce

¹⁹⁷ Title II, Section 242, CLEAN Future Act discussion draft.

¹⁹⁸ American Council for an Energy-Efficient Economy, “On-Bill Energy Efficiency,” Feb. 5, 2020, <https://www.aceee.org/toolkit/2020/02/bill-energy-efficiency>. Accessed June 2020.

Building Block: Ensure that U.S. Territories Can Take Advantage of Renewable Energy

Hurricane Maria devastated Puerto Rico and demonstrated the importance of onsite renewable energy generation. U.S. territories are often on the front lines of the impacts of climate change and may require unique scientific and technical assistance to understand climate-related threats, develop renewable energy systems, and build resilience. U.S. territories also face serious financial challenges.

Rep. Ted Lieu (D-CA) introduced the Renewable Energy for Puerto Rico and the U.S. Virgin Islands Act (H.R. 2360), which would direct the USDA to develop a grant program for Puerto Rico and the Virgin Islands for investments in renewable energy, energy efficiency, energy storage, microgrids, and worker training.

Beyond solar energy and microgrids, offshore wind resources could help power U.S. territories. However, the Outer Continental Shelf Lands Act (OCSLA) does not apply to U.S. territories. Rep. Jenniffer Gonzalez-Colon (R-PR) introduced the Offshore Wind for Territories Act (H.R. 1014). This bill would expand OCSLA to include U.S. territories. It would establish a process for offshore wind leasing and would provide dedicated funding for coral reef conservation. Elsewhere, this report outlines policy recommendations to ensure that deployment of offshore wind projects protects the integrity of the marine environment, including sensitive species.

Recommendation: Congress should provide technical assistance and funding through USDA to deploy resilient renewable energy and microgrid systems in U.S. territories, including American Samoa, the Commonwealth of the Northern Mariana Islands, Guam, Puerto Rico and the U.S. Virgin Islands. Congress should authorize federal agencies to issue waivers to territories for matching fund requirements under these and other climate-related existing grant programs.

Recommendation: Congress should increase funding for DOI's Office of Insular Affairs to work with territories to invest in resilient and clean energy infrastructure and other climate solutions.

Recommendation: Congress should expand OCSLA to apply to U.S. territories, establish a process for offshore wind leasing, and provide dedicated funding for coral reef conservation.

Recommendation: Congress should include territories in the "state" definition of any renewable energy or climate-related legislation to ensure territories have access to programs and funding.

Committees of Jurisdiction: Agriculture; Energy and Commerce; Natural Resources; Science, Space, and Technology

Work with Tribal Leaders to Expand Deployment of Clean Energy

Tribal nations can contribute to the deployment of climate solutions using their natural resources and long-standing tenets of environmental stewardship. The National Congress of American Indians (NCAI) outlined Indian Country's priorities for addressing the climate crisis in a resolution that emphasizes the importance of economic development and tribal sovereignty as part of the transition to a clean energy economy.¹⁹⁹ Offices within the Department of the Interior (DOI) and DOE have provided technical assistance to tribes on clean energy, but the level of support for these initiatives is often inconsistent between administrations. Broader infrastructure backlogs at the DOI Bureau of Indian Affairs also need attention and funding.

In addition, major federal statutes like the Federal Power Act, Public Utility Regulatory Policies Act, and the Rural Electrification Act are silent on the jurisdiction of tribes over utilities, which leaves tribes subject to state regulation of these utilities, even when they operate on tribal lands. In a 2015 resolution, NCAI urged Congress to clarify that Indian tribes have regulatory jurisdiction over utility facilities on reservations or villages.²⁰⁰ The following building blocks would help tribal nations transition to clean energy in line with the treaty and trust responsibilities of the federal government.

Building Block: Provide Clean Energy Financial Incentives That Work for Tribes

Tribes are generally not eligible to take advantage of federal tax credits, so it can be difficult to incentivize clean energy development on tribal lands. NCAI has called for Congress to provide tribes with an option to capture the benefits of tax credits.²⁰¹

Rep. Gwen Moore (D-WI) introduced the Promoting Sustainable Energy Projects for Tribal Communities Act of 2019 (H.R. 5158), which would provide tribes with an alternative method of claiming the benefit of a renewable electricity PTC, such as direct payment. Rep. Earl Blumenauer (D-OR) introduced the Renewable Energy Investment Act of 2019 (H.R. 5157), which would do the same and also allow for other taxpayers to claim the benefit of a reduced renewable electricity PTC. House Ways and Means Committee Democrats included similar provisions in Section 104 of the GREEN Act of 2020 (H.R. 7330).

Recommendation: Congress should support and strengthen the ability of tribal governments to capture the benefits of clean energy tax credits, such as through direct payment.

Committee of Jurisdiction: Ways and Means

Building Block: Expand the Office of Indian Energy Policy and Programs

In the section of the report titled “Drive Innovation and Deployment of Clean Energy and Deep Decarbonization Technologies,” the majority staff for the Select Committee recommends updating the mission of DOE to include a focus on the climate crisis. Consistent with those recommendations,

¹⁹⁹ National Congress of American Indians, “Resolution #MOH-17-053: Continued Support for the Paris Climate Agreement and Action to Address Climate Change” (2017).

²⁰⁰ National Congress of American Indians, “Resolution #SD-15-038: Indian Country’s Priorities for Federal Energy Legislation” (2015).

²⁰¹ Ibid.

the DOE Office of Indian Energy Policy and Programs could play an expanded role as a bridge between the agency and tribal nations along with DOI's Office of Indian Energy and Economic Development. Additional funding with priorities established by tribal leadership is needed for this to succeed.

One technical issue is that the definition of "Indian land" under the Energy Policy Act of 1992 does not include Alaska Native villages. Another structural issue is that tribal nations vary in their access to economic resources, so many are not able to participate in programs that include cost-share requirements.

More broadly, NCAI recommends that the DOE Office of Indian Energy Policy and Programs provide greater funding for tribal utility and energy infrastructure, including distributed renewable energy generation and energy-efficiency and electrification programs, in coordination with HUD's Office of Public and Indian Housing.²⁰² Elsewhere, this report recommends allocating Weatherization Assistance Program funds to tribal communities and reauthorizing and expanding the Energy Efficiency and Conservation Block Grant program to include electrification and allowing eligibility for tribal governments.

The discussion draft of the Energy and Commerce Committee's CLEAN Future Act would expand the definition of Indian land in the Energy Policy Act of 1992 to include areas where the majority of residents are members of Alaska Native tribes.²⁰³ It would also increase authorization for the DOE Office of Indian Energy Policy and Programs and authorize the reduction of cost share requirements for energy projects funded by that office in cases of financial need. The House Democrats included these provisions of the CLEAN Future Act in Section 33161 of their infrastructure bill, the Moving Forward Act (H.R. 2).

Recommendation: Congress should increase funding for the DOE Office of Indian Energy Policy and Programs and DOI's Office of Indian Energy and Economic Development to work with tribes to invest in tribal utility and clean energy infrastructure and other climate solutions.

Recommendation: Congress should expand the definition of Indian land in the Energy Policy Act of 1992 to include areas where most residents are members of Alaska Native tribes.

Recommendation: Congress should authorize the Director of the DOE Office of Indian Energy Policy and Programs to reduce or eliminate cost share requirements for energy projects funded by that office in cases of financial need.

Recommendation: Congress should direct the DOE Office of Indian Energy Policy and Programs to work closely with HUD to expand energy-efficiency and electrification programs for tribes.

Recommendation: Congress should ensure that tribes are eligible for reauthorized and expanded Energy Efficiency and Conservation Block Grant funds. Congress should ensure that funds are set aside for tribes from the Weatherization Assistance Program.

Committees of Jurisdiction: Natural Resources; Energy and Commerce

²⁰² National Congress of American Indians, Resolution #SD-15-038: Indian Country's Priorities for Federal Energy Legislation, 2015.

²⁰³ Title II, Section 233, CLEAN Future Act discussion draft.

Building Block: Help Tribes Develop Business Models for Clean Energy and Climate Solutions

NCAI has called for consistent, long-term funding to support energy policy analysis and education to support decision-making by tribal leaders.²⁰⁴ Tribal nations often have opportunities to partner with multinational companies and foreign nations on innovative climate solutions, but tribal nations do not have the skills and resources to take advantage of all of these opportunities in an equitable manner.²⁰⁵ Moreover, dual taxation by states of commercial activity on Indian lands can have a chilling impact on clean energy investments.²⁰⁶ On the other side, clean energy project developers may be interested in partnering with tribes but often do not have expertise in Indian law.

Rep. Tom O'Halleran (D-AZ) introduced the Providing Recovery Opportunities & Mitigating Industry's Shifting Economics (PROMISE) Act (H.R. 4318), which would provide grant funding to tribes that are transitioning away from fossil fuels to help them develop opportunities to diversify economically.

More broadly, institutions of higher education, such as colleges and universities, could help bridge the gap by partnering with tribes to analyze the myriad climate-related opportunities that are available. Funding from the DOE Office of Indian Energy Policy and Programs could facilitate partnerships between these leaders.

Recommendation: Congress should provide competitive grant funding for partnerships between institutions of higher education and tribes to analyze business opportunities for the development of tribal clean energy development and climate solutions.

Committees of Jurisdiction: Natural Resources; Education and Labor

Provide Federal Leadership Through Procurement

Building Block: Increase Federal Clean Electricity Purchase Goals

The Energy Policy Act of 2005 established federal renewable electricity purchase goals to help drive demand for what were at the time relatively new technologies. The costs of wind and solar energy have fallen dramatically since establishment of the goals, so they are due for an update. Updating the goals and implementing projects to meet those goals will create workforce opportunities for Americans around the country.

Rep. Julia Brownley (D-CA) introduced the Green Energy for Federal Buildings Act (H.R. 5142). This bill would require the federal government to increase its use of renewable energy to 35% of its total electricity by 2030, 75% by 2040, and 100% by 2050. This bill would also encourage the federal government to use renewable electricity that is produced on-site at federal facilities, on federal lands,

²⁰⁴ National Congress of American Indians, "Resolution #SD-15-038: Indian Country's Priorities for Federal Energy Legislation" (2015).

²⁰⁵ Michael Goldberg, "Q&A: President Fawn Sharp on why Tribal Nations are poised to lead the global response to climate change," *Washington State Wire*, Nov. 7, 2019, <https://washingtonstatewire.com/qa-president-fawn-sharp-on-why-tribal-nations-are-poised-to-lead-the-global-response-to-climate-change/>. Accessed June 2020.

²⁰⁶ National Congress of American Indians, "Resolution #ABQ-19-015: Urging the Secretary of the Treasury to Assist in Ending Dual Taxation of Economic Activity in Indian Country" (2019).

or on tribal lands, while also removing the current double-counting of renewable energy produced on these facilities and lands for the purposes of meeting the requirement.

In the section of the report titled “Maximize Energy Efficiency and Deploy More Clean Energy,” the majority staff for the Select Committee recommends Congress establish a clean energy standard to achieve net-zero emissions in the electricity sector by 2040.

Recommendation: Congress should direct the federal government to increase its purchase of clean electricity to 100% by 2040.

Committee of Jurisdiction: Oversight and Reform

Building Block: Enable Federal Agencies to Procure Zero-Carbon Electricity Over a Longer Period of Time

The federal government is the country’s largest user of electricity because of its large network of buildings. There is more the federal government could do with its procurement power. Existing law generally limits the length of contracts for public utility services to 10 years.²⁰⁷ With an extended contract length, these facilities could be powered by cost-effective investments in clean electricity. Federal procurement could also revitalize communities by creating jobs to satisfy new domestic demand for clean energy.

Rep. Peter Welch (D-VT) introduced the Renewable Energy Certainty Act (H.R. 932), which would authorize federal agencies to procure renewable energy and energy from co-generation sources for up to 30 years. Title II, Subtitle E, Section 247 of the discussion draft of the Energy and Commerce Committee’s CLEAN Future Act would authorize federal agencies to enter into contracts to purchase zero-emission electricity for up to 40 years.²⁰⁸

Recommendation: Congress should authorize federal agencies to enter into contracts for zero-carbon electricity for up to 40 years. These contracts should meet high-road labor standards and should provide local benefits to economically disadvantaged and historically marginalized communities, including tribal communities.

Committees of Jurisdiction: Energy and Commerce; Oversight and Reform

Building Block: Leverage TVA and the Federal Power Marketing Administrations for Regional Clean Energy Growth

The Tennessee Valley Authority (TVA) and the four federal power marketing administrations could help lead regional efforts to transition to clean energy, including by expanding transmission capacity in partnership with the private sector. The TVA is a federally owned agency that provides electricity and other services in the Southeast. Four federal power marketing administrations operate hydroelectric dams and sell electricity in 34 states: Bonneville Power Administration (BPA), Western

²⁰⁷ 40 U.S.C. § 501(b).

²⁰⁸ Title II, Section 247, CLEAN Future Act discussion draft.

Area Power Administration (WAPA), Southeastern Power Administration (SEPA), and the Southwestern Power Administration (SWPA).²⁰⁹ TVA and the four federal power marketing administrations also have transmission corridors that could host expanded transmission capacity that could enable the development of wind and solar energy nearby.

Section 1222 of the 2005 Energy Policy Act authorized WAPA and SWPA to enter into partnerships to upgrade existing electric power transmission facilities or develop new transmission facilities if the facilities would be located in a National Interest Electric Transmission Corridor and would reduce transmission congestion or accommodate increased demand.²¹⁰ No project has successfully used this existing authority.

Elsewhere, this report recommends modernizing the National Interest Electric Transmission Corridors program to, among other changes, consider greenhouse gas emissions and help achieve national climate goals. Consistent with those recommendations, Congress could modernize the Section 1222 program so that TVA and the four federal power marketing administrations could enter into partnerships to drive regional growth in clean energy, such as wind and solar energy. More research is needed on the legislative changes that would enable TVA and the four federal power marketing administrations to enter into such partnerships.

Recommendation: Congress should direct TVA and the four federal power marketing administrations to report to Congress on any legislative changes needed to enable them to enter into regional partnerships to expand clean energy growth. These legislative changes could include increases to borrowing authorities and amendments to the Federal Power Act.

Committees of Jurisdiction: Transportation and Infrastructure; Natural Resources

Building Block: Harness the Power of the Military for Net-Zero and Resilient Energy Installations

The U.S. military is the world's largest consumer of energy from fossil fuels.²¹¹ Among federal agencies, the Department of Defense (DOD) is responsible for 77% of the federal government's total energy use.²¹² Military officials are increasingly concerned about the impacts of climate change on installations and on global security, so DOD has embarked on several renewable energy initiatives.²¹³ Experts have identified near-term opportunities to reduce emissions in buildings and from non-tactical vehicles, which represent about 40% of DOD's greenhouse gas emissions.²¹⁴

Rep. Veronica Escobar (D-TX) introduced the Department of Defense Climate Resiliency and Readiness Act (H.R. 2759), which would direct DOD to achieve net-zero energy in military installations by 2030. The goal is that each installation will produce as much energy as it uses over the course of a year. The

²⁰⁹ U.S. Department of Energy, "Power Marketing Administrations," <https://www.energy.gov/ea/power-marketing-administrations>. Accessed June 2020.

²¹⁰ 42 U.S.C. § 16421.

²¹¹ Neta C. Crawford, *Pentagon Fuel Use, Climate Change, and the Costs of War* (Brown University, 2019).

²¹² Congressional Research Service, *Department of Defense Energy Management: Background and Issues for Congress* (July 2019).

²¹³ Office of the Assistant Secretary of Defense for Sustainment, "On-Site Distributed Energy Resources," https://www.acq.osd.mil/eie/FEP_Renewable_Energy.html. Accessed June 2020.

²¹⁴ Neta C. Crawford, *Pentagon Fuel Use, Climate Change, and the Costs of War* (Brown University, 2019).

bill excludes any operational sources, which are sources used to train, transport, and sustain the Armed Forces, weapons platforms, and any tactical power systems and generators at non-enduring DOD locations. The bill defines net-zero energy on an installation basis and requires an actual reduction in overall energy use, maximization of energy efficiency, and use of energy recovery and cogeneration capabilities. The bill requires DOD to produce onsite renewable energy at each installation to offset the remaining energy use.

Rep. Alcee Hastings (D-FL) introduced the National Defense Net Zero Review Act of 2020 (H.R. 7169), which would direct the Comptroller General of the United States to prepare a report on DOD's progress toward reaching net-zero goals and require the Secretary of Defense to develop the first integrated master plan for achieving DOD-wide net-zero goals for energy, water, waste management, and emissions. In addition, Rep. Sean Casten (D-IL) has released a discussion draft of the National Security Resiliency and Sustainability Act, which would set ambitious goals for clean energy procurement through mid-century for DOD.

As the military develops additional renewable energy projects to meet these ambitious goals, the projects will need to be resilient to climate change impacts. Currently, NREL provides assistance to DOD to ensure that renewable energy projects can withstand severe weather.²¹⁵ As the impacts of climate change continue to worsen, the demands on NREL will likely increase.

Recommendation: In the section of this report titled “Provide Federal Leadership on Buildings,” the majority staff for the Select Committee recommends that Congress require all new construction and major renovations of federal buildings achieve net-zero emissions by 2030. Consistent with that policy, Congress should direct the Comptroller General of the United States to assess how best to maximize net-zero energy implementation at military installations with the goal of achieving net-zero energy by 2030.

Recommendation: Congress should increase funding for NREL to partner with DOD to improve the resilience of renewable energy projects at military installations to climate change impacts.

Committee of Jurisdiction: Armed Services

²¹⁵ Bev Banks, “Army Unveils ‘Resilient’ Solar Panels, *E&E News*, February 4, 2020.

Build a Cleaner and More Resilient Transportation Sector

The transportation sector is the largest source of energy-related carbon dioxide emissions in the United States, accounting for 37% of all emissions in 2019. Light-duty cars and trucks accounted for 54% of transportation sector emissions, with heavy-duty freight trucks making up another 21%.²¹⁶ Whether the vehicle is a car or a bus or a ship, the formula is the same: emissions are a function of the vehicle's fuel efficiency, the fuel's carbon intensity, and the number of miles traveled each year.

Each part of the transportation sector faces different challenges to decarbonization. For passenger vehicles, the sheer size of the fleet makes rapid turnover an infrastructure challenge more than a technological one. For heavy-duty freight trucks, technology options like electrification may not be available in the short or medium term, given the need to carry weight and travel longer distances. For shipping and aviation, industry and experts are, relatively speaking, in the earlier stages of developing and deploying low- and zero-carbon alternatives to heavy fuels.

Congress needs to take a multi-pronged approach to the transportation sector to drive down emissions and increase the sector's resilience in the face of worsening climate impacts. Improving a vehicle's efficiency, for example, will not be enough if that vehicle travels farther each year. To improve resilience and move toward net-zero emissions in the transportation sector, Congress needs to enact a suite of federal policies to:

- Expedite deployment of zero-emission vehicles in the sectors where they are already available while making new gasoline-powered vehicles as clean as possible;
- Grow the U.S. domestic supply chain and manufacturing base for zero-emission vehicles as a key strategy to retain and create good-paying jobs;
- Invest in RDD&D to develop new zero-emission technologies for harder-to-decarbonize parts of the transportation sector;
- Support the development of low-carbon liquid fuels for passenger vehicles and other transportation modes for which electrification may not be an option, such as aviation, shipping, and long-haul trucking;
- Provide all Americans with additional lower-carbon, convenient, and affordable transportation options, including a massive expansion of public transit;
- Support states and localities in their efforts to adopt transit-oriented, smart growth strategies and make housing, businesses, and critical services more accessible; and
- Adapt, operate, and strengthen the nation's transportation systems to be more resilient to climate impacts.

Each of these bullets represents new manufacturing, new infrastructure, and a new opportunity to retain and create thousands of high-quality jobs across the transportation sector.

One area that the majority staff for the Select Committee did not tackle but remains important for Congress to discuss is the issue of the viability and equity of current revenue streams for highway and transit, including the gasoline tax. Congress should continue to explore and test options for

²¹⁶ Energy Information Administration, *Annual Energy Outlook 2020* (January 2020). “Table 19: Energy-Related Carbon Dioxide Emissions by End Use,” https://www.eia.gov/outlooks/aoe/tables_ref.php. Accessed June 2020.

alternatives that fund U.S. transportation infrastructure priorities while advancing environmental and climate priorities, such as a vehicle miles traveled (VMT) fee.

The following building blocks are key elements of a national legislative strategy to decarbonize the transportation sector.

Reduce Pollution from Passenger Vehicles by Deploying Cleaner Cars and Fuels

Light-duty vehicles, including passenger cars and SUVs, accounted for 54% of the U.S. transportation sector's energy-related carbon dioxide emissions in 2019 and 20% of all energy-related carbon dioxide emissions.²¹⁷ EIA predicts that carbon dioxide emissions from light-duty vehicles will fall by 22% between now and 2050 without additional policy intervention.²¹⁸ While a trend in the right direction, this decrease is not sufficient for the economy to achieve net-zero emissions by 2050.

To bend the emissions curve more quickly, federal policy needs to focus on expediting deployment of zero-emission vehicles and fueling infrastructure; making gasoline-powered vehicles as clean as possible by setting strong pollution standards; and pursuing lower-carbon liquid fuels as alternatives to gasoline as vehicles transition to zero-carbon options.

Any policy framework to transform the light-duty fleet must ensure that companies manufacture more advanced vehicles here at home and employ strong labor standards. Similarly, Congress needs to ensure that environmental justice communities benefit from the transition to cleaner vehicles.

ENSURE GASOLINE-POWERED VEHICLES ON THE ROAD ARE AS CLEAN AS POSSIBLE

Many experts who see vehicle electrification as the best way to cut carbon pollution from passenger vehicles also admit that this cannot happen overnight. Because the average light-duty vehicle stays on the road for 10 to 12 years, it will take decades to transition to a fully electric or zero-emission fleet.²¹⁹ Greenhouse gas emission standards for passenger vehicles need to be as strong as possible during this transition.

Building Block: Direct EPA to Use Its Existing Authority to Set Ambitious Greenhouse Gas Emission Standards for Light-Duty Vehicles and Trucks

The U.S. EPA has authority under Section 202 of the Clean Air Act to set greenhouse gas emission standards for new motor vehicles or vehicle engines.²²⁰ Under Section 209, if California satisfies certain specified requirements, EPA must waive federal preemption to allow California to set emissions

²¹⁷ Energy Information Administration, *Annual Energy Outlook 2020* (January 2020). “Table 19: Energy-Related Carbon Dioxide Emissions by End Use,” https://www.eia.gov/outlooks/aoe/tables_ref.php. Accessed June 2020.

²¹⁸ Ibid.

²¹⁹ Nic Lutsey, Dan Meszler, Aaron Isenstadt, John German, and Josh Miller, “Efficiency Technology and Cost Assessment for U.S. 2025-2030 Light-Duty Vehicles,” (International Council on Clean Transportation, 2017).

²²⁰ 42 U.S.C. § 7521.

standards for new vehicles as long as they are “at least as stringent as” federal standards;²²¹ under Section 177, states with nonattainment areas can adopt California’s vehicle emissions standards.²²² Thirteen other states, in whole or in part, follow these standards under Section 177.

In July 2011, President Barack Obama announced a historic agreement that aligned federal fuel economy standards, federal greenhouse gas emission standards, and state greenhouse gas emission standards and garnered the support of 13 major automakers, the United Auto Workers, and consumer and environmental organizations.²²³ In 2012, the Obama administration finalized these unified standards for model years 2017 through 2025 light-duty vehicles, building on standards already set for 2012-2016. The standards would achieve an average annual rate of carbon dioxide emissions reduction in model years 2017-2021 of 3.5% per year and 5% per year for model years 2022-2025.²²⁴ When fully implemented, the 2012-2016 and 2017-2025 standards were projected to save families more than \$1.7 trillion in fuel costs and reduce oil consumption by more than 2 million barrels per day in 2025.²²⁵

In August 2018, the Trump administration blew up this deal by proposing to flatline federal fuel economy and greenhouse gas emissions standards and revoke California’s waiver to set its own. In July 2019, the State of California announced that it had negotiated a voluntary agreement-in-principle to reduce emissions with Ford, Honda, BMW of North America, and Volkswagen Group of America. Volvo joined in the spring of 2020. Among other provisions, the agreement-in-principle provides less aggressive (3.7%) year-over-year reductions between 2022 and 2026 and includes flexibilities intended to spur the deployment of more zero-emissions vehicles.²²⁶

In April 2020, the Trump administration finalized weak standards for model years 2021 through 2026, reducing the year-over-year improvement to just 1.5%.²²⁷ The Trump administration set the stage for this attack in September 2019 by finalizing the revocation of the EPA waiver granted to California under Section 209 of the Clean Air Act and finalizing a rule arguing that federal law preempts state programs from regulating greenhouse gas emissions from light-duty vehicles.²²⁸

Section 401 of the Energy and Commerce Committee’s discussion draft of the CLEAN Future Act directs EPA to promulgate more stringent greenhouse gas emissions standards for new passenger

²²¹ 42 U.S.C. § 7543.

²²² 42 U.S.C. § 7507.

²²³ The White House, Office of the Press Secretary, “President Obama Announces Historic 54.5 mpg Fuel Efficiency Standard,” July 29, 2011, <https://obamawhitehouse.archives.gov/the-press-office/2011/07/29/president-obama-announces-historic-545-mpg-fuel-efficiency-standard>.

²²⁴ U.S. Environmental Protection Agency, “Fact Sheet: EPA and NHTSA Set Standards to Reduce Greenhouse Gases and Improve Fuel Economy for Model Years 2017-2025 Cars and Light Trucks,” August 2012.

²²⁵ *Ibid.*

²²⁶ California Air Resources Board, “California and major automakers reach groundbreaking framework agreement on clean emission standards,” July 25, 2019, <https://ww2.arb.ca.gov/news/california-and-major-automakers-reach-groundbreaking-framework-agreement-clean-emission>.

²²⁷ U.S. Environmental Protection Agency and National Highway Traffic Safety Administration, *The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021–2026 Passenger Cars and Light Trucks; Final Rule*, 85 Fed. Reg. 24174 (April 30, 2020).

²²⁸ U.S. Environmental Protection Agency and National Highway Traffic Safety Administration, *The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule Part I: One National Program; Withdrawal of waiver; final rule*, 84 Fed. Reg. 51310 (September 27, 2019).

cars and light-duty trucks, starting in model year 2026. The bill requires the new standards to achieve at least a 6% emissions reduction in model year 2026, relative to 2020 levels, and every year thereafter.²²⁹

Recommendation: Congress should direct the EPA to use its existing Clean Air Act authority to set new greenhouse gas emissions standards for passenger cars and light-duty trucks that achieve at least a 6% year-over-year pollution reduction for five years, starting in 2026, relative to baseline. When setting the baseline, Congress should consider the technology improvements forgone by the Trump administration's attack on the 2017-2025 program. California and other states should retain their existing authority under Clean Air Act Sections 209 and 177, respectively, to adopt emissions standards at least as stringent as federal standards.

Ambitious initiatives to ensure more domestic manufacturing of cleaner vehicles and their components must accompany these policies, including those described in the section of this report titled "Invest in Manufacturing of Clean Energy, Clean Vehicle, and Zero-Emission Technologies."

Recommendation: Congress should amend Section 177 of the Clean Air Act to allow all states to adopt and enforce California's motor vehicle emission standards.

Committee of Jurisdiction: Energy and Commerce

EXPEDITE THE DEPLOYMENT OF ZERO-EMISSION LIGHT-DUTY VEHICLES AND SUPPORTING INFRASTRUCTURE

The United States has more than 250 million light-duty vehicles on the road²³⁰ and an elaborate infrastructure to support them, making deployment of zero-emission alternatives a significant challenge. Providing consumer purchase incentives for zero-emission vehicles will not be enough. Instead, Congress needs to pursue both demand-pull and supply-push policies, including a national zero-emission vehicle sales standard; federal procurement requirements; consumer tax incentives to defray upfront vehicle costs; and tax incentives, grants, and other financial tools to help cities, states, and other entities to install electric charging stations and other zero-emission fueling infrastructure.

Building Block: Establish a Technology-Neutral National Zero-Emission Vehicle (ZEV) Sales Standard to Ensure All Light-Duty Vehicles Sold by 2035 Are Zero-Emission

California's clean cars and ZEV program—and the ability of states to opt into California's program under Section 177 of the Clean Air Act—has been the primary driver behind growing demand for zero-emission vehicles, particularly electric vehicles, in the United States. A 2018 Center for American Progress (CAP) study examined the effectiveness of various state policies to incentivize the

²²⁹ Section 401(a), CLEAN Future Act discussion draft.

²³⁰ U.S. Department of Transportation, Bureau of Transportation Statistics, "Number of U.S. Aircraft, Vehicles, Vessels, and Other Conveyances," <https://www.bts.gov/content/number-us-aircraft-vehicles-vessels-and-other-conveyances>. Accessed June 2020.

deployment of plug-in electric vehicles. CAP concluded that the ZEV mandate is “the best predictor of states with high plug-in electric vehicle market shares.”²³¹

In May 2019, Reps. Mike Levin (D-CA) and Joe Neguse (D-CO) introduced H.R. 2764, the Zero-Emission Vehicles Act of 2019. Sen. Jeff Merkley (D-OR) introduced the Senate companion (S. 1487). The bill requires that 50% of sales for new passenger vehicles be ZEVs by 2030. The sales requirement ramps up 5% each year to achieve 100% of new vehicle sales by 2040. The bill is technology-neutral, allowing for electric vehicles, hydrogen fuel cell vehicles, and other potential zero-emission technologies to qualify.

The American Lung Association has estimated that achieving 100% ZEV sales by 2050 in 10 states adopting California’s standards would reduce soot- and smog-forming pollution by 90% and deliver \$33 billion in total health and climate savings by 2050. These health benefits would translate to 195,000 fewer lost workdays, 96,000 fewer asthma attacks, and 2,200 fewer premature deaths.²³²

In September 2019, the Trump administration finalized a rule revoking the EPA waiver granted to California under Section 209 of the Clean Air Act that allows the state to set more stringent greenhouse gas emissions standards for light-duty vehicles. EPA also purports to have revoked the waiver of preemption for California’s ZEV program. The administration’s rule argues that federal law preempts state ZEV programs and state regulation of greenhouse gas emissions from light-duty vehicles.²³³

Recommendation: Congress should establish a technology-neutral national ZEV sales standard to ensure all light-duty vehicles sold by 2035 are zero-emission. The standard should include interim sales targets.

Any national ZEV standard should complement state and federal greenhouse gas standards and provide a floor, not a ceiling, for state efforts, including the 10 states with ZEV standards today. Existing state ZEV programs may expand and provide more rigorous standards than federal baseline standards, consistent with general Clean Air Act cooperative federalism principles.

Ambitious initiatives to ensure more domestic manufacturing of cleaner vehicles and their components must accompany these policies, including those described in the section of this report titled “Invest in Manufacturing of Clean Energy, Clean Vehicle, and Zero-Emission Technologies.”

Committee of Jurisdiction: Energy and Commerce

²³¹ Lia Cattaneo, *Plug-In Electric Vehicle Policy: Evaluating the Effectiveness of State Policies for Increasing Deployment* (Center for American Progress, 2018).

²³² Bonnie Holmes-Gen and Will Barrett, *Clean Air Future: Health and Climate Benefits of Zero Emission Vehicles* (American Lung Association, 2016).

²³³ U.S. Environmental Protection Agency and National Highway Traffic Safety Administration, *The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule Part I: One National Program; Withdrawal of waiver; final rule*, 84 Fed. Reg. 51310 (September 27, 2019).

Building Block: Extend Consumer Tax Credits for the Purchase of Electric Vehicles

Tax incentives and consumer rebates play an important role in driving consumer demand for new products or technologies, such as electric vehicles. The Institute of Transportation Studies at University of California-Davis identified 32 studies that show a positive relationship between financial purchase incentives and the sale of electric vehicles in the United States and globally.²³⁴

Under current law, consumers purchasing an electric vehicle can receive a tax credit of up to \$7,500. Once an automaker sells more than 200,000 electric vehicles, then the tax credits for the automaker's vehicles begin to phase out permanently. To date, Tesla and General Motors have hit the 200,000-vehicle cap.

On April 10, 2019, Rep. Dan Kildee (D-MI) introduced H.R. 2256, the Driving America Forward Act, which raises the cap and allows each automaker to sell an additional 400,000 vehicles with an accompanying \$7,000 tax credit. The bill maintains the \$7,500 tax credit for the first 200,000 electric vehicles sold per manufacturer. Sens. Debbie Stabenow (D-MI), Lamar Alexander (R-TN), Gary Peters (D-MI), and Susan Collins (R-ME) introduced S. 1094, the Senate companion. House Ways and Means Committee Democrats included this approach in Section 401 of the Growing Renewable Energy and Efficiency Now (GREEN) Act of 2020 (H.R. 7330), which the House Democrats added to their comprehensive infrastructure legislation, the Moving Forward Act (H.R. 2).²³⁵

Some members have taken a different approach. Rep. Peter Welch (D-VT) and Sen. Jeff Merkley (D-OR) introduced the Electric Credit Access Ready at Sale (CARS) Act of 2019 (H.R. 2042/S. 993). The Electric CARS Act eliminates the per-manufacturer cap entirely and authorizes it for 10 years. The bill also aims to expand electric vehicle adoption to lower- and middle-income consumers by allowing buyers to use the tax credit over a five-year period or apply the credit at the point of sale. In December 2019, Rep. Jackie Speier (D-CA) introduced the Affordable American-Made Automobile Act (H.R. 5393). Among its many provisions, the bill increases the electric vehicle tax credit to \$15,000 for cars costing less than \$35,000, which could make electric vehicles more accessible to middle-class households.

Recommendation: Congress should raise the per-manufacturer cap on the electric vehicle tax credit to support the deployment of these vehicles. Congress should consider making these tax credits refundable to make it easier for lower- and middle-income Americans to afford to buy electric or setting a transaction price cap to extend the life of the credits and apply to households most likely to benefit from and be motivated by the credit. Congress also should consider offering tiered incentives for electric vehicles based on their domestic content and adoption of strong labor standards at the facilities that manufacture or assemble the vehicles.

Committee of Jurisdiction: Ways and Means

²³⁴ Institute of Transportation Studies at University of California, Davis, "Credits and Rebates Play a Key Role in Building Consumer Market for Cleaner Electric Vehicles," undated, available at <https://its.ucdavis.edu/blog-post/credits-rebates-play-key-role-building-consumer-market-cleaner-electric-vehicles/>. Accessed June 2020.

²³⁵ Unless otherwise noted, mentions of H.R. 2 refer to the version of the bill contained in Rules Committee Print 116-54, dated June 22, 2020. The House of Representatives was preparing to debate H.R. 2 when the Select Committee's report went to print. The Rules Committee Print is available at <https://rules.house.gov/sites/democrats.rules.house.gov/files/BILLS-116HR2-RCP116-54.pdf> and will not reflect any amendments made to the bill after June 22, 2020.

Building Block: Incentivize the Purchase of Previously Owned Electric Vehicles

Hardworking Americans often struggle to afford new vehicles and rely on the used vehicle market. In response to this concern, California created the Clean Vehicle Assistance Program, which provides grants to auto dealerships to defray the costs of new or used hybrid or electric vehicles for lower-income residents.²³⁶

Members of Congress have proposed tax incentives to defray the cost of purchasing a used electric vehicle. In December 2019, Rep. Jackie Speier (D-CA) introduced the Affordable American-Made Automobile Act (H.R. 5393). Among its many provisions to spur deployment of electric vehicles, the bill creates a \$5,000 tax credit for the purchase of a used electric vehicle. In November 2019, Rep. Jimmy Gomez (D-CA) introduced the Affordable EVs for Working Families Act of 2019 (H.R. 5161) to provide a new income-based tax credit for the purchase of a previously owned electric vehicle. Buyers with up to \$30,000 (\$60,000 for married couples) in adjusted gross income can qualify for the full credit. House Ways and Means Committee Democrats included the key provisions from this bill in Section 402 of the GREEN Act of 2020 (H.R. 7330).

Recommendation: Congress should enact a federal tax incentive and/or create a grant program to facilitate the consumer purchase of used electric vehicles.

Committees of Jurisdiction: Ways and Means; Energy and Commerce

Building Block: Extend Consumer Tax Credits for Zero-Emission Fuel and Electric Vehicle Charging Infrastructure

Large-scale deployment of electric vehicles will require a similarly vast deployment of publicly available electric vehicle charging infrastructure. Consumers will expect charging stations to be as convenient and ubiquitous as gasoline stations. As of June 2020, the United States had 107,000 gasoline stations²³⁷ and 25,000 public electric vehicle charging stations.²³⁸ The pace of charging infrastructure deployment will have to grow rapidly to support an increasingly electric fleet.²³⁹ Other zero-emission vehicle technologies, like hydrogen fuel cells, will face even steeper challenges, given the relatively small number of fuel-cell vehicles on the road today.

The Section 30C Alternative Fuel Refueling Property Credit, which offers businesses and individuals a tax credit equal to 30% of the purchase price for any qualified alternative fuel vehicle refueling property, expired on December 31, 2017. The credit applies to fueling equipment for natural gas, propane, liquefied hydrogen, electricity, E85, and diesel fuel blends containing a minimum of 20% biodiesel.²⁴⁰

²³⁶ State of California, California Air Resources Board, “Clean Vehicle Assistance Program,” available at <https://cleanvehiclegrants.org/>. Accessed June 2020.

²³⁷ Bureau of Labor Statistics, “Gasoline Stations: NAICS 447,” <https://www.bls.gov/iag/tgs/iag447.htm>. Accessed June 2020.

²³⁸ U.S. Department of Energy, “Alternative Fuels Data Center,” available at <https://afdc.energy.gov/stations/#/analyze?fuel=ELEC>. Accessed June 2020.

²³⁹ Michael Nicholas, Dale Hall, Nic Lutsey, *Quantifying the Electric Vehicle Charging Infrastructure Gap Across U.S. Markets* (International Council on Clean Transportation, January 2019).

²⁴⁰ 26 U.S.C. §30C: Alternative fuel vehicle refueling property credit.

Several members introduced legislative remedies. Rep. Peter Welch (D-VT) and Sen. Jeff Merkley (D-OR) introduced the Electric CARS Act of 2019 (H.R. 2042/S. 993). In addition to extending tax credits for the consumer purchase of electric vehicles, the bill renews the Alternative Fuel Refueling Property Credit through 2029. Rep. Sean Casten (D-IL) introduced legislation (H.R. 2025) to permanently extend the Section 30C tax credit. Rep. Jackie Speier (D-CA) introduced the Affordable American-Made Automobile Act (H.R. 5393), which, among its many provisions to deploy more electric vehicles, extends the Section 30C tax credit through 2030, limits the credit to electric vehicle charging stations, and lifts the credit cap to support installation of more expensive fast-charging stations. Rep. Lloyd Doggett (D-TX) introduced the Electric Vehicle Charging Helps Access to Renewable Green Energy (EV CHARGE) Act of 2019 (H.R. 5164) to reinstate and extend the Section 30C 30% tax credit through 2024. The bill allows an additional 20% uncapped credit for infrastructure intended for general public use or for use exclusively by fleets of commercial or government vehicles.

On December 20, 2019, President Trump signed the Consolidated Appropriations Act, 2020, into law. This bill retroactively extended the Alternative Fuel Refueling Property Credit through 2020.²⁴¹ In June 2020, House Ways and Means Committee Democrats proposed extending the credit through 2025 in the GREEN Act of 2020 (H.R. 7330), Section 405. House Democrats added the GREEN Act to their comprehensive infrastructure legislation, the Moving Forward Act (H.R. 2).

Recommendation: Before it expires at the end of 2020, Congress should pass a five-year extension of the tax credit for alternative fuel infrastructure to provide greater certainty for potential investors. Congress should consider making fossil fuel infrastructure ineligible for the tax credit.

Committee of Jurisdiction: Ways and Means

Building Block: Provide Federal Grant Support for Deployment of Alternative Fuel and Electric Vehicle Charging Infrastructure

The FAST Act required the Federal Highway Administration (FHWA) to “designate national electric vehicle charging and hydrogen, propane, and natural gas fueling corridors that identify the near- and long-term need for, and location of, electric vehicle charging infrastructure, hydrogen fueling infrastructure, propane fueling infrastructure, and natural gas fueling infrastructure at strategic locations along major national highways.”²⁴² To date, FHWA has received 79 nominations that cover segments of interstates and highways in 46 states.²⁴³

Federal investment will be key to helping state and local governments build out a network of publicly available electric vehicle charging stations and other alternative fueling infrastructure along these corridors. The Clean Corridors Act of 2019, introduced by Sen. Tom Carper (D-DE) as S. 674 in the Senate and Rep. Mark DeSaulnier (D-CA) as H.R. 2616 in the House, provides grant funding to state, local, and tribal governmental entities to facilitate installation of electric vehicle charging stations and hydrogen fueling infrastructure along designated corridors in the National Highway System.

²⁴¹ Division Q, Section 125 of H.R. 1865, “Further Consolidated Appropriations Act, 2020,” 116th Congress.

²⁴² 23 U.S.C. § 151.

²⁴³ U.S. Department of Transportation (DOT), Federal Highway Administration, “Alternative Fuel Corridors,” available at https://www.fhwa.dot.gov/environment/alternative_fuel_corridors/. Accessed June 2020.

On October 25, 2019, Sen. Chuck Schumer (D-NY), along with Sens. Debbie Stabenow (D-MI), Sherrod Brown (D-OH), and Jeff Merkley (D-OR), announced a plan called Clean Cars for America. One component of the plan calls for \$45 billion in funding for states, cities, and municipalities to make electric vehicle charging infrastructure more widely available to the public. State and local governments could use the funding to install charging infrastructure along city streets and in public parking areas or subgrant it to entities that install charging infrastructure in single-family homes, apartment buildings, private garages, or other private residential or commercial properties.²⁴⁴

In January 2020, Rep. Bobby Rush (D-IL), Chairman of the Energy Subcommittee of the Energy and Commerce Committee, introduced the New Opportunities to Expand Healthy Air Using Sustainable Transportation (NO EXHAUST) Act of 2020 (H.R. 5545). The NO EXHAUST Act authorizes \$2 billion per year through 2030 to provide rebates to state and local governments and private entities that purchase electric vehicles; \$2.5 billion per year through 2030 for large-scale projects to electrify the transportation sector; and \$2.5 billion per year through 2030 to accelerate the domestic manufacturing of electric vehicles. The Energy and Commerce Committee's discussion draft of the CLEAN Future Act includes key provisions from the NO EXHAUST Act.²⁴⁵

In February 2020, Reps. Andy Levin (D-MI) and Alexandria Ocasio-Cortez (D-NY) introduced the Electric Vehicle Freedom Act (H.R. 5770) to establish a national network of EV chargers within a decade. The bill directs the Secretaries of Transportation and Energy to submit to Congress a plan to create a network of publicly available EV charging stations along public roads of the National Highway System. To implement this plan within five years, the bill establishes a competitive grant program to support state, local, and tribal governments and other entities interested in acquiring and installing EV charging infrastructure. The bill also directs that any federal spending should meet Buy America/n and prevailing wage requirements.

In February 2020, Rep. Yvette Clarke (D-NY) introduced the Electric Vehicles for Underserved Communities Act of 2020 (H.R. 5751). This bill requires DOE to assess challenges to and opportunities for the deployment of electric vehicle charging infrastructure in urban areas, particularly in underserved or disadvantaged communities. The bill also requires DOE to ensure that its programs provide access to electric vehicle infrastructure and improve air quality in underserved or disadvantaged communities.

In June 2020, the House Democrats introduced a comprehensive infrastructure bill, the Moving Forward Act (H.R. 2). Section 1303 of the bill establishes a \$350 million annual competitive grant program at DOT to deploy electric vehicle, hydrogen, and other fueling infrastructure, prioritizing projects that demonstrate the highest levels of carbon pollution reductions. Section 33332 establishes a program at DOE to provide rebates to eligible entities—individuals, state and local governments, tribal and territorial governments, non-profits, and others—that install publicly accessible electric vehicle supply equipment. The bill authorizes \$100 million each year for five years for this rebate program. Sections 33333 and 33334 include text from Rep. Clarke's bill to ensure EV infrastructure deployment benefits underserved communities.

²⁴⁴ Senate Democrats, "Leader Schumer Unveils New Clean Cars for America Climate Proposal, A Transformative Plan to Reduce Number of Carbon-Emitting Cars on the Road, Create Jobs, and Accelerate Transition to Net-Zero Emissions," press release, October 25, 2019.

²⁴⁵ Title IV, Sections 421-440, CLEAN Future Act discussion draft.

Recommendation: Congress should authorize DOT to offer grants or rebates to state, local, and tribal governments and other entities to deploy electric vehicle charging infrastructure along highway corridors and other publicly accessible locations. Funding levels should be commensurate with the public infrastructure needed to service new vehicles purchased as a result of the ZEV sales standard. A portion of the grant funding should go to installation of charging infrastructure in environmental justice communities, rural areas, and other underserved communities. Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Recommendation: Congress should require DOE to identify barriers to developing and setting interoperability standards for the deployment of electric vehicle charging infrastructure and make recommendations to Congress to overcome those barriers.

Recommendation: Congress should ensure that all current and future programs at DOE and DOT to deploy zero-emission vehicles provide equitable access to vehicle infrastructure and improve air quality in underserved or disadvantaged communities.

Committees of Jurisdiction: Transportation and Infrastructure; Energy and Commerce

Building Block: Require the Federal Government to Procure More Electric and Zero-Emission Vehicles for Civilian Fleets

The federal government's purchasing power can send important market signals and boost demand for electric vehicles and other zero-emission technologies. Under current law, 75% of new light-duty vehicles acquired by the federal government, with some exceptions, must be alternative fuel vehicles, including hybrid electric vehicles, fuel cell vehicles, and advanced lean-burn vehicles.²⁴⁶ Federal law also requires federal fleets to use alternative fuels in dual-fuel vehicles unless they obtain a waiver from DOE showing a lack of alternative fuel availability or higher cost.²⁴⁷

Most federal fleets comply with this requirement by purchasing flex-fuel vehicles that can burn E85. In FY2018, the federal government acquired more than 15,000 E85 flex-fuel vehicles and just 194 electric vehicles. Electric vehicles make up less than 1% of the federal fleet.²⁴⁸ It is time to take the next step.

Several members of Congress have introduced bills to increase the ambition for the federal fleet. In January 2020, Chairman Bobby Rush (D-IL) introduced the NO EXHAUST Act of 2020 (H.R. 5545). The NO EXHAUST Act amends the Energy Policy Act of 1992 and requires that 100% of the light-duty vehicles acquired for the federal fleet be zero-emission by 2050. At least 50% of medium- and heavy-duty vehicles acquired for the federal fleet would need to be alternative-fueled vehicles by 2050. The discussion draft of the Energy and Commerce Committee's CLEAN Future Act includes this requirement as well.²⁴⁹ Rep. Julia Brownley (D-CA) introduced the Green Federal Fleet Act (H.R. 5653),

²⁴⁶ 42 U.S. Code § 13212.

²⁴⁷ 42 U.S. Code § 6374.

²⁴⁸ Staff analysis of U.S. General Services Administration, "FY 2018 Federal Fleet Open Data Set," available at https://www.gsa.gov/cdnstatic/FY_2018_Federal_Fleet_Data_Set_8-14-2019.xlsx. Last updated August 2019.

²⁴⁹ Title IV, Sections 421-440, CLEAN Future Act discussion draft.

which would require that all new, non-tactical passenger vehicles purchased or leased by the federal government be zero-emission vehicles, with reasonable exemptions should agencies face unique circumstances making the purchase of a zero-emission vehicle infeasible.

Rep. Jared Huffman (D-CA) introduced the Federal Leadership in Energy Efficient Transportation (FLEET) Act (H.R. 2337) to modernize the U.S. Postal Service fleet. The Postal Service owns and operates the world's largest civilian vehicle fleet; however, more than 140,000 of the 232,000 mail delivery vehicles are Grumman LLVs, which average only 10 miles per gallon.²⁵⁰ The FLEET Act requires the Postal Service to reduce the fleet's petroleum consumption by 2% every year over the next 10 years and sets minimum fuel efficiency and greenhouse gas tailpipe emission standards for all new fleet vehicles. In the House Democrats' comprehensive infrastructure bill, the Moving Forward Act (H.R. 2), Section 50001 authorizes \$25 billion in funding for the Postal Service to upgrade postal infrastructure and operations and purchase delivery vehicles, processing equipment, and other goods. The bill reserves \$6 billion for the purchase of new vehicles. Section 50002 specifies that at least 75% of the new fleet must be electric or zero-emission. By 2040, any vehicle purchased must be electric or zero-emission.

Focusing on government vehicles in more remote areas, Rep. Mike Levin (D-CA) introduced H.R. 3681, the Green Spaces, Green Vehicles Act of 2019, to expand electric charging and hydrogen fuel cell infrastructure on U.S. public lands and convert National Park Service and U.S. Forest Service fleets to zero-emission vehicles. Sen. Catherine Cortez Masto (D-NV) introduced the Senate companion (S. 2041).

Recommendation: Congress should pass legislation to require the federal government to acquire an increasing percentage of zero-emission vehicles for its civilian fleets, including National Park Service and Forest Service fleets, reaching 100% of vehicle acquisitions by no later than 2035 for light-duty vehicles and 2040 for medium- and heavy-duty vehicles. Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Recommendation: Congress should require the U.S. Postal Service to integrate an increasing percentage of zero-emission vehicles into its fleet, with the goal of achieving a 100% electric or zero-emission vehicle fleet.

Committees of Jurisdiction: Oversight and Reform; Energy and Commerce

²⁵⁰ Office of Rep. Jared Huffman, "On Earth Day, Rep. Huffman Introduces Bill to Clean Up Postal Service Trusts," press release, April 22, 2019.

Building Block: Establish a Used Car Trade-In Program to Accelerate Deployment of Zero-Emission Vehicles

In 2017, the average age for a light-duty vehicle on U.S. roads was 10.3 years, suggesting that households are holding on to their vehicles for longer.²⁵¹ Consequently, most cars purchased today will still be on the road in 2030. Expediting deployment of zero-emission vehicles must include a plan to accelerate vehicle turnover in the United States.

One starting point for designing such a program is the Car Allowance Rebate System (CARS), commonly referred to as “Cash for Clunkers.” Congress and the Obama administration launched this program in 2009 to stimulate the economy by incentivizing U.S. residents to trade in their older vehicles and purchase new ones. The CARS program offered \$3,500 or \$4,500 credits to buyers who traded in light-duty vehicles with a fuel economy of 18 miles per gallon or less for new vehicles with better fuel economy.²⁵² The primary goal of the Cash for Clunkers program was to boost consumer spending and help pull the economy out of the Great Recession. A climate-focused initiative would need to prioritize deployment of zero-emission vehicles.

Another potential model is the California Clean Cars 4 All program, which provides vouchers to lower-income Californians to scrap their older, more polluting cars and replace them with zero- or near-zero-emission models. The program includes consumer protections designed to protect participating drivers from unscrupulous dealers or lenders. California air districts participating in the program also can offer vouchers for public transit, car-sharing, or bike-share in exchange for the scrapped vehicle.²⁵³

On October 25, 2019, Sen. Chuck Schumer (D-NY), along with Sens. Debbie Stabenow (D-MI), Sherrod Brown (D-OH), and Jeff Merkley (D-OH), announced a plan called Clean Cars for America. One component of the plan calls for \$392 billion in funding for a new program to help consumers make the transition from gasoline-powered cars to zero-emission vehicles. Under this program, consumers wishing to trade in a gasoline-powered vehicle for a clean vehicle would receive a point-of-sale rebate starting at \$3,000. Lower-income consumers would be eligible for an additional \$2,000 rebate for new vehicles or a 20% rebate for used vehicles. The program provides additional rebates for any vehicle made in America with strong labor standards or with significant domestic content. This program would aim to replace one-quarter of the U.S. vehicle fleet with clean vehicles after 10 years.²⁵⁴

Recommendation: Congress should create a new voucher program to accelerate the turnover of the U.S. vehicle fleet to zero-emission vehicles. The program should provide higher financial incentives for low-income consumers and vehicles manufactured in the United States with strong labor standards.

Committee of Jurisdiction: Energy and Commerce

²⁵¹ Energy Information Administration, “U.S. households are holding on to their vehicles longer,” August 21, 2018, <https://www.eia.gov/todayinenergy/detail.php?id=36914>.

²⁵² Office of the President, Council of Economic Advisers, *Economic Analysis of the Car Allowance Rebate System (“Cash for Clunkers”)*, September 2009.

²⁵³ California Air Resources Board, “Clean Cars 4 All,” available at <https://ww2.arb.ca.gov/our-work/programs/clean-cars-4-all>. Accessed June 2020.

²⁵⁴ Senate Democrats, “Leader Schumer Unveils New Clean Cars for America Climate Proposal, A Transformative Plan to Reduce Number of Carbon-Emitting Cars on the Road, Create Jobs, and Accelerate Transition to Net-Zero Emissions,” press release, October 25, 2019.

Building Block: Boost Federal R&D and Grant Spending for Advanced and Innovative Clean Vehicle Technologies

Continued deployment of electric vehicles and other zero-emission technologies will reduce pollution at the tailpipe while driving down costs and spurring continued innovation in the marketplace. That said, federal R&D can help support private sector research, push the envelope on advanced vehicle materials and technologies, and lead to breakthroughs that may help the country expedite pollution reduction in the transportation sector. Advanced data and intelligent transportation systems technologies also are entering the marketplace, offering new ways to improve mobility.

In April 2019, Reps. Debbie Dingell (D-MI) and Haley Stevens (D-MI) and Sens. Gary Peters (D-MI), Lamar Alexander (R-TN), and Debbie Stabenow (D-MI) introduced legislation to increase federal research and development of clean vehicle and advanced safety technologies. The Vehicle Innovation Act (H.R. 2170/S. 1085) authorizes more than \$300 million per year for five years to DOE to conduct R&D on materials, technologies, and processes with the potential to substantially reduce or eliminate petroleum use and the emissions of the passenger and commercial vehicles of the United States.

Recommendation: Congress should fund a robust clean vehicle R&D program at DOE to support the goal of the National ZEV sales standard of 100% zero-emission vehicle sales by 2035.

Committees of Jurisdiction: Science, Space, and Technology; Energy and Commerce

IMPROVE LOCAL, STATE, AND NATIONAL PLANNING FOR ZERO-EMISSION VEHICLES

Building Block: Incentivize State Transportation Planning for Vehicle Electrification

DOE's State Energy Program (SEP) "provides funding and technical assistance to states, territories, and the District of Columbia to enhance energy security, advance state-led energy initiatives, and maximize the benefits of decreasing energy waste."²⁵⁵ The Energy Policy and Conservation Act (EPCA) requires states to complete and submit energy conservation plans to become eligible for funding. EPCA outlines six mandatory elements, such as lighting efficiency standards and building efficiency standards, and 17 optional elements for these energy conservation plans.²⁵⁶

In January 2020, Chairman Bobby Rush (D-IL) introduced the NO EXHAUST Act of 2020 (H.R. 5545). The bill amends EPCA and adds a new optional feature to the state energy conservation plan—a state energy transportation plan. The state transportation plan must include initiatives to deploy electric vehicle charging infrastructure, modernize the power grid to accommodate vehicle charging, and leverage electric vehicles for their energy storage capacity. The bill also authorizes funding for states to develop these transportation plans. The Energy and Commerce Committee's discussion draft of the CLEAN Future Act includes key provisions from the NO EXHAUST Act.²⁵⁷ The House Democrats included this provision in Section 33338 of their infrastructure bill, the Moving Forward Act (H.R. 2).

²⁵⁵ U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, "About the State Energy Program," <https://www.energy.gov/eere/wipo/about-state-energy-program>. Accessed June 2020.

²⁵⁶ 42 U.S. Code § 6322.

²⁵⁷ Title IV, Sections 421-440, CLEAN Future Act discussion draft.

DOE's Clean Cities Coalition Program also works to support state and local efforts to reduce emissions from the transportation sector. More than 100 coalitions—comprised of businesses, fuel providers, vehicle fleets, state and local government agencies, and community organizations—work together locally to “to implement alternative fuels, fuel-saving technologies and practices, and new mobility choices.”²⁵⁸ Rep. A. Donald McEachin (D-VA) introduced H.R. 5518, a bill to codify the Clean Cities Coalition Program and authorize \$345 million for program activities over five years. H.R. 2, the Moving Forward Act, codifies the Clean Cities Coalition Program in Section 33145.

Recommendation: Congress should amend EPCA to encourage states eligible for funding under the DOE State Energy Program to include state energy transportation plans in their energy conservation plans. The state energy transportation plans should focus on vehicle electrification and upgrades to the power grid to manage new demand. Congress should authorize new funding to support states in this additional planning.

Recommendation: Congress should codify the Clean Cities Coalition Program.

Committee of Jurisdiction: Energy and Commerce

Building Block: Require States to Consider Electric Vehicle Charging Infrastructure in Their Electricity Ratemaking

Electric utilities will play an important role in the deployment of electric vehicle charging infrastructure. Some electric utilities, led by the largest utilities in California, are taking steps to install, maintain, and/or operate electric vehicle charging infrastructure as a means to drive electricity demand in their service areas.

Section 111(d) of the Public Utility Regulatory Policies Act (PURPA) requires each state commission and nonregulated electric utility to consider federal standards enumerated in 111(d) and determine whether to implement each standard. The Energy and Commerce Committee Democrats' LIFT America Act (H.R. 2741) amends Section 111(d) of PURPA to require states to consider authorizing electric utilities to recover from ratepayers any capital or operating expenditures related to deploying electric vehicle charging infrastructure. Chairman Bobby Rush's NO EXHAUST Act (H.R. 5545) contains a similar requirement, as does the discussion draft of the CLEAN Future Act.²⁵⁹ The House Democrats included this provision in Section 33337 of their infrastructure bill, the Moving Forward Act (H.R. 2).

Electricity rates also can affect deployment of EV charging infrastructure. In addition to billing for energy consumption, electric utilities apply “demand charges” to commercial and industrial customers based on their peak power demand. Utilities often base demand charges on the maximum amount of power the customer uses over a small interval during the billing cycle—often as small as 15 minutes. These demand charges can pose a significant economic barrier for owners and operators of direct current fast chargers (DCFC), which can consume a significant amount of electricity in a short

²⁵⁸ U.S. Department of Energy, Clean Cities Coalition Network, “About Clean Cities,” <https://cleancities.energy.gov/about/>. Accessed June 2020.

²⁵⁹ Section 437, CLEAN Future Act discussion draft.

amount of time to charge electric vehicles. The Great Plains Institute found that “demand charges are a barrier to the widespread availability of DCFC.”²⁶⁰

Recommendation: Congress should amend section 111(d) of PURPA to require states to consider (1) encouraging deployment of electric vehicle charging stations and authorizing utilities to recover costs related to electric vehicle supply equipment; (2) reducing demand charges for electric vehicle charging stations without affecting grid reliability; and (3) excluding from regulation as an electric utility any public or private entity selling electricity to the public solely through an electric vehicle charging facility.

Committee of Jurisdiction: Energy and Commerce

Building Block: Ensure Autonomous Vehicle Technology Reduces Carbon Dioxide Emissions

Scholars at the University of California-Davis have identified “Three Revolutions” occurring simultaneously in the transportation sector—shared mobility, electrification, and autonomous vehicles (AVs)—that have the potential to fundamentally reshape how people move from place to place.²⁶¹ If deployed with smart policy guardrails, AVs that are shared and electric have the potential to significantly reduce carbon pollution and vehicle miles traveled.²⁶² Poor implementation, however, could lead to a nightmare scenario where widespread adoption of single-passenger, gasoline-powered AVs increase vehicle miles traveled and emissions.

Rep. Earl Blumenauer (D-OR) introduced a bill, the Preparing Localities for an Autonomous and Connected Environment (PLACE) Act (H.R. 2542), to study the social and environmental impacts of AVs. The bill would establish a federally funded clearinghouse at a higher education institution to collect, conduct, and fund research to understand how AVs will affect land use, transportation, municipal budgets, the environment, and social equity.

Automakers, tech companies, and rideshare companies are investing heavily in autonomous vehicle technology, but federal governance has failed to keep pace to ensure these vehicles are safe and a net benefit for the climate.

Recommendation: Congress should direct the EPA and DOT to conduct a study to develop a national autonomous vehicle strategy focused on climate change to complement ongoing federal efforts to develop strong safety standards.

Committee of Jurisdiction: Energy and Commerce

²⁶⁰ Great Plains Institute, *Analytical White Paper: Overcoming Barriers to Expanding Fast Charging Infrastructure in the Midcontinent Region* (July 2019).

²⁶¹ University of California, Davis, “3 Revolutions,” <https://3rev.ucdavis.edu/>. Accessed June 2020.

²⁶² Caroline Rodier and Julia Michaels, *Travel Effects and Associated Greenhouse Gas Emissions of Automated Vehicles*, A White Paper from the National Center for Sustainable Transportation (2018).

PRODUCE LOWER-CARBON FUELS FOR VEHICLES

The transition to a zero-emission vehicle fleet will not happen overnight. Even after every car sold is zero-emission, it would still take 10 years for the fleet to reach 70% ZEV and 15 years for the fleet to reach 90% ZEV.²⁶³ Some parts of the transportation sector may rely on alternative fuels for the long term. Congress should consider opportunities to use low-carbon fuels, with appropriate guardrails to prevent conversion of non-agricultural lands into cropland, to shrink the carbon footprint of internal combustion engine vehicles.

Building Block: Build on the Renewable Fuel Standard with a Transition to a Low Carbon Fuel Standard

Congress established the Renewable Fuel Standard (RFS) in 2005 and amended it in 2007 to reduce the country's oil consumption and greenhouse gas emissions in the transportation sector. The program requires U.S. transportation fuels to contain minimum volumes of conventional biofuels, such as corn ethanol, and advanced biofuels. Federal statute outlines specific volumetric requirements through the year 2022 for total renewable fuels, advanced biofuels, cellulosic biofuels, and biomass-based diesel. After that date, the EPA must determine the required volumes.²⁶⁴

The 2022 date offers an opportunity to build on the RFS and transition to a program that encourages the development and production of liquid fuels that meet certain carbon emissions standards. The California Low Carbon Fuel Standard (LCFS), for example, assesses fuels based on a lifecycle carbon intensity benchmark—the amount of emissions per unit of energy output—that declines over time. The lifecycle assessment considers the direct greenhouse gas emissions associated with producing, transporting, and using the fuel and indirect emissions associated with changes in land use for some biofuels. Fuels with a carbon intensity below the benchmark generate credits, while fuels with a carbon intensity above the benchmark generate deficits.²⁶⁵

To comply with the California LCFS, transportation fuel suppliers, such as refiners, must demonstrate that the mix of fuels they supply for use in California meets the carbon intensity benchmarks. They can blend low-carbon fuels into the petroleum-based fuels they sell, buy credits generated by producers and users of low-carbon fuels, or both.²⁶⁶ In both 2018 and 2019, biodiesel, renewable diesel, and ethanol generated about 75% of the state's LCFS credits.²⁶⁷

California's LCFS policy has supported the growth of electricity as a transportation fuel and reinforced the state's ZEV sales mandate. Electric utilities, for example, can generate credits for residential

²⁶³ Center for American Progress analysis of Trieu Mai et al, *Electrification Futures Study: Scenarios of Electric Technology Adoption and Power Consumption for the United States* (National Renewable Energy Laboratory, 2018) available at <https://www.nrel.gov/docs/fy18osti/71500.pdf>. (Specifically, Maximum Technical Potential scenario). As cited in John Podesta, Christy Goldfuss, et al, *A 100 Percent Clean Future* (Center for American Progress, 2019) at 31.

²⁶⁴ 42 U.S. Code § 7545.

²⁶⁵ California Air Resources Board, "Low Carbon Fuel Standard," available at <https://ww2.arb.ca.gov/our-work/programs/low-carbon-fuel-standard/about>. Accessed June 2020.

²⁶⁶ *Ibid.*

²⁶⁷ Analysis of data from California Air Resources Board, "Low Carbon Fuel Standard," Data Dashboard, available at <https://ww3.arb.ca.gov/fuels/lcfs/dashboard/dashboard.htm>. Accessed June 2020.

electric vehicle charging based on the difference between California's average grid carbon intensity and average gasoline carbon intensity. California requires utilities to use revenue from selling these credits to provide rebates to residential customers who own or lease EVs. Owners of fueling supply equipment for non-residential EV charging, including public, workplace, and fleet charging, also can generate LCFS credits. For off-road transportation modes, electric forklifts, electric cargo handling equipment, electric transportation refrigeration units, and shore power at-berth oceangoing vessels can generate credits for equipment owners.²⁶⁸

In addition to California, a broad coalition of agriculture, environmental, renewable liquid fuel, and electricity stakeholders have developed a framework for a Midwest Clean Fuel Standard to significantly reduce transportation greenhouse gas emissions and generate economic benefits for the region.²⁶⁹

As the U.S. economy moves toward a net-zero by 2050 goal, low-carbon liquid fuels will have an important role to play in reducing oil consumption in the transportation sector and averting greenhouse gas emissions. The conversion to electric or other zero-emission vehicles will not happen overnight. Harder-to-decarbonize sectors where electrification may not be cost-effective, such as shipping, aviation, and long-haul trucking, could look to low-carbon liquid fuels as a potential solution. Highly efficient engines also could drive new demand for high-octane, low-carbon fuels.

Recommendation: Congress should develop a Low Carbon Fuel Standard to build on the Renewable Fuel Standard. The standard should set a technology- and feedstock-neutral benchmark for liquid and non-liquid fuels tied to a lifecycle assessment of the carbon intensity of the fuels. The carbon intensity standard should become more stringent (lower) over time. The lifecycle assessment should reflect the best-available science about the carbon intensity of fuel production, farming practices, land use changes, and crop productivity. The standard should include guardrails to prevent conversion of any non-agricultural lands into cropland, particularly sensitive lands with high carbon sequestration and biodiversity value. For renewable liquid fuels, the LCFS should reward entities in the value chain, including farmers and producers, that use climate-smart practices that reduce carbon emissions, store soil carbon, and reduce nitrous oxide emissions.

As described in more detail later in this section, an LCFS should allow low-carbon shipping and aviation fuels that meet the carbon intensity standards to qualify for credits. These sectors could become potential growth areas for low-carbon fuel demand.

Congress should ensure the LCFS complements the national ZEV program and greenhouse gas emissions standards for on-road vehicles, as they do in California.

Committee of Jurisdiction: Energy and Commerce

²⁶⁸ California Code of Regulations, 17 CA ADC § 95483.

²⁶⁹ Midwestern Clean Fuels Policy Initiative, *A Clean Fuels Policy for the Midwest* (January 2020), <https://www.betterenergy.org/wp-content/uploads/2020/01/Clean-Fuels-Policy-for-the-Midwest.pdf>.

Building Block: Direct EPA to Credit Electricity Generated From Renewable Biogas and Used to Power Electric Vehicles

The 2007 Energy Independence and Security Act (EISA) expanded the RFS to include any form of renewable fuel “produced from renewable biomass.”²⁷⁰ The EISA also directed EPA to study the feasibility of issuing credits, called Renewable Identification Numbers (RINs), under the RFS to electric vehicles powered by electricity produced from renewable energy sources.²⁷¹

Ultimately, EPA did not complete a study but instead established a process for credit generation as part of the 2010 RFS rule. In that rule, EPA decided to allow “fuel producers, importers and end users to include electricity, natural gas, and propane made from renewable biomass as a RIN-generating renewable fuel in RFS.”²⁷² In 2014, EPA finalized pathways for compressed gas, liquefied gas, and renewable electricity derived from biogas and used as a transportation fuel to qualify under the RFS.²⁷³ Despite this history, EPA has yet to approve any applications from biogas-to-electricity producers to generate credits under the RFS, also known as eRINs.

Recommendation: Unless and until Congress creates an LCFS, Congress should direct EPA to complete any necessary rulemakings or other administrative steps necessary to allow the generation of eRINs for biogas-derived electricity used as a transportation fuel.

Committee of Jurisdiction: Energy and Commerce

Building Block: Increasing Funding for DOE RD&D in Next-Generation Biofuels and Other Alternative Fuels

Several factors—particularly the slow turnover of existing internal combustion engine vehicles and challenges posed by electrification of aviation and long-haul trucking—demonstrate the need for continued scientific exploration of biofuels and other petroleum substitutes to reduce the carbon intensity of liquid fuels burned in the United States.

Recommendation: Congress should increase funding for DOE research, development, demonstration, and commercialization of biofuels—particularly next-generation biofuels made from non-food (cellulosic and algae-based) resources—and other petroleum substitutes. In the section below titled “Build a Cleaner and More Resilient Aviation Sector,” this report outlines a companion recommendation to increase RD&D for sustainable aviation fuels, a central component of decarbonizing airline travel.

Committee of Jurisdiction: Science, Space, and Technology

²⁷⁰ Energy Independence and Security Act § 201, Pub. L. 110-140 (Dec. 19, 2007).

²⁷¹ Energy Independence and Security Act § 206, Pub. L. 110-140 (Dec. 19, 2007).

²⁷² U.S. Environmental Protection Agency, *Regulation of Fuels and Fuel Additives: Changes to Renewable Fuel Standard Program; Final Rule*, 75 Fed. Reg. 14669-14904 (March 26, 2010).

²⁷³ U.S. Environmental Protection Agency, *Regulation of Fuels and Fuel Additives: RFS Pathways II, and Technical Amendments to the RFS Standards and E15 Misfueling Mitigation Requirements; Final Rule*, 79 Fed. Reg. 42127-42167 (July 18, 2014).

Encourage Smart Transportation Policies to Increase Consumer Choice, Reduce Congestion, and Cut Carbon Pollution

On March 9, 2020, INRIX, a global mobility analytics firm, released new data showing that the average American lost 99 hours in 2019 to sitting in traffic, costing the economy nearly \$88 billion. Between 2017 and 2019, the problem only got worse, with the average time lost increasing by two hours.²⁷⁴ Crawling traffic also generates more air pollution, which has a disproportionate impact on communities of color that are more likely to live near major roadways. The root causes of this problem are complex and interrelated, including lack of affordable housing in city centers that forces people to “drive until they qualify” and chronic underinvestment in convenient alternatives to driving, such as public transit.

Congress has limited reach to affect a city’s or state’s housing and zoning policies. But Congress does have the ability to influence the planning, funding, and construction of transportation systems. This section focuses on ways Congress can work with cities and states to provide households with more transportation options.

Building Block: Double Federal Funding for Public Transit

America needs to invest in expanding and modernizing transit. Public capital investment in highways has consistently outpaced capital investment in mass transit and rail.²⁷⁵ Under current law, it is easier to obtain funding for new highways, which comes from a guaranteed pot of money, than it is to secure funding for new transit projects, which comes from a discretionary pot of money called the Capital Investment Grants Program. Federal law allocates 20% of Highway Trust Fund monies to transit, but state and local governments spend these funds almost entirely on maintenance of existing systems. A significant backlog has grown. The American Public Transportation Association has identified at least \$232 billion in critical public transportation projects in need of funding, including repair of bus and rail assets and other priority public transit projects.²⁷⁶

Every \$1 billion invested in public transit creates 49,700 jobs and economic returns of \$5 billion of GDP growth over 20 years.²⁷⁷

In June 2020, the House Democrats introduced a comprehensive infrastructure bill, the Moving Forward Act (H.R. 2). The bill dedicates \$105 billion—a record investment—to support all modes of transit in urban, suburban, and rural communities. Section 2201 of the bill creates a new competitive grant program to increase bus frequency, ridership, and total person throughput.

Recommendation: To reduce the U.S. transit system’s maintenance backlog and expand public transit access, Congress should build on the funding authorizations in the Moving Forward Act and at least double annual funding for new intercity passenger rail projects and public transit, including bus rapid

²⁷⁴ INRIX, “Congestion Costs Each American Nearly 100 hours, \$1,400 A Year,” press release, March 9, 2020, <https://inrix.com/press-releases/2019-traffic-scorecard-us/>.

²⁷⁵ Congressional Budget Office, *Public Spending on Transportation and Water Infrastructure, 1956 to 2017* (October 2018), 21.

²⁷⁶ American Public Transportation Association, *Public Transportation Infrastructure: Critically Needed Investments* (March 2019).

²⁷⁷ American Public Transportation Association, *Economic Impact of Public Transportation Investment* (April 2020).

transit. Federal transit law should incentivize transit agencies to improve service during peak periods and maintain a state of good repair for capital assets.

Transit projects that reduce air pollution and improve mobility in environmental justice communities and underserved rural areas should receive additional funds and consideration. Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Committee of Jurisdiction: Transportation and Infrastructure

Building Block: Prioritize Maintaining and Improving Existing Transportation Infrastructure and Bringing It Up to a State of Good Repair

States are spending as much on new road construction and expansion as they are on maintenance and repair of the millions of miles of roads crisscrossing the country.²⁷⁸ As a result, the nation's roads and highways face an enormous maintenance backlog. According to the American Society of Civil Engineers, the United States had an \$836 billion backlog of highway and bridge capital needs in 2017.²⁷⁹ Moreover, numerous studies show that new highway capacity induces more vehicle miles traveled and, as a result, more air pollution.²⁸⁰

In the House Democrats' comprehensive infrastructure bill, the Moving Forward Act (H.R. 2), Section 1201 modifies the National Highway Performance Program (NHPP) to ensure states meet certain requirements before using NHPP dollars to add new highway capacity. States must demonstrate that they have made progress in achieving a state of good repair on the National Highway System; that new highway capacity is more cost-effective than an operational improvement or transit project; that they have a plan for maintaining and operating the new transportation asset while achieving a state of good repair; and that the new capacity would help the state meet a performance target, like congestion mitigation or pollution reduction.

Recommendation: Congress should direct states to prioritize maintaining and improving existing infrastructure and bringing it up to a state of good repair, including roads, bridges, and tunnels, rather than prioritizing new roads or lanes. Congress should set higher thresholds or criteria for funding of new roadway capacity projects, such as well-defined progress in achieving a state of good repair and meeting certain performance metrics, and ensure states have a financial plan to maintain the new roadway, lanes, or other infrastructure.

Committee of Jurisdiction: Transportation and Infrastructure

²⁷⁸ Transportation for America and Taxpayers for Common Sense, *Repair Priorities* (2019).

²⁷⁹ American Society of Civil Engineers, *2017 Infrastructure Report Card: Roads* (2017), at 77, <https://www.infrastructurereportcard.org/wp-content/uploads/2017/01/Roads-Final.pdf>.

²⁸⁰ See, e.g., Todd Litman, Victoria Transport Policy Institute, *Generated Traffic and Induced Travel: Implications for Transport Planning* (March 2019).

Building Block: Require States and Metropolitan Planning Organizations to Set and Meet Goals to Reduce Transportation-Related Carbon Dioxide Emissions and Provide Households with Alternatives to Driving

The federal government sends state and local governments billions of highway dollars through funding formulas with few strings attached.

Rep. Lloyd Doggett (D-TX) and Rep. Earl Blumenauer (D-OR) introduced the Green Transportation Act (H.R. 3822) in July 2019. The bill requires states and Metropolitan Planning Organizations (MPOs) to include greenhouse gas emissions reductions in their long-range public transit and highway planning. Rep. Jared Huffman (D-CA) in the House and Sens. Ed Markey (D-MA) and Tom Carper (D-DE) in the Senate introduced Generating Resilient, Environmentally Exceptional National (GREEN) Streets Act (H.R. 5354/S. 2084), which directs the Secretary of Transportation to establish minimum performance measures for states to meet, including reducing greenhouse gas emissions and per capita vehicle miles traveled on the national highway system. The bill also requires states that do not meet these standards to use federal highway funding to come into compliance and directs states and MPOs to consider projects to reduce per capita VMT and transportation-related greenhouse gas emissions. The bill requires states and MPOs to analyze the greenhouse gas and VMT impact for any large project that adds new lanes or otherwise increases traffic capacity. Finally, the bill establishes national goals for the federal highway program to reduce greenhouse gas emissions and adapt to the impacts of climate change.²⁸¹

Section 1403 of House Democrats' Moving Forward Act (H.R. 2) requires the DOT to establish new performance measures for greenhouse gas emissions and transportation system access. The bill also requires states and MPOs to consider carbon pollution and emissions reduction, climate change, resilience, and hazard mitigation throughout the transportation planning process (Sections 1401 and 1402).

Section 1213 of the Moving Forward Act creates a new \$8.3 billion carbon pollution reduction apportionment program to help states meet their climate goals. The program offers more flexibility for states that demonstrate the most significant progress in cutting carbon dioxide emissions; for states making less progress, the program directs them to use funds for specific projects to achieve measurable pollution reductions. Section 1304 establishes a \$250 million competitive community climate grant program to support local investment in innovative strategies to reduce greenhouse gas emissions. Similarly, the transportation bill passed by the Senate Environment and Public Works Committee, America's Transportation Infrastructure Act of 2019 (S. 2302), includes \$3 billion over five years for a Carbon Reduction Incentive Program. This voluntary program delivers money to states to support projects that would reduce on-road highway-related carbon dioxide emissions.

Recommendation: Congress should require the DOT to establish new minimum performance measures for greenhouse gas emissions, transportation system access, and vehicle miles traveled and require states and MPOs to consider emissions reduction, climate change, resilience, and hazard mitigation throughout the transportation planning process.

²⁸¹ Office of Rep. Jared Huffman, "Rep. Huffman Introduces Legislation to Transform Transportation Systems to Improve Communities and Respond to Climate Emergency," press release, December 9, 2019.

Recommendation: Congress should establish grant programs to support state and local efforts to meet these performance measures and incentivize maximum carbon pollution reductions through projects such as transit and bicycle infrastructure.

Committee of Jurisdiction: Transportation and Infrastructure

Building Block: Leverage Data and Technology for Climate-Smart Transportation Planning at the State and Local Level

The current transportation system uses speed as the measure of success. The goal is to help vehicles travel from A to B at a high average speed, without regard to the distance between those two points. This system has prioritized construction of new roads and lanes, incentivized the development of car-dependent communities far from employment centers, and often ignored alternatives to the single-passenger vehicle. In some communities, walking or biking short distances may not be safe, as they require crossing major throughways.

Federal, state, and local transportation planners often do not have access to adequate data to assess how well transportation systems are connecting Americans to their desired destinations.

Reps. Mark DeSaulnier (D-CA), John Curtis (R-UT), and Ben McAdams (D-UT) introduced the Connecting Opportunities through Mobility Metrics and Unlocking Transportation Efficiencies (COMMUTE) Act (H.R. 1517), which establishes a pilot program that requires DOT to provide states, MPOs, and rural planning organizations with data that measure how well the transportation system is connecting households to destinations, including jobs, health care facilities, childcare services, housing, and food sources.²⁸²

Rep. DeSaulnier also introduced the Moving and Fostering Innovation to Revolutionize Smarter Transportation (Moving FIRST) Act (H.R. 3388). The Moving FIRST Act creates a competitive grant program for cities and rural communities interested in deploying advanced data and intelligent transportation systems technologies. The bill calls out using these technologies to facilitate better land use decisions and expand the range of transportation choices and access to employment, housing, education and health services, which may include planning updates and policy changes to increase the supply of housing located in proximity to public transportation services.

In March 2020, Reps. Chuy García, Ayanna Pressley, Mark Takano, and Rashida Tlaib introduced the Improving Access to Jobs Act (H.R. 6464) and Improving Access to Services Act (H.R. 6463). The Improving Access to Jobs Act makes “safe and convenient access to employment” a condition for states’ minimum standards for new roadway construction and roadway improvement projects. The Improving Access to Services Act adds another condition—safe and convenient access to services, including health care facilities, childcare, education and workforce training, affordable housing, food sources, banking and financial institutions, and other retail shopping establishments.

Section 1403 of House Democrats’ Moving Forward Act (H.R. 2) requires the DOT to establish a new performance measure for transportation system access to assess the level of safe, reliable, and

²⁸² Office of Rep. Mark DeSaulnier, “Representatives DeSaulnier, Curtis, and McAdams Announce Bipartisan Legislation to Improve Transportation Planning and Decision Making,” press release, March 7, 2019.

convenient access to jobs and services, such as healthcare and childcare. The bill creates a working group of state, local, and nongovernmental experts to advise the DOT on how to design and implement the measure. Section 5301 renames the existing Advanced Transportation and Congestion Management Technologies Deployment Program at DOT as the Safe, Efficient Mobility through Advanced Technology (SEMAT) Program. The program would deploy advanced transportation technologies to improve mobility, decrease congestion, increase safety for pedestrians and other users, and reduce emissions.

Recommendation: Congress should direct states and MPOs to evaluate how well the transportation system is facilitating access to housing, jobs, and critical services. With the counsel of outside experts, the DOT should develop standards and criteria for how to measure access, including a consideration for how access might differ for low-income communities and communities of color.

Recommendation: Congress should fund a DOT grant program to support the use of advanced data and intelligent transportation systems technologies to reduce vehicle miles traveled, improve mobility, increase safety, and cut transportation sector emissions.

Committee of Jurisdiction: Transportation and Infrastructure

Building Block: Require States and Metropolitan Planning Organizations to Develop and Implement “Complete Streets” Programs

The current transportation system prioritizes vehicle traffic often at the expense of travelers using other forms of transport, including biking and walking. In many communities, walking or biking short distances may not be safe or even possible, as people must cross major roadways to reach their destinations. In contrast, communities with a “complete streets” program “direct their transportation planners and engineers to routinely design and operate the entire right of way to enable safe access for all users, regardless of age, ability, or mode of transportation.”²⁸³ In short, a “complete street” is one that accommodates pedestrians, bicyclists, and transit users—not just cars and trucks.

In July 2019, Rep. Steve Cohen (D-TN) and Sen. Ed Markey (D-MA) introduced the Complete Streets Act (H.R. 3663/S. 2077). The bill requires each state to set aside 5% of its federal highway money to design and implement a “complete streets” program. MPOs are responsible for certifying that each state’s complete streets policy meets minimum federal requirements established by the DOT. The bill also requires the DOT to work with states and MPOs to adopt inclusive design standards for federal surface transportation projects.

In June 2020, the House Democrats introduced a comprehensive infrastructure bill, the Moving Forward Act (H.R. 2). Section 1107 revises roadway design standards²⁸⁴ to require that they consider all potential users, including pedestrians, bicyclists, public transit riders, children, older individuals, individuals with disabilities, motorists, and freight vehicles. The bill also requires plans and specifications for all federal-aid highways to consider these context-sensitive design principles. Section 1309 establishes a \$250 million grant program to support “complete streets,” develop

²⁸³ Smart Growth America, “What are Complete Streets?”, <https://smartgrowthamerica.org/program/national-complete-streets-coalition/publications/what-are-complete-streets/>. Accessed June 2020.

²⁸⁴ 23 U.S.C. 109.

transportation networks to connect points within a community, and enhance safety for vulnerable road users.

Recommendation: Congress should require states to use “complete streets” and context-sensitive principles when designing and implementing transportation projects and provide grant funding to support associated infrastructure investment. Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Committee of Jurisdiction: Transportation and Infrastructure

Building Block: Require States and Metropolitan Planning Organizations to Deploy Transportation Demand Management

Transportation demand management (TDM) is a strategy to “inform and encourage travelers to maximize the efficiency of a transportation system leading to improved mobility, reduced congestion, and lower vehicle emissions.”²⁸⁵ Similar to demand response programs in the electricity sector, TDM helps to reduce peak demand on America’s roadways. TDM strategies include “the use of planning, programs, policy, marketing, communications, incentives, pricing, and technology to shift travel mode, routes used, departure times, number of trips,” and other decisions that result in less single-occupancy vehicle traffic.²⁸⁶

Section 1306 of the House Democrats’ infrastructure bill, the Moving Forward Act (H.R. 2), establishes a \$250 million grant program to reduce traffic gridlock in large metropolitan areas. The program supports projects to mitigate the adverse impacts of traffic congestion, including pollution; maximize the efficiency of existing roadway capacity; and employ innovative solutions for reducing gridlock. TDM is eligible for funding.

Recommendation: Congress should pass legislation to deploy TDM strategies across the country. Congress should require MPOs to consider TDM as a tool to reduce greenhouse gas emissions and provide households with alternatives to driving. Congress also should ensure local, state, and tribal governments interested in implementing TDM within their jurisdictions have the resources they need, including technical assistance.

Committee of Jurisdiction: Transportation and Infrastructure

Building Block: Encourage States and Cities to Build More Housing, Including Affordable Housing, Near Public Transit

The United States is facing a housing affordability crisis, particularly in its urban areas as more people move to cities in search of economic opportunities. At the same time, construction of affordable housing in these areas has fallen, often due to zoning restrictions and neighborhood opposition,

²⁸⁵ Association for Commuter Transportation, Letter to the Honorable Peter DeFazio, Chairman, House Committee on Transportation and Infrastructure (August 14, 2019).

²⁸⁶ Ibid.

causing demand to far outstrip supply. The result is rising housing costs in urban centers and displacement of low-income communities and communities of color to more suburban areas, where public transit options may be scarce or insufficient.²⁸⁷ Housing policy becomes climate policy when it limits households to one choice—cars—to commute and access services.

Experience in cities across the country, however, shows that development near transit does not always help low-income households—those who are least likely to own cars and would benefit the most from transit access. Unless cities force inclusion of affordable housing and factor in equity concerns, developers gravitate toward higher-rent options, such as luxury condos and retail space.²⁸⁸

Rep. Scott Peters (D-CA) introduced the Build More Housing Near Transit Act (H.R. 4307), which requires applicants for the Federal Transit Administration (FTA) New Starts Capital Investments Grant program to evaluate the feasibility of housing development near proposed transit projects and secure a commitment to affordable and market-rate housing.

Section 2701 of the House Democrats' infrastructure bill, the Moving Forward Act (H.R. 2), establishes an Office of Transit-Supportive Communities to make grants, provide technical assistance, coordinate transit-housing policies across the federal government, and promote equity for underserved communities. The office would offer grants to applicants who are designing, building, or serving a fixed guideway transit line. Section 2703 of the bill offers incentives for infrastructure projects that preserve or encourage higher density affordable housing near the project.

Recommendation: Congress should provide grants, technical assistance, and other incentives to encourage the development of affordable housing near proposed transit projects, including coordination between transit agencies and local governments.

Committee of Jurisdiction: Transportation and Infrastructure

Building Block: Support State and Local Efforts to Encourage Zero- and Near-Zero-Carbon Modes of Travel, Such as Biking and Walking

Biking, walking, and using micromobility options such as electric scooters offer the lowest-carbon and lowest-cost form of travel, but they are not available, practical, or safe for everyone. Communities designed only for vehicle traffic can make it dangerous or impossible to commute to work or go shopping in anything but a motorized vehicle.

The Fixing America's Surface Transportation (FAST) Act authorized funding for programs and projects defined as transportation alternatives, including pedestrian and bicycle infrastructure, recreational trail projects, and walking paths to schools. The FAST Act set aside \$850 million for each year in FY2018-2020 for these transportation alternatives from the Surface Transportation Block Grant program funding.²⁸⁹ Rep. Adriano Espaillat (D-NY) introduced the Transportation Alternatives

²⁸⁷ Up for Growth, *Housing Underproduction in the U.S.: Economic, Fiscal and Environmental Impacts of Enabling Transit-Oriented Smart Growth to Address America's Housing Affordability Challenge* (2018).

²⁸⁸ Eleni Bardaka and John Hersey, "Transit-Oriented Development is More Transit-Oriented When It's Affordable Housing," TransitCenter, June 15, 2018, <https://transitcenter.org/transit-oriented-development-transit-oriented-affordable-housing/>.

²⁸⁹ 23 U.S.C. 133(h).

Enhancements Act (H.R. 5231) to improve the transportation alternatives program. Sens. Ben Cardin (D-MD) and Roger Wicker (R-MS) introduced the Senate companion (S. 1098). The bill modifies the program's structure to allow funding for transportation alternatives to rise in line with overall transportation spending and to give MPOs more control over how the dollars are spent.

Rep. Julia Brownley (D-CA) introduced the Safe And Friendly for the Environment (SAFE) Streets Act (H.R. 3040) to make the country's roads safer for vulnerable users, including pedestrians, bicyclists, and individuals in wheelchairs. The bill requires state and local transportation agencies to direct more of their federal funding to areas with higher-than-usual pedestrian and bicyclist fatality rates to make dangerous roads and intersections safer.

The House Democrats' comprehensive infrastructure bill, the Moving Forward Act (H.R. 2), significantly increases support for pedestrian and bike infrastructure and other zero-emission modes through the Transportation Alternatives Program (Section 1206). The bill also requires states, working with local and regional partners, to conduct a vulnerable road user safety assessment as part of its strategic highway safety plan with a focus on corridors and hot spots that pose a high risk to bicyclists and pedestrians. States then must implement projects or strategies to reduce the safety risks identified in the assessment. States with the highest per capita levels of bicyclist and pedestrian injuries and fatalities must direct a portion of their federal funding to complete additional projects to make roadways safer for all users (Section 1209).

Recommendation: Congress should update, reauthorize, and increase funding for the Transportation Alternatives Program and other programs to make roads safer for bicyclists, pedestrians, and other vulnerable users.

Recommendation: Congress should create a new grant program for communities to pilot innovative projects to reduce carbon pollution and vehicle miles traveled, such as car-free zones and superblocks.

Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Committee of Jurisdiction: Transportation and Infrastructure

Building Block: Improve and Increase the Bicycle Commuter Tax Benefit

Under current law, employers can offer their employees pre-tax commuter tax benefits.²⁹⁰ Employers and employees benefit by avoiding payment of taxes on that income. For 2020, the IRS limit for pre-tax contributions to parking and transit commuter benefit accounts was \$270 per month.²⁹¹ Bicycle commuters do not qualify for a pre-tax benefit; instead, they can receive up to \$20 per month in

²⁹⁰ 26 U.S. Code § 132.

²⁹¹ Internal Revenue Service, Publication 15-B, *Employer's Tax Guide to Fringe Benefits* (2020), <https://www.irs.gov/publications/p15b>.

reimbursement from their employers.²⁹² The Tax Cuts and Jobs Act, signed into law by President Trump on December 22, 2017, “suspended the exclusion” for the bicycle commuting reimbursement; meaning, the law now requires bicycle commuters to pay taxes on their commuter reimbursement.²⁹³

Reps. Earl Blumenauer (D-OR), Vern Buchanan (R-FL), and Ayanna Pressley (D-MA) introduced the Bicycle Commuter Act of 2019 (H.R. 1507), which (1) repeals the suspension of the tax exclusion for employer-provided fringe benefits for bicycle commuting; (2) includes bikeshare and low-speed electric bicycles within the definition of bicycle for purposes of the reinstated tax exclusion; and (3) modifies the limitation on the reinstated tax exclusion to provide for a specified monthly limitation amount (i.e., 20% of the parking fringe benefit amount). The House Ways and Means Committee Democrats incorporated this bill in Section 406 of the GREEN Act of 2020 (H.R. 7330).

Recommendation: Congress should repeal the suspension of the tax exclusion for employer-provided fringe benefits for bicycle commuting and expand the Section 132 bicycle commuter tax benefit to support zero-carbon transportation choices.

Committee of Jurisdiction: Ways and Means

Building Block: Expand Public Transit Service Between Underserved Communities and Green Spaces

Residents of environmental justice communities often experience inequitable access to green spaces, public recreation opportunities, and nature generally. Rep. A. Donald McEachin (D-VA) and Chair Raúl Grijalva (D-AZ) introduced H.R. 5986, the Environmental Justice for All Act, which would establish an outdoor recreation legacy partnership grant program to help states, local governments, and tribes acquire land and water for parks and outdoor recreation purposes and to develop new or renovate existing outdoor recreation facilities. Included in this legislation is H.R. 4273/S. 2467, the Transit to Trails Act of 2019, introduced by Reps. Jimmy Gomez (D-CA) and Steve Stivers (R-OH) and Sen. Cory Booker (D-NJ). The Transit to Trails Act would direct the DOT to establish a grant program to fund accessible transportation systems in critically underserved communities to improve equitable access to parks, public lands, waters, and green spaces.

Recommendation: Congress should fund public transit systems that provide underserved communities with access to open spaces. Project developers should engage representatives from underserved communities early in the planning process to ensure the transit system will benefit the intended population.

Committee of Jurisdiction: Transportation and Infrastructure

Building Block: Invest in RDD&D Programs for Low-Carbon Building and Infrastructure and Materials

Building materials such as wood, concrete, and steel consume energy during manufacture, transport, and assembly. These materials become part of the embodied carbon emissions of infrastructure projects, from roadways to rail lines to levees. Attribution for the emissions associated with

²⁹² 26 U.S. Code § 132(f)(5)(F).

²⁹³ Section 11047 of P.L. 115-97.

manufacture typically goes to the industrial sector, which is responsible for the production of goods like cement and steel. This report details several decarbonization strategies specific to reducing emissions from the production of these materials in the section titled “Rebuild U.S. Industry for Global Climate Leadership.” However, there are certain strategies associated with the end-use of these materials in infrastructure projects specifically.

The House Democrats introduced a comprehensive infrastructure bill, the Moving Forward Act (H.R. 2), which, among its many provisions, establishes new programs to develop lower-carbon infrastructure materials. Section 5102 creates a university grant program for the research and development of green construction material designs and practices that would reduce and/or sequester greenhouse gas emissions during the production and construction process. Section 5202 of the bill would accelerate the deployment of innovative pavement designs, materials, and practices that would reduce greenhouse gas emissions through the Federal Highway Administration Technology and Innovation Deployment Program.

Recommendation: Congress should establish targeted RDD&D programs to support innovation in industrial feedstocks and alternative materials with lower emissions and net-zero or net-negative emissions. Further details appear in the sections of the report titled “Rebuild U.S. Industry for Global Climate Leadership” and “Reduce Emissions from Building Materials.”

Recommendation: Federal procurement for cement, concrete, and other materials for transportation projects should comply with the “Buy Clean” requirements for low-emissions materials, as described in the building block titled “Procure Low-Emission Materials and Products (“Buy Clean”) for Federally Funded Projects, Including Infrastructure and Buildings.”

Committees of Jurisdiction: Transportation and Infrastructure; Science, Space, and Technology; Energy and Commerce

Spur More Domestic Manufacturing of Zero-Emission Vehicles and Components

The United States needs a zero-emission vehicle manufacturing agenda that pairs strong greenhouse gas emissions standards, ZEV mandates, and federal procurement policies, as described earlier in this section, with a concerted plan to manufacture more of these clean vehicles and strategic components here in the United States. Congress should pursue a strategy that includes, at minimum:²⁹⁴

- Robust federal investment to help companies build, retool, or convert manufacturing plants in the United States and expand critical domestic supply chains;
- Massive clean energy and advanced vehicle research and development and domestic manufacturing of resulting technologies; and
- A plan to secure supplies of critical minerals and materials and develop domestic recycling capabilities for lithium batteries and other components.

²⁹⁴ See Testimony of Zoe Lipman, Director, Vehicles and Advanced Transportation Program, BlueGreen Alliance, *Solving the Climate Crisis: Manufacturing Jobs for America’s Workers*, Hearing Before the Select Committee on the Climate Crisis, 116th Congress (September 10, 2019).

This manufacturing agenda also must deliver family-sustaining wages for American workers and maximize both job retention and high-quality job creation.

In the section of the report titled “Invest in Manufacturing of Clean Energy, Clean Vehicle, and Zero-Emission Technologies,” the majority staff for the Select Committee lays out several specific components of a legislative manufacturing agenda, including vehicle manufacturing. In the section titled “Invest in America’s Workers and Build a Fairer Economy,” the majority staff for the Select Committee identifies complementary policies to put working people front and center in a clean economy.

Prepare the Nation’s Transportation Systems for Long-Term Climate Resilience

Transportation infrastructure is heavily exposed to extreme weather and climate impacts, such as rising temperatures and more intense rainfall, that can affect the reliability and capacity of transportation systems. To prepare the nation’s transportation systems for long-term climate resilience, the federal government will need to upgrade and repair existing assets and ensure that the siting and design of new transportation infrastructure advances resilience to climate impacts. Additional recommendations for addressing flooding, wildfire, and other climate-related threats to transportation infrastructure appear in the section of this report titled “Make U.S. Communities More Resilient to the Impacts of Climate Change.”

Building Block: Protect Vulnerable Transportation Assets in Advance of Disasters

Approximately 60,000 miles of coastal roads are vulnerable to tidal flooding and storm surge associated with storms.²⁹⁵ Additionally, ports, tunnels, and bridges are vulnerable to sea level rise and flooding, which lead to travel and shipping delays, as well as temporary or even permanent closures. Exposure to flooding, wildfires, and extreme temperatures also shortens the life expectancy of highways and roads, increases maintenance costs, and disrupts critical access to evacuation routes. Extended power outages during disasters disrupt increasingly electrified vehicle fleets, including critical public transit and freight networks.

Sens. John Barrasso (R-WY) and Tom Carper (D-DE) introduced the America’s Transportation Infrastructure Act of 2019 (S. 2302), which would channel \$10 billion to reduce emissions and increase the resilience of infrastructure to better withstand the effects of climate change, including establishment of the Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation (PROTECT) grant program. The bill passed unanimously out of the Senate Environment and Public Works Committee in July 2019. Section 1202 of the House Democrats’ infrastructure bill, the Moving Forward Act (H.R. 2), would establish a \$6.25 billion pre-disaster mitigation program for states and MPOs to make surface transportation resilience improvements, including relocation of repetitively damaged transportation assets and improvements to evacuation

²⁹⁵ U.S. Department of Transportation, FHWA, Hydraulic Engineering Circular No. 25 – Volume 2, *Highways in the Coastal Environment: Assessing Extreme Events* (October 2014), <https://www.fhwa.dot.gov/engineering/hydraulics/pubs/nhi14006/nhi14006.pdf>.

routes. Section 1207 of the bill would channel a portion of federal bridge investments toward bridge repair and rehabilitation.

Recommendation: Congress should create a new formula and grant program within the DOT to protect vulnerable transportation assets in advance of disasters, including investing in evacuation routes and increasing resilience to flooding, wildfire, erosion, and extreme weather.

Recommendation: Congress should create a new program within DOT, cost-shared with state and local governments and private sector technology developers, to assess and deploy resilient solutions for public transit electrification, including advanced microgrids and storage to supply clean backup power at electric bus depots, and to support evaluation and sharing of best practices for resilient public transit electrification. Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Committee of Jurisdiction: Transportation and Infrastructure

Building Block: Ensure the Nation’s Transportation Systems Are Designed for Resilience and Meet Federal Flood and Wildfire Standards

The nation’s transportation infrastructure is vulnerable to increases in heavy precipitation, coastal flooding, extreme heat, and wildfires.²⁹⁶ Projected future increases in inland precipitation over this century will threaten approximately 2,500 to 4,600 bridges by 2050.²⁹⁷ Higher temperatures can stress bridge integrity, reduce roadbed life expectancy, and compromise worker and public safety.²⁹⁸ Wildfires can cause authorities to shut down major roadways, impeding regular commutes as well as evacuation routes in emergencies. Cities and states that construct new transportation infrastructure and rebuild without future climate risks in mind run the risk of losing that infrastructure well before its time—a costly proposition for taxpayers. The siting and design of federally funded infrastructure should be in accordance with updated resilience standards described in the section on resilience-based codes and standards.

Section 1202 of the House Democrats’ infrastructure bill, the Moving Forward Act (H.R. 2), would require that long-range transportation plans include climate vulnerability assessments and describe strategies to reduce climate change impacts to surface transportation assets, including repeatedly damaged facilities. Transportation resilience projects identified in such plans would be eligible for funding under the pre-disaster mitigation program established by this bill. Section 1621 of the bill would commission a Transportation Research Board study on climate resilient transportation infrastructure. Section 2402 of the bill would require projects funded through Bus Facilities and Fleet Expansion Competitive Grants to elevate facilities within the Special Flood Hazard Area by at least 2 feet above the Base Flood Elevation.

²⁹⁶ U.S. Global Change Research Program, *Fourth National Climate Assessment, Volume II* (Nov. 2018), Chapter 12: Transportation.

²⁹⁷ Ibid.

²⁹⁸ Ibid.

Recommendation: Congress should require states and metropolitan planning authorities to consider resilience and hazard mitigation, including climate risks, throughout the planning, project selection, and design processes. Planning should assess the vulnerability of critical transportation assets, evacuation routes, and facilities repeatedly damaged by disasters, and dedicated funding should be made available for resilience improvements. Congress should direct the DOT to ensure that federally funded transportation projects meet updated federal resilience standards against flooding and wildfire risks or exceed them where states or local governments have adopted higher standards based on local conditions. Transportation infrastructure projects should be required to integrate lifetime climate risk into project siting and design. Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Committee of Jurisdiction: Transportation and Infrastructure

Building Block: Strengthen the Federal Highway Administration’s Emergency Relief Program

FHWA’s Emergency Relief Program provides federal funding to states to rebuild roads and bridges damaged by storms, floods, and other disasters. Since FY2012, Congress has appropriated approximately \$5.7 billion to the Emergency Relief Program.²⁹⁹ Incorporating resilience improvements into emergency relief projects has become increasingly important, particularly as states and communities sustain years of repeated damage and have no alternative but to rebuild with limited funds. Yet, too often, highway infrastructure is rebuilt to pre-disaster specifications, leaving roads and bridges vulnerable to another disaster.

In 2018, the DOT Office of Inspector General (OIG) found that states may not be maximizing the resilience of transportation infrastructure, in part because federal guidance to states does not define “resilience” or inform states on how to incorporate resilience into emergency relief projects.³⁰⁰ The DOT OIG also found that FHWA had no process to track state efforts to include resilience improvements in their emergency relief projects, impeding the Department’s ability to ensure that the benefits of resilience are achieved and to make best use of program funds.³⁰¹

Sens. Tammy Baldwin (D-WI), Mike Braun (R-IN), and Ben Cardin (D-MD) introduced the Rebuilding Stronger Infrastructure Act (S. 2129), which would require FHWA to update the Emergency Relief Manual to include the definition of resilience and identify procedures state departments of transportation may use to incorporate resilience into emergency relief projects. The America’s Transportation Infrastructure Act of 2019 (S. 2302) incorporates this bill. Section 1203 of the House Democrats’ infrastructure bill, the Moving Forward Act (H.R. 2), would clarify the eligibility of resilience improvements for FHWA Emergency Relief funding, and it would also add wildfires to the list of disasters covered under the Emergency Relief Program. Section 1203 would also authorize a Pre-Disaster Hazard Mitigation Pilot Program that would distribute funds from the Highway Trust Fund, in

²⁹⁹ U.S. Department of Transportation, Office of the Inspector General, *FHWA Lacks Detailed Guidance on Infrastructure Resilience for Emergency Relief Projects and a Process to Track Related Improvements* (January 2018).

³⁰⁰ Ibid.

³⁰¹ Ibid.

an amount equal to 5% of funds made available through the Emergency Relief Fund, for projects to mitigate hazards to highway infrastructure.

Recommendation: Congress should direct DOT to revise the FHWA Emergency Relief Manual, including by incorporating resilience into the Emergency Relief Program, and develop best practices for incorporating resilience in emergency repairs.

Recommendation: Congress should explicitly allow states to use funds from the FHWA's Emergency Relief Program, which helps states repair roads damaged by floods, hurricanes, tidal waves, earthquakes, and landslides, to repair roads damaged by wildfire. Congress also should direct the DOT to conduct a pre-disaster mitigation pilot program providing funds from the Highway Trust Fund to eligible entities under the Emergency Relief Program for projects to increase the resilience of highway infrastructure.

Committee of Jurisdiction: Transportation and Infrastructure

Building Block: Provide States Flexibility to Mitigate Climate Risks to Transportation Infrastructure

The NHPP is the largest of the federal-aid highway programs, with annual authorizations averaging over \$23 billion. The program supports improvements to the condition and performance of the National Highway System, which includes Interstate System highways and bridges as well as virtually all other major highways. The NHPP funds projects for construction, reconstruction, or operational improvement of highway segments; construction, replacement, rehabilitation, and preservation of bridges, tunnels, and ferries and ferry facilities; inspection costs and the training of inspection personnel for bridges and tunnels; bicycle and pedestrian infrastructure; intelligent transportation systems; and environmental restoration, as well as natural habitat and wetlands mitigation within National Highway System corridors.

States lack the ability to use these funds to mitigate the risk of recurring damage from extreme weather, flooding, and other natural disasters on infrastructure within the National Highway System. With access to these funds, states could mitigate the risk of recurring damage by raising and relocating roadways out of flood or slide-prone areas, constructing new protective features like drainage structures and scour protection, and using natural infrastructure to mitigate flood risk. Such a change would minimize wasteful expenditures of taxpayer dollars.

Reps. Andy Kim (D-NJ) and David Rouzer (R-NC) introduced the Resilient Highways Act (H.R. 5700), which would allow states to use up to 15% of the funds apportioned under the NHPP for projects to mitigate the risk of recurring damage from extreme weather, flooding, and other natural disasters on infrastructure that is in the National Highway System. Sen. Kirsten Gillibrand (D-NY) introduced a similar Resilient Highways Act of 2019 (S. 1909), which the America's Transportation Infrastructure Act of 2019 (S. 2302) incorporated. Section 1201 of the House Democrats' infrastructure bill, the Moving Forward Act (H.R. 2), would expand allowable uses for NHPP funds to include projects to increase the resilience of transportation facilities.

Recommendation: Congress should allow states to use funds apportioned under the NHPP for projects to mitigate the risk of recurring damage from extreme weather, flooding, and other natural disasters on transportation infrastructure. Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Committee of Jurisdiction: Transportation and Infrastructure

Reduce Pollution from Heavy-Duty Trucks and Buses by Deploying Cleaner Vehicles and Fuels

DEPLOY MORE ZERO-EMISSION BUSES

Public transportation provided 9.95 billion passenger trips in 2018, about half of which occurred on buses.³⁰² At the same time, 25 million schoolchildren ride more than 480,000 school buses each day.³⁰³ Older diesel buses expose these passengers, whether adults or children, to dangerous particle pollution that can trigger asthma attacks and exacerbate other respiratory diseases. Retrofitting or replacing buses that have older diesel engines will reduce carbon pollution and provide a host of co-benefits, including lower maintenance costs and healthier air for children.

Building Block: Provide Financial Assistance to School Districts to Replace Diesel School Buses with Clean Electric Buses

Over the lifetime of an electric school bus, school districts can save money on fuel and maintenance costs and reduce children's exposure to unhealthy diesel exhaust. School districts, however, may need upfront financial support to replace older diesel buses with cleaner electric buses. The average electric school bus costs \$200,000 more than a diesel school bus.³⁰⁴

Rep. Jahana Hayes (D-CT) introduced H.R. 3973, the Clean School Bus Act of 2019. Sen. Kamala Harris introduced the same bill as S. 1750 in the Senate. The bill creates a new Clean School Bus Grant Program at DOE to replace diesel school bus fleets with electric school buses; install charging infrastructure for school buses; and provide workforce training for the maintenance, charging, and operations of electric school buses. The bill authorizes \$1 billion over five years and prioritizes grant funding for projects that serve low-income students and achieve the most significant emissions reductions.

Rep. Tony Cardenas (D-CA) introduced the Clean Commute for Kids Act of 2019 (H.R. 2906) to reauthorize the EPA Clean School Bus Program, which Congress created in the Energy Policy Act of 2005 to replace polluting school buses with buses that run on alternative fuels.³⁰⁵ The bill amends the

³⁰² American Public Transportation Association, *2020 Public Transportation Fact Book* (March 2020) at 10.

³⁰³ American School Bus Council, "About," <http://www.americanschoolbuscouncil.org/about/>. Accessed June 2020.

³⁰⁴ Hannah Natanson, "Electric school buses are coming to Virginia," *Washington Post* (September 7, 2019).

³⁰⁵ 42 U.S.C. § 16091.

Energy Policy Act to add electricity as one of the alternative fuels considered for the program and directs the EPA to prioritize grant applications that propose to retrofit or replace school buses to become low- or zero-emissions buses. Chairman Frank Pallone (D-NJ) included language from this bill in the discussion draft of the CLEAN Future Act.³⁰⁶ In the House Democrats' infrastructure bill, the Moving Forward Act (H.R. 2), Section 33311 reauthorizes the Clean School Bus Program and expands eligibility to include buses that meet or exceed emission standards for medium-duty passenger vehicles for model year 2016.

Recommendation: Congress should reauthorize the EPA Clean School Bus Program and ensure that electric buses and charging infrastructure qualify as eligible projects. EPA should prioritize grant applications that would replace old school buses with zero-emissions buses and phase out funding for non-zero-emission technologies. EPA should provide technical assistance to schools purchasing electric or other zero-emission buses. School districts in underserved communities and communities disproportionately exposed to air pollution should receive priority for funding.

Committee of Jurisdiction: Energy and Commerce

Building Block: Increase Federal Grant Funding and Offer No-Interest Loans to City, State, and Tribal Entities for the Acquisition of Electric Transit Buses

The FAST Act authorized \$55 million per year through FY2020 for the Low or No Emission (Low-No) Grant Program, which provides funding to state and local governments for the purchase or lease of zero-emission and low-emission transit buses as well as supporting facilities.³⁰⁷ Congress appropriated an additional \$30 million for the Low-No Program for FY2019.³⁰⁸ Demand for these funds far outstrips these appropriations. In response to its notice of funding opportunity for the FY2019 funds, FTA received 155 eligible proposals from 38 states requesting \$498 million.³⁰⁹

Rep. Julia Brownley (D-CA) introduced H.R. 2164, the Green Bus Act of 2019. This bill expands several of the FTA's clean bus programs and authorizes \$150 million for the Low-No Grant Program in FY2020 with an annual \$50 million increase until reaching \$600 million in FY2029. Rep. Brownley's bill requires all new buses purchased with FTA funds be zero-emission beginning on October 1, 2029.

Sen. Jeff Merkley (D-OR) introduced the Community Health and Clean Transit Act of 2019 (S. 2403) to authorize the DOT to make direct loans to state and local governments and other eligible entities for the purchase of electric transit buses and for technical assistance related to the deployment of these buses. The bill allows applicants for Low-No Grants to apply for the loans without submitting additional paperwork.

The House Democrats' infrastructure bill, the Moving Forward Act (H.R. 2), changes the name of the grant program from "Low or No Emission Grants" to "Zero Emission Grants" and, in turn, limits eligibility to zero-emission vehicles and equipment. Section 2403 of the bill provides \$1.725 billion

³⁰⁶ Section 423, CLEAN Future Act discussion draft.

³⁰⁷ 49 U.S.C. § 5338, 49 U.S.C. § 5339(c).

³⁰⁸ P.L. 116-6.

³⁰⁹ U.S. Department of Transportation, Federal Transit Administration, "Low or No Emission Grants Program Announcement of Project Selections and Implementation Guidance," July 26, 2019.

through Fiscal Year 2025 for the Zero Emission Grant Program, an average annual increase of 500% over FAST Act funding. The bill prioritizes funding for projects in areas that are deemed nonattainment or maintenance areas under the Clean Air Act or jurisdictions that have adopted zero-emission bus transition requirements. H.R. 2 also incentivizes the purchase of zero-emission buses under the formula bus program and the discretionary bus program by increasing the federal cost share for zero-emission buses to 90%, instead of the usual 80% federal share.

Recommendation: Congress should increase funding for the Low-No Grant Program by at least tenfold to meet demand and limit grants to zero-emission buses and associated equipment. Priority for grants should go to communities with poor air quality or jurisdictions that adopt forward-thinking zero-emission bus requirements. Congress also should increase the federal cost share for zero-emission buses in the formula and discretionary bus programs. Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Committee of Jurisdiction: Transportation and Infrastructure

Building Block: Provide a Manufacturer's Tax Credit for American-Made Buses

In addition to grant programs, a manufacturer's tax credit can defray costs for zero-emission buses and encourage domestic manufacturing. Reps. Jimmy Panetta (D-CA) and Julia Brownley (D-CA), along with others, introduced the Green Bus Tax Credit Act of 2019 (H.R. 5163) to apply a 10% manufacturer's tax credit for electric and hydrogen fuel-cell buses. The Ways and Means Committee's GREEN Act of 2020 (H.R. 7330) includes the key provisions from this bill in Section 403.

Recommendation: Congress should create a manufacturer's tax credit for electric and hydrogen fuel-cell buses to encourage domestic manufacturing and make cleaner buses more affordable for transit agencies and school districts. Congress should offer a higher credit for manufacturers that commit to high-road labor standards, including clear employment and safety standards, Davis-Bacon prevailing wages and benefits, and apprenticeship eligibility.

Committee of Jurisdiction: Ways and Means

DEPLOY MORE ZERO-EMISSION MEDIUM- AND HEAVY-DUTY VEHICLES

Freight trucks accounted for 21% of the U.S. transportation sector's energy-related carbon dioxide emissions in 2019 and nearly 8% of all energy-related carbon dioxide emissions.³¹⁰ These trucks, which generally use diesel engines, also emit air pollutants that trigger asthma attacks and harm public health, particularly in communities located near port facilities and along highways. In 2016, EPA estimated that 39 million people in the United States live near seaports, Great Lakes ports, or inland

³¹⁰ Energy Information Administration, *Annual Energy Outlook 2020* (January 2020). “Table 19: Energy-Related Carbon Dioxide Emissions by End Use,” https://www.eia.gov/outlooks/aoe/tables_ref.php. Accessed June 2020.

river ports. Ports and port-related corridors tend to be in or pass through environmental justice communities, where individuals' exposure to diesel exhaust is disproportionately high.³¹¹

In recent years, several manufacturers have announced plans to develop and sell zero-emission heavy-duty trucks.³¹² Given the current constraints on battery range and weight, these trucks are most appropriate for servicing daily routes under 200 miles. Despite this progress, the Environmental Defense Fund estimates that diesel trucks will still account for more than half of the trucks on America's roads in 2050.³¹³

Reducing emissions from medium- and heavy-duty vehicles—those that weigh more than 8,500 pounds—will require a multi-pronged strategy, to include encouraging the manufacture and deployment of zero-emission medium- and heavy-duty vehicles; facilitating the widespread installation of alternative fueling infrastructure; investing heavily in RD&D for new technologies to support the harder-to-decarbonize vehicles, such as long-haul trucks; and, until all new medium- and heavy-duty vehicles are zero-emission, making new diesel- and gasoline-powered vehicles as efficient and clean as possible.

Building Block: Direct EPA to Use Its Existing Authority to Set Ambitious Greenhouse Gas Emission Standards for Medium-Duty Passenger Vehicles and Heavy-Duty Vehicles

In August 2016, EPA and NHTSA finalized Phase 2 standards to reduce carbon dioxide emissions and improve the fuel efficiency of medium- and heavy-duty vehicles through model year 2027. EPA estimated that these standards, once fully implemented, would reduce carbon dioxide emissions by 1.1 billion metric tons and save drivers \$170 billion on fuel costs.³¹⁴

Recommendation: Congress should direct the EPA to use its existing authority under Section 202 of the Clean Air Act to set new greenhouse gas emissions standards for medium- and heavy-duty vehicles that achieve at least a 4% year-over-year pollution reduction, beginning with model year 2028. These standards should include heavy-duty glider vehicles, glider engines, and glider kits, which the Trump administration attempted to exempt from current standards. California and other states should retain their existing authority under Clean Air Act Sections 209 and 177, respectively, to adopt more stringent standards.

Committee of Jurisdiction: Energy and Commerce

³¹¹ U.S. Environmental Protection Agency, *National Port Strategy Assessment: Reducing Air Pollution and Greenhouse Gases at U.S. Ports* (September 2016).

³¹² Steve Hanley, "Heavy Duty Electric Trucks Aren't Coming, They're Already Here," August 13, 2019. Available at <https://cleantechica.com/2019/08/13/heavy-duty-electric-trucks-arent-coming-theyre-already-here/>.

³¹³ Testimony of Jason Mathers, Environmental Defense Fund, Before the Subcommittee on Highways and Transit and Subcommittee on Railroads, Pipelines, and Hazardous Materials of the Committee on Transportation and Infrastructure, U.S. House of Representatives, Hearing on "Where's My Stuff?: Examining the Economic, Environmental, and Societal Impacts of Freight Transportation," 116th Congress (December 5, 2019).

³¹⁴ U.S. Environmental Protection Agency, "Regulations for Greenhouse Gas Emissions from Commercial Trucks & Buses," available at <https://www.epa.gov/regulations-emissions-vehicles-and-engines/regulations-greenhouse-gas-emissions-commercial-trucks>. Accessed June 2020.

Building Block: Set a National Sales Standard for Zero-Emission Medium- and Heavy-Duty Vehicles

On June 25, 2020, the California Air Resources Board adopted a first-in-the-world rule requiring truck manufacturers to sell an increasing number of zero-emission trucks and vans (as an increasing percentage of their California sales) starting in 2024. By 2045, every new truck sold in California will be zero-emission. The rule also tackles the environmental justice concerns surrounding diesel truck pollution near ports and railyards and sets out to achieve a fully zero-emission drayage fleet in ports and railyards by 2035 and “last-mile” delivery trucks and vans by 2040.³¹⁵ Based on the Union of Concerned Scientists’ analysis of the California Air Resources Board’s proposal, the new requirements will result in 100,000 and 300,000 electric trucks on California’s roads in 2030 and 2035, respectively.³¹⁶

California’s ZEV mandate has been central to the deployment of electric passenger vehicles in California and nationwide. A national sales requirement for medium- and heavy-duty vehicles would provide manufacturers of those vehicles with important certainty about the future of the U.S. market and open new financing for demonstration and deployment.

Recommendation: Congress should set a national technology-neutral, zero-emission sales standard for medium- and heavy-duty vehicles to accelerate the deployment of clean trucks and reduce diesel pollution that harms public health. Given the long lifetimes of medium- and heavy-duty vehicles, Congress should require that at least 30% of new medium- and heavy-duty vehicles sales be zero-emission by 2030 and 100% by 2040.

Ambitious initiatives to ensure more domestic manufacturing of cleaner trucks and their components must accompany these policies, including those described in the section of this report titled “Invest in Manufacturing of Clean Energy, Clean Vehicle, and Zero-Emission Technologies.”

Committee of Jurisdiction: Energy and Commerce

Building Block: Provide a National Purchase Incentive for Zero-Emission Heavy-Duty Trucks

Zero-emission trucks have higher upfront capital costs and require different fueling infrastructure. Consumer purchase incentives could help overcome these financial barriers and jumpstart domestic demand of zero-emission trucking technology. California, for example, manages the On-Road Heavy-Duty Voucher Incentive Program (VIP), which provides funding opportunities for small fleet owners to replace their heavy-duty diesel trucks with cleaner vehicles. The voucher system allows fleet owners to obtain the financial benefit at the point of purchase.³¹⁷ CALSTART, a nonprofit focused on accelerating clean transportation, estimates that an investment of \$20 billion could replace almost 800,000 diesel-fueled trucks with zero-emission trucks.³¹⁸

³¹⁵ California Air Resources Board, “California takes bold step to reduce truck pollution,” June 25, 2020, <https://ww2.arb.ca.gov/news/california-takes-bold-step-reduce-truck-pollution>.

³¹⁶ Jimmy O’Dea, “The Biggest Step To-Date on Electric Trucks,” blog, April 29, 2020, <https://blog.ucsusa.org/jimmy-odea/the-biggest-step-to-date-on-electric-trucks>.

³¹⁷ California Air Resources Board, “On-Road Heavy-Duty Voucher Incentive Program,” available at <https://ww2.arb.ca.gov/our-work/programs/road-heavy-duty-voucher-incentive-program/about>. Accessed June 2020.

³¹⁸ CALSTART, “Creating Jobs & Addressing the Climate Threat—How the STR Can Help,” fact sheet, December 9, 2019.

Tax credits also could help speed the domestic manufacture and deployment of zero-emission heavy-duty trucks. In November 2019, Rep. Don Beyer (D-VA) introduced the Green Vehicle Adoption Nationwide (VAN) Act of 2019 (H.R. 5162) to create a manufacturer tax credit under Section 45T of the tax code of up to \$100,000 for the sale of heavy-duty, zero-emission vehicles through the end of 2024. Eligible manufacturers may claim a credit of 10% of the sale price of an eligible vehicle, capped at a credit of \$100,000. House Ways and Means Committee Democrats included this provision as Section 403 of the GREEN Act of 2020 (H.R. 7330).

Recommendation: Congress should pass legislation creating purchase incentives, such as voucher programs or manufacturer tax credits, for zero-emission heavy-duty vehicles. These incentives should be technology neutral and, when possible, tiered to incentivize purchase of vehicles with high domestic content.

Committees of Jurisdiction: Energy and Commerce; Ways and Means

Building Block: Incentivize Electrification of Medium-Duty Commercial Vans and Trucks

Many businesses operate fleets of medium-duty trucks and vans to deliver packages, transport people or equipment, and provide services. From 2014 to 2019, e-commerce sales nearly tripled globally. On its current trajectory, emissions will increase by 36% in the top 100 cities globally by 2030.³¹⁹ In New York City, more than 1.5 million packages are delivered daily.³²⁰

Fleet owners could reduce pollution and fuel consumption by converting their delivery fleets to electric vehicle technology. Large fleet owners are already making the switch; Amazon announced in December 2019 that it had ordered 100,000 new electric delivery vehicles from Rivian.³²¹ But smaller companies may need help with upfront capital costs. The federal tax code currently provides tax credits to individual consumers who want to purchase an electric vehicle. No such incentive exists for fleet owners to make the upfront capital investment to go electric.

Recommendation: Congress should create a new tax incentive for U.S. manufacturers of medium-duty commercial vans and trucks and consider tiering it to benefit manufacturers with strong labor standards.

Recommendation: Congress should create a grant program to support fleet conversion for small businesses and nonprofit organizations with little or no tax liability. Congress should consider providing more generous grant support for trucks with high domestic content and manufactured with strong labor standards. Priority should go to environmental justice communities and other communities disproportionately exposed to diesel pollution from trucks and buses.

Committees of Jurisdiction: Ways and Means; Energy and Commerce

³¹⁹ World Economic Forum, *The Future of the Last-Mile Ecosystem: Transition Roadmaps for Public- and Private-Sector Players* (2020).

³²⁰ Matthew Haag and Winnie Hu, “1.5 Million Packages a Day: The Internet Brings Chaos to N.Y. Streets, *New York Times* (October 27, 2019).

³²¹ Sebastian Blanco, “Amazon Buying So Many Commercial Vans, It’s a Boom for Mercedes, FCA, and Ford,” *Car and Driver* (December 20, 2019).

Building Block: Significantly Increase Funding Under the Diesel Emissions Reduction Act for Zero-Emission Alternatives to Diesel Engines

EPA provides funding under the Diesel Emissions Reduction Act (DERA) National Grants Program to governmental entities and nonprofit organizations to reduce diesel emissions from school buses, heavy-duty highway vehicles, locomotive engines, marine engines, and non-road engines, equipment, or vehicles used in construction, handling of cargo, agriculture, and mining.³²² In 2020, EPA anticipates awarding \$44 million in grants under the DERA program for retrofit technologies, idle reduction technologies, aerodynamic technologies, engine replacements and conversions, and vehicle or equipment replacement.³²³ Converting diesel engines to zero- or low-emission engines provides an important climate benefit on top of the health benefits of cutting diesel particulate pollution.

The House Democrats' comprehensive infrastructure bill, the Moving Forward Act (H.R. 2), reauthorizes the DERA program at \$500 million each year for fiscal years 2021 through 2025 (Section 33301).

Recommendation: Congress should significantly increase funding for the EPA Clean Diesel National Grants Program and consider dedicating a percentage of that additional funding for zero-emission technologies. EPA should prioritize grants for projects that would benefit environmental justice communities and other communities disproportionately exposed to diesel pollution.

Committee of Jurisdiction: Energy and Commerce

Building Block: Significantly Increase Funding for DOE Transportation Electrification Grants

DOE's Transportation Electrification Program, authorized by EISA,³²⁴ provides competitive grants to state and local governments and other entities to deploy electric transportation technologies. These grants support shipside or shoreside electrification for vessels; truck stop electrification; electric airport ground support equipment; electric cargo handling equipment; and electric or dual-mode electric rail.³²⁵ Several bills, including the Energy and Commerce Committee's CLEAN Future Act discussion draft,³²⁶ Chairman Rush's NO EXHAUST Act (H.R. 5545), and Rep. Dingell's USA Electrify Forward Act (H.R. 5558) would increase funding for this program and expand eligibility to cover the most polluting equipment at U.S. ports. These bills also direct DOE to prioritize applicants that include written assurance that they will pay prevailing wages to all laborers working on the projects.

In Section 33339 of the Moving Forward Act (H.R. 2), House Democrats reauthorize the DOE Transportation Electrification Program to provide \$2 billion each year for five years for grants to state and local governments and private entities. The bill also provides \$2.5 billion each year for five years for large-scale projects to electrify the transportation sector.

³²² U.S. Environmental Protection Agency, "Clean Diesel National Grants," <https://www.epa.gov/dera/national#funding-costshare>. Accessed June 2020.

³²³ U.S. Environmental Protection Agency, "Clean Diesel National Grants: 2020 Request For Applications," <https://www.epa.gov/cleandiesel/clean-diesel-national-grants#rfa>. Accessed June 2020.

³²⁴ 42 U.S.C. § 17011.

³²⁵ 42 U.S.C. § 17011.

³²⁶ Section 439, CLEAN Future Act discussion draft.

Recommendation: Congress should significantly increase funding for the DOE Transportation Electrification Program. DOE should prioritize grant applications for projects that would benefit environmental justice communities and that offer written assurances they will pay prevailing wages. Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Recommendation: Congress should amend EISA Subsection (a)(6)(A) to expand grant eligibility for “shipside or shoreside electrification for vessels” to include ground support equipment at ports, including drayage trucks. Drayage trucks are heavy-duty trucks that transport containers to and from ports and intermodal railyards.

Committee of Jurisdiction: Energy and Commerce

Building Block: Establish a Pilot Program to Award Grants for the Retrofit of Heavy-Duty Refrigerated Vehicles

Refrigerated trucks, or “reefers,” serve to transport food products and other temperature-sensitive goods over long distances. These trucks generally have a separate “transport refrigeration unit” (TRU) that uses a diesel motor to maintain the desired temperature in the truck’s trailer. When the truck is transporting goods, the TRU runs constantly, releasing carbon pollution, particulate matter, and other pollutants that trigger asthma attacks.³²⁷ These trucks often idle in freight hubs or distribution centers, which are more likely to be in or near low-income communities and communities of color.

Rep. Yvette Clarke (D-NY) introduced the Fostering and Realizing Electrification by Encouraging Zero Emission Refrigeration (FREEZER) Trucks Act of 2019 (H.R. 5256). The bill creates a competitive grant pilot program at EPA to replace diesel TRUs with electrified and hybrid-electric units and to install charging equipment. Chairman Frank Pallone (D-NJ) included language from this bill in the discussion draft of the CLEAN Future Act.³²⁸ The House Democrats’ infrastructure bill, the Moving Forward Act (H.R. 2), directs EPA to establish a pilot program to award grants, rebates, or low-cost loans to eligible entities to replace or retrofit TRUs on refrigerated trucks with electric units or to purchase, install, or operate shore power infrastructure to enable trucks with electric TRUs to connect to electric power (Section 33321).

Recommendation: Congress should create an EPA program to award grants, rebates, or low-cost loans to replace diesel TRUs in refrigerated vehicles with electric units or to install and operate shore power infrastructure to facilitate charging of electric TRUs. Priority should go to projects that would benefit environmental justice communities and other communities disproportionately exposed to air pollution.

Committee of Jurisdiction: Energy and Commerce

³²⁷ California Air Resources Board, “Transport Refrigeration Unit,” <https://ww2.arb.ca.gov/our-work/programs/transport-refrigeration-unit/about>. Accessed June 2020.

³²⁸ Section 422, CLEAN Future Act discussion draft.

Building Block: Provide Federal Grant Support or Loans for Deployment of Alternative Fuel Infrastructure for Medium- and Heavy-Duty Vehicles

The public and private sectors are unlikely to adopt zero-emission trucks at scale until the supporting fueling infrastructure is convenient and widespread. CALSTART estimates that converting the nation's trucking infrastructure to support zero- or near-zero-emission fuels will require \$50 billion to \$100 billion in public and private investment.³²⁹

The Clean Corridors Act of 2019, introduced by Sen. Tom Carper (D-DE) as S. 674 in the Senate and Rep. Mark DeSaulnier (D-CA) as H.R. 2616 in the House, provides grant funding to state, local, and tribal governmental entities to facilitate installation of electric charging stations and hydrogen fueling infrastructure along designated corridors in the National Highway System. The bill envisions that this infrastructure would have to accommodate large vehicles, including semi-trailer trucks.

Recommendation: Congress should pass legislation authorizing DOT to offer competitive grants or loans to state, local, and tribal governments to install alternative fuel infrastructure, such as charging and hydrogen fueling stations, capable of servicing medium- and heavy-duty vehicles. Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant. Priority should go to projects that will reduce harmful air pollution in environmental justice communities and other disproportionately exposed communities, including communities near port facilities.

Recommendation: Congress should create an investment tax credit for zero-emission charging and fueling stations that can accommodate medium- and heavy-duty trucks. Congress should ensure that the tax credit is available for direct pay to facilitate its monetization.

Committees of Jurisdiction: Transportation and Infrastructure; Ways and Means

Building Block: Significantly Increase Federally Supported RDD&D to Spur New Technology for the Largest Trucks

Long-haul trucks with trailers present a significant decarbonization challenge. Electrification may not be a viable option for long-haul trucks, given their need to travel long distances and weight limits that batteries and cargo would stretch. Fuel cells and electrolytic hydrogen may offer a technological solution, but cost and infrastructure barriers remain for those technologies.

To tackle these and other questions, DOE has coordinated the SuperTruck program, which has partnered with the private sector to develop and demonstrate new technologies to double the freight efficiency of Class 8 trucks (18-wheelers).³³⁰

³²⁹ CALSTART, "Creating Jobs & Addressing the Climate Threat—How the STR Can Help," fact sheet, December 9, 2019.

³³⁰ U.S. Department of Energy, "Energy Department Announces \$137 Million Investment in Commercial and Passenger Vehicle Efficiency," August 16, 2016, <https://www.energy.gov/articles/energy-department-announces-137-million-investment-commercial-and-passenger-vehicle>.

Reps. Sean Casten (D-IL), David McKinley (R-WV), Aumua Amata Radewagen (R-AS), and Eddie Bernice Johnson (D-TX) introduced the Clean Industrial Technology Act of 2019 (H.R. 4230) to spur innovation to reduce emissions from industrial sources, including heavy road and rail transport, shipping, aviation, chemical production, steel and cement production, and heat production. The bill establishes a new advisory council to advance research and demonstration projects in these hard-to-decarbonize sectors. Sens. Sheldon Whitehouse (D-RI), Shelley Moore Capito (R-WV), Joe Manchin (D-WV), Cory Booker (D-NJ), and Mike Braun (R-IN) introduced a Senate companion (S. 2300).

Recommendation: Congress should increase federally supported RDD&D to make high-efficiency, zero-emission, long-range trucks commercially viable. This program should include robust demonstration and pilot deployment components to allow participants—including manufacturers and potential buyers—to troubleshoot problems that could hinder commercialization at scale.

Committee of Jurisdiction: Science, Space, and Technology

Building Block: Expand the Advanced Technology Vehicles Manufacturing Loan Program to Include Medium- and Heavy-Duty Vehicles

The Advanced Technology Vehicles Manufacturing (ATVM) Loan Program, administered by DOE, “provides direct loans to automotive or component manufacturers for re-equipping, expanding, or establishing manufacturing facilities in the United States that produce fuel-efficient advanced technology vehicles or qualifying components.”³³¹ Only light-duty vehicle technology is eligible for support, thereby excluding advanced technologies to decarbonize trucks, buses, and other heavy-duty vehicles.

In January 2020, Chairman Bobby Rush (D-IL) introduced the NO EXHAUST Act of 2020 (H.R. 5545). The NO EXHAUST Act expands the definition of eligible vehicles to include heavy-duty vehicles, including medium-duty passenger vehicles. Rep. Debbie Dingell (D-MI) introduced the USA Electrify Forward Act (H.R. 5558), which, among other provisions, expands the ATVM program to include zero-emission heavy-duty vehicles. The Energy and Commerce Committee’s CLEAN Future Act discussion draft also includes this language.³³² Rep. Julia Brownley (D-CA) introduced the Advanced Technology Vehicles Manufacturing Program Reform Act (H.R. 5860), which expands ATVM to cover all types of ZEV manufacturing, including medium- and heavy-duty vehicles; reforms the financial viability requirements for loan applicants; and directs the Government Accountability Office (GAO) to conduct a study to identify barriers in ATVM’s approval process. The House Democrats’ infrastructure bill, the Moving Forward Act (H.R. 2), expands the definition of eligible vehicles to include heavy-duty vehicles (Section 33342).

Recommendation: Congress should expand the ATVM program to include heavy-duty vehicles and medium-duty passenger vehicles. Congress should consider reforms to facilitate project application and review, consistent with the recommendations in the section of this report titled “Enable and Accelerate Financing for Climate Change Mitigation and Climate Resilient Infrastructure.”

Committee of Jurisdiction: Energy and Commerce

³³¹ U.S. Department of Energy, “Advanced Technology Vehicles Manufacturing (ATVM) Loan Program,” <https://www.energy.gov/lpo/advanced-technology-vehicles-manufacturing-atvm-loan-program>. Accessed June 2020.

³³² Section 442, CLEAN Future Act discussion draft.

Build a Cleaner and More Resilient Aviation Sector

The aviation sector accounted for 10% of the U.S. transportation sector's energy-related carbon dioxide emissions in 2019 and nearly 4% of all energy-related carbon dioxide emissions.³³³ Before the COVID-19 pandemic halted most air travel, the EIA estimated that U.S. aviation emissions could increase by 36% between 2019 and 2050, assuming no additional policy action.³³⁴ Similarly, experts predict that growing demand for air travel could triple global carbon dioxide emissions by 2050 without additional policy action.³³⁵ Commercial aviation may be one of the most difficult sectors to decarbonize, given the energy intensity of the fuel used, the premium placed on airline safety, and the projected growth in emissions. The solution is not to end air travel; rather, Congress needs to support American innovators who are working to identify alternatives to petroleum-based jet fuel and develop more efficient aircraft.

Full electrification of airline fleets, if technologically feasible, may be decades off. In the nearer term, sustainable alternative liquid fuels that are under development and already in use may hold the most promise for reducing the sector's consumption of traditional jet fuel, with a continued commitment to research and innovation.

The United States has been an active participant in the International Civil Aviation Organization (ICAO), a United Nations specialized agency. ICAO has set a global aspirational goal of achieving carbon-neutral growth in the aviation sector from 2020 onward.³³⁶ In 2017, ICAO finalized an aircraft carbon dioxide emissions standard that will apply to all new aircraft deliveries starting January 1, 2028.³³⁷ ICAO also established the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), which sets a carbon offsetting obligation for international flights for aircraft operators that starts in 2021.³³⁸ The Federal Aviation Administration (FAA) represents the United States in the ICAO process and manages the United States' monitoring, reporting, and verification program for U.S. airplane operator carbon dioxide emissions from international flights.

The aviation sector also must adapt to impacts of climate change and ensure critical aviation infrastructure can withstand more extreme weather conditions. Airports, particularly those on the coast or in low-lying areas, are vulnerable to sea level rise, flooding, and other impacts of climate change. Investments in airport upgrades could improve the resilience of airport operations in the face of increasingly frequent severe storms, extreme heat, and coastal flooding.

³³³ Energy Information Administration, *Annual Energy Outlook 2020* (January 2020). "Table 19: Energy-Related Carbon Dioxide Emissions by End Use," https://www.eia.gov/outlooks/aoe/tables_ref.php. Accessed June 2020.

³³⁴ Ibid.

³³⁵ Brandon Graver, Kevin Zhang, and Dan Rutherford, *CO2 Emissions from Commercial Aviation, 2018* (International Council on Clean Transportation, September 2019).

³³⁶ International Civil Aviation Organization (ICAO), *Resolution A39-2: Consolidated statement of continuing ICAO policies and practices related to environmental protection – Climate change* (2016), https://www.icao.int/environmental-protection/Documents/Resolution_A39_2.pdf.

³³⁷ ICAO, "ICAO Council adopts new CO2 emissions standard for aircraft," March 6, 2017, <https://www.icao.int/newsroom/pages/icao-council-adopts-new-co2-emissions-standard-for-aircraft.aspx>. Accessed June 2020.

³³⁸ ICAO, "Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)," available at <https://www.icao.int/environmental-protection/CORSIA/Pages/default.aspx>. Accessed June 2020.

The following recommendations focus on where Congress can build on international efforts to reduce emissions in the U.S. aviation sector and make airport infrastructure more resilient to climate impacts.

Building Block: Direct EPA to Set Science-Based Greenhouse Gas Emissions Standards for New and In-Service Aircraft

The U.S. EPA has authority under Section 231 of the Clean Air Act to set greenhouse gas emissions standards for new and existing in-service aircraft.³³⁹ In 2016, the EPA found that greenhouse gas emissions “from certain classes of engines used in certain aircraft are contributing to the air pollution ... that endangers public health and welfare” under the Clean Air Act.³⁴⁰ This sets the stage for a future EPA rulemaking to adopt greenhouse gas emission standards. As part of the ICAO process, EPA must promulgate an emissions standard at least as stringent as the ICAO standard for U.S. manufacturers to continue selling their aircraft and engines worldwide.

The ICAO standards, however, are technology-following. The average new single- and twin-aisle commercial aircraft already meets the ICAO carbon dioxide emissions requirements; by 2020, the average new aircraft will be 10% more efficient than the ICAO standard. The International Council on Clean Transportation concludes that “the standard is expected to have no effect on new aircraft fuel efficiency when fully enforced in 2028.”³⁴¹

Rep. Mike Levin (D-CA) introduced H.R. 6606, the Clean Skies Act. The bill requires EPA to finalize rules to establish emission standards for greenhouse gases from both new and in-service aircraft pursuant to Section 231 of the Clean Air Act. The bill also directs EPA to solicit comments on the minimum standards set by ICAO and more stringent standards that would achieve a greater emissions benefit.

Recommendation: Congress should direct the EPA to use its authority under the Clean Air Act to promulgate greenhouse gas emissions standards for new and in-service aircraft that are stronger than the ICAO standards. These standards should be technology-forcing, not technology-following, to spur technological innovation and should be consistent with the need to achieve net-zero emissions economy-wide by 2050.

Committee of Jurisdiction: Energy and Commerce

Building Block: Significantly Increase Federally Supported Research, Development, Demonstration, and Deployment to Reduce Aviation Emissions

The U.S. government funds several programs to improve the efficiency of the aviation sector, develop new technologies and sustainable aviation fuels, and reduce emissions of carbon dioxide and other pollutants. Most leverage private dollars to match federal spending.

³³⁹ 42 U.S.C. 7571.

³⁴⁰ U.S. Environmental Protection Agency, *Finding That Greenhouse Gas Emissions from Aircraft Cause or Contribute to Air Pollution That May Reasonably Be Anticipated to Endanger Public Health and Welfare; Final Rule*, 81 Fed. Reg. 54422 (August 15, 2016).

³⁴¹ International Council on Clean Transportation, *U.S. Passenger Jets Under ICAO’s CO₂ Standard, 2018-2038* (October 2018).

The FAA, National Aeronautics and Space Administration (NASA), DOD, Transport Canada, and EPA fund the FAA Center of Excellence for Alternative Jet Fuels and the Environment (ASCENT), a cooperative aviation research organization co-led by Washington State University and the Massachusetts Institute of Technology. One of the primary goals of ASCENT is to focus on “meeting the environmental and energy goals of the Next Generation Air Transportation system, including reducing noise, improving air quality, reducing climate impacts, and energy efficiency.”³⁴² NASA’s Aeronautics Research Mission Directorate is exploring advanced aviation technologies such as low-carbon propulsion systems and lightweight materials.³⁴³ FAA’s Continuous Lower Energy, Emissions & Noise (CLEEN) program, which is a cooperative effort with industry, focuses on improving engine technology, reducing fuel use, and developing sustainable alternative jet fuels. The DOE Bioenergy Technologies Office (BETO) also has worked with stakeholders and conducted research on alternative fuels for aviation.³⁴⁴

Reps. Sean Casten (D-IL), David McKinley (R-WV), Aumua Amata Radewagen (R-AS), and Eddie Bernice Johnson (D-TX) introduced the Clean Industrial Technology Act of 2019 (H.R. 4230) to spur innovation to reduce emissions from industrial sources, including heavy road and rail transport, shipping, aviation, chemical production, steel and cement production, and heat production. The bill establishes a new advisory council to advance research and demonstration projects in these hard-to-decarbonize sectors. Sens. Sheldon Whitehouse (D-RI), Shelley Moore Capito (R-WV), Joe Manchin (D-WV), Cory Booker (D-NJ), and Mike Braun (R-IN) introduced a Senate companion (S. 2300).

Rep. Don Beyer (D-VA) introduced the Cleaner, Quieter Airplanes Act (H.R. 5450), which bolsters NASA’s research into electrified propulsion systems and advanced airframe concepts to reduce noise and emissions. Sen. Ben Cardin (D-MD) introduced companion legislation (S. 2837).

Sections 10203 and 10204 of the House Democrats’ Moving Forward Act (H.R. 2) authorize funding for sustainable aviation fuel research at the FAA and the Center of Excellence for Alternative Jet Fuels and the Environment.

Recommendation: Congress should increase funding for federal RDD&D at NASA, DOE, FAA, and other relevant agencies into sustainable aviation fuels, electrified propulsion systems, advanced materials, and more energy-efficient aviation technology.

Committee of Jurisdiction: Science, Space, and Technology

Building Block: Provide Tax Incentives and Grant Support for Low-Emission Aviation Technology and Sustainable Aviation Fuels That Reduce Greenhouse Gas Emissions

The aviation industry has told ICAO that sustainable aviation fuel production “at a level and price to allow widespread adoption by airlines can be a game-changer in terms of aviation’s [carbon dioxide] emissions and will be a major factor in the industry meeting its 2050 goal.”³⁴⁵

³⁴² ASCENT – the Aviation Sustainability Center, <https://ascent.aero/>. Accessed June 2020.

³⁴³ NASA, “Aeronautics Research: ARMD Programs,” available at <https://www.nasa.gov/aeroresearch/programs>. Accessed June 2020.

³⁴⁴ U.S. Department of Energy, Bioenergy Technologies Office, “Aviation Fuels,” <https://www.energy.gov/eere/bioenergy/aviation-fuels>. Accessed June 2020.

³⁴⁵ ICAO, *Industry Views on the Basket of Measures and a Long-Term Goal*. 40th Assembly (September 2019), https://www.icao.int/Meetings/a40/Documents/WP/wp_194_en.pdf.

To serve as a true alternative to jet fuel, sustainable aviation fuel needs to meet strict aviation safety standards, emit significantly less carbon dioxide when burned as measured on a lifecycle basis, including both potential direct and indirect greenhouse gas emissions (including resulting in changes from land use), and be produced cost-effectively in large volumes. Commercial airlines are starting to use small amounts of sustainable aviation fuel as drop-in fuels. In 2019, for example, United Airlines agreed to purchase up to 10 million gallons of sustainable aviation biofuel over two years from Boston-based World Energy.³⁴⁶

Sustainable aviation fuel developers will need support to scale up the production of these alternative fuels. Sustainable aviation fuels are eligible for the biodiesel and renewable diesel tax credit in Section 40A of the tax code.³⁴⁷ On December 20, 2019, President Trump signed the Consolidated Appropriations Act, 2020, into law. This bill retroactively extended the tax credit, which had expired, through 2022.³⁴⁸

The House Ways and Means Democrats GREEN Act of 2020 (H.R. 7330) extends the 40A tax credit through the end of 2025 (Section 201). In addition, the House Democrats introduced a comprehensive infrastructure bill, the Moving Forward Act (H.R. 2). Section 10201 of this bill authorizes \$200 million in funding for fiscal years 2021 through 2025 for DOT to award grants or enter into cost-sharing arrangements with state and local governments, airports, air carriers, and other entities for projects to develop, demonstrate, or apply low-emission aviation technologies or produce, transport, blend, or store sustainable aviation fuels to reduce aircraft greenhouse gas emissions.

Recommendation: Before the tax credit expires in 2022, Congress should strengthen the sustainable aviation fuels tax credit to include a life-cycle carbon intensity requirement and extend it for at least five years to provide market certainty. Congress should consider the potential benefits of separating the sustainable aviation fuel tax credit from the broader biodiesel tax credit.

Recommendation: Congress should create a new competitive grant program and/or cost-sharing program at DOT and/or DOE to support projects to develop, transport, or store sustainable aviation fuels that are less carbon-intensive than jet fuel. DOT and DOE should coordinate with USDA and EPA in designing and implementing any grant program.

Committees of Jurisdiction: Ways and Means; Transportation and Infrastructure; Energy and Commerce

Building Block: Provide Additional Credit for Sustainable Aviation Fuels Under the Renewable Fuel Standard or a Future Federal Low Carbon Fuel Standard

Under the existing RFS, sustainable aviation fuel generates fewer credits per gallon than biodiesel. Similarly, the California Low Carbon Fuel Standard does not cover aviation, but users of sustainable

³⁴⁶ United Airlines, “United Airlines Expands Industry-Leading Commitment to Biofuel, Powering More Flights With More Biofuel Than Any Other U.S. Carrier,” May 22, 2019, <https://hub.united.com/united-expands-commitment-biofuel-powering-flights-2637791857.html>.

³⁴⁷ 26 U.S.C. § 40A.

³⁴⁸ Division Q, Section 121 of H.R. 1865, “Further Consolidated Appropriations Act, 2020,” 116th Congress.

aviation fuel can opt in and obtain credits. Neither program currently mandates the production or consumption of certain volumes of sustainable aviation fuel.

Recommendation: Congress should amend the Renewable Fuel Standard or craft a future federal Low Carbon Fuel Standard to provide a credit multiplier for sustainable aviation fuels that meet an ambitious emissions reduction threshold. This will provide fuel manufacturers additional market certainty and financial incentive to scale up production of sustainable aviation fuels.

Committee of Jurisdiction: Energy and Commerce

Building Block: Expand the Federal Aviation Administration’s Grant Programs for Cleaning Up Airport Ground Support Equipment

In 2003, Congress passed the Vision 100—Century of Aviation Reauthorization Act, which established the FAA’s Voluntary Airport Low Emissions (VALE) Program. VALE is a voluntary program to reduce air pollution at commercial service airports located in areas in nonattainment or maintenance of National Ambient Air Quality Standards (NAAQS).³⁴⁹ Through the program, airports can apply for grants to convert to or replace ground support equipment and vehicles with lower-emission technology or cleaner-burning fuels.³⁵⁰

The Airport Zero Emission Vehicle and Infrastructure Pilot Program is a complementary FAA program, created by Congress in 2012, to award Airport Improvement Program grants to airports for the purchase of zero-emission vehicles and fueling infrastructure. Airports located in EPA-designated nonattainment areas for criteria air pollutants receive priority for grant funding. In FY2019, FAA awarded two grants to airports in Southern California totaling \$3.5 million.³⁵¹

Section 10202 of the House Democrats’ Moving Forward Act (H.R. 2) expands the FAA’s VALE program to all commercial service airports, not just those located in areas that are in non-attainment or maintenance. The program would continue to prioritize federal funding for airports in areas with compromised air quality. In addition, Section 10102 provides supplemental funding for airport emission reduction projects, including zero-emission airport vehicles and infrastructure.

Recommendation: Congress should increase funding and expand VALE eligibility to airports located outside of NAAQS attainment areas and projects to reduce or eliminate greenhouse gas emissions, not just criteria air pollutants. Congress should ensure that charging infrastructure for electric propulsion aircraft is eligible for grant support.

Committee of Jurisdiction: Transportation and Infrastructure

³⁴⁹ 8 Pub. L. No. 108-176.

³⁵⁰ Federal Aviation Administration, “Voluntary Airport Low Emissions Program (VALE),” available at <https://www.faa.gov/airports/environmental/vale/>. Accessed June 2020.

³⁵¹ Federal Aviation Administration, “Airport Zero Emissions Vehicle and Infrastructure Pilot Program Airports,” https://www.faa.gov/airports/environmental/zero_emissions_vehicles/. Accessed June 2020.

Building Block: Improve the Resilience of the Nation’s Airports to Climate Change

Climate impacts can stress airport facilities and operations in numerous ways. Extreme storms can delay flight landings and departures, and extreme heat affects airplanes’ ability to take off.³⁵² Moreover, 13 of the nation’s 47 busiest airports have at least one runway within 12 feet of sea level, making them particularly vulnerable to storm surge and tidal flooding.³⁵³ Extreme heat can cause thermal expansion of paved surfaces such as runways, reducing their service life. Industry leaders recommend that airports conduct risk assessments, develop mitigation measures, and take climate resilience into consideration for their master plans.³⁵⁴

Section 10101 of the House Democrats’ infrastructure bill, the Moving Forward Act (H.R. 2), would increase annual funding for the Airport Improvement Program (AIP) through 2025. Section 10102 would set aside additional funds for projects that reduce airport emissions or increase airport resilience. Section 10103 of the bill would include airport climate resilience projects among eligible uses for AIP funds.

Recommendation: Congress should increase funding for the AIP and direct the FAA to make AIP funds available for airport climate resilience assessments and resilience building projects. Congress should also require all airports to complete a climate risk assessment within five years to retain eligibility for program funds. Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Committee of Jurisdiction: Transportation and Infrastructure

Expand, Maintain, and Modernize the Nation’s Rail Network

Freight rail offers a lower-carbon alternative to airline travel and freight movement by truck. According to the Association of American Railroads and freight rail company CSX, it is four times more efficient to move a ton of freight by rail than by truck over the highway.³⁵⁵ Intercity and passenger rail also provides commuters with more transportation choices, helping to reduce highway congestion and tailpipe emissions.

Building Block: Increase Federal Funding for the Nation’s Rail Network to Improve and Expand Service and Make the System Climate-Resilient

The United States needs to increase its investment in passenger rail to make it a convenient, lower-carbon option to flying and to reduce congestion on—and emissions from—America’s busiest

³⁵² Transportation Research Board and National Research Council. *Potential Impacts of Climate Change on U.S. Transportation: Special Report 290* (The National Academies Press, 2008).

³⁵³ U.S. Global Change Research Program, *Climate Change Impacts in the United States: The Third National Climate Assessment* (May 2014), Chapter 5: Transportation.

³⁵⁴ Airports Council International, *Policy Brief: Airports’ Resilience and Adaptation to a Changing Climate* (September 2018).

³⁵⁵ Association of American Railroads, “Freight Railroads Help Reduce Greenhouse Gas Emissions,” April 2019, <https://www.aar.org/wp-content/uploads/2018/07/AAR-Railroads-Greenhouse-Gas-Emissions.pdf>; CSX, “Fuel Efficiency,” <https://www.csx.com/index.cfm/about-us/the-csx-advantage/fuel-efficiency/>. Accessed June 2020.

interstates. To date, however, the United States' investment in passenger rail has not kept pace with that of China and Europe. In 2019, China announced that it planned record-high rail investment of around 850 billion yuan (\$125 billion).³⁵⁶ In January 2020, Germany and the largest railway operator, Deutsche Bahn, signed an agreement to invest 86 billion euros over the next 10 years to upgrade its rails, stations, signaling control, and power supply.³⁵⁷ In contrast, the U.S. passenger rail system is facing staggering maintenance backlogs. In 2019, Amtrak said its "state of good repair" backlog had passed \$33 billion.³⁵⁸

In June 2020, the House Democrats introduced a comprehensive infrastructure bill, the Moving Forward Act (H.R. 2), which includes several provisions to expand and improve America's rail infrastructure. Section 9102 establishes a new \$19 billion Passenger Rail Improvement, Modernization, and Expansion (PRIME) grant program to fund capital projects to repair, optimize performance, and expand intercity rail passenger transportation. High speed rail projects would be eligible for the funds. The bill directs the DOT to prioritize projects that incorporate regional planning, have multi-state support, and/or provide environmental benefits, such as greenhouse gas and air pollution emissions reductions. The bill (Section 9103) also reauthorizes the Consolidated Rail Infrastructure and Safety Improvements (CRISI) grant program, which funds passenger and freight rail projects, at \$7 billion over five years – a more than fivefold increase over FAST Act levels. Section 9104 of the bill provides direct loans and loan guarantees to finance development of railroad infrastructure through the Railroad Rehabilitation and Improvement Financing (RRIF) program. Because many of the nation's railways are sited near waterways, Section 9106 directs DOT to sponsor a study by the National Academies of Science, Engineering, and Medicine to assess and report on potential climate change impacts to the national rail network and to identify strategies to mitigate these impacts.

Recommendation: Congress should authorize and appropriate sufficient funding to transform our rail network and maintain it in a state of good repair; establish new or improved intercity, commuter, or higher-speed passenger rail corridors, while also reducing congestion and improving on-time passenger rail service; and ensure that rail infrastructure projects account for the effects of climate change, including heat waves and increasingly severe disasters. Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Committee of Jurisdiction: Transportation and Infrastructure

Building Block: Extend the Tax Credit for Maintenance and Upgrades of Short-Line Railroads

More than 600 short line railroads provide service more than 47,500 route miles each year, accounting for 29% of freight rail in the United States.³⁵⁹ These railroads provide residents, farmers, and manufacturers in small towns and rural America with critical connections to the national rail network.

³⁵⁶ "China ratchets up stimulus with record rail spending," *Nikkei Asian Review*, January 21, 2019.

³⁵⁷ "Germany to invest 86 bln euros to upgrade ageing railway network," *Reuters*, January 14, 2020.

³⁵⁸ Amtrak, *Amtrak Five Year Infrastructure Asset Line Plan* (2019).

³⁵⁹ American Short Line and Regional Railroad Association, "The Short Line and Regional Railroad Industry," available at https://www.aslrra.org/web/About/Industry_Facts/web/About/Industry_Facts.aspx?hkey=bd7c0cd1-4a93-4230-a0c2-c03fab0135e2. Accessed March 2020.

In 2005, Congress enacted the 45G Short Line Rehabilitation Tax Credit³⁶⁰ to spur private investment in short line track maintenance and upgrades. The American Short Line and Regional Railroad Association estimates that the tax credit has allowed the short line railroads to invest \$4 billion since its inception.³⁶¹ Congress allowed it to expire at the end of December 2017.

In January 2019, Rep. Earl Blumenauer (D-OR) and Rep. Mike Kelly (R-PA) introduced the bipartisan Building Rail Access for Customers and the Economy (BRACE) Act of 2019 (H.R. 510) to permanently extend the 45G tax credit. On December 20, 2019, President Trump signed the Consolidated Appropriations Act, 2020, into law. This bill retroactively extended the Short Line Rehabilitation Tax Credit through the end of 2022.³⁶²

Recommendation: Before the 45G tax credit expires at the end of 2022, Congress should extend it to facilitate repairs and upgrades.

Committee of Jurisdiction: Ways and Means

Building Block: Incentivize Electrification at the Nation’s Railyards

Like ports, railyards are a major source of air pollution that triggers asthma attacks and harms public health. In 2018, Loma Linda University School of Public Health released a study of all 18 major freight railyards in California and found a connection between freight-railyard pollution and asthma-related emergency room visits in children.³⁶³ Low-income communities and communities of color are often most exposed to pollution from locomotives, cargo handling equipment, and trucks that service the railyards.

DOE’s Transportation Electrification Program, authorized by EISA,³⁶⁴ provides competitive grants to state and local governments and other entities to deploy electric transportation technologies. These grants support shipside or shoreside electrification for vessels, truck-stop electrification, electric airport ground support equipment, electric cargo handling equipment, and electric or dual-mode electric rail.³⁶⁵

Recommendation: Congress should establish a challenge grant program through DOE’s existing Transportation Electrification Program to spur innovation at railyards, with a focus on electrification of locomotives and cargo handling equipment, such as cranes. Congress should prioritize funding for railyards located in environmental justice communities and other communities disproportionately exposed to air pollution.

Committee of Jurisdiction: Energy and Commerce

³⁶⁰ 26 U.S.C. §45G

³⁶¹ American Short Line and Regional Railroad Association, “The Short Line Tax Credit (45G),” https://www.aslrra.org/web/Advocacy/45G_Tax_Credit/web/Advocacy/New_Advocacy/Short_Line_Tax_Credit.aspx?hkey=55c93c8b-a377-49f0-9669-f5d5b36d83e2. Accessed June 2020.

³⁶² Section 112 of H.R. 1865, “Further Consolidated Appropriations Act, 2020,” 116th Congress.

³⁶³ Rhonda Spencer-Hwang, et al, “Association of major California freight railyards with asthma-related pediatric emergency department hospital visits,” *Preventative Medicine Reports* 13 (March 2019): 73-39.

³⁶⁴ 42 U.S.C. § 17011.

³⁶⁵ Ibid.

Build a Cleaner and More Resilient Maritime and Shipping Sector

Ports are central to the movement of goods and passengers and are vital to America’s global competitiveness and economic prosperity. The freight traffic and diesel-powered equipment used to load and unload ships at ports of entry generate significant nitrogen oxides, fine particles, and carbon dioxide. The ships themselves also are a source of air pollution. Domestic and international shipping accounted for 4% of the U.S. transportation sector’s energy-related carbon dioxide emissions in 2019.³⁶⁶ The United Nations International Maritime Organization (IMO) predicts, however, that global shipping emissions could reach 18% of total emissions by 2050 if no action is taken.³⁶⁷ Low-income communities and communities of color often live in proximity to ports, where they are disproportionately exposed to pollution from the nation’s goods movement.

The IMO has committed to reducing global greenhouse gas emissions from shipping by at least 50% from 2008 levels by 2050.³⁶⁸ Since ships are capital-intensive and long-lived, the Global Maritime Forum’s Getting to Zero Coalition estimates that commercially viable zero-emission vessels must start entering the global fleet by no later than 2030 in order to meet the 2050 goal.³⁶⁹

The World Shipping Council has stated unequivocally that “a global vessel fleet that relies primarily or even substantially on fossil fuels” cannot meet the ambitious 2050 goal.³⁷⁰ To lead the world in finding a solution, the United States will need to implement a coordinated federal strategy to develop and deploy lower-carbon shipping fuels and propulsion systems. The United States will also need to invest in electrification and resilience of U.S. ports and harbors to promote cleaner air and more reliable operations in the face of rising sea levels and more frequent severe coastal storms. Such efforts will afford the country an opportunity to strengthen its “Blue Economy” and leverage its skilled maritime workforce.

EPA has authority under the Clean Air Act to set greenhouse gas emissions standards for non-road engines and non-road vehicles, including marine engines, if those emissions contribute to air pollution that “may reasonably be anticipated to endanger public health or welfare.”³⁷¹ A new president committed to climate action could exercise this authority. The following recommendations focus on where Congress can drive additional progress in the U.S. maritime and shipping sector for both pollution reduction and climate resilience.

³⁶⁶ Energy Information Administration, *Annual Energy Outlook 2020* (January 2020). “Table 19: Energy-Related Carbon Dioxide Emissions by End Use,” https://www.eia.gov/outlooks/aoe/tables_ref.php. Accessed June 2020.

³⁶⁷ David S. Lee et al., Manchester Metropolitan University, “Shipping and Aviation Emissions in the Context of a 2°C Emission Pathway,” 2013, http://www.cate.mmu.ac.uk/wp-content/uploads/2013/03/Shipping_and_aviation_emissions_and_2_degrees_22032013.pdf.

³⁶⁸ International Maritime Organization, “UN body adopts climate change strategy for shipping,” April 13, 2018. Available at <http://www.imo.org/en/MediaCentre/PressBriefings/Pages/06GHGinitialstrategy.aspx>.

³⁶⁹ Global Maritime Forum, “Getting to Zero Coalition,” <https://www.globalmaritimeforum.org/getting-to-zero-coalition>. Accessed March 2020.

³⁷⁰ Testimony of John W. Butler, World Shipping Council, Before the Subcommittee on Coast Guard and Maritime Transportation of the Committee on Transportation and Infrastructure, U.S. House of Representatives, “The Path to a Carbon-Free Maritime Industry: Investments and Innovation,” 116th Congress (January 14, 2020).

³⁷¹ 22 U.S.C. 7547.

Building Block: Significantly Increase Federally Supported Research, Development, Demonstration, and Deployment to Reduce Emissions in the Shipping Sector

Some maritime vessels, such as passenger ferries, can use battery-electric technology instead of fossil fuels because they are relatively light and travel short, fixed routes. Other vessels, such as cargo ships, are too heavy and travel great distances across the ocean, making electrification impossible within the constraints of today's technologies. The industry needs additional research and development to identify zero-emission solutions for all vessel types.

The DOT's Maritime Environmental and Technical Assistance (META) Program, administered by the Maritime Administration (MARAD), "promotes the research, demonstration, and development of emerging technologies, practices, and processes that improve maritime industrial environmental sustainability."³⁷² It largely has focused its RDD&D on preventing the transport of aquatic invasive species and reducing vessel and port air emissions, but it also has investigated biofuels and fuel cells as alternative power sources for vessels.

In June 2020, Sen. Edward Markey (D-MA) introduced the Expanding Maritime Environmental and Technical Assistance Program Act (S. 4025), which authorizes an additional \$3 million for the META Program to research on zero-emission port and vessel technologies.

Recommendation: Congress should increase funding for META to make decarbonization of the U.S. shipping sector and seaports a top priority. MARAD could use META to research innovative hull designs, advanced propulsion systems and materials, alternative liquid fuels, and other zero-emission vessel technologies.

Committees of Jurisdiction: Transportation and Infrastructure; Science, Space, and Technology

Building Block: Ensure Low-Carbon Shipping Fuels Are Eligible for Credits Under the Renewable Fuel Standard or a Future Low Carbon Fuel Standard

Electrification of large vessels traveling across the ocean may prove technologically impossible or cost prohibitive. As a result, low-carbon liquid fuels, in combination with other technological advancements, may play an important role in decarbonizing the maritime sector. Currently, renewable fuels used in oceangoing vessels are ineligible for credits under the RFS.

Recommendation: Congress should ensure that qualifying shipping fuels are eligible for credits under the RFS or a future Low Carbon Fuel Standard, assuming the fuels meet all applicable standards.

Committee of Jurisdiction: Energy and Commerce

³⁷² Maritime Administration, U.S. Department of Transportation, "Maritime Environmental and Technical Assistance (META) Program," <https://www.maritime.dot.gov/innovation/meta/maritime-environmental-and-technical-assistance-meta-program>. Accessed June 2020.

Building Block: Provide Grants to Expedite Port Electrification, Reduce Emissions From Port Operations, and Upgrade Ports for Offshore Wind Development

When ships dock at a port and continue to run their diesel engines, they generate significant air pollution, including smog-forming nitrogen oxides and fine particles that can trigger asthma attacks and other respiratory problems. Communities located near these ports—often environmental justice communities—bear the brunt of this air pollution.

Ships can use shore power to plug into the local electricity grid and power off auxiliary engines while at berth, a process known as cold ironing. EPA estimates that plugging into shore power can reduce a vessel’s air emissions by up to 98%.³⁷³ California has enacted a rule to reduce diesel particulate and nitrogen oxides from container ships, passenger ships, and refrigerated-cargo ships docked at California ports. The State of California predicts that accessing shore power will be the most common method for complying with the regulation.³⁷⁴

Although the U.S. Navy has been using shore power for decades, most commercial ports do not have the appropriate infrastructure to provide shore power to vessels at berth. Key barriers to shore power installation include the up-front capital costs of installing new landside infrastructure and upgrading the electrical grid to handle new load, and vessel modifications.³⁷⁵ Some commercial ports have invested in shore power infrastructure but struggled to successfully encourage vessels to plug into it. In many cases, logistical and cost barriers may discourage vessels from utilizing shore power. In the absence of financial or regulatory drivers, these vessels may continue to lack the incentive to plug into shore power, even if it becomes more readily available.

Members of Congress have introduced multiple bills that would reduce port emissions. The transportation bill passed by the Senate Environment and Public Works Committee, America’s Transportation Infrastructure Act of 2019 (S. 2302), includes \$370 million to coordinate and provide funding to test, evaluate, and deploy projects that reduce port-related emissions from idling trucks, including through the advancement of port electrification and improvements in efficiency, focusing on port operations, including heavy-duty commercial vehicles.

Rep. Suzanne Bonamici (D-OR) and Rep. Don Young (R-AK) introduced the Water Power Research and Development Act (H.R. 6084), which takes steps to decarbonize maritime energy infrastructure, including port infrastructure. The bill directs the Departments of Energy, Transportation, and Commerce to conduct a study on the use of marine energy technologies in the maritime transportation and infrastructure sectors.

In May 2020, Rep. Nanette Diaz Barragán (D-CA) introduced H.R. 7024, the Climate Smart Ports Act, which creates a \$1 billion-a-year ports infrastructure program to reduce carbon and toxic air pollution. The program would replace diesel-burning cargo handling equipment, drayage trucks, and other equipment with zero-emissions equipment and technology; install shore power for docked ships and electric charging stations for new equipment; fund microgrids at ports; and implement

³⁷³ U.S. Environmental Protection Agency, *Shore Power Technology: Assessment at U.S. Ports* (March 2017).

³⁷⁴ California Air Resources Board, “Shore Power for Ocean-going Vessels,”

<https://ww3.arb.ca.gov/ports/shorepower/background/background.htm>. Accessed June 2020.

³⁷⁵ U.S. Environmental Protection Agency, *Shore Power Technology: Assessment at U.S. Ports* (March 2017).

strong labor provisions to protect dockworkers from automation, require a prevailing wage for work funded through the program, and encourage the use of union labor and local hiring. Sens. Jeff Merkley (D-OR), Ron Wyden (D-OR), Cory Booker (D-NJ), Elizabeth Warren (D-MA), and Martin Heinrich (D-NM) introduced the Senate companion. The House Democrats included \$500 million per year for the Climate Smart Ports Act in Section 25002 of its comprehensive infrastructure bill, the Moving Forward Act (H.R. 2).

In June 2020, Rep. Lisa Blunt Rochester (D-DE) introduced the Climate Action Planning for Ports Act of 2020 (H.R. 7304), which establishes a competitive grant program at EPA to incentivize port authorities and state, local, and tribal governments to create and implement climate action plans to reduce greenhouse gas emissions and other air pollutants at America's ports. The bill directs EPA to prioritize grant applications that, among other factors, (1) take a regional approach to reducing greenhouse gas emissions at ports; (2) collaborate with near-port communities and environmental justice communities to develop the climate action plans; and (3) would have benefits beyond the port facilities, such as reducing offsite air pollutants from vehicles, equipment, and vessels.

In addition to cutting emissions, port authorities may need to upgrade their infrastructure or purchase new equipment to service the growing offshore wind industry. Offshore wind components, including blades, nacelles, towers, and foundations, are large and heavy. Assembly and storage areas must have high load bearing capacity, and port authorities may have to acquire specialized equipment and allocate new space for delivery, storage, installation, maintenance, and servicing.³⁷⁶

Recommendation: Congress should increase funding for DOT and/or EPA grant programs to (1) support retrofitting or replacing diesel vehicles, drayage trucks, and other equipment at ports; (2) upgrade the nation's inland ports and seaports to improve rail access and support ship-to-shore power; and (3) prepare coastal port infrastructure to service offshore wind development. Priority should go to projects that will reduce harmful emissions in environmental justice communities and communities disproportionately exposed to air pollution. Project developers should engage representatives from near-port communities early in the planning process.

Recommendation: As detailed in the section of this report titled "Reduce Pollution from Heavy-Duty Trucks and Buses by Deploying Cleaner Vehicles and Fuels," Congress should significantly increase funding for the EPA Clean Diesel National Grants Program and DOE Transportation Electrification Program to reduce emissions from heavy-duty equipment operating at ports. Congress should amend EISA Subsection (a)(6)(A) to expand eligibility for the DOE transportation electrification program grants to include ground support equipment at ports, including drayage trucks.

Recommendation: Congress should consider crafting legislation to require vessels to plug into shore power where available and when feasible.

For all recommendations, federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements),

³⁷⁶ Kinetik Partners, Prepared for Maryland Energy Administration, *Analysis of Maryland Port Facilities for Offshore Wind Energy Services* (December 2011).

complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Committees of Jurisdiction: Transportation and Infrastructure; Energy and Commerce

Building Block: Provide Funding for Electrification of Passenger Ferries

Ferries are ideal candidates for electrification. Since they tend to travel short, fixed routes, batteries can power the vessels for the length of their journey. In addition, their routine stops at port to load and unload passengers allow enough time to recharge. Washington State announced in December 2019 that it was switching from diesel ferries to electric-hybrid ferries and building a 144-car electric ferry.³⁷⁷

Electric passenger ferries tend to have higher upfront capital costs than diesel ferries but lower operational costs over the lifetime of the vessels.³⁷⁸

The House Democrats' comprehensive infrastructure bill, the Moving Forward Act (H.R. 2), increases funding authorizations for ferry boats and related infrastructure by 50% (Section 1208). Section 2915 authorizes DOT to make grants for zero- or reduced-emission passenger ferries.

Recommendation: Congress should increase funding for DOT programs to support ferry electrification and installation of necessary shoreside charging infrastructure. Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Committee of Jurisdiction: Transportation and Infrastructure

Building Block: Make Energy-Efficient Offshore Wind Servicing Vessels Eligible for Federal Loan Guarantees

The Federal Ship Financing Program, commonly referred to as "Title XI" based on its location in the Merchant Marine Act of 1936, provides for "a full faith and credit guarantee by the United States Government to promote the growth and modernization of the U.S. merchant marine and U.S. shipyards."³⁷⁹ The program offers long-term, low-interest debt repayment guarantees to encourage U.S. shipowners to obtain new vessels from U.S. shipyards.

The International Energy Agency projects that global offshore wind capacity will increase fifteen-fold and emerge as a \$1 trillion industry over the next two decades.³⁸⁰ The United States has significant

³⁷⁷ State of Washington, Gov. Jay Inslee, "Clean transportation advances with hybrid-electric ferries," December 19, 2019, <https://www.governor.wa.gov/news-media/clean-transportation-advances-hybrid-electric-ferries>.

³⁷⁸ Testimony of Peter Bryn, ABB Marine and Ports, Before the Subcommittee on Coast Guard and Maritime Transportation of the Committee on Transportation and Infrastructure, U.S. House of Representatives, "The Path to a Carbon-Free Maritime Industry: Investments and Innovation," 116th Congress (January 14, 2020).

³⁷⁹ U.S. Maritime Administration, "Federal Ship Financing Program (Title XI)," <https://www.maritime.dot.gov/grants/title-xi/federal-ship-financing-program-title-xi>. Accessed June 2020.

³⁸⁰ International Energy Agency, *Offshore Wind Outlook 2019* (November 2019).

offshore wind energy capacity and, with the right policies, will become part of that trajectory. Tapping America's offshore wind capacity also creates new opportunities for domestic manufacture of related equipment and vessels. Offshore wind components, including blades, nacelles, towers, and foundations, are large and heavy and may require specialized vessels for delivery, installation, maintenance, and servicing.

Recommendation: Congress should amend the Title XI loan guarantee program to include wind turbine installation vessels to incentivize the manufacture of vessels that will be needed to service a growing offshore wind industry. These vessels should meet the International Maritime Organization's Energy Efficiency Design Index (EEDI) standards. The EEDI standards require that new ships meet a minimum energy efficiency standard per capacity mile for reference ships based on ship type and size. The energy efficiency standard becomes more stringent every five years.³⁸¹

Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Committee of Jurisdiction: Transportation and Infrastructure

Building Block: Increase the Resilience of the Nation's Ports and Harbors to Climate Impacts

The nation's ports and harbors are key nodes in global supply chains, so it is critical that they are able to maintain continuity of operations in the face of manmade and natural disruptions, including terrorist attacks, coastal storms, and the current COVID-19 pandemic. Certain climate-related impacts, including rising sea level, floods, storm surges, and strong winds, are posing increasing threats of disruption to port and harbor operations.³⁸² The resilience of U.S. ports to disruptive events depends both on maintenance of strong physical infrastructure for landside and waterside operations and on advanced planning for emergency coordination and communications to ensure rapid response and recovery.³⁸³ For example, Superstorm Sandy inundated many critical facilities at the Port of New York and New Jersey, and logistical bottlenecks resulting from cargo diversions disrupted supply chains for weeks after the storm.³⁸⁴ The "Ports Resilience Index," which was published in 2016 by a group of port operations managers with support from the National Oceanic and Atmospheric Administration (NOAA), identifies key considerations for increasing the resilience of U.S. ports and harbors. These considerations include advanced stakeholder coordination planning and comprehensive hazard assessments of port infrastructure and assets.³⁸⁵

³⁸¹ International Maritime Organization, "Air Pollution, Energy Efficiency and Greenhouse Gas Emissions: Energy Efficiency Measures," <http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Pages/Technical-and-Operational-Measures.aspx>. Accessed June 2020.

³⁸² Regina Asariotis, Hassiba Benamara, and Viktoria Mohos-Naray, UNCTAD Research Paper No. 18, "Port Industry Survey on Climate Change Impacts and Adaptation" (United Nations Conference on Trade and Development, December 2018).

³⁸³ National Cooperative Freight Research Program, Report 30, *Making U.S. Ports Resilient as Part of Extended Intermodal Supply Chains* (The National Academies of Science, Engineering, and Medicine, 2014).

³⁸⁴ *Ibid.*

³⁸⁵ Lauren L. Morris and Tracie Sempier, *Ports Resilience Index: A Port Management Self-Assessment* (Ports Resilience Expert Committee, 2016), http://masgc.org/assets/images/Ports_resilience_index.pdf.

The Harbor Maintenance Tax is a user fee collected from shippers to fund the U.S. Army Corps of Engineers' (USACE) coastal operations and maintenance, such as dredging ship channels and repairing jetties. As part of the Coronavirus Aid, Relief, and Economic Security (CARES) Act, Congress adjusted the discretionary spending limit on the Harbor Maintenance Trust Fund (HMTF) to allow expenditure of the HMTF's previous year's revenues, which would guarantee more than \$1.7 billion in HMTF spending for FY2021 to support waterside harbor infrastructure improvements.³⁸⁶ However, Congress needs to fully unlock the more than \$9 billion available in the HMTF and assure that those investments result in ports and harbor infrastructure that can withstand climate impacts, including rising sea levels and more intense coastal storms. In addition to HMTF spending on waterside harbor infrastructure, Congress also can invest in additional climate resilience improvements to U.S. ports and harbors through future Water Resources Development Acts. Federal interagency entities, such as the Mitigation Framework Leadership Group (MitFLG), could help to coordinate a unified federal framework for climate-resilient investments in U.S. ports and harbors, including guidance on vulnerability assessments and adaptation planning for individual ports and harbors.

Transportation and Infrastructure Committee Chair Peter DeFazio (D-OR), Committee Ranking Member Sam Graves (R-MO), Chairwoman of the Subcommittee on Water Resources and Environment Grace F. Napolitano (D-CA), Subcommittee Ranking Member Bruce Westerman (R-AR), and Rep. Mike Kelly (R-PA) introduced the Full Utilization of the Harbor Maintenance Trust Fund Act (H.R. 2440), which would fully exempt HMTF spending from consideration within overall discretionary spending caps, thereby enabling full utilization of the HMTF to ensure that the funds are used to support navigation and maintain federally authorized harbors. Section 21003 of the House Democrats' infrastructure bill, the Moving Forward Act (H.R. 2), includes this provision.

Recommendation: Congress should fully fund the Harbor Maintenance Trust Fund and continue to allow fees to pay for projects to increase the resilience of U.S. ports and harbors.

Recommendation: Congress should ensure that future investments in U.S. ports and harbors, including HMTF expenditures on waterside infrastructure improvements, prioritize long-term climate resilience. Congress should direct an existing federal interagency entity, such as the MitFLG, to coordinate implementation and prioritization of federal investments to prepare ports and harbors for the effects of sea level rise, more frequent severe coastal storms, and other climate change impacts. Project developers should engage representatives from port and harbor communities early in the planning process.

Committee of Jurisdiction: Transportation and Infrastructure

³⁸⁶ Coronavirus Aid, Relief, and Economic Security (CARES) Act, Pub L No 116-136, Sec. 14003.

Build and Upgrade Homes and Businesses to Maximize Energy Efficiency and Eliminate Emissions

Decarbonizing buildings presents both a substantial economic opportunity and a complex challenge. Across the country, there are roughly 125 million homes and 5 million commercial buildings.³⁸⁷ These buildings vary widely in age, structure, and efficiency and use an enormous amount of electricity. Residential and commercial buildings are responsible for about three-quarters of U.S. electricity sales and two-fifths of U.S. energy use.³⁸⁸ At the same time, retrofitting existing buildings is a significant opportunity to create local jobs while also reducing carbon emissions and energy bills.

In 2019, the energy efficiency industry employed nearly 2.38 million Americans and was poised to grow another 3% in 2020.³⁸⁹ However, economic impacts from the COVID-19 pandemic resulted in more than 400,000 energy efficiency job losses in March and April 2020 alone.³⁹⁰ Congress can put millions of Americans to work, reduce energy costs and increase energy resilience for families and businesses, and significantly reduce carbon pollution by supporting building efficiency and decarbonization in economic recovery efforts and for decades to come. To decarbonize this sector, the United States needs to ensure all new buildings are as clean as possible—from the energy used to heat the buildings to the building materials themselves—and retrofit existing buildings to make them more efficient. The national effort to reduce pollution from buildings will create construction jobs in every county in the United States.

Because there are many different, disperse decision-makers responsible for the millions of buildings in the United States, the federal government provides the greatest impact through incentives, technical assistance, and convening. For example, building codes dictate the minimum requirements for construction of new buildings, including their energy efficiency. While the federal government is involved in the consensus process of creating new model codes, state and local jurisdictions decide which model codes to adopt and enforce based on their specific circumstances, such as their risks for certain types of natural disasters or the climate of their region. For existing buildings, updated building codes are much less relevant, and individual building owners and tenants make decisions on building improvements and energy use, respectively. Rather than impose top-down mandates on individuals, the recommendations in the Climate Crisis Action Plan focus on providing financial incentives and technical support to help local jurisdictions and individuals make their buildings cleaner, while setting goals and requirements for the federal building stock to lead by example.

In addition to decarbonizing the U.S. building sector, the federal government must help ensure the resilience of American homes and businesses. The section of the report titled “Make U.S. Communities More Resilient to the Impacts of Climate Change” includes comprehensive policies that Congress must implement alongside the energy and emissions reductions measures detailed in this section.

³⁸⁷ Pacific Northwest National Laboratory, “Buildings-Grid Integration,” <https://bgintegration.pnnl.gov>. Accessed June 2020.

³⁸⁸ Energy Information Administration, *Monthly Energy Review* (May 2020), Table 7.6: Electricity End Use and Table 2.1: Energy Consumption by Sector.

³⁸⁹ National Association of State Energy Officials and Energy Futures Initiative, *2020 U.S. Energy and Employment Report* (National Association of State Energy Officials and Energy Futures Initiative, 2020).

³⁹⁰ E2, “Clean Energy & COVID-19 Economic Crisis: April 2020 Impact Analysis,” <https://e2.org/reports/clean-jobs-covid-economic-crisis-april-2020>. Accessed June 2020.

Because buildings form the foundation of communities, Congress should implement an inclusive stakeholder process when developing the policies described below and solicit input from representatives of low-income communities and communities of color.

Reduce Energy Use in New and Existing Buildings

In the building sector, lighting, heating, cooling, and ventilating building interiors, heating water, and operating other appliances require a lot of energy. Several factors converge to slow deployment of energy-efficient technologies, including the upfront cost of investing in energy efficiency improvements, split incentives for owners and renters, and the undervaluing of energy efficiency in energy pricing and utility rate design. To overcome these barriers, local, state, and federal policies need to work together to unlock the environmental and economic potential of energy efficiency retrofits and energy-efficient new construction.

Building Block: Provide Incentives for Homeowner Investments in Energy Efficiency

Homeowner investments in energy efficiency improvements can reduce carbon emissions and energy bills. Despite these benefits, however, homeowners often do not have the upfront capital or sufficient incentives from utility rate design to invest in these improvements. To address this problem, Congress enacted the Section 25C tax credit for homeowner investments in energy-efficient heating, cooling, and water heating and energy-efficient doors and windows in existing and renovated homes, but Congress allowed this tax credit to expire at the end of 2017.³⁹¹ On December 20, 2019, President Trump signed the Consolidated Appropriations Act, 2020 into law. This bill retroactively extended the Section 25C tax credit through 2020.³⁹²

Reps. Jimmy Gomez (D-CA) and Mike Kelly (R-PA) and Sens. Maggie Hassan (D-NH) and Susan Collins (R-ME) introduced the Home Energy Savings Act (H.R. 4506/S. 2588), which would extend the Section 25C tax credit for homeowner investments in energy efficiency improvements through 2026, increase the value of the tax credit to 15% of the installation costs, increase the tax credit's lifetime cap, and update the qualification requirements. Section 301 of the House Ways and Means Committee Democrats' GREEN Act of 2020 (H.R. 7330) includes similar provisions and would extend the tax credit through 2025. Section 301 of the GREEN Act also includes home energy audits as eligible under 25C, a provision separately introduced by Rep. Gwen Moore (D-WI) as the Empowering Homeowners Energy Efficiency Act of 2019 (H.R. 5159).

In addition, many states, local governments, and utilities offer rebates for investments in energy efficiency improvements, because rebates return cash to homeowners faster than tax credits and can offer a more powerful incentive. Grant programs, like the Weatherization Assistance Program (discussed in detail below), are also effective but typically target low-income and vulnerable communities.

³⁹¹ 26 U.S.C. § 25C.

³⁹² Consolidated Appropriations Act 2020, Pub L No 116-93.

Reps. Peter Welch (D-VT) and David McKinley (R-WV) introduced the Home Owner Managing Energy Savings (HOMES) Act of 2019 (H.R. 2043), which the Energy and Commerce Committee also included in their LIFT America Act (H.R. 2741) and updated in their CLEAN Future Act discussion draft.³⁹³ The House Democrats also added the updated HOMES provision in their infrastructure bill, the Moving Forward Act (H.R. 2). The updated provision would (1) provide rebates to homeowners for installation of insulation, air sealing, and replacement of HVAC systems; and (2) provide grants to states for carrying out rebate programs for conducting energy efficiency retrofits, whose value would be based on the levels of home energy savings achieved. Retrofits that achieve a 20% reduction would be eligible for a \$2,000 rebate, while retrofits that achieve a 40% reduction would be eligible for a \$4,000 rebate. On June 24, 2020, Reps. Peter Welch (D-VT) and David McKinley (R-WV) and Sens. Chris Van Hollen (D-MD), Jeanne Shaheen (D-NH), and Chris Coons (D-DE) introduced the HOPE for HOMES Act of 2020 (H.R. 7325/S. 4052), which incorporates the HOMES Act and would pair the rebate program with a grant program for online workforce training designed to prepare workers to conduct comprehensive home energy efficiency retrofits eligible for HOMES rebates.

Recommendation: Before it expires at the end of 2020, Congress should pass a longer-term extension and update of the Section 25C tax credit for homeowner investments in energy efficiency improvements.

Recommendation: Congress should establish federal rebates for homeowner energy efficiency retrofits of existing homes and fund workforce training programs to train workers to conduct these retrofits.

Committees of Jurisdiction: Ways and Means; Energy and Commerce

Building Block: Help Homeowners Leverage Savings from Energy Efficiency Improvements

While tax credits and rebates can help encourage homeowners to invest in energy efficiency improvements, additional barriers remain. For example, homeowners may hold off on investing in energy efficiency improvements if they are worried that they may need to sell their house and move before they can recoup the value of their investments in energy efficiency improvements. In addition, even if prospective home buyers would like to purchase homes with energy efficiency improvements, their mortgage applications will not factor in the cost savings from the improvements.

The Sensible Accounting to Value Energy (SAVE) Act, part of the Energy Savings and Industrial Competitiveness Act of 2019 (H.R. 3962/S. 2137) introduced by Reps. Peter Welch (D-VT) and David McKinley (R-WV) and Sens. Rob Portman (R-OH) and Jeanne Shaheen (D-NH), would help home sellers leverage savings from investments in energy efficiency improvements by allowing home buyers to increase their borrowing capacity for mortgages on energy-efficient homes.

Recommendation: Congress should help home buyers leverage energy efficiency investments to increase their borrowing capacity for mortgages on energy-efficient homes.

Committee of Jurisdiction: Financial Services

³⁹³ Title III, Section 331, CLEAN Future Act discussion draft.

Building Block: Extend the Tax Deduction for Commercial Investments in Energy Efficiency

As with homeowners, owners of multi-family apartment buildings and commercial buildings often face deterrents to investing in energy efficiency because of the upfront capital required for these investments.

Congress enacted the Section 179D tax deduction for commercial investments in energy efficiency, including in interior lighting, heating, cooling, and ventilation, hot water systems, and the building envelope.³⁹⁴ Congress allowed this tax deduction to expire at the end of 2017. On December 20, 2019, President Trump signed the Consolidated Appropriations Act, 2020 into law. This bill retroactively extended the Section 179D tax deduction through 2020.³⁹⁵

Rep. Earl Blumenauer (D-OR) introduced the Energy Efficient Commercial Buildings Act of 2019 (H.R. 5160), which would extend the 179D tax deduction for commercial investments in energy efficiency improvements through 2024, increase the value of the tax deduction, and ensure that the improvements reduce associated energy costs by more than 30% compared with the most recent standards developed by ASHRAE, a professional association representing members in the heating, ventilation, air conditioning, and refrigeration sectors. Section 303 of the GREEN Act of 2020 (H.R. 7330) also includes similar provisions and would extend the 179D tax deduction through 2025.

Recommendation: Before it expires at the end of 2020, Congress should pass a longer-term extension and update of the Section 179D tax deduction for commercial investments in energy efficiency improvements.

Committee of Jurisdiction: Ways and Means

Building Block: Extend the Tax Credit for Builders of New, Energy-Efficient Homes

Homebuilders and commercial developers of new, energy-efficient houses and multi-family apartment buildings are eligible for the Section 45L tax credit if they use energy-efficient materials.³⁹⁶ Congress allowed this tax deduction to expire at the end of 2017. On December 20, 2019, President Trump signed the Consolidated Appropriations Act, 2020 into law. This bill retroactively extended the Section 45L tax credit through 2020.³⁹⁷

Reps. Jimmy Gomez (D-CA) and Mike Kelly (R-PA) and Sens. Maggie Hassan (D-NH) and Susan Collins (R-ME) introduced the New Home Energy Efficiency Act (H.R. 4646/S. 2595), which would extend the Section 45L tax credit for new, energy-efficient homes through 2020, increase the maximum credit per home to \$2,500, and update the energy savings requirements for receiving the credit. Section 304 of the GREEN Act of 2020 (H.R. 7330) includes similar provisions and would extend the tax credit through 2025.

³⁹⁴ 26 U.S.C. § 179D.

³⁹⁵ Consolidated Appropriations Act 2020, Pub L No 116-93.

³⁹⁶ 26 U.S.C. § 45L.

³⁹⁷ Consolidated Appropriations Act 2020, Pub L No 116-93.

Recommendation: Before it expires at the end of 2020, Congress should pass a longer-term extension of the Section 45L tax credit for new, energy-efficient homes and update the energy efficiency requirements to receive the credit.

Committee of Jurisdiction: Ways and Means

Building Block: Provide Tax Incentives for Commercial Building Efficiency Technologies, Such As Combined Heat and Power and Mechanical Insulation

Commercial buildings and complexes that require large amounts of electricity and heat, such as industrial facilities, hospitals, and universities, often benefit from generating energy onsite. CHP technologies help these commercial facilities use energy more efficiently by coupling power and heat generation. Mechanical insulation for these and other commercial energy systems also increases energy efficiency. Tax credits can help incentivize commercial building owners to deploy these energy efficiency technologies that are already commercially available but have upfront costs or may lack general awareness of their potential benefits.

Reps. Mike Thompson (D-CA) and Paul Cook (R-CA) and Sen. Catherine Cortez Masto (D-NV) introduced the Renewable Energy Extension Act of 2019 (H.R. 3961/S. 2289), which would extend the Section 48 investment tax credit for CHP for five years. Section 102 of the GREEN Act of 2020 (H.R. 7330) also includes an extension of the CHP tax credit. Section 104 of the bill would provide a direct pay option for this tax credit.

Rep. Linda Sanchez (D-CA) introduced the Mechanical Insulation Installation Incentive Act of 2019 (H.R. 5166), as included in Section 502 of the GREEN Act of 2020 (H.R. 7330), which would establish a 10% tax credit for the labor costs of installing mechanical insulation.

Recommendation: Congress should pass legislation to extend the CHP tax credit and establish a tax credit for installing mechanical insulation. Congress should provide a direct pay option for these tax credits.

Committee of Jurisdiction: Ways and Means

Building Block: Establish Tax Incentives for Construction of Net-Zero Energy Buildings

To achieve economy-wide decarbonization, the United States will need to eliminate all carbon emissions from the building sector. One step toward that goal is to encourage construction of “net-zero energy buildings” (also called “zero energy buildings” or “zero net energy buildings”), which are generally defined as buildings that produce at least as much energy as they use on an annual basis. These buildings typically accomplish this through very energy-efficient building design to minimize the building energy load, coupled with onsite renewable energy generation.

Although net-zero energy buildings in many situations are feasible today, less than 1% of buildings are considered net-zero energy.³⁹⁸ Developers need incentives to accelerate the construction of net-zero buildings, which will help bring down costs through market experience.

Recommendation: Congress should draft legislation to create tax credits for the construction of new net-zero energy homes and commercial buildings. Congress should design the credit so that it phases out once a significant portion of new homes and buildings achieve net-zero emissions.

Committee of Jurisdiction: Ways and Means

Building Block: Establish a Small Business Energy Efficiency Grant Program to Leverage Existing Utility and Other Energy Efficiency Programs

The economic impact of the COVID-19 crisis hit small businesses particularly hard. A new program for offering no-cost energy efficiency improvements can help small businesses working to get back on their feet with short- and long-term recovery by permanently lowering their energy bills.³⁹⁹ Energy efficiency upgrades can also provide co-benefits, such as improved indoor air quality and ventilation, which can help small businesses ensure safe, healthy environments for their workers and customers. The new program could take advantage of existing utility demand-side management (DSM) programs that historically have had low participation rates for small business or small commercial customers due to upfront costs and limited customer time and expertise.⁴⁰⁰ Linking the program to existing utility DSM programs would also ensure their continuation as utilities consider restructuring their spending portfolios.

Recommendation: Congress should create a DOE grant program to enable small businesses to make cost-saving energy efficiency upgrades. The program should leverage existing utility DSM programs (and other state- or commission-approved third-party programs) to cover the customer cost-share of the project, eliminating the cost of the program to the small business. When selecting grant recipients, DOE should aim to distribute funds to geographically diverse DSM programs and utilities of different ownership structures. DOE should require grantees to identify small businesses most in need of energy efficiency improvements, including minority-, women-, and veteran-owned businesses and businesses in underserved and rural communities, and distribute funds according to those needs.

Committee of Jurisdiction: Energy and Commerce

Building Block: Facilitate Customer Access to Utility Data Through Model Standards and Incentives

It is possible to use sensors and computer network-connected devices to create “smart” building systems that are flexible and automated and can analyze and optimize building energy systems. The

³⁹⁸ Renilde Becque et al, *Accelerating Building Decarbonization: Eight Attainable Policy Pathways to Net Zero Carbon Buildings for All* (World Resources Institute, 2019).

³⁹⁹ Alliance to Save Energy, “Small Business Energy Efficiency Grant Program,” <https://www.ase.org/small-business-energy-efficiency-grant-program>. Accessed June 2020.

⁴⁰⁰ Dan York et al., *Expanding the Energy Efficiency Pie: Serving More Customers, Saving More Energy Through High Program Participation* (American Council for an Energy-Efficient Economy, 2015).

potential of these systems is maximized when buildings are as efficient as possible and the smart building systems are connected to the electric grid for use in demand response.

Many startups are focusing on delivering smart technology-based solutions for energy use management. However, these companies often lack access to detailed data that would help them determine how to optimize their customers' energy use. Utilities manage and retain this data.

In 2012, in response to a call to action from the Obama administration, electric utilities created a Green Button initiative to help standardize online access by customers to their own electricity data.⁴⁰¹ While several utilities have committed to participating, much more could be done to encourage this type of transparency across the nation.

Reps. Peter Welch (D-VT) and Matt Cartwright (D-PA) introduced the Access to Consumer Energy Information Act (E-Access Act) (H.R. 5796), which would establish a DOE policy of encouraging state policies and programs that provide customer access to their own electricity data. The bill would amend the Energy Policy and Conservation Act to authorize state energy conservation plans to include a description of programs that expand consumer access to their own electricity data. The bill would also direct DOE to establish voluntary guidelines and model standards to implement retail electric energy information access in states. States that submit to DOE a summary of their data-sharing policies to demonstrate compliance with the voluntary guidelines would be eligible for funding and technical assistance on data access.

Rep. Katie Porter (D-CA) introduced the Consumer Access to Grid Information Act of 2020 (H.R. 5649), which would direct the DOE Office of Energy Efficiency and Renewable Energy (EERE) to establish a grant program to fund R&D related to the creation of cell phone apps that provide grid information to the public.

Recommendation: Congress should encourage customer access to their own electricity data by establishing model standards and incentives for state adoption. Congress should consider funding grant programs for the creation of cell phone apps that can provide customer utility data, as well as more general information about the electric grid.

Committees of Jurisdiction: Energy and Commerce; Science, Space, and Technology

Building Block: Continue to Research and Deploy Smart Technologies to Manage Building Energy Systems

The federal government can help expand the deployment of smart technologies for building energy and water systems. Reps. Peter Welch (D-VT) and Adam Kinzinger (R-IL) introduced the Smart Building Acceleration Act (H.R. 2044), which the Energy and Commerce Committee also incorporated into their LIFT America Act (H.R. 2741) and CLEAN Future Act discussion draft.⁴⁰² This bill would direct DOE and the General Services Administration (GSA) to implement smart building technology in federal buildings. It would also direct DOE to conduct a survey and study of privately-owned smart buildings

⁴⁰¹ U.S. Department of Energy, "Green Button: Open Energy Data," <https://www.energy.gov/data/green-button>. Accessed June 2020.

⁴⁰² Title III, Section 325, CLEAN Future Act discussion draft.

in the United States. It would be possible to expand the scopes of the survey and study to include smart residential buildings. Additionally, the bill would direct DOE to develop smart building accelerators as part of the existing Better Building Challenge and to conduct research and development to accelerate the deployment of smart building technologies.

Reps. Jerry McNerney (D-CA) and Adam Kinzinger (R-IL) introduced the Smart Energy and Water Efficiency Act of 2019 (H.R. 2665), which the LIFT America Act (H.R. 2741) and the CLEAN Future Act discussion draft also incorporated.⁴⁰³ The bill would establish a DOE grant program to implement advanced and innovative technology-based solutions to improve the energy or water efficiency of water, wastewater, or water reuse systems.

Recommendation: Congress should direct DOE and GSA to implement smart building technology in federal buildings.

Recommendation: Congress should direct DOE to conduct a survey of privately-owned commercial and residential smart buildings in the United States and to develop smart building accelerators to facilitate the deployment of smart building technologies.

Recommendation: Congress should establish a grant program for demonstrating smart energy and water efficiency technologies.

Committees of Jurisdiction: Energy and Commerce; Transportation and Infrastructure; Science, Space, and Technology

Building Block: Expand Federal Research in Building Technologies

Reducing carbon dioxide emissions from the building sector requires tackling all building components, including the materials used to construct the building; the design of the building envelope (roof, windows, doors); space heating and cooling; water heating; lighting; and cooking fuels and refrigerants. Multiple offices within DOE have focused on these strategies, including the Building Technologies Office (BTO) in EERE, the Advanced Research Projects Agency-Energy, and the DOE system of national laboratories.

The 2016 Mid-Century Strategy on Deep Decarbonization (MCS) highlighted research priorities for buildings. Research must attempt to develop alternative refrigerants as well as reduce the costs and improve the performance of electric heat pumps for heating and cooling, solar-power water heating, and geothermal heat pumps.⁴⁰⁴ By 2050, geothermal heat pumps could provide heating and cooling for as many as 28 million households.⁴⁰⁵ Elsewhere, this report outlines recommendations for continued research, development, and demonstration of geothermal energy to provide zero-carbon electricity.

⁴⁰³ Title III, Section 324, CLEAN Future Act discussion draft.

⁴⁰⁴ U.S. Government, *United States Mid-Century Strategy for Deep Decarbonization* (2016).

⁴⁰⁵ U.S. Department of Energy, *GeoVision: Harnessing the Heat Beneath Our Feet* (2019).

The MCS stated that there is a need for continued research on building envelope technologies, windows, and dynamic solar window controls. More work should be done to improve the performance and reduce the costs of LEDs, advanced lighting systems, and other electric loads.

Finally, there is a need for more research on building energy systems, grid-connected demand-side management technologies, and coordination of building energy systems with onsite electricity generation and energy storage. Better collection of building performance data would also help develop these technologies. In addition to R&D for building operations, innovation in building construction, such as prefabrication, can also help reduce costs, energy use, and building emissions. For example, the Advanced Building Construction Initiative led by BTO “integrates energy-efficiency solutions into highly productive U.S. construction practices for new buildings and retrofits.”⁴⁰⁶

Recommendation: Congress should provide robust funding for DOE to ramp up R&D for advanced building technologies.

Committee of Jurisdiction: Science, Space, and Technology

Building Block: Incentivize State and Local Adoption of Updated Model Building Codes and Zero-Emission Building Codes

Buildings often last for as many as 50 years. Most of the new buildings constructed today will remain standing in 2050. For this reason, today’s building codes will have a significant impact on the carbon footprint of the building sector for decades. Building codes are generally within the jurisdiction of states and local governments, but the federal government can provide incentives and technical assistance for states and cities that adopt updated building codes.

When states and cities adopt building codes, they are largely based on international model codes and set requirements for new buildings and major alterations to existing buildings. Building simulations and analysis by Pacific Northwest National Laboratory show that the energy use of the average U.S. home or building that met at least the 2012 residential or 2013 commercial model energy code decreased by more than 30% compared to a similar home from 2008 or commercial building from 2003.⁴⁰⁷ However, about a third of all states are still using a 2009 or older energy code, leading to lock-in of higher energy-use buildings and lost opportunities for reducing building emissions.⁴⁰⁸ Local jurisdictions often lack the resources and a sufficiently trained workforce to enforce new building codes.⁴⁰⁹

⁴⁰⁶ U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, “What is the Advanced Building Construction Initiative?,” <https://www.energy.gov/eere/buildings/what-advanced-building-construction-initiative>. Accessed June 2020.

⁴⁰⁷ Lowell Ungar, “Take a ride on the energy slide with building codes,” ACEEE, Feb. 12, 2016, <https://www.aceee.org/blog/2016/02/take-ride-energy-slide-building-codes>. Accessed June 2020.

⁴⁰⁸ *International Codes-Adoption by State* (International Code Council, 2020).

⁴⁰⁹ Testimony of Anica Landreneau, Senior Principal, Director of Sustainable Design, HOK, *Solving the Climate Crisis: Cleaner, Stronger Buildings*, Hearing Before the House Select Committee on the Climate Crisis, 116th Congress (October 17, 2019).

Local jurisdictions that have adopted at least the 2009 model energy code did so because of incentives provided in the American Recovery and Reinvestment Act of 2009 (ARRA). The ARRA offered more State Energy Program (SEP) funding to states willing to adopt the most recent residential and commercial building energy codes and to submit a plan to achieve compliance with the latest model codes in at least 90% of new and renovated building space within eight years.⁴¹⁰

Reps. Peter Welch (D-VT) and David McKinley (R-WV) and Sens. Rob Portman (R-OH) and Jeanne Shaheen (D-NH) introduced the Energy Savings and Industrial Competitiveness Act of 2019 (H.R. 3962/S. 2137). Title I, Subtitle A of the bill would require the Secretary of Energy to (1) encourage and support the adoption of state, tribal, and local building energy codes that meet or exceed the latest model codes; (2) provide technical assistance for code implementation; and (3) provide incentive funding to jurisdictions that certify code updates and progress towards compliance.

The Energy and Commerce Committee's discussion draft of the CLEAN Future Act would, among other provisions, (1) establish national energy savings targets for model building energy codes, moving toward "zero energy ready" buildings by 2030; (2) direct DOE to designate model building energy codes that meet these targets and support and certify adoption of updated codes by states, tribes, and local governments; and (3) provide incentive funding and technical assistance to aid with adoption and compliance, while allowing withholding of federal financial support related to energy or buildings for jurisdictions not in compliance.⁴¹¹

While many states are lagging in energy code adoption, leading states and cities are exploring phasing in (net) zero-energy and (net) zero-carbon building codes. Zero-energy buildings generally refer to very energy-efficient buildings that produce as much onsite or nearby renewable energy as they consume annually, while zero-carbon buildings include accounting of emissions in addition to the zero-energy concept.⁴¹² The 2021 International Energy Conservation Code (IECC) will contain a Zero Code appendix, following a zero-carbon building framework, that states and local governments could adopt. Additional technical assistance and adoption incentives from the federal government would help encourage other localities to adopt stretch codes.

Recommendation: Congress should incentivize states, local governments, tribes, and territories to adopt the most updated residential and commercial building energy codes, with the goal of all jurisdictions adopting a net-zero-emission code by 2030. The net-zero-emission code could be based on an existing platform, such as the Zero Code appendix of the 2021 IECC, and should require buildings to (1) maximize energy efficiency, (2) use onsite or nearby net-zero-emission energy sources to meet energy needs, as feasible, and (3) meet the remaining energy needs through a combination of procurement of offsite net-zero-emission energy and electricity from the grid, taking into account the emissions intensity of the local grid to determine the need for additional clean or renewable energy credits for meeting the code. Congress should authorize additional funding, provided through the SEP, for building energy code and net-zero-emission code workforce development, training, and compliance. To receive this additional SEP funding, Congress should require states to explain in their state energy plan (1) how they plan to implement the latest model energy code and a net-zero-

⁴¹⁰ American Recovery and Reinvestment Act of 2009, Pub L No 111-5.

⁴¹¹ Title III, Section 301, CLEAN Future Act discussion draft.

⁴¹² Renilde Becqué et al, *Accelerating Building Decarbonization: Eight Attainable Policy Pathways to Net Zero Carbon Buildings for All* (World Resources Institute, 2019).

emission code by 2030 or (2) if they do not plan to adopt the latest model energy code and a net-zero-emission code by 2030, findings from a public stakeholder process that considers the energy, emissions, resilience, and cost impacts of not adopting the latest code and the reasoning behind not adopting the latest code. Jurisdictions that adopt a net-zero-emission code earlier than 2030 should receive supplemental funds.

Recommendation: Congress should direct DOE to provide technical support for states, local governments, tribes, and territories to adopt, implement, and enforce the latest model energy code and net-zero-emission codes.

Committee of Jurisdiction: Energy and Commerce

Building Block: Establish a National Energy Benchmarking Program for Buildings

While building codes can help reduce emissions and energy use in new and majorly renovated buildings, they do not improve performance in existing buildings. As a first step, it is important to understand the baseline energy performance of a building before undertaking steps to reduce its energy use. In this vein, more than two dozen local and state governments have adopted transparency and benchmarking policies for existing buildings. These policies require standardized disclosure of energy use and comparison to relevant benchmarks.

These programs provide potential building tenants and investors with accurate information about energy use and create market demand for energy efficiency. They also create the groundwork for further policies and programs to reduce building emissions. Even without additional measures, simply benchmarking building energy performance has resulted in energy savings from improved operations and maintenance and voluntary investments in energy efficiency.⁴¹³

Forty percent of the United States is already covered by state and local transparency and benchmarking policies for public and commercial buildings,⁴¹⁴ and there are existing federal programs and tools that facilitate building energy audits and benchmarking, such as the DOE Building Energy Asset Score and the EPA Energy Star Portfolio Manager. The Energy Information Administration also collects buildings data through the Commercial Buildings Energy Consumption Survey. However, incomplete building energy data from separate state and local requirements and voluntary federal programs limit the effectiveness of benchmarking and the potential energy and emissions reductions. The federal government can encourage further energy savings for commercial buildings through a national energy benchmarking program. All states and cities would benefit from the expansion and standardization of benchmarking and transparency policies to provide a more robust benchmarking dataset and to help them adopt additional policies and programs for further energy, cost, and emissions reductions.

⁴¹³ Zachary Hart, *The Benefits of Benchmarking Building Performance* (Institute for Market Transformation, 2015).

⁴¹⁴ Testimony of Anica Landreneau, Senior Principal, Director of Sustainable Design, HOK, *Solving the Climate Crisis: Cleaner, Stronger Buildings*, Hearing Before the House Select Committee on the Climate Crisis, 116th Congress (October 17, 2019); Institute for Market Transformation, “Map: U.S. City, County, and State Policies for Existing Buildings: Benchmarking, Transparency and Beyond,” <https://www.imt.org/resources/map-u-s-building-benchmarking-policies>. Accessed June 2020.

In the 114th Congress, Reps. Kathy Castor (D-FL) and Adam Kinzinger (R-IL) introduced H.R. 1867 (“To encourage benchmarking and disclosure of energy information for commercial buildings”), which required benchmarking and disclosure for federally leased buildings.⁴¹⁵ This became law in April 2015.

Federal, state, and local governments could establish similar benchmarking programs for the residential sector to ensure that potential purchasers and renters of homes have access to information about energy use and emissions. DOE and its national laboratories developed the voluntary Home Energy Score program to provide estimates of a home’s energy efficiency, total energy use, and energy costs and recommendations for cost-effective energy efficiency improvements.⁴¹⁶

Recommendation: Building on H.R. 1867, Congress should direct EPA, in coordination with DOE, to establish an energy benchmarking and transparency requirement for all commercial buildings. The program should utilize existing federal benchmarking tools and datasets and provide resources and technical assistance to building owners for completion of the benchmarking and disclosure requirements. EPA should manage any reporting requirements and maintain a publicly accessible database on building energy use, with safeguards for privacy. While energy efficiency should be the priority, Congress should consider directing EPA and DOE to update this benchmarking and disclosure requirement by 2030 to include building emissions, which can help reveal opportunities for emissions reductions through fuel switching.

Recommendation: Congress should direct DOE and EPA to study the feasibility and effectiveness of an energy benchmarking and transparency requirement for residential buildings and make recommendations on what federal policies or incentives, if any, should be implemented to better provide home energy and emissions information to consumers.

Committee of Jurisdiction: Energy and Commerce

Building Block: Create a Model Building Energy and Emissions Performance Standard and Incentivize Adoption of Performance-Based Building Standards

In addition to transparency and benchmarking, performance standards can spur energy, cost, and emissions reductions. Performance standards go beyond the measurement and reporting requirements in benchmarking policies and require buildings to meet specified levels of energy use or emissions, often informed by benchmarking data and ratcheted over time to force continual improvement.⁴¹⁷ For example, Washington, D.C. requires building owners to improve the energy efficiency of their buildings if they fall below a specific energy performance threshold based on median building Energy Star scores.⁴¹⁸ Buildings can meet the requirement through a performance

⁴¹⁵ H.R. 1867, “To encourage benchmarking and disclosure of energy information for commercial buildings,” 114th Congress, <https://www.congress.gov/bill/114th-congress/house-bill/1867>.

⁴¹⁶ U. S. Department of Energy, “About the Home Energy Score,” <https://betterbuildingssolutioncenter.energy.gov/home-energy-score/home-energy-score-about-score>. Accessed June 2020.

⁴¹⁷ Steven Nadel and Adam Hinge, *Mandatory Building Performance Standards: A Key Policy for Achieving Climate Goals* (American Council for an Energy-Efficient Economy, 2020).

⁴¹⁸ D.C. Department of Energy and Environment, “Building Energy Performance Standards,” <https://doee.dc.gov/service/building-energy-performance-standards>. Accessed June 2020.

pathway, documenting a 20% energy reduction over the five-year compliance period, or through a prescriptive list of cost-effective energy efficiency measures. Washington state is implementing a similar program.⁴¹⁹

In 2019, New York City enacted Local Law 97, which creates carbon emission caps for energy use in buildings over 25,000 square feet.⁴²⁰ This covers almost 60% of the city's building area, about 50,000 buildings in both the residential and commercial space.⁴²¹ Beginning in 2024, the emissions limits will affect the 20% most carbon-intensive buildings, and in 2030, the limits will become more stringent, affecting the 75% most carbon-intensive buildings.⁴²² As a performance standard, the law provides flexibility for compliance, including renewable energy credits and emissions offsets as compliance pathways, in addition to building energy efficiency measures and onsite clean energy generation.⁴²³ These types of performance standards could be an effective strategy to reduce the overall costs of reducing carbon emissions from large commercial buildings.

While these and other leading cities are beginning to experiment with performance-based building standards, the federal government can be a technical partner and convener for information-sharing and best practices. As more jurisdictions adopt these types of standards, the federal government can analyze which programs are most effective at reducing building energy use and emissions and determine how to incentivize adoption of proven initiatives. The federal government can also play a role in evolving the model code process beyond prescriptive codes toward performance-based codes and standards.

Recommendation: Congress should direct DOE to analyze the effectiveness of existing building performance standards and create a model building energy and emissions standard for local jurisdictions to adopt. Congress should also direct DOE to advance the adoption of performance-based codes in future model code deliberations.

Recommendation: Congress should incentivize states and cities to adopt performance-based building standards and provide technical assistance and financial assistance for performance-based code enforcement workforce training. Congress should make additional funds available for states and cities that have adopted performance standards to help buildings subject to the standards comply with the standards.

Committees of Jurisdiction: Energy and Commerce; Science, Space, and Technology

⁴¹⁹ Washington State Department of Commerce, "Buildings - Washington State Department of Commerce," <https://www.commerce.wa.gov/growing-the-economy/energy/buildings>. Accessed June 2020.

⁴²⁰ Urban Green Council, "Groundbreaking New Emissions Law Cuts Carbon from Buildings," Press Release, April 18, 2019, https://www.urbangreencouncil.org/sites/default/files/19.04.18_new_building_emissions_law - urban_green_council.pdf. Accessed June 2020.

⁴²¹ Urban Green Council, "NYC Building Emissions Law Summary," https://www.urbangreencouncil.org/sites/default/files/urban_green_building_emissions_law_summary_2020.02.19.pdf. Accessed June 2020.

⁴²² Ibid. This is based on current Energy Star Portfolio Manager emissions factors.

⁴²³ City of New York, Local Law No. 97 (2019).

Building Block: Establish Robust Energy Efficiency Standards for Appliances and Equipment

The Energy Policy and Conservation Act requires DOE to establish and maintain energy efficiency standards for residential and commercial appliances and equipment.⁴²⁴ From 1987 to 2015, these efficiency standards helped the United States avoid roughly 3 billion tons of carbon dioxide emissions.⁴²⁵ The DOE's Appliance and Equipment Standards Program covers more than 60 products and has been a key driver for significant consumer savings and efficiency gains in homes, commercial buildings, and industry.⁴²⁶

Recently, DOE has missed deadlines for setting new standards and attempted to weaken or rollback existing standards.⁴²⁷ Even where these deadlines are missed, the law preempts states from setting their own standards.⁴²⁸ DOE could use its existing authority to set additional standards for other appliances and equipment to unlock additional energy savings, especially related to commercial buildings and industrial equipment. As an illustration, while existing standards cover about 90% of home energy use, they only represent about 60% of commercial building energy use and 30% of industrial energy use.⁴²⁹ DOE could also establish standards in a way that encourages electrification of appliances and equipment to reach further emissions reductions as the grid becomes cleaner.

The Energy and Commerce Committee's discussion draft of the CLEAN Future Act would suspend preemption for federal efficiency standards when DOE misses deadlines to update such standards.⁴³⁰

Recommendation: Congress should pass legislation to codify the appliance and equipment standards that the Trump administration has delayed or attempted to weaken and direct DOE to set additional appliance and equipment standards based on energy and emissions reduction potential, as appropriate. Congress should also allow states to set stricter standards and new standards when DOE misses applicable deadlines. Such new or stricter state standards should remain in effect until DOE sets a corresponding standard that is as strict as or stricter than the state standard, to prevent a late rulemaking from rolling back progress made by states.

Committee of Jurisdiction: Energy and Commerce

Building Block: Expand Investments in Urban and Rural Broadband to Facilitate Deployment of Smart Grid Technologies

Urban and rural communities would benefit from expanded access to broadband for many social and economic development reasons. From a climate mitigation perspective, broadband opens the door to using smart thermostats and energy management systems in the building sector that can reduce energy bills and emissions. In the report section titled "Prepare the Nation's Telecommunications

⁴²⁴ 42 U.S.C. §§ 6291-6374e.

⁴²⁵ U.S. Department of Energy, *Saving Energy and Money with Appliance and Equipment Standards in the United States* (2017).

⁴²⁶ Andrew deLaski and Joanna Mauer, *Energy-Saving States of America: How Every State Benefits from National Appliance Standards* (Appliance Standards Awareness Project and American Council for an Energy-Efficient Economy, 2017).

⁴²⁷ Robert Walton, "DOE must implement 4 long-delayed efficiency standards, 9th Circuit Rules," *Utility Dive*, Oct. 11, 2019.

⁴²⁸ 42 U.S.C. § 6297.

⁴²⁹ U.S. Department of Energy, *Saving Energy and Money with Appliance and Equipment Standards in the United States* (2017).

⁴³⁰ Title III, Section 321, CLEAN Future Act discussion draft.

Network for Climate Impacts,” the majority staff for the Select Committee makes several recommendations for expanding broadband access to communities across the United States, including underserved and vulnerable communities.

The Energy and Commerce Committee Democrats’ LIFT America Act (H.R. 2741) would invest in deployment of broadband internet service across the country.⁴³¹ The House Democrats included this provision of the LIFT America Act in Section 31301 of their infrastructure bill, the Moving Forward Act (H.R. 2). The Moving Forward Act would invest \$80 billion in broadband deployment. The LIFT America Act and Moving Forward Act would also provide \$5 billion in low-interest financing for broadband infrastructure projects.⁴³²

Recommendation: Congress should expand urban and rural broadband infrastructure.

Committee of Jurisdiction: Energy and Commerce

Generate More Net-Zero Energy Onsite and Electrify End Uses

Maximizing energy efficiency of new and existing buildings is an important first step to reducing building emissions, but buildings must pair efficiency measures with net-zero energy sources to reach complete decarbonization. Generating net-zero energy onsite, coupled with electrification of end uses like heating, is a key strategy for achieving net-zero-emission buildings. Onsite renewable energy generation at homes and businesses has grown in the last decade, and there are already commercial options for electric space and water heating in most regions of the country. Developing and deploying cost-effective electric alternatives for buildings in cold weather climates is an important priority for policymakers. Policies can also accelerate deployment of onsite net-zero energy for immediate emissions reductions while facilitating the transition to a decarbonized power sector that will open the door to beneficial electrification of buildings at a larger scale.

This section of the report focuses on recommendations for increased onsite energy generation, but recommendations that support distributed energy resources more broadly would also aid onsite generation. In the section titled “Build a Cleaner and More Resilient Electricity Sector,” this report recommends policies to expand distributed energy resources to increase the resilience of the electric grid, including a voluntary national program to streamline permitting and inspection of distributed renewable energy generation and storage and electric vehicle supply equipment.

Building Block: Extend Tax Credits for Homeowner Investments in Renewable Energy

Homeowners are interested in residential renewable energy systems like rooftop solar and geothermal heat pumps for a number of reasons, including lower energy bills, environmental benefits, a sense of energy independence, and protection from power loss in extreme weather events.

⁴³¹ Section 11001, LIFT America Act.

⁴³² Title I, Subtitle C, LIFT America Act; Division G, Title I, Subtitle C, Chapter 2, Moving Forward Act.

At the same time, many homeowners do not have the upfront capital to invest in commercially available renewable energy systems. Congress enacted the Section 25D tax credit for residential investments in renewable energy in new and existing homes, including solar electricity and water heating, fuel cells, small wind energy, and geothermal heat pumps. The Section 25D tax credit phases down through 2021, however.⁴³³

Rep. Joe Neguse (D-CO) introduced the Solar Expansion of Distributed Generation Exponentially (EDGE) Act (H.R. 476), which would extend the Section 25D tax credit for two years for solar property with a nameplate capacity of less than 20 kW and increase the value of the tax credit to 50% of the costs of the solar property. Reps. Mike Thompson (D-CA) and Paul Cook (R-CA) and Sen. Catherine Cortez Masto introduced the Renewable Energy Extension Act of 2019 (H.R. 3961/S. 2289), which, among other provisions, would extend the Section 25D tax credit through 2024 and then phase it down through 2026. Section 302 of the GREEN Act of 2020 (H.R. 7330) would extend the tax credit through 2025, phasing it down through 2027, and would also expand the tax credit to apply to battery storage and energy-efficient biomass fuel property.

Recommendation: Congress should extend the Section 25D tax credit for homeowner investments in renewable energy.

Committee of Jurisdiction: Ways and Means

Building Block: Provide Financial Incentives for Building Electrification

The onsite combustion of fossil fuels for space and water heating and other building end uses accounts for a significant portion of building emissions. As the electric grid becomes cleaner and buildings increasingly generate renewable electricity onsite, electrification will be a key strategy for addressing these emissions.

While there are electric alternatives available for space heating, water heating, and cooking, property owners often lack the upfront capital needed to invest in these technologies. Point-of-sale rebates for household appliances would help homeowners to replace their existing equipment.

Using stimulus funding from the ARRA, DOE created the State Energy-Efficient Appliance Rebate Program (SEEARP) to help consumers replace inefficient appliances with new, efficient models.⁴³⁴ From 2009 to 2012, SEEARP provided nearly \$300 million for appliance rebates, saving consumers more than \$73 million in annual energy and water costs and avoiding more than 240,000 metric tons of annual greenhouse gas emissions.⁴³⁵ SEEARP could offer a successful model for a national electric appliance rebate program. For higher capital cost projects, like whole home electric retrofits and all-electric new home construction, tax credits may be a more appropriate incentive.

⁴³³ 26 U.S.C. § 25D.

⁴³⁴ U.S. Department of Energy, Building Technologies Office, *State Energy-Efficient Appliance Rebate Program: Volume 1 – Program Design Lessons Learned* (2015).

⁴³⁵ U.S. Department of Energy, “State Energy-Efficient Appliance Rebate Program,” <https://www.energy.gov/eere/buildings/state-energy-efficient-appliance-rebate-program>. Accessed June 2020; Building Technologies Office, U.S. Department of Energy, *State Energy-Efficient Appliance Rebate Program: Volume 2 – Program Results* (2015).

Recommendation: Congress should create point-of-sale rebates for the replacement of fossil fuel-based space heating, water heating, and cooking appliances with electric air-source heat pumps, heat pump electric water heaters, and induction ranges and cooktops, respectively. The rebate should have strict eligibility requirements to incentivize purchases of only the most efficient appliances. The rebate values should generally lower the cost of the electric appliances enough to be competitive with fossil fuel-based and less efficient alternatives. The rebate should also be contingent on retirement of the fossil fuel-based appliance. The appliances purchased through the rebate program should follow Buy American requirements and be assembled in the United States.

Recommendation: Congress should draft legislation to create tax incentives for whole home retrofits and new home construction, which would apply to the total cost of the electric unit, parts, and labor.

Committees of Jurisdiction: Energy and Commerce; Ways and Means

Building Block: Identify Net Metering Best Practices and Establish a Model Standard for State Adoption

Net metering allows electric consumers with onsite energy generation to sell excess electricity back to the grid. States have adopted a range of net metering policies to determine how to value the power generated by distributed renewable energy resources like rooftop solar and how to account for the costs of electricity transmission and distribution. Some state net metering policies provide more incentives for investments in distributed generation than others.

Rep. Tony Cardenas (D-CA) and Sen. Maggie Hassan (D-NH) introduced the National Evaluation of Techniques for Making Energy Technologies More Efficient and Resilient (NET METER) Act of 2019 (H.R. 1009/S. 346), which would direct DOE to task the National Academies of Sciences, Engineering, and Medicine to conduct a national study of net metering, including opportunities to integrate information technology and renewable energy and battery storage resources.

Recommendation: Congress should direct DOE to identify net metering best practices to encourage more investment in clean distributed generation, such as rooftop solar, batteries, and other technologies. DOE should use these best practices to create a model net metering standard for states that would help standardize how they treat distributed generation and maximize its deployment.

Committee of Jurisdiction: Energy and Commerce

Building Block: Develop Model Building Codes and Rebates for Electric Vehicle Supply Equipment

The building sector can help reduce transportation sector emissions by enabling homeowners, apartment dwellers, and employees in office buildings to charge electric vehicles onsite using electric vehicle supply equipment (EVSE). It is more expensive to retrofit buildings to support EVSE than it is to incorporate these plans into new buildings. As a result, across the country, several local governments, including Atlanta and Washington, D.C., are requiring that new buildings be “EV-ready.” To achieve deep reductions in transportation sector emissions across the board, policymakers will need to ensure broader deployment of EVSE, including in environmental justice and vulnerable communities.

Chairman Bobby Rush (D-IL) introduced the New Opportunities to Expand Healthy Air Using Sustainable Transportation (NO EXHAUST) Act of 2020 (H.R. 5545), which would direct DOE to develop model building codes to integrate EVSE and onsite renewable energy generation and storage into residential and commercial buildings. It would also direct DOE to provide rebates to state and local governments for the installation of publicly accessible EVSE. The rebates can include labor costs if the wages are equal to the local prevailing wage. The bill would direct DOE to administer the program in a way that would provide access to EVSE, address transportation needs, and improve air quality for underserved and disadvantaged communities. Finally, the bill would require DOE to study barriers to the deployment of EVSE in underserved or disadvantaged communities and best practices to increase EVSE deployment in these areas.

Rep. Debbie Dingell (D-MI) introduced the USA Electrify Forward Act (H.R. 5558), which would direct DOE to establish or update a model building code for integrating EVSE and onsite renewable power equipment and electric storage equipment into residential and commercial buildings.

The House Democrats' comprehensive infrastructure legislation, the Moving Forward Act (H.R. 2), includes provisions like those in the NO EXHAUST Act of 2020 and the USA Electrify Forward Act for expanding deployment of EVSE. Section 33335 requires DOE to update model building codes for integrating EVSE into multi-family buildings.

Recommendation: Congress should direct DOE to develop model building codes that integrate electric vehicle supply equipment, onsite renewable energy generation, and storage into residential and commercial buildings, including multi-family buildings.

Recommendation: Congress should authorize DOE to provide rebates to state and local governments, tribes, and territories for the installation of publicly accessible electric vehicle supply equipment. Labor costs should be eligible for the rebate if the installation project pays the locally prevailing wage. DOE should ensure this program provides access to electric vehicle supply equipment, addresses transportation needs, and improves air quality for environmental justice and vulnerable communities.

Recommendation: Congress should direct DOE to identify best practices to increase electric vehicle supply equipment deployment in environmental justice and vulnerable communities.

Committee of Jurisdiction: Energy and Commerce

Reduce Emissions from Building Materials

Building materials such as wood, concrete, and steel consume energy during manufacture, transport, and assembly. These building materials become part of the embodied carbon emissions of buildings. The emissions associated with manufacture are typically attributed to the industrial sector, which is responsible for the production of goods like cement and steel. Details on several decarbonization strategies specific to reducing emissions from the production of these materials appear in the section titled “Rebuild U.S. Industry for Global Climate Leadership.” However, there are certain strategies unique to the end use of these materials in buildings, which is the focus of this section.

Several strategies can be used to reduce embodied emissions in the building sector, including avoiding new construction and reusing existing materials when possible; using less of an emissions-intensive material to perform the same needs; and substituting emissions-intensive materials with lower-emissions alternatives. Academics and industry have developed tools to quantify these emissions, including the Embodied Carbon in Construction Calculator, an example of a free, open-access online resource for this purpose.⁴³⁶

Building Block: Expand Financial Incentives for Building Reuse

Rather than demolishing an existing building and constructing a new building in its place, avoiding new construction and reusing existing building structures for the development of new buildings has the potential to significantly decrease the embodied emissions associated with building construction. Through adaptive reuse, developers can avoid the energy and waste associated with demolition and raw material production and transportation.⁴³⁷ Studies have shown that with careful selection of construction materials to minimize environmental impacts, building reuse consistently leads to less pollution compared with demolition and new construction.⁴³⁸

Building rehabilitation or historic preservation tax credits at the federal and state levels have successfully incentivized building reuse, typically for preservation and community revitalization purposes.⁴³⁹ Currently, the Section 47 federal rehabilitation tax credit provides a 20% credit for rehabilitation of certified historic structures. Previously, the tax credit had a three-tier structure: “a 25 percent credit for ‘historic rehabilitations,’ a non-historic rehabilitation credit of 20 percent for buildings at least 40 years old, and a 15 percent credit for buildings at least 30 years old.”⁴⁴⁰ Re-expansion of the tax credit could help incentivize further building reuse beyond certified historic buildings and could be used to specifically incentivize reduction of embodied emissions associated with building construction if the non-historic credit provisions were tied to this goal.

Section 90301 of the House Democrats’ Moving Forward Act (H.R. 2) would temporarily increase the rehabilitation tax credit to 30%, phasing back down to 20% in 2027 and thereafter. Sections 90306 and 90307 of the bill would also make the tax credit easier to access by nonprofits and other tax-exempt entities, including public schools.

Recommendation: Congress should re-expand and increase the Section 47 rehabilitation tax credit to incentivize the reuse of existing building structures when developing new buildings that minimizes the need for new construction materials and reduces emissions. In addition to providing a credit for rehabilitating certified historic structures, the expanded tax credit should include credits for non-historic buildings of a certain age. To ensure that the rehabilitation of buildings results in emissions

⁴³⁶ Building Transparency, “Embodied Carbon in Construction Calculator,” <https://www.buildingtransparency.org/en/>. Accessed June 2020.

⁴³⁷ Craig Langston, Bond University School of Sustainable Development, “*On Archetypes and Building Adaptive Reuse*,” (Pacific Rim Real Estate Society, 2011).

⁴³⁸ Preservation Green Lab, *The Greenest Building: Quantifying the Environmental Value of Building Reuse* (National Trust for Historic Preservation, 2011).

⁴³⁹ National Park Service, *Federal Tax Incentives for Rehabilitating Historic Buildings: Statistical Report and Analysis for Fiscal Year 2016* (2017); National Trust for Historic Preservation, “Preservation and State Historic Tax Credits,” <https://forum.savingplaces.org/learn/fundamentals/economics/tax-credits/state-htc>. Accessed June 2020.

⁴⁴⁰ Internal Revenue Service, *Rehabilitation Tax Credit* (February 2002).

reductions in both construction and operations, receipt of the credit should require meeting the latest model energy building code.

Committee of Jurisdiction: Ways and Means

Building Block: Establish a National Environmental Product Declaration Database and Require Federal Use of EPDs for Building Material Procurement

Environmental Product Declarations (EPDs) provide environmental information on products, including the emissions associated with the production of building materials. It is necessary to standardize these EPDs to better account for lifecycle greenhouse gas emissions and allow for more accurate comparison between materials. They could also be more specific and include plant-level information. Because not all products have EPDs and current EPDs can be inconsistent and unreliable for making accurate comparisons between materials, project designers and developers rarely use them to inform decisions on building material procurement. The standardization of EPDs would enable building designers and developers to easily understand the emissions impacts of their material and product choices and would incentivize manufacturers to reduce product emissions.

The federal government can help increase the use and effectiveness of EPDs through standardization and technical assistance. To jumpstart the use of EPDs and market creation of low-emissions building materials, the federal government can lead by requiring the use of EPDs in building material procurement decisions.

The Energy and Commerce Committee's discussion draft of the CLEAN Future Act would, among other provisions, create a national EPD database of construction materials and products.⁴⁴¹

Recommendation: Congress should direct EPA to establish a national EPD database of building materials and products and determine standardized requirements for lifecycle analysis of greenhouse gas emissions used in database EPDs, building upon existing standards and databases, such as ISO 14025 and American Association of State Highway and Transportation Officials materials standards.

Recommendation: Congress should require federal agencies to use EPDs when they procure building materials. Agencies should coordinate this procurement with a Federal Buy Clean Program, as described in the section titled "Rebuild U.S. Industry for Global Climate Leadership."

Committees of Jurisdiction: Energy and Commerce; Oversight and Reform

Building Block: Establish a Green Building Material and Products Certification Program and Label

The voluntary EPA and DOE Energy Star program for appliances allows consumers to easily identify energy-efficient product options through the Energy Star label. The federal government could establish a similar program for rating green building materials and other building sector products based on the emissions intensity of their production.

⁴⁴¹ Title V, Section 521, CLEAN Future Act discussion draft.

Recommendation: Congress should direct EPA to establish a voluntary certification and label program for green building materials and products. EPA should base the program on EPDs and coordinate with efforts to standardize EPDs, as described above, to facilitate comparison between materials and ensure transparency.

Committee of Jurisdiction: Energy and Commerce

Building Block: Accelerate the Use of Captured Carbon in Building Materials

Carbon utilization involves the reuse of man-made carbon dioxide and is one of the activities described in the phrase carbon capture, utilization, and storage (CCUS). It is possible to convert captured carbon into useful products, like fuels and plastics. Experts also see a significant opportunity to reuse captured carbon to create building materials, such as concrete and aggregate, which can reduce the embodied emissions associated with construction.⁴⁴²

Like any new technology trying to displace existing methods and products, carbon utilization requires additional RD&D to scale up while reducing costs. The federal government can better support carbon utilization through improved research coordination and increased funding for smaller-scale utilization pilots and projects. For example, carbon utilization projects use smaller amounts of carbon dioxide than carbon capture projects at large industrial facilities and power plants, so they are ineligible for the Section 45Q tax credit.

Policies that support CCUS generally would also benefit the reuse of captured carbon and appear in the section titled “Transform U.S. Industry and Expand Domestic Manufacturing of Clean Energy and Zero-Emission Technologies.”

Recommendation: Congress should reduce the capture threshold for carbon utilization under the Section 45Q tax credit to 1,000 metric tons of qualified carbon oxide per year to benefit startup companies with innovative technologies to reuse captured carbon in products, such as building materials.

Recommendation: Congress should direct DOE to provide funding to convert carbon capture pilot projects to carbon utilization pilot projects upon completion of the capture pilot project.

Recommendation: Congress should establish an Interagency Carbon Utilization Task Force to better coordinate ongoing research within DOE, DOD, and other federal agencies. Federal support for reuse of captured carbon should ensure clear climate benefits.

Committees of Jurisdiction: Science, Space, and Technology; Ways and Means

⁴⁴² Cameron Hepburn et al., “The technological and economic prospects for CO₂ utilization and removal,” *Nature* 575 (2019): 87–97.

Building Block: Increase Research Funding for Mass Timber in Commercial Buildings

Mass timber, such as cross-laminated timber (CLT), is an innovative wood technology that has the potential to significantly expand the market for wood products across the country through its use in tall buildings. CLT creates a market for small diameter and underutilized forest material, timber that has typically been left on the forest floor because it was not economical to remove.⁴⁴³ Removing this material can, in some cases, improve forest ecosystems by reducing fire hazards, providing healthier habitat, and protecting watersheds.⁴⁴⁴ Wood products are also less carbon intensive than traditional building materials such as concrete and steel, as they not only have the natural ability to sequester carbon, but if harvested sustainably, they produce fewer carbon emissions in the manufacturing process.⁴⁴⁵ CLT is highly resilient to fires and earthquakes, and its strength and ability to resist compression makes it a promising alternative to steel and concrete construction in mid- and high-rise buildings.⁴⁴⁶

Congress recognized the value of mass timber when including the bipartisan Timber Innovation Act of 2017 (H.R. 1380/S. 538), introduced by Rep. Suzan DelBene (D-WA) and Sen. Debbie Stabenow (D-MI) in the Farm Bill in 2018.⁴⁴⁷ The Timber Innovation Act established the Forest Service's Wood Innovation Program, which grants funding to support traditional wood utilization projects and promotes wood as a construction material in commercial buildings.⁴⁴⁸

Recommendation: Congress should increase funding for the Forest Service's Wood Innovation Program to further promote use of mass timber in commercial buildings.

Committee of Jurisdiction: Agriculture

Building Block: Reduce Embodied Emissions from Federal Buildings and Projects Through Performance-Based Construction Requirements and Embodied Emissions Goals

The American Society for Testing and Materials (ASTM) and other standards and most building codes are prescriptive rather than performance-based. For example, construction specifications for concrete often rely on outdated “recipes,” which lead to more emissions-intensive concrete mixes. Rather than simply following a recipe, performance-based requirements would specify properties like concrete strength, and suppliers would have more flexibility in designing the concrete mix to meet the requirements while minimizing associated emissions. Furthermore, broader performance-based standards would enable material substitution, so designers and developers would have more

⁴⁴³ Susan L. Levan-Green and Jean Livingston, “Exploring the Uses for Small-Diameter Trees,” *Forest Products Journal* 51, no. 9 (2001): 10-21; Speech by Tom Tidwell, Chief, U.S. Forest Service, *State of Forests and Forestry in the United States*, World Conservation Congress (September 4, 2016).

⁴⁴⁴ Susan L. Levan-Green and Jean Livingston, “Exploring the Uses for Small-Diameter Trees,” *Forest Products Journal* 51, no. 9 (2001): 10-21.

⁴⁴⁵ Richard Bergman et al., “The Carbon Impacts of Wood Products,” *Forest Products Journal* 64, no. 7/8 (2014): 220-231.

⁴⁴⁶ U.S. Forest Service, “Build Better, Stronger, Faster with CLT,” <https://www.fs.usda.gov/features/build-better-stronger-faster-clt>. Accessed June 2020.

⁴⁴⁷ H.R. 1380 and S. 538, “Timber Innovation Act of 2017,” 115th Congress, <https://www.congress.gov/bill/115th-congress/house-bill/1380> and <https://www.congress.gov/bill/115th-congress/senate-bill/538>; Agriculture Improvement Act of 2018, Pub L No 115-334.

⁴⁴⁸ U.S. Forest Service, “Wood Innovations Home,” <https://www.fs.usda.gov/naspf/programs/wood-education-and-resource-center/wood-innovations-home>. Accessed June 2020.

flexibility in choosing appropriate building materials to meet the specified requirements while minimizing associated emissions. Further study of embodied carbon emissions in federal buildings and construction would help inform the emissions benefits of material substitution. These efforts would encourage the use of building materials from captured carbon and CLT, as discussed above.

Recommendation: Congress should require federal agencies to use performance-based construction specifications for federal infrastructure and building projects. When coupled with the use of EPDs, as discussed above, these performance-based requirements should enable project developers to make construction material decisions that fulfill structural specifications while minimizing emissions.

Recommendation: Congress should direct and fund GSA to study the embodied carbon of materials in the design and construction of federal buildings. Congress should draft legislation to direct GSA and other federal agencies to reduce their embodied carbon by a certain percentage over time.

Committees of Jurisdiction: Energy and Commerce; Transportation and Infrastructure; Oversight and Reform

Invest in Disproportionately Exposed, Frontline, and Vulnerable Communities

The COVID-19 pandemic left millions of Americans unemployed and exacerbated financial hardships for families struggling to make ends meet. Even before the pandemic, one in three U.S. households experienced energy insecurity, forced to choose between paying their energy bills over other needs, having their energy services disconnected, and keeping their homes at unhealthy temperatures.⁴⁴⁹ Low- and moderate-income Americans spend a greater percentage of their household budgets on energy costs. They often rent their homes, and these residences are generally less energy-efficient than owner-occupied homes. In rental homes, the landlord does not have an incentive to invest in energy efficiency improvements, because tenants are generally responsible for utility bills. Policies that incentivize energy efficiency improvements in low- and moderate-income homes and affordable housing would help overcome these barriers, reducing the energy bills of energy-insecure families and making them more resilient to future economic downturns.

In crafting the policy recommendations below, Congress should implement an inclusive stakeholder process that solicits early input and feedback from those most affected by the outcomes of the policy choices, including low-income communities and communities of color.

Building Block: Increase Funding to Help Weatherize Every Home in America

Since 1976, the Weatherization Assistance Program (WAP) has helped 7 million low- and moderate-income families increase the energy efficiency of their homes.⁴⁵⁰ Millions of additional homes would

⁴⁴⁹ U.S. Energy Information Administration, “One in three U.S. households faces a challenge in meeting energy needs,” <https://www.eia.gov/todayinenergy/detail.php?id=37072>. Accessed June 2020.

⁴⁵⁰ U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, “Weatherization Assistance Program,” <https://www.energy.gov/eere/wap/weatherization-assistance-program>. Accessed June 2020.

benefit from weatherization assistance, which includes a comprehensive energy assessment to determine the most cost-effective measures for increasing home energy efficiency, health, and safety, followed by installation of the identified measures, such as improvements in insulation and air sealing, heating and air conditioning systems, lighting, and appliances.⁴⁵¹ Investments in weatherization have economic multiplier effects because workers develop skills through construction-related efficiency jobs that are readily transferable to other economic sectors.

In some cases, households would have to address underlying safety issues, such as mold and lead paint, before taking advantage of any energy efficiency upgrades. In addition, most tribal nations are not directly allocated WAP funding and instead compete for state funds, which creates an additional burden for tribes seeking to participate.

Reps. Paul Tonko (D-NY), Bobby Rush (D-IL), and Marcy Kaptur (D-OH) and Sens. Chris Coons (D-DE), Susan Collins (R-ME), Jack Reed (D-RI), and Jeanne Shaheen (D-NH) introduced the Weatherization Enhancement and Local Energy Efficiency Investment and Accountability Act (H.R. 2041/S. 983), which would reauthorize WAP and expand the program to include installation of renewable energy and other advanced technologies as part of the weatherization process and to create a WAP enhancement and innovation grant program to increase the number of low-income homes eligible for weatherization—through measures such as remediating existing safety issues—and improve the capabilities of weatherization entities to carry out WAP retrofits. The LIFT America Act (H.R. 2741) also includes this provision. Section 311 of the CLEAN Future Act discussion draft and Section 33231 of the Moving Forward Act (H.R. 2) would similarly reauthorize and expand WAP, increasing funding up to \$1 billion per year in 2025.⁴⁵²

On March 17, 2020, Rep. Paul Tonko (D-NY) led a bipartisan letter signed by 135 House members seeking \$310 million in appropriations for WAP and \$90 million in appropriations for the State Energy Program in FY21 Funding.⁴⁵³ On March 26, 2020, Reps. A. Donald McEachin (D-VA) and Raúl Grijalva (D-AZ) led a letter requesting \$7 billion for WAP to better reach and serve low-income families and outlining other environmental justice priorities for stimulus.⁴⁵⁴ Similarly, on April 20, 2020, Sen. Tammy Duckworth (D-IL) led a letter signed by 16 Senators seeking \$7 billion in funding for WAP to reduce energy costs for consumers and support clean energy jobs.⁴⁵⁵

Recommendation: Congress should expand and increase WAP funding, with an aim of helping to facilitate the weatherization of every eligible home in the country. States should prioritize weatherization investments in communities that have experienced harm from the declining use of fossil fuels and environmental justice communities that have experienced disproportionate harm from pollution exposure. Before allocating WAP funds, states should identify the communities most in

⁴⁵¹ U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, *Weatherization Assistance Program Fact Sheet* (2019).

⁴⁵² Title III, Section 311, CLEAN Future Act discussion draft.

⁴⁵³ Letter from Rep. Paul Tonko (D-NY) requesting the Committee on Appropriations, Subcommittee on Energy & Water Development & Related Agencies to fund WAP at \$310 million and SEP at \$90 million for FY 2021, March 17, 2020.

⁴⁵⁴ Letter from Reps. A. Donald McEachin (D-VA) and Raúl Grijalva (D-AZ) requesting environmental justice priorities, including \$7 billion for WAP, March 26, 2020.

⁴⁵⁵ Letter from Sen. Tammy Duckworth (D-IL) requesting environmental justice priorities, including \$7 billion for WAP, April 20, 2020.

need of energy efficiency improvements, including low-income communities with high energy cost burdens, and distribute funds according to those needs.

Recommendation: Congress should amend the Energy Conservation and Production Act to ensure that all tribes receive WAP funding directly.

Recommendation: Congress should create a grant program within WAP to help remediate health and safety issues in homes so that energy efficiency upgrades are possible.

Federal support for projects described in this building block should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Committee of Jurisdiction: Energy and Commerce

Building Block: Increase Funding for Low-Income Energy Assistance and Create More Access to Residential Solar Energy for Low-Income Families

The Department of Health and Human Services (HHS) administers LIHEAP, which provides states with funding to help low-income families pay for energy bills. States can use some LIHEAP funds to invest in solar energy for certain housing. On average, less than 20% of eligible households receive LIHEAP funds due to funding constraints.⁴⁵⁶ Increasing funding for LIHEAP would help more families afford their energy costs during economic downturns, like the one triggered by the COVID-19 pandemic, and help utilities maintain operating budgets and ensure service continuity for their customers.

Rep. A. Donald McEachin (D-VA) introduced the Low-Income Solar Energy Act (H.R. 4291), which would increase funding for LIHEAP and expand the ability of states and tribes to use the funds for solar energy for housing. The bill would also direct DOE to create financing programs for residential solar geared toward low-income families and authorize building owners that receive assistance under Section 8 to receive interest-free loans for solar energy. The bill would allow public housing authorities to contract with solar energy companies and reinvest any savings to continue to help low-income families. It would clarify HUD's regulations so that reduced energy bills from solar energy upgrades would not lead to rent increases for tenants.

Title II, Subtitle F of the Energy and Commerce Committee's CLEAN Future Act discussion draft would extend the LIHEAP program for 10 years and authorize \$5.1 billion in appropriations each year.

Congress appropriated \$3.74 billion for LIHEAP in regular appropriations for FY2020.⁴⁵⁷ In March 2020, Congress appropriated an additional \$900 million for LIHEAP through the CARES Act (H.R. 748) in response to the COVID-19 pandemic.⁴⁵⁸ On March 26, 2020, Reps. A. Donald McEachin (D-VA) and Raúl Grijalva (D-AZ) led a letter requesting \$7 billion to expand LIHEAP to help environmental justice

⁴⁵⁶ Congressional Research Service, *LIHEAP: Program and Funding* (June 22, 2018).

⁴⁵⁷ Further Consolidated Appropriations Act, 2020, Pub L No 116-94.

⁴⁵⁸ Coronavirus Aid, Relief, and Economic Security (CARES) Act, Pub L No 116-136.

communities affected by the COVID-19 pandemic.⁴⁵⁹ In April 2020, Reps. Suzanne Bonamici (D-OR), Debbie Dingell (D-MI), and Rashida Tlaib (D-MI) led a letter signed by 75 representatives that requested at least \$4.3 billion in supplemental funding for LIHEAP and a LIHEAP-like program to address water utility costs.⁴⁶⁰ Similarly, in April 2020, Sen. Tammy Duckworth led a letter signed by 16 Senators seeking \$17 billion in total FY2020 funding for LIHEAP.⁴⁶¹

As of May 8, 2020, HHS had awarded all the supplemental LIHEAP funding provided under the CARES Act. Later in May 2020, Chairwoman Nita Lowey (D-NY) introduced and the House passed the Health and Economic Recovery Omnibus Emergency Solutions (HEROES) Act (H.R. 6800), which would, among other provisions, appropriate an additional \$1.5 billion for LIHEAP to respond to COVID-19 and include utility costs as eligible payments for state renter and homeowner assistance. The Senate had not acted on this bill as of June 30, 2020.

Recommendation: Congress should increase funding for LIHEAP, with an aim of helping all eligible households, and allow states and tribes to use more of the funds for residential solar energy for low-income families.

Recommendation: Congress should encourage public housing authorities to contract with solar energy companies and reinvest savings. Congress should direct HUD to issue rules to ensure reduced energy bills from the solar improvements do not lead to rent increases for tenants.

Committees of Jurisdiction: Energy and Commerce; Financial Services

Building Block: Increase Grant Funding to States and Local Jurisdictions to Run Efficiency Programs and Deploy Energy Efficiency Investments in Local Communities

Since the 1970s, SEP has provided flexible funding and technical assistance to state energy offices to improve energy efficiency and reduce energy costs and wastes, among other things. In ARRA, Congress infused SEP with \$3.1 billion, which created more than 135,000 job-years of employment and saved consumers nearly \$7.8 billion in energy bills.⁴⁶² Increasing funding through SEP can offer timely aid to state energy efficiency programs and increase local investments in energy efficiency.

Congress also funded through ARRA the short-term EECBG program, which provided \$3.2 billion in grants to help states, local governments, and tribes develop innovative energy efficiency and

⁴⁵⁹ Letter from Reps. A. Donald McEachin (D-VA) and Raúl Grijalva (D-AZ) requesting environmental justice priorities, including \$7 billion for LIHEAP, March 26, 2020.

⁴⁶⁰ Office of Rep. Suzanne Bonamici, “Bonamici, Dingell, Tlaib Lead 75 Colleagues; Advocate for Funding to Help Low-Income Families Pay for Utilities,” Press Release, April 9, 2020.

⁴⁶¹ Letter from Sen. Tammy Duckworth (D-IL) requesting environmental justice priorities, including \$17 billion for LIHEAP, April 20, 2020.

⁴⁶² Oak Ridge National Laboratory, U.S. Department of Energy, *National Evaluation of the State Energy Program: An Evaluation of Select Activities Conducted Under the State Energy Program* (April 2015).

renewable energy initiatives and create local jobs. The EECBG program generated lifetime cost savings of \$5.2 billion and created 63,000 jobs.⁴⁶³

If reauthorized, EECBG could complement implementation of updated energy codes and building energy performance measures. Congress could allow cities, states, tribes, and territories to use funds for building electrification, which would expedite full decarbonization of buildings and early adoption of more ambitious building codes to achieve net-zero emissions.

Rep. Greg Stanton (D-AZ) introduced H.R. 2088 (“To amend the Energy Independence and Security Act of 2007 to reauthorize the Energy Efficiency and Conservation Block Grant Program”). This bill would reauthorize and increase funding for the EECBG. The CLEAN Future Act discussion draft and Moving Forward Act (H.R. 2) also include this provision.⁴⁶⁴

Recommendation: Congress should significantly increase funding for the State Energy Program.

Recommendation: Congress should reauthorize and increase funding for the Energy Efficiency and Conservation Block Grant Program and expand project eligibility to include building electrification. The program should allow cities to have financing flexibility. Tribes should be eligible to receive funding directly through the DOE Office of Indian Energy Policy and Programs.

Before allocating SEP and EECBG funds, states, localities, and tribes should identify the communities most in need of energy efficiency improvements, including low-income communities with high energy cost burdens, and distribute funds according to those needs. Federal support for projects funded through SEP and EECBG should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Committee of Jurisdiction: Energy and Commerce

Building Block: Establish an Energy Efficiency Loan Program for Community Development Financial Institutions

Community Development Financial Institutions are mission-driven organizations, like credit unions and microloan funds, that focus on providing capital to low-income communities.⁴⁶⁵ It would be possible to leverage their existing relationships with clients to expand loans for energy efficiency upgrades for residences and businesses.

Rep. Ann Kuster (D-NH) and Sen. Jeff Merkley (D-OR) introduced the Community Energy Savings Program Act of 2019 (H.R. 5514/S. 2382), which would direct DOE to establish a grant program for

⁴⁶³ U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, “About the Energy Efficiency and Conservation Block Grant Program,” <https://www.energy.gov/eere/wipo/about-energy-efficiency-and-conservation-block-grant-program>. Accessed June 2020.

⁴⁶⁴ Title III, Section 322, CLEAN Future Act discussion draft.

⁴⁶⁵ U.S. Department of the Treasury, “Community Development Financial Institutions Fund,” <https://www.cdfifund.gov/Pages/default.aspx>. Accessed June 2020.

states and tribes who would use the funds to offer loans for cost-effective energy efficiency investments to Community Development Financial Institutions, public utilities, public power districts, electricity cooperatives, and local governments. These energy efficiency investments can include renewable energy, energy storage, and demand response systems.

Recommendation: Congress should establish a grant program for states and tribes to offer loans for cost-effective energy efficiency, renewable energy, and energy storage investments to Community Development Financial Institutions, public utilities, public power districts, electricity cooperatives, and local governments. Congress should coordinate this with or incorporate it into a national climate bank, as recommended in the section titled “Drive Innovation and Deployment of Clean Energy and Deep Decarbonization Technologies.”

Committee of Jurisdiction: Energy and Commerce

Building Block: Increase Tax Credits and Efficiency Incentives for Affordable Housing

The United States is facing a housing affordability crisis, particularly in its urban areas as more people move to cities in search of economic opportunities. At the same time, construction of affordable housing in these areas has fallen, often due to zoning restrictions and neighborhood opposition, causing demand to far outstrip supply. The result is rising housing costs in urban centers and displacement of low-income communities and communities of color to more suburban areas, where public transit options may be scarce or insufficient.⁴⁶⁶ Housing policy becomes climate policy when it limits households to one choice—cars—to commute and access services.

The Section 42 Low-Income Housing Tax Credit is available for investors in affordable rental housing. More abundant affordable housing near city centers reduces vehicle miles traveled and transportation sector emissions.

Rep. Suzan DelBene (D-WA) and Sen. Maria Cantwell (D-WA) introduced the Affordable Housing Credit Improvement Act of 2019 (H.R. 3077/S. 1703), which would increase the Section 42 Low-Income Housing Tax Credit and allow developers to use the Section 45L tax credit for new, energy-efficient homes and the Section 179D tax deduction for commercial investments in energy efficiency improvements without reducing the basis of the property. This will encourage developers to build affordable housing that also is energy-efficient, providing built-in energy cost-savings to low-income households. Section 90605 of the Moving Forward Act (H.R. 2) would similarly increase the credit allocation.

Recommendation: Congress should increase the Section 42 Low-Income Housing Tax Credit and allow taxpayers to claim it along with the Section 45L tax credit and Section 179D tax deduction.

Committee of Jurisdiction: Ways and Means

⁴⁶⁶ Up for Growth, *Housing Underproduction in the U.S.: Economic, Fiscal and Environmental Impacts of Enabling Transit-Oriented Smart Growth to Address America’s Housing Affordability Challenge* (2018).

Building Block: Increase Federal Funding to Retrofit and Decarbonize All Public Housing

In the United States, approximately 1.2 million Americans reside in 1 million public housing units.⁴⁶⁷ Much of this public housing needs major upgrades. Shelter-in-place orders implemented to combat the spread of COVID-19 have further underscored this growing need for improvements. Residents of environmental justice communities experience adverse indoor conditions, including exposure to pollution from appliances and poor ventilation in low-income housing. Indoor air pollutants pose serious health risks, especially for children, and increase susceptibility to chronic health conditions. Updating and electrifying the nation's long-neglected public housing will have positive health impacts, while reducing emissions and creating jobs.

Rep. Alexandria Ocasio-Cortez (D-NY) and Sen. Bernie Sanders (I-VT) introduced the Green New Deal for Public Housing Act (H.R. 5185/S. 2876), which would create seven federal grant programs for public housing authorities, including for community workforce development, deep energy retrofits, energy efficiency, water quality, building electrification, community energy generation, recycling and zero-waste programs, community resilience, and climate adaptation. The bill specifies that the use of grant funds requires high-road labor standards and compliance with Buy America provisions.

Recommendation: Congress should expand investments in public housing for weatherization, electrification, and onsite renewable energy generation. As part of these investments, Congress should establish a fund to electrify stoves, heating, and hot water in public housing nationwide to eliminate the respiratory triggers produced by fossil fuel use in public housing. Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Committee of Jurisdiction: Financial Services

Building Block: Update the Energy Efficiency Standards for Manufactured Housing and Federally Assisted Housing

Energy efficiency standards for federally assisted housing and manufactured housing are woefully outdated. Energy efficiency standards for manufactured housing have not been updated since 1994. The 2007 Energy Independence and Security Act required DOE to update the energy efficiency standards for manufactured housing and HUD and USDA to update standards for public and federally assisted housing.⁴⁶⁸ To date, DOE has issued a proposed rulemaking for energy efficiency standards for manufactured housing but has failed to update the standards in a final rule.⁴⁶⁹ HUD and USDA have updated the standards for public and federally assisted housing once, establishing the 2009 IECC and

⁴⁶⁷ HUD, "HUD's Public Housing Program," https://www.hud.gov/topics/rental_assistance/phprog. Accessed June 2020.

⁴⁶⁸ Energy Independence and Security Act of 2007, Pub L No 110-140, Section 413 and Section 481.

⁴⁶⁹ U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, "Appliance and Equipment Standards Rulemakings and Notices: Manufactured Housing,"

https://www1.eere.energy.gov/buildings/appliance_standards/standards.aspx?productid=64. Accessed June 2020.

ASHRAE 90.1-2007 as the minimum standards, which are more than three code cycles behind the most recent model codes.⁴⁷⁰

Rep. Sean Casten (D-IL) introduced the Housing Efficiency Standards Act of 2020 (H.R. 7240), which would direct HUD and USDA to update energy efficiency standards for public and federally assisted housing to the latest national model building energy codes.

Recommendation: Congress should require DOE, in consultation with HUD, to regularly update energy efficiency standards for manufactured housing and HUD and USDA to regularly update energy efficiency standards for public and federally assisted housing.

Committees of Jurisdiction: Energy and Commerce; Financial Services

Building Block: Invest in Energy-Efficient Schools, Hospitals, Churches, and Public Buildings

Nonprofits like schools, hospitals, and churches, especially those in low- and moderate-income neighborhoods, often do not have the resources to invest in energy efficiency and resilience improvements. For example, a recent GAO study found that about 36,000 schools nationwide need updates to their HVAC systems.⁴⁷¹ Because they are nonprofit organizations, they are not able to take advantage of certain financial incentives that are available to commercial entities, like tax credits. They also often do not have the technical expertise to partner with energy savings performance contractors or the funds to hire engineers to help them strengthen their buildings. Yet, these facilities often serve as critical resources for communities, especially during emergencies, such as the COVID-19 pandemic and frequent natural disasters.

Rep. Matt Cartwright (D-PA) introduced H.R. 3120 (“To require the Secretary of Energy to establish an energy efficiency materials pilot program, and for other purposes”), which would direct DOE to establish a pilot program to provide grants for nonprofits to invest in energy-efficient materials, including roofs, windows, doors, HVAC systems, and renewable energy and heating systems.

Chairman Bobby Scott (D-VA) introduced the Rebuild America’s Schools Act of 2019 (H.R. 865). This bill would make significant investments to address critical physical and digital infrastructure needs in schools. The bill would also allow recipients to use funds to improve energy and water efficiency and require the use of certain green building practices and products made in the United States. The House Democrats included an updated version of this bill as the Reopen and Rebuild America’s Schools Act of 2020 in Division K of their infrastructure bill, the Moving Forward Act (H.R. 2). The updated bill would invest \$130 billion targeted at high-poverty schools with facilities that endanger the health and safety of students and educators. This investment would help students get back to school and create over 2 million jobs to help workers get back to work as the country recovers from the COVID-19 pandemic. The updated bill also includes a requirement for schools receiving funds for any new construction, modernization, or renovation project to meet the most recent model building energy code or standard.

⁴⁷⁰ U.S. Department of Housing and Urban Development, “Energy Codes for Hud-Assisted and FHA-Insured Properties,” https://www.hud.gov/program_offices/economic_development/eegb/standards. Accessed June 2020.

⁴⁷¹ Government Accountability Office, GAO-20-494, *School Districts Frequently Identified Multiple Building Systems Needing Updates or Replacement* (June 2020).

Rep. David Loebsack (D-IA) introduced the Renew America's Schools Act of 2019 (H.R. 3322), which would provide funding for partnerships to provide energy efficiency and renewable energy retrofits of schools. This bill, included in the LIFT America Act (H.R. 2741), would also prioritize high-need schools and require compliance with Davis-Bacon prevailing wage requirements. Rep. Robin Kelly (D-IL) introduced H.R. 2119 (“To amend the Energy Policy Act of 2005 to reauthorize grants for improving the energy efficiency of public buildings, and for other purposes”), which would reauthorize a DOE grant program to assist local governments in improving energy efficiency in public buildings and facilities.

H.R. 3120, H.R. 3322, and H.R. 2119 also appear in Sections 326, 314, and 312, respectively, of the CLEAN Future Act discussion draft.⁴⁷² The Moving Forward Act includes H.R. 3322 and H.R. 2119 in Sections 33222 and 33211, respectively.

On June 24, 2020, Rep. Lisa Blunt Rochester (D-DE) and Sen. Tina Smith (D-MN) introduced the Open Back Better Act of 2020 (H.R. 7303/S. 4060), which would authorize \$20 billion over four years for states, federal agencies, and tribes to upgrade the resilience and energy efficiency of mission critical public building infrastructure. The bill would deliver this funding through the DOE SEP, the Federal Energy Management Program, and the DOE Office of Indian Energy and require that projects meet prevailing wage requirements and leverage funds as much as possible through energy savings performance contracts and other means of private financing.

Recommendation: Congress should establish competitive grant programs to help nonprofits like schools, hospitals, and churches invest in energy efficiency, renewable energy, and resilience upgrades. Environmental justice communities should be high priorities for federal investments. When funding broader infrastructure improvements at these institutions, Congress should also ensure that upgrades for energy and water efficiency and resilience are eligible uses of funds and new construction or renovation projects use green building practices.

Recommendation: Congress should reauthorize and fund DOE grants for improving energy efficiency and resilience of local government buildings and facilities and provide additional funding to states, federal agencies, and tribes for energy efficiency and resilience upgrades of mission critical public buildings and facilities.

For both of these recommendations, Congress should ensure that projects receiving funding meet updated model building energy codes and resilience standards, such as the building energy codes detailed elsewhere in this section and federal flood and wildfire resilience standards recommended in the section titled “Make U.S. Communities More Resilient to the Impacts of Climate Change.” In addition, federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Committees of Jurisdiction: Energy and Commerce; Education and Labor

⁴⁷² Title III, Sections 314, 326, and 312, CLEAN Future Act discussion draft.

Building Block: Increase Funding for Department of Housing and Urban Development Policies to Fight Climate Change and Promote Equity

HUD administers many programs that aim to increase the affordability of homes and the sustainability of communities. These programs could increase deployment of building technologies that are more energy-efficient and reduce greenhouse gas emissions if they increased energy efficiency requirements. These include Community Development Block Grants, Community Reinvestment Act investments, federal housing tax credits, green mortgage products, and funding from the Office of Public and Indian Housing. These programs would need to receive additional funding to provide to recipients, however, since many of these programs cannot meet existing demand.

State housing finance agencies (HFAs) often run HUD programs as well as individual state programs for affordable housing, including assisted and unsubsidized market housing. Much of this affordable housing stock, which existing HUD programs may not cover, would also benefit from weatherization and other efficiency improvements, as well as healthier building materials.

Recommendation: Congress should increase funding for HUD programs, including funding for energy efficiency upgrades and capital improvements, and increase energy efficiency requirements associated with the programs and investments it administers.

Recommendation: Congress should create a HUD program to fund energy efficiency improvements in assisted and unsubsidized affordable multifamily housing. The program should also provide technical assistance to affordable housing providers to make energy and water efficiency improvements, install renewable energy, and incorporate healthy building materials. Where possible, improvement projects should be used as opportunities to mitigate and remediate lead hazards. State HFAs should administer the funds to property owners and have the flexibility to use the funds as outright grants or use them to create financing packages that mix grants, loans, and/or performance contracts. HFAs should require property owners receiving grants or low-cost financing to keep rents within HUD affordability guidelines for at least 5 years after making efficiency improvements.

Recommendation: Congress should provide “support for climate research that assesses how policies affect overburdened and vulnerable communities,” including low-income communities and communities of color.⁴⁷³ Specifically, Congress should direct HUD to conduct research to determine whether there are distributional impacts from policies to promote renewable energy, energy efficiency, and electrification. In many cases, policies to promote economic development have led to gentrification, so lessons from these experiences should be incorporated into future climate policy.⁴⁷⁴ Based on the results of this research, HUD should develop recommendations to improve equitable access to energy efficiency, renewable energy, and electrification in the building sector.

Committee of Jurisdiction: Financial Services

⁴⁷³ Equitable and Just National Climate Platform, “A Vision for an Equitable and Just Climate Future,” <https://ajustclimate.org/index.html>. Accessed June 2020.

⁴⁷⁴ World Resources Institute, “How to Prevent City Climate Action from Becoming ‘Green Gentrification,’” <https://www.wri.org/blog/2019/12/how-prevent-city-climate-action-becoming-green-gentrification>. Accessed June 2020.

Building Block: Relaunch and Expand the Sustainable Communities Initiative

The Obama administration launched the Sustainable Communities Initiative with three agencies: HUD, EPA, and DOT.⁴⁷⁵ The initiative provided grants to improve local and regional planning on both affordable housing and transportation in a way that reduced environmental impacts, such as through transit-oriented mixed-use development. Under this initiative, the Regional Planning Grants prioritize partnerships focused on issues of regional significance, while Community Challenge Planning Grants focus on specific neighborhoods or districts. The Sustainable Communities Initiative could be expanded to place greater emphasis on reducing greenhouse gas emissions from the building and transportation sectors.

Recommendation: Congress should direct HUD to relaunch and expand the Sustainable Communities Initiative with the EPA and DOT.

Committee of Jurisdiction: Financial Services

Building Block: Strengthen Community Land Banks to Return Vacant Housing Stock to Productive Use

Vacant, abandoned, and tax delinquent properties can destabilize neighborhoods, create fire, health, and safety hazards, drive down property values, and drain local tax dollars. Too often, the cost of repairs and maintenance of such properties, as well as addressing unpaid taxes and liens on such properties, exceeds property values, which discourages potential purchasers. Low income communities and communities of color disproportionately bear the burden of living near such properties and the associated health and safety hazards.

Land banks are local or state government or nonprofit entities that can acquire these vacant, abandoned, or tax delinquent properties and return them to productive use by addressing tax burdens, rehabilitating properties, or demolishing unsalvageable ones. Land banks are governed by local laws and operate in harmony with local building codes to ensure the safety and habitability of problem properties. Land banks can also help prepare properties for energy efficiency and resilience retrofits. Although land banks are operating in communities across the nation, providing them with access to best practices, technical assistance, and resources will maximize impact and help to meet community needs.

In June 2020, Reps. Dan Kildee (D-MI) and Drew Ferguson (R-GA) introduced the National Land Bank Network Act (H.R. 7103) to develop partnerships and programming to advance the work of land banks, provide land banks with access to technical assistance and research, and provide grants to strengthen land banks and support the creation of new land banks in communities.

Recommendation: Congress should direct the Neighborhood Reinvestment Corporation to enhance partnerships, technical assistance, and grant assistance to strengthen and expand the national network of land banks to address vacant and abandoned properties and enable their return to productive use for safety, resilience, and habitability.

Committee of Jurisdiction: Financial Services

⁴⁷⁵ HUD, Office of Sustainable Communities, <https://www.hud.gov/hudprograms/sci>. Accessed June 2020.

Provide Federal Leadership on Buildings

As the largest building owner in the country, the federal government could have a powerful impact by setting ambitious energy use and emissions reduction targets, demonstrating how to implement performance-based metrics and standards, and deploying new technologies. In addition to overarching energy use and emissions reduction targets, the federal government could establish more specific targets to reduce water use, increase onsite renewable energy generation, and reduce embodied carbon.

Building Block: Require New Construction and Major Renovations of Federal Buildings to Achieve Net-Zero Emissions by 2030

Local jurisdictions control whether buildings within their borders meet model building codes and standards. The federal government can build capacity for model code implementation and lead by example by requiring all new construction and major renovations of federal buildings to achieve net-zero emissions as soon as possible and no later than 2030.

While there are differing interpretations of the term, net-zero emissions buildings are generally buildings that produce or purchase enough emissions-free energy to offset emissions from annual building energy use and could include buildings powered by onsite, nearby, or grid-connected electricity.⁴⁷⁶ Net-zero emissions targets can also apply to a whole community or campus that encompasses multiple buildings. A net-zero emissions goal for federal facilities would provide a cost-effective and flexible pathway for decreasing emissions from federal facilities, while also building capacity for state, local, and private buildings to follow suit. Because federal buildings exist in communities all over the country, new construction and renovation of net-zero-emission federal buildings will help improve local capabilities for net-zero construction techniques and build local markets and supply chains for net-zero-emission building materials and products that local governments and other building owners can tap into. To maximize efficiency and flexibility, the federal government could take a portfolio approach to reducing emissions from federal facilities by setting net-zero emissions goals across complexes or groups of federal buildings rather than each individual building. The federal government could also expand net-zero emissions goals to include non-energy-related building emissions, such as the embodied carbon emissions discussed above.

Recommendation: By 2030, Congress should require federal agencies to achieve net-zero emissions when building or leasing new federal buildings or undergoing major renovations of existing federal buildings. Congress could set this goal based on an existing platform, such as the Zero Code appendix of the 2021 IECC, and should require buildings to (1) maximize energy efficiency, (2) use onsite or nearby net-zero-emission energy sources to meet energy needs, as feasible, and (3) meet the remaining energy needs through a combination of procurement of offsite net-zero-emission energy and electricity from the grid, taking into account the emissions intensity of the local grid to determine the need for additional clean or renewable energy credits for meeting the code. Agencies should employ electrification strategies as much as possible and aspire to include embodied carbon emissions from building materials in the net-zero calculation as soon as possible.

⁴⁷⁶ National Renewable Energy Laboratory, U.S. Department of Energy, NREL/TP-550-44586, *Net-Zero Energy Buildings: A Classification System Based on Renewable Energy Supply Options* (June 2010); Renilde Becque et al, *Accelerating Building Decarbonization: Eight Attainable Policy Pathways to Net Zero Carbon Buildings for All* (World Resources Institute, 2019).

Recommendation: In order to help federal agencies meet these net-zero emissions requirements for new buildings and encourage deep retrofits that can meet these standards, Congress should consider appropriating incremental funds to enable these projects. Agencies could then apply for this additional funding when needed. For example, if a federal agency is already planning a new construction project or major renovation and has existing internal funding or private financing for the project, then the agency could apply for additional funds to cover the incremental costs of making the project achieve net-zero emissions.

Committees of Jurisdiction: Energy and Commerce; Transportation and Infrastructure; Oversight and Reform

Building Block: Establish Ambitious Energy Efficiency and Emissions Reduction Targets for All Federal Buildings

To fully address the carbon footprint of its facilities, the federal government will need to reduce emissions in existing buildings in addition to constructing new, cleaner buildings. This will require a combination of energy efficiency improvements, electrification, and reliance on net-zero-emission energy for building operations. Federal building managers can bundle multiple efficiency, electrification, and net-zero-emission energy upgrades into whole-building deep energy retrofits to achieve greater energy and emissions savings. An analysis of federal energy savings projects found that projects under GSA's National Deep Energy Retrofit program achieved average energy savings more than double that of other federal energy efficiency projects.⁴⁷⁷

The Federal Energy Management Program (FEMP) provides guidance and resources to help federal agencies manage their energy use and comply with energy efficiency and other requirements. FEMP also supports tracking and sharing of agency performance. However, FEMP does not have authorizing legislation.

The Energy Independence and Security Act of 2007 established a building energy intensity reduction requirement of 30% below 2003 levels by 2015.⁴⁷⁸ As of 2018, the federal government had not achieved this requirement, only reaching 25.5% reductions in 2018.⁴⁷⁹

Reps. Peter Welch (D-VT) and Adam Kinzinger (R-IL) introduced the Federal Energy and Water Management Performance Act of 2020 (H.R. 5650) and Sens. Lisa Murkowski (R-AK) and Joe Manchin (D-WV) introduced the Federal Energy and Water Management Performance Act of 2019 (S. 1857), which are similar to a provision of the Energy Savings and Industrial Competitiveness Act of 2019 (H.R. 3962/S. 2137) introduced by Reps. Peter Welch (D-VT) and David McKinley (R-WV) and Sens. Rob Portman (R-OH) and Jeanne Shaheen (D-NH). These provisions would codify FEMP and require federal agencies to reduce average building energy intensity at their facilities by 2.5% each year. Sections 33251 and 33252 of the Moving Forward Act (H.R. 2) also include similar provisions.

⁴⁷⁷ Oak Ridge National Laboratory, U.S. Department of Energy, *Energy Savings from GSA's National Deep Energy Retrofit Program* (September 2014).

⁴⁷⁸ Energy Independence and Security Act of 2007, Pub L No 110-140.

⁴⁷⁹ Office of Federal Sustainability, "Federal Government-Wide Performance Data," https://www.sustainability.gov/government_data.html. Accessed June 2020.

Rep. Julia Brownley (D-CA) introduced the Green Energy for Federal Buildings Act (H.R. 5142). This bill would require the federal government to increase its use of renewable energy to 35% of its total electricity by 2030, 75% by 2040, and 100% by 2050. This bill would also encourage the federal government to use renewable energy that is produced onsite at federal facilities, on federal lands, or on tribal lands, while also removing the current double-counting of renewable energy produced on these facilities and lands for the purposes of meeting the requirement.

Rep. Joe Neguse (D-CO) introduced the Green Government Resolution (H.Con.Res. 74). This resolution directs the Architect of the Capitol to ensure that Capitol Complex buildings align with Washington, D.C.'s city-wide clean energy goals by transitioning to 100% renewable electricity by 2032.⁴⁸⁰

Recommendation: Congress should codify FEMP and establish ambitious energy use intensity and emissions reduction targets for federal buildings, including its leased buildings.

Recommendation: Congress should require and fund GSA and FEMP to undertake at least 100 deep energy retrofits of federal buildings by 2025. GSA and FEMP should target buildings already scheduled for renovation or that need other building improvements to maximize cost-efficiency. Congress should direct federal agencies to develop and implement a plan to achieve deep energy and water retrofits at 5% of their large facilities each year, starting in 2025. Agencies should coordinate these retrofits with other large capital investments to reduce costs. Congress should require deep retrofits to achieve at least 50% energy savings—assessed as combined electricity and fuels savings—and 25% water savings, or the maximum that is technically feasible.

Recommendation: Congress should implement energy and emissions benchmarking and performance-based requirements on individual federal buildings to show leadership and build capacity for state and local jurisdictions to adopt similar measures. Congress should coordinate these requirements with DOE's creation of a model building energy and emissions performance standard, as described above.

Committees of Jurisdiction: Energy and Commerce; Transportation and Infrastructure; Oversight and Reform

Building Block: Expand Federal Use of Energy Savings Performance Contracting

Federal agencies have used energy savings performance contracting (ESPC) for more than 20 years to invest in energy efficiency improvements without upfront capital or special congressional appropriations. Instead, repayment of the investments to a third-party contractor occurs over time from savings on energy bills. Despite these benefits, there remain many untapped opportunities for ESPC projects. The 2007 Energy Independence and Security Act requires federal agencies to identify cost-effective energy and water efficiency measures for their facilities but does not require the agencies to implement these measures.⁴⁸¹ The ESPC process provides an ideal mechanism for addressing these already identified energy efficiency upgrades.

⁴⁸⁰ H.Con.Res. 74, "Encouraging the Architect of the Capitol to transition to the exclusive use of electricity derived from renewable energy sources to power the United States Capitol Complex by 2032," 116th Congress, <https://www.congress.gov/bill/116th-congress/house-concurrent-resolution/74>.

⁴⁸¹ Energy Independence and Security Act of 2007, Pub L No 110-140, Section 432.

Reps. Peter Welch (D-VT) and Adam Kinzinger (R-IL) and Sens. Cory Gardner (R-CO) and Chris Coons (D-DE) introduced the Energy Savings Through Public-Private Partnerships Act of 2019 (H.R. 3079/S. 1706), which would require implementation of cost-effective energy efficiency and water efficiency measures and encourage expanded use of performance contracting at federal facilities to achieve these goals. The CLEAN Future Act discussion draft also includes this bill.⁴⁸²

In addition, Reps. Peter Welch (D-VT) and David McKinley (R-WV) and Sens. Rob Portman (R-OH) and Jeanne Shaheen (D-NH) introduced the Energy Savings and Industrial Competitiveness Act of 2019 (H.R. 3962/S. 2137). Among other provisions, the bill would direct the Chief Information Officers Council to recommend best practices for the use of energy savings performance contracting to achieve energy performance goals.

Recommendation: Congress should expand federal use of energy savings performance contracting to maximize energy efficiency and water efficiency.

Committees of Jurisdiction: Energy and Commerce; Oversight and Reform

Building Block: Develop a Federal Smart Technology Strategy

Reps. Anna Eshoo (D-CA) and Adam Kinzinger (R-IL) introduced and the House passed the Energy Efficient Government Technology Act (H.R. 1420), which would direct the federal government to reduce energy use by using energy-efficient technologies that are already commercially available, including smart technologies. The bill includes a special focus on improving energy efficiency at data centers, including creating an open data initiative so third parties can help develop solutions to reduce energy use.

The bill directs federal agencies to develop an implementation strategy, including measurement and verification techniques and general best practices, for using energy-efficiency technologies at federal facilities. Each agency must consider using advanced metering infrastructure, energy-efficient data center strategies, advanced power management tools, building energy management tools, and telework options. The Office of Management and Budget (OMB) would evaluate the efforts of federal agencies on these tasks. The Energy Savings and Industrial Competitiveness Act of 2019 (H.R. 3962/S. 2137) and the CLEAN Future Act discussion draft also include this bill.⁴⁸³

Recommendation: Congress should establish a federal smart technology strategy to reduce energy use and emissions in federal buildings, especially at small- and medium-sized data centers.

Committee of Jurisdiction: Energy and Commerce

⁴⁸² Title III, Section 341, CLEAN Future Act discussion draft.

⁴⁸³ Title III, Section 323, CLEAN Future Act discussion draft.

Invest in Water Infrastructure to Provide Clean Water and Prevent Catastrophic Flooding

Of all the infrastructure types, water is the most fundamental to life. Access to safe, clean water is essential to public health, agriculture, and commerce. However, most states already face water shortages, water quality challenges, and funding shortfalls despite household water rate increases. As the nation confronts a significant and broad-based infrastructure crisis, dams, levees, and other water control structures raise particular concern because they provide important protection to all other infrastructure investments. The nation's water and flood infrastructure is aging, and investments are not keeping pace with the need. There is a need for strategic investment to bridge the water infrastructure funding gap and ensure that water systems, dams, and levees serve today's needs, meet future demands, and withstand the more extreme conditions anticipated in the future. Additional recommendations for addressing the risks of flooding and climate-related threats to water systems appear in the section of this report titled "Make U.S. Communities More Resilient to the Impacts of Climate Change."

Invest in Infrastructure to Prevent Catastrophic Flooding

Building Block: Transform the Nation's Flood Risk Infrastructure to Protect Communities for Climate Resilience

Levees and dams play a significant role in flood risk reduction in communities across the United States that were settled in flood-prone areas around rivers and coasts. At least one-third of communities with a population of 50,000+ have some portion of their jurisdiction protected by levees.⁴⁸⁴ Levees and dams also provide protective services to all other types of infrastructure, from roads and bridges to water facilities and power plants. However, the nation has a complicated experience with flood risk management infrastructure, as systems can overtop or fail with catastrophic and deadly consequences. Numerous government reports reflect lessons learned and contain a valuable body of findings and recommendations for Congress to consider:

- Levees and dams may help reduce risk—but they do not eliminate it.^{485,486}
- Levee construction can have the unintended effect of intensifying flood risk by creating a false sense of safety that can attract new homes, tax base, and infrastructure in leveed areas.⁴⁸⁷
- Federal civil works programs have operated in combination with the National Flood Insurance Program to drive widespread construction of levees designed only to the minimum standards necessary to obviate flood insurance requirements, instead of designing levee systems to

⁴⁸⁴ U.S. Army Corps of Engineers, "National Levee Safety: Levees and Communities," <https://www.usace.army.mil/National-Levee-Safety/About-Levees/Levees-and-Communities/>. Accessed June 2020.

⁴⁸⁵ Ibid.

⁴⁸⁶ Federal Emergency Management Agency (FEMA), *Fact Sheet: Risk Exposure and Residual Risk Related to Dams* (May 2018).

⁴⁸⁷ National Committee on Levee Safety, *Recommendations for a National Levee Safety Program: A Report to Congress* (January 2009) at 15, 53.

- higher standards and ensuring that property owners are covered by risk-based flood insurance so that their economic losses are covered when the levee is overtopped or fails.⁴⁸⁸
- Decades of deferred maintenance and neglect of many of the nation’s dams and levees pose significant risk of loss of life and property for communities in leveed areas and downstream of dams.^{489,490} USACE reports that 13% of the federal levee portfolio where more than 8 million people live or work requires interim actions to reduce risk of loss of life and property while more long-term solutions are being pursued.⁴⁹¹

The nation’s network of more than 30,000 miles of federally-documented levees—and a substantial number of additional levees that are not yet accounted for in the National Levee Database⁴⁹²—provide protection for more than \$1.3 trillion in property in every state, territory, and the District of Columbia.⁴⁹³ More than half of levees are owned by states and local entities, which often have limited budgets for repairs and maintenance. Due to the significant inventory of levees that are outside federal authority, the condition of the nation’s levees is largely unknown. The American Society of Civil Engineers estimates that \$80 billion is needed in the next 10 years to maintain and strengthen the nation’s levees.⁴⁹⁴ USACE estimates the cost to address risk for the 14,150 miles of levees in the USACE levee portfolio to be \$21 billion.⁴⁹⁵ In 2014, Congress authorized a national levee safety initiative and directed FEMA to support the establishment or improvement of state and tribal levee safety programs. However, the initiative has yet to receive funding other than for the national levee inventory.

Dams also provide vital services and flood protection while posing risks that changing hydrologic conditions—such as droughts and floods—can exacerbate to stress dams and related infrastructure. Due to the lack of investment in dam maintenance and repair, an estimated \$45 billion is needed to rehabilitate dams to meet current design and safety standards that do not account for the ways that climate change will further stress dams.⁴⁹⁶ Investments in technical assistance and state dam safety programs also fall short of meeting needs. Additionally, there are opportunities to adjust reservoir management strategies to use enhanced monitoring and improved weather and water forecasts to inform decision-making to selectively retain or release water from reservoirs to manage flood events, optimize water supply reliability, and enhance environmental co-benefits.⁴⁹⁷ Since dams can also be detrimental to habitats for fisheries and other species, flood protection benefits should be weighed with ecological consequences, especially for endangered species.

⁴⁸⁸ Ibid. at 10.

⁴⁸⁹ Ibid. at 13, 39, 55.

⁴⁹⁰ American Society of Civil Engineers, 2017 *Infrastructure Report Card: Dams*, <https://www.infrastructurereportcard.org/wp-content/uploads/2017/01/Dams-Final.pdf>.

⁴⁹¹ USACE, *Levee Portfolio Report: A Summary of the Risks and Benefits Associated with the USACE Levee Portfolio* (March 2018).

⁴⁹² USACE, “National Levee Database,” <https://levees.sec.usace.army.mil/#/>. Accessed June 2020.

⁴⁹³ American Society of Civil Engineers, 2017 *Infrastructure Report Card: Levees*, <https://www.infrastructurereportcard.org/wp-content/uploads/2017/01/Levees-Final.pdf>.

⁴⁹⁴ Ibid.

⁴⁹⁵ USACE, *Levee Portfolio Report: A Summary of the Risks and Benefits Associated with the USACE Levee Portfolio* (March 2018), <https://usace.contentdm.oclc.org/utils/getfile/collection/p266001coll1/id/7167>.

⁴⁹⁶ American Society of Civil Engineers, 2017 *Infrastructure Report Card: Dams*, <https://www.infrastructurereportcard.org/wp-content/uploads/2017/01/Dams-Final.pdf>.

⁴⁹⁷ Center for Western Weather and Water Extremes, Scripps Institution of Oceanography, University of California San Diego, “Forecast Informed Reservoir Operations,” <http://cw3e-web.ucsd.edu/firo/>. Accessed June 2020.

Rep. Julia Brownley (D-CA) introduced H.R. 5504, a bill to amend the National Dam Safety Program Act with respect to the definition of 'eligible high hazard potential dam.' The bill would expand eligibility under the FEMA High Hazard Dam Program to dams with small hydroelectric generation capacity. This would ensure more at-risk dams can receive federal assistance.

Recommendation: Congress should increase funds for the FEMA National Dam Safety Program, High Hazard Potential Dam Rehabilitation Program, Bureau of Reclamation Safety of Dams Program, and USDA Small Watershed Dam Rehabilitation Program to support dam safety training, technical assistance, research, public awareness, and support to states and territories to improve their dam safety programs. Congress should increase funding to help address the ecological effects of dams, repair high hazard dams to reduce the risk of loss of life and property, and protect access to clean and safe drinking water. Congress also should expand eligibility for federal funding to include small hydropower-generating dams. Congress should also direct USACE, Bureau of Reclamation, NOAA, the U.S. Geological Survey (USGS), and the U.S. Fish and Wildlife Service to report to the Congress within two years on opportunities to leverage improvements in weather and water forecasts and climate projections to expand use of forecast-informed strategies for the operation of dams and reservoirs.

Recommendation: Congress should fully fund the USACE Levee Safety Program to establish and promote consistent levee safety standards; create levee safety guidelines that include resilience-based codes and standards for development in areas behind levees; and complete assessments of the nation's levees, taking climate risks into account. Congress should authorize and appropriate funding to address climate risks identified through those assessments. Congress should provide funding to FEMA to support the establishment of state and tribal levee safety programs to ensure that the nation's network of levees help to protect communities from the effects of extreme flooding. Congress should also require that levee owners or operators show financial capability to operate, maintain, repair, and replace the levee for its expected life.

Committees of Jurisdiction: Transportation and Infrastructure; Natural Resources; Agriculture

Building Block: Fully Integrate Green Infrastructure and Nonstructural Flood Risk Reduction in Feasibility Studies for Federal Flood Risk Management Infrastructure

Levees by their very nature can adversely affect properties that are upstream, downstream, adjacent to, or across the waterway. Levees function as barriers between waterways and communities, transferring flood waters onto other property and increasing flood depths and velocities, which can exacerbate erosion. Levees can damage or displace important riparian vegetation that would otherwise help to absorb floodwaters and slow velocities, as well as provide habitat and community recreational amenities. Levees can also block water flows, often cutting off access to wetland areas critical to aquatic species. Levees that are placed too close to waterways may maximize land behind the levee that is available for development but leave less room for floodwaters, which makes water run faster and higher. As a result, the effects of levee overtopping or failure can be catastrophic.

Nonfederal owners and operators, including communities, regional entities, or special districts, are responsible for the ongoing maintenance of thousands of miles of levees, pump stations, and other structures. Too often, levee owners have not been willing or able to keep up with those maintenance

responsibilities as upstream development increases flood heights and other financial pressures draw needed funds away from infrastructure maintenance obligations.

As flood risks drive more communities to consider new levees or expansion of existing systems, communities and federal agencies should consider the potential adverse environmental and economic impacts of levees and evaluate the full range of less intensive and less costly options to integrate them into the design of flood risk management approaches. By maximizing the natural capacities of functioning river systems to allow for more natural flood regimes, and integrating features such as wetlands, natural floodplains, and setback levees into the overall flood risk management strategy, the risks of catastrophic floods and system failures can be reduced, along with maintenance costs.

Recommendation: Congress should ensure that USACE investigates the full range of cost-effective potential solutions as part of congressionally-authorized federal flood risk studies, including nonstructural options such as buying out and relocating willing property owners and communities that are exposed to repeated and increasing flood losses; elevating and floodproofing structures, where appropriate; and restoring intact, functioning, and healthy coastal and riverine ecosystems that can reduce flood impacts and provide other benefits, including mitigating erosion and enhancing water quality, recreation, and intrinsic community well-being. USACE should also evaluate less structural, engineered measures such as setback levees and ecosystem restoration. The feasibility study process should provide for meaningful public engagement, particularly for environmental justice communities, whose input should help determine the strategies that will be implemented to address flooding. The process also should factor in the economic value of co-benefits for nature-based solutions for reducing flood risks, such as community outdoor recreation, carbon sequestration by restored wetlands, and cooling by urban afforestation programs.

Recommendation: Congress should direct USACE to provide a report to Congress on federally authorized and non-federally operated flood damage reduction projects that are in poor condition and may benefit from repair, removal, rehabilitation, or replacement with nature-based features and green infrastructure.

Recommendation: Congress should direct USACE to apply consistent cost-share requirements for natural infrastructure projects and nonstructural projects that “restore or protect natural resources, including streams, rivers, floodplains, wetlands, or coasts, if those efforts will reduce flood risk.”⁴⁹⁸

The section of this report titled “Increase Climate Resilience of Ocean and Coastal Ecosystems and Aquatic Wildlife” provides further recommendations for investing in green infrastructure to increase coastal and riverine resilience.

Committee of Jurisdiction: Transportation and Infrastructure

⁴⁹⁸ 33 U.S.C. § 701n(a)(4)

Building Block: Repair, Rehabilitate, and Replace Existing Damaged Flood Infrastructure for Climate Resilience

USACE repairs certain nonfederal levees that are damaged during flood events under the Levee Rehabilitation and Improvements Program, known as P.L. 84-99.⁴⁹⁹ Traditionally, under this program USACE has rebuilt levees back to pre-flood conditions that may not account for the effects of climate change, such as increased flood risk, and rarely used available alternatives that integrate natural features and nonstructural options.⁵⁰⁰

In some areas of the country, such as along the Missouri River,⁵⁰¹ some levees experience damage during every major flood and require repeated repairs, at up to 100% expense to the federal taxpayer. Congress amended the Levee Rehabilitation and Improvements Program in 2014, 2016, and 2018 to make clear that USACE can undertake levee setbacks and realignments to reduce repetitive flood damage and provide rivers with more space to safely accommodate flood waters. The Water Resources Reform and Development Act of 2014 included a requirement for USACE to complete a review of their emergency response authorities, including the amounts spent in the previous five years to carry out projects under P.L. 84-99 and to continue reporting on P.L. 84-99 expenditures in a biennial report to Congress.⁵⁰² This reporting was intended to establish a public record of repetitive loss flood risk management infrastructure. Notwithstanding the direction from Congress, USACE has not provided adequate implementation guidance to ensure that nonstructural and less structural options are fully investigated and implemented, accounting for the potential environmental, safety, and economic benefits they may bring, including reducing the public costs of recurring damage and repairs to levees and to assets they are intended to protect.

Recommendation: Congress should direct USACE to identify repeatedly damaged levees, engage in pre-disaster planning of levee repairs that incorporate less structural and nonstructural options, and implement these projects in a timely manner when the infrastructure is damaged. Congress should also direct USACE to provide technical assistance to communities that have parts of their jurisdiction behind levees and to levee owners and operators on strategies to manage risks associated with levees, including opportunities to repair, rehabilitate, and replace damaged levees in ways that maximize less structural and nonstructural options.

Committee of Jurisdiction: Transportation and Infrastructure

⁴⁹⁹ P.L. 84-99 program (33 USC 701n).

⁵⁰⁰ Structural flood risk management strategies, including dams, levees, and floodwalls, change the characteristics of a flood to reduce flood probability in a given area. Nonstructural measures, such as buyouts, evacuations, and ecosystem restoration, lessen the impact or consequences of flooding, but do not change the characteristics of the flood itself. See National Research Council, *Levees and the National Flood Insurance Program: Improving Policies and Practices* (The National Academies Press, 2013).

⁵⁰¹ John I. Remus, "Assessment of Conceptual Nonstructural Alternative Levee Setbacks along the Missouri River (Lower L-575 / Upper L-550 and Lower L-550)," USACE, May 24, 2012, <https://digitalcommons.unl.edu/usarmyceomaha/147/>.

⁵⁰² Water Resources Reform and Development Act of 2014, Pub L No 113-121.

Building Block: Establish an Ecosystem Services Valuation System to Support Resilient Communities

Ecosystems can provide multiple services, but the siting and design of federal projects do not fully study or account for them. For example, wetlands provide flood risk reduction, water quality improvements, wildlife habitat, and carbon sequestration, along with economic benefits such as recreation and tourism. Research indicates that wetland losses increased property damage from Hurricane Irma by \$430 million.⁵⁰³ USACE has researched opportunities to incorporate ecosystem goods and services in USACE planning and environmental benefits evaluation and concluded that “developing a methodology or framework to analyze ecosystem goods and services could be useful for integrated water resources management and problem solving by providing a multi-faceted view of the effects of water resources decisions and linking of the USACE missions with other agencies.”⁵⁰⁴ Including ecosystem goods and services in project planning, design, and evaluation can provide a more complete and accurate view of project effects, more directly demonstrate the value of ecosystem services, and provide for more transparent consideration of the benefits and costs of proposed projects.

USACE, however, has made little progress in establishing such a framework or methodology for evaluating ecosystem benefits that contribute to the effectiveness of USACE projects, studies, and designs, both for new flood risk management projects and for consideration of alternatives in working with communities to solve problems with increasing flood risk and sea level rise.

Recommendation: Congress should direct USACE to conduct a study and report back to the Congress on ways to evaluate ecosystem benefits for flood risk reduction projects, including the direct value of floodwater retention, other impacts of flood risk reduction, and indirect values of reduced cost and maintenance, water quality, habitat, recreation, and tourism.

Committee of Jurisdiction: Transportation and Infrastructure

Invest in Water Systems to Best Serve Community Needs in the Face of Climate Impacts

Building Block: Strengthen the Nation’s Wastewater and Drinking Water Infrastructure for Climate Resilience

The American Society of Civil Engineers has given the nation’s water systems low marks due to aging infrastructure, legacy and emerging contaminants, and long-deferred maintenance that will require \$1 trillion to maintain and expand service to meet anticipated demands over the next 25 years.⁵⁰⁵ EPA and the National Research Council have identified the need to better assess environmental, public

⁵⁰³ Fanling Sun and Richard T. Carson, “Coastal wetlands reduce property damage during tropical cyclones,” *Proceedings of the National Academy of Sciences* 117, no. 11 (2020): 5719-5725.

⁵⁰⁴ USACE, 2013-R-07, *Using Information on Ecosystem Goods and Services in Corps Planning: An Examination of Authorities, Policies, Guidance, and Practices* (Institute of Water Resources, September 2013).

⁵⁰⁵ American Society of Civil Engineers, 2017 *Infrastructure Report Card: Drinking Water*, https://www.infrastructurereportcard.org/cat-item/drinking_water/.

health, and safety risks that disproportionately affect communities of color and low-income communities due to proximity to sources of water pollution and lack of access to safe drinking water.^{506,507} Climate impacts further stress water systems by disrupting natural cycles as water shortages affect crop yields in dryer seasons, floods become more frequent and damaging, and water quality degrades. Additionally, population and demographic changes make it more difficult to project future water resource needs.⁵⁰⁸

Increased rainfall intensity and flooding are affecting wastewater treatment plant efficiency and contribute to pollution in lakes, rivers, and coastal waterways. Sea level rise can also affect the capacity of downstream sewers and increase saltwater intrusion. Extreme rain events are causing combined sewer overflows when the combined flow of wastewater and stormwater exceeds the capacity of sewer systems and pollutes waterways. Wastewater infrastructure and combined sewer overflow control programs have relied on the historic hydrologic record, not taking climate change into account.⁵⁰⁹

The increased risks of system damage and service disruption will require that water and wastewater service providers conduct more frequent maintenance, repair, and upgrades to ensure system resilience, which can increase up-front and operational costs. Communities, water infrastructure engineers, and the owners and operators of water supply and wastewater treatment infrastructure should site and design new systems to incorporate lifecycle impacts and costs, and upgrade and protect existing systems to reduce risks to waterways and public health.

In addition, many communities are implementing green infrastructure approaches to address the water quality impacts of wet weather events by reducing polluted stormwater discharges and sewer overflows. Green infrastructure uses vegetation, soils, and natural processes to manage water, create healthier urban environments, and mimic nature by infiltrating, evapotranspiring, or harvesting rainwater.⁵¹⁰

In order to meet the funding challenges associated with increased cost for new water systems and to upgrade existing systems, communities and service providers will need significant investment and partnership. Utilities also need additional technical assistance on an ongoing basis to manage climate risks.⁵¹¹

Many Members of Congress have introduced legislation to strengthen the country's wastewater and drinking water infrastructure. Chair Peter DeFazio (D-OR) introduced the Water Quality Protection and Job Creation Act of 2019 (H.R. 1497), which would increase funding to help communities across the nation build and maintain drinking water and wastewater infrastructure. The bill would also help

⁵⁰⁶ U.S. Environmental Protection Agency, *Sociodemographic Data Used for Identifying Potentially Highly Exposed Populations* (July 1999).

⁵⁰⁷ National Research Council, *Science and Decisions: Advancing Risk Assessment* (National Academies Press, 2009).

⁵⁰⁸ U.S. Global Change Research Program, *Fourth National Climate Assessment, Volume II* (November 2018), Chapter 3: Water.

⁵⁰⁹ Anastasios Zouboulis and Athanasia Tolkou, "Effect of Climate Change in Wastewater Treatment Plants: Reviewing the Problems and Solutions," *Managing Water Resources under Climate Uncertainty* (2015): 197-220.

⁵¹⁰ U.S. Environmental Protection Agency, "Green Infrastructure Policy for the CWSRF Program," <https://www.epa.gov/cwsrf/green-infrastructure-policy-cwsrf-program>. Accessed June 2020.

⁵¹¹ Government Accountability Office, GAO-20-24, *Water Infrastructure: Technical Assistance and Climate Resilience Planning Could Help Utilities Prepare for Potential Climate Change Impacts* (February 2020).

reduce the impacts of climate change by encouraging greater use of green infrastructure approaches to address local water quality challenges and by requiring utilities to maximize their energy efficiency potential, including the recapture and reuse of methane, where economically feasible. The House Democrats' infrastructure bill, the Moving Forward Act (H.R. 2), would make similar investments in water and wastewater infrastructure.⁵¹² Section 22104 of the bill would further extend grant eligibility to include public wastewater utility assessments of disaster risk and projects to increase the resilience of public treatment works. Sections 22108 and 22112 of the bill would codify that a portion of the Clean Water State Revolving Fund be set aside for tribes and territories.

Chair DeFazio also introduced the Clean Water for All Act (H.R. 6745), which would direct EPA and USACE to implement their responsibilities under the Federal Water Pollution Control Act to prevent water quality degradation, increased flood risk, and adverse impacts to minority and low-income populations. Rep. Derek Kilmer (D-WA) introduced the P3 Act (H.R. 2718), which would allow states and local governments to issue green infrastructure bonds as tax-exempt private activity bonds for projects that preserve, enhance, or mimic natural infiltration, evapotranspiration, or capture of stormwater.

Section 623 of the Energy and Commerce Committee's discussion draft of the CLEAN Future Act and Section 33103 of the Moving Forward Act would authorize additional funding for resilience and adaptation of drinking water facilities. Rep. Salud Carbajal (D-CA) introduced the Clean Water Infrastructure Resilience and Sustainability Act (H.R. 2470) to authorize grants to increase the resilience of publicly owned treatment works.

Rep. Dan Kildee (D-MI) introduced the Water Justice Act (H.R. 4033), which would declare a Drinking Water Infrastructure Emergency and increase funding for critical upgrades to the nation's water infrastructure, including investments in communities and schools to test for and remove contaminants in water. The bill would also provide assistance for families struggling with the cost of rising water bills and support a broad range of sustainable water infrastructure projects.

Recommendation: Congress should direct the EPA to require that all water infrastructure projects greater than \$5 million that receive federal financial assistance use lifecycle risk and cost analysis, and to site and design new projects and make improvements to existing facilities to meet the climate risks that are anticipated over the lifetime of the asset. As federal standards for flood and wildfire resilience are established, EPA should also ensure that federally funded or permitted water supply and treatment infrastructure is sited, designed, and repaired to meet those standards, along with more stringent state or local standards.

Recommendation: Congress should significantly increase appropriations to the Clean Water Act and Safe Drinking Water Act revolving loan funds, including for tribes and territories, to enable communities to upgrade and maintain their wastewater and drinking water systems and provide support to frontline communities and low-income households.

For each recommendation, federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements),

⁵¹² Division F, Title II, Subtitle A, Water Quality Protection and Job Creation Act.

complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Committees of Jurisdiction: Energy and Commerce; Transportation and Infrastructure

Building Block: Increase Funding to the Water Infrastructure Finance and Innovation Act (WIFIA) to Support Innovative Finance Strategies

Water infrastructure systems can pose environmental and safety threats when storm events overwhelm them. System owners and communities need a range of finance options to address the challenges they face in providing reliable water and wastewater infrastructure services. The EPA estimates that, over the next 20 years, capital improvements to the nation's water and wastewater infrastructure systems will require \$740 billion of investment.⁵¹³

In the Water Resources Reform and Development Act of 2014, Congress enacted WIFIA to authorize EPA to provide federal credit assistance for water infrastructure projects through secured direct loans and loan guarantees.⁵¹⁴

For 2020, Congress provided \$55 million for WIFIA to cover the subsidy costs required to provide a much larger amount of credit assistance, while mitigating the federal government's risk from borrowers that do not repay loans.⁵¹⁵ The EPA and OMB estimate that the average subsidy cost for WIFIA-funded projects will be relatively low; therefore, the appropriation can be leveraged into a much larger amount of credit assistance. EPA estimates that this budget authority may finance approximately \$12 billion in water infrastructure investment.⁵¹⁶

Pay-for-performance models, such as Environmental Impact Bonds (EIBs), are demonstrating success at attracting private investment in natural infrastructure and more sustainable stormwater management strategies.⁵¹⁷ Congress needs to expand opportunities to provide communities with more significant credit assistance to pursue EIBs and other pay-for-performance finance strategies to reduce stormwater impacts and increase community resilience.

Recommendation: Congress should increase appropriations to cover the subsidy cost of providing WIFIA credit assistance for a larger program to reach more borrowers. Congress should also confirm that it authorizes EPA to use WIFIA funds to provide financing toward EIBs.

Committee of Jurisdiction: Transportation and Infrastructure

⁵¹³ U.S. Environmental Protection Agency, "Notice of Funding Availability (NOFA) for Applications for Credit Assistance Under the Water Infrastructure Finance and Innovation Act (WIFIA) Program," April 5, 2019, 84 FR 13657.

⁵¹⁴ Water Resources Reform and Development Act of 2014, Pub L No 113-121, Title V, Subtitle C.

⁵¹⁵ Pub L No 116-94, Division D, Title II.

⁵¹⁶ U.S. Environmental Protection Agency, "Notice of Funding Availability (NOFA) for Applications for Credit Assistance Under the Water Infrastructure Finance and Innovation Act (WIFIA) Program," April 5, 2019, 84 FR 13657.

⁵¹⁷ Quantified Ventures, "Sharing Risk, Rewarding Outcomes: The Environmental Impact Bond," October 31, 2018, <https://www.quantifiedventures.com/blog/what-is-an-environmental-impact-bond>. Accessed June 2020.

Building Block: Invest in Water Storage and Infrastructure for Drought Resilience

Water resources across the United States are increasingly stressed, endangering the communities, economies, and habitats that rely on them. From metro Atlanta to the Central Valley of California, the climate crisis will further stress these limited water resources. The United States currently lacks a comprehensive and sustainable approach to water resource management to guide drought preparedness and improve water supply reliability. The nation can do better to tap opportunities to meet water resource and infrastructure challenges with innovative science, data, and technology. Water-stressed communities need help to prepare for droughts, meet drinking water and irrigation needs, and invest in watershed health that benefits downstream communities, fish, and wildlife.

In February 2020, Rep. Jared Huffman (D-CA) released a discussion draft of the Furthering Underutilized Technologies and Unleashing Responsible Expenditures (FUTURE) Drought Resiliency Act to increase the authorization for the Bureau of Reclamation's water recycling program to \$500 million and increase the federal funding cap for water recycling by \$10 million. The bill would authorize \$750 million for groundwater and surface water storage projects and provide new authorization for natural storage projects that use natural materials to increase aquifer recharge or floodplain water storage. It also would raise the authorization for the existing desalination program to \$260 million and establish a process for Congress to authorize major water storage projects at the Bureau of Reclamation, similar to the biennial Water Resources Development Act cycle used to approve USACE water infrastructure projects.⁵¹⁸ The House Democrats incorporated these provisions into their infrastructure bill, the Moving Forward Act (H.R. 2).⁵¹⁹

Rep. Mike Levin (D-CA) introduced the Desalination Development Act (H.R. 3723), which would authorize funding for desalination project development. It would also prioritize projects to maximize the use of renewable energy and energy efficiency, address drought, and reduce reliance on imported water supplies from imperiled ecosystems. House Democrats incorporated these provisions into Section 81215 of the Moving Forward Act (H.R. 2).

Rep. Joe Neguse (D-CO) introduced the 21st Century Conservation Corps for Our Health and Our Jobs Act (H.R. 7264), which would increase funds for the Bureau of Reclamation's WaterSMART program to provide water and energy efficiency grants to farmers and ranchers to build and improve infrastructure that helps reduce drought effects and water use, while promoting important resource conservation efforts.

Rep. Grace Napolitano (D-CA) introduced the Water Recycling Investment and Improvement Act (H.R. 1162), which would establish a grant program for projects that will increase water supply and water management flexibility for states and local governments and provide ecosystem benefits. The House Democrats incorporated this grant program into Section 81211 of the Moving Forward Act (H.R. 2).

Chair Peter DeFazio (D-OR) introduced the Water Quality Protection and Job Creation Act of 2019 (H.R. 1497), which would promote water efficiency and help communities across the nation reduce the impacts of climate change by providing funding for projects to capture, treat, or reuse wastewater and

⁵¹⁸ "FUTURE Drought Resiliency Act," or "Furthering Underutilized Technologies and Unleashing Responsible Expenditures for Drought Resiliency Act," <https://huffman.house.gov/imo/media/doc/Huffman%20Water%20Bill%20Text.pdf>.

⁵¹⁹ Division L, Title I, Subtitle B. FUTURE Western Water Infrastructure and Drought Resiliency.

stormwater runoff. The House Democrats incorporated similar provisions into their infrastructure bill, the Moving Forward Act (H.R. 2).⁵²⁰

Rep. Jennifer Gonzalez-Colon (R-PR) introduced the Puerto Rico WaterSMART Grants Eligibility Act (H.R. 6050), which would include territories as eligible applicants for the Bureau of Reclamation WaterSMART grants program supporting water reliability and access.

Recommendation: Congress should increase the authorization and the funding cap for water recycling programs in the Bureau of Reclamation; provide additional funding for water storage, natural infrastructure projects, and the existing desalination program; and establish a predictable process for authorizing major federal water storage projects, similar to the Water Resources Development Act. Congress also should extend eligibility for these programs to include territories.

Recommendation: Congress should increase funds to EPA programs that support community water supply resilience, including the Drinking Water Infrastructure Resilience and Sustainability program to support water conservation and water use efficiency; the modification or relocation of existing drinking water system infrastructure that is at risk of flooding; the design or construction of desalination facilities to serve existing communities; the implementation of projects to reclaim and reuse wastewater and stormwater runoff to augment water supply; and the enhancement of water supply through the use of watershed management and source water protection. Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Committees of Jurisdiction: Natural Resources; Transportation and Infrastructure; Energy and Commerce

Building Block: Advance Innovative Green Infrastructure Techniques to Manage Pollution and Reduce Climate Risks

Many communities and water system owners are facing significant financial challenges to make improvements to their stormwater and wastewater systems, including those needed to meet the provisions of the Clean Water Act. Communities and infrastructure owners are increasingly seeking to incorporate cost-effective green infrastructure projects to address their water quality and quantity challenges. Communities can use natural or engineered systems that mimic natural processes to infiltrate or capture stormwater and preserve or enhance natural hydrology to address water quality and flood issues. Natural features such as marshes, wetlands, and forests can help address polluted runoff and increase infrastructure resilience against sea level rise, flooding, storm surge, and other impacts. These green infrastructure projects can be more cost-efficient than traditional gray infrastructure projects and help to provide stable jobs through both project creation and maintenance.

Several Members of Congress have introduced legislation to support use of green infrastructure by states, tribes, local governments, and the private sector. Rep. Denny Heck (D-WA) introduced the

⁵²⁰ Division F, Title II, Subtitle A. Water Quality Protection and Job Creation Act.

Clean Water Through Green Infrastructure Act (H.R. 4266), which defines the sorts of innovative stormwater management technologies and techniques that would be considered green infrastructure and creates Centers of Excellence for innovative stormwater control infrastructure. The bill also establishes a grant program to help communities and stormwater management system owners and operators carry out green infrastructure projects. Section 1605 of the House Democrats' infrastructure bill, the Moving Forward Act (H.R. 2), commissions a Transportation Research Board study on best practices for stormwater runoff.

Rep. Debbie Mucarsel-Powell (D-FL) introduced the Water Infrastructure Sustainability and Efficiency (WISE) Act (H.R. 2458) to permanently codify within the Clean Water Act the requirement that states utilize a portion of their annual Clean Water State Revolving Fund allocation for projects to address green infrastructure, water or energy efficiency improvements, or other environmentally innovative activities. The House Democrats included this requirement in Section 22109 of the Moving Forward Act (H.R. 2).

Rep. Tom Malinowski (D-NJ) introduced the Natural Infrastructure and Resilience Act (H.R. 5871), which would expand the list of eligible activities through the Surface Transportation Block Grant Program to include projects that integrate natural infrastructure that uses, restores, or emulates natural ecological processes to enhance the resilience of transportation facilities. Section 1205 of the Moving Forward Act (H.R. 2) would make construction of protective features for transportation facility resilience, including natural infrastructure, eligible for funding under the Surface Transportation Block Grant Program.

Recommendation: Congress should codify the requirement that states dedicate a portion of their annual Clean Water State Revolving Fund grant allocation for implementation of green infrastructure approaches.

Recommendation: Congress should direct the EPA to establish centers of excellence for innovative stormwater and floodplain management for research, development, and deployment of technical assistance on green infrastructure that is relevant to the geographical region; collaborate with institutions of higher education, states, local governments, territories, and tribes; and provide training on innovative stormwater and floodplain management.

Recommendation: Congress should create a new grant program in EPA to provide funds to states, local governments, territories, and tribes to carry out green infrastructure projects including planning and design, development of fee structures to provide financial support, and installation. Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Recommendation: Congress should amend the FAST Act to allow the use of Surface Transportation Block Grant Program funds for projects using natural infrastructure that relies on or mimics natural ecological processes to increase the resilience of transportation facilities.

Committee of Jurisdiction: Transportation and Infrastructure

Prepare the Nation's Telecommunications Network for Climate Impacts

Wireless and broadband networks are essential utilities for commerce, health, education, and emergency services. However, millions of Americans lack access to reliable broadband internet, and telecommunications networks are vulnerable to outages during disasters.

Until the 1930s, millions of Americans could not access the electrical grid, especially in rural areas where only about 10% of households were electrified.⁵²¹ Congress passed the Rural Electrification Act of 1936, which transformed the economy and living standards of rural America.⁵²² Today, we have a similar opportunity to expand access to resilient telecommunications networks to close the “digital divide,” which disproportionately prevents low-income and rural Americans from accessing technology and telecommunications.⁵²³ The COVID-19 pandemic and resulting stay-at-home orders have highlighted how the gaps in access to information and communication technology hinders access to public safety information, telemedicine, telework, online education, and government assistance, especially for low-income and rural Americans.⁵²⁴

This section provides recommendations for expanding and strengthening the nation’s wireless and broadband communications networks to support public safety and community resilience. These recommendations acknowledge the essential value of wireless and broadband communications in preparing for, responding to, and quickly recovering from disasters.

Building Block: Assure the Resilience of the Nation’s Wireless Communications Networks to Climate Impacts and Reliability in Disasters

Wireless communications play a critical role in disasters and other civil emergencies. During such crises, cell towers may be damaged or destroyed, leaving survivors unable to call 9-1-1, receive evacuation orders and alerts, or access updated emergency information. The Federal Communications Commission (FCC) reports that of the 240 million calls made to 9-1-1 each year, more than 80% are from wireless devices.⁵²⁵ The California Office of Emergency Services reported that during the October 2017 wildfires, 341 cell sites went offline, and 489 cell sites went offline during the

⁵²¹ Harold D. Wallace Jr., “Power from the people: Rural Electrification brought more than lights,” National Museum of American History, February 12, 2016, <https://americanhistory.si.edu/blog/rural-electrification>. Accessed June 2020.

⁵²² Pub L No 74-605.

⁵²³ Monica Anderson and Madhumitha Kumar, “Digital divide persists even as lower-income Americans make gains in tech adoption,” Pew Research Center, May 7, 2019, <https://www.pewresearch.org/fact-tank/2019/05/07/digital-divide-persists-even-as-lower-income-americans-make-gains-in-tech-adoption/>; Andrew Perrin, “Digital gap between rural and nonrural America persists,” Pew Research Center, May 31, 2019, <https://www.pewresearch.org/fact-tank/2019/05/31/digital-gap-between-rural-and-nonrural-america-persists/>.

⁵²⁴ FCC Commissioner Geoffrey Starks, “To Fight Coronavirus, Millions More Americans Need Internet Access,” *The New York Times*, March 19, 2020.

⁵²⁵ FCC, *Factsheet: Wireless E911 Location Accuracy Requirements, Fourth Further Notice of Proposed Rulemaking – PS Docket No. 07-114* (February 22, 2019), <https://docs.fcc.gov/public/attachments/DOC-356299A1.pdf>.

2018 Camp and Woolsey fires, preventing affected wireless users from being able to receive emergency alerts, call 9-1-1, or use their cell phones to navigate to the safest evacuation route.⁵²⁶

The National 9-1-1 Program, housed at NHTSA within the DOT, is working with states, territories, and localities to deploy a nationwide “Next Generation 9-1-1” system, which would ensure secure and reliable delivery of all types of emergency communications (voice, text, data, video, and other media), improve call location tracking, and increase interconnectivity across 9-1-1 systems.⁵²⁷ However, a 2019 report found that inadequate funding is delaying full implementation of the Next Generation 9-1-1 system.⁵²⁸

Aside from the 9-1-1 system itself, people depend on their phones and devices for placing emergency calls and accessing public safety information during disasters.⁵²⁹ At least 17% of U.S. adults depend exclusively on wireless networks for internet access at home.⁵³⁰ However, states and territories currently lack the explicit authority to require that telecommunications companies deploy and maintain wireless infrastructure to be resilient to wildfires and other natural hazards. Resilience-building measures, such as fiber cables with fire-resistant casing, would help maintain critical public safety lines of communication between community members and emergency services. Wireless carriers also need to more promptly report service outages to 9-1-1 centers when they do occur.

Additional wireless infrastructure issues may also inhibit disaster response. First, current plans to deploy advanced 5G wireless technology could significantly degrade weather forecast accuracy, and federal agencies have been unable to agree on a specific designation of 5G frequencies to avoid these issues.⁵³¹ Second, data limits set by wireless providers may hinder access to critical information by first responders.⁵³² Third, as described in the section of this report titled “Reduce Wildfire Risks and Support Community Resilience Against Wildfires,” FCC guidelines need to be fine-tuned to ensure appropriate and timely public safety communications through the Wireless Emergency Alert system. Measures to increase the resilience of wireless networks must account for each of these issues.

Several members of Congress have introduced legislation to address some of these concerns. The Energy and Commerce Committee Democrats’ LIFT America Act (H.R. 2741) would provide \$12 billion in funding to accelerate deployment of Next Generation 9-1-1 services across America.⁵³³ The House

⁵²⁶ Testimony of Mark Ghilarducci, Director, California Office of Emergency Management, before the Committee on Oversight and Reform Subcommittee on Environment, House of Representatives (June 25, 2019).

⁵²⁷ National 9-1-1 Program, “Next Generation 9-1-1,” https://www.911.gov/issue_nextgeneration911.html. Accessed June 2020.

⁵²⁸ National 9-1-1 Program, *NG911 Roadmap: Pathways toward nationwide interconnection of 911 services, Version 1.0* (2019), https://www.911.gov/project_ng911roadmap.html.

⁵²⁹ Government Accountability Office, GAO-18-198, *Telecommunications: FCC Should Improve Monitoring of Industry Efforts to Strengthen Wireless Network Resiliency* (December 2017).

⁵³⁰ Pew Research Center, “Mobile Technology and Home Broadband 2019,” June 13, 2019, <https://www.pewresearch.org/internet/2019/06/13/mobile-technology-and-home-broadband-2019/>. Accessed June 2020.

⁵³¹ Letter from House Science, Space, and Technology Committee Chairwoman Eddie Bernice Johnson (D-TX) and Ranking Member Frank Lucas (R-OK) requesting GAO evaluation on spectrum interference issues, December 10, 2019, <https://science.house.gov/news/press-releases/chairwoman-johnson-and-ranking-member-lucas-request-gao-evaluation-on-spectrum-interference-issues>.

⁵³² Ryan Suppe, “Verizon throttled ‘unlimited’ data of Calif. fire department during Mendocino wildfire,” *USA Today*, August 22, 2018.

⁵³³ LIFT America Act, Title I, Subtitle B. Next Generation 9-1-1.

Democrats included this grant program in Section 31603 of their infrastructure bill, the Moving Forward Act (H.R. 2). Rep. Doris Matsui (D-CA) introduced a bill (H.R. 5918) to strengthen requirements for wireless carriers to report service outages to 9-1-1 call centers. Rep. Anna Eshoo (D-CA) introduced the Wireless Infrastructure Resiliency during Emergencies and Disasters (WIRED) Act (H.R. 3836), which would allow states to require wireless companies to deploy infrastructure that can withstand natural disasters.

Chairman Frank Pallone, Jr. (D-NJ) and Rep. Jerry McNerney (D-CA) introduced the Reinforcing and Evaluating Service Integrity, Local Infrastructure, and Emergency Notification for Today's (RESILIENT) Networks Act (H.R. 5926). This bill would require advanced planning and coordination among communications providers, 9-1-1 operators, and public safety entities to ensure the reliability of wireless networks during emergencies.

Recommendation: Congress should invest in deployment of Next Generation 9-1-1 to strengthen the continuity and capacity of 9-1-1 services during disasters.

Recommendation: Congress should give states and territories the authority to require that wireless communications networks be resilient to disasters as part of the terms and conditions for mobile services. Congress should direct the FCC to require providers of wireless communications services, 9-1-1 operators, and public safety entities to work together to ensure that advanced communications service remains operational during times of emergency and pre-planned power downs and that wireless networks do not interfere with critical weather forecasts.

Committee of Jurisdiction: Energy and Commerce

Building Block: Expand Access to and Ensure the Resilience of Broadband Infrastructure

Access to reliable and affordable broadband internet is increasingly essential for Americans seeking out education, good-paying jobs, and government services. The FCC estimates, however, that more than 20 million Americans have no way to access a broadband connection, defined as a download rate of at least 25 megabits per second (Mbps) and an upload rate of 3 Mbps.⁵³⁴ Issues of affordability and poor service quality further limit broadband access, especially for tribal communities.⁵³⁵ Closing this broadband “digital divide” is essential for supporting education and job creation in frontline and rural communities, where disproportionate lack of internet access compounds existing economic and social inequities.⁵³⁶ Broadband infrastructure also supports innovative actions to mitigate the climate crisis, including deployment of smart grids, building electrification, and precision agriculture, which are described elsewhere in this report.

The reliability of our nation’s broadband infrastructure is critical for the resilience of communities to climate-related disasters and other emergencies. A stable and functioning broadband internet system

⁵³⁴ FCC, *2019 Broadband Deployment Report* (May 2019).

⁵³⁵ Government Accountability Office, GAO-18-630, *Broadband Internet: FCC's Data Overstate Access on Tribal Lands* (September 2018).

⁵³⁶ Kelsey Berkowitz and Jim Kessler, *The Racial Equality and Economic Opportunity Case for Expanding Broadband* (Third Way, February 2019).

can accelerate real-time information access and emergency communications during and after disasters.⁵³⁷ It is also essential to design internet networks to withstand and bounce back quickly after disasters. Unfortunately, more than a year after Hurricane Maria, average internet speeds in Puerto Rico remained ten times slower than in the continental United States, hindering the island's economic recovery.⁵³⁸ Inadequate internet access makes it more difficult for households affected by disasters to obtain basic information about aid eligibility, application deadlines and procedures, and guidance on how to track and access status updates for federal disaster aid.

To accelerate broadband deployment, the FCC recently launched a \$20 billion Rural Digital Opportunity Fund.⁵³⁹ Additional broadband deployment programs exist at the federal, state, and local levels.⁵⁴⁰ To address affordability, the FCC requires telecommunications providers to contribute a fraction of their revenues to the Universal Service Fund, which subsidizes phone and broadband for low-income and rural households and supports education and rural telehealth, through programs such as Lifeline and E-Rate.⁵⁴¹ In response to the COVID-19 pandemic, the FCC launched the Keep Americans Connected Pledge, which encourages phone and broadband providers to voluntarily suspend service terminations and late fees for 60 days and to open mobile hotspots for those without a home-based broadband connection.⁵⁴² In addition, the Coronavirus Aid, Relief, and Economic Security (CARES) Act, which became law in March 2020, established a \$200 million FCC grant program to support access to broadband for telehealth services.⁵⁴³

Before the COVID-19 pandemic, members of Congress introduced legislation to expand broadband service. The Energy and Commerce Committee Democrats' LIFT America Act (H.R. 2741) would invest in deployment of broadband internet across the country.⁵⁴⁴ This provision of the LIFT America Act was included in Section 31301 of the House Democrats' infrastructure bill, the Moving Forward Act (H.R. 2), which would invest \$80 billion in broadband deployment. The LIFT America Act and Moving Forward Act would also provide \$5 billion in low-interest financing for broadband infrastructure projects.⁵⁴⁵ Rep. Grace Meng (D-NY) introduced the Closing the Homework Gap Through Mobile Hotspots Act (H.R. 5243), which would establish a grant program for deployment of mobile hotspots for schools, universities, tribes, and libraries, with priority given to institutions supporting low-income students. This grant program was incorporated into Section 31161 of the Moving Forward Act. Section 31202 of the Moving Forward Act would direct the FCC to establish broadband transparency rules that would

⁵³⁷ Kris Tremaine and Kyle Tuberson, "How the Internet of Things Can Prepare Cities for Natural Disasters," *Harvard Business Review*, December 1, 2017.

⁵³⁸ Nick Thieme, "After Hurricane Maria, Puerto Rico's Internet Problems Go from Bad to Worse," NOVA, PBS, October 23, 2018.

⁵³⁹ FCC, "FCC Launches \$20 Billion Rural Digital Opportunity Fund to Expand Rural Broadband Deployment," January 30, 2020, <https://docs.fcc.gov/public/attachments/DOC-362190A1.pdf>.

⁵⁴⁰ Congressional Research Service, *State Broadband Initiatives: Selected State and Local Approaches as Potential Models for Federal Initiatives to Address the Digital Divide* (April 6, 2020).

⁵⁴¹ FCC, "Universal Service Support Mechanisms," <https://www.fcc.gov/consumers/guides/universal-service-support-mechanisms>. Accessed June 2020.

⁵⁴² FCC, "Keep Americans Connected," <https://www.fcc.gov/keep-americans-connected>. Accessed June 2020.

⁵⁴³ Pub L No 116-136; FCC, "COVID-19 Telehealth Program," <https://www.fcc.gov/covid-19-telehealth-program>. Accessed June 2020.

⁵⁴⁴ LIFT America Act, Title I, Subtitle A. Broadband Internet Access Service Program.

⁵⁴⁵ LIFT America Act, Title I, Subtitle C. Broadband Infrastructure Finance and Innovation; Moving Forward Act, Division G, Title I, Subtitle C, Chapter 2. Broadband Infrastructure Finance and Innovation.

require service providers to collect data on the resilience of the broadband service network to disasters.

Recommendation: Congress should increase investments in FCC programs to expand urban and rural broadband infrastructure and assess system resilience toward the goal of achieving reliable and universal broadband access for all. Congress should also direct the FCC to prioritize broadband improvements for economically disadvantaged and underserved communities that are experiencing or are likely to experience disproportionate environmental and climate change impacts.

Recommendation: Congress should provide additional funding to programs that offer affordable broadband connection options and mobile hotspots for rural and low-income households, along with schools and health care providers. Congress should direct the FCC to mandate that telecommunications providers suspend service terminations and late fees during declared emergencies and for 60 days after disasters.

Recommendation: Congress should increase investment to expand broadband infrastructure and information technology in the territories to enable electric grid optimization, precision agriculture, telework, and telehealth.

Committee of Jurisdiction: Energy and Commerce

Plug Leaks and Cut Pollution from America's Oil and Gas Infrastructure

Methane accounted for about 10% of all U.S. greenhouse gas emissions from human activities in 2018; however, it is a potent greenhouse gas that is more effective than carbon dioxide at trapping heat in the atmosphere. EPA reports that natural gas and petroleum systems accounted for 28% of all anthropogenic methane emissions in 2018—the largest industrial source.⁵⁴⁶

Several recent studies have shown that EPA may be underestimating emissions from natural gas and petroleum systems. In 2018, scientists from the Environmental Defense Fund, University of Texas, and other institutions found that methane emissions from the U.S. oil and natural gas supply chain were about 60% higher than EPA estimate.⁵⁴⁷ Scientists from the University of Michigan measured methane emissions in six major East Coast cities and found that fugitive methane emissions from aging natural gas infrastructure are more than double the levels reported by EPA.⁵⁴⁸ Two separate studies found that oil and gas operations in the Permian Basin in Texas and New Mexico are releasing more than 3.5% of

⁵⁴⁶ U.S. Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2018* (April 2020).

⁵⁴⁷ Ramón A. Alvarez, Daniel Zavala-Araiza, et al, “Assessment of methane emissions from the U.S. oil and gas supply chain,” *Science* 361 (6398), July 2018: 186-188.

⁵⁴⁸ Genevieve Plant et al, “Large Fugitive Methane Emissions from Urban Centers Along the U.S. East Coast,” *Geophysical Research Letters* 46 (14), July 2019.

the natural gas they extract as methane pollution, double the average rate found in other basins in the United States.⁵⁴⁹

This section outlines policy recommendations to cut methane pollution from the oil and gas sector as well as reduce air and water pollution from the sector's drilling and waste disposal operations. The section of the report titled "Make Public Lands and Waters Part of the Climate Solution" includes more recommendations about protecting wild and scenic places from oil and gas drilling and ending unfair subsidies for companies drilling or mining on America's public lands.

Cut Methane Pollution from Oil and Gas Production

Building Block: Reinstate the EPA New Source Performance Standards for Oil and Gas Operations and the Bureau of Land Management's Methane and Waste Prevention Rule

The Obama administration's EPA finalized new source performance standards (NSPS) for the oil and gas sector in June 2016, expanding and strengthening standards set in 2012.⁵⁵⁰ The 2016 NSPS rule set pollution limits for methane from oil and gas production operations and required owners/operators to find and repair methane leaks at well sites and compressor stations. In that same year, the Obama administration's Bureau of Land Management (BLM) issued rules to reduce waste of natural gas from venting, flaring, and leaks during oil and gas production on onshore federal and tribal lands.⁵⁵¹

The Trump administration gutted the BLM methane waste rules in September 2018.⁵⁵² In September 2019, the Trump EPA proposed a rule to exempt natural gas transmission and storage from the EPA new source standards altogether and eliminate methane standards for the remaining oil and gas sources covered by the rules, or, as an alternative, eliminate methane standards for the oil and gas supply sector.⁵⁵³

In May 2019, Rep. Diana DeGette (D-CO), Rep. Ben Ray Luján (D-NM), and Chairman Raúl Grijalva (D-AZ) introduced the Methane Waste Prevention Act (H.R. 2711) to implement the EPA's NSPS rule, as finalized, and reinstate and enhance the BLM methane waste rule. The bill would require oil and gas producers to capture 99% of the natural gas produced on public lands within five years of enactment. The bill also would ban methane venting on public lands and prohibit methane flaring at new wells.

⁵⁴⁹ Yuzhong Zhang et al, "Quantifying methane emissions from the largest oil-producing basin in the United States from space," *Science Advances* 6 (17), April 2020; Environmental Defense Fund, "However you measure it, Permian oil and gas operations have highest emissions ever measured in a U.S. oilfield," May 11, 2020, <http://blogs.edf.org/energyexchange/2020/05/11/however-you-measure-it-permian-oil-and-gas-operations-have-highest-emissions-ever-measured-in-a-u-s-oilfield>.

⁵⁵⁰ U.S. Environmental Protection Agency, "Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources; Final Rule," 81 Fed. Reg. 35824 (June 3, 2016); U.S. Environmental Protection Agency, "Oil and Natural Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants Reviews; Final Rule," 77 Fed. Reg. 49490 (Aug. 16, 2012).

⁵⁵¹ U.S. Department of the Interior, Bureau of Land Management, "Waste Prevention, Production Subject to Royalties, and Resource Conservation; Final Rule," 81 Fed. Reg. 83008 (November 18, 2016).

⁵⁵² U.S. Department of the Interior, Bureau of Land Management, "Waste Prevention, Production Subject to Royalties, and Resource Conservation; Rescission or Revision of Certain Requirements," 83 Fed. Reg. 49184 (September 28, 2018).

⁵⁵³ U.S. Environmental Protection Agency, "Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources Review; Proposed Rule," 84 Fed. Reg. 50244 (September 24, 2019).

Recommendation: Congress should reinstate the EPA's NSPS rule, as finalized in 2016, and the BLM methane waste rules.

Committees of Jurisdiction: Energy and Commerce; Natural Resources

Building Block: Set Ambitious National Goals for Reducing Methane Emissions from the Oil and Gas Sector and Direct EPA and BLM to Issue New Rules to Achieve those Goals

In 2015, the Obama administration announced a goal of cutting methane emissions from the oil and gas sector by 40% to 45% from 2012 levels by 2025.⁵⁵⁴ Since that time, the science on the need to cut methane and other potent greenhouse gases has become even stronger. The IPCC has identified deep reductions in methane pollution as essential for limiting global warming to 1.5°C with no or limited overshoot.⁵⁵⁵ In addition, methane leak detection technology has continued to improve as oil and gas operations have expanded.

Achieving these reductions or a more ambitious goal will require action beyond reinstating the 2016 Obama administration rules. The EPA's NSPS is limited in that it only covers new sources of pollution in the oil and gas sector, not sources that were already in existence at the time the rule was finalized, and additional reductions from new sources are necessary and achievable. The BLM also has the potential to achieve greater methane pollution and waste reductions on public lands than envisioned by the Obama-era rule.

Recommendation: Congress should pass legislation establishing a national methane pollution reduction goal for the oil and gas sector of 65% to 70% by 2025 and 90% by 2030, relative to 2012 levels,⁵⁵⁶ and directing EPA and BLM to conduct rulemakings to achieve those reductions from new and existing oil and gas operations. The rules should require active monitoring for methane leaks throughout the system and, at minimum, cover methane emissions from oil and gas production, including new and existing offshore petroleum and natural gas production facilities; gathering and boosting; processing; transmission and distribution; storage; and equipment that handles liquefied natural gas (LNG). The rules should provide a clear pathway and criteria for EPA and BLM to recognize and approve the use of new advanced leak detection techniques upon their development. The legislation should set a clear and urgent timeline for promulgation and implementation of the rules.

Committees of Jurisdiction: Energy and Commerce; Natural Resources

Building Block: Set Limits on Routine Flaring of Associated Natural Gas at Oil Wells

Oil drilling often produces natural gas as a by-product at the wellhead. Oil companies have a few options: they can vent it, which directly releases methane into the air and raises safety issues; they

⁵⁵⁴ The White House, "Fact Sheet: Administration Takes Steps Forward on Climate Action Plan by Announcing Actions to Cut Methane Emissions," January 14, 2015. Available at <https://obamawhitehouse.archives.gov/the-press-office/2015/01/14/fact-sheet-administration-takes-steps-forward-climate-action-plan-anno-1>.

⁵⁵⁵ Intergovernmental Panel on Climate Change, *Special Report on Global Warming of 1.5°C* (October 2018).

⁵⁵⁶ For analysis of how to achieve these targets, see Clean Air Task Force, *Reducing Methane from Oil and Gas A Path to a 65% Reduction in Sector Emissions* (April 2020), https://www.catf.us/wp-content/uploads/2020/04/Path_to_65pc_OG_reduction-April2020_final.pdf.

can capture the gas and reinject it, use it, or transport it to market through a pipeline or other means; or they can flare it, which averts methane pollution but releases carbon dioxide and other harmful air pollutants. The boom in U.S. oil production from shale formations has caused flaring to skyrocket in the United States, particularly in North Dakota and Texas. Gas flaring increased in the United States by 48% from 2017 to 2018.⁵⁵⁷ Natural gas prices have remained low, dampening market incentives to invest in the infrastructure needed to use or sell the gas rather than burn it as a waste product.

The World Bank launched the Zero Routine Flaring by 2030 initiative to build international cooperation around the goal of eliminating “routine flaring” no later than 2030. Routine flaring, as opposed to flaring for safety purposes, is “flaring during normal oil production operations in the absence of sufficient facilities or amenable geology to re-inject the produced gas, utilize it on-site, or dispatch it to a market.”⁵⁵⁸

Recommendation: Congress should direct the EPA and BLM to require operators to use, sell, or re-inject an increasing percentage of routinely flared gas at oil wells, achieving 100% by the earliest date practicable but no later than 2030. The EPA and BLM should set an interim target as well that achieves substantial reductions in routine flaring by 2025 to drive technological development and deployment.

Committees of Jurisdiction: Energy and Commerce; Natural Resources

Building Block: Require the EPA to Expand Air Quality Monitoring to Communities with Significant Oil and Gas Development

Oil and gas drilling operations are a significant local source of volatile organic compounds, hazardous air pollutants, and ozone-forming emissions. Communities that live downwind of these operations bear the brunt of this pollution, including low-income, tribal, and Indigenous communities, but many areas with extensive oil and gas development have few or no air quality monitors to detect and quantify the problem. For example, the Permian Basin, which spans almost 64,000 square miles, has only one air monitoring station measuring levels of sulfur dioxide, a major flaring-related pollutant.⁵⁵⁹

Recommendation: Congress should direct EPA to require states to conduct air quality monitoring for criteria⁵⁶⁰ and hazardous air pollutants in areas with significant oil and gas development and should ensure that this information is made available to the affected communities. Congress should authorize and appropriate the funds necessary to expand monitoring into new locations.

Committee of Jurisdiction: Energy and Commerce

⁵⁵⁷ The World Bank, “Increased Shale Oil Production and Political Conflict Contribute to Increase in Global Gas Flaring,” June 12, 2019, available at <https://www.worldbank.org/en/news/press-release/2019/06/12/increased-shale-oil-production-and-political-conflict-contribute-to-increase-in-global-gas-flaring.print>.

⁵⁵⁸ The World Bank, “Zero Routine Flaring by 2030,” <https://www.worldbank.org/en/programs/zero-routine-flaring-by-2030>. Accessed June 2020.

⁵⁵⁹ Environmental Integrity Project, *Sour Wind in West Texas* (May 2019).

⁵⁶⁰ Criteria air pollutants include those for which the EPA has set National Ambient Air Quality Standards: carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, and sulfur dioxide.

Eliminate Methane Leaks from Existing Natural Gas Pipelines

The natural gas supply chain includes more than two million miles of transmission and distribution pipelines.⁵⁶¹ Gathering pipelines carry natural gas from producing wells to centralized processing facilities prior to transmission. Transmission pipelines take natural gas from the producers and processors directly to power plants, industrial consumers, or to city gates, where natural gas distributors take over.

In the last two decades, there have been thousands of reportable safety incidents involving natural gas transmission pipelines, including accidental releases leading to explosions and fires.⁵⁶² In addition to these serious accidents, persistent leaky pipes and routine venting in natural gas transmission and storage release 1.3 million metric tons of methane each year.⁵⁶³

The elimination of methane leaks from the natural gas sector as we transition to clean energy would have a climate benefit, but it would also provide economic benefits. Compliance with methane emissions regulations to reduce methane leaks from oil and gas gathering, processing, and transmission facilities could create more than 50,000 jobs in 10 years.⁵⁶⁴ More broadly, repairing distribution pipelines to eliminate all leaks could lead to more than 300,000 family-sustaining jobs and avoid 81 million metric tons of emissions. Eliminating these gas losses could also save consumers \$1.5 billion.⁵⁶⁵

Building Block: Eliminate Methane Leaks from Natural Gas Transmission Lines

Current federal pipeline safety regulations require operators of natural gas transmission pipelines to conduct annual patrols and leakage surveys with leak detector equipment, with more frequent inspection requirements in higher-density population areas.⁵⁶⁶ Pipeline operators must repair the most dangerous problems immediately, but the rest may be repaired when feasible.⁵⁶⁷ As implemented, current regulations do not adequately address smaller, chronic methane leaks that add up to a significant climate problem.

Chairman Bobby Rush (D-IL) and Chairman Peter DeFazio (D-OR) introduced the Safe, Accountable, Fair, and Environmentally Responsible (SAFER) Pipelines Act of 2019 (H.R. 3432/H.R. 5120), which would take a comprehensive approach to enhance the safety of and reduce emissions from natural gas and hazardous liquid pipelines. The bill would require natural gas pipeline operators to use advanced leak detection systems. Operators of natural gas and hazardous liquid transmission pipelines in high-consequence areas must repair cracks and install automatic or remote shutoff

⁵⁶¹ Pipeline and Hazardous Materials Safety Administration, “Annual Report Mileage Summary Statistics,” June 28, 2017, <https://www.phmsa.dot.gov/data-and-statistics/pipeline/annual-report-mileage-summary-statistics>. Accessed June 2020.

⁵⁶² Pipeline and Hazardous Materials Safety Administration, “Pipeline Incident 20 Year Trends,” <https://www.phmsa.dot.gov/data-and-statistics/pipeline/pipeline-incident-20-year-trends>. Accessed June 2020.

⁵⁶³ U.S. Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2017* (April 2019).

⁵⁶⁴ Jim Barrett et al, *Plugging the Leaks: Protecting Workers, Reducing Pollution, and Creating Quality Jobs by Reducing Methane Waste in the U.S. Oil and Gas Industry* (BlueGreen Alliance, 2016).

⁵⁶⁵ BlueGreen Alliance, “Clean Infrastructure: Natural Gas Distribution Infrastructure,” <https://www.bluegreenalliance.org/work-issue/natural-gas-infrastructure/>. Accessed June 2020.

⁵⁶⁶ 49 U.S.C. § 60109; 49 C.F.R. Part 192.

⁵⁶⁷ 49 C.F.R. § 192.711.

valves. The SAFER Pipelines Act would also require natural gas pipeline operators to immediately repair pipelines after any gas leakage of or exceeding 300,000 cubic feet. Natural gas pipeline operators must use best available technology to capture gas released during routine operations or maintenance, such as venting to relieve pressure, blowdowns, and emergency procedures. The bill would require regulation of all natural gas gathering lines in populated areas and natural gas gathering lines of at least eight inches in rural areas. In addition, the bill would increase penalties for violations of safety laws and regulations.

Sen. Tom Udall (D-NM) introduced the Methane Emissions from Transmission Harm American Neighborhoods and the Environment (METHANE) Act (S. 2469), which would require natural gas pipeline operators to use advanced leak detection technology to the maximum extent practicable. Advanced leak detection technology includes vehicle- or aircraft-mounted high-sensitivity methane detectors (including drones) using global positioning system (GPS) technology. Pipeline operators would have to develop a replacement or repair program for pipelines known to be leaky based on their operating history or design, age, and material. They also would have to report on any unintentional gas leak of or exceeding 50,000 cubic feet. The bill would require pipeline operators to use best available technology to capture natural gas when making repairs.

Recommendation: Congress should pass legislation to require natural gas pipeline operators to install and use advanced leak detection technology on all gas pipelines.

Recommendation: Congress should require natural gas pipeline operators to use the best available technology to capture gas released during routine operations and maintenance.

Recommendation: Congress should establish deadlines for pipeline operators to install automatic or remote-controlled shutoff valves in all areas and implement a leak detection and repair program. Natural gas gathering lines in populated areas and gathering lines of at least eight inches in rural areas should be subject to leak detection and repair requirements.

Recommendation: Congress should require natural gas pipeline operators to report and immediately repair any large loss event, such as a gas leak of or exceeding 50,000 cubic feet.

Recommendation: Congress should increase civil penalties for violations of federal safety laws and regulations.

Committees of Jurisdiction: Energy and Commerce; Transportation and Infrastructure

Building Block: Provide Funding to Eliminate Methane Leaks from Natural Gas Distribution Lines Within 10 Years

Aging natural gas distribution infrastructure leads to undetected greenhouse gas emissions and in some cases safety issues and even fatalities. Addressing this environmental and public safety challenge also is an economic opportunity: repairing 100,000 miles of leak-prone natural gas distribution pipelines could create as many as 300,000 good-paying jobs.⁵⁶⁸

⁵⁶⁸ BlueGreen Alliance, “Clean Infrastructure: Natural Gas Distribution Infrastructure,” <https://www.bluegreenalliance.org/work-issue/natural-gas-infrastructure/>. Accessed June 2020.

The DOT establishes minimum safety standards for these pipelines, which are administered and enforced by state partners. However, states generally have jurisdiction over the economic regulation of natural gas distribution infrastructure, which delivers the gas from the city gate to retail customers.

The Energy and Commerce Committee's LIFT America Act (H.R. 2741) would create a DOE grant program for states to incentivize leak detection, repair, and replacement of natural gas distribution pipelines and to offset any increased costs for low-income ratepayers. The House Democrats included this program in Section 33121 of their infrastructure bill, the Moving Forward Act (H.R. 2). Similarly, Rep. Mikie Sherrill (D-NJ) introduced H.R. 5542, which is a stand-alone bill to accomplish this goal. Use of the funds would require compliance with prevailing wage requirements. The bill would authorize funding for 10 years.

A broader challenge to encouraging leak detection, repair, and replacement is that most states allow natural gas utilities to pass on the cost of lost gas to ratepayers, which would counteract the incentive provided by grant funding.

Recommendation: Congress should establish a program at DOE to provide funding for states to create incentives for leak detection, repair, and replacement of leak-prone natural gas distribution pipelines and to offset increased costs for low-income ratepayers. The goal should be to eliminate leaks from pipelines within 10 years. Before allocating federal funds, states should identify the communities most in need of gas infrastructure upgrades, including low-income communities with high energy cost burdens, and distribute funds according to those needs. Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Committee of Jurisdiction: Energy and Commerce

Ensure That Natural Gas Pipelines Do Not Harm the Climate, the Environment, and Communities

In recent years, public concerns about the federal process to approve new natural gas infrastructure have grown. The FERC recently announced that it would reorganize the Office of the General Counsel to address some of these concerns.⁵⁶⁹ The context of the climate crisis, however, requires a more comprehensive strategy. Smart climate policy must invest in low-carbon infrastructure but also benefit communities and workers. The section of the report titled "Invest in America's Workers and Build a Fairer Economy" outlines recommendations to ensure the transition to a cleaner energy economy occurs on a foundation of equity and fairness for workers and their families.

⁵⁶⁹ Federal Energy Regulatory Commission, "FERC Chairman Reorganizes OGC to Speed Landowner Rehearing Process," <https://www.ferc.gov/media/news-releases/2020/2020-1/01-31-20.asp#.Xk1i4ShKiUk>. Accessed June 2020.

Building Block: Require FERC to Consider the Climate Crisis and Other Impacts When Reviewing Pipeline Applications

FERC reviews applications for construction of new interstate natural gas pipelines under the authority of Section 7 of the Natural Gas Act. FERC may approve a pipeline only if the agency finds that the proposed facility is or will be required by the present or future public convenience and necessity.⁵⁷⁰ This is a broad standard, which courts have held includes consideration of environmental impacts, but some FERC commissioners have interpreted these considerations narrowly.⁵⁷¹

FERC conducts an extremely narrow market analysis to determine “necessity” and has held that contracts between two corporate affiliates can constitute necessity.⁵⁷² This short-term perspective does not consider whether long-term declines in natural gas demand, perhaps as the result of climate policy, could render it a stranded asset. In addition, FERC currently does not evaluate whether existing or simultaneously proposed infrastructure in a region is sufficient to meet demand for natural gas, which could lead to the buildup of duplicative natural gas infrastructure. A recent investigation led by the House Committee on Oversight and Reform, Subcommittee on Civil Rights and Civil Liberties, concluded that over the last 20 years, FERC approved 1,021 applications, rejecting no more than six, which is an approval rate of more than 99% and could be viewed as “rubber-stamping.”⁵⁷³

FERC Commissioner Richard Glick has argued that the Natural Gas Act’s public convenience and necessity test requires consideration of the climate crisis. By ignoring it, Commissioner Glick contends that the “Commission has fallen short of its statutory obligations to consider the impact of its actions on climate change.”⁵⁷⁴

Moreover, courts have held that NEPA requires FERC to consider downstream greenhouse gas emissions as “reasonably foreseeable” indirect effects of a natural gas pipeline.⁵⁷⁵ FERC, however, has responded by limiting the application of the precedent to the facts of the *Sabal Trail* case where the plants burning the natural gas were specifically identified.⁵⁷⁶ FERC often emphasizes the challenges inherent in determining the significance of any particular greenhouse gas emissions.⁵⁷⁷ The environmental impacts identified pursuant to a NEPA review, including a project’s effect on the climate crisis, are relevant to determining whether a project is required by the public convenience and necessity test. Accordingly, FERC’s reticence to robustly analyze a project’s environmental impacts under NEPA also impedes FERC’s ability to conduct a sufficient analysis under the Natural Gas Act.

⁵⁷⁰ Natural Gas Act, 15 U.S.C. § 717f(e).

⁵⁷¹ Romany Webb, *Climate Change, FERC, and Natural Gas Pipelines: The Legal Basis for Considering Greenhouse Gas Emissions Under Section 7 of the Natural Gas Act* (Sabin Center for Climate Change Law, Columbia Law School, 2019); Rich Glick and Matthew Christiansen, “FERC and Climate Change,” *Energy Law Journal* 40, no. 1 (2019).

⁵⁷² See, e.g., 163 FERC ¶ 61,159, Commissioner Richard Glick Concurrence Regarding PennEast Pipeline Company, LLC (May 30, 2018).

⁵⁷³ Office of Rep. Jamie Raskin, “Rep. Raskin Releases Preliminary Findings Showing FERC Pipeline Approval Process Skewed Against Landowners,” April 28, 2020, <https://raskin.house.gov/media/press-releases/rep-raskin-releases-preliminary-findings-showing-ferc-pipeline-approval-process>.

⁵⁷⁴ Rich Glick and Matthew Christiansen, “FERC and Climate Change,” *Energy Law Journal* 40, no. 1 (2019).

⁵⁷⁵ *Sierra Club v. FERC*, 867 F.3d 1357, 1371 (D.C. Cir. 2017).

⁵⁷⁶ *Ibid.*

⁵⁷⁷ 169 FERC ¶ 61,131, Commissioner Richard Glick Dissent Regarding Rio Grande LNG, LLC (Nov. 21, 2019).

FERC's analysis of impacts on communities and landowners should also be improved. FERC currently reviews these issues under NEPA. Experts have highlighted that FERC's reliance on census tract data in rural areas in some cases leads to undercounting environmental justice communities, because rural census tracts are larger and include communities with varying levels of wealth, which affects the calculation of averages.⁵⁷⁸ In some cases, FERC also considers "minorities" as a general category, which may cause FERC to overlook the impact of proposed projects on smaller communities near proposed projects, such as American Indians.⁵⁷⁹

Section 215 of the Energy and Commerce Committee's discussion draft of the CLEAN Future Act clarifies that FERC must consider climate change in Section 7 decision-making.⁵⁸⁰ Specifically, it would amend Section 7 to require FERC to ensure that the potential benefits of new infrastructure outweigh any adverse effects. It also requires FERC to consider the climate policies of affected states, regional infrastructure need determinations, all environmental impacts identified pursuant to NEPA, including any direct, indirect, and cumulative impacts on climate change, and community and landowner impacts.

Recommendation: Existing law gives FERC the authority to consider the climate crisis in its analysis of public necessity and convenience. To ensure that FERC follows congressional intent, Congress should amend the Natural Gas Act to require FERC to consider all factors relevant to the public convenience and necessity, including upstream and downstream greenhouse gas emissions, community and landowner impacts, and market necessity on a long-term and regional basis.

Committee of Jurisdiction: Energy and Commerce

Building Block: Ensure Landowners Receive Notice That Pipeline Developers Might Take Their Land

The Natural Gas Act requires that landowners receive notice of any application to build a natural gas pipeline on their land.⁵⁸¹ FERC delegates the obligation to provide notice to the developer but does not review or approve the content of the notice or the method of providing notice, or require that the notice include clear and consistent instructions on how landowners must intervene in a FERC proceeding to preserve their rights to challenge a FERC decision.

As a result, the window for landowner intervention, which varies but has been as short as 13 days, often closes before the landowner is aware of the proceeding or understands what steps they must take to intervene. This is critical because only intervenors can appeal Certificates of Public Convenience and Necessity granted by FERC. Because Certificates of Public Convenience and Necessity are also treated as a proxy for the "public use" finding for eminent domain actions, landowners who fail to intervene in a FERC proceeding also lose the opportunity to substantively

⁵⁷⁸ Montina Cole, "Pipeline Case Brief: FERC Enables Environmental Injustice," Natural Resources Defense Council, April 2019, <https://www.nrdc.org/experts/montina-cole/pipeline-case-brief-erc-enables-environmental-injustice>. Accessed June 2020.

⁵⁷⁹ Ibid.

⁵⁸⁰ Title II, Section 215, CLEAN Future Act discussion draft.

⁵⁸¹ Natural Gas Act, 15 U.S.C. § 717f(d).

challenge a taking in court. In addition, when pipelines are re-routed, additional landowners may be affected without having received actual notice.

Similarly, the statute requires that landowners receive notice of the granting of a Certificate of Public Convenience and Necessity,⁵⁸² but many of the same notice problems apply here as well. Often, landowners are not aware of deadlines to file a request for a rehearing in order to preserve their rights.

Recommendation: Congress should amend the Natural Gas Act to require FERC to ensure that landowners in the broader geographic vicinity of a proposed pipeline receive actual notice of applications for Certificates of Public Convenience and Necessity. FERC should review and approve the proposed content and method of providing notice. Notices should provide clear instructions on how to intervene and the consequences of a failure to intervene. The minimum time allowed for initial intervention should be standardized.

Recommendation: Congress should amend the Natural Gas Act to require subsequent notice of any issuance of a Certificate of Public Convenience and Necessity that explains the process of judicial review.

Committee of Jurisdiction: Energy and Commerce

Building Block: Give Landowners a Fair Chance to Challenge Pipeline Approvals in Court

Under the Natural Gas Act, a landowner or other party to a FERC proceeding must apply for a rehearing within 30 days of a FERC order allowing a pipeline to move forward.⁵⁸³ If FERC does not act upon the application for a rehearing within 30 days, it is deemed denied, which opens the door for those who sought rehearing to challenge the FERC order in a federal court of appeals.⁵⁸⁴ The Federal Power Act contains an identical set of rehearing provisions relating to FERC actions under that statute, such as approvals to site LNG terminals.⁵⁸⁵

FERC practice is to routinely issue an order “tolling” or pausing the date for issuing a final, appealable decision on a request for rehearing (“tolling order”).⁵⁸⁶ In fact, a recent investigation led by the House Committee on Oversight and Reform, Subcommittee on Civil Rights and Civil Liberties concluded that over the last 12 years, FERC issued tolling orders to every landowner requesting rehearing and later denied every request.⁵⁸⁷ Through a tolling order, FERC provides itself with unlimited additional time but keeps the landowner in a holding pattern. Meanwhile, the pipeline developer may continue to pursue eminent domain and construction may begin.⁵⁸⁸ The House investigation concluded that FERC

⁵⁸² Natural Gas Act, 15 U.S.C. § 717f.

⁵⁸³ Natural Gas Act, 15 U.S.C. § 717r(a).

⁵⁸⁴ Natural Gas Act, 15 U.S.C. § 717r(b).

⁵⁸⁵ Federal Power Act, 16 U.S.C. § 825l(a)–(b).

⁵⁸⁶ Office of Rep. Jamie Raskin, “Rep. Raskin Releases Preliminary Findings Showing FERC Pipeline Approval Process Skewed Against Landowners,” April 28, 2020, <https://raskin.house.gov/media/press-releases/rep-raskin-releases-preliminary-findings-showing-ferc-pipeline-approval-process>.

⁵⁸⁷ Ibid.

⁵⁸⁸ Natural Gas Act, 15 U.S.C. § 717f(h).

approved construction in 64% of all cases in the last 12 years where there was a pending request for rehearing.⁵⁸⁹

The Court of Appeals for the District of Columbia Circuit recently described this practice as “Kafkaesque.”⁵⁹⁰ It also frustrates the intent of Congress, which, as expressed in the Natural Gas Act and the Federal Power Act, is to allow parties a timely process to challenge agency decisions.

This process is particularly damaging for landowners whose property is taken through condemnation as the FERC certificate is the basis for the “public use” finding for eminent domain. Accordingly, in order to substantively challenge a taking, a landowner must be able to appeal the FERC certificate in a timely manner.

In June 2020, FERC issued an instant final rule to limit construction until the Commission acts on a request for a rehearing, but the final rule does not prevent the exercise of the right of eminent domain.⁵⁹¹

Rep. Tom Malinowski (D-NJ) introduced the Landowners’ Right to Due Process in Rehearings at FERC Act of 2020 (H.R. 6982), which would require FERC to reach a decision on a rehearing request within 90 days and would prevent the exercise of the right of eminent domain before a final decision is issued. Similarly, Rep. Sean Casten (D-IL) introduced the Right to Timely Rehearings at FERC Act of 2020 (H.R. 6963), which would establish a 120-day deadline for rehearing requests.

Recommendation: Congress should amend the Natural Gas Act and the Federal Power Act to allow FERC 60 days to act upon an application for a rehearing and issue a final agency action subject to judicial review. Congress should amend the Natural Gas Act to preclude pipeline developers from exercising the right of eminent domain or beginning construction, tree felling, and other ground disturbance until the 60-day time period has elapsed. Congress should clarify in the statute that if FERC does not issue a final agency action subject to judicial review within 60 days, the application will be deemed denied and will be treated as a final agency action subject to judicial review.

Committee of Jurisdiction: Energy and Commerce

Building Block: Require Pipeline Developers to Obtain All Permits Before Seizing Land and Starting Construction

Once FERC has determined that a proposed pipeline is or will be required by current or future public convenience or necessity, FERC will issue a Certificate of Public Convenience and Necessity to the

⁵⁸⁹ Office of Rep. Jamie Raskin, “Rep. Raskin Releases Preliminary Findings Showing FERC Pipeline Approval Process Skewed Against Landowners,” April 28, 2020.

⁵⁹⁰ *Allegheny Defense Project, et al. v. FERC*, No. 17-1098 (August 2, 2019).

⁵⁹¹ Federal Energy Regulatory Commission, “Commissioner Richard Glick Concurrence in Part and Dissent in Part Regarding Allegheny Defense Project Final Rule,” (June 9, 2020) <https://ferc.gov/news-events/news/commissioner-richard-glick-concurrence-part-and-dissent-part-regarding-allegheny>. Accessed June 2020.

developer.⁵⁹² The certificate holder may initiate eminent domain proceedings to acquire rights-of-way from landowners.⁵⁹³

FERC often issues conditional certificates while applicants wait for other federally required authorizations and permits, such as under the Clean Air Act or the Clean Water Act.⁵⁹⁴ Pipeline developers may continue to seek the right to exercise eminent domain under conditional certificates.

FERC policy also allows the developer to move forward with some activities while it waits for the federally required authorizations. Many “construction activities” are not authorized at this point in the process, but FERC defines construction narrowly so that even permanent alteration of land by felling trees may take place before the developer has obtained all required permits and the right to exercise eminent domain.⁵⁹⁵ There have been cases where pipeline developers cut down trees on the property of unwilling landowners and the developers’ applications for required permits were ultimately denied.⁵⁹⁶

Rep. Tom Malinowski (D-NJ) introduced the Fairness for Landowners Facing Eminent Domain Act (H.R. 5454), which would require pipeline developers to obtain all necessary federal and state permits prior to exercising the right of eminent domain. In cases where a pipeline developer requests a material amendment to their existing certificate, such as for a route change, the bill would also require pipeline developers to obtain all necessary federal and state permits before they can exercise the right of eminent domain. This provision was also included in the Energy and Commerce Committee’s discussion draft of the CLEAN Future Act.⁵⁹⁷

Recommendation: Congress should amend the Natural Gas Act to preclude pipeline developers from exercising the right of eminent domain, tree felling, or other ground disturbance until they receive all necessary federal and state permits.

Recommendation: Congress should amend the Natural Gas Act to require that if a pipeline developer requests a material amendment to their existing certificate, they should obtain all necessary federal and state permits prior to exercising the right of eminent domain.

Committee of Jurisdiction: Energy and Commerce

Building Block: Establish the Office of Public Participation and Consumer Advocacy at FERC

In 1978, Congress authorized the Office of Public Participation and Consumer Advocacy at FERC, but this office has never been created or funded. This vulnerability presents a challenge to the transition

⁵⁹² Natural Gas Act, 15 U.S.C. § 717f.

⁵⁹³ Natural Gas Act, 15 U.S.C. § 717f(h).

⁵⁹⁴ 149 FERC ¶ 61,199 (Dec. 2, 2014) (“Order Issuing Certificates and Approving Abandonment”); 164 FERC ¶ 61,029 (Jul. 19, 2018) (“Order Denying Rehearing”); *Del. Riverkeeper Network v. FERC*, 857 F.3d 388, 399 (D.C. Cir. 2017).

⁵⁹⁵ Letter from Terry Turpin, Director, Division of Gas – Environment and Engineering, FERC to Lynda Schubring, Environmental Project Manager, Construction Pipeline Company, LLC, Docket No. CP13-499-000 (Jan. 29, 2016).

⁵⁹⁶ Jon Hurdle, “New York State denies permit to Constitution Pipeline, halting construction,” *State Impact Pennsylvania - NPR*, April 22, 2016; Jon Hurdle, “Maple syrup trees cut to make way for the Constitution Pipeline,” *State Impact Pennsylvania - NPR*, March 2, 2016.

⁵⁹⁷ Title II, Section 216, CLEAN Future Act discussion draft.

to a clean energy economy by eroding public trust in the regulation of energy infrastructure development. If established, this office could afford the public greater opportunities to participate in the siting and regulation of energy infrastructure, consistent with the recommendations of this report. Elsewhere, this report describes how this office could help improve the governance and transparency of wholesale power markets.

Rep. Jan D. Schakowsky (D-IL) introduced the Public Engagement at FERC Act (H.R. 3240), which would establish an Office of Public Participation and Consumer Advocacy at FERC and authorize it to intervene in most proceedings before FERC on behalf of energy customers. The bill would also provide community and public interest groups with funding to intervene in FERC proceedings to site natural gas infrastructure to ensure consideration of their concerns. The Energy and Commerce Committee's discussion draft of the CLEAN Future Act includes this bill.⁵⁹⁸

Recommendation: Congress should reauthorize the Office of Public Participation and Consumer Advocacy at FERC to review and resolve barriers to public participation, and to provide intervenor funding before FERC and organizations with FERC-delegated authority.

Committee of Jurisdiction: Energy and Commerce

Building Block: Reform FERC's Governance Structure to Facilitate Climate Action

Under current law, no more than three of the five FERC Commissioners may be from the same political party, because Congress did not intend for FERC to be a partisan agency.⁵⁹⁹ However, it is possible for an administration to game the system by failing to nominate Commissioners from the opposing party when there is a vacancy.⁶⁰⁰ These political abuses make it harder to fight the climate crisis, because the expertise of FERC Commissioners is needed to guide the transition of the country's energy infrastructure in line with emissions reductions goals.

Similarly, the recusal process for FERC Commissioners is opaque and vulnerable to abuse. FERC Commissioners could strategically recuse themselves to deny a quorum, in which case some filings would be deemed approved without Commissioners taking action.⁶⁰¹ This vulnerability presents a challenge to the transition to a clean energy economy by eroding public trust in the regulation of energy infrastructure development.

Recommendation: Congress should amend the quorum requirements in the Federal Power Act to clarify that if there are only four FERC Commissioners, no more than two may be from the same political party. If there are only three FERC Commissioners, they will constitute a quorum for no more than 180 days from the vacancy and only if no more than two are from the same political party.

⁵⁹⁸ Title II, Section 214, CLEAN Future Act discussion draft.

⁵⁹⁹ 16 U.S.C. § 792.

⁶⁰⁰ Iulia Gheorghiu, "Sen. Manchin 'fighting' for White House nomination of Democratic FERC candidate," Utility Dive, November 6, 2019.

⁶⁰¹ Robert Walton, "Shorthanded FERC allows New England capacity market auction results to stand," Utility Dive, October 1, 2019.

Recommendation: Congress should require FERC Commissioners to outline the basis for any recusal in the docket record.

Committee of Jurisdiction: Energy and Commerce

Curb Air and Water Pollution and Safely Dispose of Hazardous Waste From the Oil and Gas Industry

Building Block: Eliminate Exemptions for the Oil and Gas Industry in Cornerstone Environmental Laws

The oil and gas industry enjoys key exemptions from the nation's bedrock environmental laws. Several members of Congress have introduced legislation to remove them.

The Clean Water Act provides that EPA cannot require a permit for discharges of stormwater runoff from construction and industrial activities associated with oil and gas exploration, production, processing or treatment operations, or transmission facilities.⁶⁰² Rep. Matt Cartwright (D-PA) introduced H.R. 4007, the Focused Reduction of Effluence and Stormwater runoff through Hydrofracking Environmental Regulation (FRESHER) Act of 2019, to close this loophole and require oil and gas companies to obtain a stormwater runoff permit for construction and operations.

Oil and gas wastes are exempt from the Resource Conservation and Recovery Act's hazardous waste disposal regulations. Rep. Matt Cartwright (D-PA) introduced H.R. 4006, the Closing Loopholes and Ending Arbitrary and Needless Evasion of Regulations (CLEANER) Act of 2019, to close this loophole to ensure safe disposal of produced water, drilling fluids and cuttings, pit sludges, and other waste associated with constructing and producing a well.

Oil and gas companies also received special treatment under the Clean Air Act, which requires major sources of hazardous air pollution, including clustered facilities with high aggregate pollution, to install advanced pollution controls. The statute, however, prevents the agency from aggregating the pollution from oil and gas wells and treating them as a major source, even if they are close together and operated by the same company.⁶⁰³ Rep. Yvette Clarke (D-NY) introduced H.R. 585, the Bringing Reductions to Energy's Airborne Toxic Health Effects (BREATHE) Act, to close this loophole.

Rep. Jan Schakowsky (D-IL) introduced H.R. 3604, the Safe Hydration is an American Right in Energy Development (SHARED) Act of 2019, which would require testing of drinking water sources near oil and gas operations. The Energy and Commerce Committee Democrats included the CLEANER Act, BREATHE Act, and SHARED Act in the discussion draft of the CLEAN Future Act.⁶⁰⁴

Recommendation: Congress should pass legislation to eliminate exemptions for oil and gas companies in the Clean Air Act, Clean Water Act, and Resource Conservation and Recovery Act.

Committees of Jurisdiction: Energy and Commerce; Transportation and Infrastructure

⁶⁰² 33 U.S.C. §1342(l)(2).

⁶⁰³ 42 U.S.C. §7412(n).

⁶⁰⁴ Sections 613, 614, and 615, CLEAN Future Act discussion draft.

Ensure That LNG Infrastructure Does Not Harm the Climate, the Environment, and Communities

Building Block: Require DOE and FERC to Consider Climate Change and Other Impacts When Reviewing Applications for LNG Export Infrastructure

Section 3 of the Natural Gas Act requires DOE and FERC, respectively, to approve the import or export of LNG and any application to site, construct, expand, or operate an LNG terminal unless it would not be consistent with the public interest.⁶⁰⁵ The statute creates a presumption that LNG imports and exports are consistent with the public interest where there is a free trade agreement in place requiring countries to treat foreign natural gas the same as domestic natural gas (“national treatment”).⁶⁰⁶ The most recent climate science calling for dramatic emissions reductions indicates this presumption may be outdated. In addition, in May 2020, the Trump Administration proposed to rollback NEPA requirements applicable to DOE approval of LNG imports and exports.⁶⁰⁷

Furthermore, experts like FERC Commissioner Richard Glick have explained that FERC should consider the climate crisis as part of its analysis of whether the siting, construction, expansion, or operation of an LNG terminal is consistent with the public interest.⁶⁰⁸ However, without the shared consensus of the Commissioners on this point, FERC routinely approves LNG terminals without a robust examination of the project’s upstream or downstream greenhouse gas emissions that may be indirect effects of the export when determining whether the LNG export facility satisfies Section 3 of the Natural Gas Act.⁶⁰⁹

Furthermore, Commissioner Glick has highlighted that FERC sometimes gives too much weight to the potential economic boost from the siting of LNG terminals and not enough consideration to the “incremental impact that increased pollution will have on economically disadvantaged communities, which frequently experience a disproportionate toll from the development of new industrial facilities,” simply because it will be “no worse than the surrounding county.”⁶¹⁰

Section 215 of the Energy and Commerce Committee’s discussion draft of the CLEAN Future Act clarifies that FERC must consider climate change in Section 3 decision-making.⁶¹¹ Specifically it would amend Section 3 of the Natural Gas Act to remove the presumption in favor of approval of the import or export of natural gas and require FERC to ensure that the potential benefits of exporting or importing natural gas outweigh any adverse effects. It would also require FERC to consider the climate policies of affected states, regional infrastructure needs, all environmental impacts identified pursuant to the National Environmental Policy Act, including any direct, indirect, and cumulative effects on climate change, and community and landowner impacts.

⁶⁰⁵ Natural Gas Act, 15 U.S.C. § 717b.

⁶⁰⁶ Natural Gas Act, 15 U.S.C. § 717b(c).

⁶⁰⁷ 85 Fed. Reg. 25,340 (“National Environmental Policy Act Implementing Procedures”)(May 1, 2020).

⁶⁰⁸ 168 FERC ¶ 61,020, Commissioner Richard Glick Dissent Regarding Gulf LNG Liquefaction Company, LLC (Jul. 16, 2019).

⁶⁰⁹ 169 FERC ¶ 61,131, Commissioner Richard Glick Dissent Regarding Rio Grande LNG, LLC (Nov. 21, 2019).

⁶¹⁰ *Ibid.*

⁶¹¹ Title II, Section 215, CLEAN Future Act discussion draft.

Recommendation: Existing law requires consideration of lifecycle GHG emissions. To ensure that federal agencies follow congressional intent, Congress should amend the Natural Gas Act to require FERC and DOE to collectively consider all factors relevant to the public interest, including upstream and downstream greenhouse gas emissions, and community and landowner impacts.

Committee of Jurisdiction: Energy and Commerce

Building Block: Prohibit Pipeline Developers from Using Eminent Domain Authority for Pipelines Carrying Gas for Export

Federal eminent domain authority allows the taking of private property for public use with just compensation.⁶¹² In certain limited cases, such as under the Natural Gas Act, Congress has allowed private sector actors to exercise the right of eminent domain. Given the imposition on private landowners, however, the case for private exercise of eminent domain authority is weaker in the context of meeting the energy demands of foreign nations, such as by exporting LNG.

Rep. Tom Malinowski (D-NJ) introduced the Fairness for Landowners Facing Eminent Domain Act (H.R. 5454), which would preclude pipeline developers from exercising the right of eminent domain for pipelines or other equipment that are attached to LNG terminals that would export natural gas. This bill was also included in the Energy and Commerce Committee's discussion draft of the CLEAN Future Act.⁶¹³

Recommendation: Congress should amend the Natural Gas Act to prohibit a pipeline developer from exercising eminent domain authority for pipelines attached to LNG terminals where the primary purpose of the pipelines is to support the export of natural gas.

Committee of Jurisdiction: Energy and Commerce

Make the Nation's Pipelines More Resilient to Climate Impacts

Building Block: Consider Climate Impacts in the Siting, Design, Repair, and Maintenance of Pipelines

The United States is home to about 2.5 million miles of American natural gas pipelines⁶¹⁴ and approximately 200,000 miles of petroleum pipelines. The impacts of extreme weather and other climate impacts pose significant risks to the nation's network of pipelines. Extreme rainfall can lead to flash floods that undermine pipeline crossings.⁶¹⁵ Melting permafrost and extreme temperatures can

⁶¹² Department of Justice, "History of the Federal Use of Eminent Domain," <https://www.justice.gov/enrd/history-federal-use-eminent-domain>. Accessed June 2020.

⁶¹³ Title II, Section 216, CLEAN Future Act discussion draft.

⁶¹⁴ Pipeline and Hazardous Materials Safety Administration, "Annual Report Mileage Summary Statistics," Jun. 28, 2017, <https://www.phmsa.dot.gov/data-and-statistics/pipeline/annual-report-mileage-summary-statistics>. Accessed June 2020.

⁶¹⁵ U.S. Department of Energy, DOE/EPSC-0005, *Climate Change and the U.S. Energy Sector: Regional Vulnerabilities and Resilience Solutions* (October 2015).

cause the ground to shift and soften and risk pipeline rupture.⁶¹⁶ Hurricanes Katrina and Rita damaged more than 450 pipelines⁶¹⁷ and caused more than 120 spills.⁶¹⁸ Flooding in the Midwest last year prompted the Pipeline and Hazardous Materials Safety Administration to issue an advisory to pipeline owners regarding the threats to pipeline facilities associated with erosion and other geologic hazards.⁶¹⁹

Rep. Harley Rouda (D-CA) introduced the Pipeline Seismic Safety Study Act (H.R. 4375), which directs the Secretary of Transportation and National Academy of Engineering to conduct a study on seismicity, land subsidence, and landslides concerning pipeline safety. The research study scope could be expanded to include studies on other climate-related hazards, including flooding and wildfire.

Recommendation: Congress should ensure that siting, design, repair, and maintenance standards for hazardous liquid and natural gas pipelines take climate risks into account and meet any federal flood and wildfire resilience standards.

Committee of Jurisdiction: Transportation and Infrastructure

⁶¹⁶ U.S. Global Change Research Program, *Fourth National Climate Assessment, Volume II* (November 2018).

⁶¹⁷ Bureau of Ocean Energy Management, “MMS Updates Hurricanes Katrina and Rita Damage,” May 1, 2006,

<https://www.boem.gov/sites/default/files/boem-newsroom/Press-Releases/2006/press0501.pdf>. Accessed June 2020.

⁶¹⁸ Bureau of Safety and Environmental Enforcement, *Pipeline Damage Assessment from Hurricanes Katrina and Rita in the Gulf of Mexico* (2007).

⁶¹⁹ 84 FR 18919, “Pipeline Safety: Potential for Damage to Pipeline Facilities Caused by Earth Movement and Other Geological Hazards” May 2, 2019.

DRIVE INNOVATION AND DEPLOYMENT OF CLEAN ENERGY AND DEEP DECARBONIZATION TECHNOLOGIES

While widespread deployment of existing clean energy technologies would significantly reduce greenhouse gas emissions across the U.S. economy, full decarbonization of the economy will require new technologies that have yet to be invented. The opportunities are enormous, but cutting-edge technologies face barriers to development and deployment. The truly transformational technologies needed to decarbonize the economy take a long time to mature and often require new hardware solutions, which then require more capital. This results in multiple capital gaps along the development timeline of these technologies. Since energy is treated as a commodity, that makes it difficult for new technologies to overcome higher initial costs, and the emphasis placed on electricity reliability has led to a regulatory framework that does not appropriately value flexible and distributed characteristics of many innovative clean technologies. Moreover, the market also fails to value the clear advantage of these carbon-free technologies and their climate mitigation potential. Thus, robust innovation policy at all process stages—research, development, demonstration, and deployment (RDD&D)—will be critical to the timely and widespread implementation of these new technologies.

The **research** stage, often characterized as basic or applied, consists of scientific discovery and knowledge creation, with applied research directed toward a specific aim or objective. All innovations begin with research, but it often takes decades for research discoveries to reach the market, especially for clean energy and decarbonization technologies. The federal government largely funds research because individual private sector entities cannot fully reap the benefits of investments in research.

The **development** stage translates research discoveries into practical products and processes. Inventions must prove themselves to be scalable and capable of commercial production at a reasonable cost, but the difficulty of commercial risk assessment and the long timelines and high fixed costs of energy technologies lead to limited investment in development. Some funding comes from the federal government at the development stage but significantly less than it provides for basic or applied research.

The **demonstration** stage involves testing and demonstration of technologies, at both pilot and commercial scales, with the objective of preparing the technologies for adoption by actual users. Like the development stage, long time horizons, large capital requirements, and the high risk associated with new decarbonization technologies limit the overall amount of funding and the types of technologies and applications that receive funding for demonstration. The private sector overwhelmingly provides demonstration funding, largely through end-use producers and suppliers, as well as venture capital.

During **deployment**, a technology or product undergoes widespread adoption and diffusion into the marketplace after proving economic viability at scale. While the risk of the technology failing is less of a concern, there is still a need for large amounts of capital to scale and support the business, so market demand and financing become important drivers for investment. Like demonstration, the

private sector dominates funding through corporate investment (raised from a variety of passive investors), project financing, and private equity.

Technology rarely progresses smoothly through the stages, and advancement to the next stage often requires multiple series of feedback. Between the stages are so-called “valleys of death,” where technologies and companies fail to proceed to the next stage of innovation. In the wake of the COVID-19 pandemic, government support for all stages of RDD&D will be even more important to maintain a robust innovation system that can help shepherd promising technologies across the valleys of death. While policies targeting technologies at different phases of maturity will have varying degrees of effectiveness for immediate stimulus and short-term job creation, investments across the innovation pipeline will fuel long-term economic growth. The United States and the world cannot allow the COVID-19 crisis to delay these investments to develop and deploy the technologies needed to decarbonize the economy by midcentury and avert another global crisis.

Support Technological Innovation to Drive Deep Decarbonization and U.S. Competitiveness

Several federal programs attempt to overcome some of the challenges to innovation and valleys of death described above. The Department of Energy (DOE) has a robust presence in U.S. clean energy innovation. Its basic science and applied energy offices carry out essential RD&D programs and funding. Its network of national laboratories provides original research and scientific and technical support. The Advanced Research Projects Agency – Energy (ARPA-E) funds high-risk, high-reward innovations. And the DOE Office of Technology Transitions aims to advance the commercial impact of DOE research and investments.

However, in order to deploy clean energy technologies at the pace and scale necessary to address the climate crisis, the government will need to provide additional direct support at each step of the innovation process. According to the International Energy Agency, annual worldwide investment in carbon-free and low-carbon energy has stalled in recent years but will need to more than double its current level by 2030 in order to meet emissions reductions goals aligned with the Paris Agreement.⁶²⁰ Public RD&D funding, along with new support initiatives, will need to drive this major investment in clean energy deployment. Because of the long runway for clean tech commercialization, it is important to ramp up research now, so the new technologies needed for deep decarbonization will be market-ready as soon as possible and not later than midcentury. Public investment will leverage private capital investment. Furthermore, without robust development, demonstration, and deployment policy support, not only will promising solutions fail to be implemented, but commercialization and production may occur outside of the United States, allowing other countries to reap the economic benefits of U.S.-funded research. American leadership is vital.

The recommendations in this section largely focus on the technology- or supply-push policies needed for technology commercialization, but demand-pull policies also are essential to accelerate deployment. Details on these policies appear in other sections of this report and include a price on carbon, tax incentives, elimination of certain fossil fuel subsidies, government procurement of lower-

⁶²⁰ International Energy Agency, *World Energy Investment 2019* (2019).

emission products and materials, and emissions-based performance standards. By imposing costs on emissions or giving value to low-emission options, demand-pull policies put clean energy technologies on a level playing field and help incentivize widespread technology deployment. They also help promote earlier-stage innovations by creating guaranteed markets, which increases return on investment and reduces risk, improving investment prospects.

Building Block: Reauthorize and Update the Mission and Goals of DOE to Prioritize Decarbonization of the Energy Sector and Climate Change Mitigation

The Energy Policy Act of 2005 established “increasing the efficiency of all energy intensive sectors” and “decreasing the environmental impact of energy-related activities” as one of several goals of DOE. The statute did not establish an explicit goal of reducing greenhouse gas emissions to mitigate climate change.⁶²¹ This has hampered DOE’s ability to directly address emissions reduction and climate in its programming. For deep decarbonization, DOE programs need to focus on more than energy efficiency, including clean energy and emissions reduction. Energy use is not responsible for some greenhouse gas emissions, such as from manufacturing and industry. DOE already has experience working with these industries to improve energy efficiency, but it needs additional authority to focus on non-power emissions. Considering only energy efficiency also leaves out the possibility of emissions reduction through fuel-switching and conservation.

The Energy Policy Act of 2005 also established energy diversity, energy independence, and energy security as DOE goals.⁶²² As the energy sector transforms to power a deeply decarbonized economy and as climate change impacts worsen, DOE will need to address additional challenges. The widespread deployment of new, clean technologies will require significant changes in and expansion of U.S. manufacturing capabilities and the energy workforce. The resilience of energy systems to climate impacts will be critical. Finally, the legacy of environmental injustice of the current energy system and the equitable access to clean energy in a rapidly decarbonizing world must be central to DOE’s decision-making and planning.

Recommendation: Congress should update DOE’s authorization language to make decarbonization of the energy sector and climate change mitigation core pieces of DOE’s mission and to expand DOE’s goals to include resilience to climate change, competitiveness of U.S. clean energy manufacturing, energy workforce development, and energy equity and environmental justice. Every DOE program should seek to address these new goals in addition to the goals in existing statute.

Committees of Jurisdiction: Energy and Commerce; Science, Space, and Technology

Building Block: Reorganize DOE to Effectively Advance Technologies for Decarbonization and Address the Climate Crisis

DOE’s current organizational structure is outdated and cannot adequately address the climate crisis. The applied energy offices are largely organized by fuel and focus mostly on distinct technologies rather than energy systems. This has caused potentially cross-cutting technologies to be siloed into single applications—such as carbon capture for power generation and hydrogen for transportation,

⁶²¹ Energy Policy Act of 2005, Pub L No 109-58.

⁶²² Ibid.

despite both having potential to reduce industrial emissions—and has led to fragmented approaches for or complete disregard of other key platform technologies. Separating basic energy sciences from applied energy also prevents coordination that can help technologies move from the research stage to development and demonstration.

There are multiple possible ways to restructure DOE, and many experts disagree on the best method. Some proposals include keeping basic and applied energy research under one Under Secretary to maintain their coordination⁶²³ and organizing applied energy offices by end-use sector rather than fuel.⁶²⁴ The reorganization should seek to create a structure that is best suited for accomplishing the updated DOE mission of decarbonization and climate mitigation, as recommended above.

Recommendation: Congress should establish a congressional commission to determine how to reorganize DOE's structure to best facilitate the RDD&D of clean energy and other decarbonization technologies and of the reduction of greenhouse gas emissions from the production and use of energy. The commission should consult relevant authorizing committees, DOE staff, and outside experts to inform its work and should produce a final report with commission activities, findings, and specific legislative recommendations on how to best reorganize DOE's structure. To ensure timely evaluation, Congress should require the commission to complete its work within one or two years.

Recommendation: Until the above comprehensive reorganization is carried out based on the recommendations of the congressional commission, Congress should require the appointment of one Under Secretary for Science and Energy and establish and fund three new Assistant Secretaries for Transportation, Buildings, and Manufacturing and Industry (as recommended in the section of this report titled "Rebuild U.S. Industry for Global Climate Leadership") to better address the emissions from these sectors by elevating them out of the Office of Energy Efficiency and Renewable Energy (EERE).

Committees of Jurisdiction: Science, Space, and Technology; Energy and Commerce

Building Block: Restore the U.S. Commitment to Mission Innovation and Significantly Increase Clean Energy RD&D Funding Over Ten Years

Mission Innovation, launched to help accomplish the goals of the Paris Climate Agreement, is a global initiative to accelerate the pace of clean energy innovation to make clean energy widely affordable. Its 25 members committed to double public investment in clean energy innovation over five years, to better engage the private sector, and to work together on key challenges, including smart grids, clean energy materials, and renewable and clean hydrogen.⁶²⁵ The United States has not enacted clean energy RD&D funding on pace to reach the goal of doubling public investment (from a baseline of \$6.4 billion in 2016 to \$12.8 billion in 2021).⁶²⁶

⁶²³ Tarak Shah and Arjun Krishnaswami, *Transforming the U.S. Department of Energy in Response to the Climate Crisis* (Natural Resources Defense Council, 2019).

⁶²⁴ IHS Markit and Energy Futures Initiative, *Advancing the Landscape of Clean Energy Innovation* (Breakthrough Energy, 2019).

⁶²⁵ Mission Innovation, "Overview," <http://mission-innovation.net/about-mi/overview>. Accessed June 2020.

⁶²⁶ Office of Management and Budget, *Domestic Implementation Framework for Mission Innovation* (November 2016).

Moreover, in order to maintain its leadership in clean energy innovation, the United States will need to significantly increase public funding and support for research, development, and demonstration to successfully commercialize U.S. technologies. DOE accounts for about 75% of U.S. clean energy innovation, but other agencies—such as DOD, DOT, USDA, and the National Science Foundation—are also responsible for funding clean energy RD&D.

Recommendation: Congress should recommit the United States to Mission Innovation by meeting the initial objective of doubling investment in clean energy RD&D and continuing to increase funding over the next 10 years. To accommodate the recommendations in this report, such as additional goals, offices, research areas, and technology demonstration support, DOE's clean energy RD&D funding should increase substantially. In response to the Select Committee's Request for Information, Breakthrough Energy recommended an increase in U.S. clean energy innovation funding to \$35 billion over 10 years.⁶²⁷ This level of funding is comparable to current funding levels for R&D at the National Institutes of Health and will be approximately 0.1% of U.S. GDP in 2030, which is roughly the proportion of GDP that China currently invests in energy RD&D.⁶²⁸ While it is important to target an increase in DOE's funding, other relevant agencies should also be included in the Mission Innovation goal of doubling investment.

Committee of Jurisdiction: Science, Space, and Technology

Building Block: Pursue RDD&D for the Most Promising Technologies to Address Emissions and Advance Resilience in Specific Sectors

In addition to significantly increasing the U.S. government's overall financial commitment to RDD&D at DOE and other agencies, Congress needs to support specific technologies that offer demonstrated promise for decarbonizing the economy and making our communities more resilient to climate impacts. To determine funding priorities in a transparent and consistent way, DOE could adopt selection criteria to identify technologies with the greatest potential. Experts have suggested the following criteria: technical merit (including emissions reduction potential and other environmental performance), market viability, compatibility (with existing and new infrastructure and systems), and consumer value.⁶²⁹ Resilience could be another important criterion to consider.

Recommendation: Congress should increase funding and initiatives for specific technologies critical to the resilience and decarbonization of the power, transportation, industry, building, and agriculture sectors, as well as natural and technological carbon removal. The gaps differ by sector and are described in more detail in other sections of this report. Some priority areas include:

- Power sector: Grid-scale and long-duration storage, smart grid technologies, offshore wind, next-generation nuclear, marine and hydrokinetic energy, integration and deployment of distributed energy resources and non-wires alternatives, reduction of soft costs (costs associated with permitting, construction, operation, and maintenance) for clean energy projects, and energy generation technologies, infrastructure, and materials that are more resilient to climate impacts.

⁶²⁷ Submission from Breakthrough Energy, In Response to Request for Information, House Select Committee on the Climate Crisis, 116th Congress (November 22, 2019).

⁶²⁸ Congressional Research Service, *Federal Research and Development (R&D) Funding: FY2020* (November 2019).

⁶²⁹ IHS Markit and Energy Futures Initiative, *Advancing the Landscape of Clean Energy Innovation* (Breakthrough Energy, 2019).

- Transportation sector: Low-carbon technologies for heavy-duty vehicles and long-haul trucks, sustainable aviation and maritime fuels and airplane and ship electrification, high-density batteries, and next-generation construction materials and applications for transportation infrastructure systems.
- Industrial sector: Electrification and low-emission heat sources, low-emission hydrogen, carbon capture utilization and storage, and a circular economy framework.
- Buildings: Smart and resilient building technologies, grid-integrated buildings, electric and geothermal heat pumps, and low-emission building materials and technologies.
- Agricultural sector: Stress-tolerant crops that can withstand increasing heat, drought, and disease; development of animal feed to reduce livestock emissions; soil carbon sequestration; urban and indoor agriculture; and methods to measure and evaluate soil health, carbon sequestration, and agricultural emissions reductions.
- Natural climate solutions: Lifecycle accounting of the climate impacts and carbon benefits of wood use and products, including biomass; measurement and evaluation of forest restoration, forest health and wildfire behavior, and carbon sequestration on U.S. lands, forests, and soils; and understanding climate impacts and benefits of blue carbon ecosystems.
- Carbon removal: Direct air capture, bioenergy with carbon capture, and carbon mineralization.

Committees of Jurisdiction: Science, Space, and Technology; Energy and Commerce; Transportation and Infrastructure; Agriculture; Natural Resources

Building Block: Pursue RDD&D for Cross-Cutting Technologies That Will Enable Further Emissions Reductions Across All Sectors

Several enabling technologies—technologies that can facilitate leaps in performance of other technologies—have the potential to significantly reduce emissions in multiple sectors. Climate-beneficial carbon capture and low-emission hydrogen have potential applications in the electric, transportation, industry, and building sectors. As electrification of the economy increases, digitalization and artificial intelligence could dramatically increase the efficiency and performance of energy systems. The advancement of these cross-cutting technologies would benefit from a coordinated approach and single funding source, rather than fragmented individual projects in different program offices.

Recommendation: Congress should increase and dedicate funding for enabling technologies and direct DOE to establish cross-cutting programs to maximize coordination of applicable offices and programs. An Under Secretary for Science and Energy would be well-positioned to oversee these cross-cutting programs.

Committee of Jurisdiction: Science, Space, and Technology; Energy and Commerce

Building Block: Engage Environmental Justice Communities in Clean Energy RDD&D

The Equitable and Just National Climate Platform underscores that “the shift to a sustainable, just, and equitable energy future requires innovative forms of investment and governance that distribute

the benefits of this transition equitably and justly.”⁶³⁰ As DOE conducts RDD&D programs in new energy technologies, the Department should engage stakeholders and frontline communities who will benefit from or could be harmed by these emerging technologies. Creating this relationship will facilitate technical knowledge transfer into these communities, while also enabling local and traditional ecological knowledge to inform technology innovation. Early deployment initiatives can further ensure that all communities benefit from DOE’s work and no community is left behind in the transition to a clean economy.

Recommendation: Congress should establish a DOE Energy Justice and Democracy program to reduce energy poverty, ensure environmental justice communities have access to innovations in energy efficiency and renewable energy technologies, support community energy planning and energy choices programs, and promote climate resilience in vulnerable communities. The program should interface with DOE RDD&D programs to ensure equity considerations in new technology development and demonstrations and to work with environmental justice communities and minority-serving institutions to incorporate local knowledge and practices and build a foundation for STEM education. The program should assess how DOE offices award grant funding and deploy pilot programs to ensure equitable distribution of resources. The program should also build upon and coordinate with existing programs within and outside of DOE that have experience working in frontline communities, such as the Weatherization Assistance Program and Low-Income Home Energy Assistance Program.

Committees of Jurisdiction: Science, Space, and Technology; Energy and Commerce

Building Block: Ensure Diverse Participation in DOE RDD&D Programs

As DOE establishes new programs and increases funding for existing programs to mitigate and adapt to climate change, these opportunities should reach all communities, especially those that have historically been harmed by traditional energy generation and infrastructure. Prioritizing diverse participation in DOE programs will not only afford economic development and educational opportunities in these frontline communities, but it will also incorporate new voices and ideas for clean energy and climate resilience solutions appropriate for the communities in which they live. The America COMPETES Act, which became law in 2007, required DOE to conduct outreach to minority-serving institutions to increase awareness of new funding opportunities created by that legislation.⁶³¹

Recommendation: Congress should direct DOE to ensure that grant recipients for existing and new RDD&D programs represent a variety of types of institutions of higher education by broadly disseminating grant information and conducting outreach to minority-serving institutions, including historically Black colleges and universities, Hispanic-serving institutions, tribal colleges and universities, and Alaska Native- and Native Hawaiian-serving institutions.

Committees of Jurisdiction: Science, Space, and Technology; Energy and Commerce

⁶³⁰ Equitable and Just National Climate Platform, “A Vision for an Equitable and Just Climate Future,” <https://ajustclimate.org/index.html>. Accessed June 2020.

⁶³¹ America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science Act, Pub L No 110-69.

Building Block: Increase Funding for the Advanced Research Projects Agency-Energy to Reach at Least \$2 Billion per Year by 2030

ARPA-E advances high-risk, potentially transformational energy technologies that are too early for private sector investment. The program is one of the main federal funding mechanisms for innovative technologies in the development phase and provides grant funding and technical assistance to energy researchers through a competitive selection process and active program management. As of February 2020, ARPA-E has provided \$2.3 billion in R&D funding to more than 850 projects, leading to 82 companies, more than \$3.2 billion in private sector follow-on funding, and 385 patents.⁶³² With more funding needed for technology development, increasing funding for ARPA-E would help to address this gap and make an even greater impact on the advancement of clean energy technologies.

Chairwoman Eddie Bernice Johnson (D-TX) introduced the ARPA-E Reauthorization Act of 2019 (H.R. 4091), which would reauthorize the DOE ARPA-E program and increase its annual funding authorization up to \$750 million through 2024.⁶³³ Sens. Chris Van Hollen (D-MD) and Lamar Alexander (R-TN) introduced a similar bill of the same title (S. 2714).

Recommendation: Building off H.R. 4091, Congress should continue to increase ARPA-E's funding authorization to reach at least \$2 billion per year by 2030, eventually reaching \$3 billion per year, which would approach parity with DARPA's budget (\$3.427 billion in FY2019).⁶³⁴

Committee of Jurisdiction: Science, Space, and Technology

Building Block: Facilitate the Coordination and Creation of Clean Tech Incubators and Accelerators Within and Outside of the Federal Government

Incubators and accelerators help innovators and startups commercialize their inventions by providing funding, space and equipment, mentorship and professional development, public-private connections, and help for securing financing. Clean energy technologies face unique challenges to deployment due to the large upfront costs of initial pilot-scale demonstration projects. For this reason, clean energy technology incubators and accelerators play an important role in the development of clean energy technologies. Through the National Incubator Initiative for Clean Energy, DOE helped create the Incubatenergy Network, a nationwide community of clean tech incubators and accelerators that have collectively supported almost 500 companies, which have raised more than \$1 billion in funding and created nearly 3,000 jobs.⁶³⁵ By providing supplemental funding to new and existing incubators and accelerators and increasing the network's level of coordination, DOE would help additional companies commercialize their clean energy technologies

⁶³² Advanced Research Projects Agency - Energy, "ARPA-E Impact," <https://arpa-e.energy.gov/?q=site-page/arpa-e-impact>. Accessed June 2020.

⁶³³ As introduced, H.R. 4091 increased ARPA-E annual funding up to \$1 billion through 2024, but this was amended in committee to \$750 million through 2024; Amendment to H.R. 4091 offered by Chairwoman Johnson (D-TX), U.S. House Committee on Science, Space, and Technology,

<https://science.house.gov/imo/media/doc/HR%204091%20Managers%20Amendment.pdf>. Accessed June 2020.

⁶³⁴ Defense Advanced Research Projects Agency, "Budget," <https://www.darpa.mil/about-us/budget>. Accessed June 2020.

⁶³⁵ U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, "National Incubator Initiative for Clean Energy (NIICE)," <https://www.energy.gov/eere/technology-to-market/national-incubator-initiative-clean-energy-niice-0>. Accessed June 2020.

and provide a better understanding of where topical or regional gaps in the network exist to direct future expansion efforts.

DOE has also established its own incubator-like programs through entrepreneurial fellowships that provide stipends to private sector and academic scientists and engineers and embed them within a DOE national lab. These Lab-Embedded Entrepreneurship Programs (LEEPs) include Cyclotron Road at Lawrence Berkeley National Laboratory, Chain Reaction Innovations at Argonne National Laboratory, and Innovation Crossroads at Oak Ridge National Laboratory. Establishing additional programs at other DOE labs and federally funded research and development centers would help increase the pool of clean energy entrepreneurs and better utilize federal lab expertise and equipment for clean tech commercialization.

Rep. Ben Ray Luján (D-NM) introduced the Leveraging our National Labs to Develop Tomorrow's Technology Leaders Act (H.R. 5965), which would direct DOE to award grants to national labs, nonprofit organizations, institutes of higher education, federally owned corporations, and other appropriate entities to establish or maintain LEEPs.

Recommendation: Congress should authorize DOE to (1) develop a national coordinating organization for clean tech incubators and accelerators, (2) provide funding for existing and additional incubators and accelerators, and (3) establish additional lab-embedded entrepreneurship programs at national laboratories and federally funded research and development centers.

Committee of Jurisdiction: Science, Space, and Technology

Building Block: Foster a Culture of Entrepreneurship at DOE National Laboratories to Encourage the Transfer of Innovative Clean Energy Technologies from the Lab to the Marketplace

Transferring clean energy technology from federally funded laboratories to the marketplace is critical to preventing the most innovative research ideas from withering on the lab bench. One important mechanism for enhancing this technology transfer is to encourage entrepreneurial thinking and behavior amongst laboratory scientists and engineers. Entrepreneurial separation programs allow DOE national laboratory researchers to temporarily leave their posts to advance a promising energy technology through a new or existing company, with the option of returning to their lab position within a specified amount of time. Sandia National Laboratory implemented an entrepreneurial separation program in 1994, which has since resulted in 68 of their researchers creating new companies, 85 more contributing to the expansion of existing ones, and 42 others returning to the lab with newfound knowledge of the private sector.⁶³⁶

By providing researchers this opportunity to temporarily leave to pursue an entrepreneurial activity, labs help de-risk researchers' choice to attempt to commercialize a clean energy technology. This gives more researchers the confidence to take the leap of faith often needed to pursue the risky path of entrepreneurship. Regardless of an individual researcher's choice, fostering a culture of entrepreneurship at the national laboratories will improve DOE's ability to get innovative clean energy technologies into the hands of the American people.

⁶³⁶ Nancy Salem, "Calling all entrepreneurs," *Sandia Lab News*, October 28, 2016, 8.

Recommendation: Congress should direct DOE to give national laboratory directors the authority to establish entrepreneurial separation programs, allowing researchers to leave for up to three years to pursue entrepreneurial activities.

Committee of Jurisdiction: Science, Space, and Technology

Building Block: Support the Use of Milestone-Based Demonstration Projects and Additional Prizes and Challenges to Advance Innovative Clean Energy Technologies for Climate Mitigation and Adaptation

Agencies use prizes and challenges to incentivize innovation by rewarding participants for achieving specific goals. They are cost-effective, by only paying for success, and can help engage nontraditional innovators to bring new perspectives and solutions. DOE has successfully fostered innovation through prizes and challenges, such as the L Prize for higher-performance LED lighting and the Wave Energy Prize.⁶³⁷ However, unlike many other agencies, DOE has not adopted department-wide policies and guidance to coordinate best practices and maximize effectiveness. DOE could use additional prizes and challenges to find new solutions for climate mitigation and adaptation and to diversify the people and organizations working on these issues.

Moreover, DOE could apply this model to demonstration projects, which face unique challenges in cost overruns and management. This approach would allow DOE to disburse a predetermined amount of funding to demonstration project partners only when they have reached agreed-upon technical milestones. As a result, milestone-based demonstration projects could help distribute federal resources amongst a larger pool of applicants and provide a clear path for discontinuing funding to underperforming projects.

Recommendation: Congress should authorize DOE to implement milestone-based demonstration projects to broaden the base of innovators that can compete for demonstration funding and ensure the efficient use of federal funds.

Recommendation: Congress should direct DOE to increase the use of prizes and challenges for climate mitigation and resilience and to develop coordinated policies and guidance for prize implementation.

Committee of Jurisdiction: Science, Space, and Technology

Building Block: Strengthen Collaboration Between Small Businesses and National Labs by Expanding DOE Voucher Programs

The United States is home to more than 31 million small businesses employing more than 60 million Americans.⁶³⁸ Small businesses may have innovative ideas to launch new products but often face prohibitive upfront costs to purchase the capital equipment they need to develop their new

⁶³⁷ U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, “EERE Success Story—L Prize Competition Drives LED Lighting Innovation, Energy Savings,” <https://www.energy.gov/eere/success-stories/articles/eere-success-story-l-prize-competition-drives-led-lighting-innovation>; U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, “Project Profile: WEC Prize,” <https://www.energy.gov/eere/water/project-profile-wec-prize>. Accessed June 2020.

⁶³⁸ Small Business Administration, Office of Advocacy, “2020 Small Business Profile,” <https://cdn.advocacy.sba.gov/wp-content/uploads/2020/06/04144224/2020-Small-Business-Economic-Profile-US.pdf>. Accessed June 2020.

technologies. To address this challenge, DOE has established pilot programs that award vouchers to small businesses that they can use “to leverage expertise and research facilities at DOE national labs at a discounted price, helping small businesses advance technologies along the innovation pipeline from idea to product.”⁶³⁹ The EERE voucher program has facilitated partnerships with 114 companies from 31 states, indicating that Congress can expand on this model to strengthen collaboration between DOE national labs and U.S. small businesses.⁶⁴⁰

Reps. Ben Ray Luján (D-NM) and Charles Fleischmann (R-TN) introduced the bipartisan Promoting Small Business Innovation through Partnerships with National Labs Act of 2019 (H.R. 3574), which would codify a DOE national lab voucher program that could be used at all DOE national labs for any technology area. Sens. Chris Coons (D-DE) and James Risch (R-ID) introduced a related bill, the Small Businesses Partnering with National Labs Act of 2019 (S. 2009).

Recommendation: Congress should pass legislation to strengthen collaboration between small businesses and the DOE national lab network by expanding DOE voucher programs.

Committee of Jurisdiction: Science, Space, and Technology

Building Block: Promote Regional Energy Innovation Partnerships to Help New Technologies Achieve Commercial Deployment

Different regions around the country have variable energy supply and demand, requiring different solutions to transition to a clean energy economy. The development and demonstration stages of the innovation process also often occur at the regional level and rely on regional innovation ecosystems to facilitate commercialization.⁶⁴¹ Enabling regional energy innovation partnerships can help emerging technologies overcome the commercialization valley of death and achieve market deployment. The partnerships could help incentivize states, regions, academic institutions, and businesses to organize and address a specific targeted clean energy technology and market intersection.

Rep. Suzanne Bonamici (D-OR) introduced the Regional Clean Energy Innovation Act (H.R. 7237), which would establish a DOE Office of Advanced Clean Energy Technologies and direct the Secretary of Energy to manage a network of Regional Energy Innovation and Development Institutes to accelerate clean energy innovation in the mid- and post-research stage. These institutes could help projects overcome obstacles to deployment and avoid a commercialization valley of death; connect federally funded research and development with state and regional initiatives; and advance decarbonization strategies.

Recommendation: Congress should direct DOE to establish regional energy innovation partnerships.

Committees of Jurisdiction: Science, Space, and Technology; Energy and Commerce

⁶³⁹ Office of Sen. Chris Coons, “Bipartisan, bicameral bill from Sens. Coons, Risch, Smith, Gardner & Reps. Luján, Fleischmann supports small business innovation,” Press Release, June 27, 2019.

⁶⁴⁰ U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, “Small Business Vouchers,” <https://www.energy.gov/eere/technology-to-market/small-business-vouchers>. Accessed June 2020.

⁶⁴¹ Kavita Surana et al, *Regional Clean Energy Innovation* (Energy Futures Initiative and University of Maryland Global Sustainability Initiative, 2020).

Building Block: Increase Funding for Demonstration and Establish a DOE Office Focused on Clean Technology Demonstration

Demonstration is an essential but regularly underfunded stage in the innovation process. Because of the iterative nature of RDD&D, demonstration project failures may be as useful as successes, leading to new insights in areas for further research and development that could ultimately result in successful technology demonstration and commercialization. Individual investors, however, cannot fully capture the potential benefits of failure. Although most demonstration investment comes from the private sector, this risk of failure is often too high for the private sector, resulting in inadequate funding. Public investment can fill these gaps and provide co-investment with the private sector.

Large-scale demonstration of clean energy and decarbonization technologies are often capital-intensive and complex, requiring not only technical expertise but also project management expertise to be successful. Rather than having individual technology offices support large demonstration projects, housing all major demonstration projects in one office would offer projects more stable funding and allow them to benefit from project management best practices.⁶⁴² An overarching demonstration office would also better accommodate cross-sector, cross-technology projects and enable information-sharing and learning across technology offices.⁶⁴³ Having experienced project managers coordinate large demonstration projects would also help reduce investment risk for the government and depoliticize project decisions. Instead of technologists tied to having their particular technologies succeed and politicians trying to maintain investments for their local constituencies, expert managers could depoliticize the process by using rigorous performance requirements to determine which projects to select and whether and when to cut funding for projects that are underperforming.

The difficulties associated with demonstration projects have led to mixed results within DOE's history. Successful projects reveal the potential value of more effective federal investment in technology demonstration. For example, the American Recovery and Reinvestment Act of 2009 funded 16 energy storage demonstrations as part of the Smart Grid Demonstration program at DOE. One of these projects, jointly funded by DOE and Southern California Edison (SCE), successfully built an 8 MW battery energy storage system to "demonstrate utility scale lithium-ion battery technology in improving grid performance and integrating intermittent wind generation."⁶⁴⁴ Following this successful demonstration project, SCE has completed another utility-scale battery storage facility capable of storing up to 20 MW and has nearly 400 MW of energy storage under contract.⁶⁴⁵

Recommendation: Congress should increase funding for technology demonstration to support pilot-scale demonstrations in specific clean energy and efficiency technology areas. Congress should provide separate, dedicated funding, starting at \$1 billion per year, for large-scale demonstrations of clean energy and decarbonization technologies.

⁶⁴² Robert Rozansky and David M. Hart, *More and Better: Building and Managing a Federal Energy Demonstration Project Portfolio* (Information Technology and Innovation Foundation, 2020).

⁶⁴³ Ibid.

⁶⁴⁴ Donald Bender et al, *ARRA Energy Storage Demonstration Projects: Lessons Learned and Recommendations* (Sandia National Laboratories, 2015).

⁶⁴⁵ Edison International, "Energy Storage," <https://www.edison.com/home/innovation/energy-storage.html>. Accessed June 2020.

Recommendation: Congress should create a DOE office focused on demonstration of clean energy and other decarbonization technologies. The office should focus on first-of-a-kind large-scale demonstration projects and provide demonstration project management expertise, while maintaining close coordination with the applied technology offices for technical expertise. Project selection, funding, and termination should be based on rigorous performance criteria.

Committees of Jurisdiction: Science, Space, and Technology; Energy and Commerce

Building Block: Establish a Nonprofit DOE Foundation to Coordinate Public-Private-Philanthropic Partnerships and Channel Private Sector Investment in Clean Energy Innovation

Despite the urgent need to bring new innovative energy technologies to market, the energy sector is presently attracting a much lower proportion of venture capital financing than it has in previous decades.⁶⁴⁶ Over the last decade, venture capital investment in clean energy has also shifted to more software-based solutions rather than the much-needed innovative tough tech required for the energy transition.⁶⁴⁷ Philanthropic giving has also failed to fill this commercialization gap, with most funding focused on basic science at the beginning of the innovation cycle and policy and advocacy at the end.⁶⁴⁸ Furthermore, a connectivity gap persists between private sector investors and other nongovernmental organizations on the one hand and DOE on the other, which inhibits technologies developed from DOE funding and at DOE national labs from reaching commercialization and wider uptake.⁶⁴⁹ The myriad programs and initiatives at DOE, the diversity of national labs, and the complicated rules for forming DOE partnerships and contracts make it difficult for outside actors to access DOE expertise and facilities.⁶⁵⁰

In order to improve collaboration and increase overall support for clean energy innovation, the federal government must encourage strategic coalitions of philanthropic investors, industry, long-term venture capital, and other partners. These public-private-philanthropic partnerships are critical for identifying and incubating the breakthrough technologies necessary to transform our energy system. Some federal agencies have established independent nonprofit foundations to help create these partnerships and to leverage private sector follow-on funding. For example, the Foundation for the National Institutes of Health has raised more than \$80 for every dollar of NIH funding.⁶⁵¹ A semi-independent, nonprofit DOE foundation could provide the flexibility to create these strategic partnerships and funding vehicles while maintaining a connection to DOE to ensure efficient coordination with existing goals and initiatives.⁶⁵² For instance, the foundation could provide seed funding to local and regional innovation initiatives described elsewhere in this section, such as regional innovation partnerships and clean energy accelerators and incubators.

⁶⁴⁶ Peter Sopher, *Early-stage venture capital for energy innovation* (International Energy Agency, 2017).

⁶⁴⁷ IHS Markit and Energy Futures Initiative, *Advancing the Landscape of Clean Energy Innovation* (Breakthrough Energy, 2019).

⁶⁴⁸ Jetta L. Wong and David M. Hart, *Mind the Gap: A Design for a New Energy Technology Commercialization Foundation* (Information Technology and Innovation Foundation, 2020).

⁶⁴⁹ Ibid.

⁶⁵⁰ Ibid.

⁶⁵¹ Foundation for the National Institutes of Health, “FNIH Capabilities Brochure,” <https://fnih.org/sites/default/files/final/FNIH%20Capabilities%20Brochure.pdf>. Accessed June 2020.

⁶⁵² Jetta L. Wong and David M. Hart, *Mind the Gap: A Design for a New Energy Technology Commercialization Foundation* (Information Technology and Innovation Foundation, 2020).

The bipartisan, bicameral Increasing and Mobilizing Partnerships to Achieve Commercialization of Technologies (IMPACT) for Energy Act (H.R. 3575/S. 2005), introduced by Reps. Ben Ray Luján (D-NM) and Joe Wilson (R-SC) and Sens. Chris Coons (D-DE) and Lindsey Graham (R-SC), would establish a nonprofit foundation that would engage with the private sector to raise funds that support the creation, development, and commercialization of innovative technologies that address tomorrow's energy challenges.

Recommendation: Congress should establish a DOE foundation to coordinate public-private-philanthropic partnerships and fund clean energy innovation and commercialization.

Committees of Jurisdiction: Science, Space, and Technology; Ways and Means

Enable and Accelerate Financing for Climate Change Mitigation and Climate-Resilient Infrastructure

In addition to providing direct support for clean energy innovation, Congress can help mobilize investment in infrastructure resilience, along with technology development, demonstration, and deployment, by leveraging private capital. These investments can create millions of good-paying jobs in communities across the country. Congress also can use tax policy to incentivize investment in infrastructure resilience and clean energy innovation.

Building Block: Establish a National Climate Bank to Help Finance Technologies for Emissions Reduction and Climate-Resilient Infrastructure

Green banks are public or nonprofit finance institutions that deploy clean energy technologies and climate-resilient infrastructure by connecting projects with capital in target markets. They use innovative financing tools and structures to lower the cost of capital and leverage more public and private investment. Furthermore, by enabling more flexible financing for individuals, such as lending based on ability to pay rather than credit scores, green banks help fill a financing gap in underserved communities. As of 2019, 15 state and local green banks operated in the United States, facilitating more than \$5 billion of investment from 2011-2019 and leveraging more than \$3 of private investment for every \$1 of public investment.⁶⁵³ Green banks are a proven model that could be replicated across the United States to help all communities benefit from the deployment of clean energy technologies and climate-resilient infrastructure.

Rep. Debbie Dingell (D-MI) introduced the National Climate Bank Act (H.R. 5416), as included in the Energy and Commerce Committee's discussion draft of the Climate Leadership and Environmental Action for our Nation's (CLEAN) Future Act, which would establish a National Climate Bank as an independent nonprofit capitalized with \$35 billion over six years.⁶⁵⁴ The National Climate Bank would

⁶⁵³ American Green Bank Consortium and Coalition for Green Capital, *Green Banks in the United States: 2020 US Green Bank Annual Industry Report* (American Green Bank Consortium and Coalition for Green Capital, 2020).

⁶⁵⁴ Title VII, Section 811, Climate Leadership and Environmental Action for our Nation's (CLEAN) Future Act discussion draft, House Committee on Energy and Commerce, 116th Congress, available at

(1) leverage private capital to finance a variety of clean energy and other emissions-reducing projects and climate adaptation and resilience efforts; (2) prioritize investment in “climate-impacted communities”—frontline, rural, low-income, and environmental justice communities—as well as communities affected by the clean economy transition; (3) establish new state and local green banks; and (4) capitalize existing state and local green banks. Sen. Ed Markey (D-MA) introduced a similar bill of the same title (S. 2057), and Rep. James Himes (D-CT) and Sen. Chris Murphy (D-CT) introduced the National Green Bank Act of 2019 (H.R. 3423/S. 1528), which would issue green bonds to capitalize new and existing state and local green banks. Green bonds are fixed-interest-rate investment products that allow issuers (in this case, the U.S. Treasury) to raise money for projects that have positive environmental or climate mitigation and resilience impacts while enabling everyday investors to finance climate solutions.

A recent report found that a national climate bank (also referred to as a clean energy jobs fund) with an initial capitalization of \$35 billion could drive nearly \$500 billion of public and private investment and create 5.4 million new job-years in the first five years of operation.⁶⁵⁵

Recommendation: Congress should establish a national climate bank to finance targeted deployment of clean energy and other decarbonization technologies and climate-resilient infrastructure. The climate bank should capitalize new and existing state and local green banks and finance its own projects. When financing projects, the national climate bank, as well as the state and local banks it capitalizes, should (1) prioritize environmental justice, frontline, and rural communities and communities most affected by the transition to a clean economy; (2) emphasize support for projects without clear revenue models or lacking significant returns, such as certain energy and climate-resilient infrastructure; and (3) focus efforts on using innovative financing techniques and structures and market development to fill financing gaps to drive deployment of already proven, commercialized technologies, rather than trying to finance first-of-a-kind commercial scale deployment. The banks should develop clear metrics for community prioritization, and a substantial portion of investment activity should address projects in priority communities. The banks should maximize creation of public-private partnerships to leverage private funds and avoid competing with private capital. The national climate bank should also focus on larger-scale projects that may be too capital-intensive or require greater regional coordination than any individual state or local green bank can handle. All bank investments should incorporate prevailing wage requirements and strong labor provisions, including project labor agreements for projects above a certain investment threshold, and require compliance with all labor, environmental, and civil rights statutes. Congress should consider capitalizing the bank through green bonds and other innovative financial instruments.

Committees of Jurisdiction: Energy and Commerce; Financial Services; Ways and Means; Agriculture; Transportation and Infrastructure

<https://energyccommerce.house.gov/newsroom/press-releases/ec-leaders-release-draft-clean-future-act-legislative-text-to-achieve-a-100>.

⁶⁵⁵ Vivid Economics, *Bounce Back Greener: The Economic Impact Potential of a Clean Energy Jobs Fund* (Vivid Economics, 2020).

Building Block: Reform the DOE Title XVII Loan Guarantee Program to Provide Financing for Early Commercial Deployment of Innovative Decarbonization Technologies

The DOE Loan Programs Office (LPO) issues (1) loan guarantees through the Title XVII program for innovative clean energy technologies and the tribal energy loan guarantee program and (2) direct loans through the Advanced Technology Vehicles Manufacturing program. Overall, the LPO portfolio has performed positively. As of March 2020, LPO had issued more than \$35 billion in loans and loan guarantees with a loss rate of less than 3%.⁶⁵⁶

The Energy Policy Act of 2005 established the Title XVII loan guarantee program.⁶⁵⁷ The original program, commonly known as Section 1703, was designed to help new technologies with high technology or execution risk secure financing to overcome the commercialization valley of death. By guaranteeing to repay part or all of a loan in case of default by the borrower, government loan guarantees remove or reduce a lender's risk, thereby enabling affordable financing of the project. Under Section 1703, projects were required to "(1) avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases and (2) employ new or significantly improved technologies as compared to commercial technologies in service in the United States at the time the guarantee is issued."⁶⁵⁸ Applicants also had to pay the credit subsidy costs (the expected long-term liability of the government for issuing the loan guarantees, calculated from OMB guidance, as required by the Federal Credit Reform Act (FCRA) of 1990) for their projects.⁶⁵⁹ The "new or significantly improved" requirement, often referred to as the innovativeness requirement, and the requirement to pay for credit subsidy costs created barriers to granting loan guarantees under Section 1703.

DOE did not issue any Title XVII loan guarantees until the American Recovery and Reinvestment Act of 2009 (ARRA) created Section 1705, a temporary loan guarantee program under Title XVII focused on renewable energy deployment.⁶⁶⁰ Section 1705 allowed DOE to issue loan guarantees to projects using existing commercial technologies (relaxing the innovativeness requirement), and ARRA appropriated funds to cover credit subsidy costs, thereby reducing the barriers found in Section 1703. DOE financed more than 20 projects under Section 1705, including the first five utility-scale solar photovoltaic (PV) projects in the United States. By 2016, the private sector had financed an additional 45 utility-scale solar PV projects, leading to a 531% increase in installed capacity over just five years.⁶⁶¹ DOE's authority to guarantee loans under Section 1705 expired on September 30, 2011, after which DOE has issued only one new loan guarantee under Section 1703.⁶⁶²

Despite successful projects financed under the loan guarantee program, its low loan loss rate reveals risk aversion in selecting loan guarantee recipients, which defeats the original purpose of the Title XVII

⁶⁵⁶ U.S. Department of Energy, Loan Programs Office, "Portfolio," <https://www.energy.gov/lpo/portfolio>. Accessed June 2020.

⁶⁵⁷ Energy Policy Act of 2005, Pub L No 109-58.

⁶⁵⁸ Ibid.

⁶⁵⁹ Ibid.

⁶⁶⁰ American Recovery and Reinvestment Act of 2009, Pub L No 111-5.

⁶⁶¹ U.S. Department of Energy, "Energy Department Analysis: Loan Guarantee Program Launched Utility-Scale Photovoltaic Solar Market in the United States," <https://www.energy.gov/articles/energy-department-analysis-loan-guarantee-program-launched-utility-scale-photovoltaic-solar>. Accessed June 2020.

⁶⁶² U.S. Department of Energy, Loan Programs Office, "Portfolio Projects," <https://www.energy.gov/lpo/portfolio/portfolio-projects>. Accessed June 2020.

program to commercialize technologies too risky to receive financing from the private sector. By definition, riskier projects will lead to more failures and losses, so the performance of such a program should not be judged solely on financial returns and losses. A balanced selection of projects should reduce risks in the overall portfolio. However, because FCRA requires individual assessments of project credit subsidy cost and a separate credit approval process for each project, a portfolio approach to project selection is not possible under the current Title XVII structure.⁶⁶³ Furthermore, DOE has implemented the majority of Title XVII loan guarantees through loans made by the Federal Financing Bank of the U.S. Treasury rather than private sector lenders, which has minimized the program's potential for leveraging private capital through de-risking.

As of March 2020, the Title XVII program had nearly \$24 billion remaining in loan guarantee authority, split between advanced fossil energy projects, advanced nuclear energy projects, and renewable energy and efficient energy projects.⁶⁶⁴ Given the shortcomings of the existing Section 1703 and Section 1705 programs, changes to the program are warranted to better use the remaining authority. Potential reforms include clarifying eligibility criteria and expanding solicitations to include a wider array of technologies and to ensure that the innovation requirement is not overly restrictive nor leads to risk aversion; using a portfolio approach to measuring program performance; taking into account specific regions of the United States when determining the limit on financing similar types of projects; encouraging private sector lenders to participate in the program; improving the application process and fee schedule, including appropriating funds for the credit subsidy cost and evaluating alternative methodologies for its calculation; and relaxing the prohibition on granting financing to projects that will benefit from other forms of federal support.⁶⁶⁵

The Energy and Commerce Committee's discussion draft of the CLEAN Future Act would, among other provisions, make some reforms to the Title XVII loan guarantee program, including limiting administrative fees, requiring the use of appropriated funds for credit subsidy costs, and expanding the list of eligible projects.⁶⁶⁶ The House Democrats included similar reforms in Section 33181 of their infrastructure bill, the Moving Forward Act (H.R. 2).⁶⁶⁷

Others have suggested more wholesale reforms to the program, such as establishing an independent financing entity with more flexible financing mechanisms that are not subject to FCRA constraints, enabling a portfolio approach to balance project risks. In the 111th Congress, for example, Sen. Jeff Bingaman (D-NM) and Rep. Jay Inslee (D-WA) introduced the 21st Century Energy Technology Deployment Act (S. 949/H.R. 2212), which would make some reforms to the DOE Title XVII loan guarantee program and create a Clean Energy Investment Fund (the Fund) and a Clean Energy

⁶⁶³ Congressional Budget Office, *Federal Loan Guarantees for the Construction of Nuclear Power Plants* (August 2011).

⁶⁶⁴ U.S. Department of Energy, Loan Programs Office, "Title XVII," <https://www.energy.gov/lpo/title-xvii>. Accessed June 2020.

⁶⁶⁵ Ernest Moniz et al, *Leveraging the DOE Loan Program* (Energy Futures Initiative, 2018); Lexi Jackson, "Financing Novel Energy Technologies: How the Loan Programs Office Advances American Competitiveness," Bipartisan Policy Center, August 1, 2019, <https://bipartisanpolicy.org/blog/financing-novel-energy-technologies-how-the-loan-programs-office-advances-american-competitiveness>. Accessed June 2020; Congressional Research Service, *Loan Guarantees for Clean Energy Technologies: Goals, Concerns, and Policy Options* (January 2012).

⁶⁶⁶ Title V, Section 502, CLEAN Future Act discussion draft.

⁶⁶⁷ Unless otherwise noted, mentions of H.R. 2 refer to the version of the bill contained in Rules Committee Print 116-54, dated June 22, 2020. The House of Representatives was preparing to debate H.R. 2 when the Select Committee's report went to print. The Rules Committee Print is available at <https://rules.house.gov/sites/democrats.rules.house.gov/files/BILLS-116HR2-RCP116-54.pdf> and will not reflect any amendments made to the bill after June 22, 2020.

Deployment Administration (CEDA). CEDA would assume the responsibilities of the Title XVII program and expand upon the available financing mechanisms by using the Fund to issue direct loans, letters of credit, loan guarantees, insurance products, or such other credit enhancements or debt instruments for the manufacture or deployment of clean energy technologies.⁶⁶⁸ Rep. John Dingell (D-MI) offered CEDA as an amendment to the American Clean Energy and Security Act of 2009 (commonly referred to as Waxman-Markey), which subsequently passed the House on June 26, 2009.⁶⁶⁹ Sen. Jeff Bingaman and the Senate Energy and Natural Resources Committee introduced the latest iteration of CEDA as the Clean Energy Financing Act of 2011 during the 112th Congress.⁶⁷⁰

A tailored financing approach would be best to deliver technology commercialization and deployment at the scale needed to respond to the climate crisis. A national climate bank—filling in the gaps from private capital—could take on the role played by the Section 1705 program to facilitate deployment of commercialized technologies, as recommended above. To complement this national climate bank, a reformed Title XVII loan guarantee program and alternative financing entity would focus on commercializing risky technologies and proving that these first-of-a-kind technologies are deployable at scale.

Recommendation: Congress should provide financing for commercialization and early deployment of clean energy and low-emission technologies by (1) reforming the Title XVII loan guarantee program to make it more effective and (2) establishing a new financing entity, similar to CEDA, with more flexible financing mechanisms. Congress should expand project eligibility to include a wider array of innovative technologies for clean energy and emissions-reductions, including manufacturing of such technologies and energy infrastructure and its resilience. The new financing entity should focus on the first several commercial deployments of high-risk technologies, which would have difficulty securing financing in the private market, and should use a portfolio approach when selecting projects and measuring performance to better balance risk. The entity should also (1) expand financing mechanisms beyond loan guarantees to better leverage private capital and better match payments to project cash flows and (2) employ a revolving fund mechanism with initial capitalization so any payments, such as from interest or equity, can be used to finance other projects.

Committees of Jurisdiction: Science, Space, and Technology; Energy and Commerce

Building Block: Level the Playing Field for Clean Energy Technologies by Expanding the Eligibility of Publicly Traded Partnerships

In general, a corporation is subject to tax at the entity level on its profits, and shareholders are subject to a second level of tax when the corporation pays a dividend. By contrast, a partnership is not generally subject to income tax. Instead, the partners take into account their share of the partnership's income, deductions, credits, and other tax attributes in computing their own taxes. A

⁶⁶⁸ S. 949 and H.R. 2212, “21st Century Energy Technology Deployment Act,” 111th Congress, <https://www.congress.gov/bill/111th-congress/senate-bill/949> and <https://www.congress.gov/bill/111th-congress/house-bill/2212>.

⁶⁶⁹ H.R. 2454, “American Clean Energy and Security Act of 2009,” 111th Congress, <https://www.congress.gov/bill/111th-congress/house-bill/2454>.

⁶⁷⁰ S. 1510, “Clean Energy Financing Act of 2011,” 112th Congress, <https://www.congress.gov/bill/112th-congress/senate-bill/1510>.

publicly traded partnership (PTP) or master limited partnership (MLP) is a business structure that combines publicly traded equity, similar to a publicly traded corporation, with the tax treatment of a partnership. In general, partnerships that are publicly traded must earn 90% of their income from qualifying sources,⁶⁷¹ including interest, dividends, real property, commodities, and income derived from fossil fuels, minerals and natural resources.⁶⁷² The ability to combine passthrough taxation with the liquidity of a publicly traded equity provides PTPs with a unique advantage in the capital markets. Thus, certain coal, oil, and gas activities that can take advantage of this structure may have a financial edge over clean energy technologies.

Reps. Mike Thompson (D-CA) and Ron Estes (R-KS) and Sens. Chris Coons (D-DE) and Jerry Moran (R-KS) introduced the Financing Our Energy Future Act (H.R. 3249/S. 1841), which would expand qualifying income of PTPs to include renewable and alternative energy generation projects and related infrastructure for transportation or storage. House Ways and Means Committee Democrats introduced the Growing Renewable Energy and Efficiency Now (GREEN) Act of 2020 (H.R. 7330), which the House Democrats included in the Moving Forward Act (H.R. 2). Section 106 of the GREEN Act includes a provision for expanding PTP qualifying income to include green energy projects.

Recommendation: To level the playing field for clean energy technologies, Congress should expand the eligibility of PTPs to clean energy and other decarbonization technologies.

Committee of Jurisdiction: Ways and Means

Building Block: Expand the Eligibility of Private Activity Bonds to Projects That Provide a Climate Benefit

Private activity bonds (PABs) are tax-exempt municipal bonds that lower the cost of borrowing for qualified private projects that provide a public benefit. Strict rules govern what types of projects qualify. Adding projects that provide a climate benefit to the list of qualified projects could help make them easier to finance and attract private investment into a local community.

Several members have introduced legislation to expand PAB eligibility to clean and net-zero technologies. Rep. Jackie Speier (D-CA) introduced the Affordable American-made Automobile Act (H.R. 5393), which would allow the use of PABs to finance battery electric vehicle or electric vehicle battery manufacturing facilities. Sen Catherine Cortez Masto (D-NV) introduced the Greener Transportation for Communities Act (S. 2039), which would allow the use of PABs to finance zero-emission vehicle infrastructure. The House Democrats included a similar provision in Section 90107 of the Moving Forward Act (H.R. 2). Rep. Tim Burchett (R-TN) and Sens. Michael Bennet (D-CO) and Rob Portman (R-OH) introduced the Carbon Capture Improvement Act of 2019 (H.R. 3861/S. 1763), which would allow the use of PABs to finance qualified carbon dioxide capture facilities.

Recommendation: Congress should expand the type of projects eligible for financing through private activity bonds to include projects that provide a climate benefit, such as electric vehicle or battery manufacturing facilities, zero-emission vehicle infrastructure, and carbon capture facilities.

Committee of Jurisdiction: Ways and Means

⁶⁷¹ I.R.C. Section 7704(c).

⁶⁷² I.R.C. Section 7704(d).

Building Block: Address Municipal Cash-Flow Problems to Enable Investments in Climate Resilience

The fiscal sustainability of the states, local governments, tribes, and territories (SLTTs) is essential to a range of public health and safety priorities, from infrastructure to health care and disaster response. The \$3.8 trillion municipal bond market is a fundamental part of the financial system, providing states, counties, cities, and other government entities with funding needed to provide public services to their citizens. Credit rating firms are considering the effects climate change can have on SLTT budgets, particularly the effects on liquidity and ability to repay, in their credit analyses for SLTT borrowers.⁶⁷³

In April 2020, the Federal Reserve announced the establishment of the Municipal Liquidity Facility (MLF) to help SLTTs address cash flow problems associated with revenue reductions and increased expenditures due to the COVID-19 pandemic.⁶⁷⁴ Section 4003 of the Coronavirus Aid, Relief, and Economic Security (CARES) Act authorized the Federal Reserve to purchase bonds in the secondary market.⁶⁷⁵ The Department of the Treasury will use funds appropriated under the CARES Act to make an initial equity investment of \$35 billion to enable purchase of up to \$500 billion of eligible notes.⁶⁷⁶ The MLF will provide for lending to states, counties with more than 500,000 residents, cities with more than 250,000 residents, and multistate entities.⁶⁷⁷ Congress needs to take further action to ensure that smaller governments and entities will have access to funds from the MLF. Treasury needs to prioritize purchases that will help reinvigorate the municipal bond market and provide access to capital for investments in resilient infrastructure. By making these purchases, the Federal Reserve would help banks shed some of their holdings, providing more capacity to underwrite and purchase new municipal securities issuances for infrastructure projects.

Recommendation: Congress should direct the Department of the Treasury to expand eligible SLTT borrowers from the MLF to include tribes and territories and to include less populous cities and counties. Congress should also direct Treasury to prioritize MLF purchases for infrastructure projects that will increase infrastructure resilience.

Committee of Jurisdiction: Financial Services

⁶⁷³ Government Accountability Office, GAO-20-437, *Intergovernmental Issues: Key Trends and Issues Regarding State and Local Sector Finances* (March 2020).

⁶⁷⁴ Federal Reserve, “Policy Tools: Municipal Liquidity Facility,” <https://www.federalreserve.gov/monetarypolicy/muni.htm>. Accessed June 2020.

⁶⁷⁵ Coronavirus Aid, Relief, and Economic Security (CARES) Act, Pub L No 116-136.

⁶⁷⁶ Federal Reserve Bank of New York, “FAQs: Municipal Liquidity Facility,” <https://www.newyorkfed.org/markets/municipal-liquidity-facility/municipal-liquidity-facility-faq>. Accessed June 2020.

⁶⁷⁷ *Ibid.*

Expose Climate-Related Risks to Private Capital to Shift Assets Toward Climate-Smart Investments

The transition to a decarbonized, climate-resilient economy will require significant sums of investment over the next several decades. A sizable amount of private capital is available for investment, but much of this capital currently funds activities counter to addressing the climate crisis, such as fossil fuel development. Even so, investment in sustainability and resilience continues to trend upward, with \$31 trillion held in sustainable or green investments deployed globally.⁶⁷⁸ To achieve decarbonization goals and climate resilience, private investment must shift away from activities that contribute to carbon pollution and mobilize toward the deployment of clean energy technologies and resilient infrastructure.

The federal government can help accelerate this shift by exposing the climate-related physical and financial risks associated with potential investments. Understanding these risks will also help make the financial system more resilient, which further enables continued investments in transformation of the economy.

Building Block: Require Publicly Traded Companies to Disclose Climate-Related Risks

The climate crisis can pose risks to companies in multiple ways. The physical risks from climate change can be both acute, such as extreme weather events, and chronic, such as sea level rise and changes in temperature and precipitation. Non-physical risks to companies can be associated with the transition to a lower-carbon economy, such as policy and legal reforms, technological changes, and market changes as consumers seek less carbon-intensive products and solutions.⁶⁷⁹

The Securities and Exchange Commission (SEC) currently requires public companies to disclose financial statements and other “material” business information that generally includes any information that shareholders would need to make informed investment decisions. Without defined triggers, companies use their own judgement to decide what qualifies as “material,” leading to inconsistencies in and a dearth of disclosed information. As a result, shareholders and markets lack information about companies’ exposure to climate-related risks at a time that the market appears to dramatically undervalue the costs and potential impacts of the climate crisis. The SEC has issued guidance but has not mandated any specific climate-related disclosures. However, in the 10 years since the last update to SEC guidance, climate risks have become more apparent and measurable as weather-driven events have resulted in significant financial impacts, leading shareholders, investors, and regulators to increasingly demand climate-related information. Corporate entities and investors that are interested in sustainable finance would also benefit from defined environmental, social, and governance metrics that can serve as triggers for disclosures.

States, municipalities, sub-sovereigns, and other public finance issuers are also exposed to environmental risks, such as rising sea levels and flooding, or regulatory compliance risk like

⁶⁷⁸ Reed Landberg et al., “Green Finance is Now \$31 Trillion and Growing,” *Bloomberg*, June 7, 2019, <https://www.bloomberg.com/graphics/2019-green-finance>. Accessed June 2020.

⁶⁷⁹ *Recommendations of the Task Force on Climate-related Financial Disclosures* (Task Force on Climate-related Financial Disclosures, 2017).

emissions regulations. Coastal states and communities are particularly vulnerable to climate risks that robust resilience planning and adaptation measures could address to varying degrees. As public debt issuers engage capital markets for investment in infrastructure and other adaptations, issuers and investors alike will benefit from greater transparency in the risk metrics and methodologies that credit rating agencies use in rating bonds.

Rep. Sean Casten (D-IL) and Sen. Elizabeth Warren (D-MA) introduced the Climate Risk Disclosure Act of 2019 (H.R. 3623/S. 2075), which would require public companies to disclose more information about their exposure to climate-related risks to the SEC, including their direct and indirect greenhouse gas emissions, the fossil fuel-related assets that they own or manage, how their valuation would be affected if climate change continues at its current pace or if policymakers successfully restrict greenhouse gas emissions to meet the 1.5°C goal, and their risk management strategies related to the physical risks and transition risks posed by the climate crisis.

Rep. Juan Vargas (D-CA) introduced the ESG Disclosure Simplification Act of 2019 (H.R. 4329), which would establish a Sustainable Finance Advisory Committee tasked with making recommendations for what environmental, social, and governance metrics the SEC should require issuers to disclose.

Recommendation: Congress should pass legislation to require public companies to report climate risks in their financial disclosures to the SEC. Congress should direct the SEC to update its guidance to provide clear and enforceable triggers for disclosure of climate-related physical, transition, and liability risks.

Recommendation: Congress should establish a federal advisory committee on sustainable finance to make recommendations to the SEC regarding the environmental, social, and governance metrics that the SEC should require issuers to disclose in their financial statements.

Recommendation: Congress should direct the SEC, in consultation with the Department of the Treasury and the Financial Stability Oversight Council (FSOC), to require that credit rating agencies disclose their methodologies for evaluating climate risk in assessing public finance issuers' capacities to protect critical assets, provide for public services, and maintain financial stability.

Committees of Jurisdiction: Financial Services; Energy and Commerce

Building Block: Require the Federal Reserve to Identify and Manage Climate-Related Financial Risks

The climate-related physical and transition risks that affect companies' bottom lines are also likely to increase systemic risk to the financial sector by exacerbating market volatility and eroding investor confidence.⁶⁸⁰ The Bank of England began stress testing the U.K. financial system against climate risks with scenario-based testing for insurance firms.⁶⁸¹ Although U.S. financial regulators are not yet

⁶⁸⁰ Office of Rep. Sean Casten, "Become a Cosponsor of the Climate Change Financial Risk Act of 2019," Dear Colleague Letter, November 22, 2019.

⁶⁸¹ Bank of England, "Insurance Stress Test 2019," <https://www.bankofengland.co.uk/prudential-regulation/letter/2019/insurance-stress-test-2019>. Accessed June 2020.

applying similar stress testing to the financial sector or U.S. economy, data from 2016 to 2018 show that the United States' annual costs from natural disasters totaled more than \$150 billion.⁶⁸² And if temperatures rise to 4°C above preindustrial levels over the next 80 years, global economic losses could exceed \$20 trillion per year—inflicting unprecedented and likely permanent economic damage on a global scale.⁶⁸³

Rep. Sean Casten (D-IL) and Sen. Brian Schatz (D-HI) introduced the Climate Change Financial Risk Act of 2019 (H.R. 5194/S. 2903), which would require the Federal Reserve to: (1) “develop climate change scenarios for the financial stress tests,” (2) “use the scenarios to quantify how expected physical and/or transition risks would disrupt global business operations and otherwise change conditions across the economy,” and (3) conduct biennial stress tests on large financial institutions.⁶⁸⁴ The tests would “require each financial institution to create and update a qualitative plan that defines how the institution will evolve its capital planning practices to limit the financial impacts of future climate risks. These adaptations could include the orderly divestment of certain assets or the mitigation of credit risk by reducing lending to climate-exposed sectors like oil and gas.”⁶⁸⁵

In May 2020, Reps. Mike Levin (D-CA) and Sean Casten (D-IL) led a letter to Federal Reserve Chairman Jerome Powell urging “the Federal Reserve to join the Network for Greening the Financial System (NGFS) as an active member.”⁶⁸⁶ Established in 2017 by eight central banks, the NGFS aims “to help strengthen the global response required to meet the goals of the Paris agreement and to enhance the role of the financial system to manage risks and to mobilize capital for green and low-carbon investments in the broader context of environmentally sustainable development” and has grown to 65 members around the world.⁶⁸⁷

Recommendation: Congress should direct the Federal Reserve and other federal financial regulators, as appropriate, to identify and mitigate climate-related risks of large financial institutions through a comprehensive macroprudential framework. These measures should include enhanced capital, stress testing, margin, portfolio limits, and divesture to address climate-related risks.

Committees of Jurisdiction: Financial Services; Energy and Commerce

Building Block: Assess and Report on Climate Risks to Markets, Investors, and the Financial System

FSOC has not focused on climate change as a systemic risk. However, a variety of stakeholders and international bodies—including the International Monetary Fund, Bank of England, and other

⁶⁸² National Oceanic and Atmospheric Administration (NOAA), *2018's Billion Dollar Disasters in Context* (February 2019).

⁶⁸³ Tom Kompas et al, “The Effects of Climate Change on GDP by Country and the Global Economic Gains From Complying With the Paris Climate Accord,” *Earth's Future* 6, no. 8 (2018): 1153–1173.

⁶⁸⁴ Office of Rep. Sean Casten, “Become a Cosponsor of the Climate Change Financial Risk Act of 2019,” Dear Colleague Letter, November 22, 2019.

⁶⁸⁵ Ibid.

⁶⁸⁶ Reps. Mike Levin, Sean Casten, et al., Letter to the Honorable Jerome H. Powell, Chair of the Board, Federal Reserve (May 18, 2020).

⁶⁸⁷ Network for Greening the Financial System, “Origin and Purpose,” <https://www.ngfs.net/en/about-us/governance/origin-and-purpose>. Accessed June 2020.

European central banks—have raised concerns about the escalating problems arising from climate change and the need to deploy financial and monetary policy tools to mitigate risks that are affecting the financial system.⁶⁸⁸

The Climate Change Financial Risk Act of 2019 (H.R. 5194/S. 2903), introduced by Rep. Sean Casten (D-IL) and Sen. Brian Schatz (D-HI), would establish “a climate change risk subcommittee within FSOC and require it to assess and report annually on the systemic risks of climate change to the U.S. financial system.”⁶⁸⁹

The Commodity Futures Trading Commission created the Climate-Related Market Risk Subcommittee under the Market Risk Advisory Committee to identify challenges in evaluating and managing climate-related financial and market risks, including identifying how market participants can improve integration of climate-related scenario analysis, stress testing, governance initiatives, and disclosures into financial and market risk assessments and reporting.⁶⁹⁰ The Subcommittee is also considering policy initiatives and best practices for risk management and appropriate methods to assess climate-related financial and market risks and their potential impacts on agricultural production, energy, food, insurance, real estate, and other financial stability indicators.⁶⁹¹ The Subcommittee report is anticipated during summer 2020.

Recommendation: Congress should direct FSOC to study climate risks to the financial system. FSOC should include a section in each FSOC Annual Report devoted to climate risk and financial stability and make administrative and legislative recommendations for further regulation to mitigate such risks throughout the financial system, including a broad range of financial activities and institutions. For example, FSOC should investigate the climate risks of smaller financial institutions, such as local banks, which could have acute risks from regional concentration of assets.

Recommendation: Congress should direct the Commodity Futures Trading Commission to provide copies of the forthcoming report of the Climate-Related Market Risk Subcommittee under the Market Risk Advisory Committee to the House Committee on Financial Services and Committee on Energy and Commerce.

Committees of Jurisdiction: Financial Services; Agriculture

⁶⁸⁸ William Oman, *A Role for Financial and Monetary Policies in Climate Change Mitigation* (International Monetary Fund, 2019).

⁶⁸⁹ Office of Rep. Sean Casten, “Become a Cosponsor of the Climate Change Financial Risk Act of 2019,” Dear Colleague Letter, November 22, 2019.

⁶⁹⁰ Commodity Futures Trading Commission, “CFTC Commissioner Behnam Announces the Establishment of the Market Risk Advisory Committee’s Climate-Related Market Risk Subcommittee and Seeks Nominations for Membership,” Press Release, July 10, 2019.

⁶⁹¹ Ibid.

TRANSFORM U.S. INDUSTRY AND EXPAND DOMESTIC MANUFACTURING OF CLEAN ENERGY AND ZERO-EMISSION TECHNOLOGIES

The world is on the cusp of a manufacturing and industrial transformation inspired by the need to deploy more zero-emission technologies and build cleaner, more resilient infrastructure. The United States has an opportunity to establish itself as a global leader in this transformation and spur a new generation of good-paying, high-quality manufacturing jobs in the process. At the same time, American industries and workers risk being left behind if the federal government does not step up to lead this transformation. As nations around the world consider green stimulus packages to recover from the COVID-19 pandemic, the United States must take bold, proactive actions to secure America's future in manufacturing and industry.⁶⁹²

Leading this global transformation will require a national commitment to modernize and decarbonize heavy industry in the United States; develop and implement coordinated national strategies to secure critical clean technology supply chains and ensure that U.S. technological innovation translates into domestic manufacturing; and invest in carbon removal technologies that the whole world will need to achieve net-negative emissions. By making manufacturing and industrial modernization a national priority, Congress can usher in new investment in the communities that need it the most, including deindustrialized communities, and build a cleaner, safer, and more equitable industrial base that supports good jobs across the United States.

Rebuild U.S. Industry for Global Climate Leadership

The industrial sector accounts for 29% of U.S. emissions—more than any other sector—when indirect emissions from offsite electricity production are included.⁶⁹³ It is often characterized as difficult-to-decarbonize because integral components of the industrial processes are also the primary emissions sources—the burning of fuels for high-temperature process heat, the chemical reactions involved in production processes, and the feedstocks. Even if the industrial sector addressed its energy-related emissions through efficiency or fuel-switching, the non-energy emissions that are intrinsic to today's production process and the products themselves would remain. In the United States, iron and steel, cement, and chemicals and plastics are the subsectors that contribute most to non-energy industrial carbon dioxide emissions.⁶⁹⁴

Many industrial subsectors lack alternatives to current processes, and federal investment in research and development to identify new technologies remains insufficient. The capital stock is also long-lived and expensive, making it more difficult for industry subsectors to change processes or adopt new technologies. Moreover, many industrial subsectors, including iron and steel, glass, and cement,

⁶⁹² Justin Worland, "As the Rest of the World Plans a Green Recovery, America Is Once Again Falling Behind," *Time*, May 15, 2020.

⁶⁹³ U.S. Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2018* (April 2020).

⁶⁹⁴ Ibid.

are energy-intensive and trade-exposed (EITE), which means they are sensitive to energy price increases because they use a lot of energy and must compete with similar goods from overseas.

The United States must implement a comprehensive set of policies, coupled with substantial, sustained, and coordinated investments, to achieve a net-zero emissions industrial sector by midcentury while enhancing U.S. competitiveness, creating high-quality domestic jobs, and ensuring clean, safe, fair, and equitable industrial development for workers and communities. Subsector emissions performance standards will be critical to drive industrial decarbonization and generate demand for low-emission industrial goods and products. The federal government can ensure that U.S. firms and manufacturers are able to meet such standards through careful design and complementary immediate investments—including research, development, demonstration, and deployment (RDD&D); direct support for modernizing industrial facilities and manufacturing; infrastructure; and preferential procurement. Federal policies should also promote the transition to a circular economy, which aims to keep resources in a closed cycle and to eliminate waste and pollution.

As nations around the world advance toward fully decarbonized economies and vie for global leadership in clean technologies, these domestic policies and investments will strengthen U.S. competitiveness and deliver benefits to the U.S. economy.

Key Decarbonization Approaches for the Industrial Sector

Although the industrial sector is diverse, several technologies can drive emissions reductions across industry subsectors. These platform technologies include energy efficiency, electrification, fuel-switching, carbon capture, low-emission hydrogen, and materials efficiency, recirculation, and substitution.⁶⁹⁵

Traditional **energy efficiency**, like equipment standards, has helped the industrial sector reduce energy intensity, and new technologies can achieve further systems-level energy efficiency. Combined heat and power (CHP) and waste heat to power (WHP) technologies help firms use energy more efficiently by coupling power and heat generation and by using waste heat from industrial processes for electricity or to pre-heat input materials. Mechanical insulation for these and other industrial energy systems also increases energy efficiency. Advances in chemical separation can reduce required temperatures and significantly increase energy efficiency in a variety of industries, such as food processing and chemicals manufacturing. Smart manufacturing, which uses sensors, data analytics, and automated controls to optimize system efficiency and productivity, can help industries reduce their emissions and enhance their competitiveness.

As the power sector continues to decarbonize, the **electrification** of industrial processes offers a key pathway to reduce industrial emissions. Current electric technologies can replace some low-heat processes, and with continued innovation, electricity also could replace some medium- or high-heat processes and power breakthrough processes, like direct electrolysis for steel production.

⁶⁹⁵ Jeffrey Rissman et al., “Technologies and policies to decarbonize global industry: Review and assessment of mitigation drivers through 2070,” *Applied Energy* 266 (2020).

Fuel-switching to lower-emission energy sources has the potential to reduce emissions from industrial process heat. Renewable thermal technologies include solar thermal, certain biomass, geothermal energy, and renewable natural gas. Other potential low-emission heat sources include hydrogen and advanced nuclear technologies.

Carbon capture, utilization, and storage (CCUS) has the potential to drastically reduce pollution from multiple industry subsectors by capturing emissions associated with both energy use and chemical processes. Some industrial processes, like ammonia and ethanol production, have relatively pure streams of carbon dioxide, thus making capture less expensive and CCUS more feasible. Other industrial sources, however, need to develop better separation technologies for cost-effective deployment.

Carbon utilization also has the potential to provide alternative materials and feedstocks for industrial goods, but most captured carbon requires permanent storage through geologic sequestration for maximum climate benefit. CCUS encompasses a wide range of technologies and applications, which have varying climate benefits when calculating science-based net emissions reductions over the full lifecycle of the project, including its direct and indirect effects. Any efforts to advance CCUS should have clear climate benefits and be part of an overall strategy to reduce all greenhouse gas emissions. Congress should pair CCUS policy with complementary efforts to reduce traditional air and water pollution to ensure CCUS development at industrial facilities does not unintentionally increase pollution in fenceline communities.⁶⁹⁶

Hydrogen has the potential to provide medium- to high-temperature heat, enable innovative processes, such as the production of low-emission steel, and supply low-emission industrial feedstocks. However, 95% of current U.S. hydrogen production involves steam methane reforming (SMR) of natural gas, which releases carbon dioxide as a byproduct.⁶⁹⁷ Therefore, decarbonizing the production of hydrogen will be necessary for it to play an important role in reducing pollution from the industrial sector. For example, electrolysis using zero-carbon electricity from renewables or nuclear can generate zero-emission “green hydrogen;” similarly, SMR with carbon capture can generate low-emission “blue hydrogen.” As the electric grid becomes less emissions-intensive, grid-based electrolysis of hydrogen will also inherently become cleaner.

A **circular economy** framework aims to decouple economic activity from resource consumption by smart design of products and systems to keep resources in a closed cycle and eliminate waste and pollution. Demand reduction through materials efficiency and circularity can play a significant role in cutting industrial emissions and has the potential to reduce overall costs of deploying other decarbonization technologies. The main strategies include materials recirculation, product materials efficiency, materials substitution, and circular business models.

⁶⁹⁶ Fenceline communities are generally referred to as populations living near sources of pollution that experience the most immediate and highest exposure and risks.

⁶⁹⁷ U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, “Hydrogen Production: Natural Gas Reforming,” <https://www.energy.gov/eere/fuelcells/hydrogen-production-natural-gas-reforming>. Accessed June 2020.

Focus Innovation and Commercialization in Technologies to Reduce Industrial Emissions

Many of the platform technologies for reducing industrial emissions are not commercially ready because they are often too early-stage or risky to attract private sector investments and too expensive for wide uptake. Other potential breakthrough technologies have yet to be discovered. These technologies need further support in research and development, as well as demonstration and deployment, to fully realize their potential for industrial decarbonization. The federal government should invest more funding in industrial decarbonization RDD&D in a broad, coordinated manner, while also establishing targeted innovation and commercialization programs in key platform technologies that many industrial subsectors can implement. In addition to increased funding, adjusting the focus of agency missions and their organizational structures around emissions reductions can also help redirect the U.S. innovation agenda to solving the difficult problem of industrial decarbonization.

Building Block: Expand and Empower the Department of Energy Advanced Manufacturing Office to Better Address Industrial Emissions by Establishing a New Assistant Secretary of Manufacturing and Industry

The Department of Energy (DOE) Advanced Manufacturing Office (AMO) leads many programs that focus on reducing industrial energy use through new manufacturing technologies. However, AMO sits within the DOE Office of Energy Efficiency and Renewable Energy (EERE), limiting its authority to address emissions directly. Direct process emissions outside of energy use account for a significant portion of industrial emissions, and some of the technologies for reducing industrial emissions—such as carbon capture and hydrogen—lie outside of energy efficiency. Thus, key opportunities for emissions reduction exist beyond AMO’s purview.

The House Energy and Water Appropriations bill for FY2020 included report language that directed the AMO to create decarbonization roadmaps for key technology areas:

The Department shall develop decarbonization roadmaps in key technology areas to guide research and development at the Department to achieve significant, economical greenhouse gas emission reductions by 2050, including energy efficiency, process electrification, industrial electrification technologies, and carbon capture. Roadmaps should be developed in consultation with external stakeholders and relevant offices within the Department.⁶⁹⁸

Energy and Commerce Committee Chairman Frank Pallone (D-NJ), Chairman Paul Tonko (D-NY), and Chairman Bobby Rush (D-IL) introduced a discussion draft of the Climate Leadership and Environmental Action for our Nation’s (CLEAN) Future Act, which would, among other provisions, establish a DOE Assistant Secretary for Manufacturing and Industry to coordinate RDD&D for reducing industrial emissions while promoting U.S. manufacturing competitiveness.⁶⁹⁹

⁶⁹⁸ U.S. House Committee on Appropriations, H. Rept. 116-83, *Energy and Water Development and Related Agencies Appropriations Bill, 2020* (May 2019).

⁶⁹⁹ Section 501, Climate Leadership and Environmental Action for our Nation’s (CLEAN) Future Act discussion draft, House Committee on Energy and Commerce, 116th Congress, <https://energycommerce.house.gov/newsroom/press-releases/ec-leaders-release-draft-clean-future-act-legislative-text-to-achieve-a-100>.

Recommendation: To better direct federal efforts to reduce emissions from industry, Congress should lift AMO out of EERE and create and fund a new Assistant Secretary for Manufacturing and Industry within DOE, in coordination with broader DOE reorganization recommended in the section “Drive Innovation and Deployment of Clean Energy and Deep Decarbonization Technologies.” Congress should include emissions reductions as part of the mission of the new Office of Manufacturing and Industry and increase its resources to expand beyond AMO’s activities in energy efficiency. In addition to creating decarbonization roadmaps, this new assistant secretary should oversee the existing and new industrial efficiency and decarbonization RDD&D initiatives in the recommendations below.

Committees of Jurisdiction: Science, Space, and Technology; Energy and Commerce

Building Block: Increase Investment and Coordination in Research, Development, Demonstration, and Deployment of Technologies with the Specific Objective of Reducing Emissions from Industrial Sources

DOE already invests in some R&D efforts that will be helpful in decarbonizing the industrial sector, such as carbon capture and storage (CCS), but its efforts lack a targeted approach. DOE needs to lead a cross-agency, coordinated federal RDD&D program with the stated purpose of reducing emissions from key industrial subsectors.

Reps. Sean Casten (D-IL) and David McKinley (R-WV) and Sens. Sheldon Whitehouse (D-RI) and Shelley Moore Capito (R-WV) introduced the bipartisan Clean Industrial Technology Act of 2019 (H.R. 4230/S. 2300), which would establish a cross-agency, DOE-led research, development, and demonstration (RD&D) program to develop technologies that will help reduce emissions from industrial sources; a Federal Advisory Committee to develop and guide progress of the program and to create industry-specific emissions reductions roadmaps; and a technical assistance program to implement industrial emissions reductions.

Recommendation: Congress should pass legislation to bolster and guide federal RDD&D funding and to create a cross-agency program, led by DOE and the new Assistant Secretary for Manufacturing and Industry, that focuses on technologies that enable emissions reductions in the industrial sector.

Committee of Jurisdiction: Science, Space, and Technology

Building Block: Establish and Expand Targeted Research Programs and Public-Private Partnerships for Developing and Deploying Industrial Efficiency Technologies

Traditional industrial efficiency, like equipment standards, has helped the industrial sector reduce energy intensity, and new technologies can lead to further systems-level energy efficiency. Smart manufacturing technologies can help industries become more energy and materials efficient, reducing their emissions and enhancing their competitiveness. Applying a systems integration approach to energy and materials efficiency beyond individual processes, such as to entire buildings or whole facilities co-located in industrial parks, can reveal additional opportunities to maximize industrial efficiency.

DOE has several existing programs that provide technical assistance to manufacturers in order to improve their facilities' energy efficiency. DOE's CHP Technical Assistance Partnerships encourage deployment of CHP, WHP, and district energy technologies through end-user engagement, stakeholder engagement, and technical services.⁷⁰⁰ DOE Industrial Assessment Centers (IACs), housed at 31 universities around the country, provide no-cost assessments to small- and medium-sized manufacturers to "identify opportunities to improve productivity and competitiveness, reduce waste, and save energy."⁷⁰¹ The DOE Better Plants Program helps its more than 230 partner companies significantly improve their energy efficiency and competitiveness through setting specific energy intensity reduction goals, saving a cumulative \$6.7 billion through 2018.⁷⁰² Finally, DOE's ISO 50001 Ready program provides no-cost resources for facilities to implement ISO 50001, an international voluntary standard for energy management systems, and promotes continued energy performance improvement.⁷⁰³

The Energy and Commerce Committee's discussion draft of the CLEAN Future Act would formally authorize and fund the DOE CHP Technical Assistance Partnership Program.⁷⁰⁴

Title II of the bipartisan Energy Savings and Industrial Competitiveness Act of 2019 (H.R. 3962/S. 2137), introduced by Reps. Peter Welch (D-VT) and David McKinley (R-WV) and Sens. Rob Portman (D-OH) and Jeanne Shaheen (D-NH), would (1) accelerate the development, demonstration, and deployment of industrial energy efficiency technologies through the authorization and expansion of Industrial Research and Assessment Centers and (2) establish a Sustainable Manufacturing Initiative, which would include technical assessments for manufacturers and a research and development program for new sustainable manufacturing technologies.

Reps. Peter Welch (D-VT) and Tom Reed (R-NY) and Sens. Jeanne Shaheen (D-NH) and Lamar Alexander (R-TN) introduced the bipartisan Smart Manufacturing Leadership Act (H.R. 1633/S. 715), which would direct DOE to (1) develop a national smart manufacturing plan, (2) provide assistance to small- and medium-sized manufacturers for implementing smart manufacturing technologies, and (3) give grants to states for establishing smart manufacturing programs. The CLEAN Future Act discussion draft also includes a similar provision on a national smart manufacturing plan.⁷⁰⁵

Recommendation: Congress should pass legislation to advance the deployment of industrial efficiency and smart manufacturing technologies through expanding existing DOE programs and creating new RDD&D programs and public-private partnerships. Where applicable, programs should encourage systems integration to achieve energy and materials efficiency. The new Assistant Secretary for Manufacturing and Industry should facilitate coordination between these various

⁷⁰⁰ U.S. Department of Energy, "CHP Technical Assistance Partnerships (CHP TAPs)," <https://betterbuildingssolutioncenter.energy.gov/chp/chp-taps>. Accessed June 2020.

⁷⁰¹ U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, "Industrial Assessment Centers (IACs)," <https://www.energy.gov/eere/amo/industrial-assessment-centers-iacs>. Accessed June 2020.

⁷⁰² U.S. Department of Energy, "Overview: Better Buildings, Better Plants," <https://betterbuildingssolutioncenter.energy.gov/sites/default/files/attachments/Better%20Plants%20Overview%20-%20February%202020.pdf>. Accessed June 2020.

⁷⁰³ U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, "50001 Ready Program," <https://www.energy.gov/eere/amo/50001-ready-program>. Accessed June 2020.

⁷⁰⁴ Title V, Section 511, CLEAN Future Act discussion draft.

⁷⁰⁵ Title V, Section 512, CLEAN Future Act discussion draft.

programs and ensure that manufacturers are aware of all available programs and opportunities to reduce energy use and emissions.

Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Committees of Jurisdiction: Science, Space, and Technology; Energy and Commerce

Building Block: Establish Targeted RDD&D Programs for Electrification and Low- and Zero-Emission Industrial Heat Technologies

Many different industrial facilities require process heat at low, medium, and high temperatures. To fully address industrial emissions, these sources of heat will need to be decarbonized through electrification (dependent on achieving a net-zero electric grid, addressed elsewhere in this report), fuel-switching to low-emission heat sources, or CCUS.

The technologies to decarbonize the industrial sector are at different stages of development. Many low- and zero-emission medium- and high-heat sources, as well as the equipment needed to use them, are not yet cost-effective for widespread deployment in industry. Advancement of low-emission fuels generation, transport, and storage, as well as thermal storage capable of maintaining high temperatures, would help make these low- and zero-emission heat sources more flexible. For electrification of industrial heat to succeed, policymakers will need to address grid integration costs and advance development of longer-lasting energy storage. Although some existing programs support R&D for these technologies, they would benefit from a focused RDD&D program designed specifically to reduce emissions from industrial process heat. Because of the frequent geographical concentration of industry subsectors, establishing partnerships at these industrial clusters to demonstrate these technologies would help catalyze their expanded deployment.

Recommendation: Congress should direct and fund DOE to support targeted innovation and deployment in technologies for industrial electrification, low- and zero-emission heat sources, and thermal storage. As part of this program, the new Office of Manufacturing and Industry should establish grants for research collaborations and consortia at industrial clusters to support pilot and demonstration projects of these technologies.

Committees of Jurisdiction: Science, Space, and Technology; Energy and Commerce

Building Block: Strengthen and Expand RDD&D Programs for Industrial Carbon Capture and Carbon Utilization for Industrial Feedstocks

Federal R&D programs for carbon capture have historically focused on the power sector, specifically for coal-fired power plants, as directed in the Energy Policy Act of 2005.⁷⁰⁶ While there may be significant potential to export coal CCUS technology to countries like China, which has a large, young

⁷⁰⁶ Energy Policy Act of 2005, Pub L No 109-58.

fleet of coal plants, carbon capture is most promising in the United States for existing natural gas-fired power plants and industrial facilities.⁷⁰⁷ Industrial CCUS will be critical to achieve net-zero emissions by 2050 and net-negative emissions during the second half of the century. Industrial CCUS would benefit from Congress strengthening and expanding existing RDD&D programs to address the technologies for capture at various types of industrial facilities, as well as permanent storage and utilization of the captured carbon. Several potential uses of captured carbon can also help provide lower-emission alternatives to current industrial feedstocks, such as concrete building materials and synthetic hydrocarbons for fuels, chemicals, and plastics. New federal RDD&D programs for carbon utilization would help these nascent technologies develop and scale.

Reps. Marc Veasey (D-TX) and David Schweikert (R-AZ) introduced the bipartisan Fossil Energy Research and Development Act of 2019 (H.R. 3607), which would reauthorize DOE's Fossil Energy Office to focus on CCUS research, development, demonstration, and commercialization for both the power and industrial sectors through carbon capture pilot test centers and large-scale demonstrations. The bill would also authorize programs for carbon storage validation and testing and for carbon utilization. Sens. Joe Manchin (D-WV) and Lisa Murkowski (R-AK) introduced the bipartisan Enhancing Fossil Fuel Energy Carbon Technology (EFFECT) Act of 2019 (S. 1201), which would also establish DOE programs for CCUS.

The Energy and Commerce Committee's discussion draft of the CLEAN Future Act would similarly reauthorize DOE's Fossil Energy Office and create a DOE carbon capture and utilization technology commercialization program.⁷⁰⁸ The program would fund front-end engineering design studies and commercial demonstration projects for advanced carbon capture.

Recommendation: Congress should pass legislation directing DOE to expand RDD&D support for carbon capture technologies, especially for the industrial sector and for carbon utilization for industrial feedstocks. Support for large-scale demonstration projects will be particularly important and should facilitate commercialization of affordable carbon capture retrofit technologies for export to the developing world. Any projects receiving federal support should meet high standards for achieving a clear climate benefit and maintain robust environmental health, safety, and labor standards.

Committees of Jurisdiction: Science, Space, and Technology; Energy and Commerce

Building Block: Strengthen and Expand RDD&D Programs for Low- and Zero-Emission Hydrogen and Its Use in Industry

Hydrogen is the main candidate for low- and zero-emission industrial fuels and can be combusted to provide zero-emission heat. Other potential uses of hydrogen in industry include the production of low-emission steel and use as a complementary feedstock to captured carbon for synthetic hydrocarbon chemicals. To be truly carbon-neutral, the production of synthetic fuels from direct air capture (DAC) (described further in the section titled "Develop, Manufacture, and Deploy Cutting-Edge

⁷⁰⁷ International Energy Agency, *Ready for CCS Retrofit: The Potential for Equipping China's Existing Coal Fleet with Carbon Capture and Storage* (May 2016).

⁷⁰⁸ Title V, Section 503, CLEAN Future Act discussion draft.

Carbon Removal Technology”) must also use zero-emission hydrogen. However, federal R&D programs for hydrogen have typically focused on hydrogen fuel cells for transportation.

Expanding hydrogen R&D to include industrial uses and creating new programs to support pilots, demonstration, and deployment of hydrogen fuel-switching in industrial facilities will be critical for increasing hydrogen use in industry. Developing new materials for cost-effective and safe hydrogen storage will also be crucial for industrial hydrogen deployment. There is a need for further RDD&D for reducing the cost of low- and zero-emission hydrogen production techniques, such as innovative electrolyzer materials and manufacturing for electrolysis using zero-emission electricity.

DOE’s H2@Scale initiative aims to explore the potential for broader hydrogen production and utilization, primarily for resilience of power generation and transmission. In January 2020, DOE announced \$64 million in funding within H2@Scale for innovations to build new markets for hydrogen.⁷⁰⁹

Recommendation: Congress should increase funding for DOE to strengthen and expand hydrogen RDD&D to support innovation in low- and zero-emission hydrogen production and storage and create new initiatives for industrial uses of hydrogen in feedstocks, industrial processes, and heating. DOE should ensure the safety of hydrogen technologies in any programs supporting innovation of low- and zero-emission fuels.

Committees of Jurisdiction: Science, Space, and Technology; Energy and Commerce

Building Block: Establish RDD&D Programs for Industrial Feedstocks and Alternative Materials With Lower Emissions and Net-Zero or Net-Negative Emissions

Innovation for reducing emissions associated with key industrial feedstocks and for low- and zero-emission alternatives is another important focus area in order to completely decarbonize industry. These potential technologies include low-emission hydrogen, renewable biomass feedstocks and alternative materials, recycled materials, and multiple uses for captured carbon. Depending on the lifetime of the end-use product, some of these technologies may effectively store carbon, contributing to net-negative emissions. For example, buildings composed of cross-laminated timber or concrete made with captured carbon can store hundreds of metric tons of carbon dioxide.⁷¹⁰

In June 2020, the House Democrats introduced a comprehensive infrastructure bill, the Moving Forward Act (H.R. 2).⁷¹¹ Section 5102 of this bill would establish a university grant program for the research and development of green construction material designs and practices that would reduce

⁷⁰⁹ U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, “Energy Department Announces Up to \$64M to Advance H2@Scale in New Markets,” <https://www.energy.gov/eere/articles/energy-department-announces-64m-advance-h2scale-new-markets>. Accessed June 2020.

⁷¹⁰ Bullitt Center, “Structural Materials,” <http://www.bullittcenter.org/building/building-features/tall-timbers>. Accessed June 2020; Carbon Cure, “725 Ponce de Leon Ave – Atlanta, GA,” <https://www.carboncure.com/case-studies/2018/5/26/725-ponce>. Accessed June 2020.

⁷¹¹ Unless otherwise noted, mentions of H.R. 2 refer to the version of the bill contained in Rules Committee Print 116-54, dated June 22, 2020. The House of Representatives was preparing to debate H.R. 2 when the Select Committee’s report went to print. The Rules Committee Print is available at <https://rules.house.gov/sites/democrats.rules.house.gov/files/BILLS-116HR2-RCP116-54.pdf> and will not reflect any amendments made to the bill after June 22, 2020.

and/or sequester greenhouse gas emissions during the production and construction process. Section 5202 of the bill would accelerate the deployment of innovative pavement designs, materials, and practices that would reduce greenhouse gas emissions through the Federal Highway Administration Technology and Innovation Deployment Program.

Critical minerals—rare earth elements and other minerals that are key resources for energy and advanced technologies—are priority industrial feedstocks that need further RDD&D to ensure a secure and sustainable supply. An interruption to these mineral supplies could increase the cost of batteries and other clean energy technologies, slowing the transition to a net-zero economy. Rep. Eric Swalwell (D-CA) introduced the Securing Energy Critical Elements and American Jobs Act of 2019 (H.R. 4481), which would establish R&D programs to find ways to use critical elements more effectively and substitute and recycle critical minerals.

The chemical industry also provides essential feedstocks for manufacturing and industry but currently derives much of its raw inputs from fossil fuels. Thus, full decarbonization of industrial chemicals demands increased RDD&D. Sustainable chemistry is one framework for tackling this challenge. The Organization for Economic Cooperation and Development defines sustainable chemistry as “a scientific concept that seeks to improve the efficiency with which natural resources are used to meet human needs for chemical products and services” and that “encompasses the design, manufacture and use of efficient, effective, safe and more environmentally benign chemical products and processes.”⁷¹² Reps. Daniel Lipinski (D-IL) and John Moolenaar (R-MI) introduced and the House passed the Sustainable Chemistry Research and Development Act of 2019 (H.R. 2051), which would improve federal coordination of programs in sustainable chemistry, including research, development, demonstration, technology transfer, and commercialization of sustainable chemistry technologies. Sens. Chris Coons (D-DE) and Susan Collins (R-ME) introduced a similar bill of the same title in the Senate (S. 999).

Recommendation: Congress should establish targeted RDD&D programs to support innovation in industrial feedstocks and alternative materials with lower emissions and net-zero or net-negative emissions. These programs should address feedstocks for buildings and infrastructure, the chemical industry, and energy and advanced technologies. They should also consider the entire material lifecycle with regard to emissions reductions and other environmental impacts, including sustainable practices for renewable feedstocks, and prioritize innovation in materials efficiency.

Committees of Jurisdiction: Science, Space, and Technology; Energy and Commerce; Transportation and Infrastructure

Building Block: Develop a Circular Economy Roadmap for the United States

A circular economy framework, which aims to keep resources in a closed cycle and to eliminate waste and pollution, has the potential to significantly reduce industrial emissions in a cost-effective way. However, transitioning to a circular economy would require significant changes in how society creates, designs, uses, and disposes of materials and goods and could mean different systemic transformations for different subsectors. Thus, to inform which policies will lead to a more effective

⁷¹² Organization for Economic Cooperation and Development, “Sustainable Chemistry,” <http://www.oecd.org/chemicalsafety/risk-management/sustainablechemistry.htm>. Accessed June 2020.

and just transition, the United States needs a better understanding of how to incorporate circular economy principles into various industries.

For heavy industry, implementing a circular economy framework in the cement, steel, aluminum, and plastics subsectors could reduce global carbon dioxide emissions by 40% in 2050, compared to business as usual.⁷¹³ The main strategies for accomplishing this include materials recirculation, product materials efficiency, materials substitution, and circular business models. Executing these strategies will take different forms for each subsector, and understanding how material flows, product uses, and business models will need to change for different industries (e.g., steel vs. plastics) can inform which policies need to be put in place and what types of infrastructure will be needed (or not needed) to facilitate this circular transition. For clean energy and other advanced technologies, understanding how to apply a circular economy framework for critical minerals will also be a crucial challenge.

Recommendation: Congress should draft legislation to task relevant agencies, including DOE, the Environmental Protection Agency (EPA), and the National Institute of Standards and Technology (NIST), with developing a U.S. circular economy roadmap that can be used to guide efforts to transition to a circular economy. The agencies should leverage efforts from existing programs, such as DOE's Reducing EMbodied-Energy And Decreasing Emissions (REMADE) Institute, and consult outside experts and industry stakeholders. The roadmap should include a vision for how key industrial subsectors would fit into a circular economy, key milestones and targets for these subsectors, and recommendations on specific federal policies needed to drive this transition, including options for financing a circular economy model. Policies that should be considered and refined include R&D support for specific technologies and materials; targets or requirements for recycled content of certain goods; standards and/or incentives to encourage better product design, longer product lifetimes, extended producer responsibility, refillable packaging and products, and new service-based and sharing business models; preferential procurement; and fees and/or bans on certain materials, products, waste streams, and waste processing methods.

Committees of Jurisdiction: Science, Space, and Technology; Energy and Commerce

Building Block: Support Demonstration and Commercialization of Technologies for Reducing Industrial Emissions

In addition to specific RDD&D programs for the platform technologies described above, all technologies for reducing industrial emissions would benefit from demonstration and commercialization support and funding for which other clean energy technologies, such as electricity generation and transportation, are eligible. For industrial sector technologies, addressing the entire supply chain and closing the gap between pilot development and commercial scale-up will be essential. Because large-scale demonstrations can be too capital-intensive and risky for a single industrial firm to undertake, initiatives that enable the creation of consortia may be particularly useful for industrial sector projects. These partnerships could utilize tools like risk-sharing mechanisms, resource pooling, and funding pre-competitive pilots.

⁷¹³ Energy Transitions Commission, *Mission Possible: Reaching Net-Zero Carbon Emissions from Harder-to-Abate Sectors by Mid-Century* (November 2018).

Recommendation: Congress should ensure that technologies and infrastructure to reduce industrial emissions are eligible for any broad clean energy demonstration and commercialization programs, such as regional energy innovation partnerships, DOE large-scale demonstration funding, prizes, or a DOE foundation, as discussed in the section “Drive Innovation and Deployment of Clean Energy and Deep Decarbonization Technologies.”

Committees of Jurisdiction: Science, Space, and Technology; Energy and Commerce

Financially Support Deployment of Low-Emission and Industrial Efficiency Technologies

Transforming the industrial sector to achieve net-zero emissions will require massive, proactive public and private investment to deploy the breakthrough and platform technologies described above. The federal government must implement a comprehensive suite of direct support, financial incentives, and programs that leverage private financing to ensure that all industrial facilities and manufacturers—large and small—have the tools and resources to reduce emissions while strengthening their businesses, creating and sustaining high-quality, good-paying jobs, and improving their local communities.

Some technologies that would reduce industrial emissions are already commercially available but encounter barriers to widespread deployment, such as high costs, lack of needed infrastructure, lock-in of incumbent technologies, and market distortions such as fossil fuel subsidies. These lower-emission technologies need financial support to increase market penetration and reduce costs. Depending on the characteristics of a technology, different types of support could be more effective, ranging from grants and rebates to tax incentives to direct or indirect debt and equity financing. For example, a combination of all three types at varying times has helped renewable electricity technologies, like wind and solar, become cost-effective options in the electricity market.

For industrial firms, several factors determine the most effective support mechanism, including size of the firm, role in the supply chain, level of technology readiness and risk, capital costs, and the expected revenue model. Whatever the type of funding support, its effectiveness will depend on long-term predictability and transparency. In general, using performance-based incentives or tying support to outcomes can help ensure the efficient spending of government funds. When designing incentives, it is also important to avoid technology lock-in and balance solutions that quickly draw down emissions and those that will enable a net-zero emissions economy.

Building Block: Establish Revolving Loan Funds to Support Energy Efficiency and Industrial Process Modernization and Incentivize Manufacturing of Industrial Efficiency Technologies

Small- and medium-sized firms often have difficulty freeing up internal capital and accessing cheap capital externally for costly energy efficiency or process modernization upgrades or for manufacturing equipment retooling for industrial efficiency. A federally backed revolving loan fund can help supplement private sector capital and enable small- and medium-sized firms to take on projects that would help them reduce emissions from their facilities and from the industrial sector more broadly. Making the fund revolving would ensure it is self-sustaining after initial capitalization.

Recommendation: Congress should draft legislation to establish revolving loan funds for industrial efficiency upgrades, process modernization to reduce emissions, and related equipment manufacturing. Congress should coordinate such efforts with a national climate bank, as recommended in the section titled “Drive Innovation and Deployment of Clean Energy and Deep Decarbonization Technologies.” However, Congress should consider whether industry needs dedicated funds (rather than simply being eligible for funding under a national climate bank) to accommodate different risks and capital requirements that may be unique to the industrial sector. Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Committee of Jurisdiction: Energy and Commerce

Building Block: Provide Direct Grants and Rebates to Deploy Industrial Efficiency Technologies

Industrial efficiency equipment upgrades have high upfront costs and require turnover of capital stock with long lifetimes. Industrial firms also negotiate low energy rates, which makes justifying high-cost energy efficiency upgrades more difficult than in other sectors. Furthermore, firms receive internal pressure to only invest in projects with high rates of return and two-year paybacks and are often financially discouraged from upgrading or retrofitting their equipment if the current equipment has not fully depreciated. In these instances, direct grants or rebates may be the most appropriate funding mechanism to encourage firms to widely deploy these technologies.

Title II of the Energy Savings and Industrial Competitiveness Act of 2019 (H.R. 3962/S. 2137), introduced by Reps. Peter Welch (D-VT) and David McKinley (R-WV) and Sens. Rob Portman (R-OH) and Jeanne Shaheen (D-NH), would establish rebate programs for electric motor and electronic control systems that enable reductions in energy and for energy-efficient transformers. The CLEAN Future Act discussion draft also includes similar rebate provisions.⁷¹⁴ The House Democrats included the energy-efficient transformer rebate program in Section 33112 of their infrastructure bill, the Moving Forward Act (H.R. 2).

In the 115th Congress, Rep. Matt Cartwright (D-PA) and Sen. Jeff Merkley (D-OR) introduced the Job Creation through Energy Efficient Manufacturing Act (H.R. 5042/S. 1687), which would provide grants for carrying out energy efficiency improvement projects to reduce electricity or natural gas use by small- and medium-sized manufacturers.⁷¹⁵ Any projects receiving grant funding would have to meet certain labor requirements and would be required to use iron or steel products and manufactured products produced in the United States.

Recommendation: Congress should pass legislation to provide grants and rebates to industrial firms for deploying commercially available industrial efficiency technologies with high upfront capital costs.

⁷¹⁴ Title II, Section 237 and Title V, Section 513, CLEAN Future Act discussion draft.

⁷¹⁵ H.R. 5042 and S. 1687, “Job Creation through Energy Efficient Manufacturing Act,” 115th Congress, <https://www.congress.gov/bill/115th-congress/house-bill/5042> and <https://www.congress.gov/bill/115th-congress/senate-bill/1687>.

Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Committees of Jurisdiction: Energy and Commerce; Science, Space, and Technology

Building Block: Provide Tax Incentives for Industrial Efficiency, Such As CHP, WHP, and Mechanical Insulation

Tax credits can help incentivize firms to deploy energy-efficient technologies in industry that are already commercially available—like CHP, WHP, and mechanical insulation—further bringing down their costs and making firms more competitive.

Reps. Mike Thompson (D-CA) and Paul Cook (R-CA) and Sen. Catherine Cortez Masto (D-NV) introduced the Renewable Energy Extension Act of 2019 (H.R. 3961/S. 2289), which would extend the Section 48 investment tax credit for CHP for five years. Rep. Bradley Schneider (D-IL) introduced the Waste Heat to Power Investment Tax Credit Act of 2019 (H.R. 5155), which would add WHP as an eligible property in the Section 48 investment tax credit. Sen. Tom Carper (D-DE) introduced a similar bill, the Waste Heat to Power Investment Tax Credit Act (S. 2283). House Ways and Means Committee Democrats introduced the Growing Renewable Energy and Efficiency Now (GREEN) Act of 2020 (H.R. 7330), which House Democrats included in the Moving Forward Act (H.R. 2). Section 102 of the GREEN Act includes an extension of the CHP tax credit and addition of the WHP tax credit. Section 104 of the bill would also provide a direct pay option for these tax credits.

Rep. Linda Sanchez (D-CA) introduced the Mechanical Insulation Installation Incentive Act of 2019 (H.R. 5166), which would establish a 10% tax credit for the labor costs of installing mechanical insulation. The GREEN Act of 2020 (H.R. 7330) incorporates this provision in Section 502.

Recommendation: Congress should pass legislation to extend the CHP tax credit, expand investment tax credits to include WHP, and establish a tax credit for installing mechanical insulation. Congress should provide a direct pay option for these tax credits.

Committee of Jurisdiction: Ways and Means

Building Block: Provide Tax Incentives for Industrial Carbon Capture and Utilization That Provides a Climate Benefit

Tax incentives can help make industrial CCUS projects cost-effective, increasing their deployment and associated emissions reductions. This could include creating new tax credits, extending existing tax credits, and enhancing the financial feasibility of existing incentives.

Industrial carbon capture projects can qualify for the existing 45Q tax credit for carbon oxide sequestration. The Internal Revenue Service (IRS), however, took more than two years to release 45Q implementation guidance, which may prevent some projects from commencing construction before the tax credit expires. Furthermore, because industrial facilities generally emit less carbon dioxide

annually than fossil fuel power plants, industrial capture projects would receive less annual revenue from the tax credit, making them harder to finance overall. Additional adjustments to the 45Q tax credit could help make industrial carbon capture more economically viable, which the industrial sector will need to fully decarbonize.

Rep. Terri Sewell (D-AL) introduced the Carbon Capture and Sequestration Extension Act of 2019 (H.R. 5156), which would extend the commence construction deadline for the Section 45Q tax credit for carbon oxide sequestration through 2024. Section 103 of the GREEN Act of 2020 (H.R. 7330) would extend the commence construction deadline for the Section 45Q tax credit through 2025, and Section 104 would provide a direct pay option for this tax credit.

Recommendation: Congress should draft legislation to help support deployment of carbon capture in hard-to-abate sectors, especially in the industrial sector and for carbon utilization for industrial feedstocks. This should include extending the 45Q tax credit to provide long-term investment certainty for carbon capture projects that provide a clear climate benefit over the lifecycle of the project, including its direct and indirect effects, and lowering the capture threshold for carbon utilization. Congress should provide a direct pay option for the 45Q tax credit. Congress should also consider extending the time period for claiming the tax credit, increasing the value of the tax credit, and enacting investment tax credits specifically for industrial carbon capture and carbon utilization projects. The IRS should ensure that taxpayers claiming the 45Q tax credit meet all EPA and IRS requirements for safe and secure carbon storage, as detailed further below.

Committee of Jurisdiction: Ways and Means

Building Block: Provide Tax Incentives for Industrial Hydrogen Use and Low- and Zero-Emission Hydrogen Production

While there are potential uses for hydrogen throughout heavy industry to help reduce industrial emissions, this would require a significant increase in hydrogen production, which would also need to be decarbonized to maximize the climate benefit. Thus, demand and supply for green hydrogen must increase simultaneously, creating a chicken-and-egg problem whereby one cannot occur before the other. Moreover, fuel-switching to hydrogen in industrial processes and producing green hydrogen are high-cost alternatives. Current commercial methods to produce green hydrogen cost two to eight times more than conventional hydrogen production from steam methane reforming without CCS.⁷¹⁶

An investment tax credit (ITC) for switching industrial processes to using hydrogen would help create demand for low- and zero-emission hydrogen. Meanwhile, a production tax credit (PTC) for low- and zero-emission hydrogen would help increase supply of cleaner hydrogen. Congress needs to incentivize demand and supply simultaneously and tie these incentives to the use of low- and zero-emission fuels and feedstocks to overcome the chicken-and-egg problem.

The Energy Storage Tax Incentive and Deployment Act of 2019 (H.R. 2096/S. 1142), introduced by Rep. Mike Doyle (D-PA) and Sens. Martin Heinrich (D-NM) and Cory Gardner (R-CO), would extend the 30% energy ITC to energy storage technologies, including hydrogen. Section 102 of the GREEN Act of 2020

⁷¹⁶ Julio Friedmann et al, *Low-Carbon Heat Solutions for Heavy Industry: Sources, Options, and Costs Today* (Center on Global Energy Policy, 2019).

(H.R. 7330) also includes this provision. This tax credit focuses on incentivizing energy storage deployment, a critical element of a net-zero emissions grid, as detailed in the section titled “Build a Cleaner and More Resilient Electricity Sector.” Thus, while it could help incentivize increased production of hydrogen, such a tax credit would only apply to hydrogen use in the power sector.

In general, a PTC would be more cost-efficient than an ITC to stimulate green hydrogen production for industrial uses because it would incentivize actual production rather than capital investments.⁷¹⁷ For example, with an ITC under variable, real-time electricity costs, hydrogen producers may choose to run their electrolyzers less during times of higher electricity costs because they have lower fixed costs to repay. Meanwhile, a PTC would not affect producers’ electrolyzer utilization decisions, leading to lower hydrogen production costs. Even at constant high or low electricity costs, an ITC would perform as efficiently as, but not more efficiently than, a PTC of equivalent value because producers would not factor electricity costs into utilization decisions. Furthermore, an energy storage ITC that does not differentiate between power sources of the electricity used for hydrogen electrolysis and allows electrified steam methane reforming to qualify without CCS would mean that the hydrogen produced could still result in significant emissions.⁷¹⁸

Recommendation: Congress should draft legislation to provide a technology-neutral PTC for low- and zero-emission hydrogen production. To encourage further emissions reductions, the value of the PTC should be tiered based on the emissions displaced in production and the end-use application.⁷¹⁹ Congress should harmonize the PTC with other tax credits to avoid a double benefit, such as for the production of blue hydrogen that would also be eligible for the 45Q tax credit for CCUS or the use of hydrogen in the power sector that could be eligible for an energy storage tax credit.

Recommendation: Congress should draft legislation to provide an ITC for industrial hydrogen end uses, such as equipment upgrades at facilities that switch from emissions-intensive heating or processes to using hydrogen, not including equipment for hydrogen production. To ensure emissions reductions, Congress should tie the ITC to the use of low- or zero-emission hydrogen.

Congress should provide a direct pay option for the tax credits recommended above.

Committee of Jurisdiction: Ways and Means

Building Block: Enable Financing for Reducing Industrial Emissions

A broad array of other financing opportunities would help deploy emissions reduction technologies in the industrial sector through targeted portfolio investments of public capital and by leveraging private capital through low-interest loans and technology de-risking.

Recommendation: Congress should ensure that projects and infrastructure to reduce industrial emissions are eligible for any broad clean energy and climate financing mechanisms, such as master

⁷¹⁷ Jay Bartlett et al, *Tax Credit Considerations for Decarbonized Hydrogen in the Industrial Sector* (Resources for the Future, 2020), Pre-publication version shared with the Select Committee.

⁷¹⁸ Jay Bartlett et al, *Investment Tax Credits for Hydrogen Storage* (Resources for the Future, 2020).

⁷¹⁹ Jay Bartlett et al, *Tax Credit Considerations for Decarbonized Hydrogen in the Industrial Sector* (Resources for the Future, 2020), Pre-publication version shared with the Select Committee.

limited partnerships, private activity bonds, a national climate bank, the DOE Title XVII loan guarantee program, or a Clean Energy Deployment Administration, as discussed in the section “Drive Innovation and Deployment of Clean Energy and Deep Decarbonization Technologies.”

Committees of Jurisdiction: Energy and Commerce; Ways and Means; Science, Space, and Technology

Build Physical and Knowledge Infrastructure to Enable Industrial Decarbonization

Even if individual facilities have the technical and financial capacity to upgrade their equipment and processes to reduce emissions, many of the platform technologies for decarbonizing industry will require development of infrastructure beyond the scope of individual plants and firms. The switch to new technologies may make existing infrastructure obsolete. In general, leveraging existing infrastructure as much as possible, avoiding technology lock-in, and developing multiuse infrastructure would help make new infrastructure development more efficient and prevent additional stranded assets. For example, existing fossil fuel-related infrastructure can be upgraded for hydrogen or carbon capture.⁷²⁰ Infrastructure should also move toward integrated systems of industrial facilities that embody a circular economy model, whereby waste energy and materials from one industrial process can be used as inputs for another. Beyond physical infrastructure, new knowledge infrastructure—in the form of worker education and training, and data gathering and analysis—will also be crucial in implementing technologies for reducing industrial emissions. Digitalization and information-sharing of emissions intensity and other environmental data will be fundamental to enabling differentiation of industrial goods.

Building Block: Facilitate the Development of Robust Materials Recovery and Recycling Infrastructure

In order to reduce demand for new materials and their associated emissions, industry will need to recover existing materials and goods after use and properly sort and recycle them for use in new products. This will require infrastructure to collect goods at end-of-life, to disassemble and sort various material components, to chemically recycle certain materials into original molecular building blocks, and to transport these materials between recycling steps and to manufacturers as feedstocks.⁷²¹ In addition to these new physical systems, infrastructure for tracking information and data related to the properties of materials and product components will be critical to enable effective sorting and recycling.

To transform the United States into a truly circular economy, material recovery and recycling infrastructure will need to encompass all manufactured goods and packaging at all steps of the recycling process. While expanding and standardizing existing local recycling infrastructure for materials like paper, plastic, glass, and aluminum will play an important role in increasing material

⁷²⁰ Energy Futures Initiative, *Optionality, Flexibility & Innovation: Pathways for Deep Decarbonization in California* (2019).

⁷²¹ Today, recyclable scrap and waste materials are often shipped overseas, but this is becoming more difficult as countries like China restrict the amount and types of materials they will accept. Shipping recyclable materials overseas also creates transportation emissions, contributes to pollution in developing countries, and increases the challenge of circularizing the domestic economy. A lack of domestic recycling infrastructure has resulted in recyclables being burned or landfilled when no foreign market is available.

recovery, the country also will need new domestic infrastructure for turning these materials into new products. Furthermore, the country will need to make larger infrastructure investments to handle recycling of durable goods, electronics, and building materials, which consist of many different materials and must be properly disassembled. As more clean energy technologies—like solar panels, wind turbines, and batteries—are deployed and eventually decommissioned, new infrastructure for recycling these large, complex, diverse, and distributed components will become critical.

In addition to reducing emissions from new material production, increased recycling will have other environmental and economic benefits. Better recycling of single-use plastic containers will help reduce ocean plastic pollution harmful to marine ecosystems, while recycling of batteries, solar panels, and other electronics will help create a more secure and sustainable supply of critical minerals for manufacturing new equipment for clean energy and advanced technologies.

Title III of the Save Our Seas 2.0 Act (H.R. 3969), introduced by Rep. Suzanne Bonamici (D-OR), would establish a waste management infrastructure grant program to support local governments, tribes, and local waste management systems in improving waste management strategies and implementing innovative recycling and reuse technologies. The bill would also direct the EPA Administrator to report on the economic, technological, and resource barriers to increasing the collection of recyclable materials and provide recommendations for how to overcome those barriers. Sens. Dan Sullivan (R-AK) and Sheldon Whitehouse (D-RI) introduced and the Senate passed a similar bill of the same title (S. 1982).

Rep. Alan Lowenthal (D-CA) and Sen. Tom Udall (D-NM) introduced the Break Free from Plastic Pollution Act of 2020 (H.R. 5845/S. 3263), which would, among other provisions, (1) require producers of packaging, containers, food-service products, and paper to design, manage, and finance programs to collect and process product waste and (2) establish a national refund requirement for all beverage containers to fund collection, recycling, and reuse infrastructure.

Rep. Ilhan Omar (D-MN) introduced the Zeroing Excess, Reducing Organic Waste, and Sustaining Technical Expertise (ZERO WASTE) Act (H.R. 4050), which would direct EPA to award grants to state, local, and tribal governments and nonprofit organizations to implement zero-waste practices, including organics recycling infrastructure and electronic waste reuse and recycling.

Recommendation: Congress should pass legislation to facilitate the development of infrastructure for materials recovery and recycling. This should include supporting the expansion and standardization of local waste management and recycling infrastructure, as well as establishing larger physical and information infrastructure networks for the collection and recycling of durable goods, electronics, clean energy technologies, building materials, and other consumer and industrial goods. As infrastructure expands, governments and firms should incorporate strategies to reduce emissions from such infrastructure, such as electrification of recycling collection fleets and processing facilities. In general, the expansion of materials recovery and recycling infrastructure should complement policies to encourage materials efficiency and source reduction and manage toxic waste that is not recoverable or recyclable.

Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America and Davis-Bacon prevailing wage requirements), complying with all labor,

environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Committees of Jurisdiction: Energy and Commerce; Transportation and Infrastructure

Building Block: Expand Large-Scale Carbon Storage Capabilities Through Demonstration Projects and Increased Public Engagement

For carbon capture to be useful for climate change mitigation, carbon dioxide must be both successfully captured and permanently stored or reused in new materials and products that are recycled or protected from decay at the end of the products' lifetimes. While researchers are exploring multiple avenues for carbon reuse, the best option for storing captured carbon from a climate perspective is permanent sequestration of carbon dioxide below ground.

DOE manages a Carbon Storage Assurance Facility Enterprise (CarbonSAFE) initiative to increase U.S. capacity to store carbon captured from point sources. This program builds on a network of Regional Carbon Sequestration Partnerships DOE created to develop regional capacity to undertake carbon storage projects. The program's scale, however, does not match the need and urgency of the problem.

Reps. Marc Veasey (D-TX) and David Schweikert (R-AZ) introduced the bipartisan Fossil Energy Research and Development Act of 2019 (H.R. 3607), which would, among other provisions, direct DOE to carry out an RD&D program for carbon storage. This would include funding new or expanding existing demonstrations of large-scale carbon sequestration as part of DOE's Regional Carbon Sequestration Partnerships and transitioning these demonstration projects into integrated, commercial storage complexes.

Section 503(e) of the Energy and Commerce Committee's discussion draft of the CLEAN Future Act would fund commercialization projects of large-scale carbon dioxide storage sites in saline geological formations that are designed to store at least 10 million tons per year of carbon dioxide.⁷²²

In addition, the federal government needs to prioritize public outreach about large-scale subsurface carbon storage since public understanding and trust is key to the success of individual projects.⁷²³ The existing Regional Carbon Sequestration Partnerships may be well-positioned to engage a broad range of stakeholders to increase public understanding of subsurface carbon storage.

Recommendation: Congress should pass legislation authorizing DOE to carry out a carbon storage RD&D program to expand large-scale carbon storage capabilities. The program should expand the CarbonSAFE initiative and fund demonstration and commercialization projects for large-scale carbon dioxide storage sites in saline geological formations. Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

⁷²² Title V, Section 503, CLEAN Future Act discussion draft.

⁷²³ Sallie E. Greenberg and Lori M. Gauvreau, "Communicating Science and Technology While Engaging the Public at the Illinois Basin – Decatur Project," *Greenhouse Gases: Science and Technology* 4, no. 5 (2014), <https://doi.org/10.1002/ghg.1435>.

Recommendation: Congress should also direct DOE, in conjunction with the Regional Carbon Sequestration Partnerships, to host regional meetings to bring a broad range of stakeholders together to develop materials and engage communities to help the public better understand subsurface carbon storage.

Committees of Jurisdiction: Science, Space, and Technology; Energy and Commerce

Building Block: Ensure Robust Regulatory Oversight of Subsurface Carbon Storage

Achieving public confidence in subsurface carbon storage requires robust federal oversight of carbon storage projects. EPA maintains an Underground Injection Control program and issues Class VI permits for geological sequestration of carbon dioxide. Under Subpart RR of EPA's greenhouse gas reporting requirements, facilities that conduct geological sequestration of carbon dioxide must develop and implement an EPA-approved monitoring, reporting, and verification (MRV) plan, and report the amount of carbon dioxide sequestered at the facility, among other things.⁷²⁴

An April 2020 letter from the U.S. Treasury Inspector General for Tax Administration revealed that from tax years 2010-2019, taxpayers claimed nearly \$900 million in Section 45Q tax credits for carbon dioxide sequestration when they were not in compliance with EPA Subpart RR regulations.⁷²⁵ The IRS has audited and disallowed about \$530 million of the noncompliant credits claimed.⁷²⁶ On April 29, 2020, Sen. Robert Menendez (D-NJ) sent a letter to IRS Commissioner Charles Rettig urging the IRS to better enforce compliance for claiming Section 45Q tax credits, including "conduct[ing] an audit of every taxpayer that has previously claimed more than \$10,000 in value of the Section 45Q credit, and...‘conduct[ing] a campaign or special project to examine every taxpayer that claimed the credit’ moving forward to ensure that the taxpayer is in compliance with all necessary regulations."⁷²⁷

The CO₂ Regulatory Certainty Act (S. 2263), introduced by Sen. John Hoeven (R-ND), would weaken the standards that apply to the geologic storage of carbon dioxide for claiming the Section 45Q tax credit.

Section 503(e) of the Energy and Commerce Committee's discussion draft of the CLEAN Future Act would authorize increased appropriations for EPA to permit Class VI wells for the injection of carbon dioxide for geologic storage in accordance with the Safe Drinking Water Act. It would also direct the EPA to provide grants to states that have been delegated authority to permit Class VI wells for the injection of carbon dioxide for geologic storage in accordance with the Safe Drinking Water Act.⁷²⁸

Recommendation: Congress should authorize increased appropriations for EPA to permit Class VI wells for the injection of carbon dioxide for geologic storage in accordance with the Safe Drinking Water Act. Congress should also direct EPA to provide grants to states that have been delegated authority to permit Class VI wells for the injection of carbon dioxide for geologic storage in accordance with the Safe Drinking Water Act.

⁷²⁴ U.S. Environmental Protection Agency, EPA 816-U-16-001, *Frequently Asked Questions: Class VI and Subpart RR Reporting* (September 2016).

⁷²⁵ J. Russell George, U.S. Treasury Inspector General for Tax Administration, Letter to the Honorable Robert Menendez, United States Senate (April 15, 2020).

⁷²⁶ *Ibid.*

⁷²⁷ Sen. Robert Menendez, Letter to the Honorable Charles P. Rettig, Commissioner, Internal Revenue Service (April 29, 2020).

⁷²⁸ Title V, Section 503, CLEAN Future Act discussion draft.

Recommendation: Congress should reject attempts to weaken the existing regulations that apply to the geologic storage of carbon dioxide, including requirements for claiming the Section 45Q tax credit.

Committees of Jurisdiction: Energy and Commerce; Ways and Means

Building Block: Facilitate the Development of Infrastructure Hubs for Low- and Zero-Emission Hydrogen Use in Industry

To achieve wide use of hydrogen at a reasonable cost, industry will need infrastructure to generate and transport hydrogen to facilities and to store hydrogen before and after transport. One option is to generate hydrogen at a small number of large-scale facilities and then distribute it through a pipeline network to individual industrial facilities. Another option is to generate it at a larger number of more dispersed, small-scale facilities, which would require less distribution infrastructure. Instead of transporting hydrogen directly, hydrogen producers could also transform the hydrogen into ammonia or methane for transport or storage.

In the near term, the federal government should prioritize development of hydrogen infrastructure in regions where industries already use industrial hydrogen and where it can be produced with low or zero emissions, such as where there is an abundance of cheap, zero-emission electricity to produce green hydrogen or where existing infrastructure would lend itself to the production of blue hydrogen. The Gulf, particularly Louisiana and Texas, would be an ideal region for industry to demonstrate hydrogen infrastructure hubs.

Recommendation: Congress should draft legislation to facilitate the development of hydrogen generation, transportation, and storage infrastructure, starting with hydrogen infrastructure hubs in regions that dominate industrial use of hydrogen. Congress should direct the Department of Transportation (DOT), the Pipeline and Hazardous Materials Safety Administration (PHMSA), DOE, the Department of Commerce (DOC), NIST, and other relevant agencies to (1) create a hydrogen infrastructure development plan, (2) review the regulatory framework for hydrogen infrastructure development, and (3) amend existing or implement new regulations, and codes and standards, to enable the construction of infrastructure aligned with the development plan. The agencies should consider other potential uses of hydrogen, such as in the power, transportation, and building sectors, when determining where to prioritize development of hydrogen infrastructure. When reviewing and implementing regulations, the agencies should work with stakeholders to ensure that the process for siting, permitting, and construction of infrastructure (1) includes early engagement with affected communities, landowners, and tribes; (2) optimizes use of existing infrastructure; and (3) comprehensively assesses and mitigates environmental and safety impacts.

Committees of Jurisdiction: Transportation and Infrastructure; Energy and Commerce; Science, Space, and Technology

Building Block: Establish a National Environmental Product Declaration Database and Technical Assistance Program

Environmental Product Declarations (EPDs) provide environmental information on products, including the emissions associated with the production of industrial materials and goods. Standardized EPDs are the most useful to account for lifecycle greenhouse gas emissions and allow for more accurate comparison between materials. Because not all products have EPDs and current EPDs can be inconsistent and unreliable for making accurate comparisons between materials, project designers and developers rarely use them to inform decisions on material procurement. The standardization of EPDs would enable purchasers of industrial goods to easily understand the emissions impacts of their material and product choices and help incentivize manufacturers to reduce product emissions.

The Energy and Commerce Committee's discussion draft of the CLEAN Future Act would, among other provisions, create a national EPD database of construction materials and products and a technical assistance and grant program to help manufacturers develop and verify EPDs for their products.⁷²⁹

Recommendation: Congress should direct EPA to establish a national EPD database of construction materials and products and other industrial goods and determine standardized requirements for lifecycle analysis of greenhouse gas emissions used in database EPDs, building upon existing standards and databases, such as ISO 14025 and American Association of State Highway and Transportation Officials materials standards. The EPA should coordinate this database with any federal Buy Clean policies, as described in more detail below.

Recommendation: Congress should authorize a new EPA technical assistance program to help manufacturers produce EPDs for the national EPD database and a grant program to help small- and medium-sized manufacturers develop and verify EPDs for their products.

Committee of Jurisdiction: Energy and Commerce

Building Block: Invest in the Workforce for a Decarbonized Industrial Sector

As new technologies and areas of industry emerge to address industrial sector emissions, workers may need to learn new skills or find opportunities to transfer existing skills into new trades. As the industrial sector transitions to a net-zero, circular economy, it is crucial that it does not leave workers behind and that education and training programs include skillsets relevant for industrial firms.

Recommendation: Congress should ensure that jobs and skills relevant to the industrial sector and industrial firms are included in any upskilling workforce development programs, such as registered apprenticeships and incumbent worker or on-the-job training, to help prevent the displacement or dislocation of workers and make sure that workers have the skills they need to transition to a clean economy, as detailed in the section "Invest in America's Workers and Build a Fairer Economy." These programs should not only support workers' access to new skills, but they should also provide relevant skills assessments to help workers find opportunities that translate their existing skills and expertise into other good-paying jobs.

Committee of Jurisdiction: Education and Labor

⁷²⁹ Title V, Section 521, CLEAN Future Act discussion draft.

Create Markets and Establish Standards for Low-Emission Industrial Goods and Technologies

While RD&D and financial incentives will help make technologies for industrial decarbonization commercially available, Congress also must enact complementary demand-side policies to force widespread deployment. Differentiating industrial goods by their emissions intensity and other environmental characteristics and creating guaranteed markets for these preferred goods through public procurement and standards will ensure that all firms reduce, and eventually eliminate, their emissions and other pollution. Additional policies that will help boost demand for low-emission goods include carbon pricing, discussed in the section titled “Break Down Barriers for Clean Energy Technologies,” and end-use policies for the building sector, discussed in the section titled “Build and Upgrade Homes and Businesses to Maximize Energy Efficiency and Eliminate Emissions.”

Building Block: Procure Low-Emission Materials and Products (“Buy Clean”) for Federally Funded Projects, Including Infrastructure and Buildings

Iron and steel, chemicals and plastics, and cement and concrete contribute a significant share of industrial emissions in the United States. Current lower-emissions versions of these commodity products come at a price premium, preventing wide uptake in the general market. Creating a market specifically for low-emission materials and products would help scale their production and bring down their costs. Because the federal government is a major purchaser of these commodities, particularly for infrastructure and buildings, federal procurement of low-emission options would create a significant market, increasing their deployment and sending a clear signal to the private sector that investments in low-emission technologies would be profitable. People often call this type of policy “Buy Clean.” California has enacted a Buy Clean policy for structural steel, carbon steel rebar, flat glass, and mineral wool board insulation, and several other states are considering similar policies.⁷³⁰

The Energy and Commerce Committee’s discussion draft of the CLEAN Future Act creates a Federal Buy Clean Program to “steadily reduce the quantity of embodied carbon emissions of construction materials and products and promote the use of clean construction materials and products, in projects supported by Federal funds.”⁷³¹

Many industrial products are also traded internationally and are often categorized as EITE goods. U.S. production of some of these materials can be less emissions-intensive than in other countries, so procurement policies can also benefit domestic production and manufacturing in EITE industries without explicit “Buy America/n” requirements or border adjustment provisions.

Recommendation: Congress should direct EPA, working with DOE and NIST as technical partners, to establish a Buy Clean Program for federal procurement and projects supported by federal funds that (1) sets maximum emissions intensity benchmarks for procurement of all steel, concrete, and other

⁷³⁰ California Department of General Services, “Buy Clean California Act,” <https://www.dgs.ca.gov/PD/Resources/Page-Content/Procurement-Division-Resources-List-Folder/Buy-Clean-California-Act>. Accessed June 2020.

⁷³¹ Title V, Section 521, CLEAN Future Act discussion draft.

emissions-intensive goods and (2) requires a portion of procurement to support innovative low-emission materials.

Congress should consider the state of the art in available technologies while balancing feasibility and cost considerations when determining the maximum emissions intensity benchmarks. In order to protect EITE industries, Congress should also set these benchmarks at levels that most domestic manufacturers can meet with available technologies but cut out dirtier goods. The benchmarks should also increase in stringency to push industries to improve and to continue driving down costs in increasingly lower-emission technologies. EPA should build on existing data and programs, such as Energy Star for Industry and the national EPD database recommended above, to determine appropriate benchmarks and product categories and engage relevant stakeholders (at minimum, unions, environmental organizations, affected businesses, environmental justice groups, and academics) as part of an inclusive and transparent decision-making process. To have the greatest possible impact, the Buy Clean Program should apply to all federal agencies involved in procuring and funding projects that procure steel and other emissions-intensive industrial goods.

To create incentives for breakthrough innovations in very low-emission materials, Congress should direct EPA to create an additional requirement for procuring low-emission goods. This requirement should apply to all federal agencies and all projects above a certain size (such as \$1 million in total project cost) that utilize more than a minimal amount of federal funds. The requirement should start as a small percentage of all procurement of a material by each agency and each covered project, and it should increase over time. The emissions intensity benchmark for this higher tier of products should push the state of the art in low-emissions technology and should also continue to ratchet as technologies improve. For example, a higher tier for concrete could incentivize procurement of concrete made with captured carbon to help advance carbon utilization. In addition to this higher tier or as an alternative, Congress should consider creating a system that rewards extra points to bids that provide desirable features, such as lower emissions, job creation in frontline communities, high-road labor standards, and domestic content.

To ensure accurate comparisons between products, the Buy Clean Program should incorporate standardized lifecycle emissions accounting, data transparency measures, and third-party verification. Congress should direct EPA to carefully consider the types of material or product categories (e.g., structural steel vs. automotive steel), their level of specificity (e.g., cement vs. concrete), and differences in process (e.g., electric arc furnace vs. basic oxygen furnace steel production) to include in any procurement policy to balance flexibility of meeting the policy with ease of implementation. To address labor issues in addition to environmental issues, Congress may want to pair a Buy Clean policy with labor procurement standards, sometimes called “Buy Fair.” Congress should pair Buy Clean policies with continued investments to help firms reduce emissions, such as the RDD&D and financial support mechanisms described in this section. Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Committees of Jurisdiction: Energy and Commerce; Transportation and Infrastructure; Oversight and Reform; Science, Space, and Technology

Building Block: Implement Tradable Performance-Based Emissions Standards for Key Industrial Products

Sector-wide standards, like clean energy standards for electricity, can ensure emissions reductions and can create markets beyond public procurement to further pull the supply of low-emission industrial products. Performance standards set emissions intensity benchmarks per unit of output for given industrial products, which decrease over time to continue driving emissions reductions. Researchers estimate that setting standards at levels of the worst-performing 10% and 40% of facilities within the U.S. iron and steel, petrochemical manufacturing, and cement manufacturing industries could reduce carbon dioxide emissions by more than 6 million metric tons per year and 40 million metric tons per year, respectively.⁷³²

Performance-based emissions standards can be purely regulatory, where all firms must meet the same standards, or they can be more market-based, where trading of credits is allowed between firms who over- and under-perform relative to the benchmarks. Trading enables more cost-efficient emissions reductions while keeping compliance costs within the sector, which minimizes consumer cost impacts.⁷³³ Thus, firms are better able to remain competitive while reducing the emissions intensities of their products, an important factor for EITE industries. Trading also incentivizes more innovative solutions because firms receive credit for their performance beyond the requirement.

Trading, however, would not guarantee that all facilities reduce their emissions, which could raise equity concerns if those emissions persist in environmental justice communities. Congress could impose some limits to trading to minimize this undesirable outcome while still allowing compliance flexibility and incentivizing innovation. Enforcement and implementation of strong EPA regulations for pollutants, as well as considerations of cumulative impacts of this environmental pollution, would help to minimize any potential negative effects of trading. This report offers more recommendations to reduce emissions in environmental justice communities in the section titled “Invest in Disproportionately Exposed Communities to Cut Pollution and Advance Environmental Justice.”

Recommendation: Congress should direct EPA, working with DOE and NIST as technical partners, to establish tradable performance standards for emissions-intensive industries, such as iron and steel, aluminum, cement and concrete, ceramics, glass, chemicals and plastics, fertilizers, and pulp and paper. EPA should carefully consider which sectors to include in the standard and how to set the emissions intensity benchmarks, including the scope of product lifecycle emissions, differentiation between similar types of products, and the stringency of the benchmarks. EPA should also coordinate with the Buy Clean Program recommended above and consult with a variety of stakeholders, including the industries to be covered by the standard and fenceline communities, to determine appropriate benchmarks. EPA should design the benchmarks in a fair, simple, and transparent way that is difficult to game, and the benchmarks should ratchet over time toward a goal of net-zero emissions. Reporting of product emissions intensities should include standardized lifecycle emissions accounting, data transparency measures, and third-party verification and should be coordinated with existing data structures, such as the national EPD database recommended above. To ensure firms can

⁷³² Vincent Gonzales et al., *Clean Energy Standard for Industry: Scoping Analysis* (Resources for the Future, 2020).

⁷³³ Carolyn Fischer, *Market-Based Clean Performance Standards as Building Blocks for Carbon Pricing* (The Hamilton Project, 2019).

meet the standards, Congress must match increasingly stringent benchmarks with more generous investments, such as the RDD&D and financial support mechanisms described above.

Congress should place some limits on the trading of credits to avoid unintended consequences, such as allowing high-emissions facilities to evade requirements to reduce emissions and creating disparities in fenceline communities. Congress should require the EPA to assess the distributional impacts of this policy, especially in environmental justice communities most harmed by past pollution, and to make policy adjustments to minimize any negative impacts on these communities. Congress should also consider implementing a credit price ceiling to cap costs and a credit price floor to accelerate emissions reductions and reduce uncertainty. To allow for potential integration with economy-wide policies, the EPA should carefully craft these standards to leave room for future policy harmonization. To address carbon leakage issues from trade, Congress should implement complementary border adjustment mechanisms, discussed in further detail below.

Committees of Jurisdiction: Energy and Commerce; Science, Space, and Technology

Building Block: Implement Border Adjustment Mechanisms for Emissions-Intensive Goods

Implementing domestic subsector emissions standards or a price on carbon could increase costs for domestic manufacturers, particularly in EITE industries. To compensate for increasing costs, they would have to increase the price of their products or take a cut from their revenue, placing them at a competitive disadvantage with unregulated foreign manufacturers. Without additional policies to compensate for the differences in price and product-related emissions, domestic manufacturers could decide to close or offshore their facilities. While the domestic carbon policies would have succeeded in reducing emissions from domestic production, these emissions would still manifest in other countries where production has increased, resulting in “carbon leakage.”

Even without enacting additional federal carbon policies, carbon leakage already occurs through the international trade of emissions-intensive industrial goods. The amount of emissions embodied in trade—which are often unaccounted for in domestic carbon policies—has steadily grown over the last several decades and amounts to about one-quarter of the global carbon footprint today.⁷³⁴ The United States is the largest importer of embodied emissions, more than double that of China, the next largest importer.⁷³⁵

Border adjustment mechanisms modify the prices of imports and exports based on the emissions associated with their production and domestic carbon policies. In general, these mechanisms charge taxes on dirtier imports and provide rebates for cleaner exports. By leveling the playing field for domestic manufacturers that must comply with domestic carbon policies and by associating product prices with production-related emissions, border adjustment mechanisms resolve the issues of carbon leakage and offshoring.

Recommendation: If Congress enacts domestic performance standards for emissions-intensive industries or a carbon price, Congress should also enact a border adjustment mechanism, such as import tariffs and export subsidies, for key emissions-intensive industries, including EITE goods. The

⁷³⁴ Daniel Moran et al, *The Carbon Loophole in Climate Policy* (Buy Clean, 2018).

⁷³⁵ Ibid.

design of the border adjustment mechanism should be such that an imported good with a higher emissions intensity than the benchmark would be charged a tariff, prorated by the difference between the emissions intensity of the good compared to the benchmark. Conversely, an exported good with a lower emissions intensity compared to the subsector standard set by the receiving country (or the average subsector emissions intensity within the country, if no standard exists) would be given a subsidy, prorated by the difference between the emissions intensity of the good compared to the standard of the receiving country. The federal government should use revenue from the tariffs to offset the export subsidy and direct any excess revenue to (1) domestic manufacturers of EITE goods to invest in technologies and equipment to reduce their emissions, (2) RDD&D support for technologies to reduce industrial emissions, as detailed above, and (3) communities most affected by the transition away from fossil fuels.

An independent, expert panel should determine the emissions intensities of imported goods and average emissions intensities of sectors in other countries for calculating the tariff or subsidy. This panel should review and revise these determinations on a regular basis to incentivize other countries and international manufacturers to continue to reduce their emissions. Congress should follow international trade rules and the principles of non-discrimination in implementing this policy.

Committees of Jurisdiction: Ways and Means; Energy and Commerce

Building Block: Establish Robust Energy Efficiency Standards for Industrial Equipment and Processes

The Energy Policy and Conservation Act requires DOE to establish and maintain energy efficiency standards for residential and commercial appliances and equipment.⁷³⁶ From 1987 to 2015, these efficiency standards helped the United States avoid about 3 billion tons of carbon dioxide emissions.⁷³⁷ The DOE's Appliance and Equipment Standards Program covers more than 60 products and has been a key driver for significant consumer savings and efficiency gains in homes, commercial buildings, and industry.⁷³⁸

Recently, DOE has missed deadlines for setting new standards and attempted to weaken or rollback existing standards.⁷³⁹ Even where these deadlines are missed, the law preempts states from setting their own standards.⁷⁴⁰ DOE could use its existing authority to set additional standards for other appliances and equipment to unlock additional energy savings, especially related to industrial equipment. As an illustration, while existing standards cover about 90% of home energy use and about 60% of commercial building energy use, they only represent 30% of industrial energy use.⁷⁴¹

⁷³⁶ 42 U.S.C. §§ 6291-6374e.

⁷³⁷ U.S. Department of Energy, *Saving Energy and Money with Appliance and Equipment Standards in the United States* (2017).

⁷³⁸ Andrew deLaski and Joanna Mauer, *Energy-Saving States of America: How Every State Benefits from National Appliance Standards* (Appliance Standards Awareness Project and American Council for an Energy-Efficient Economy, 2017).

⁷³⁹ Robert Walton, "DOE must implement 4 long-delayed efficiency standards, 9th Circuit Rules," *Utility Dive*, October 11, 2019.

⁷⁴⁰ 42 U.S.C. § 6297.

⁷⁴¹ U.S. Department of Energy, *Saving Energy and Money with Appliance and Equipment Standards in the United States* (2017).

DOE could also establish process- or system-level efficiency standards, rather than component-level standards, to encourage further energy savings.⁷⁴²

The Energy and Commerce Committee's discussion draft of the CLEAN Future Act would suspend preemption for federal efficiency standards when DOE misses deadlines to update such standards.⁷⁴³

Recommendation: Congress should pass legislation to codify the appliance and equipment standards that the Trump administration has delayed or attempted to weaken and direct DOE to set additional industrial equipment and process standards based on energy and emissions reduction potential, as appropriate. Congress should also allow states to set stricter standards and new standards when DOE misses applicable deadlines. Such new or stricter state standards should remain in effect until DOE sets a corresponding standard that is as strict as or stricter than the state standard, to prevent a late rulemaking from rolling back progress made by states.

Committee of Jurisdiction: Energy and Commerce

Building Block: Establish a Low-Emission Heat Portfolio/Performance Standard

State renewable portfolio standards (RPSs) have helped create markets for renewable electricity technologies, increasing their deployment and reducing their costs. Some state RPS programs include carveouts for renewable thermal energy. If expanded to the federal level for industrial thermal energy, this mechanism could incentivize the adoption of low-emission sources for industrial heat. Like an RPS, a low-emission heat portfolio standard could require industrial facilities to obtain an increasing amount of their thermal energy needs from low- or zero-emission sources, such as clean electricity, solar thermal, certain biomass, geothermal, biogas/renewable natural gas, low-emission hydrogen, and advanced nuclear. Alternatively, a low-emission heat performance standard could require industrial facilities to meet a certain benchmark carbon intensity from their heat sources.

Recommendation: Congress should draft legislation to establish a federal low-emission heat portfolio/performance standard to advance the deployment of low-emission heating technologies in industry. The standard should be technology-neutral and require technologies to fall below a certain emissions threshold to qualify. When designing the standard, Congress should consult a diverse group of stakeholders and experts, including relevant agencies and industry. Congress should consider tailored targets for different industry subsectors based on best available technologies and a phase-in period to allow industry time to prepare for necessary investments. As in many RPS programs, Congress should also consider allowing industry actors to trade credits to fulfill requirements and including carveouts for certain technologies, such as those that are earlier in their development or offer additional environmental benefits.

Committee of Jurisdiction: Energy and Commerce

⁷⁴² Jeffrey Rissman et al., "Technologies and policies to decarbonize global industry: Review and assessment of mitigation drivers through 2070," *Applied Energy* 266 (2020).

⁷⁴³ Title III, Section 321, CLEAN Future Act discussion draft.

Building Block: Establish Standards to Increase Materials Recirculation and Efficiency to Move Toward a Circular Economy

Just as energy efficiency is a cost-effective, complementary approach to transitioning to cleaner energy generation, materials efficiency and circularity are critical tools to cutting carbon pollution from industrial production. While investments in materials innovation and developing a circular economy roadmap will be important, as described earlier in this section, the federal government will need to adopt related standards and requirements to pull these new technologies and concepts into the market and wider deployment. These standards can take many forms, but they largely target materials and product manufacturers and affect their use of raw or recycled materials, the way they handle post-consumer goods and product recycling, their product design processes, or their business models. Some standards can also affect consumers, such as recycling requirements for households and businesses, fees for landfilling or using certain products, and requirements for using less materials in infrastructure and construction. In general, these standards should seek to increase materials efficiency and recycling and move society away from consumption and waste toward a more circular economy.

Rep. Alan Lowenthal (D-CA) and Sen. Tom Udall (D-NM) introduced the Break Free from Plastic Pollution Act of 2020 (H.R. 5845/S. 3263), which would (1) require extended producer responsibility for certain products and packaging to shift the burden of recycling and pollution clean-up from the public to producers, (2) prohibit use of certain single-use products, (3) encourage recycling and composting through standardization, recycled content requirements, better product design and labeling, and prohibition of certain waste exports, and (4) pause the permitting of new and expanded industrial facilities that create new plastic or convert plastic into chemical feedstocks for new products or fuel while EPA updates regulations on these facilities to ensure minimal air and water discharges.

In December 2019, Reps. Joe Neguse (D-CO) and Kim Schrier (D-WA) sent a letter requesting that the House Administration Committee enact a policy change to preclude the use of disposable plastic bottles in all committee rooms and proceedings.⁷⁴⁴

Recommendation: Congress should pass legislation to establish standards that would increase materials recirculation and efficiency, including extended producer responsibility, standardization of recycling and composting, and recycled content requirements. Congress should consider placing fees or bans on certain materials and products, prohibiting certain waste exports, and requiring holistic consideration of future material needs and associated emissions before permitting of new material production facilities. Congress should also consider standards related to product design, such as requiring design for repair, reuse, and recycling and banning planned obsolescence. Where possible, the standards should aim to shift the burden of waste management and pollution from the public to producers. These standards and other policy measures should include all major industrial materials, such as plastics and chemicals, iron and steel, cement and concrete, aluminum, glass, and pulp and paper. When implementing these policies, Congress should follow the recommendations from the circular economy roadmap described in more detail earlier in this section.

Committee of Jurisdiction: Energy and Commerce

⁷⁴⁴ Reps. Joe Neguse and Kim Schrier, Letter to the Honorable Zoe Lofgren, Chairperson, Committee on House Administration (December 11, 2019).

Building Block: Ensure that Technologies Enabling Industrial Decarbonization Are Included in Federal Energy Procurement Policies and Standards

As members of Congress consider legislation to establish clean energy procurement policies and clean energy and fuel standards, as described elsewhere in this report, they should include technologies that can also help decarbonize industry—like CHP, WHP, carbon capture, low- and zero-emission hydrogen, and advanced nuclear. Incentivizing these platform technologies in other sectors will increase their deployment and reduce their costs, thereby enabling their use in the industrial sector.

Recommendation: Congress should include key platform technologies that can reduce emissions across sectors when drafting legislation to establish federal energy procurement policies and standards.

Committees of Jurisdiction: Energy and Commerce; Oversight and Reform

Building Block: Create International Certifications and Labels for Emissions-Intensive Goods

The EPA Energy Star label for energy-efficient appliances has helped to differentiate similar products based on sustainable characteristics and enabled consumers to make more informed choices, creating demand for more energy-efficient equipment. Through memoranda of understanding, the United States has been able to partner with other countries interested in using the Energy Star system and label. A voluntary international label or certification system for traded low-emission industrial goods could provide similar benefits for consumers and manufacturers.

Recommendation: Congress should direct the EPA to develop, through rulemaking, a certification system and label program for low-emission industrial goods that consumers can use to compare products on the global market. Congress should follow international trade rules and the principles of non-discrimination in implementing this policy.

Committees of Jurisdiction: Energy and Commerce; Ways and Means

Invest in Manufacturing of Clean Energy, Clean Vehicle, and Zero-Emission Technologies

In the section titled “Drive Innovation and Deployment of Clean Energy and Deep Decarbonization Technologies,” the majority staff for the Select Committee recommends steeply ramping up RDD&D for zero-emission technologies. Innovation will be essential to fueling the technological transformations needed to reach net-zero by 2050 and achieve net-negative emissions in the second half of the century. Innovation in American labs, however, is only half of the solution to guarantee U.S. leadership in the response to the climate crisis. American workers should be the ones manufacturing these American ideas. When crafting federal climate policy, Congress needs to incentivize high-road domestic manufacturing of American innovations and ensure taxpayer-supported RDD&D delivers a public benefit that grows the middle class. Strategic planning and sustained, proactive investment in domestic clean technology manufacturing and supply chains can ensure that working people and their communities are not left behind in America’s net-zero future.

Construct New or Retool Existing Manufacturing Facilities in the United States

Building Block: Reauthorize and Fund the 48C Advanced Energy Project Credit

The American Recovery and Reinvestment Act (ARRA) of 2009 created a tax credit for any project that “re-equips, expands, or establishes a manufacturing facility” to produce renewable energy, fuel cells, energy storage, carbon capture and sequestration, renewable fuels, electric vehicles, and other technologies.⁷⁴⁵ ARRA authorized \$2.3 billion in credits.⁷⁴⁶ DOE selected recipients based on several criteria laid out in statute, including domestic job creation, pollution reduction, potential for technological innovation and commercial deployment, and cost.⁷⁴⁷

In November 2019, Rep. Brendan Boyle (D-PA) introduced the Innovative Energy Manufacturing Act of 2019 (H.R. 5165). The bill revives the 48C credit and allocates an additional \$2.5 billion in credits for each year from 2020 through and including 2024. Section 501 of the GREEN Act of 2020 (H.R. 7330) similarly revives the 48C credit and allocates an additional \$2.5 billion in credits for each year from 2021 through and including 2025. The bill also directs the Secretary of Treasury to give projects priority if the manufacturing is not for assembly of parts, if applicable workers are paid prevailing wages, or if the project has the greatest potential for commercial deployment of new applications.

Recommendation: Congress should authorize new funding for the 48C advanced energy tax credit to re-equip, expand, or establish domestic clean energy, transportation, grid, and industrial decarbonization technology manufacturing facilities. Congress should consider directing DOE and the IRS, when selecting tax credit recipients, to give preference to applicants that adhere to high labor standards and responsible labor practices, including union neutrality; sound wages and benefits; strong health and safety programs; compliance with all labor and civil rights statutes; and application

⁷⁴⁵ 26 U.S. Code § 48C.

⁷⁴⁶ American Recovery and Reinvestment Act (ARRA) of 2009, Section 1302.

⁷⁴⁷ 26 U.S. Code § 48C.

of Davis-Bacon prevailing wage requirements and adoption of community benefit agreements and project labor agreements, where relevant.

Committee of Jurisdiction: Ways and Means

Building Block: Reauthorize, Update, and Expand the Section 45M Technology Production Tax Credit for Clean Energy, Energy Efficiency, and Decarbonization Technologies

The Energy Policy Act of 2005 established the Section 45M energy-efficient appliance credit for manufacturers of efficient dishwashers, clothes washers, and refrigerators.⁷⁴⁸ The credit encouraged domestic manufacturers to produce more energy-efficient appliances by linking the value of the credit to the efficiency of the appliance and the increase in production of the appliance by the manufacturer. Congress extended and updated the credit several times but allowed it to expire in 2013 and repealed it in 2018.⁷⁴⁹ The Section 45M tax credit could be reinstated and expanded to incentivize domestic manufacture of other clean energy and decarbonization technologies and components—such as solar cells, wind turbine components, battery cells, fuel cells, hydrogen electrolyzers, carbon capture and DAC sorbent materials, and smart grid/building technologies.

Recommendation: Congress should reauthorize and expand the Section 45M production tax credit for the manufacture of clean energy, energy efficiency, and decarbonization technologies. For energy-efficient appliances, Congress should update the requirements such that only the most efficient appliances are eligible. Congress should set the efficiency requirements to automatically become more stringent over time to encourage continuous efficiency improvements. Congress should strategically consider which other technologies and products to include under the credit, taking into account domestic and international manufacturing capabilities, potential growth in manufacturing subsectors, the potential quantity and quality of jobs created, and emissions reductions potential. Congress should prioritize technologies and components that would fill current gaps in critical pieces of domestic supply chains and tie the eligibility of the tax credit to increasingly stringent requirements to encourage continuous improvement in the technologies supported. Congress should provide a direct pay option for the 45M tax credit. Congress should also consider authorizing DOE and the IRS to determine specific eligibility requirements or select recipients through a competitive application process, similar to the Section 48C tax credit described above, rather than legislating eligibility requirements. Congress should direct DOE and the IRS to give preference to manufacturers that adhere to strong labor standards and responsible labor practices, including union neutrality, sound wages and benefits, strong health and safety programs, and compliance with all labor and civil rights statutes.

Committee of Jurisdiction: Ways and Means

⁷⁴⁸ Energy Policy Act of 2005, Pub. L. No. 109-58, Section 1334.

⁷⁴⁹ Energy Improvement and Extension Act of 2008, Pub. L. No. 110-343, Section 305; Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act of 2010, Pub. L. No. 111-312, Section 709; American Taxpayer Relief Act of 2012, Pub. L. No. 112-240, Section 409; Tax Technical Corrections Act of 2018, Pub. L. No. 115-141, Section 401.

Building Block: Support the Construction, Expansion, or Retooling of U.S. Automobile Manufacturing Facilities

The Energy Independence and Security Act (EISA) of 2007 established two programs to encourage the domestic manufacturing of advanced vehicle technologies.

Section 136 created the DOE Advanced Technology Vehicles Manufacturing (ATVM) direct loan program, which supports “automotive or component manufacturers for reequipping, expanding, or establishing manufacturing facilities in the United States that produce fuel-efficient advanced technology vehicles or qualifying components.”⁷⁵⁰ The program, however, has not approved any new loans since 2015.

Section 132 established the Domestic Manufacturing Conversion Grant Program to offer grants to “automobile manufacturers and suppliers and hybrid component manufacturers” to encourage domestic production of efficient hybrid, plug-in electric hybrid, plug-in electric drive, and other advanced vehicles.⁷⁵¹ The law directs DOE to prioritize the “refurbishment or retooling of manufacturing facilities that have recently ceased operation or will cease operation in the near future.”⁷⁵² Congress has never funded the program.

In January 2020, Rep. Debbie Dingell (D-MI) introduced the USA Electrify Forward Act (H.R. 5558) to accelerate U.S. production, manufacturing, and deployment of electric vehicles and charging infrastructure. The bill, among other provisions, updates the Domestic Manufacturing Conversion Grant Program to focus on plug-in electric vehicles and directs DOE to prioritize grant applicants who commit to paying all laborers and mechanics the prevailing local wage. The USA Electrify Forward Act also reauthorizes the ATVM program through 2030 and expands the types of vehicle manufacturing that can qualify for loans. Chairman Bobby Rush (D-IL) also included these provisions in the New Opportunities to Expand Healthy Air Using Sustainable Transportation (NO EXHAUST) Act of 2020 (H.R. 5545) and the discussion draft for the CLEAN Future Act.⁷⁵³ Rep. Jackie Speier’s (D-CA) Affordable American-Made Automobile Act (H.R. 5393) authorizes \$15 billion in private activity bonds to retool existing and construct new manufacturing facilities for batteries and electric vehicles.

The House Democrats introduced a comprehensive infrastructure bill, the Moving Forward Act (H.R. 2), in June 2020. Section 33341 of the bill authorizes \$2.5 billion each year through 2025 for the Domestic Manufacturing Conversion Grant Program. The bill expands the program to include plug-in electric vehicles and directs the Secretary of Energy to accelerate domestic manufacturing of batteries, power electronics, and other technologies for use in plug-in vehicles. Section 33342 of the bill reauthorizes the ATVM program through 2025 and expands the definition of “advanced technology vehicle” to include heavy-duty vehicles, hydrogen fuel cell vehicles, and other types.

⁷⁵⁰ U.S. Department of Energy, “Advanced Technology Vehicles Manufacturing (ATVM) Loan Program,” <https://www.energy.gov/ipo/advanced-technology-vehicles-manufacturing-atvm-loan-program>. Accessed June 2020.

⁷⁵¹ 42 USC §16062(a)(2).

⁷⁵² 42 USC §16062(a)(3).

⁷⁵³ Sections 441-442, CLEAN Future Act discussion draft.

Recommendation: Congress should authorize and fund the DOE Domestic Manufacturing Conversion Grant Program to construct new or retool existing U.S. facilities to support growing domestic demand for electric vehicles and other zero-carbon vehicle technologies and components.

Recommendation: Congress should reauthorize and expand the ATVM program to reequip, expand, or establish advanced vehicle manufacturing facilities in the United States.

Projects in deindustrialized and under-invested communities, including low-income communities and communities of color, should receive priority for funding. Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Committee of Jurisdiction: Energy and Commerce

Develop and Implement Comprehensive Federal Strategies to Achieve Domestic Manufacturing and Supply Chain Goals

Building Block: Develop a National Clean Energy, Decarbonization, and Advanced Vehicle Manufacturing Strategy

The climate imperative to deploy more clean energy, decarbonization, and advanced vehicle technologies offers an opportunity to boost America's competitive edge, rebuild America's manufacturing base, and invest in U.S. workers in a clean, fair, and equitable way. This will require a proactive, cross-government strategy to set world-leading carbon pollution standards, invest in technological innovation, and build a powerful export market for new technologies by manufacturing them here at home.

The COVID-19 pandemic exposed the vulnerability of global supply chains, including products vital to U.S. health and security. While disruptions to critical suppliers forced many manufacturers to shut down production, smart and agile manufacturing capacity enabled some domestic manufacturers to quickly convert their production lines to make components and products critical to the crisis response. Focusing on agile supply chains and deploying advanced manufacturing technologies as part of a national manufacturing strategy would build a more resilient and competitive U.S. manufacturing sector for the technologies the country will need to decarbonize the economy.

Recommendation: Congress should direct the White House to develop a national clean energy, decarbonization, and advanced vehicle manufacturing strategy to increase domestic demand for clean energy and zero-emission vehicles, drive innovation, and promote domestic manufacturing along the supply chain. When developing the strategy, the White House should consider existing domestic and international manufacturing capabilities and forward-looking technologies for decarbonization, strategically building on areas of U.S. manufacturing strength and identifying future market opportunities where no country has taken the lead. The White House should also consider how to build in sustainability and resilience for future domestic manufacturing supply chains, including using agile and advanced manufacturing systems, ensuring diversity of suppliers, and

promoting efficient, low-emission, and circular production processes. The strategy should state that robust domestic manufacturing of the technologies the world will need to fight climate change is a national priority. This strategy should also include a focus on workforce development strategies to create the necessary talent pipeline and a plan to ensure that jobs in the clean economy are high-quality and good-paying.

Committees of Jurisdiction: Energy and Commerce; Science, Space, and Technology; Education and Labor

Building Block: Work with Stakeholders to Develop Clean Energy and Vehicle Tax Policy That Encourages Domestic Manufacturing of Decarbonization Technologies

Consumer tax incentives and rebates can drive domestic demand for new technologies, such as electric vehicles, but they do not necessarily induce domestic manufacturing of those technologies. Europe and China are taking active steps to secure their piece of the electric vehicle supply chain, including batteries and other key electric vehicle components. Once these supply chains embed themselves abroad, it will be difficult for the United States to wrest back that manufacturing base.

Members in the House and Senate have started developing innovative ideas to pair policies to boost consumer demand for a technology with domestic manufacturing of that technology. Rep. Rashida Tlaib (D-MI) and Sen. Sherrod Brown (D-OH) introduced the American Cars, American Jobs Act of 2019 (H.R. 2510/S. 683), which provides consumer rebates of \$3,500-\$4,500 for vehicles with domestic content and assembled in the United States.

In December 2019, Rep. Jackie Speier (D-CA) introduced the Affordable American-Made Automobile Act (H.R. 5393), which sets out to make the United States a global leader in electric vehicle manufacturing and technology. The bill increases the electric vehicle tax credit to \$15,000 for cars costing less than \$35,000, which could make electric vehicles more accessible to middle-class households. To qualify for the tax credit, the vehicle's battery cell, battery package, battery management system, and battery cooling system must be manufactured in the United States.

Recommendation: Congress should work with stakeholders to craft clean energy and clean vehicle tax policy that not only spurs deployment of zero-emission vehicles but also domestic manufacture of those vehicles.

Committee of Jurisdiction: Ways and Means

Building Block: Develop and Implement a National Strategy and Research Program for Critical Minerals in the Clean Energy and Electric Vehicle Supply Chains

Electric vehicles, solar panels, wind turbines, and other advanced energy technologies rely on several critical and “rare earth” minerals. Many of these materials are in vulnerable or volatile supply chains, given relative scarcity of the resources or geopolitical risks. To achieve a net-zero economy by 2050 and boost domestic manufacturing of clean energy technologies, the United States will need to access the global supply chain for these materials and identify opportunities to develop a reliable supply chain here at home. In 2013, the DOE established the Critical Materials Institute, under the leadership

of the Ames National Laboratory, to diversify the country's mineral supply chain, develop substitutes, and improve material recycling.⁷⁵⁴ Congress has never formally authorized the Institute.

Rep. Eric Swalwell (D-CA) introduced the Securing Energy Critical Elements and American Jobs Act of 2019 (H.R. 4481) to "develop the technical expertise and production capabilities to assure a long-term, secure and sustainable supply of energy critical elements (ECEs)."⁷⁵⁵ The bill authorizes the Critical Materials Institute's research program and requires DOE to develop and update a strategic plan every two years for this work.

Currently, the United States only recycles 5% of lithium-ion batteries at the end of their life cycle.⁷⁵⁶ The MIT Energy Initiative estimates that the global EV market will generate more than 400 GWh of spent lithium-ion batteries each year by 2030.⁷⁵⁷ Discarding used batteries as waste forfeits their full economic value, creates potential environmental problems associated with disposal, encourages mining for virgin minerals, and leaves the United States dependent on other countries for key materials.

In January 2019, DOE launched the first lithium-ion battery recycling R&D center, the ReCell Center. The mission of the ReCell Center is to "grow a sustainable advanced battery recycling industry by developing an economic and environmentally sound recycling process that can be adopted by industry for lithium-ion and future battery chemistries."⁷⁵⁸ The DOE effort, launched with just \$15 million, could point the way forward for a more expansive U.S. R&D program.

Recommendation: Congress should authorize a national critical minerals research program at the DOE and direct the department to develop a national strategy for securing critical minerals in the clean energy and electric vehicle supply chain in an environmentally, economically, and socially responsible way. This strategy should be part of a broader discussion on the circular economy, wherein manufacturers design their processes to reduce waste and find new uses for their products and materials (discussed in greater detail in the section titled "Rebuild U.S. Industry for Global Climate Leadership"). This strategy should also include a focus on workforce development strategies to create the necessary talent pipeline and a plan for ensuring any emerging industry meets high-road labor standards.

Recommendation: Congress should provide significant funding for DOE to pursue research into sustainable recycling of batteries, alternatives for lithium-ion batteries in EVs and grid-scale energy storage, and demonstration projects that integrate used EV batteries into the grid.

Committees of Jurisdiction: Science, Space, and Technology; Energy and Commerce; Education and Labor

⁷⁵⁴ Ames Laboratory, Critical Materials Institute, <https://www.ameslab.gov/cmi>. Accessed June 2020.

⁷⁵⁵ Office of Rep. Eric Swalwell, "Swalwell Introduces Bill to Protect Energy Security," September 24, 2019, <https://swalwell.house.gov/media-center/press-releases/swalwell-introduces-bill-protect-energy-security>.

⁷⁵⁶ U.S. Department of Energy, "Energy Department Announces Battery Recycling Prize and Battery Recycling R&D Center," January 17, 2019, <https://www.energy.gov/articles/energy-department-announces-battery-recycling-prize-and-battery-recycling-rd-center>.

⁷⁵⁷ Massachusetts Institute of Technology, *Insights into Future Mobility* (2019) at 81.

⁷⁵⁸ The ReCell Center, "About," <https://recellcenter.org/about/>. Accessed June 2020.

Align Federal Innovation and Procurement Policy With Domestic Manufacturing Objectives

Building Block: Increase the Number of DOE-Supported Manufacturing USA Institutes

Manufacturing USA is an interagency network of 14 advanced manufacturing institutes, which facilitate collaboration among government, industry, and U.S. universities to enhance technology transfer in U.S. manufacturing industries and help companies commercialize new technologies. Collectively, the Manufacturing USA institutes have engaged more than 1,000 member organizations, leveraged \$183 million in federal funds to attract \$304 million in state and private investment, and trained more than 200,000 workers, students, and educators with advanced manufacturing skills and knowledge.⁷⁵⁹

DOE currently oversees five institutes (power electronics, advanced composites, smart manufacturing, process intensification, and reducing embodied emissions) and has announced funding for a sixth in cybersecurity. Under the current structure, each institute receives startup federal funding for five years, after which it must transition to other sources of funding. However, program participants have acknowledged that this transition window may be too short and opportunities for follow-on or permanent funding would help institutes to continue fulfilling their missions.⁷⁶⁰ Further expansion of the energy-related institutes would also help tackle other complex, cross-cutting opportunities for clean energy manufacturing innovation and address the lack of support and investment for technology scale-up.

Recommendation: Congress should direct DOE to expand its network of Manufacturing USA institutes to enhance innovation in clean energy manufacturing and increase deployment of clean energy technologies. The selection of new institute topics should aim to fill gaps in the network and involve input from industry, academia, and states and regions. Congress should consider extending the initial period of funding for the institutes or creating other opportunities for follow-on funding after the initial period.

Committee of Jurisdiction: Science, Space, and Technology

Building Block: Prioritize Federal Innovation Funding for Applicants That Submit U.S. Manufacturing Plans and Connect DOE Awardees with Department of Commerce Manufacturing Programs

Rapid and large-scale clean energy deployment will offer a significant opportunity to grow the U.S. economy by reviving the manufacturing and industrial sectors. To realize this opportunity, however, the federal government needs to meet two objectives. First, as recommended throughout the section titled “Drive Innovation and Deployment of Clean Energy and Deep Decarbonization Technologies,” the U.S. government needs to offer robust, focused policies to incentivize and support domestic development, demonstration, and deployment of clean technologies. Second, the U.S. government

⁷⁵⁹ Advanced Manufacturing National Program Office, National Institute of Standards and Technology, Department of Commerce, NIST AMS 600-5, *Manufacturing USA Annual Report, Fiscal Year 2018* (September 2019).

⁷⁶⁰ David Hart et al., *Manufacturing USA at DOE: Supporting Energy Innovation* (Information Technology and Innovation Foundation, 2018).

needs to ensure commercialization and manufacture of those technologies here in the United States, rather than abroad.

Under a provision of the Bayh-Dole Act, EERE and the Advanced Research Projects Agency – Energy (ARPA-E) may require applicants for grants or other funding to submit U.S. Manufacturing Plans, which include a commitment to manufacture in the United States any technology resulting from federally supported research.⁷⁶¹ The federal government, however, has little power to enforce these commitments.

The DOC also has several current and former programs focused on advancing U.S. manufacturing, such as NIST's Manufacturing Extension Partnership, the Economic Development Administration's (EDA's) Build to Scale program, and EDA's Investing in Manufacturing Communities Partnership. Strengthening the coordination between these programs and DOE could help DOE funding recipients translate their innovations into investments in U.S. manufacturing.

Recommendation: Congress should authorize DOE to encourage applied energy program offices to give special consideration to grant applicants who submit U.S. Manufacturing Plans. This incentive would help ensure that U.S. investments result in domestic manufacturing that drives economic development and employment.

Recommendation: Congress should also direct DOE to provide better coordination between its programs and awardees and the U.S. manufacturing programs at DOC.

Committees of Jurisdiction: Science, Space, and Technology; Energy and Commerce

Building Block: Fund New Consortia to Translate Ideas from National Labs and Research Institutions Into the Manufacturing Base

Businesses and manufacturers that want to harness the latest clean technologies or advanced manufacturing processes may find that they are out of reach. Some promising innovations may not make it out of the laboratory into the marketplace; others may require prohibitive upfront capital investments. Rep. Matt Cartwright (D-PA) introduced the Consortia-Led Energy and Advanced Manufacturing Networks Act (H.R. 5505) to create a program in the DOC to provide up to \$100 million in grants toward new public-private consortia dedicated to commercializing cutting-edge clean energy technology and advanced manufacturing ideas.

Recommendation: Congress should create and fund new consortia, made up of research universities, private companies, national laboratories, venture capitalists, and state and nonprofit entities with expertise in technology commercialization, to ensure the best clean technology and advanced manufacturing ideas reach the U.S. marketplace.

Committees of Jurisdiction: Energy and Commerce; Science, Space, and Technology

⁷⁶¹ U.S. Department of Energy, *Determination of Exceptional Circumstances Under the Bayh-Dole Act for Energy Efficiency, Renewable Energy, and Advanced Energy Technologies* (September 2013).

Building Block: Procure Bulk Domestic Clean Energy, Energy Efficiency, and Decarbonization Technologies and Products

While the grants, rebates, and tax incentives recommended throughout this report would increase demand for clean energy and other emissions-reducing technologies, the pace and scale of demand from individual purchases may not be fast or large enough to facilitate a rapid revitalization of domestic manufacturing facilities. The federal government can use its purchasing power to drive investment in clean domestic manufacturing. Bulk procurement orders would provide manufacturers the demand certainty needed to make long-term investments and hiring decisions to bring their factories back to full capacity after the economic fallout from the COVID-19 pandemic and continue to grow into the future. These investments will in turn help drive down the costs of production, reducing the costs of clean energy and decarbonization efforts and further increasing demand in a virtuous cycle.

Recommendation: Congress should establish a program to procure bulk orders of clean energy, energy efficiency, and other decarbonization technologies and products. Congress should direct the EPA and DOE to determine eligible products, such as highly efficient appliances and equipment and low-emission materials for federal buildings, zero-emission vehicles for federal fleets, components for public transit and passenger rail, and smart grid/building components for federal systems. The EPA and DOE should coordinate product purchases with agencies responsible for relevant federal procurement programs and targets recommended throughout this report. Congress should require the bulk purchases to boost domestic manufacturing and reward producers with robust environmental and labor standards, such as Buy Clean (discussed above) and Buy Fair, respectively.

Recommendation: Congress should consider creating a program to provide a portion of bulk purchased products and appliances to state and local governments at a discounted rate, which they should use for public facilities, fleets, and transit and/or consumer clean energy and efficiency programs.

Committees of Jurisdiction: Energy and Commerce; Oversight and Reform

Develop, Manufacture, and Deploy Cutting-Edge Carbon Removal Technology

Because the world has allowed climate change to continue unabated, the task of limiting dangerous levels of warming will require more dramatic intervention, including carbon dioxide removal. The Intergovernmental Panel on Climate Change (IPCC) defines carbon dioxide removal as “anthropogenic activities removing CO₂ from the atmosphere and durably storing it in geological, terrestrial, or ocean reservoirs, or in products. It includes existing and potential anthropogenic enhancement of biological or geochemical sinks and direct air capture and storage, but excludes natural CO₂ uptake not directly caused by human activities.”⁷⁶²

The IPCC concluded that carbon dioxide removal measures will certainly be necessary to limit the increase in average global temperatures to 1.5°C and will likely be necessary to limit the increase to 2°C. Carbon removal measures also may be critical to return the atmosphere to lower concentrations of carbon dioxide, particularly if the world initially overshoots the 1.5°C target.⁷⁶³

The scale of the challenge is enormous. The National Academies of Science, Engineering, and Medicine estimate that we need carbon removal at a scale of 10 gigatons of carbon dioxide each year by midcentury.⁷⁶⁴ The largest operating direct air capture (DAC) plant in North America has the capacity to capture one single ton of CO₂ each day.⁷⁶⁵ There are few data points, but current estimates of the cost of DAC range from \$94 - \$600/ton.⁷⁶⁶

Given these uncertainties, the world cannot rely solely on carbon removal technologies as a panacea or as a substitute for cost-effective primary mitigation. The IPCC warned that “[c]arbon cycle and climate system understanding is still limited about the effectiveness of net negative emissions to reduce temperatures after they peak.”⁷⁶⁷ As such, Congress should approach carbon removal as one part of a portfolio of deployable technologies to maximize the likelihood of limiting the average increase in global temperatures and restoring climate balance.

Still, there is reason for optimism. Wind and solar energy provide clear examples of how government policies can help reduce costs, improve performance, and expand the scale of deployment of new technologies. Importantly, long-lived and sustained investment in innovation has proven effective for accelerating cost reduction and performance improvements. This was true not only for wind and solar but for LEDs and battery technology as well. Recent work by the Rhodium Group suggests that costs

⁷⁶² Intergovernmental Panel on Climate Change, *Special Report on Global Warming of 1.5°C* (October 2018).

⁷⁶³ Ibid.

⁷⁶⁴ *Negative Emissions Technologies and Reliable Sequestration: A Research Agenda* (National Academies of Sciences, Engineering, and Medicine, 2019).

⁷⁶⁵ Carbon Engineering, “Frequently Asked Questions,” <https://carbonengineering.com/frequently-asked-questions/>. Accessed June 2020.

⁷⁶⁶ David W. Keith et al, “A Process for Capturing CO₂ from the Atmosphere,” *Joule* 2, 8 (2018): 1573; Carbon 180, “Direct Air Capture,” <https://carbon180.org/fact-sheets>. Accessed June 2020.

⁷⁶⁷ Intergovernmental Panel on Climate Change, *Special Report on Global Warming of 1.5°C* (October 2018).

for DAC could fall to \$85-261/ton by 2030 with widespread deployment and scaling.⁷⁶⁸ Scaling of DAC also provides significant job creation potential. A June 2020 Rhodium Group report finds that building and operating a single DAC plant with a one-million-ton capture capacity could generate nearly 3,500 jobs.⁷⁶⁹ By 2050, scale-up of DAC could account for nearly 250,000 construction jobs and more than 270,000 direct manufacturing jobs.⁷⁷⁰

This section discusses engineering approaches to carbon removal, such as DAC, bioenergy with carbon capture and storage (BECCS), and carbon mineralization or enhanced geological weathering using rocks to absorb carbon dioxide. These approaches permanently return carbon dioxide to the geosphere. Other sections of this report focus on natural pathways that temporarily place carbon dioxide in the biosphere, such as soil management, wetlands restoration, reforestation, afforestation, and ocean-based strategies.

A broad, comprehensive federal strategy will be required to meet the scale of the carbon removal challenge. Key components include expanding RDD&D; providing financial incentives for carbon removal; preparing for large-scale subsurface storage of carbon dioxide; and creating markets for products made from carbon captured from the atmosphere.

Develop a Robust, Coordinated Federal RD&D Strategy on Carbon Removal Technologies

Directly capturing carbon from seawater or the atmosphere and either sequestering the carbon below ground or converting it into useful products is within the mission and expertise of a dozen federal agencies, including the Departments of Energy and Agriculture and the National Oceanic and Atmospheric Administration (NOAA). However, carbon removal is not currently a priority for any of these agencies. A new federal initiative focused on carbon removal could build on existing programs, raise the visibility of carbon removal among agency leaders, and meet the emissions challenge. Most importantly, it would accelerate deployment of U.S.-based technologies into domestic and international markets to remove carbon dioxide at scale this decade.

Building Block: Launch an Ambitious Federal RD&D Program for Carbon Removal Technologies

One immediate element of the carbon removal research challenge is a rapid and profound increase in the scale of federal investments. The National Academies of Sciences, Engineering, and Medicine recommended a 10-year federal commitment of \$240 million per year for DAC, which refers to technologies that remove carbon directly from the atmosphere.⁷⁷¹ More recently, the Energy Futures Initiative recommended a 10-year federal RD&D program of \$10.7 billion for carbon removal, starting

⁷⁶⁸ John Larsen et al., *Capturing Leadership: Policies for the U.S. to Advance Direct Air Capture Technology* (Rhodium Group, 2019).

⁷⁶⁹ John Larsen et al., *Capturing New Jobs: The employment opportunities associated with scale-up of Direct Air Capture (DAC) technology in the US* (Rhodium Group, 2020).

⁷⁷⁰ *Ibid.*

⁷⁷¹ *Negative Emissions Technologies and Reliable Sequestration: A Research Agenda* (National Academies of Sciences, Engineering, and Medicine, 2019).

with a year-one allocation of \$325 million.⁷⁷² The program would aim to reach a gigaton-scale deployment of carbon removal, identify cost targets, and minimize ecological impacts. The funding would be directed toward 10 federal agencies, with the DOE and the Department of Agriculture (USDA) playing key roles.⁷⁷³ The federal agencies include the Department of Defense (DOD), the Department of the Interior (DOI), the EPA, NIST, NOAA, the National Science Foundation (NSF), the DOT, and the National Aeronautics and Space Administration (NASA).

Recommendation: Congress should launch a 10-year, multi-agency RD&D program for carbon removal.

Committees of Jurisdiction: Science, Space, and Technology; Armed Services; Energy and Commerce; Agriculture

Building Block: Coordinate Carbon Removal Activities Across the Government

A substantial increase in federal investment in carbon removal technology underscores the need for coordination among the federal agencies. The Energy Futures Initiative recommended that the Executive Office of the President coordinate these federal agency efforts through the Office of Science and Technology Policy and the Office of Management and Budget. More broadly, the Executive Office of the President should coordinate internationally on carbon removal research through the Mission Innovation initiative.

Recommendation: Congress should establish a Committee on Large-Scale Carbon Management within the National Science and Technology Council to coordinate carbon removal and related activities among all federal agencies.

Committee of Jurisdiction: Science, Space, and Technology

Building Block: Prioritize Direct Air Capture Research, Development, and Demonstration

Only five commercial efforts to develop DAC projects currently exist; these projects are located in the United States, Canada, Switzerland, and the Netherlands.⁷⁷⁴ Since this is a relatively new field, the United States still has a clear chance to become the world leader in DAC technology.⁷⁷⁵

⁷⁷² Ernest J. Moniz, et al., *Clearing the Air: A Federal RD&D Initiative and Management Plan for Carbon Dioxide Removal Technologies* (Energy Futures Initiative, 2019).

⁷⁷³ The 10 Federal agencies are: Department of Energy, the Department of Agriculture, the National Oceanic and Atmospheric Administration, the National Science Foundation, the Department of the Interior, the National Aeronautics and Space Administration, the Environmental Protection Agency, the Department of Transportation, and the National Institute of Standards and Technology. See Ernest J. Moniz, et al., *Clearing the Air: A Federal RD&D Initiative and Management Plan for Carbon Dioxide Removal Technologies* (Energy Futures Initiative, 2019).

⁷⁷⁴ Carbon 180, “Carbon Removal Fact Sheets: Direct Air Capture,” <https://carbon180.org/fact-sheets>. Accessed June 2020; David Sandalow, et al., *Direct Air Capture of Carbon Dioxide* (Innovation for a Cool Earth Forum, 2018).

⁷⁷⁵ John Larsen et al., *Capturing Leadership: Policies for the US to Advance Direct Air Capture Technology* (Rhodium Group, 2019).

Rep. Marc Veasey (D-TX) introduced the Fossil Energy Research and Development Act of 2019 (H.R. 3607), which would authorize DOE to research carbon removal and establish a DAC test center and technology prize.

The Energy and Commerce Committee's discussion draft of the CLEAN Future Act would establish a carbon capture commercialization program that would include funding for a Front-End Engineering Design study for a DAC technology commercial demonstration project and five DAC commercial demonstration projects. The bill would also create a DAC Technology Prize Program.⁷⁷⁶

Some of the key areas where continued research is needed include: 1) developing new solvent and sorbent materials and new processes to separate carbon dioxide; 2) development of air contactors, including the use of low-cost materials; 3) applied research on system-level integration; 4) research on manufacturing; and 5) lifecycle greenhouse gas emissions analysis and review of environmental impacts and costs.⁷⁷⁷

At the end of 2019, Congress appropriated \$20 million for the DOE to research DAC and other negative emissions technologies.⁷⁷⁸ While a start, this is not sufficient to meet the carbon removal challenge.

Recommendation: Congress should direct federal agencies to prioritize DAC RD&D. Congress should authorize funding for Front-End Engineering Design studies and DAC technology commercial demonstration projects. Congress should also direct DOE to create a DAC Technology Prize Program.

Committees of Jurisdiction: Energy and Commerce; Science, Space, and Technology

Building Block: Prioritize Research on Bioenergy with Carbon Capture

The IPCC anticipates the world will use Bioenergy with Carbon Capture and Storage (BECCS) to achieve carbon removal at a scale larger than a few hundred gigatons.⁷⁷⁹ BECCS refers to technologies that produce energy from biomass and store the carbon dioxide.⁷⁸⁰ If BECCS is deployed at the scale envisioned by the IPCC, world leaders will need to address concerns that BECCS deployment at scale would compete with food production and other land uses and would harm biodiversity.

To date, commercial deployment of BECCS projects has been limited. The United States is home to promising application of carbon capture with ethanol production. In 2017, the Archer Daniels Midland project came online, becoming the world's first commercial-scale carbon capture project at an ethanol production plant. The project captures carbon dioxide and stores it in a saline formation below ground. Expanded development of carbon capture on ethanol production would help build experience with geologic sequestration, which could help reduce costs for negative emissions technologies.

⁷⁷⁶ Title V, Section 501, CLEAN Future Act discussion draft.

⁷⁷⁷ Ernest J. Moniz et al., *Clearing the Air: A Federal RD&D Initiative and Management Plan for Carbon Dioxide Removal Technologies* (Energy Futures Initiative, 2019).

⁷⁷⁸ Consolidated Appropriations Act 2020, Pub. L. No. 116-93.

⁷⁷⁹ Intergovernmental Panel on Climate Change, *Special Report on Global Warming of 1.5°C* (October 2018).

⁷⁸⁰ Christopher Consoli, *Bioenergy and Carbon Capture and Storage* (Global CCS Institute, March 2019).

Looking ahead, key areas for research include developing sustainable biomass supply such as algae, converting biomass to low-carbon fuels and electricity, and achieving cost reductions. The Energy Futures Initiative recommends studying carbon dynamics, technological development, and biomass sustainability for BECCS.⁷⁸¹ In the section of this report titled “Protect and Restore Forests and Grasslands,” the majority staff for the Select Committee recommends guidelines for accurately accounting for the climate and biodiversity implications of woody biomass.

Recommendation: Congress should direct DOE to establish a BECCS research program in coordination with USDA and the U.S. Bureau of Land Management (BLM) with a cost target of less than \$100/ton.⁷⁸² DOE should also develop standards for understanding the lifecycle greenhouse gas emissions and land-use impacts of BECCS. DOE should develop best practices to improve carbon removal while minimizing land and environmental impacts.

Committees of Jurisdiction: Science, Space, and Technology; Agriculture; Natural Resources

Building Block: Expand Carbon Mineralization Research

In nature, the exposure of certain rocks and minerals to atmospheric carbon dioxide and water causes carbonates like calcite to form. These carbonates store carbon in a solid state over the long term. This process, referred to as geological weathering or carbon mineralization, has generated interest among scientists hoping to accelerate this natural process to reduce atmospheric concentrations of carbon dioxide.

Building on the work of the U.S. Geological Survey,⁷⁸³ key areas for continued research include: 1) research on geophysics and geochemistry to better understand the potential scale of carbon mineralization as a negative emissions technology; 2) a resource survey to highlight sustainable sources of key rocks and minerals; 3) applied research using industrial waste and mine tailings; and 4) the potential of environmental impacts and ways to avoid or minimize environmental impacts.

Recommendation: Congress should direct DOI and DOE to expand carbon mineralization research.

Committees of Jurisdiction: Natural Resources; Science, Space, and Technology

Provide Financial Incentives for Carbon Removal

Private-sector investors may be discouraged by the higher costs and technology risks of first-of-a-kind carbon removal projects. Financial incentives for investors can help break down these market barriers. For carbon removal technologies, Congress needs to replicate the success of the wind and solar industry, where tax credits and loan guarantees reduced costs, improved performance, and expanded the scale and pace of deployment.

⁷⁸¹ Ernest J. Moniz et al., *Clearing the Air: A Federal RD&D Initiative and Management Plan for Carbon Dioxide Removal Technologies* (Energy Futures Initiative, 2019).

⁷⁸² Ibid.

⁷⁸³ U.S. Geological Survey, *Making Minerals: How Growing Rocks Can Help Reduce Carbon Emissions* (March 2019).

Building Block: Modernize the Section 45Q Tax Credit for Direct Air Capture

Some carbon removal technologies, such as DAC, qualify for the Section 45Q tax credit for CCUS technologies. Eligible DAC projects must capture at least 100,000 tons of carbon dioxide each year and must commence construction by the end of 2023. Once projects qualify, they may claim the tax credit for 12 years.

These parameters are challenging for DAC projects, because DAC technologies are both less mature than some technologies used to separate carbon dioxide from point sources and more expensive, which limits near-term scalability.

Recommendation: For DAC projects, Congress should eliminate the Section 45Q capture threshold, further extend the deadline to commence construction, and extend the period during which the credit may be claimed. In addition to the 45Q tax credit, Congress should consider legislation that would develop financial incentives such as grants, loan guarantees, or direct federal investment, to jump start a DAC industry.

Committees of Jurisdiction: Ways and Means; Energy and Commerce

Prepare for Large-Scale Subsurface Storage of Carbon Dioxide

Removing carbon dioxide from the atmosphere at a scale of 10 gigatons each year by 2050 will require enormous storage capabilities. While captured carbon can be converted into useful products and stored in plastics and polymers as well as building materials like concrete, cement, and aggregates, these all break down over time. Permanent sequestration of carbon dioxide below ground would yield the greatest climate benefit.

In the section titled “Rebuild U.S. Industry for Global Climate Leadership,” this report outlines recommendations to expand carbon storage demonstration projects and to ensure robust regulatory oversight of subsurface carbon storage.

Create Markets for Products Made from Carbon Captured from the Atmosphere

Given the scale of carbon storage needs, entrepreneurs have been exploring carbon utilization, or the conversion of captured carbon into useful products, as a complement to subsurface storage. From a financial perspective, carbon utilization is an attractive option because it provides a revenue stream to offset the capture costs. Developing a business model for DAC could also provide a pathway for sustained private sector investment.

One promising carbon utilization strategy is to develop “drop-in fuels,” or fuels that could work with conventional engines. Drop-in fuels could take advantage of the large market size for conventional fuels and the urgent need to displace them with lower-carbon alternatives. Another promising pathway involves use of carbon dioxide to cure cement and concrete. Certain novel products bind carbon dioxide in mineral form in concrete and cement permanently and could use carbon capture via

DAC or BECCS. Roughly 90% of cement and concrete is purchased by federal, state, and city governments, providing extraordinary leverage to create markets and drive down costs rapidly.⁷⁸⁴ Elsewhere, this report outlines opportunities to develop procurement policies for low-carbon and net-negative cement and concrete.

Ultimately, expanding markets for the reuse of captured carbon would expand carbon recycling, but geologic sequestration offers the most climate benefit.

Building Block: Expand Any Federal Fuel Standard to Include Fuels Made from Captured Carbon

In California, fuels made from carbon captured from the atmosphere qualify under the state's Low Carbon Fuel Standard (LCFS). The LCFS values carbon at \$194-209/ton, which makes it the world's highest carbon price and a powerful incentive to invest in technologies like DAC.⁷⁸⁵ At the federal level, the Renewable Fuel Standard (RFS) requires oil refiners and importers of gasoline and diesel to blend increasing volumes of lower-emission renewable fuels into transportation fuels.⁷⁸⁶

A federal-level fuel policy that provides credits to fuels produced from captured carbon would create a market pull for the carbon removal technologies. This would attract private sector investment in deploying carbon removal technologies at commercial scale.

Recommendation: In the section of this report titled "Produce Lower-Carbon Fuels for Vehicles," the majority staff for the Select Committee recommends building on the RFS to establish a national LCFS. A national LCFS should allow fuels produced from carbon captured from seawater or the atmosphere to qualify for credits if they meet a carbon intensity benchmark. Like the California Low Carbon Fuel Standard, DAC should qualify as a compliance mechanism.

Committee of Jurisdiction: Energy and Commerce

Building Block: Continue Supporting the Development of Military Fuels and Products from Captured Carbon

The military has a unique use case for fuels made from captured carbon, because generating fuels onsite at Forward Operating Bases could avoid vulnerabilities associated with physically delivering conventional fossil fuels, which requires protection from enemy attacks. In fact, the U.S. Naval Research Laboratory has patented a carbon capture device for producing synthetic fuel from seawater.⁷⁸⁷ The Air Force is partnering with Opus 12 to investigate opportunities to develop alternative jet fuel from captured carbon as part of its commitment to decrease dependence on

⁷⁸⁴ Testimony of Dr. S. Julio Friedmann, Senior Research Scholar, Center on Global Energy Policy at Columbia University School of International & Public Affairs, *Industrial Decarbonization*, Hearing Before the House Committee on Energy and Commerce, 116th Congress (September 18, 2019).

⁷⁸⁵ California Air Resources Board, "Weekly LCFS Credit Transfer Activity Reports: 25th May 2020 – 31st May 2020," <https://ww3.arb.ca.gov/fuels/lcfs/credit/lrtweeklycreditreports.htm>. Accessed June 2020.

⁷⁸⁶ 42 U.S.C. § 7545.

⁷⁸⁷ U.S. Naval Research Laboratory, "NRL Receives US Patent for Carbon Capture Device: A Key Step in Synthetic Fuel Production from Seawater," <https://www.nrl.navy.mil/news/releases/nrl-receives-us-patent-carbon-capture-device-key-step-synthetic-fuel-production-seawater>. Accessed June 2020.

foreign oil, increase fuel choice, and improve energy security.⁷⁸⁸ Much more work remains to demonstrate and deploy these types of carbon removal technologies on a larger scale.

Rep. Don Beyer (D-VA) introduced the Securing Energy for our Armed Forces Using Engineering Leadership (SEA FUEL) Act of 2019 (H.R. 3227), which would direct DOD, in coordination with the Department of Homeland Security (DHS) and DOE, to establish a program focused on capturing carbon dioxide from seawater (blue carbon capture) and the atmosphere (DAC) to transform the carbon dioxide into military fuels. At the end of 2019, Congress enacted the SEA FUEL Act and appropriated \$8 million for this research program.⁷⁸⁹

In the section titled “Rebuild U.S. Industry for Global Climate Leadership,” this report describes opportunities to reuse captured carbon by transforming it into useful products. Captured carbon could be converted into precipitating sand for use as an alternative to coral reefs to nourish beaches in distant locations like the Kwajalein Atoll missile test site.

Recommendation: Congress should build on the SEA FUEL Act and provide additional funding to further support RD&D projects to develop military fuels from captured carbon dioxide. Congress should direct DOD to develop a standard for the procurement of synthetic fuels, including those made from carbon dioxide, and propose a procurement standard that includes proposals for escalating procurement and use of synthetic fuels using BECCS and DAC.

Committee of Jurisdiction: Armed Services

Building Block: Establish Federal Procurement of Fuels Made from Captured Carbon

Beyond the military, federal agencies could procure fuels made from captured carbon for use in federal vehicles. Under existing law, 75% of new light-duty vehicles acquired by the federal government must be alternative-fueled vehicles.⁷⁹⁰ Current law also requires purchases of alternative fuels, as defined in statute, for dual-fuel vehicles.⁷⁹¹ Agencies are frequently granted waivers from these requirements. Congress could expand this requirement to include fuels made from captured carbon in order to generate demand for this promising technology. Elsewhere, in the section titled “Reduce Pollution from Passenger Vehicles by Deploying Cleaner Cars and Fuels,” this report recommends that Congress require all federal vehicle acquisitions to be zero-emission by 2035 for light-duty vehicles and 2040 for medium- and heavy-duty vehicles.

Recommendation: Congress should expand the definition of alternative fuel to include fuels made from captured carbon.

Recommendation: Congress should direct the General Services Administration to establish a competitive procurement process for fuels made from captured carbon for use in federal vehicles.

Committees of Jurisdiction: Energy and Commerce; Transportation and Infrastructure

⁷⁸⁸ Small Business Administration, Small Business Innovation Research Program, “Award Details: CO₂-derived Alternative Jet Fuel,” <https://www.sbir.gov/sbirsearch/detail/1623579>. Accessed June 2020.

⁷⁸⁹ National Defense Authorization Act for Fiscal Year 2020, Pub L No 116-92, codified at 10 U.S.C. § 223.

⁷⁹⁰ 42 U.S.C. § 13212.

⁷⁹¹ 42 U.S.C. §§ 6374(a)(3)(E); § 6374(g)(2).

Cut Emissions of Super-Pollutants and Support Next-Generation Coolant Manufacturers

Building Block: Phase Down the Production and Consumption of Hydrofluorocarbons in the United States.

Hydrofluorocarbons (HFCs) are gases used as refrigerants in vehicles and buildings, aerosol propellants, foam blowing agents, solvents, and fire retardants. HFCs are more potent than carbon dioxide, so even small concentrations can have a significant near-term impact on the climate. On October 15, 2016, parties to the Montreal Protocol on Substances That Deplete the Ozone Layer adopted the Kigali Amendment to phase down the global production and consumption of HFCs, which were introduced as alternatives to ozone-depleting gases. Implementing the Kigali Amendment worldwide could prevent between 0.2 degrees and 0.44 degrees Celsius of warming by the end of the 21st century.⁷⁹²

Despite strong Senate bipartisan support for ratification,⁷⁹³ President Trump has not yet submitted the Kigali Amendment to the Senate.

In October 2019, the CEOs of 31 major appliance makers and chemical producers called on Congress to set a schedule for phasing down HFC production and consumption in the United States.⁷⁹⁴ These CEOs noted that the United States has an opportunity to lead in the development and manufacture of next-generation technologies. A recent study by the University of Maryland found that phasing down HFCs would create 33,000 new American manufacturing jobs and increase U.S. exports of heating, ventilation, air conditioning, and refrigeration equipment by 25% over the next decade.⁷⁹⁵

Recommendation: Congress should (1) direct the EPA to phase down the production and consumption of HFCs, curb HFC leakage, and speed the transition to available alternatives; (2) increase resources for agency enforcement of and education about regulations pertaining to HFCs, including prohibitions against venting; and (3) create a grant program to provide resources to states and localities to facilitate the replacement of equipment using HFCs to reduce consumer costs.

Committee of Jurisdiction: Energy and Commerce

⁷⁹² Institute for Governance & Sustainable Development, “Nations Agree to Kigali Amendment: Largest Near-Term Temperature Reduction from Single Agreement (October 15, 2016), <http://www.igsd.org/nations-agree-to-kigali-amendment-largest-near-term-temperature-reduction-from-single-agreement/>.

⁷⁹³ Letter from Sens. John Kennedy (R-LA), Bill Cassidy (R-LA), and 11 other GOP Senators to President Donald J. Trump, June 4, 2018, urging the president to “send the Kigali Amendment to the Montreal Protocol to the Senate for its advice and consent.”

⁷⁹⁴ Letter from the Alliance for Responsible Atmospheric Policy and the Air-Conditioning, Heating, and Refrigeration Institute to Sen. John Barrasso, Sen. Tom Carper, Rep. Frank Pallone, and Rep. Greg Walden (October 8, 2019).

⁷⁹⁵ Inforum and JMS Consulting, *Economic Impacts of U.S. Ratification of the Kigali Amendment*, Report Prepared for the Air-Conditioning, Heating, & Refrigeration Institute and the Alliance for Responsible Atmospheric Policy (April 19, 2018).

BREAK DOWN BARRIERS FOR CLEAN ENERGY TECHNOLOGIES

Clean energy technology faces several structural barriers to rapid and widespread deployment. At the top of the list is a tax code that benefits oil, coal, and other incumbent energy technologies over new technologies and an economic system that fails to account for the cost of carbon pollution in energy prices.

These structural biases have been imbedded in the tax code for decades and entrenched in the U.S. economy for even longer. As a result, throughout this report the majority staff for the Select Committee has recommended new tax incentives for specific clean energy technologies that will be essential to decarbonize the economy at the scale and pace to limit warming to 1.5°C. In an ideal world, energy-related tax incentives would be technology neutral and based on performance to allow the broadest scope for innovation. Congress and tax policy experts should continue to examine the best mix of tax incentives and other policy instruments to maximize development and deployment of technologies the country needs to meet its net-zero emissions goal.

In the meantime, Congress can act to remove specific tax deductions and credits that subsidize oil and gas production in the United States and put a price on carbon to internalize the cost of climate change in energy prices.

Align the Tax Code with a Net-Zero Goal and Eliminate Unnecessary Tax Breaks for Oil and Gas Companies

The U.S. tax code provides the oil and gas sector billions of dollars in tax deductions and other incentives that make it more difficult for zero-carbon energy sources to compete.

For example, oil and gas companies can deduct intangible drilling costs—the costs associated with preparing a well for production and 60% to 80% of the total cost of a well—upfront rather than over the lifetime of the asset or project. This provides a boost to cash flow at the front end of a major project.⁷⁹⁶ The law allows independent oil and gas producers to deduct 100% of their intangible drilling costs in the first year. Integrated oil companies can deduct 70% of these costs in the first year and then amortize the rest over five years.⁷⁹⁷ In 2016, the Joint Committee on Taxation estimated that eliminating this tax break would generate \$1.59 billion in revenue in 2017 and \$13 billion over the next 10 years.⁷⁹⁸ As another example, the tax code allows independent oil and gas producers to deduct 15% of their gross income from oil and gas produced from a well each year.⁷⁹⁹ Because this deduction is not

⁷⁹⁶ Peter Erickson et al, “Why fossil fuel subsidies matter,” *Nature* 578, E1–E4 (2020).

⁷⁹⁷ 26 U.S.C. § 263(c).

⁷⁹⁸ Joint Committee on Taxation, *Estimated Budget Effects of the Revenue Provisions Contained in the President’s Fiscal Year 2017 Budget Proposal*, March 24, 2016.

⁷⁹⁹ 26 U.S.C. § 613A.

based on capital costs, a company's total deductions can exceed capital costs.⁸⁰⁰ In 2016, the Joint Committee on Taxation estimated that eliminating this "percentage depletion" allowance would generate \$12.1 billion over the next 10 years.⁸⁰¹

Recommendation: Congress should ensure that the U.S. tax code aligns with the national goal of achieving net-zero emissions by no later than 2050. As a start, Congress should repeal unnecessary tax breaks for the oil and gas industry.

Committee of Jurisdiction: Ways and Means

Put a Price on Carbon Pollution

The environmental and societal costs of greenhouse gas emissions from the burning of fossil fuels are clear, including loss of life and property damage caused by wildfires, stronger hurricanes, and other extreme weather events. When a ton of carbon pollution billows from a smokestack, however, no one pays for that pollution. As a result, industry, investors, and consumers do not internalize the true cost of the choices they are making and have less incentive to choose less-polluting products or technologies. Until the market reflects the true cost of carbon pollution, the U.S. economy will remain biased toward fossil fuel combustion.

One way to correct this market failure is to put a price on each ton of pollution. Congress could design a comprehensive climate plan without a carbon price, but a carbon price "percolates through the entire economy, providing an incentive for all decision makers in the economy to look for ways to reduce emissions."⁸⁰²

Carbon pricing can take many forms. The majority staff for the Select Committee offers the following principles for designing an effective and equitable carbon pricing system:

1. Congress should establish a carbon pricing system designed to achieve America's economy-wide greenhouse gas emissions reduction goal of net-zero by no later than 2050.
2. Congress should consider a carbon price as only one tool to complement a suite of policies to achieve deep pollution reductions and strengthen community resilience to climate impacts. Carbon pricing is not a silver bullet.
3. Congress should ensure that energy-intensive, trade-exposed domestic industries that are working to reduce pollution remain on a level playing field with foreign competitors that use dirtier technologies.

⁸⁰⁰ Environmental and Energy Study Institute, *Fact Sheet: Fossil Fuel Subsidies: A Closer Look at Tax Breaks and Societal Costs* (July 29, 2019), <https://www.eesi.org/papers/view/fact-sheet-fossil-fuel-subsidies-a-closer-look-at-tax-breaks-and-societal-costs>.

⁸⁰¹ Joint Committee on Taxation, *Estimated Budget Effects of the Revenue Provisions Contained in the President's Fiscal Year 2017 Budget Proposal*, March 24, 2016.

⁸⁰² Resources for the Future, "Key Considerations for US Climate Policy: Clean Energy Standards & Carbon Pricing," comments submitted to the Select Committee on the Climate Crisis, November 22, 2019, <https://www.rff.org/publications/testimony-and-public-comments/key-considerations-us-climate-policy-clean-energy-standards-carbon-pricing/>.

4. Congress should ensure low- and moderate-income households benefit from a national carbon price.
5. Congress should pair a carbon price with policies to achieve measurable air pollution reductions from facilities located in environmental justice (EJ) communities, which face chronic and acute health impacts from a legacy of industrial development in their neighborhoods.
6. Congress should respect states and localities that have led the nation in climate action, ensure that a national carbon price complements and builds on their programs, and apply the lessons learned from their experiences and other international approaches.
7. Congress should not offer liability relief or nullify Clean Air Act authorities or other existing statutory duties to cut pollution in exchange for a carbon price.

Most, but not all, proposed federal carbon pricing mechanisms generate significant revenue that can be used to invest in communities, research and development, and more. Congress may decide to use some of the revenue to address top priorities, including investing in low-income communities, communities of color, and communities and workers in economic transition; rebuilding America's infrastructure in a climate-resilient way to support a net-zero economy; financing clean energy and energy efficiency projects to expedite pollution reduction; supporting natural climate solutions and conservation; or funding other recommendations in this report.

The majority staff for the Select Committee also acknowledges that environmental justice communities have raised concerns that carbon pricing and other market mechanisms "do not guarantee emissions reduction in EJ communities and can even allow increased emissions in communities that are already disproportionately burdened with pollution and substandard infrastructure."⁸⁰³ Throughout this report, the majority staff for the Select Committee has proposed new investment in low-income communities and communities of color and "policy tools that help achieve both local and national emissions reductions of carbon and other forms of pollution."⁸⁰⁴ In addition, the section of this report titled "Invest in Disproportionately Exposed Communities to Cut Pollution and Advance Environmental Justice" lays out several policies to ensure the federal government integrates environmental justice in its decision-making; engages members of low-income communities and communities of color and builds their capacity to participate in the policy-making process; and calls on the EPA to enforce the law and address the disparate health impacts of cumulative pollution in environmental justice communities.

⁸⁰³ Equitable and Just National Climate Platform, available at <https://ajustclimate.org/>. Accessed June 2020.

⁸⁰⁴ Ibid.

INVEST IN AMERICA'S WORKERS AND BUILD A FAIRER ECONOMY

Tackling climate change and reaching net-zero emissions by 2050 will reshape the U.S. economy. This offers a unique opportunity to build a new, clean energy economy on a foundation of equity and fairness for workers and their communities. Smart climate policy must invest across the country and in economically vulnerable communities and deliver good-paying, high-quality jobs and accessible career pathways into them for all Americans.

Throughout this report, the majority staff for the Select Committee has offered recommendations to advance American leadership in clean technology innovation and deployment, rebuild America's manufacturing base, and invest in resilient infrastructure projects—all of which will create jobs across the United States. These recommendations are even more important in the wake of the COVID-19 pandemic that left 40 million Americans out of work by the end of May 2020 and mothballed manufacturing facilities. In the following pages, the majority staff for the Select Committee identify additional policies to put working people front and center as the clean energy economy takes shape.

Ensure the Clean Energy Economy Benefits Current and Future Workers

Building Block: Empower Workers to Secure Good-Paying Jobs with Strong Labor Standards

For the transition to a resilient, clean energy economy to be successful, we must build it on a foundation that provides workers with a guarantee that they will earn family-sustaining wages in safe working conditions. One of the best ways to ensure that a resilient, clean energy economy is a fair economy is to strengthen workers' right to organize a union and negotiate higher wages and better benefits.

Rep. Bobby Scott (D-VA), Chairman of the House Committee on Education and Labor, introduced the Protecting the Right to Organize (PRO) Act (H.R. 2474), which amends federal labor laws to extend new protections to workers and strengthen workers' rights. Specifically, the bill deters employers from violating workers' rights and empowers workers to enforce their labor rights in court; strengthens workers' right to join together and negotiate for better working conditions; and closes loopholes in federal labor laws, such as those that allow employers to misclassify their employees as independent contractors.⁸⁰⁵ On February 6, 2020, the PRO Act passed the House of Representatives with a bipartisan vote of 224-194.

Recommendation: Congress should pass legislation to secure workers' right to organize a union to negotiate for higher wages, safer working conditions, and better benefits.

Committee of Jurisdiction: Education and Labor

⁸⁰⁵ House Committee on Education and Labor, "Fact Sheet: Protecting the Right to Organize Act," May 2, 2019.

Building Block: Ensure Federally Funded Construction and Infrastructure Projects Meet the Highest Labor Standards

The transition to a climate-resilient and clean energy economy will create millions of jobs in construction and infrastructure development as the country builds and rebuilds to make communities, homes, and businesses more energy-efficient and resilient to extreme weather; adds new transmission lines for clean energy deployment; and installs new clean energy and advanced vehicle infrastructure. This report recommends that the federal government play a key role in spurring this economic development and job creation. Tying this federal funding to specific labor standards can ensure the new jobs are high-quality, family-sustaining jobs.

Recommendation: Federal spending should strengthen communities and improve the quality of life for working Americans. Congress should:

- Ensure that all projects receiving federal funding meet Buy America standards; ensure that Buy America/n standards are appropriately applied and enforced to cover key materials and products that are part of these projects.
- Extend Davis-Bacon Act prevailing wage requirements to all federally funded projects and to all federal contractors.
- Require that recipients of federal funding negotiate Community Benefits (or Workforce) Agreements (CBAs), where relevant. CBAs are legal agreements between community organizations and project developers that specify the actions the developer will take, such as local hire commitments, to ensure specific benefits accrue to the community in which the project is located and to low-income workers.
- Require that federally funded construction and infrastructure project developers sign Project Labor Agreements (PLAs), where relevant. PLAs are collective bargaining agreements between contractors and one or more labor organizations that set out employment terms and conditions for a construction project and often contain CBA elements.

Committees of Jurisdiction: Education and Labor; Transportation and Infrastructure; Energy and Commerce

Building Block: Identify Potential Opportunities to Incentivize High-Road Labor Standards in Clean Energy and Clean Vehicle Tax Policy

In this report, the majority staff for the Select Committee recommends that Congress employ several tools to expedite the deployment of clean energy and vehicle technologies, including tax incentives and direct federal spending. As a general matter, projects receiving federal funding must meet certain labor standards, including Davis-Bacon prevailing wage requirements. This is not the case for most projects and individuals benefiting from federal tax incentives.

Sen. Jeff Merkley (D-OR) introduced the Good Jobs for 21st Century Energy Act (S. 2185), which creates a new 10% tax credit for clean energy generation facilities, storage, carbon capture technologies, manufacturing, and energy efficiency projects. Employers qualify for this tax credit only if they commit to strong labor standards, including clear employment and safety standards, Davis-Bacon prevailing wage standards, and the utilization of participants from registered apprenticeship programs.

In June 2020, House Ways and Means Committee Democrats introduced the Growing Renewable Energy and Efficiency Now (GREEN) Act of 2020 (H.R. 7330), which House Democrats included in the Moving Forward Act (H.R. 2). Section 503 of the GREEN Act provides additional tax benefits for certain renewable energy and efficiency projects and activities that adopt strong labor practices and pay prevailing wages consistent with Davis-Bacon requirements for similar federal projects.

Recommendation: Congress should continue to engage with stakeholders, including labor unions, clean energy companies, and advanced vehicle manufacturers, to identify a policy path to ensure that federal tax policy expedites the deployment of zero-carbon energy and vehicle technologies while continuing to create good-paying, high-quality jobs.

Committee of Jurisdiction: Ways and Means

Make a Federal Commitment to Workers and Communities

Building Block: Invest in Community-Driven and Place-Based Solutions for Workers and Communities in Transition

The downturn in the coal industry over the last decade has devastated the economies of coal-producing regions and communities and led to tremendous job losses and economic uncertainty for coal workers and their families—a trend that will likely accelerate as we transition to a net-zero economy. And while jobs in the clean energy sector are growing quickly, they may not be in the locations where the coal jobs are being lost, nor are they always of the same quality.

A strong federal commitment to ensuring fair treatment for workers and communities hardest hit by the shift away from coal and other fossil fuels is critical and must begin with a robust community-centered stakeholder process. This federal commitment must provide comprehensive financial support and care for the displaced workers, including wage replacement, health care, and job retraining and placement. This commitment must also extend to the communities themselves and address loss of tax revenue, ensure reclamation and remediation of legacy coal sites—while holding companies accountable for their obligations under the law—and include robust funding for infrastructure and economic development. Bold action will require comprehensive federal investments in community-driven and place-based solutions.

A program that has an early focus on coal could provide a road map for other sectors, workers, and communities likely to be affected in the energy transition in the coming decades and support anticipated transformations in the future of work.

Recommendation: Congress should establish a National Economic Transition Office to coordinate, scale up, and target federal economic and workforce development assistance to communities and workers struggling as the result of changes in how America uses and consumes energy, starting with the coal economy. Congress should direct the office to pursue solutions through a community-centric stakeholder process that equally brings together representatives of the affected communities, labor,

tribes, business, and other stakeholders with state and federal resources to identify local needs, hear from affected parties, and develop actionable recommendations. This national initiative should include:

- A comprehensive set of systemic supports for workers, including wage replacement, health care support, contributions to retirement funds or pension plans, and robust paid retraining opportunities and job placement assistance tied to high-quality employment;
- A set of personal supports for workers who lose their jobs, including a range of wrap-around and counseling services for issues such as substance abuse, family and domestic challenges, financial planning, housing, and mental health support;
- Investments in local leaders to provide critical capacity-building support to effectively plan for and respond to economic and community transition, as well as in entrepreneurs and small business owners in these regions;
- Resources to support communities that depend on the extraction and generation of energy sources affected by declining demand, such as coal and oil, for local taxes and economic activity, including temporary replacement of lost tax revenue to ensure critical services (fire, police, schools, social services, etc.); and
- A robust interagency grants program to provide resources for planning and implementation of economic diversification that benefits all citizens of the community or region, building on and aligning existing programs at the Appalachian Regional Commission, Economic Development Administration, Department of Labor (DOL), and other agencies.

Committee of Jurisdiction: Education and Labor

Building Block: Prioritize Communities in Economic Transition and Environmental Justice Communities for Federal Spending and Investment

To respond to the climate crisis, the United States will need to invest heavily in new technologies, cleaner and more resilient infrastructure, and restoration of natural resources. The U.S. government has an opportunity to direct that spending and investment where communities need it most, including communities in economic transition and environmental justice communities.

Many communities across the country are experiencing economic distress as companies or entire industries that anchored their local economy move abroad or begin to decline. Such is the case with counties across Appalachia that have long relied on coal mining for tax revenue and employment. These impacts are exacerbating already inadequate infrastructure systems in these communities. From broadband and connectivity to clean and safe water, these communities need investments not only to create jobs but to ensure safe communities and provide a foundation for economic development.

Recommendation: This report makes several recommendations for new federal investment and incentives for clean and resilient infrastructure. Congress should direct a significant percentage of this spending to communities most affected by the economic transition away from fossil fuel consumption and environmental justice communities. These communities should receive federal spending and investment first, most often, and in larger amounts. All federal investments and grants should require the use of CBAs and PLAs and comply with strong prevailing wage laws.

Recommendation: Congress should consider new opportunities to use the tax code to attract investment into the areas that need it most.

Committees of Jurisdiction: Energy and Commerce; Natural Resources; Transportation and Infrastructure; Ways and Means

Building Block: Expand Registered Apprenticeship Programs in the Clean Energy Economy

The transition to a clean economy will create high demand for skilled workers in the power sector, manufacturing, and construction, among other sectors. Registered Apprenticeships are a proven model for providing workers with paid, on-the-job skills training and education to prepare them for positions with specific employers or high-demand industries. Registered Apprenticeships are those that have met national standards established by the DOL to provide workers employment that pays a competitive wage and increases as training advances, a portable credential that is valued in the labor market beyond the immediate employer, and an opportunity for career advancement. Workers that have completed a registered apprenticeship earn approximately \$300,000 more over their careers than non-apprenticeship workers.⁸⁰⁶

Several Members of Congress have introduced bills to expand Registered Apprenticeship programs in the United States. Rep. Suzanne Bonamici (D-OR) introduced the Promoting Apprenticeships through Regional Training Networks for Employers Required Skills (PARTNERS) Act (H.R. 989), a bipartisan bill to establish a grant program to support industry partnerships to help small- and medium-sized businesses develop work-based learning programs. Rep. Mark Pocan (D-WI) introduced H.R. 4965, the Leveraging Effective Apprenticeships to Rebuild National Skills (LEARNS) Act, to provide financial support to new Registered Apprenticeship programs and create national standards for Registered Apprenticeship programs.

Recommendation: Congress should reauthorize the National Apprenticeship Act and expand industry partnerships with labor unions, community and technical colleges, and employers in the clean energy economy to increase the number of workers participating in Registered Apprenticeships. As of June 2020, the Committee on Education and Labor had held a hearing on the discussion draft of the National Apprenticeship Act of 2020, released by Rep. Susan Davis (D-CA).⁸⁰⁷

Committee of Jurisdiction: Education and Labor

⁸⁰⁶ Debbie Reed et al., *An Effectiveness Assessment and Cost-Benefit Analysis of Registered Apprenticeship in 10 States* (Washington: Mathematica Policy Research, 2012).

⁸⁰⁷ Committee on Education and Labor, Subcommittee on Higher Education and Workforce Investment, Hearing on “Reauthorizing the National Apprenticeship Act: Strengthening and Growing Apprenticeships for the 21st century,” March 4, 2020.

Building Block: Coordinate Clean Energy Training Programs to Strengthen the Diversity and Inclusivity of Our Workforce

America's energy workforce is highly skilled. The transition to an equitable and just net-zero economy by 2050, however, will require training a new generation of workers; retraining some existing workers for new trades; and ensuring that individuals in low-income communities, communities of color, and communities in economic transition have access to new opportunities. Several Members of Congress have introduced legislation to expand worker training and make it more inclusive.

Chairman Bobby Rush (D-IL) introduced the Blue Collar to Green Collar Jobs Development Act of 2019 (H.R. 4061) to establish a new program in DOE's Office of Minority Economic Impact to improve the education and training of underrepresented groups, including religious and ethnic minorities, women, veterans, individuals with disabilities, unemployed energy workers, and low-income individuals, for jobs in energy-related industries.

Rep. Antonio Delgado (D-NY) introduced the Green Jobs and Opportunity Act (H.R. 4148), which directs DOL and DOE to complete a study about likely workforce needs and shortages in the clean energy technology industry. The bill authorizes millions in grant money to establish training programs to alleviate any workforce shortages and skill gaps that the study identifies.

Rep. William Keating (D-MA) introduced the Offshore Wind Jobs and Opportunity Act (H.R. 3068). This bill authorizes the Department of the Interior (DOI) to provide grants to community colleges and labor unions for the development of training programs for offshore wind careers. The House Democrats introduced a comprehensive infrastructure bill in June 2020, the Moving Forward Act (H.R. 2).⁸⁰⁸ Section 84501 of this bill incorporates a grant program like the one in the Keating bill.

Reps. Paul Mitchell (R-MI) and Suzanne Bonamici (D-OR) introduced the Building U.S. Infrastructure by Leveraging Demands for Skills (BUILDs) Act (H.R. 2831). The bill would set aside funding for grants to industry partnerships to support workforce development programs in transportation, energy, construction, and other infrastructure-related industries. The BUILDs Act would help increase diversity in these sectors by providing individuals who have historically faced barriers to employment with the support services and training they need to succeed, including skills training, adult basic education, mentoring, work attire, and childcare.

Recommendation: Congress should direct DOL to consult with relevant federal agencies, labor unions, community and technical colleges, clean energy companies, state and local officials, local workforce boards, economic development organizations, institutions of higher education, and other stakeholders to identify skills and competencies needed in the clean energy economy and develop targeted training programs to fill those needs. These training programs should not duplicate those already provided by DOL or other agencies and should include benchmarks for inclusivity and diversity.

Committee of Jurisdiction: Education and Labor

⁸⁰⁸ Unless otherwise noted, mentions of H.R. 2 refer to the version of the bill contained in Rules Committee Print 116-54, dated June 22, 2020. The House of Representatives was preparing to debate H.R. 2 when the Select Committee's report went to print. The Rules Committee Print is available at <https://rules.house.gov/sites/democrats.rules.house.gov/files/BILLS-116HR2-RCP116-54.pdf> and will not reflect any amendments made to the bill after June 22, 2020.

Support the Health Care Needs of Coal Miners

Building Block: Shore Up the Black Lung Disability Trust Fund to Support Sick Coal Miners

Coal workers' pneumoconiosis, more familiarly known as black lung disease, is an incurable lung disease caused by the inhalation of coal dust. The Black Lung Benefits Act provides monthly payments and medical benefits to coal miners disabled by pneumoconiosis caused by exposure to coal dust in U.S. mines. The coal mine operator for which the miner worked is responsible for the payment of benefits. The Black Lung Disability Trust Fund steps in to pay benefits under certain circumstances, such as when the government cannot identify the liable coal mine operator or if the coal mine operator is no longer solvent.⁸⁰⁹

The Trust Fund has fallen into debt. When coal companies declare bankruptcy, their black lung liabilities transfer over to the Trust Fund. Today, the Trust Fund covers three-fourths of all Black Lung Benefit Act claims. In addition, declining coal production and a steep drop in the coal tax rate, which Congress allowed to lapse at the end of 2018, have reduced revenues entering the Trust Fund. At the same time, outlays are on the rise, as more miners are being diagnosed with the most severe form of black lung disease, Progressive Massive Fibrosis.⁸¹⁰ The Government Accountability Office (GAO) predicts that the Trust Fund's outstanding debt could exceed \$15 billion by 2050.⁸¹¹

In July 2019, Rep. Bobby Scott (D-VA) introduced the Black Lung Benefits Disability Trust Fund Solvency Act (H.R. 3876) to return the Trust Fund to solvency. On December 31, 2018, Congress allowed the coal excise tax rate, which funds the Trust Fund, to fall by 55% to \$0.50 per ton for underground coal and \$0.25 per ton for surface coal. The bill restores the black lung excise tax rate to \$1.10 per ton for underground coal and \$0.55 per ton for surface coal for 10 years through December 31, 2029.⁸¹²

In December 2019, Congress passed, and the President signed, the Consolidated Appropriations Act, 2020. In this spending package, Congress restored the black lung excise tax rate to previous levels, but the extension expires at the end of 2020.⁸¹³

Recommendation: Congress should maintain the coal excise tax rate at no less than \$1.10 per ton for underground coal and \$0.55 per ton for surface coal to help restore the solvency of the Black Lung Disability Trust Fund.

⁸⁰⁹ U.S. Department of Labor, Office of Workers' Compensation Programs, Division of Coal Mine Workers' Compensation, "Compliance Guide to the Black Lung Benefits Act," <https://www.dol.gov/owcp/dcmwc/regs/compliance/blbenact.htm>. Accessed June 2020.

⁸¹⁰ U.S. Centers for Disease Control and Prevention, "Resurgence of Progressive Massive Fibrosis in Coal Miners —Eastern Kentucky, 2016," *Morbidity and Mortality Weekly Report* (December 16, 2016).

⁸¹¹ Government Accountability Office, *Black Lung Benefits Program: Financing and Oversight Challenges Are Adversely Affecting the Trust Fund* (June 2019).

⁸¹² House Committee on Education and Labor, "Fact Sheet: Black Lung Benefits Disability Trust Fund Solvency Act of 2019 (H.R. 3876)," July 23, 2019.

⁸¹³ Division A of H.R. 1865, Further Consolidated Appropriations Act, 2020, 116th Congress.

Recommendation: As coal production declines, revenue from the coal excise tax may not be enough to support the Trust Fund. Congress and stakeholders should explore a higher tax rate or alternative funding mechanisms to shore up the Trust Fund over the long term.

Committee of Jurisdiction: Ways and Means

Building Block: Improve the Federal Benefits and Services Provided to Sick Coal Miners and Their Families

Coal miners afflicted with black lung often face a long uphill fight to secure benefits. The GAO found that DOL's Black Lung Benefits Program imposes significant burdens on miners, such that "coal miners face a number of challenges pursuing federal black lung claims, including finding legal representation and developing sound medical evidence to support their claims."⁸¹⁴ Coal companies fight claims as well. A Pulitzer Prize-winning investigation by the Center for Public Integrity found that industry-funded lawyers and doctors worked closely with coal companies to defeat the benefits claims of sick miners by hiding evidence and providing dubious medical test results.⁸¹⁵

Sen. Bob Casey (D-PA) introduced the Black Lung Benefit Improvement Act of 2019 (S. 2205) to improve and strengthen the Black Lung Benefits Program. The bill seeks to facilitate miners' access to legal representation and requires that parties to a benefit claim disclose all relevant medical evidence. The bill also restores cost-of-living adjustments for black lung disability benefits and requires DOL to develop a strategy to reduce the claims backlog. Importantly, the bill strengthens criminal penalties for doctors, lawyers, and others making false statements during the claims process.

Recommendation: Congress should pass legislation to protect coal miners' health and rights by strengthening the Black Lung Benefits Act to require operators to make full disclosure of all relevant medical evidence; provide miners with financial support to obtain quality legal representation in the claims process; establish criminal penalties for individuals who use false information to challenge a black lung benefit claim; and ensure the solvency of the Black Lung Disability Trust Fund.

Committee of Jurisdiction: Education and Labor

⁸¹⁴ Government Accountability Office, *Black Lung Benefits Program: Administrative and Structural Changes Could Improve Miners' Ability to Pursue Claims* (October 2009).

⁸¹⁵ Center for Public Integrity, "Breathless and Burdened" (October 29–November 1, 2013), <https://publicintegrity.org/topics/environment/breathless-and-burdened/>. Accessed June 2020.

Create Jobs Through Conservation and Reclamation and Restoration of Coal Mines and Abandoned Wells

Building Block: Create Job Opportunities in Conservation and Climate Resilience

An economy that achieves net-zero emissions by 2050 will need a large clean energy workforce, but it also will need a workforce dedicated to scaling up natural climate solutions, such as forest and wetlands restoration, and community climate resilience.

In the section of this report titled “Capture the Full Potential of Natural Climate Solutions,” the majority staff for the Select Committee recommends re-launching the Civilian Conservation Corps to employ young people to restore and plant new forests in rural and urban areas, engage in regenerative agriculture, and restore ecosystems and other natural spaces. Similarly, in the section of the report titled “Support Community Leadership in Climate Resilience and Equity,” the majority staff for the Select Committee recommends launching a Climate Resilience Service Corps within the Corporation for National and Community Service to carry out national service projects that improve community adaptation, mitigation, preparedness, response, and recovery from disasters and other climate-driven threats. In addition to providing critical services, these programs will help develop a workforce dedicated to nature-based solutions to climate change and community climate resilience.

Recommendation: Congress should reestablish the Civilian Conservation Corps and create a Climate Resilience Service Corps. This legislation should direct the Department of Labor to work with relevant federal agencies to coordinate similar efforts. Recruiting and selecting a diverse pool of applicants for these programs should be a priority.

Committees of Jurisdiction: Natural Resources; Education and Labor

Building Block: Clean Up Abandoned Coal Mines That Threaten Public Safety and Health

In 1977, Congress passed the Surface Mining Control and Reclamation Act (SMCRA) and established the Abandoned Mine Land (AML) Trust Fund. The law requires coal mine operators to pay a fee on every ton of coal mined in order to pay for abandoned mine reclamation. The AML program distributes funding to eligible states and tribes to mitigate surface mining impacts associated with coal mining, including water contamination and toxic waste. This reclamation work spurs economic activity and job creation in rural and often-distressed areas.

The authorization for fee collection expires in 2021, but significant cleanup challenges remain. According to DOI, it will cost at least \$10 billion to remediate the remaining high priority abandoned mines in the United States.⁸¹⁶

Rep. Matt Cartwright (D-PA) introduced the Surface Mining Control and Reclamation Act Amendments of 2019 (H.R. 4248), a bipartisan bill to extend the fee collection authority at current levels through

⁸¹⁶ Rep. Matt Cartwright, “Cartwright Bill to Clean Up Abandoned Coal Mined Approved by Committee, Advances to House Floor,” press release, January 15, 2020, <https://cartwright.house.gov/media-center/press-releases/cartwright-bill-to-clean-up-abandoned-coal-mines-approved-by-committee>.

FY2036. The bill also authorizes DOI to reimburse states and tribal governments for the emergency restoration, reclamation, abatement, control, or prevention of adverse effects of coal mining.

The AML program has distributed \$6 billion to states and tribes for reclamation since 1977,⁸¹⁷ but the AML Fund currently has a \$2.3 billion unappropriated balance.⁸¹⁸ Rep. Matt Cartwright (D-PA) introduced the bipartisan Revitalizing the Economy of Coal Communities by Leveraging Local Activities and Investing More (RECLAIM) Act of 2019 (H.R. 2156) to accelerate disbursement of \$1 billion to communities with abandoned mine lands that have experienced economic distress as a result of the coal industry downturn. The RECLAIM Act ensures states and tribes spend this money for reclamation of the highest priority abandoned mine sites, which they can then use for future economic or community development.

The House Democrats' infrastructure bill, the Moving Forward Act (H.R. 2), included a subtitle (Sections 84301-84305) with the key provisions from the RECLAIM Act. Sections 84201-84203 of this bill include the Surface Mining Control and Reclamation Act Amendments of 2019 (H.R. 4248).

Recommendation: Congress should extend the fee collection authority for the AML Trust Fund at current levels, given the scope of the work needed to clean up remaining mines.

Recommendation: Congress should accelerate disbursement of at least \$1 billion in unappropriated funds from the AML Fund to clean up abandoned mines in distressed coal communities and spur new economic opportunities.

Committees of Jurisdiction: Natural Resources

Building Block: Invest in Orphaned Oil and Gas Well Reclamation and Remediation on Federal and Nonfederal Land

When oil and gas operators abandon wells, they become “orphaned,” leaving taxpayers responsible for the costs of reclamation. Improperly plugged and unreclaimed wells can leak oil, brine, and methane, contaminating groundwater and contributing to the climate crisis. The exact number of abandoned and orphaned wells is unknown, but BLM has identified more than 200 orphaned wells on federal lands.⁸¹⁹ States have reported more than 56,000 documented orphaned wells and estimated the number of undocumented orphaned wells is between 210,000 and 746,000.⁸²⁰ The EPA estimates that more than 3 million abandoned and/or orphaned wells litter the country in total.⁸²¹ Abandoned wells can leak greenhouse gases into the atmosphere. When well sites are restored to natural landscapes, however, the reclaimed lands act as natural carbon sinks, storing carbon in roots and

⁸¹⁷ U.S. Department of the Interior, Office of Surface Mining Reclamation and Enforcement, “Reclaiming Abandoned Mine Lands,” <https://www.osmre.gov/programs/aml.shtm>. Accessed June 2020.

⁸¹⁸ Lance N. Larson, *The Abandoned Mine Reclamation Fund: Reauthorization Issues in the 116th Congress* (Congressional Research Service, 2020).

⁸¹⁹ Government Accountability Office, GAO-18-250, *Oil and Gas Wells: Bureau of Land Management Needs to Improve its Data and Oversight of Its Potential Liabilities* (May 2018).

⁸²⁰ Interstate Oil & Gas Compact Commission, *Idle and Orphan Oil and Gas Wells: State and Provincial Regulatory Strategies* (2019): 12-14.

⁸²¹ U.S. Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2016: Abandoned Oil and Gas Wells* (April 2018).

soils. A federal program to reclaim and restore abandoned wells across the country can reduce pollution while also providing high-quality jobs to fossil fuel workers.

Section 84101 of the House Democrats' infrastructure bill, the Moving Forward Act (H.R. 2), would establish a federal orphaned well remediation program and authorize a \$2 billion over five years to remediate, reclaim, and close orphaned oil and gas wells on federal, tribal, state, and private lands.

Recommendation: Congress should establish a reclamation fund to remediate and reclaim orphaned oil and gas wells. This fund should provide funding for federal land management agencies to reclaim and restore orphaned wells on public lands and waters as well as for states, tribes, and territories to restore abandoned wells on state, private, tribal, and territorial lands. This program should establish strong reclamation standards for abandoned well sites both onshore and offshore and prioritize climate and biodiversity benefits.

Recommendation: BLM's inspection and enforcement program is responsible for ensuring safe and responsible resource development, including stopping methane leaks, spills, and unsafe drilling and mining practices. Congress should increase funding for BLM's inspection and enforcement efforts, which should include detecting and inventorying abandoned and orphaned wells on public lands. Congress should direct DOI to establish a database and maps of all identified wells and prioritize reclamation efforts. Additionally, Congress should provide funding to state and territorial oil and gas regulatory offices and agencies for inspection, enforcement, and detection efforts within their jurisdictions.

Committee of Jurisdiction: Natural Resources

Protect Workers from Extreme Weather Conditions

Building Block: Protect Farm Workers and Construction Workers from Extreme Heat

Excessive heat exposure poses a direct threat to workers and the economy. The climate crisis increases this danger, as 19 of the 20 hottest years on record have occurred since 2001.⁸²² Rising temperatures are projected to cause an increase in heat-related workplace injuries and illnesses, a dramatic loss in labor capacity, and reductions in productivity.⁸²³ Farm workers and construction workers suffer the highest incidence of heat illness,⁸²⁴ but all workers employed in excessively hot and humid environments are at significant risk of illness or loss of life due to extreme conditions.⁸²⁵ According to the National Climate Assessment, the costs of lower labor productivity under rising

⁸²² National Aeronautics and Space Administration, "Vital Signs of the Planet: Global Temperature," <https://climate.nasa.gov/vital-signs/global-temperature/>. Accessed June 2020.

⁸²³ Kristina Dahl, et al., *Killer Heat in the United States: Climate Choices and the Future of Dangerously Hot Days* (Union of Concerned Scientists, 2019).

⁸²⁴ National Institute for Occupational Safety and Health, *Criteria for a Recommended Standard: Occupational Exposure to Heat and Hot Environments* (February 2016).

⁸²⁵ Occupational Safety and Health Administration, "Using the Heat Index: A Guide for Employers," https://www.osha.gov/SLTC/heatillness/heat_index/pdfs/all_in_one.pdf. Accessed June 2020.

temperatures are estimated to reach up to \$160 billion in lost wages per year in the United States by 2090.⁸²⁶

Rep. Judy Chu introduced the Asuncion Valdivia Heat Illness and Fatality Prevention Act of 2019 (H.R. 3668), which would help workers adapt to current climate change impacts, like heat stress, by requiring employers to provide water, shade, and rest.

Recommendation: Congress should direct the Secretary of Labor to establish a standard on prevention of occupational exposure to excessive heat and require employers to implement a workplace excessive heat prevention plan to protect employees from heat-related injuries and illnesses. Standards and requirements should consider (1) exposure limits that trigger action to protect employees from heat-related illness; (2) hydration; (3) scheduled and paid rest breaks in shaded or climate-controlled spaces; (4) employer and supervisor training; and (5) emergency medical response planning.

Committee of Jurisdiction: Education and Labor

⁸²⁶ U.S. Global Change Research Program, *Fourth National Climate Assessment, Volume II* (November 2018), Chapter 14: Health, Labor Productivity, <https://nca2018.globalchange.gov/chapter/14/>.

INVEST IN DISPROPORTIONATELY EXPOSED COMMUNITIES TO CUT POLLUTION AND ADVANCE ENVIRONMENTAL JUSTICE

In the United States, communities of color, low-income communities, and tribal and Indigenous communities “are disproportionately burdened by environmental hazards that include exposure to polluted air, waterways, and landscapes.”⁸²⁷ A 2019 study of eight cities, for example, found that residents of historically redlined communities—those that experienced now-illegal mortgage lending discrimination based on race and social class—are more than twice as likely as residents of non-redlined neighborhoods to visit emergency rooms for asthma-related treatment.⁸²⁸ Redlined neighborhoods also often have fewer trees, which, far from inconsequential, provide shade and reduce ground temperature on hot days.⁸²⁹ Another study of hazardous waste facilities found a “clear historical pattern of racially disparate siting” of these facilities.⁸³⁰

These environmental justice communities are more vulnerable to the effects of climate change “due to a combination of factors, particularly the legacy of segregation and historically racist zoning codes, and often have the least resources to respond.”⁸³¹ The 2018 *National Climate Assessment* found that climate impacts will not be distributed equally. Risks “are often highest for those that are already vulnerable,” including lower-income communities, communities of color, children, and the elderly. Climate change “threatens to exacerbate existing social and economic inequalities that result in higher exposure and sensitivity to extreme weather,” as vulnerable communities already have less capacity to prepare for and recover from extreme weather and climate-related events.⁸³²

Throughout this report, the majority staff for the Select Committee has integrated equity and environmental justice into the Climate Crisis Action Plan and its recommendations for building a cleaner and more resilient economy. The following recommendations provide more targeted policies to reduce harmful air and water pollution in environmental justice and frontline communities, empower these communities in federal policymaking, and achieve a just transition. The recommendations in the Climate Crisis Action Plan are informed by staff and Member conversations with environmental justice groups and two important national conversations, described below.

In July 2019, a group of prominent environmental justice leaders and national environmental organizations released the Equitable and Just National Climate Platform, which identifies the “desired outcomes and priorities for a national climate policy agenda, including to improve the public health

⁸²⁷ Environmental Justice for All Act of 2020, Section 1.

⁸²⁸ Kara Manke, “Historically redlined communities face higher asthma rates,” *Berkeley News*, May 22, 2019. Available at <https://news.berkeley.edu/2019/05/22/historically-redlined-communities-face-higher-asthma-rates/>.

⁸²⁹ Jim Morrison, “Can We Turn Down the Temperature on Urban Heat Islands?,” *Yale Environment 360*, September 12, 2019, <https://e360.yale.edu/features/can-we-turn-down-the-temperature-on-urban-heat-islands>.

⁸³⁰ Paul Mohai and Robin Saha, “Which came first, people or pollution? Assessing the disparate siting and post-siting demographic change hypotheses of environmental injustice,” *Environmental Research Letters* 10(11) (Nov. 18, 2015).

⁸³¹ Environmental Justice for All Act of 2020, Section 1.

⁸³² U.S. Global Change Research Program, *Fourth National Climate Assessment, Volume II* (November 2018), Chapter 1. Available at <https://nca2018.globalchange.gov/chapter/1/>.

and well-being of all communities while tackling the climate crisis and environmental racism head-on.”⁸³³ This platform outlines areas where the environmental justice leaders and environmental organizations identified shared goals.

Second, guided by the Jemez Principles for Democratic Organizing, Rep. Raúl M. Grijalva (D-AZ), Chair of the Committee on Natural Resources, and Rep. A. Donald McEachin (D-VA), a member of the Select Committee on the Climate Crisis, launched a comprehensive environmental justice initiative for the 116th Congress “because all people have the right to pure air, clean water, and an environment that enriches life. For too many, these rights are still unrealized, and that injustice creates a pattern of continuous suffering for environmental justice communities.”⁸³⁴ On June 26, 2019, Chair Grijalva and Rep. McEachin hosted the first-of-its-kind Congressional Convening on Environmental Justice in Washington, D.C. to discuss a shared vision for forthcoming environmental justice legislation. On November 15, 2019, they released a discussion draft of their environmental justice bill and opened it for public comment for several months.⁸³⁵ On February 27, 2020, Chair Grijalva and Rep. McEachin introduced their landmark Environmental Justice for All Act (H.R. 5986), the culmination of a yearlong collaborative process with the environmental justice community.⁸³⁶ Many of the recommendations below reflect provisions in the Environmental Justice for All Act.

The Environmental Justice for All Act defines “environmental justice community” as “a community with significant representation of communities of color, low-income communities, or Tribal and indigenous communities, that experiences, or is at risk of experiencing higher or more adverse human health or environmental effects.”⁸³⁷ The recommendations below use that definition.

Strengthen Enforcement of Cornerstone Environmental Laws in Environmental Justice Communities

Building Block: Launch and Fund an Enforcement Surge at the Environmental Protection Agency, With a Focus on Environmental Justice Communities

The strongest environmental law will not reduce pollution if left unenforced. Thorough and frequent inspections and compliance monitoring are key to uncovering violations of the law and pursuing justice. Since 2010, however, the number of compliance inspections and evaluations conducted by the Environmental Protection Agency (EPA) has fallen by half. Civil enforcement case initiations and conclusions have dropped at a similar rate.⁸³⁸

⁸³³ Equitable and Just National Climate Platform, <https://ajustclimate.org/about.html>. Accessed June 2020.

⁸³⁴ Committee on Natural Resources Democrats, “Environmental Justice,” <https://naturalresources.house.gov/environmental-justice>. Accessed June 2020.

⁸³⁵ Committee on Natural Resources Democrats, “Chair Grijalva, Rep. McEachin Release Discussion Draft of Environmental Justice Bill, Marking New Public Input Phase of Historic Collaborative Effort,” press release, November 15, 2019.

⁸³⁶ Committee on Natural Resources Democrats, “Following Year-Long Collaborative Effort, Chair Grijalva and Rep. McEachin Introduce Landmark Environmental Justice Legislation,” press release, February 27, 2020.

⁸³⁷ Environmental Justice for All Act, Section 3.

⁸³⁸ U.S. Environmental Protection Agency, “Fiscal Year 2018 EPA Enforcement and Compliance Annual Results,” February 8, 2019.

EPA also has faced criticism for its lax enforcement of Title VI of the Civil Rights Act, which prohibits discrimination on the basis of race, color, and national origin in programs and activities receiving federal financial assistance.⁸³⁹ In 2016, the U.S. Commission on Civil Rights looked at whether EPA was fulfilling its environmental justice obligations by responding to and resolving complaints about alleged discrimination. The Commission concluded that “EPA’s inability to timely process or resolve Title VI complaints has resulted in recipients of EPA funding not being held accountable for alleged discrimination.”⁸⁴⁰

Recommendation: Congress should double EPA’s enforcement budget and direct the agency to make environmental and climate justice one of its enforcement and compliance assurance priorities. EPA could begin by identifying 100 communities most overburdened by industrial pollution for a targeted enforcement surge, including enhanced additional air and water quality monitoring.

Recommendation: Congress should direct the EPA Inspector General to review the outcomes of this enforcement surge in environmental justice communities, including any disparities in how states are enforcing the law. Where the EPA Inspector General identifies disparities indicating lax enforcement, EPA should consider using its backstop enforcement authority to take action against potential violators.

Recommendation: Congress should increase staffing in the External Civil Rights Enforcement Office in EPA’s Office of General Counsel to respond in a timely manner to Title VI complaints as they relate to environmental justice concerns.

Recommendation: For any environmental projects initiated as part of an EPA settlement agreement to resolve violations that occurred in an environmental justice community, Congress should direct EPA to ensure that (1) individuals in the affected environmental justice community are involved in the development of the project, and (2) the project benefits the health and well-being of the affected environmental justice community.⁸⁴¹

Committees of Jurisdiction: Energy and Commerce; Transportation and Infrastructure

Building Block: Amend the Civil Rights Act to Protect Victims of Environmental and Climate Injustice

Title VI of the Civil Rights Act prohibits discrimination on the basis of race, color, and national origin in programs and activities receiving federal financial assistance.⁸⁴² In *Alexander v. Sandoval*, the Supreme Court interpreted Title VI as providing individuals a legal remedy—a private right of action—for an act of intentional discrimination but not for an act that only has a disparate impact on a racial group or other subpopulation.

⁸³⁹ 42 U.S.C. § 2000d et seq.

⁸⁴⁰ U.S. Commission on Civil Rights, *Environmental Justice: Examining the Environmental Protection Agency’s Compliance and Enforcement of Title VI and Executive Order 12898* (September 2016).

⁸⁴¹ Environmental Justice for All Act, Section 21.

⁸⁴² 42 U.S.C. § 2000d et seq.

In the *Sandoval* case, Martha Sandoval argued that Alabama's policy of offering the driver's license test solely in English discriminated based on national origin because it had a disparate impact on non-English-speakers born outside the United States. Since the Supreme Court ruled that Sandoval did not have a private right of action based on disparate impact, one can conclude that an individual living in a community of color overburdened by harmful pollution may have no legal remedy under the Civil Rights Act to seek redress.

The Grijalva-McEachin Environmental Justice for All Act amends the Civil Rights Act to clarify when discrimination based on disparate impact has occurred.⁸⁴³ The bill also corrects the Supreme Court's flawed decision in the *Sandoval* case and establishes the right of individual citizens to bring private actions under Section 602 of the Civil Rights Act against entities allegedly engaging in discriminatory activities that have a disparate impact.⁸⁴⁴

Recommendation: Congress should amend the Civil Rights Act to define discrimination based on disparate impact, establish a private right of action under Title VI, Section 602, and "ensure that citizens can use this important mechanism to seek legal remedy when faced with discrimination."⁸⁴⁵

Committee of Jurisdiction: Judiciary

Building Block: Direct the EPA to Consider Cumulative Pollution Impacts in Its Implementation of Environmental Laws

Environmental justice communities experience cumulative impacts from exposure to concentrated air and water pollution. The New Jersey Environmental Justice Alliance (NJEJA) defines "cumulative impacts" as "the impacts caused by multiple pollutants, often emitted by multiple sources of pollution, and their interaction with each other and with any social vulnerabilities that exist in a community."⁸⁴⁶ NJEJA and others argue that the EPA should factor in these cumulative impacts when deciding whether to issue or renew a permit for an industrial facility in an environmental justice community.⁸⁴⁷

Several members of Congress have offered proposals to ensure EPA considers cumulative and disproportionate environmental and health impacts. The Environmental Justice Act of 2019 (requires EPA to consider cumulative pollution impacts and facilities' violations when making permitting decisions under the Clean Water Act and the Clean Air Act.⁸⁴⁸ The Grijalva-McEachin Environmental Justice for All Act also requires a cumulative pollution impacts analysis and review of persistent violations during the permitting process.⁸⁴⁹ The Energy and Commerce Committee's CLEAN Future Act discussion draft requires states, as part of their state implementation plans under the Clean Air Act, to

⁸⁴³ Environmental Justice for All Act, Section 5.

⁸⁴⁴ Ibid.

⁸⁴⁵ Committee on Natural Resources Democrats, "Statement of Principles for Environmental Justice Legislation," <https://naturalresources.house.gov/environmental-justice>. Accessed May 2020.

⁸⁴⁶ New Jersey Environmental Justice Alliance, *Statewide Policy Platform 2017-2018*, February 2018, <http://www.njeja.org/wp-content/uploads/2018/02/NJEJA-Policy-Platform-Final.pdf>.

⁸⁴⁷ Ibid.

⁸⁴⁸ Environmental Justice Act of 2019.

⁸⁴⁹ Environmental Justice for All Act, Section 7.

“reduce disproportionate impacts on fenceline communities (meaning populations living in close proximity to a source of pollution), populations of color, communities of color, indigenous communities, and low-income communities.”⁸⁵⁰

Recommendation: Congress should direct the EPA to create a plan to (1) develop a methodology to assess the cumulative and disproportionate impacts of pollution on environmental justice communities, and (2) integrate that methodology into agency decision-making.

Committees of Jurisdiction: Energy and Commerce; Transportation and Infrastructure

Embed Environmental and Climate Justice in Federal Government Decision-Making

Building Block: Invest in Environmental Justice Communities and Communities in Economic Transition

To respond to the climate crisis, the United States will need to invest heavily in new technologies, cleaner and more resilient infrastructure, and restoration of natural resources. The U.S. government has an opportunity to direct that investment where it is needed most.

Environmental justice communities are living with the effects of decades of inadequate public and private investment and the legacy of policy choices rooted in racism. Crumbling infrastructure, substandard housing, and persistent pollution are some of the symptoms they suffer every day. The climate crisis will only exacerbate these inequities. Other communities are experiencing economic distress as companies or entire industries that anchor local economies move abroad or decline. For example, counties across Appalachia that have long relied on coal mining for tax revenue and employment are in search of new industries to lift communities and families.

Recommendation: This report makes several recommendations for new federal investment and incentives for clean and resilient infrastructure. Congress should direct a significant percentage of this spending to environmental justice communities and communities most affected by the economic transition away from fossil fuel consumption.

Committees of Jurisdiction: Energy and Commerce; Natural Resources; Transportation and Infrastructure

⁸⁵⁰ Section 606, CLEAN Future Act discussion draft, <https://energycommerce.house.gov/newsroom/press-releases/ec-leaders-release-draft-clean-future-act-legislative-text-to-achieve-a-100>.

Building Block: Codify the 1994 Executive Order on Environmental Justice and the Federal Interagency Working Group on Environmental Justice

President Bill Clinton's Executive Order 12898 established the responsibility of each federal agency to "make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low income populations in the United States...."⁸⁵¹ The executive order also created an Interagency Working Group on Environmental Justice to coordinate and advance environmental justice principles across the federal government. The President of United States has the authority to revoke an executive order at any time.

The Ruiz-Booker Environmental Justice Act codifies this executive order into law. The bill strengthens the Executive Order by adding more opportunities for the public to participate, including public meetings and solicitations for public comment.⁸⁵² The Grijalva-McEachin Environmental Justice for All Act also codifies key components of the Executive Order and requires each federal agency to develop an environmental justice strategy that "identifies and addresses any disproportionately high or adverse human health or environmental effects of its programs, policies, practices, and activities on communities of color; low-income communities; and Tribal and indigenous communities."⁸⁵³ The Energy and Commerce Committee's CLEAN Future Act includes similar codifying language.⁸⁵⁴

Recommendation: Congress should codify Executive Order 12898 and strengthen requirements for agencies to develop comprehensive environmental justice strategies through transparent and inclusive processes.

Recommendation: Congress should codify the Interagency Working Group on Environmental Justice and establish its purpose to (1) improve coordination and collaboration among federal agencies and to help advise and assist federal agencies in identifying and addressing, as appropriate, the disproportionate human health and environmental effects of federal programs, policies, practices, and activities on communities of color, low-income communities, and tribal and Indigenous communities; (2) promote meaningful involvement and due process in the development, implementation, and enforcement of environmental laws; (3) coordinate with and provide direct guidance and technical assistance to environmental justice communities, with a focus on increasing community understanding of the science, regulations, and policy related to federal agency actions on environmental justice issues; and (4) address environmental health, pollution, and public health burdens in environmental justice communities, and build healthy, sustainable, and resilient communities.⁸⁵⁵

Committee of Jurisdiction: Energy and Commerce

⁸⁵¹ Office of the President, Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," February 16, 1994.

⁸⁵² Environmental Justice Act of 2019.

⁸⁵³ Environmental Justice for All Act, Section 9.

⁸⁵⁴ Section 604, CLEAN Future Act discussion draft.

⁸⁵⁵ Environmental Justice for All Act, Section 8.

Building Block: Create an Environmental Justice Ombudsman Within the EPA

Community residents are on the frontlines of pollution, whether they can see it rising from a smokestack in their neighborhood or experience chronic and acute health impacts from exposure. As such, citizen complaints are often the first signs of a potential violation of environmental law. Climate change will exacerbate the inequities experienced by communities most burdened by air and water pollution.

Communities need greater access to decision-makers to communicate the environmental and climate impacts they see in their communities. One way to do this is to designate an office to interface directly with concerned individuals. For example, in response to the Flint water crisis in Michigan, the Environmental Justice Work Group recommended, among many other items, that Governor Rick Snyder establish an environmental justice ombudsman in his office. The ombudsman would “serve as the statewide point of contact for accepting, investigating and resolving allegations of environmental injustice committed by the State.”⁸⁵⁶ As a general matter, the role of an agency ombudsman is to conduct independent investigations into complaints filed by citizens, including those who may have felt ignored or dismissed through other channels.

The Grijalva-McEachin Environmental Justice for All Act creates an Environmental Justice Ombudsman within EPA to “receive, review, and process complaints and allegations with respect to environmental justice programs and activities of the Environmental Protection Agency” and “identify and thereafter review, examine, and make recommendations to the Administrator to address recurring and chronic complaints regarding specific environmental justice programs and activities of the Environmental Protection Agency.”⁸⁵⁷

Recommendation: Congress should authorize and fund the position of Environmental Justice Ombudsman within EPA.

Committees of Jurisdiction: Energy and Commerce; Natural Resources

Building Block: Codify the National Environmental Justice Advisory Council

In September 1993, the EPA established the National Environmental Justice Advisory Council (NEJAC) by charter pursuant to the Federal Advisory Committee Act. The Council “provides independent advice and recommendations to the EPA Administrator” on a “broad range of strategic, scientific, technological, regulatory, community engagement, and economic issues related to environmental justice.”⁸⁵⁸ The Ruiz-Booker Environmental Justice Act of 2019, Grijalva-McEachin Environmental Justice for All Act,⁸⁵⁹ and the CLEAN Future Act discussion draft⁸⁶⁰ all would codify NEJAC.

⁸⁵⁶ State of Michigan, Office of the Governor, *Environmental Justice Work Group Report* (March 2018).

⁸⁵⁷ Environmental Justice for All Act, Section 10.

⁸⁵⁸ U.S. Environmental Protection Agency, National Environmental Justice Advisory Council, www.epa.gov/environmentaljustice/national-environmental-justice-advisory-council. Accessed June 2020.

⁸⁵⁹ Environmental Justice for All Act, Section 18.

⁸⁶⁰ Section 605, CLEAN Future Act discussion draft.

Recommendation: Congress should codify the NEJAC to ensure it continues to provide independent advice and recommendations to EPA on environmental and climate justice issues. The Council should advise the EPA Administrator and be comprised of individuals “who have knowledge of, or experience relating to, the effect of environmental conditions on communities of color, low-income communities, and Tribal and indigenous communities.”⁸⁶¹

Committee of Jurisdiction: Energy and Commerce

Building Block: Require Federal Agencies to Screen Proposed Regulations for Environmental and Climate Impacts in Frontline Communities

Executive Order 12898 instructs all federal agencies to “collect, maintain and analyze information assessing and comparing environmental and human health risks borne by populations identified by race, national origin or income.”⁸⁶² The EPA developed the EJSCREEN environmental justice mapping and screening tool to help meet its obligations under this order. The EPA uses EJSCREEN “to screen for areas that may be candidates for additional consideration, analysis or outreach as EPA develops programs, policies and activities that may affect communities.”⁸⁶³

In May 2020, Reps. A. Donald McEachin (D-VA), Raúl Grijalva, Pramila Jayapal, and Nanette Diaz Barragán introduced H.R. 6826 to codify the EJSCREEN tool. The bill requires the EPA to update and make publicly available the EJSCREEN tool or an equivalent environmental justice mapping and screening tool. Senators Tammy Duckworth (D-IL), Tom Carper (D-DE), and Cory Booker (D-NJ) introduced the Senate companion (S. 3633).

When Congress considers legislation, the Congressional Budget Office (CBO) provides a formal estimate of the bill’s impact on the federal budget. That CBO “score” becomes a key data point in congressional debate on legislation, including energy- and climate-related legislation. Congress does not receive any similarly authoritative information on the environmental, climate, and health impacts of proposed legislation nor any deeper analysis of the impacts on low-income communities and communities of color. Similarly, federal agencies face few requirements beyond Executive Order 12898 to provide detailed information about the potential impact of a proposed rule on these frontline communities. The Government Accountability Office (GAO) recently reviewed agencies’ implementation of this Executive Order and found their “progress toward environmental justice is difficult to gauge... because most do not have updated strategic plans and have not reported annually on their progress or developed methods to assess progress.”⁸⁶⁴

In July 2019, Rep. Alexandria Ocasio-Cortez (D-NY) and Sen. Kamala Harris (D-CA) released a discussion draft of their Climate Equity Act. Among its many provisions, the bill would establish a Congressional Climate and Environmental Equity Office, modeled after the CBO, to provide an “equity

⁸⁶¹ Environmental Justice for All Act, Section 18.

⁸⁶² Office of the President, Executive Order 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,” February 16, 1994.

⁸⁶³ U.S. Environmental Protection Agency, EJSCREEN: Environmental Justice Screening and Mapping Tool, “How Does EPA Use EJSCREEN?”, <https://www.epa.gov/ejscreen/how-does-epa-use-ejscreen>. Accessed June 2020.

⁸⁶⁴ Government Accountability Office, *Environmental Justice: Federal Efforts Need Better Planning, Coordination, and Methods to Assess Progress*, GAO-19-543 (September 16, 2019).

score” for environment- and climate-related legislation that measures the quantitative impact on frontline communities. The bill also requires federal agencies to include a climate and environmental justice analysis in both proposed and final rules.⁸⁶⁵

Recommendation: Congress should codify the EJSCREEN tool and provide EPA additional funding to update and improve the EJSCREEN tool or an equivalent tool. The tool should include, at minimum, nationally consistent data; environmental pollution data; demographic data, including data relating to race, ethnicity, and income; and capacity to produce maps and reports by geographical area. Maintaining and improving the EJSCREEN tool, however, is only the first step. Congress also should direct EPA and other federal agencies to use this tool to establish an “equity screen” for major federal actions, which will help agencies understand how a potential policy or project could improve or exacerbate legacy pollution and inequities in environmental justice communities.

Recommendation: Congress should establish a process to consider creating a method to measure the quantitative impact of environment- and climate-related legislation on environmental justice communities and report back within one year with recommendations for how or if how to proceed.

Committees of Jurisdiction: The legislative drafting details would determine jurisdiction.

Building Block: Require Federal Employees to Receive Environmental Justice Training

Effective environmental justice policy in federal agencies will require core staff to become more intentional about seeking the fair treatment of all communities, and environmental justice communities in particular, in their daily work and development of the agencies’ policies and programs. At the center of environmental justice is ensuring meaningful community involvement in agency decisionmaking.

The Grijalva-McEachin Environmental Justice for All Act would require federal employees from EPA, DOI, and other agencies to participate in environmental justice training.⁸⁶⁶ The training program would ensure that agency staff have the knowledge and tools necessary to incorporate environmental justice into their work.

Recommendation: Congress should require employees from EPA, DOI, and other relevant agencies to participate in an environmental and climate justice training program. Trainings should focus on “educating officials and staff about the disproportionate impacts faced by environmental justice communities and stress the need to minimize harm to these populations.”⁸⁶⁷

Committees of Jurisdiction: Energy and Commerce; Natural Resources

⁸⁶⁵ Office of Rep. Alexandra Ocasio-Cortez, “Comment Submissions for the Climate Equity Act,” <https://ocasio-cortez.house.gov/climateequityact>. Accessed June 2020.

⁸⁶⁶ Environmental Justice for All Act, Section 15.

⁸⁶⁷ Committee on Natural Resources Democrats, “Statement of Principles for Environmental Justice Legislation,” <https://naturalresources.house.gov/environmental-justice>. Accessed June 2020.

Ensure Meaningful Engagement and Consultation with Environmental Justice Communities

Building Block: Strengthen the National Environmental Policy Act to Provide Additional Protections to Environmental Justice and Tribal Communities

The National Environmental Policy Act (NEPA) directs federal agencies to conduct an environmental review before authorizing a major action that could have an impact on the environment, such as the permitting of a highway, pipeline, or wind farm. NEPA requires this review to consider the environmental impacts of the proposed action and alternatives to the proposed action.⁸⁶⁸ In 1994, President Bill Clinton issued a Presidential Memorandum directing federal agencies conducting NEPA reviews to “analyze the environmental effects, including human health, economic and social effects, of Federal actions, including effects on minority communities and low-income communities.... Mitigation measures outlined or analyzed in an environmental assessment, environmental impact statement, or record of decision, whenever feasible, should address significant and adverse environmental effects of proposed Federal actions on minority communities and low-income communities.”⁸⁶⁹

Environmental justice communities and other stakeholders can use NEPA to “prevent a disproportionate share of polluting projects from being sited in overburdened communities.”⁸⁷⁰ The Grijalva-McEachin Environmental Justice for All Act establishes additional protections for environmental justice communities that could be affected by a major federal action. The bill requires a federal agency conducting a NEPA review to prepare a community impact report, which, among other elements, would assess whether a proposed federal action affecting an environmental justice community will cause multiple or cumulative exposures to human health and environmental hazards that influence, exacerbate, or contribute to adverse health outcomes. In addition, the bill establishes new requirements to ensure the participation of environmental justice and tribal communities in the NEPA process.⁸⁷¹

Recommendation: Congress should amend NEPA to require deeper analysis of the environmental and climate justice impacts of a proposed federal action, including cumulative pollution impacts, and facilitate an inclusive process for individuals in environmental justice and tribal communities.

Committee of Jurisdiction: Natural Resources

⁸⁶⁸ 42 USC § 4332.

⁸⁶⁹ The White House, Presidential Memorandum, “Executive Order on Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,” February 11, 2009.

⁸⁷⁰ Committee on Natural Resources Democrats, “Statement of Principles for Environmental Justice Legislation,” <https://naturalresources.house.gov/environmental-justice>. Accessed June 2020.

⁸⁷¹ Environmental Justice for All Act, Section 14.

Building Block: Direct EPA to Hold Biennial Public Meetings on Environmental and Climate Justice at Each Regional Office

Residents of environmental justice communities are less likely to have the resources to travel to Washington, D.C. to communicate their concerns about local pollution or provide input on the agency's strategic priorities. The Grijalva-McEachin Environmental Justice for All Act directs the EPA Administrator, after robust and inclusive outreach, to hold multiple regional public meetings on environmental justice issues.⁸⁷²

Recommendation: Congress should direct EPA to hold high-level biennial public meetings on environmental justice issues at each regional office. Planning should include robust and inclusive outreach to communities in the region.

Committee of Jurisdiction: Energy and Commerce

Build the Capacity of Organizations and Communities Working Toward Environmental Justice

Building Block: Provide Funding and Training to Build the Capacity of Nonprofit Organizations and Community Leaders in Environmental Justice Communities

Nonprofit, community-based organizations working in environmental justice communities often run on shoestring budgets and rely on committed volunteers. As a result, they may not have the resources needed to fully engage in the policymaking process, whether it relates to the permitting of an industrial facility down the road or the development of climate legislation in the U.S. Congress. Their concerns rarely achieve prominence in competition with other well-funded stakeholders. This is not a fair or smart way to make policy.

In February 2020, Reps. Joseph Kennedy III (D-MA), Nanette Diaz Barragán (D-CA), and Raúl Ruiz (D-CA) introduced the Voices for Environmental Justice Act (H.R. 5842). The bill creates new technical assistance grant programs at EPA to help low-income communities, communities of color, and tribal communities participate in agency rulemakings and other proceedings. The grant recipients can use the money to hire experts to analyze and interpret health studies, conduct additional pollution monitoring, develop technical responses to agency requests for comment, and provide other services. The Energy and Commerce Committee's CLEAN Future Act discussion draft includes similar technical assistance grants.⁸⁷³

The Grijalva-McEachin Environmental Justice for All Act creates new grant programs to build the capacity of nonprofit, community-based organizations to address issues relating to environmental justice; to support state and tribal programs to carry out culturally and linguistically appropriate activities to reduce or eliminate disproportionately adverse human health or environmental effects on

⁸⁷² Environmental Justice for All Act, Section 20.

⁸⁷³ Sections 602 and 610, CLEAN Future Act discussion draft.

environmental justice and tribal communities; and training to increase the capacity of residents of environmental justice communities to identify and address disproportionately adverse human health or environmental effects, including basic and advanced techniques for the detection, assessment, and evaluation of the effects of hazardous substances on human health.⁸⁷⁴

In May 2020, at the height of the COVID-19 pandemic in the United States, Reps. Raúl Ruiz (D-CA) and A. Donald McEachin (D-VA) introduced H.R. 6692, which authorizes \$50 million for FY2020 for the EPA Environmental Justice Small Grants Program, Environmental Justice Collaborative Problem-Solving Cooperative Agreement Program, and Community Action for a Renewed Environment Grant Program. These grants would support pollution monitoring in or near environmental justice communities and investigate or address the disproportionate impacts of COVID-19 on these communities. Harvard scientists concluded that long-term exposure to air pollution—a daily reality in environmental justice communities—increases the mortality risk for COVID-19 patients.⁸⁷⁵

Recommendation: Congress should increase funding for the EPA's Environmental Justice Small Grants Program, Collaborative Problem-Solving Cooperative Agreement Program, and Community Action for a Renewed Environment Grant Program, and, if necessary, create new or expand existing grant programs to provide technical assistance to build the capacity of states, tribes, and nonprofit, community-based organizations working to reduce the disproportionate impacts of environmental pollution and climate change in environmental justice communities.

Recommendation: Congress should require EPA to create an online Environmental and Climate Justice Clearinghouse that contains information related to the agency's environmental justice work, training materials, and the contact information for environmental justice experts. EPA should develop this clearinghouse in close coordination with representatives from environmental justice communities.⁸⁷⁶

Committee of Jurisdiction: Energy and Commerce

Building Block: Support Institutions of Higher Education to Start or Expand Environmental Justice Programs

Institutions of higher education, particularly historically black colleges and universities (HBCUs) and other Minority Serving Institutions (MSIs), have an important role to play in developing policy related to environmental and climate justice and conducting research into the cumulative impacts of pollution exposure in low-income communities and communities of color. These institutions can help design equitable programs and policies to help these communities adapt and build resilience to the impacts of climate change, since they will be hurt first and worst as the climate continues to warm.

HBCUs also can work with communities to solve pressing environmental and climate justice problems. For example, the Deep South Center for Environmental Justice launched the HBCU Climate

⁸⁷⁴ Environmental Justice for All Act, Sections 16 and 17.

⁸⁷⁵ Xiao Wu, Rachel C. Nethery, M. Benjamin Sabath, Danielle Braun, and Francesca Dominici, *COVID-19 PM2.5: A national study on long-term exposure to air pollution and COVID-19 mortality in the United States*, Harvard University (April 2020), <https://projects.iq.harvard.edu/covid-pm/home>. Accessed June 2020.

⁸⁷⁶ Environmental Justice for All Act, Section 19.

Change Consortium to engage student leaders, scientists, and advocates on environmental justice, community resilience, climate adaptation and other major climate change topics, especially in vulnerable communities in the Southern United States.⁸⁷⁷

Rep. John Lewis (D-GA) introduced the CORE Justice Act of 2019 (H.R. 5167), which provides a capped refundable credit of \$1 billion for each year from 2020 through and including 2024 to institutions of higher education to develop environmental justice programs for students. The bill specifies that eligible programs should address qualified environmental stressors for the primary purpose of improving health and economic outcomes of individuals residing in low-income communities and communities of color. The bill describes “environmental stressors” as contamination of the air, water, soil, or food and changing weather conditions.

House Ways and Means Committee Democrats included this bill in Section 601 of the Growing Renewable Energy and Efficiency Now (GREEN) Act of 2020 (H.R. 7330).

Recommendation: Congress should create a qualified environmental justice program credit in Section 36C of the tax code. It should be a capped refundable competitive credit of \$1 billion each year for institutions of higher education to develop and implement environmental justice programs as part of their curriculum. Programs with material participation from HBCUs and MSIs should be eligible for a higher credit.

Recommendation: Congress should create a grant program to support HBCUs, tribal colleges, and other MSIs to create environmental and climate justice centers at the institutions with the purpose of working with their communities to tackle environmental justice and climate-related challenges.

Committees of Jurisdiction: Ways and Means; Education and Labor

⁸⁷⁷ Deep South Center for Environmental Justice, “HBCU Climate Change Consortium,” <http://www.dscej.org/our-work/hbcu-climate-change-consortium>. Accessed June 2020.

IMPROVE PUBLIC HEALTH AND MANAGE CLIMATE RISKS TO HEALTH INFRASTRUCTURE

The climate crisis is a public health threat multiplier. Climate change can affect human health in myriad ways: by intensifying heat waves, floods, and other extreme weather events; by degrading air quality; and by increasing the risk of infectious disease emergence and spread.⁸⁷⁸ The effects of climate change on human health can include a range of undesirable outcomes, such as worsening respiratory and cardiac conditions and impacts to mental health. Increases in air pollution or heat exposure related to climate change are also associated with adverse pregnancy outcomes, with Black mothers at particularly high risk of preterm birth and lower birth weight.⁸⁷⁹ Health issues and emergencies caused by surging climate impacts can strain the capacity of hospitals, public health professionals, and the entire health sector.⁸⁸⁰ Alternatively, actions to reduce carbon pollution and build climate resilience can improve public health, save lives, and generate hundreds of billions of dollars in health-related economic benefits each year by the end of the century.⁸⁸¹

The COVID-19 pandemic and its impacts to the health care system, communities, and the economy illustrate the urgent need to better prepare the nation for public health emergencies. The pandemic also illustrates and exploits the pre-existing conditions affected by long-term exposure to air pollution that increase the risk of death in those with COVID-19.⁸⁸² Therefore, climate policy solutions must also confront disproportionate public health and safety risks to vulnerable populations, particularly communities of color. This section presents recommendations to prepare the nation for the public health impacts of the climate crisis and related health emergencies.

Strengthen National Planning on Climate Threats to Public Health and the Health Care Sector

In 2016, the U.S. Global Change Research Program (USGCRP) published an assessment of the impacts of climate change on human health that identified specific threats from increased heat-related deaths and illness; greater risks of drowning, injuries, gastrointestinal illness, and toxic exposures associated with sea level rise and more frequent flooding; increased exposures and risks associated with waterborne illnesses; increased seasonal variability and geographic distribution of vector-borne disease; and mental health impacts driven by changes in exposure to disasters.⁸⁸³ Congress needs to take steps to strengthen national strategic planning; support state, local, tribal, and territorial (SLTT) planning and assessment; ensure the availability of actionable data for public health emergencies;

⁸⁷⁸ U.S. Global Change Research Program, *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment* (April 2016) at 252-253.

⁸⁷⁹ Bruce Bekkar, M.D., Susan Pacheco, M.D., Rupa Basu, Ph.D., et al., “Association of Air Pollution and Heat Exposure With Preterm Birth, Low Birth Weight, and Stillbirth in the US: A Systematic Review,” *JAMA Netw Open*. 2020;3(6).

⁸⁸⁰ U.S. Global Change Research Program, *Fourth National Climate Assessment, Volume II* (November 2018).

⁸⁸¹ Ibid.

⁸⁸² Xiao Wu, Rachel C. Nethery, Benjamin M. Sabeth, Danielle Braun, and Francesca Dominici, “Exposure to air pollution and COVID-19 mortality in the United States: A nationwide cross-sectional study,” *medRxiv* (April 27, 2020 preprint).

⁸⁸³ U.S. Global Change Research Program, *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment* (April 2016).

and address the disproportionate health impacts of the climate crisis as part of comprehensive justice and equity policy.

Building Block: Adopt a National Strategy to Advance Research, Planning, and Preparedness for Climate Threats to Public Health

Despite the increasing and significant impacts of climate on human health, the United States currently lacks a comprehensive national strategy to respond to the health risks and harms of the climate crisis. A successful strategy must assign roles, objectives, and benchmarks to prioritize action at all levels of government and across sectors against climate threats to public health and the nation's health care infrastructure. Such a national strategy should identify opportunities to adjust federal planning, programming, and funding prioritization to address the health impacts of climate change, identify vulnerable populations, and ensure that federal, state, and local decisions are informed by the best-available information about climate threats to human health, including mental health, and the health care sector. In the section titled "Make U.S. Communities More Resilient to the Impacts of Climate Change," this report calls for SLTTs to write climate adaptation plans that should address health threats and identify actions that communities will take to respond to them.

The HHS Office of the Assistant Secretary for Preparedness Response (ASPR) was established in 2006 to lead federal efforts on preparedness and response for public health emergencies.⁸⁸⁴ The ASPR National Health Security Strategy (2019-22) provides a high-level strategy for coordinating around emerging public health threats, including climate-related disasters.⁸⁸⁵ However, the strategy should provide comprehensive measures to address physical and operational risks, including to supply chains, and help public health departments and health care facilities assess and overcome their climate-related risks. It also should address the health-related needs of frontline communities and vulnerable populations that are disproportionately harmed by extreme weather and other effects of climate change, including the potential for food insecurity arising from declining crop yields.⁸⁸⁶

In light of the growing health-related threats of the climate crisis that are exploiting social and economic risk factors, additional research is needed to identify vulnerable populations, predict adverse health effects of climate change, and produce models and methods for mitigating climate-driven threats to public health. In 2015, HHS convened a Climate Justice Conference, which identified needs for additional research on climate and health, including data gathering, analyses, and applications to environmental justice concerns.⁸⁸⁷ The National Institute of Environmental Health Sciences (NIEHS) program on Climate Change and Human Health Research funds academic research on the health impacts of climate change and how climate mitigation and adaptation strategies can affect health outcomes.⁸⁸⁸

⁸⁸⁴ Pub L No 109-417, Pandemic and All-Hazards Preparedness Act. Sec. 102. Assistant Secretary for Preparedness and Response.

⁸⁸⁵ HHS, *National Health Security Strategy 2019-2022*, January 2019.

⁸⁸⁶ Wolfram Schlenker and Michael J. Roberts, "Nonlinear temperature effects indicate severe damages to U.S. crop yields under climate change," *Proceedings of the National Academy of Sciences* 106, no 37 (2009): 15594-15598.

⁸⁸⁷ NIH, National Institute of Environmental Health Sciences, *2015 HHS Climate Justice Conference: Responding to Emerging Health Effects* (June 2015).

⁸⁸⁸ NIH, National Institute of Environmental Health Sciences, "Climate Change and Human Health Research Program Description," <https://www.niehs.nih.gov/research/supported/centers/climate/index.cfm>. Accessed June 2020.

Rep. Matt Cartwright (D-PA) introduced the Climate Change Health Protection and Promotion Act of 2019 (H.R. 1243), which calls for the development of a national strategic action plan and program to help health professionals and health care systems prepare for and respond to the public health effects of climate change. Section 633 of the Energy and Commerce Committee's discussion draft of the Climate Leadership and Environmental Action for our Nation's (CLEAN) Future Act similarly calls for national strategic planning, along with codifying the Centers for Disease Control and Prevention (CDC) Climate and Health Program.⁸⁸⁹

Recommendation: Congress should direct HHS to develop a comprehensive national strategic action plan to address the physical and operational risks from climate change to public health systems and health care facilities, and to assist communities and public health departments in preparing for and responding to the public health risks of the climate crisis, including mental health and food insecurity. This strategic planning process should provide for meaningful public input, particularly from vulnerable populations and frontline communities.

Recommendation: Congress should increase funds to the NIEHS for research on climate change and human health to improve understanding of climate-related health impacts and to guide decision-makers around the country in understanding and addressing health risks due to a changing climate.

Committee of Jurisdiction: Energy and Commerce

Building Block: Support State, Local, Tribal, and Territorial Planning and Assessment for Climate and Health Preparedness

The CDC Climate and Health Program leads efforts to anticipate the health effects of climate change, to ensure that systems are in place to detect and track them, and to take steps to prepare for, respond to, and manage associated risks.⁸⁹⁰ The Climate and Health Program is the primary source of direct federal support for state and local public health departments working to respond to the current and future effects of the climate crisis. For example, the Climate and Health Program led the development of the BRACE (Building Resilience Against Climate Effects) framework, which guides SLTT public health departments on consideration of climate risks in public health vulnerability assessments and planning. To support implementation of BRACE, CDC established the Climate Ready States and Cities Initiative, which has awarded grants to 18 state and local health departments.⁸⁹¹ In addition, the Climate Ready Tribes Initiative has awarded grants to six tribes,⁸⁹² and the Climate-Ready Territories program awarded grants to an additional three territorial health agencies for demonstration projects on climate and health preparedness.⁸⁹³

⁸⁸⁹ Section 633, CLEAN Future Act discussion draft.

⁸⁹⁰ CDC, "CDC's Climate and Health Program," <https://www.cdc.gov/climateandhealth/default.htm>. Accessed June 2020.

⁸⁹¹ CDC, "CDC's Climate-Ready States & Cities Initiative," https://www.cdc.gov/climateandhealth/climate_ready.htm. Accessed June 2020.

⁸⁹² National Indian Health Board, "Climate Ready Tribes," https://www.nihb.org/public_health/climate_ready_tribes.php. Accessed June 2020.

⁸⁹³ Association of State and Territorial Health Officials, "Climate-Ready Territories," <https://www.astho.org/Climate-Change/Climate-Ready-Territories/>. Accessed June 2020.

On top of perennial funding challenges, public health departments often struggle to obtain locally relevant climate projections to inform risk assessments. The USGCRP Interagency Crosscutting Group on Climate Change and Human Health coordinates federal science and research on climate change health impacts. In addition to producing USGCRP's 2016 climate and health assessment, the Interagency Crosscutting Group on Climate Change and Human Health coordinates federal climate and health information activities, like the National Integrated Heat Health Information System.⁸⁹⁴ However, major knowledge and information gaps remain for public health officials planning for climate-related health risks, such as projecting areas vulnerable to extreme heat and the air quality impacts of wildfire smoke.⁸⁹⁵ Research has identified correlations between historically redlined areas of racially-motivated lending and insurance practices with present-day summertime temperature variations within cities.⁸⁹⁶ The National Environmental Public Health Tracking Network provides grants to health departments in 25 states, but additional funds are needed to track and publicly deploy data on climate-related health threats, including extreme heat and smoke conditions, for all states and territories.⁸⁹⁷

The CDC Epidemiology and Laboratory Capacity Cooperative Agreement program provides grants to public health departments to increase their capacity to detect, respond to, control, and prevent infectious diseases, including those diseases whose incidence and impacts are exacerbated by the climate crisis. For example, these grants can help address the increasing threat of vector-borne diseases, such as Zika, West Nile Virus, and Lyme disease, as the geographic distributions of mosquitos, ticks, and other vectors change. The Coronavirus Aid, Relief, and Economic Security (CARES) Act provided a one-time infusion of \$631 million to the Epidemiology and Laboratory Capacity Cooperative Agreement program to augment existing efforts by state and local health departments to detect, trace, and control the ongoing COVID-19 pandemic.⁸⁹⁸ When COVID-19 subsides as a public health emergency, public health departments will need sustained funding support to prepare for and respond to future disease outbreaks, including those worsened by climate change.

In November 2019, Rep. Anna Eshoo (D-CA) introduced the Smoke Planning and Research Act of 2019 (H.R. 4924), which would provide federal funding through the U.S. Environmental Protection Agency (EPA) to research and plan for the public health impacts of wildfire smoke. Earlier in the year, Rep. Lauren Underwood (D-IL) introduced the Climate and Health Protection Act (H.R. 3819), which would explicitly authorize and increase funds to the CDC Climate and Health Program to help translate climate science to inform SLTT public health agencies about the health impacts of a changing climate and create decision support tools to build capacity to prepare for climate change.

Recommendation: Congress should increase funding to the CDC Climate and Health Program to assist SLTT health departments with climate risk assessments, resilience planning, and implementation of

⁸⁹⁴ U.S. Global Change Research Program, "Extreme Heat—NIHHIS," U.S. Climate Resilience Toolkit, <https://toolkit.climate.gov/topics/human-health/extreme-heat>. Accessed June 2020.

⁸⁹⁵ U.S. Environmental Protection Agency, EPA 600/R-19-001, *Wildland Fire Research Framework: 2019-2022* (April 2019), https://www.epa.gov/sites/production/files/2019-04/documents/wildland_fire_research_framework_final-tagged.pdf.

⁸⁹⁶ Jeremy S. Hoffman, Vivek Shandas, and Nicholas Pendleton, "The Effects of Historical Housing Policies on Resident Exposure to Intra-Urban Heat: A Study of 108 US Urban Areas," *Climate* 8, no. 1 (2020): 12.

⁸⁹⁷ CDC, "National Environmental Public Health Tracking," <https://www.cdc.gov/nceh/tracking/>. Accessed June 2020.

⁸⁹⁸ CDC, "HHS Announces CARES Act Funding Distribution to States and Localities in Support of COVID-19 Response," April 23, 2020, <https://www.cdc.gov/media/releases/2020/p0423-CARES-act.html>.

actions to increase preparedness to extreme weather and other climate impacts. Some of this increased funding should be directed toward expanding CDC's Climate-Ready States and Cities and Climate Ready Territories Initiatives to fund all 50 states and expand the number of local, tribal, and territorial health agencies that are using the BRACE framework to identify likely climate impacts in their communities, potential health effects associated with these impacts, and their most at-risk populations and locations.

Recommendation: Congress should increase funding to the CDC National Environmental Public Health Tracking Network to track and publicly report data on climate-related public health threats for all U.S. states and territories.

Recommendation: Congress should increase funding to CDC for the Epidemiology and Laboratory Capacity Cooperative Agreement program for grants to SLTT health departments to increase their capacity to detect, respond to, control, and prevent infectious diseases, including those diseases whose incidence and impacts are exacerbated by the climate crisis.

Recommendation: Congress should fund and direct the USGCRP Interagency Crosscutting Group on Climate Change and Human Health to assess the existing availability of actionable information and projections on regional and localized climate-related health impacts, such as heat island mapping, and then to create a national federal research plan that recommends how federal agencies should implement improvements in programs to make forward-looking climate projections readily available to the public, hospitals, and public health departments. The USGCRP Interagency Crosscutting Group on Climate Change and Human Health should collaborate with a diverse set of stakeholders to develop the recommendations and should also highlight disproportionate health impacts to vulnerable populations and how to mitigate them.

Recommendation: Congress should direct EPA, in consultation with NOAA, to establish a new grant program for wildfire smoke research and community smoke mitigation efforts. Research efforts should include health facilities and practitioners.

Committees of Jurisdiction: Energy and Commerce; Science, Space, and Technology

Building Block: Ensure Access to Complete and Accurate Data on Climate-Related Public Health Emergencies

Planning, preparedness, and response to health emergencies depend on the availability and timeliness of comprehensive data on risks and impacts. When health emergencies occur, response teams, policymakers, and the public need access to updated, detailed information on affected populations, casualties, loss of life, geographic locations, and demographics, among other data, to inform response priorities and to understand important disparities in how populations are affected. Flaws in the current system for gathering and reporting public health data in catastrophic events make accurate and timely accounting nearly impossible.

The COVID-19 pandemic ran headlong into longstanding problems with U.S. public health surveillance, including variations across federal, state, and local laws and surveillance systems, such

as for electronic reporting of health data⁸⁹⁹ and standards for certification of death.⁹⁰⁰ As a result, SLTT health departments and federal policymakers have struggled with the timeliness of reporting,⁹⁰¹ completeness of mortality data,⁹⁰² and availability of demographic information on COVID-19 cases.⁹⁰³ Public health experts have expressed concern about the inconsistency in reporting protocols that hamper evaluation of the public safety and effectiveness of treatment, interventions, and reopening strategies.⁹⁰⁴ Importantly, demographic data such as race, ethnicity, and age of COVID-19 cases are essential to the identification of health disparities,⁹⁰⁵ which are preventable differences in the burden of disease and opportunities to achieve optimal health outcomes for socially disadvantaged populations. The recent experience with the COVID-19 pandemic and prior challenges during disasters,⁹⁰⁶ along with the lack of data and reporting to Congress on the demographic characteristics, including race, ethnicity, and geographic region, of individuals tested for or diagnosed with COVID-19,⁹⁰⁷ demonstrate the need to establish data gathering and reporting protocols to prepare the nation for future public health emergencies that are anticipated to become more frequent as a result of the climate crisis.

Section 45001 of the Energy and Commerce Committee Democrats' Leading Infrastructure for Tomorrow's (LIFT) America Act (H.R. 2741) would authorize funding to transform the U.S. public health data system, including improvements to information technology and data systems for CDC and public health departments. These provisions from the LIFT America Act were incorporated into Section 30548 of the Health and Economic Recovery Omnibus Emergency Solutions (HEROES) Act (H.R. 6800), which was passed by the House in May 2020.

Recommendation: Congress should require HHS to establish standards and guidelines for the collection and reporting of casualties, mortalities, and other key data for climate-related public health emergencies and other disasters. Those standards should account for and require reporting of economic, racial/ethnic, age, gender identity, disability status, primary language, and other

⁸⁹⁹ Allison Viola, "Making the Electronic Case Reporting Transition," *Journal of the American Health Information Management Association*, December 13, 2019.

⁹⁰⁰ James R. Gill and Maura E. DeJoseph, "The Importance of Proper Death Certification During the COVID-19 Pandemic," *JAMA*, June 10, 2020.

⁹⁰¹ Mitchell J. Blutt and Lewis J. Kaplan, "We need a national dashboard of digital coronavirus data," *Washington Post*, April 20, 2020.

⁹⁰² Sarah Kliff and Julie Bosman, "Official Counts Understate the U.S. Coronavirus Death Toll," *New York Times*, April 5, 2020.

⁹⁰³ Johns Hopkins University Coronavirus Resource Center, "Maps & Trends: Racial Data Transparency," <https://coronavirus.jhu.edu/data/racial-data-transparency>. Accessed June 2020.

⁹⁰⁴ U.S. Rep. Kathy Castor, Letter to the Honorable Ron DeSantis, Governor, State of Florida, and Scott Rivkees, M.D., Surgeon General, State of Florida, May 19, 2020, https://castor.house.gov/uploadedfiles/ltr_to_desantis_and_rivkees_re_data_transparency.pdf.

⁹⁰⁵ CDC, Alzheimer's Disease and Healthy Aging, "Health Disparities," <https://www.cdc.gov/aging/disparities/index.htm>. Accessed June 2020.

⁹⁰⁶ For example, academic research requested by the Governor of Puerto Rico placed the death toll attributed to Hurricane Maria orders of magnitude higher than early figures and recommended specific changes to mortality surveillance and calculation methodologies. Milken Institute School of Public Health, *Ascertainment of the estimated excess mortality from Hurricane Maria in Puerto Rico* (George Washington University, 2018).

⁹⁰⁷ Letter from Sen. Patty Murray, Ranking Member, Senate Committee on Health, Education, Labor and Pensions, and Rep. Frank Pallone, Chairman, House Committee on Energy and Commerce, to the Honorable Alex M. Azar II, Secretary, Department of Health and Human Services, May 22, 2020, www.help.senate.gov/imo/media/doc/052220%20EC%20HELP%20Health%20Disparities%20Letter%20Final%20v3.pdf.

demographic information for patients, victims, and survivors to support the identification of trends in disparate risks and impacts.

Recommendation: Congress should direct HHS to establish a nationwide electronic public health data system to standardize and use data that improves public health and clinical outcomes, including for climate-related health impacts, by assuring interoperability across health data reporting platforms, expediting sharing of information, and facilitating automated reporting. Congress should direct HHS to ensure the preservation of privacy and security for personally identifiable information and robust protocols for cyber-resilience.

Committee of Jurisdiction: Energy and Commerce

Building Block: Enhance CDC Programs to Reduce the Climate-Related Health Burdens for Frontline Communities

The 2016 USGCRP climate and health assessment identified three primary ways that the climate crisis affects populations differently, depending on their vulnerability to “disproportionate, multiple, and complex risks to their health and well-being in response to climate change.”⁹⁰⁸ First, frontline communities are typically located in places that are more exposed to pollution, flooding, extreme heat, and other environmental and workplace risk factors. Second, frontline communities face a greater burden of underlying medical conditions, making them more sensitive to climate-related health impacts. Third, frontline communities have limited adaptive capacity to bounce back from climate-related illness, due to limited access to medical care and reduced economic opportunities. The COVID-19 pandemic has manifested the same disproportionate health impacts expected for climate change.⁹⁰⁹

The CDC Racial and Ethnic Approaches to Community Health (REACH) program provides grants to state and local health departments, tribes, universities, and community-based organizations to reduce racial and ethnic health disparities. The CDC Good Health and Wellness in Indian Country Program provides grants to tribes and tribal organizations to implement evidence-based strategies to support healthy living and chronic disease prevention. The CDC National Center for Chronic Disease Prevention and Health Promotion maintains a Social Determinants of Health web portal, which aggregates CDC resources on environmental risk factors that contribute to social disparities in health outcomes.⁹¹⁰

Rep. Nanette Barragán (D-CA) introduced the Improving Social Determinants of Health Act of 2020 (H.R. 6561), which would authorize a CDC Social Determinants of Health Program to provide grants to health agencies and nonprofits to understand and address environmental conditions leading to health disparities in their communities. Rep. Cheri Bustos (D-IL) introduced the Social Determinants Accelerator Act of 2019 (H.R. 4004), which would direct HHS to convene an interagency technical

⁹⁰⁸ U.S. Global Change Research Program, *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment* (April 2016). Chapter 9: Populations of Concern.

⁹⁰⁹ CDC, “COVID-19 in Racial and Ethnic Minority Groups,” <https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/racial-ethnic-minorities.html>. Accessed June 2020; Xiao Wu, Rachel C. Nethery, Benjamin M. Sabeth, Danielle Braun, and Francesca Dominici, “Exposure to air pollution and COVID-19 mortality in the United States: A nationwide cross-sectional study,” *medRxiv* (April 27, 2020 preprint), <https://doi.org/10.1101/2020.04.05.20054502>.

⁹¹⁰ CDC, “Social Determinants of Health,” <https://www.cdc.gov/socialdeterminants/index.htm>. Accessed June 2020.

advisory council on social determinants of health. The bill also would provide grants for SLTT governments to develop “Social Determinants Accelerator Plans” to address the needs of at-risk populations.

Recommendation: Congress should increase funding for CDC grant programs to SLTT departments to reduce health disparities for frontline communities affected by the climate crisis, including the REACH program and Good Health and Wellness in Indian Country.

Recommendation: Congress should authorize and increase funding to the CDC Social Determinants of Health program to assess climate related risks to public health, identify solutions, and put tools into practice to address social factors that contribute to preventable inequities in health outcomes. Congress should also direct CDC to provide grants to SLTT health authorities to develop plans that address climate-related health needs of at-risk populations.

The section of this report titled “Invest in Disproportionately Exposed Communities to Cut Pollution and Advance Environmental Justice” provides additional recommendations for how to reduce the pollution burden in and vulnerability of frontline communities.

Committee of Jurisdiction: Energy and Commerce

Ensure Resilient Public Health Supply Chains

Climate change poses threats to health care infrastructure and supply chains that could impair response to disasters and public health emergencies. Disruptions to supply chains for personal protective equipment, pharmaceuticals, and medical devices are nearly always identified during an emergency when those disruptions can take a significant toll on event response, survivability, and recovery. A proactive approach calls for a comprehensive risk assessment and supply chain management strategy to identify critical sectors and commodities that could be affected by climate-driven threats and disasters.

Building Block: Strengthen Health Supply Chain Planning and Management for Climate Resilience

The National Infrastructure Protection Plan: Healthcare and Public Health Sector-Specific Plan, prepared jointly by the Department of Homeland Security (DHS) Cybersecurity & Infrastructure Security Agency and HHS ASPR, provides an HHS-led government-wide assessment of public health system vulnerabilities, including supply chains.⁹¹¹ The ASPR-led Public Health Emergency Medical Countermeasures Enterprise (PHEMCE) coordinates medical countermeasure-related activities across HHS, the Department of Defense (DOD), the Department of Veterans Affairs (VA), DHS, and the Department of Agriculture (USDA) to prepare for chemical, biological, radiological, and nuclear threats and emerging infectious diseases. The ASPR oversees procurement, inventory management,

⁹¹¹ Departments of Homeland Security and Health and Human Services, *National Infrastructure Protection Plan (NIPP): Healthcare and Public Health Sector-Specific Plan*, May 2016.

and stockpiling, including the Strategic National Stockpile and procurement of advanced medical countermeasures.⁹¹²

In December 2019, the Assistant Secretary for Preparedness and Response testified that “supply chain issues are among the most significant challenges to preparing for an influenza epidemic as well as other infectious diseases,” especially dependence on foreign suppliers of active pharmaceutical ingredients and auxiliary medical supplies.⁹¹³ A 2019 internal HHS pandemic simulation exercise highlighted the potential for confusion in federal agency responses to state government requests for antiviral medications, personal protective equipment, ventilators, and other critical supplies.⁹¹⁴

Rather than addressing supply chain challenges, the ASPR office has reportedly scaled back existing PHEMCE interagency processes for ensuring adequate stockpiling of critical health supplies.⁹¹⁵ Such supply chain limitations have not only hindered the COVID-19 response but also potentially reduced the federal capacity to respond to future hurricanes, wildfires, and other climate-fueled disasters. Preparedness for public health emergencies and disasters has in common the need to perform advanced stockpiling of emergency food and critical supplies, as well as to prepare emergency response personnel.⁹¹⁶ Acknowledging the challenge of hurricane response in the midst of a public health emergency, the Federal Emergency Management Agency (FEMA) issued guidance in May 2020 advising emergency managers to prepare additional backup supplies and to address potentially reduced support from emergency response volunteers.⁹¹⁷

The complexity and global nature of the medical supply chain underscore the need for clear regulatory roles and coordination during a public health emergency. This was demonstrated early on during the COVID-19 pandemic.⁹¹⁸ This lack of clarity hampered state and industry responses to the need for critical medical supplies. The Veterans Administration for instance, was unable to determine when its next shipments were going to come in as their four-week supply of emergency equipment was rapidly diminishing.⁹¹⁹ Reps. Suzanne Bonamici (D-OR) and Haley Stevens (D-MI) called for an

⁹¹² Department of Health and Human Services, “About the Strategic National Stockpile,” <https://www.phe.gov/about/sns/Pages/default.aspx>. Accessed June 2020.

⁹¹³ Robert Kadlec, HHS Assistant Secretary for Preparedness and Response, Written Testimony for House Committee on Energy and Commerce, Subcommittee on Oversight and Investigations, “Flu Season: U.S. Public Health Preparedness and Response,” December 4, 2019.

⁹¹⁴ David E. Sanger, Eric Lipton, Eileen Sullivan, and Michael Crowley, “Before Virus Outbreak, a Cascade of Warnings Went Unheeded,” *New York Times*, March 19, 2020.

⁹¹⁵ Jon Swaine, Robert O’Harrow Jr., and Aaron C. Davis, “Before pandemic, Trump’s stockpile chief put focus on biodefense. An old client benefited,” *The Washington Post*, May 4, 2020.

⁹¹⁶ Aaron Clark-Ginsberg, Gary Cecchine, Craig Fugate, Craig A. Bond, “Planning for the Upcoming Hurricane Season in Light of COVID-19,” *The RAND Blog*, May 4, 2020, <https://www.rand.org/blog/2020/05/planning-for-the-upcoming-hurricane-season-in-light.html>.

⁹¹⁷ Federal Emergency Management Agency (FEMA), *COVID-19 Pandemic Operational Guidance for the 2020 Hurricane Season* (May 2020).

⁹¹⁸ House Committee on Energy and Commerce Chairman Frank Pallone, Subcommittee Chairwoman Anna Eshoo, and Subcommittee Chair Diana DeGette, Letter to the Honorable Alex M. Azar II, Secretary, HHS, and the Honorable Peter T. Gaynor, Administrator, FEMA, April 20, 2020, https://energycommerce.house.gov/sites/democrats.energycommerce.house.gov/files/documents/HHS.FEMA_.2020.4.20.%20Letter%20re%20COVID-19%20Supplies.OI_.HE_.pdf.

⁹¹⁹ Lisa Rein, “VA health chief acknowledges a shortage of protective gear for its hospital workers,” *Washington Post*, April 25, 2020.

Emergency Interagency Task Force on Manufacturing to identify bottlenecks in the supply chain and regulatory burdens for the production of in-demand materials, including personal protective equipment, during the COVID-19 national emergency.⁹²⁰ Rep. Joe Neguse (D-CO) led a letter to the White House Coronavirus Task Force requesting increased transparency on personal protective equipment shipments and FEMA's supply chain management process.⁹²¹

Recommendation: Congress should direct the HHS ASPR to conduct an annual assessment of weather-related threats to health care infrastructure and supply chains that could impair response to disasters and public health emergencies.

Recommendation: Congress should direct the DHS Cybersecurity & Infrastructure Security Agency and the HHS ASPR to update the National Infrastructure Protection Plan: Healthcare and Public Health Sector-Specific Plan to assess climate-related risk and ensure the resilience of the nation's supplies of critical commodities, including medical supplies, equipment, and pharmaceuticals.

Recommendation: Congress should direct FEMA to better integrate other federal health agencies, such as the VA and the Indian Health Service (IHS), into its supply chain planning and coordination in the event of a disaster declaration or usage of the Defense Production Act.

Committees of Jurisdiction: Energy and Commerce; Natural Resources; Transportation and Infrastructure; Financial Services

Building Block: Strengthen National Shipping and Distribution for Last-Mile Delivery of Health Commodities

Patients and health insurers alike increasingly rely on mail order pharmacies for the delivery of needed medications.⁹²² For example, more than 330,000 veterans receive prescriptions every work day from the VA Mail Order Pharmacy.⁹²³ Given this critical role, the U.S. Postal Service (USPS) and private shipping and logistics firms need to anticipate the effects of extreme weather and climate change on their facilities, operations, and workers to maintain reliable service.

Recommendation: Congress should direct and fund the USPS to evaluate its operational resilience for sustained and reliable service in public health emergencies, extreme weather and other climate events, including for postal sorting facilities, post offices, and delivery routes in areas that are prone to flooding, wildfire, and other extreme weather or conditions that may disrupt the reliable delivery of the mail, especially prescriptions and medical supplies.

⁹²⁰ Letter from Reps. Suzanne Bonamici (D-OR) and Haley Stevens (D-MI) to Speaker Nancy Pelosi and House Minority Leader Kevin McCarthy, March 23, 2020, <https://bonamici.house.gov/sites/bonamici.house.gov/files/2020%2003%2023%20-%20Bonamici-Stevens%20Letter%20to%20Leadership%20on%20Manufacturing%20Priorities%20for%20COVID-19.pdf>. Accessed June 2020.

⁹²¹ Letter from Reps. Joe Neguse (D-CO), Jason Crow (D-CO), Diana DeGette (D-CO), and Ed Perlmutter (D-CO), and Sen. Michael Bennet (D-CO) to Vice President Mike Pence, Chair, Coronavirus Task Force, April 9, 2020.

<https://neguse.house.gov/imo/media/doc/4.9.20%20COVID%20Supplies%20Letter.pdf>. Accessed June 2020.

⁹²² Laura Daily, "Should you switch to a mail-order pharmacy? Here are the factors to consider," *The Washington Post*, January 8, 2019.

⁹²³ VA, "Pharmacy Benefits Management Services: VA Mail Order Pharmacy," https://www.pbm.va.gov/PBM/CMOP/VA_Mail_Order_Pharmacy.asp. Accessed June 2020.

Recommendation: Congress should direct the Mitigation Framework Leadership Group (MitFLG) and ASPR to form a public-private collaboration with major U.S. and global distribution and shipping enterprises to develop strategies to assure the resilience of distribution networks.

Committees of Jurisdiction: Oversight and Reform; Transportation and Infrastructure; Energy and Commerce

Restore and Enhance U.S. Global Leadership on Climate and Public Health

One of the ways climate change can affect human health is by increasing exposures to infectious and zoonotic diseases.⁹²⁴ Today, diseases can spread quickly around the world, sparking outbreaks that can overwhelm health systems, inflict significant loss of life, and devastate economies. Global-scale outbreaks not only threaten health, they also can contribute to civil disruption and depress demand for U.S. services and exports. American jobs and the U.S. economy depend on effective and functional global health surveillance and security capabilities to identify and respond to disease outbreaks whether they occur in the United States or overseas.

Building Block: Restore and Enhance U.S. Participation in WHO and the Global Health Security Agenda

The World Health Organization (WHO) was founded in 1948 as a specialized agency within the United Nations with the mandate to act as a coordinating authority on international health issues. The WHO establishes international health standards, provides technical assistance and guidance to countries, and supports international response to health emergencies. The organization also administers the WHO Global Programme on Climate Change and Health, which operates as a comprehensive program to lead the health components of the UN systemwide response to the climate crisis, including the health components of the UN Framework Convention on Climate Change, the 2015 Paris Agreement, and Sustainable Development Goals.⁹²⁵

WHO relies on assessed and voluntary contributions from member states and private organizations to implement its global health mission. The United States provides voluntary contributions through appropriations to various programs, including the U.S. Agency for International Development (USAID) Global Health Programs and International Disaster Assistance accounts and the CDC Global Health account. As the largest contributor to the WHO, the United States has participated in the organization's governance structure and provided financial and technical assistance to the WHO mission areas, including research on the public health impacts of climate change. In May 2020,

⁹²⁴ U.S. Global Change Research Program, *Fourth National Climate Assessment, Volume II* (November 2018).

⁹²⁵ WHO, "WHO Global Programme on Climate Change & Health," <https://www.who.int/globalchange/mediacentre/news/global-programme/en/>. Accessed June 2020.

President Trump announced the United States was terminating its relationship with WHO, although Congress has not approved this change.⁹²⁶

The United States also plays a leading role in the Global Health Security Agenda (GHSA), a coalition of countries, private sector partners, and non-governmental organizations that correspondingly helps strengthen infectious disease prevention, detection, and response. The United States participates in the GHSA through the CDC and through USAID. The CDC collaborates with counterparts around the world to strengthen global infectious disease surveillance, tracking, and response to contain and control disease outbreaks and other public health emergencies before they spread. USAID contributes to U.S. implementation of the GHSA through several programs, including the PREDICT project, which was launched in 2009 to support the identification of the most likely sources of zoonotic disease and the ways that pathogens can jump the species barrier to affect human health.⁹²⁷ As climate change affects the incidence, location, and seasonal distribution of infectious diseases, robust global cooperation is crucial to more effectively manage these threats.

Rep. Kurt Schrader (D-OR) introduced the Advancing Emergency Preparedness Through One Health Act (H.R. 3771), which would require HHS and USDA to coordinate with other relevant agencies and departments to submit a national framework to Congress for a coordinated interagency effort to monitor and respond to zoonotic disease outbreaks. Rep. Gerald Connolly (D-VA) introduced the Global Health Security Act of 2019 (H.R. 2166), which would codify the role of the GHSA Interagency Review Council to coordinate federal interagency health surveillance activities.

Recommendation: Congress should support U.S. membership in and funding for WHO and support the WHO Global Programme on Climate Change and Health to (1) enhance scientific monitoring and evidence gathering and analysis on the links between climate change and health and support for a global climate and health research agenda; (2) support efforts by countries to protect human health from climate change by strengthening national capabilities and improving the resilience and adaptive capacity of health systems against the impacts of climate change; and (3) support efforts by countries to reduce health vulnerability to climate change and enhance public health while reducing carbon emissions.

Recommendation: Congress should increase funds to CDC and USAID programs that advance the goals of the GHSA. These include funding for global monitoring and surveillance of infectious disease threats, especially those exacerbated by climate change, and for participation in efforts to contain global health threats before they compromise U.S. national security. Congress should codify the GHSA Interagency Review Council to coordinate federal interagency health surveillance activities, including implementation of a national framework for zoonotic disease surveillance, and to share data and best practices for disaster preparedness, climate resilience, and mitigation.

Committees of Jurisdiction: Foreign Affairs; Energy and Commerce

⁹²⁶ Executive Office of the President, “Remarks by President Trump on Actions Against China,” issued on May 30, 2020, <https://www.whitehouse.gov/briefings-statements/remarks-president-trump-actions-china/>. Accessed June 2020.

⁹²⁷ USAID, “Fact Sheet: Investments in Global Health Security by the U.S. Agency for International Development,” May 7, 2020, <https://www.usaid.gov/news-information/press-releases/may-7-2020-investments-global-health-security-us-agency-international>. Accessed June 2020.

Support Community Preparedness for the Health Impacts of Disasters

While the causes of the climate crisis are global, the health effects are inherently local as communities confront increasing risks and occurrences of extreme heat, flooding, infectious diseases, and other climate impacts that adversely affect human health.

Building Block: Increase Funding to HHS Programs for Community Disaster Preparedness and Resilience to Climate and Health Threats

Climate-fueled disasters can harm health through acute events, such as injuries and loss of life, and through reductions in access to essential health services. Several existing public health disaster response programs merit additional financial support.

The CDC's Public Health Emergency Preparedness (PHEP) Cooperative Agreement provides funds to help state, local, and territorial public health departments respond to infectious diseases, extreme weather, and other climate-driven threats. Among its functions, PHEP funding helps communities to strengthen their medical and public health capabilities, including emergency operations coordination, medical surge, and responder safety and health.⁹²⁸ However, in 2020, PHEP received \$675 million,⁹²⁹ down from \$939 million in previous fiscal years.⁹³⁰ In response to the COVID-19 pandemic, House Appropriations Committee Chairwoman Nita Lowey (D-NY) introduced the HEROES Act (H.R. 6800), which, among other provisions, would provide \$1 billion in additional appropriations to the PHEP Cooperative Agreement program and extend PHEP grant eligibility to include tribes.⁹³¹

The Public Health Emergency Fund (PHEF) is a rapid response fund available for use by HHS ASPR following disasters and public health emergencies.⁹³² The Pandemic and All-Hazards Preparedness and Advancing Innovation Act of 2019 expanded eligible uses of the PHEF to include support for coordination among federal and SLTT entities for rapid response to public health emergencies.⁹³³ The Act also enabled the HHS Secretary to use the PHEF to support activation of the National Disaster Medical System and the Medical Reserve Corps, which are teams of medical professionals and civilian volunteers, respectively, who can provide supplementary medical assistance to SLTT health authorities following disasters.⁹³⁴ In 2018, the Bipartisan Commission on Biodefense recommended that annual appropriations maintain PHEF reserves of at least \$2 billion.⁹³⁵

⁹²⁸ CDC, *Public Health Emergency Preparedness and Response Capabilities: National Standards for State, Local, Tribal, and Territorial Public Health* (October 2018, updated January 2019).

⁹²⁹ HHS, "Public Health Preparedness and Response," <https://www.cdc.gov/cpr/whatwedo/phpr.htm>. Accessed June 2020.

⁹³⁰ Rhea K. Farberman, APR, et al., *The Impact of Chronic Underfunding on America's Public Health System: Trends, Risks, and Recommendations, 2020* (Trust for America's Health, 2020).

⁹³¹ Division A, Title VI; Division C, Title VI, Subtitle C.

⁹³² 42 USC § 247d(b).

⁹³³ Pub L No 116-22. Section 206. Strengthening and Supporting the Public Health Emergency Rapid Response Fund.

⁹³⁴ Pub L No 116-22. Section 207. Improving All-Hazards Preparedness and Response by Public Health Emergency Volunteers.

⁹³⁵ Bipartisan Commission on Biodefense. *Holding the Line on Biodefense: State, Local, Tribal, and Territorial Reinforcements Needed* (October 2018).

In addition to planning and resources, communities need a public health workforce that is ready to respond when disasters strike. The U.S. Public Health Service is a federal uniformed service charged with responding to public health needs in the United States and abroad. Its commissioned officer corps includes more than 6,000 doctors, nurses, and other medical professionals. Many corps officers are already engaged in critical public health duties, such as IHS and Bureau of Prisons care, limiting the capacity of officers to respond to emergency public health needs.⁹³⁶ The CARES Act established a Ready Reserve Corps within the U.S. Public Health Service to serve in public health emergencies.⁹³⁷

The NIEHS Worker Training Program supports nonprofits, including labor organizations, to develop training programs to support environmental, hazardous waste, and disaster workers.⁹³⁸ For example, the Worker Training Program initiated a Gulf Responder Resilience Training Project in 2012 to develop a behavioral health resilience curriculum for disaster workers and recovering communities.⁹³⁹ However, the President's 2021 budget proposed a 12% cut to the Worker Training Program.⁹⁴⁰

Section 30550 of the HEROES Act would provide additional funding to SLTT health departments for improvements to core public health infrastructure, including workforce expansion, laboratory systems, health information systems, disease surveillance, and contact tracing capacity. Section 30551 would provide additional funding for core public health infrastructure at CDC.

Rep. Rosa DeLauro (D-CT) introduced the Public Health Emergency Fund Act (H.R. 5723), which would provide \$5 billion in appropriations to the PHEF.

Recommendation: Congress should expand eligibility and increase support to the CDC's PHEP Cooperative Agreement to provide SLTT public health departments with the resources to help hospitals and health care facilities increase capacities and capabilities to confront climate threats, including infectious disease surveillance and response to biological threats.

Recommendation: Congress should ensure that the PHEF maintains sufficient reserves for rapid response to declared public health emergencies and for activation of public health resources for an emergency (e.g., hurricane, wildfire) that requires a rapid response to save lives and protect the public while Congress assesses the need for supplemental funding.

Recommendation: Congress should increase funds to HHS Public Health Service's Ready Reserve Corps to enhance surge capacity for health sector emergency response, including providing for additional health care workers and adaptive physical capacity for patient care.

Recommendation: Congress should increase funding to the NIEHS Worker Training Program and direct the NIEHS to enhance training on climate resilience and disaster preparedness, prioritizing

⁹³⁶ Quil Lawrence, "Public Health Service Poised To Create a Ready Reserve To Fight The Coronavirus," *NPR*, April 15, 2020.

⁹³⁷ Pub L No 116-136. Section 3214. United States Public Health Service Modernization.

⁹³⁸ NIH, National Institute of Environmental Health Sciences, "About the Worker Training Program," https://www.niehs.nih.gov/careers/hazmat/about_wetp/index.cfm. Accessed June 2020.

⁹³⁹ NIH, National Institute of Environmental Health Sciences, "Responder & Community Resilience," <https://tools.niehs.nih.gov/wetp/index.cfm?id=2528>. Accessed June 2020.

⁹⁴⁰ HHS, *Fiscal Year 2021 National Institutes of Health, National Institute of Environmental Health Sciences (NIEHS), Superfund-Related Activities*. At 10.

funding for efforts to increase the number of disadvantaged and underrepresented workers in areas such as environmental restoration, resilient construction techniques, and emergency response.

Committee of Jurisdiction: Energy and Commerce

Building Block: Help Medically Vulnerable Populations Become More Disaster-Resilient

One of the challenges that disasters of all sorts pose is the lack of information about vulnerable populations, including patients who are medically dependent on electricity, need assistance to evacuate, or rely on home-based health care. Disasters take a particularly devastating toll on seniors. Nearly half of the deaths from Hurricane Katrina were adults aged 75 and older.⁹⁴¹ Nearly two-thirds of the fatalities in the 1995 Chicago heat wave were persons aged 65 or older.⁹⁴² And people over 85 years of age are nearly four times as likely to die in wildfire than the overall population.⁹⁴³ Power outages in 2019 that affected more than two million Californians put at risk those with home medical needs.⁹⁴⁴

Researchers also have identified important preparedness gaps for medically vulnerable populations, including seniors and those with disabilities that require advance planning to provide for their health and safety in disasters. For example, more than 40% of surveyed survivors who did not evacuate ahead of Hurricane Katrina were either physically unable to leave or were caring for someone with a disability.⁹⁴⁵ Of Americans aged 50 or older, nearly 10% would be unable to evacuate on their own.⁹⁴⁶ Despite these risks, less than 25% of seniors have made plans for how they would respond to a disaster or evacuate.⁹⁴⁷ Although more than 2 million people live in nursing homes and assisted living facilities as of 2016,⁹⁴⁸ preparedness planning is inconsistent across those facilities with limited awareness and resource constraints often cited as barriers to planning.⁹⁴⁹

Individuals who are medically dependent on electricity are also vulnerable to power shutoffs in their homes during disasters and heat waves. Many states impose moratoria on power shutoffs for low-income individuals during disasters, but rules are inconsistent and do not address power outages.⁹⁵⁰ One solution is to expand deployment of home-based energy storage and microgrids, prioritizing

⁹⁴¹ Joan Brunkard, Gonza Namulanda, and Raoult Ratard, "Hurricane Katrina Deaths, Louisiana, 2005," *Disaster Medicine and Public Health Preparedness* 2, no. 4 (2008): 215-223.

⁹⁴² Steven Whitman, et al., "Mortality in Chicago Attributed to the July 1995 Heat Wave," *American Journal of Public Health* 87, no. 9 (1997): 1515-1518.

⁹⁴³ U.S. Fire Administration, "U.S. fire deaths, fire death rates, and risk of dying in a fire," https://www.usfa.fema.gov/data/statistics/fire_death_rates.html. Accessed June 2020.

⁹⁴⁴ Taryn Luna, Maria L. La Ganga, Patrick McGreevy, and Joseph Serna, "Tempers flare as millions in California endure power outages from PG&E," *Los Angeles Times*, October 10, 2019.

⁹⁴⁵ Mollyann Brodie, et al., "Experiences of Hurricane Katrina Evacuees in Houston Shelters: Implications for Future Planning," *Am J Public Health* 96, no. 8 (2006): 1402-1408.

⁹⁴⁶ Tala M. Al-rousan, Linda M. Rubenstein, and Robert B. Wallace, "Preparedness for Natural Disasters Among Older U.S. Adults: A Nationwide Survey," *Am J Public Health* 104, no. 3 (2014): 506-511.

⁹⁴⁷ Ibid.

⁹⁴⁸ CDC, National Center for Health Statistics, *Vital and Health Statistics* (February 2019), https://www.cdc.gov/nchs/data/series/sr_03/sr03_43-508.pdf.

⁹⁴⁹ Regina A. Shih, et al., *Improving Disaster Resilience Among Older Adults: Insights from Public Health Departments and Aging-in-Place Efforts* (Rand Corporation, 2018).

⁹⁵⁰ Joseph Daniel, "As Heatwave Blankets Nation, Utility Disconnect Policies Can Kill," Union of Concerned Scientists, July 22, 2019, <https://blog.ucsusa.org/joseph-daniel/as-heatwave-blankets-nation-utility-disconnect-policies-can-kill>.

individuals who are medically dependent on electricity.⁹⁵¹ The emPOWER program at HHS operates as a partnership between the ASPR and the Centers for Medicare & Medicaid Services to provide dynamic data and mapping tools to those who live independently and rely on electricity-dependent medical equipment and health care services. Tools available through the emPOWER program support state, territory, local, and community efforts to identify and meet the needs of at-risk individuals throughout the emergency management cycle.⁹⁵²

Federal action is needed to support SLTT efforts to enhance the climate resilience and preparedness of medically vulnerable populations, ensure that warnings of health emergencies reach those populations, and develop data and planning to meet their safety and medical needs as part of disaster response and recovery.

Recommendation: Congress should increase funding to the HHS PHEP Cooperative Agreements and the emPOWER Program to help SLTT public health departments coordinate with health care facilities that receive federal funding to (1) assess risks to vulnerable populations and identify patients, including our nation's veterans and the elderly, in facilities, nursing homes, or residential settings who are medically dependent on electricity, may need assistance for evacuations, or are dependent on home delivery of medical supplies, meals, or home-based health care; and (2) create a patient notification system to communicate warnings for health impacts such as extreme heat, poor air quality, extreme weather events, and power interruption.

The section of the report titled “Expand Deployment of Distributed Energy Resources” includes further recommendations for deploying distributed energy resources, including to provide backup power to support critical health needs.

Committee of Jurisdiction: Energy and Commerce

⁹⁵¹ Kristina Dahl, et al., *Killer Heat in the United States: Climate Choices and the Future of Dangerously Hot Days* (Union of Concerned Scientists, July 2019).

⁹⁵² HHS, “HHS emPOWER Program: emPOWERing Communities, Saving Lives,” https://empowermap.hhs.gov/HHS%20emPOWER%20Program_Fact%20Sheet_FINAL_v9_508.pdf. Accessed June 2020.

Increase the Preparedness and Resilience of the Nation's Hospitals and Health Infrastructure

America's health infrastructure includes hospitals, research facilities, residential health care settings, community-based ambulatory facilities, and retail and home care. Each of these links in the health system faces extreme weather risks imposed by climate change, including increasingly severe heat waves, hurricanes, flooding, extreme wind events, drought, and wildfires.⁹⁵³ A 2018 HHS Office of Inspector General report found that many hospitals lack the capacity to plan for competing preparedness priorities, including emerging infectious diseases, active shooter incidents, and extreme weather events.⁹⁵⁴ Without adequate preparation, increasingly frequent climate-fueled disasters could upend the nation's health infrastructure, increase capital and insurance costs for health facilities, and disrupt revenue streams and insurance reimbursements.⁹⁵⁵

This section outlines policy recommendations to increase the preparedness and resilience of hospitals and health infrastructure. The section of the report titled "Make U.S. Communities More Resilient to the Impacts of Climate Change" includes additional recommendations for increasing the resilience of all critical buildings and infrastructure, including health facilities.

Building Block: Support Hospital Planning and Preparedness for Climate Resilience

Hospitals, long-term care facilities, and outpatient providers participating in Medicare and Medicaid are subject to the Emergency Preparedness Rule, which requires them to develop plans and strategies for coordinated response to natural and human-caused disasters to assure patient safety during emergencies.⁹⁵⁶ Each participating provider or supplier must comply with requirements in four core emergency management elements: emergency planning; policies and procedures; communications planning; and training and testing. Under the Emergency Preparedness Rule, all participating providers must develop emergency plans that address their specific risks. For example, providers in hurricane-prone areas will have different preparedness priorities than those in "tornado alley."

The HHS Hospital Preparedness Program (HPP) provides federal funding to support health care systems in preparing for emergencies, including coordination of regional health care coalitions.⁹⁵⁷ Despite the increasing need to prepare for climate-fueled health crises, congressional appropriations to HPP are in decline. In 2003, Congress funded the HPP at \$515 million.⁹⁵⁸ In 2020, it received only \$275.6 million in regular appropriations,⁹⁵⁹ though an additional \$250 million in supplemental

⁹⁵³ HHS, *Primary Protection: Enhancing Health Care Resilience for a Changing Climate* (December 2014).

⁹⁵⁴ HHS Office of the Inspector General, OEI-06-15-00230 *Hospitals Reported Improved Preparedness for Emerging Infectious Diseases After the Ebola Outbreak* (October 2018).

⁹⁵⁵ Health Care Without Harm, *Safe Haven in the Storm: Protecting Lives and Margins with Climate-Smart Health Care* (January 2018).

⁹⁵⁶ 42 CFR 482.15.

⁹⁵⁷ HHS, "Hospital Preparedness Program," <https://www.phe.gov/Preparedness/planning/hpp/Pages/default.aspx>. Accessed June 2020.

⁹⁵⁸ Crystal R. Watson, Matthew Watson, Tara Kirk Sell, "Public Health Preparedness Funding: Key Programs and Trends from 2001 to 2017," *Am J Public Health* 107 (2017): S165-S167.

⁹⁵⁹ HHS, *Fiscal Year 2021 Public Health and Social Services Emergency Fund Justification of Estimates for*

appropriations were provided for HHS awards to existing HPP grantees and subgrantees through the CARES Act.⁹⁶⁰

Recommendation: Congress should strengthen the HPP to support hospitals and other critical health facilities to prepare emergency plans that address increasing climate-related risks, including provisions to ensure reliable power and water supplies during disasters.

Committee of Jurisdiction: Energy and Commerce

Building Block: Build, Rebuild, and Retrofit Hospitals and Health Infrastructure for Climate Resilience

Hospitals and health care facilities are on the front lines of the climate crisis, bearing the costs of increasing illnesses, injuries, and disease and more extreme weather events, including heatwaves, wildfires, floods, and storms. For example, a 2017 federal analysis identified more than 300 hospitals and 4,400 nursing homes at high risk of flooding.⁹⁶¹ During extreme events, the health and safety of patients, health care workers, and the entire community depend on local hospitals that are accessible, operational, and providing high-quality care with capacity to respond to increased medical needs. However, between 2000 and 2017, more than 150 hospitals had to evacuate in response to disasters.⁹⁶²

Though the Emergency Preparedness Rule is a useful planning tool, it does not require providers to address the range of extreme weather and climate risks, such as chronic flooding and extreme heat, that can cause power interruptions and adversely affect facilities, access, and operations. The Rule also does not require facilities to assess the vulnerabilities of equipment and supply chains and the impacts of emergencies on the resilience of their workforces of health care workers, service workers, and maintenance personnel necessary to ensure the continued operations of facilities. These are important gaps in the Rule that require congressional action to address.

Additionally, there is a need to modify the Emergency Preparedness Rule and requirements to ensure that facilities comply with the latest model building codes for critical facilities and with federal resilience standards for flood and wildfire risks. To help advance facility resilience standards, the American Society for Health Care Engineering is partnering with the International Codes Council to address problems stemming from inconsistent and outdated building codes for hospitals and health care facilities so that they can better withstand extreme weather and other effects of climate change.⁹⁶³ For example, when building a new rehabilitation hospital on the edge of Boston Harbor, Partners HealthCare utilized projected sea level rise and predictions of increased flooding to design

Appropriations Committee (February 2020).

⁹⁶⁰ Pub L No 116-136.

⁹⁶¹ Arie Manangan, S. Saha, P. Schramm, and E. Hines, “Flooding Risk of Medical Infrastructure – A National Assessment of Hospitals and Nursing Homes in Flood Hazard Zones [abstract]” (American Meteorological Society Eighth Conference on Environmental Health, 2017), <https://ams.confex.com/ams/97Annual/webprogram/Paper303356.html>.

⁹⁶² Aishwarya Sharma, Sharon Mace, “Reviewing Disasters: Hospital Evacuations in the United States from 2000 to 2017,” *Abstracts of Oral Presentations-WADEM Congress on Disaster and Emergency Medicine 2019* 34, no. s1 (2019): s22.

⁹⁶³ Jeffrey T. O’Neill and John Williams, “Ensuring relevance of building codes: ASHE and ICC work together to improve the development cycle for health care construction codes,” *ASHE Health Facilities Management*, January 10, 2019.

the Spaulding Rehabilitation Facility to withstand a variety of flooding and storm scenarios. The facility also maximizes efficiency and the ability to operate in the event of grid power outages.⁹⁶⁴ Though FEMA Hazard Mitigation Assistance programs support certain narrowly designated resilience retrofits to hospitals and health facilities,⁹⁶⁵ there is currently no dedicated federal program to support such work. Congress needs to make additional resources available to evaluate existing facilities and carry out retrofits to address deficiencies so that they will remain accessible and operational in extreme weather.

Health care facilities also present opportunities to increase resilience and advance clean energy projects to provide multiple benefits, including resource efficiency, operational savings, sustainability, and reliability when supplies are most needed – in civil emergencies and disasters. For example, St. Joseph's Hospital in Tampa, Florida, is the only hospital campus in the area with a co-generator plant, which powers a 1.7-megawatt generator to produce electricity throughout the hospital campus and allows the facility to remain operational in the event of power interruption.⁹⁶⁶ Montefiore Medical Center in the Bronx, New York, uses a combined heat and power plant to provide the hospital with its own clean, reliable, and efficient power, reducing greenhouse gas emissions by more than 17,000 tons each year, and helping it to operate during the 2003 heatwave blackout and Hurricanes Irene and Sandy when other facilities had to close.⁹⁶⁷ Congress needs to provide additional resources to help facilities provide redundant power supplies, including integration of microgrids.

Recommendation: Congress should direct HHS to ensure that federally funded projects for construction, rebuilding, and retrofits to hospitals and health facility infrastructure use the latest published editions of building codes and climate-informed standards for energy efficiency, flood, and wildfire risks.

Recommendation: Congress should establish a new program at HHS to support pre-disaster hospital and health facility resilience projects, including retrofits and maintenance to reduce flood and wildfire risk, harden facilities against extreme weather, and integrate redundant water and power supplies, including microgrids and community renewable energy grids, where applicable, to enhance resilience and access to water and energy when certain portions of the grid are disabled.

Recommendation: Congress should direct HHS to update the Emergency Preparedness Rule to require health care facilities to prepare for extreme weather and climate impacts, including providing for energy resilience and innovative clean power sources for sustained power outages.

Committee of Jurisdiction: Energy and Commerce

⁹⁶⁴ U.S. Global Change Research Program, “U.S. Climate Resilience Toolkit: Investment in Infrastructure at Sea-Level Hospital Will Pay Off by Reducing Risk,” <https://toolkit.climate.gov/case-studies/investment-infrastrucure-sea-level-hospital-will-pay-reducing-risk>. Accessed June 2020.

⁹⁶⁵ FEMA, *Hazard Mitigation Assistance Guidance* (February 2015), https://www.fema.gov/media-library-data/1424983165449-38f5dfc69c0bd4ea8a161e8bb7b79553/HMA_Guidance_022715_508.pdf.

⁹⁶⁶ Mitch Perry, “In Tampa, Democratic U.S. Reps. Kathy Castor and Frank Pallone extol St. Joseph’s Hospital energy efficiencies,” *Florida Politics*, November 9, 2015.

⁹⁶⁷ U.S. Environmental Protection Agency, “Winners of the 2015 ENERGY STAR® CHP Award,” Montefiore Medical Center, p. 9, https://www.epa.gov/sites/production/files/2015-07/documents/past_energy_starr_chp_award_winners.pdf. Accessed June 2020.

Building Block: Support the Resilience of Tribal, Territorial, Safety Net, and Rural Health Facilities

Tribal, territorial, safety net, and rural hospitals and health facilities serve populations with limited access to health care. These underserved populations are often the communities most vulnerable to the impacts of climate change.⁹⁶⁸ Safety net hospitals include Critical Access Hospitals in rural areas, facilities that provide free or reduced-cost care, and other essential hospitals that serve a large proportion of uninsured, underinsured, Medicaid, and other vulnerable populations. Safety net health care facilities also include Federally Qualified Health Centers, Rural Health Clinics, Tribal Health Centers, Urban Indian Organizations,⁹⁶⁹ and other facilities providing primary medical, dental, and behavioral care to underserved populations. Many of these facilities face constant financial pressure, leaving them with little capacity to prepare for climate-related impacts to their health delivery infrastructure and to the health vulnerability of their patients. The COVID-19 pandemic has underscored the precarious financial conditions of these safety net facilities, which currently face lost revenue and increasing costs.⁹⁷⁰

The Energy and Commerce Committee Democrats' LIFT America Act (H.R. 2741) would authorize funding for improvements to America's safety net health infrastructure, including revival of Hill-Burton Act construction of health facilities that are obligated to provide free or reduced-cost care. It would also fund improvements to IHS facilities, laboratory infrastructure for disease surveillance, and community-based health care centers. In June 2020, the House Democrats introduced a comprehensive infrastructure bill, the Moving Forward Act (H.R. 2).⁹⁷¹ Sections 34101-34105 of this bill would also authorize these health care infrastructure investments and would add the requirement that projects increase energy efficiency, energy resilience, or greater use of renewable energy.

Recommendation: Congress should create a grant program to fund projects to increase resilience and energy efficiency and to support use of renewable energy for tribal, territorial, safety net, and rural hospitals and health facilities that primarily treat uninsured, underinsured, Medicaid, and other vulnerable populations, including Critical Access Hospitals, Federally Qualified Health Facilities, Rural Health Clinics, Tribal Health Centers, and Urban Indian Organizations.

Recommendation: Congress should direct HHS to create a program to provide technical assistance and funding for tribal, territorial, safety net, and rural hospital preparedness for extreme weather and climate impacts, including providing for energy resilience and innovative clean power sources for sustained power outages.

Committees of Jurisdiction: Energy and Commerce; Natural Resources

⁹⁶⁸ U.S. Global Change Research Program, *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment* (April 2016). Chapter 9: Populations of Concern.

⁹⁶⁹ Defined in 25 U.S.C. 1603 as "a nonprofit corporate body situated in an urban center, governed by an urban Indian controlled board of directors, and providing for the maximum participation of all interested Indian groups and individuals, which body is capable of legally cooperating with other public and private entities for the purpose of performing the activities described in section 1653(a) of this title."

⁹⁷⁰ Lauren Weber, "Coronavirus Threatens Rural Hospitals Already at the Financial Brink," *NPR*, March 21, 2020.

⁹⁷¹ Unless otherwise noted, mentions of H.R. 2 refer to the version of the bill contained in Rules Committee Print 116-54, dated June 22, 2020. The House of Representatives was preparing to debate H.R. 2 when the Select Committee's report went to print. The Rules Committee Print is available at <https://rules.house.gov/sites/democrats.rules.house.gov/files/BILLS-116HR2-RCP116-54.pdf> and will not reflect any amendments made to the bill after June 22, 2020.

Ensure the Climate Resilience of Veterans Health Systems

The climate crisis adversely affects the nation's veterans, due to the health effects of climate change and due to the disruptions in access to care that can occur when Veterans Health Administration facilities and operations are affected by extreme weather.

Building Block: Enhance Department of Veterans Affairs Planning and Capabilities to Assure Climate Resilience

The Veterans Health Administration operates one of the nation's largest integrated direct health care delivery systems, with a workforce of more than 350,000 employees serving nearly 20 million veterans along with their dependents for a total scope of more than 40 million people who are potentially eligible for services and other benefits.⁹⁷² The VA owns or leases more than 8,000 buildings⁹⁷³ and administers nearly 3.2 million home loans,⁹⁷⁴ making VA policies and practices significant drivers of health and safety for our nation's veterans. The 2014 VA Climate Adaptation Plan identified the agency's primary climate-related vulnerabilities as "the susceptibility of its infrastructure to damage and the burdens placed on its healthcare delivery systems."⁹⁷⁵ The plan outlined actions to ensure the physical and operational resilience of VA facilities and systems, including measures to address floods and other weather threats and to expand use of renewable and combined heat and power generation to allow facilities to operate independently of the electric grid. However, the Trump administration deleted from the VA Sustainable Design Manual all considerations of climate impacts in VA facility site selection and development criteria.⁹⁷⁶

Climate change can also have widespread effects on the physical and mental health of veterans and VA staff, as well as on the need for emergency medicine. Health impacts to veterans can include increased risk of heat stress, prevalence of infectious disease, and degraded air quality. Extreme weather and other climate impacts can increase demand for emergency care and supplies. Scientists have documented the effect of disasters on individuals' acute and chronic mental health challenges, including increases in post-traumatic stress disorder, anxiety, depression, suicidality, and substance use. For individuals who already have experienced multiple traumas or stressors, like many veterans, disasters may exacerbate underlying mental health issues.⁹⁷⁷

The COVID-19 pandemic has also revealed problems with VA stockpiles and supply chain resilience and the need to improve interagency coordination among VA, DOD, IHS, and communities.⁹⁷⁸ VA facilities have reported shortages of supplies and staff, raising questions about readiness.

⁹⁷² VA, *FY2021 Budget Submission* (February 2020).

⁹⁷³ VA, *U.S. Department of Veterans Affairs Climate Change Adaptation Plan* (June 2014).

⁹⁷⁴ VA, *Department of Veterans Affairs FY 2018-2024 Strategic Plan* (updated May 2019).

⁹⁷⁵ VA, *U.S. Department of Veterans Affairs Climate Change Adaptation Plan* (June 2014).

⁹⁷⁶ Select Committee Majority Staff analysis of VA, Office of Construction & Facilities Management, "Sustainable Design," <https://www.cfm.va.gov/til/sustain.asp>. Accessed June 2020; VA, *Sustainable Design Manual* (May 2014), <https://www.cfm.va.gov/til/sustain/dmSustain201405.pdf>; VA, *Sustainable Design Manual Rev. 1* (August 2017), <https://www.cfm.va.gov/til/sustain/dmSustain.pdf>.

⁹⁷⁷ Susan Clayton Whitmore-Williams, Christie Manning, Kirra Krygsman, and Meighen Speiser, *Mental Health and Our Changing Climate: Impacts, Implications, and Guidance* (American Psychological Association and ecoAmerica, 2017).

⁹⁷⁸ Leo Shane, "VA staffers sound alarm over shortages in staffing, equipment," *Military Times*, April 3, 2020; Ben Kesling, "Veterans Affairs Hospitals Facing 'Serious' Shortage of Protective Gear, Internal Memos Show," *Wall Street Journal*, April 8, 2020.

Rep. John Garamendi (D-CA) introduced the Pharmaceutical Independence Long-Term Readiness Reform Act (H.R. 4710), which would require DOD to consider medical supply chain vulnerabilities in the National Defense Strategy and to offer recommendations to increase medical supply chain reliability by diversifying suppliers.

Recommendation: Congress should direct the VA to update its Climate Adaptation Plan and address the likely effects of climate change on its health care operations, including staffing models and projections of veteran mental health needs.

Recommendation: Congress should direct the VA to update the Sustainable Design Manual to address climate threats and ensure that new and retrofitted facilities, including new lending for veterans housing, comply with the most recently published consensus-based building codes for energy efficiency and federal standards for flood and wildfire resilience.

Recommendation: Congress should direct the VA to study and assure the resilience of supply chains, allow the VA to stockpile supplies and medicines at VA facilities, and allow longer storage and sharing of supplies among DOD, VA, IHS, and communities.

Committees of Jurisdiction: Veterans Affairs; Armed Services; Natural Resources; Energy and Commerce

Strengthen Mental Health Capabilities for Climate Resilience and Preparedness

The climate crisis is harming the mental health and well-being of individuals and communities, both through the acute impacts of climate-influenced disasters and through the chronic impacts of extreme heat, climate-related environmental changes, and associated social and economic dislocation.⁹⁷⁹ America's mental health system is already overburdened,⁹⁸⁰ and increasingly severe climate impacts will put further strain on mental health resources in the future. The ongoing COVID-19 pandemic has further revealed vulnerabilities in the nation's mental and behavioral health system.⁹⁸¹ Disasters and mass casualty events impose psychological burdens on health care workers and first responders,⁹⁸² and their economic effects can increase rates of mental health and substance use disorders.⁹⁸³ The federal government needs to better prepare for climate- and disaster-related impacts on mental health and invest in strengthening the social and mental health resilience of communities, including students and youth.

⁹⁷⁹ U.S. Global Change Research Program, *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment* (April 2016) at 218.

⁹⁸⁰ National Alliance on Mental Illness, "Mental Health By the Numbers," <https://www.nami.org/mhstats>. Accessed June 2020.

⁹⁸¹ Cheryl Platzman Weinstock, "Ripple Effects of COVID-19 Strain Mental Health Systems," *U.S. News and World Report*, June 4, 2020.

⁹⁸² Vamanjore A. Naushad et al., "A Systematic Review of the Impact of Disaster on the Mental Health of Medical Responders," *Prehospital and Disaster Medicine* 34, no. 6 (2019): 632-643.

⁹⁸³ Meadows Mental Health Policy Institute, "Projected COVID-19 MHSUD Impacts, Volume 1: Effects of COVID-Induced Economic Recession (COVID Recession)," April 28, 2020, <https://www.texasstateofmind.org/uploads/whitepapers/COVID-MHSUDImpacts.pdf>.

Building Block: Fully Integrate Mental Health into Federal Planning for the Health Impacts of Climate Change

Climate change impacts on mental health are inextricably related to the physical, economic, and social health of communities.⁹⁸⁴ Recognizing these intersections, the National Biodefense Science Board in 2014 recommended that the federal government leverage the National Health Security Strategy, issued every four years by HHS ASPR, as a mechanism to increase interagency coordination around building community health resilience.⁹⁸⁵ However, the HHS 2014 Climate Adaptation Plan addressed only a narrow range of behavioral health services for disaster response.⁹⁸⁶ HHS needs to develop and implement a comprehensive government-wide plan to address the growing mental health impacts of climate change and their intersections with the physical, economic, and social health of communities.

Recommendation: Congress should direct HHS to address mental health and community health resilience to climate change in the quadrennial National Health Security Strategy, identifying and mapping climate-related mental health impacts and addressing specific risks and barriers to the effective implementation of its mission and programs for mental health.

Committee of Jurisdiction: Energy and Commerce

Building Block: Improve Services to Address Acute Mental Health Needs During and After Disasters

Life-threatening extreme weather events, including hurricanes, floods, and wildfires, have been documented to cause acute stress and trauma for those experiencing them, leading to higher rates of depression and suicide, especially for persons with preexisting mental health conditions.⁹⁸⁷ In addition, extreme weather events disrupt access to restorative resources and social support networks, leading individuals to turn to high-risk coping behaviors, such as alcohol use, to manage disaster-related stress.⁹⁸⁸

The federal government manages several programs to support the mental and behavioral health needs of individuals and communities after disasters. The HHS Substance Abuse and Mental Health Services Administration (SAMHSA), in partnership with FEMA, operates the Crisis Counseling Assistance and Training Program, which supports utilization of community-based behavioral health and educational services to individuals and communities after disasters. For example, a recent Crisis Counseling Assistance and Training Program grant funded community-based outreach and support

⁹⁸⁴ Susan Clayton Whitmore-Williams, Christie Manning, Kirra Krygsman, and Meighen Speiser, *Mental Health and Our Changing Climate: Impacts, Implications, and Guidance* (American Psychological Association and ecoAmerica, 2017).

⁹⁸⁵ National Biodefense Science Board, *Community Health Resilience Report* (2014).

⁹⁸⁶ HHS, *HHS Climate Adaptation Plan* (2014).

⁹⁸⁷ U.S. Global Change Research Program, *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment* (April 2016) at 220.

⁹⁸⁸ Ibid. at 221.

services after the March 2020 Tennessee tornado outbreak.⁹⁸⁹ SAMHSA also operates the Disaster Distress Helpline, which provides 24/7 crisis support via phone and text message. In response to the COVID-19 pandemic, this service experienced a nearly tenfold increase in calls in April 2020 compared to usual levels.⁹⁹⁰ Despite demand for such services, funding for these SAMHSA disaster response activities has remained flat at \$1.95 million per year since 2014.

Other SAMHSA programs, including the National Suicide Prevention Lifeline and the National Child Traumatic Stress Network, also support crisis behavioral health services critical to addressing the acute mental health impacts of climate-related disasters. The SAMHSA-FEMA Disaster Technical Assistance Center provides technical assistance, including information for disaster planners, first responders, and behavioral health professionals on available crisis mental health resources for patients. However, resources for coordination and implementation of disaster behavioral health planning are limited, and the federal government does not currently fund crisis behavioral health services geared specifically toward the mental health needs of first responders.

Rep. Ami Bera (D-CA) and Sen. Jacky Rosen (D-NV) introduced the Helping Emergency Responders Overcome (HERO) Act of 2019 (H.R. 1646/S. 3244), which would provide grants for peer-support behavioral health and wellness programs within emergency medical services agencies and fire departments. In response to the COVID-19 pandemic, the HEROES Act (H.R. 6800) would, among other provisions, require SAMHSA to establish an Emergency Mental Health and Substance Use Training and Technical Assistance Center to provide assistance and support for addressing trauma, stress, and mental health needs during emergencies.⁹⁹¹

Recommendation: Congress should provide additional funding for federal crisis mental health programs, including the SAMHSA-FEMA Crisis Counseling Assistance and Training Program and Disaster Technical Assistance Center, along with the SAMHSA Disaster Distress Helpline, National Suicide Prevention Lifeline, and National Child Traumatic Stress Network, to address the surge in demand for these mental health services after climate-fueled disasters.

Recommendation: Congress should establish and fund an HHS program to provide behavioral health support to fire departments, emergency medical service agencies, and other disaster first responders.

Recommendation: Congress should direct the Mitigation Framework Leadership Group (MitFLG) to convene a working group on mental health and community resilience to identify opportunities to enhance interagency and SLTT coordination on mental health and community social and emotional resilience in the disaster context. This working group should also identify opportunities to enhance training for federal staff in Joint Field Offices who have contact with survivors to help match survivor mental health needs with resources.

Committees of Jurisdiction: Energy and Commerce; Transportation and Infrastructure

⁹⁸⁹ Tennessee Department of Mental Health & Substance Abuse Services, “TDMHSAS Receives Federal Grant for Storm Survivor Mental Health Treatment,” March 26, 2020, <https://www.tn.gov/behavioral-health/news/2020/3/26/tdmhsas-receives-federal-grant-for-storm-survivor-mental-health-treatment.html>.

⁹⁹⁰ Amanda Jackson, “A crisis mental-health hotline has seen an 891% spike in calls,” CNN, April 10, 2020.

⁹⁹¹ Division C, Title VI, Subtitle A, Sec. 30619. Emergency Mental Health and Substance Use Training and Technical Assistance Center.

Building Block: Invest in Community-Based Approaches to Increasing Mental Health Resilience in the Face of Climate Impacts, Emphasizing Disproportionately Exposed Communities

While the current clinical treatment-based approach to behavioral health is essential for treating acute mental illness and substance abuse, expanding the scope of behavioral health services beyond individual treatment and toward building mental health resilience across communities could help to blunt the impact of climate-related stress and trauma. This is particularly important for people disproportionately exposed to environmental pollution and climate impacts, who are therefore most likely to suffer the mental health impacts of climate change.⁹⁹²

Recognizing the importance of holistic community-based approaches, in 2014 Congress established the Certified Community Behavioral Health Clinics (CCBHC) demonstration program through Medicaid.⁹⁹³ CCBHCs provide integrated physical health, mental health, and substance abuse treatments, including 24/7 crisis response. In March 2020, the CARES Act extended and expanded the CCBHC demonstration program.⁹⁹⁴

Though community-based care approaches, such as CCBHCs, are an important first step, a complete response to unmet mental health needs requires extending outside of clinical settings and joining with non-clinical community partners, including clergy, teachers, community health workers, parents, and peers. A large body of research shows how such non-clinician community members can assume many tasks and skills for supportive counseling, as well as for promoting mental health and resilience, in partnership with clinicians. This “task-sharing” approach expands the reach, capacity, community ownership, and effectiveness of the mental health system.⁹⁹⁵

Recommendation: Congress should fund and direct HHS to expand community-based approaches to increasing mental health and community resilience to meet the increasing demand for direct care mental health services imposed by chronic and acute climate impacts, as well as to provide technical assistance and coaching to support local groups to adopt effective interventions through task-sharing, especially in vulnerable communities that are disproportionately exposed to climate impacts.

Committee of Jurisdiction: Energy and Commerce

Building Block: Address the Climate-Related Mental Health Impacts on Students and Youth

A child born today is expected to experience significant climate-related health impacts,⁹⁹⁶ which are compounded by the stress and anxiety effects of climate-fueled disasters that are especially

⁹⁹² Katie Hayes, G. Blashki, J. Wiseman, S. Burke, and L. Reifels. "Climate change and mental health: risks, impacts and priority actions," *Int J Ment Health Syst* 12, no. 28 (2018).

⁹⁹³ Pub L No 113-93. Sec. 223. Demonstration Programs to Improve Community Mental Health Services.

⁹⁹⁴ Pub L No 116-136. Sec. 3814. Extension and Expansion of Community Mental Health Services Demonstration Program.

⁹⁹⁵ Vikram Patel, et al., “The Lancet Commission on global mental health and sustainable development,” *Lancet* 392, no. 10157 (2018): 1553-1598.

⁹⁹⁶ Nick Watts, et al., “The 2019 Report of The Lancet Countdown on health and climate change: ensuring that the health of a child born today is not defined by a changing climate,” *The Lancet* 394, no. 10211 (2019): 1836-1878.

pronounced among young people.⁹⁹⁷ Current and anticipated climate-related environmental changes also generate measurable grief, hopelessness, and other negative mental health impairments for youth and people of all ages.⁹⁹⁸

Our nation's schools are important providers of behavioral health services to young people, including through school counselors and School-Based Health Centers, which offer primary, preventative, and mental health care to children and adolescents. The Department of Education supports school-based mental health counseling services and awareness training primarily through two grant programs: Student Support and Academic Enrichment Grants and School Safety National Activities.

HHS SAMHSA supports Project AWARE (Advancing Wellness and Resiliency in Education), which provides grants to state education agencies and nonprofit entities to increase access to school mental health services and train school personnel, emergency first responders, and others to recognize and treat mental disorders among students, such as through Mental Health First Aid.⁹⁹⁹

Rep. Grace Napolitano (D-CA) introduced the Mental Health Services for Students Act of 2019 (H.R. 1109), which would expand the scope of the Project AWARE program. Rep. Bonnie Watson Coleman (D-NJ) introduced the Pursuing Equity in Mental Health Act of 2019 (H.R. 5469), which would increase funds to address youth suicide and racial disparities in mental health.

Recommendation: Congress should increase dedicated funding for the Student Support and Academic Enrichment Grant Program, the School Safety National Activities program, School-Based Health Centers, and Project AWARE, in order to provide increased counseling and mental health services for the nation's students, including support to prepare for and respond to the trauma of climate-fueled disasters. Funding support should address the shortage of school-based counselors by funding additional mental health professional training demonstration grants through the School Safety National Activities program, along with programs to address disparities in access to mental health services.

Committees of Jurisdiction: Education and Labor; Energy and Commerce

⁹⁹⁷ Y. Neria, A. Nandi, and S. Galea, "Post-traumatic stress disorder following disasters: a systematic review," *Psychological Medicine* 38, no. 4 (2008): 467-480.

⁹⁹⁸ Ashlee Cunsolo and Neville R. Ellis, "Ecological grief as a mental health response to climate change-related loss," *Nature Climate Change* 8, (2018): 275-281.

⁹⁹⁹ National Council for Behavioral Health, "Mental Health First Aid Funding Opportunities," <https://www.mentalhealthfirstaid.org/funding-opportunities/>. Accessed June 2020.

INVEST IN AMERICAN AGRICULTURE FOR CLIMATE SOLUTIONS

American farmers and ranchers can be active partners in solving the climate crisis and are already working to improve conservation and provide valuable climate and ecosystems benefits. More than 15% of all farmland is used for conservation and wildlife habitat improvement, and soil health efforts have increased by 17% since 2012.¹⁰⁰⁰ The 2018 Farm Bill achieved important conservation victories by providing robust funding for conservation programs, starting new On-Farm Conservation Innovation Trials, and adding acreage under the Conservation Reserve Program.¹⁰⁰¹ In February 2020, the U.S. Department of Agriculture (USDA) announced an initiative to reduce the environmental footprint of U.S. agriculture by 50% by 2050, including increasing carbon sequestration.¹⁰⁰²

With more than 900 million acres of agricultural land across the country, the United States has the potential to sequester substantial amounts of carbon in agricultural soils.¹⁰⁰³ Currently, U.S. agricultural soils generally present with 1% or less soil carbon, but studies show that among farmers practicing robust soil health practices, soils present with between 3% to 6% of soil carbon, demonstrating the potential for agriculture to significantly contribute to solving the climate crisis.¹⁰⁰⁴

Today, agriculture contributes about one-tenth of total U.S. greenhouse gas emissions annually.¹⁰⁰⁵ To reduce these emissions, Congress should build upon the successes in the 2018 Farm Bill to work with farmers and ranchers to increase climate stewardship practices and agricultural carbon sequestration.

¹⁰⁰⁰ Farmers for a Sustainable Future, “Farmers for A Sustainable Future,” <https://unitedegg.com/wp-content/uploads/2019/05/FFASF-Sustainable-Flyer.pdf>. Accessed June 2020.

¹⁰⁰¹ House Agriculture Committee Democrats, *Farm Bill House & Senate Conference Report: Conservation Provisions in the 2018 Farm Bill* (2018); CRS, R45698, *Agricultural Conservation in the 2018 Farm Bill* (April 18, 2019).

¹⁰⁰² U.S. Department of Agriculture, “Press Release: Secretary Perdue Announces New Innovation Initiative for USDA” (February 20, 2020), www.usda.gov/media/press-releases/2020/02/20/secretary-perdue-announces-new-innovation-initiative-usda.

¹⁰⁰³ Testimony of Dr. Jennifer Moore-Kucera, American Farmland Trust, *Hearing on Solving the Climate Crisis: Opportunities in Agriculture*, Select Committee on the Climate Crisis, 116th Congress (October 30, 2019); Question for the Record response from Tina Owens, Senior Director of Agriculture Funding and Communication, Danone North America, *Hearing on Solving the Climate Crisis: Opportunities in Agriculture*, Select Committee on the Climate Crisis, 116th Congress (October 30, 2019).

¹⁰⁰⁴ Question for the Record Response from Tina Owens, Senior Director of Agriculture Funding and Communication, Danone North America, *Solving the Climate Crisis: Opportunities in Agriculture*, Hearing Before the House Select Committee on the Climate Crisis, 116th Congress (October 30, 2019).

¹⁰⁰⁵ U.S. Environmental Protection Agency, “Sources of Greenhouse Gas Emissions,” <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>. Accessed June 2020.

Increase Agricultural Carbon Sequestration and Resilience Through Climate Stewardship Practices

Climate stewardship practices improve soil health, which can result in higher crop yields, enhanced carbon sequestration, and soils that are more resilient to flood and drought. Such practices include no- and low-till farming, cover crops, prescribed and rotational grazing, planting perennial crops, diversified crop rotations, improved nutrient management, and agroforestry systems that integrate trees, crops, and livestock.¹⁰⁰⁶ By providing financial and technical assistance, Congress can help America's farmers and ranchers implement climate stewardship practices while increasing profitability and making their farms more resilient to the impacts of climate change.

Building Block: Prioritize and Increase Climate Mitigation and Resilience Through Conservation Title Working Lands Programs

Barriers to better agricultural soil management are primarily financial, despite the long-term benefits of soil fertility, as well as limited technical expertise and cultural challenges.¹⁰⁰⁷ The USDA's working lands programs, which provide financial and technical assistance to farmers for improved land stewardship and conservation practices, are consistently oversubscribed, and just 15% of U.S. farmland is currently under a federal conservation program.¹⁰⁰⁸ Additional funding for voluntary working lands programs is therefore critical to maximizing soil health and carbon sequestration.

The Conservation Stewardship Program (CSP) is a voluntary conservation program that encourages producers to address resource concerns in a comprehensive manner by providing annual payments for conservation activities on working lands.¹⁰⁰⁹ Through CSP, farmers and ranchers receive technical and financial assistance to implement, manage, and maintain conservation stewardship practices, such as planting cover crops, implementing rotational grazing, and establishing diversified crop rotations. The Environmental Quality Incentives Program (EQIP) is a voluntary conservation program that provides cost share and technical assistance to producers to install or implement conservation improvements and practices such as restoring pasture or implementing nutrient management plans.¹⁰¹⁰ The Regional Conservation Partnership Program (RCPP) promotes coordination of USDA's Natural Resources Conservation Service (NRCS) conservation activities by co-investing with partners

¹⁰⁰⁶ See generally U.S. Department of Agriculture, *USDA Building Blocks for Climate-Smart Agriculture and Forestry: Implementation Plan and Progress Report* (May 2016); USDA, "Soil Health," <https://www.farmers.gov/conserve/soil-health>. Accessed June 2020; U.S. Department of Agriculture NRCS, "Healthy Soil," <https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/organic/?cid=nrcseprd1363633>. Accessed June 2020.

¹⁰⁰⁷ Alexander Rudee & James Mulligan, *Federal Policy Options for a Carbonshot in Natural & Working Lands* (The World Resources Institute, 2019): 39.

¹⁰⁰⁸ American Farm Bureau Federation, "More than 140 Million Acres in Federal Farm Conservation Programs" (May 8, 2019), <https://www.fb.org/market-intel/more-than-140-million-acres-in-federal-farm-conservation-programs>; Testimony for the Record of the Environmental Working Group, *Public Hearing RE: The Next Farm Bill: Conservation Policy*, Hearing Before the House Agriculture Committee, Subcommittee on Conservation and Forestry, 115th Congress (February 28, 2017).

¹⁰⁰⁹ U.S. Department of Agriculture NRCS, "Conservation Stewardship Program—Payment for Performance," www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/programs/financial/csp/?cid=nrcs143_008316. Accessed June 2020.

¹⁰¹⁰ U.S. Department of Agriculture NRCS, "Environmental Quality Incentives Program," <https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/eqip/>. Accessed June 2020.

to implement projects that demonstrate innovative solutions to conservation challenges.¹⁰¹¹ Through RCPP, NRCS partners with state and local agencies and non-governmental organizations to provide financial and technical assistance for farmers to address natural resource concerns and implement conservation activities.

Several members of Congress have proposed legislation to increase and expand conservation title working lands programs for climate mitigation and adaptation. Rep. Deb Haaland (D-NM) and Sen. Cory Booker (D-NJ) introduced H.R. 4269/S. 2452, the Climate Stewardship Act of 2019, to increase funding for these programs. The bill would increase mandatory funding for CSP and EQIP each to \$7 billion per year and dedicate new funding for a set of “climate stewardship practices.” Those practices include planting cover crops, using less nitrogen fertilizer, rotating crops, low- and no-till farming, and prescribed grazing for livestock. The legislation would also increase funding for RCPP. Rep. Chellie Pingree (D-ME) introduced H.R. 5861, the Agriculture Resilience Act, which would also boost funding for and expand EQIP and CSP. The Agriculture Resilience Act adds climate mitigation and adaption to EQIP’s program purpose, makes climate mitigation and adaptation practices eligible for EQIP incentive contracts, and increases funding for Conservation Innovation Grants. Rep. Joe Neguse (D-CO) introduced H.R. 7264, the 21st Century Conservation Corps for Our Health and Our Jobs Act, which would provide an additional \$5.5 billion in funding for RCPP. Finally, Reps. Julia Brownley (D-CA) and Chellie Pingree (D-ME) introduced H.R. 6023, the Cultivating Organic Matter through the Promotion of Sustainable Techniques (COMPOST) Act, which would add composting as a conservation practice for USDA conservation programs.

Rep. Cheri Bustos (D-IL) developed a Rural Green Partnership Framework, which calls for increasing funding for conservation programs and making more acres available for federal assistance in order to incentivize adoption and maintenance of conservation management farming practices that maximize soil carbon sequestration.¹⁰¹²

Recommendation: Congress should dramatically increase funding for climate-smart agricultural activities in working lands programs, including EQIP, CSP, and RCPP, to maximize climate mitigation and resilience potential on farms and ranches. In addition, Congress should (1) add climate adaptation and mitigation to EQIP, CSP, and RCPP’s program purposes; (2) make practices that increase carbon sequestration or reduce greenhouse gas emissions eligible for EQIP’s conservation incentive contracts; (3) increase funding for Conservation Innovation Grants and add practices that reduce emissions and sequester carbon as a research priority; (4) increase funding for On-Farm Conservation Innovation Trials and add climate-smart agriculture as an acceptable innovative conservation approach; (5) restore the option for automatic contract renewals under CSP, provided that previous contract commitments are kept and continual improvements are made, in order to allow farmers to seamlessly continue sequestering carbon and implementing climate stewardship practices; (6) increase the beginning and socially disadvantaged farmer and rancher set-aside in EQIP and CSP; (7) direct USDA to reduce administrative barriers to signing up for conservation programs, including simplifying contracts, increasing administrative support for farmers and ranchers, and creating a comprehensive website to allow farmers to more easily access the wide range of incentives

¹⁰¹¹ U.S. Department of Agriculture NRCS, “Regional Conservation Partnership Program,” <https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/rcpp/>. Accessed June 2020.

¹⁰¹² Office of Congresswoman Cheri Bustos, The Rural Green Partnership Framework (August 2019), <https://bustos.house.gov/wp-content/uploads/2019/08/Rural-Green-Partnership-1.pdf>.

for the promotion of climate stewardship practices; and (8) increase staffing in USDA field offices proportionally to meet the needs of farmers and ranchers.

Committee of Jurisdiction: Agriculture

Building Block: Improve Agricultural Land Conservation and Climate Mitigation and Resilience Through Retirement and Easement Programs

Protecting farmland from conversion to nonagricultural land prevents greenhouse gas emissions associated with urban development and reduces the need to convert undisturbed natural areas to new cropland. Avoiding conversion of forests, grasslands, and wetlands to cropland allows those ecosystems to continue capturing and storing carbon and averts release of carbon already sequestered in roots and soils.¹⁰¹³ Slowing the rate of farmland loss reduces the pressure to cultivate sensitive working lands with high ecological value and marginal lands that have the potential to be reforested, retired, or returned to natural landscapes. Removing land from crop production also reduces or eliminates tillage, nitrogen fertilization, and energy use, resulting in a climate benefit.¹⁰¹⁴

The Conservation Reserve Program (CRP) is a land conservation program that pays farmers a yearly rental payment to remove environmentally sensitive land from production and plant long-term resource-conserving vegetative species, such as approved grasses or trees, to improve air and water quality, increase soil health, and enhance wildlife habitat.¹⁰¹⁵ Most contracts for land enrolled in CRP are 10-15 years in length.¹⁰¹⁶ The Conservation Reserve Enhancement Program (CREP) is a part of CRP that targets specific state or nationally significant conservation concerns, and federal funds are supplemented with nonfederal funds to address those concerns.¹⁰¹⁷

The Agricultural Conservation Easement Program (ACEP) helps landowners, land trusts, and other entities protect, restore, and enhance wetlands, grasslands, and working lands through conservation and agricultural easements.¹⁰¹⁸ The Agricultural Land Easement program is one component of ACEP and is used to protect agricultural lands from development, thus maintaining conservation and agricultural use of the land permanently.¹⁰¹⁹ Because CRP is limited in the number of acres it can enroll, transitioning expiring CRP acres into easements frees up CRP acres, allowing CRP to enroll additional acres with high climate mitigation benefits.¹⁰²⁰

¹⁰¹³ Joseph Fargione, et al., *Natural climate solutions for the United States* (Science Advances, November 14, 2018): 3.

¹⁰¹⁴ U.S. Department of Agriculture, *USDA Building Blocks for Climate-Smart Agriculture and Forestry: Implementation Plan and Progress Report* (May 2016): 24.

¹⁰¹⁵ U.S. Department of Agriculture FSA, “Conservation Reserve Program,” <https://www.fsa.usda.gov/programs-and-services/conservation-programs/conservation-reserve-program/>. Accessed June 2020.

¹⁰¹⁶ Ibid.

¹⁰¹⁷ U.S. Department of Agriculture FSA, “Conservation Reserve Enhancement Program,” <https://www.fsa.usda.gov/programs-and-services/conservation-programs/conservation-reserve-enhancement/index>. Accessed June 2020.

¹⁰¹⁸ U.S. Department of Agriculture NRCS, “Agricultural Conservation Easement Program,” <https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/acep/>. Accessed June 2020.

¹⁰¹⁹ Ibid.

¹⁰²⁰ U.S. Department of Agriculture, *USDA Building Blocks for Climate-Smart Agriculture and Forestry: Implementation Plan and Progress Report* (May 2016): 25.

The Healthy Forests Reserve Program (HFRP) is an NRCS program that helps landowners restore, enhance, and protect forests on private lands through easements and financial assistance. The program provides landowners with 10-year restoration agreements or 30-year or permanent easements for specific conservation actions.¹⁰²¹ By restoring and protecting forests, HFRP increases wildlife habitat, improves plant and animal biodiversity, and enhances carbon sequestration.¹⁰²²

The section of this report titled “Reduce Climate Disaster Risks and Costs” describes the Emergency Watershed Protection Program Floodplain Easements Option, which helps landowners address flooding hazards on agricultural lands.

To maximize the climate benefits of easement and retirement programs, Rep. Deb Haaland (D-NM) and Sen. Cory Booker (D-NJ) introduced H.R. 4269/S. 2452, the Climate Stewardship Act of 2019, which would increase the number of acres enrolled in CRP and focus new enrollments on less productive and environmentally important farmland. It would also double funding for ACEP from \$450 million to \$900 million per year. Rep. Chellie Pingree (D-ME) introduced H.R. 5861, the Agriculture Resilience Act, which would also increase funding for ACEP and require ACEP participants to complete a conservation plan, with the option of automatic enrollment in CSP to cover the costs of the conservation plan and place responsibility of any conservation plan monitoring with USDA.

Recommendation: Congress should significantly increase the acreage enrolled in CRP and funding for ACEP and HFRP and direct USDA to consider long-term carbon sequestration, climate adaptation, and biodiversity benefits when administering these programs. Additionally, to expand and improve CRP and ACEP, Congress should (1) require ACEP participants to complete and maintain a conservation plan, including climate benefits, with the option of automatic enrollment in a conservation working lands program such as CSP or EQIP to cover the costs of the conservation plan; (2) prioritize ACEP applications for land coming out of other conservation programs; (3) increase CRP rental rates and incentives; (4) significantly increase the number of acres enrolled through CRP and focus on enrolling more acres devoted to climate-smart conservation practices through CREP and the continuous category of CRP; (5) allow farmers to enroll marginal lands through longer term or permanent CRP contracts or easements; and (6) direct USDA to target areas at risk of conversion to nonagricultural uses – including land retired for the purposes of improving sustainability of groundwater basins – as well as flood-prone lands, peatlands, or other areas where climate benefits are substantial.

Committee of Jurisdiction: Agriculture

Building Block: Establish Climate Mitigation Bundles Within the Conservation Stewardship Program to Increase Climate Stewardship Practices

CSP provides financial and technical assistance to farmers to implement or improve practices that enhance conservation, which can reduce greenhouse gas emissions and increase carbon

¹⁰²¹ U.S. Department of Agriculture NRCS, “Healthy Forests Reserve Program,” <https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/forests/>. Accessed June 2020.

¹⁰²² Ibid.

sequestration.¹⁰²³ Farmers can consider “bundles” of activities that complement each other to maximize conservation benefits.¹⁰²⁴ Utilizing bundles makes a CSP applicant more competitive and will generally result in higher payments.¹⁰²⁵

Recommendation: Congress should direct NRCS to establish region-specific climate change mitigation bundles within CSP. These bundles should include practices that reduce agricultural greenhouse gas emissions, such as improved nutrient management, and practices that increase carbon sequestration, such as using cover crops, reduced tillage, and diverse crop rotations.

Committee of Jurisdiction: Agriculture

Building Block: Increase Financial and Technical Support for Agroforestry Through Regional Agroforestry Centers

Agroforestry systems have the potential to sequester significant amounts of carbon. “Silvopasture,” the incorporation of trees in pasture, and “alley cropping,” the practice of planting rows of trees with rows of crops, are particularly effective at increasing the amount of carbon stored in roots and soils. Integrating trees into pasture and cropland has the potential to sequester almost 150 million metric tons of carbon dioxide per year, in addition to providing numerous co-benefits such as providing shade for livestock, improving soil health and water quality, and adding revenue streams for farmers.¹⁰²⁶

Rep. Chellie Pingree (D-ME) introduced H.R. 5861, the Agriculture Resilience Act, which would authorize regional agroforestry centers to complement the national agroforestry center with an emphasis on soil health and climate change.

Recommendation: Congress should establish regional agroforestry centers to conduct research, train extension agents, and provide assistance to agroforestry producers. Congress should also establish a grant program or expand EQIP funding to provide more robust financial assistance to farmers transitioning to agroforestry.

Committee of Jurisdiction: Agriculture

¹⁰²³ U.S. Department of Agriculture NRCS, “Conservation Stewardship Program – Payment for Performance,” https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/programs/financial/csp/?cid=nrcs143_008316. Accessed June 2020.

¹⁰²⁴ U.S. Department of Agriculture NRCS, “CSP Enhancements and Bundles,” <https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/programs/financial/csp/?cid=nrcseprd1288624>. Accessed June 2020.

¹⁰²⁵ Ibid.

¹⁰²⁶ Rudee & James, et al., *Federal Policy Options for a “Carbonshot” in Natural & Working Lands* (The World Resources Institute, 2020): 19.

Building Block: Set National Climate Stewardship Practice Goals on All U.S. Cropland

Providing technical and financial assistance will encourage farmers and ranchers to implement climate stewardship practices, but setting specific goals, as Secretary Vilsack did during the Obama administration in the Building Blocks for Climate-Smart Agriculture and Forestry,¹⁰²⁷ will allow USDA to measure, quantify, and assess the adoption of conservation practices and climate change mitigation and adaptation efforts in the agricultural sector.

Rep. Chellie Pingree (D-ME) introduced H.R. 5861, the Agriculture Resilience Act, which would set national goals to adopt soil health and farmland preservation practices, restore lost soil carbon, and reduce farmland and grassland conversion. This legislation also would direct USDA to develop a plan to achieve these goals.

The Agriculture Resilience Act sets goals to (1) expand adoption of soil health practices (including diverse crop rotations, cover cropping, conservation tillage, perennialization of highly erodible land, agroforestry, composting, biologically based nutrient management, and advanced grazing management, including silvopasture) sufficiently to restore at least a quarter of the soil carbon that has been lost in the last 300 years by not later than 2030 and at least half of lost soil carbon by not later than 2040; (2) increase cover crop acres in the United States to at least 25% of crop acres by not later than 2030 and at least 50% by not later than 2040, with at least 50% of cropland acres covered by crops, cover crops, or residue year-round by not later than 2030, rising to at least 75% by not later than 2040; (3) reduce the rate of conversion in the United States of agricultural land to development, as well as the rate of grassland conversion to cropping, by at least 80% by not later than 2030, and eliminated by not later than 2040; (4) establish advanced grazing management, including management-intensive rotational grazing, on at least 50% of all grazing lands by not later than 2030 and 100% of all grazing land by not later than 2040; and (5) re-integrate livestock and crop production systems at farm, local, and regional levels and increase acreage on individual farms under crop-livestock integrated management by at least 50% over 2017 levels by not later than 2030 and by 100% over 2017 levels by not later than 2040.

Recommendation: Congress should set national climate stewardship practice goals and direct USDA to update these goals at least every four years to restore and maximize soil carbon in working lands.

Committee of Jurisdiction: Agriculture

Building Block: Improve Conservation Compliance Enforcement to Prevent Soil Erosion As Well As Grassland and Wetland Conversion to Cropland

In order to participate in most programs administered by the Farm Service Agency (FSA) and NRCS, agricultural producers must comply with certain conservation requirements on land that is highly erodible or that is considered a wetland, collectively called “Conservation Compliance.”¹⁰²⁸ The “swampbuster” provision prohibits producers from planting or producing an agricultural commodity

¹⁰²⁷ See generally U.S. Department of Agriculture, *USDA Building Blocks for Climate-Smart Agriculture and Forestry: Implementation Plan and Progress Report* (May 2016).

¹⁰²⁸ U.S. Department of Agriculture FSA, “Conservation Compliance,” https://www.fsa.usda.gov/programs-and-services/payment-eligibility/conservation_compliance/index. Accessed June 2020.

on a converted wetland or converting a wetland to make it possible to plant an agricultural commodity. The “sodbuster” provision prohibits producers from planting or producing an agricultural commodity on highly erodible land without following an NRCS approved conservation plan or system. The “sodsaver” provision disincentivizes producers from planting crops on native sod and grasses that have not previously been tilled. Producers who fail to comply with these requirements could become ineligible for certain federal farm program benefits such as FSA loans, NRCS conservation program benefits, and federal crop insurance premium subsidies.¹⁰²⁹

A 2003 Government Accountability Office (GAO) audit found that many NRCS field offices were not implementing Conservation Compliance as required by law due to a lack of staff, prioritization, or comfort with their enforcement role.¹⁰³⁰ The report also noted NRCS’s weak oversight of field offices as an obstacle to adequate Conservation Compliance implementation as well as inappropriate FSA waivers for noncompliance determinations.¹⁰³¹

Currently, the sodsaver provision only applies to the six states of the Prairie Pothole Region: Iowa, Minnesota, Montana, Nebraska, North Dakota, and South Dakota. States such as Texas and Kansas, however, are currently experiencing some of the highest rates of grassland loss.¹⁰³²

In the 115th Congress, Rep. Kristi Noem (R-SD) and Sen. John Thune (R-SD) introduced H.R. 3939/S. 1913, the American Prairie Conservation Act, which would expand the sodsaver provision to the rest of the country. The legislation would also strengthen the sodsaver provision by requiring more accurate tracking and reporting on grassland loss.¹⁰³³ In the 116th Congress, Rep. Chellie Pingree (D-ME) introduced H.R. 5861, the Agriculture Resilience Act, which would expand Conservation Compliance to add soil health plans to the existing Conservation Compliance regime and apply that new component to all cropland.

Recommendation: Congress should improve enforcement of Conservation Compliance provisions and processing of reported violations by increasing NRCS and FSA staff to allow for enhanced compliance enforcement and monitoring as well as faster processing of reported violations.

Recommendation: Congress should provide additional financial and technical assistance for restoring native grasses and wetlands and expand the sodsaver policy nationwide.

Committee of Jurisdiction: Agriculture

¹⁰²⁹ U.S. Department of Agriculture NRCS, “Conservation Compliance,”

<https://www.nrcs.usda.gov/wps/portal/nrcs/detail/?cid=stelprdb1270039>. Accessed June 2020.

¹⁰³⁰ Government Accountability Office, GAO-03-418, *USDA Needs to Better Ensure Protection of Highly Erodible Cropland and Wetlands* (April 21, 2003): 5, 22.

¹⁰³¹ Ibid at 6, 26.

¹⁰³² Tyler J. Lark, et al., *Cropland expansion outpaces agricultural and biofuel policies in the United States*, (Environmental Research Letters, 2015); National Sustainable Agriculture Coalition, “To Protect Native Grasslands, Sodsaver Provision must be Strengthened,” (July 15, 2016), <https://sustainableagriculture.net/blog/sodsaver-nsac-comments/>.

¹⁰³³ H.R. 3939 and S. 1913, American Prairie Conservation Act, 115th Congress, <https://www.congress.gov/bill/115th-congress/house-bill/3939> and <https://www.congress.gov/bill/115th-congress/senate-bill/1913>.

Building Block: Measure, Quantify, Evaluate, and Report on the Impact of Conservation Programs and Practices on Carbon Sequestration, Soil Health, and Greenhouse Gas Reductions

The USDA COMET-Farm tool estimates greenhouse gas emissions and sinks on farms using data submitted by farmers about their land and management as well as spatially specific information from geospatial databases on climate and soil conditions. Improved measurement and quantification of conservation programs and practices on carbon sequestration and greenhouse gas emissions reductions will allow USDA to evaluate and utilize that data for potential participation in carbon and environmental markets. It will also create the potential for producer performance-based payments and financial incentives founded on evidence-based carbon sequestration, soil health, and greenhouse gas reduction outcomes. Additionally, tracking the effectiveness of specific practices will allow USDA to prioritize those practices within existing conservation programs.

Rep. Chellie Pingree introduced H.R. 5861, the Agriculture Resilience Act, which would direct the Treasury Department and USDA to study the feasibility of developing a federal income tax credit to incentivize soil carbon capture on farms and ranches, including methods for measuring carbon sequestered or abated on a farm or ranch.

Recommendation: Congress should increase funding for R&D initiatives to develop cost-effective, scalable methods to measure and quantify carbon sequestration and greenhouse gas reduction on farms and ranches. This legislation should also (1) direct USDA to increase funding for Soil Health Demonstration Trials, which provide funding for farmers to adopt innovative conservation practices that improve soil health and soil carbon and evaluate the impacts of practice implementation; (2) encourage cooperative agreements and data sharing between farmers and federal, state, and local agencies, land-grant universities, private and nonprofit institutions, agricultural cooperatives, agricultural retailers, and conservation organizations to coordinate and support the implementation of measuring, quantifying, evaluating, and reporting levels of carbon sequestration and greenhouse gas emission reductions on farms; and (3) direct the Department of Treasury, in coordination with USDA, to study the feasibility of developing a federal tax credit to incentivize carbon sequestration and abatement on farms.

Committees of Jurisdiction: Agriculture; Ways and Means

Building Block: Support Organic Agriculture

All types of agricultural producers can practice good climate stewardship, and farming organically is one of the many options for farmers and ranchers who want to improve soil health. Additionally, providing a variety of market options can help keep farmers competitive and on the land. Organic agriculture focuses on building soil health and does not rely on certain energy-intensive chemical inputs, thereby increasing carbon storage and reducing greenhouse gas emissions.¹⁰³⁴

Rep. Chellie Pingree (D-ME) introduced H.R. 5861, the Agriculture Resilience Act, which would increase the maximum annual cost-share payment for organic certifications to \$1,000 per organic producer or handler.

¹⁰³⁴ U.S. Department of Agriculture SARE, “What is Organic Farming?,” <https://www.sare.org/Learning-Center/Bulletins/Transitioning-to-Organic-Production/Text-Version/What-is-Organic-Farming>. Accessed June 2020.

Recommendation: Congress should increase support for organic agriculture and incentivize climate stewardship practices by organic producers. This legislation should include (1) a national organic agriculture transition program, including farmer-to-farmer mentorship opportunities, financial and technical assistance, and initiatives for beginning and socially disadvantaged farmers; (2) increased funding for the National Organic Program; (3) a land-link program to connect retiring organic landowners with young, beginning, and socially disadvantaged farmers who are seeking organic land but cannot afford it; (4) expansion of NRCS, extension programs, and key partner technical assistance to provide support to existing organic producers and farmers to increase climate-smart agricultural practices; (5) increased cost-share payments and mandatory funding levels for FSA's National Organic Certification Cost Share Program, which provides cost-share assistance to producers who are obtaining or renewing their certification under the National Organic Program; (6) codification of the Organic Livestock and Poultry Production rule, which implements organic animal welfare standards and was repealed by the Trump administration; and (7) increased federal organic-to-institution procurement.

Committee of Jurisdiction: Agriculture

Building Block: Invest in Sustainable Climate-Smart Management on Private Forests

Forests are effective carbon sinks and are responsible for more than 90% of land sector sequestration in the United States.¹⁰³⁵ Preserving and sustainably managing existing forests mitigates climate change by increasing carbon sequestration in trees, roots, and soils and reducing greenhouse gas emissions from land conversion. Private forests, which make up half of the forested land in the United States, can play an important role in sequestering and storing carbon and providing more climate-adapted ecosystems.¹⁰³⁶ Private forests, however, are increasingly at risk of being converted to non-forest lands.¹⁰³⁷

HFRP helps landowners restore, enhance, and protect forestland resources on private lands through voluntary easements and financial assistance. The program provides landowners with 10-year restoration agreements and 30-year or permanent easements for specific conservation actions. The objectives of HFRP are to promote the recovery of endangered and threatened species; improve plant and animal biodiversity; and enhance carbon sequestration.¹⁰³⁸

The section of this report titled “Capture the Full Potential of Natural Climate Solutions” offers additional recommendations for conserving and managing private and public forests.

Recommendation: Congress should provide robust funding for HFRP and allow restored land to be eligible for long-term or permanent easements. Additionally, Congress should expand support within conservation programs, such as EQIP, CSP, and RCPP, to incentivize landowners to increase tree-

¹⁰³⁵ Todd A. Ontl, et al., *Forest Management for Carbon Sequestration and Climate Adaptation* (Journal of Forestry, January 2020): 86; U.S. Environmental Protection Agency, EPA 430-R-16-002, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 – 2014* (April 15, 2016): ES-20; Joseph E. Fargione, *Natural climate solutions for the United States* (Science Advances, November 14, 2018): 1-3.

¹⁰³⁶ U.S. Forest Service, NRS-INF-31-15, *Who Owns America’s Trees, Woods, and Forests?* (March 2015): 3.

¹⁰³⁷ U.S. Forest Service, “Private Forestland Stewardship,” <https://www.fs.usda.gov/ccrc/topics/forest-stewardship>. Accessed June 2020.

¹⁰³⁸ U.S. Department of Agriculture NRCS, “Healthy Forests Reserve Program,”

<https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/forests/>. Accessed June 2020.

planting and restoration on both agricultural and non-agricultural land and employ riparian forest buffers, windbreaks, and other forestry practices that would increase carbon sequestration and resilience to the impacts of climate change. Congress should also increase NRCS and FSA staff and funding for states to hire additional foresters to improve climate stewardship practices on private forested land.

Committee of Jurisdiction: Agriculture

Building Block: Revise NRCS Conservation Practice Standards to Increase Consideration of Climate Mitigation and Resilience

Conservation practice standards are found in Field Office Technical Guides, which provide region-specific technical information about the conservation of soil, water, air, and related plant and animal resources.¹⁰³⁹ NRCS Conservation Practice Standards define a conservation practice, where it applies, and requirements for installing the practice. Considering climate mitigation within applicable Conservation Practice Standards will enhance climate benefits from conservation practices.

Recommendation: Congress should direct NRCS to revise Conservation Practice Standards to include consideration of climate benefits within any relevant Conservation Practice Standard.

Committee of Jurisdiction: Agriculture

Building Block: Support State Soil Health Initiatives to Increase Adoption of Climate Stewardship Practices

States are finding new and innovative ways to help farmers improve soil health and carbon sequestration, reduce greenhouse gas emissions, and make farms more resilient to extreme and unpredictable weather. For example, California's Healthy Soils Program has been successful in helping farmers increase carbon sequestration,¹⁰⁴⁰ and Iowa's crop insurance for cover crop initiative has provided farmers with financial benefits for planting cover crops.¹⁰⁴¹

Rep. Chellie Pingree (D-ME) introduced H.R. 5861, the Agriculture Resilience Act, which would establish a state soil health grant program to provide states and tribal governments with funding for soil health and carbon sequestration programs.

Recommendation: Congress should direct USDA to establish partnerships with state and local governments and provide funding and support to state departments of agriculture for climate stewardship programs. Congress should also establish a state soil health grant program to provide states and tribes with funding for soil carbon sequestration programs.

Committee of Jurisdiction: Agriculture

¹⁰³⁹ U.S. Department of Agriculture NRCS, "National Conservation Practice Standards," <https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/cp/ncps/>. Accessed June 2020.

¹⁰⁴⁰ California Department of Food and Agriculture, "Healthy Soils Program," <https://www.cdfa.ca.gov/oefi/healthysolids/>. Accessed June 2020.

¹⁰⁴¹ Iowa Department of Agriculture, "Crop Insurance Discount Available for Farmers who Plant Cover Crops" (September 30, 2019), <https://iowaagriculture.gov/news/crop-insurance-discounts-available-farmers-who-plant-cover-crops>.

Building Block: Provide Incentives for Farmers Leasing Land to Invest in Soil Health and Climate Stewardship Practices

Many farmers lease all or parts of their land.¹⁰⁴² Leasing is a good option for farmers who are looking to start or expand their operation without coming up with the upfront capital required for a down payment. However, when farmers operate on leased land, they may not necessarily enjoy many of the long-term benefits and incentives for building soil health.

Recommendation: Congress should establish a grant program for state and local governments to develop and implement a strategy to increase climate stewardship practices on land leased by farmers and owned by non-operator landowners within their communities. This legislation should also direct USDA to develop federal incentives for longer-term leasing contracts and climate stewardship practices on leased land, such as preferred USDA loan rates on infrastructure and equipment for farmers who plant cover crop or practice reduced-till farming.

Committee of Jurisdiction: Agriculture

Building Block: Provide Lending, Credit, and Land Valuation Incentives for Improving and Maintaining Soil Health and Carbon Sequestration

Conservation management can produce cost savings, and in some cases, increase yield and make farms more resilient to impacts of climate change. Yet, crop insurers, lenders, and landowners may ignore the financial value of conservation. Many farm operations run on credit – farmers bring in revenue when they sell their crop but must borrow to finance the upfront costs to produce the crop.¹⁰⁴³ When making lending decisions, agricultural lenders should consider conservation and soil health practices.

Recommendation: Congress should incentivize data collection to demonstrate the reduced risk and profitability benefits of conservation practices. Lenders can create products that are more favorable to farmers reducing their risk through soil health. Additionally, Congress should direct USDA to investigate how FSA lending could offer programs providing more favorable credit to farmers and ranchers using climate-smart agricultural practices recognized by NRCS without providing a disadvantage to farmers in different regions and with different incomes. For example, USDA should increase support and funding for local conservation districts that loan equipment at no cost to farmers who want to implement climate stewardship practices but cannot afford the upfront costs for the necessary infrastructure and equipment.

Committee of Jurisdiction: Agriculture

¹⁰⁴² U.S. Department of Agriculture ERS, “Farmland Ownership and Tenure,” <https://www.ers.usda.gov/topics/farm-economy/land-use-land-value-tenure/farmland-ownership-and-tenure/>. Accessed June 2020.

¹⁰⁴³ Maggie Monast, et. al., *Farm Finance and Conservation: How stewardship generates value for farmers, lenders, insurers and landowners* (Environmental Defense Fund & K Coe Isom, 2018): 41.

Building Block: Create a “Climate-Based Producer” Certification to Create New Markets and Incentives to Adopt Climate Stewardship Practices

Creating a new mechanism to develop markets and certain government program benefits available to farmers who meet a “climate-based producer” certification could help drive and maintain widespread adoption of climate stewardship practices. “Climate-based producers” would implement certain practices from a list of options specified by USDA that reduce agricultural greenhouse gas emissions or increase carbon sequestration.

Many private companies, including food and beverage companies, have expressed interest in reducing emissions from their supply chains.¹⁰⁴⁴ As more companies set carbon reduction and neutrality goals, a standardized certification requiring producers to commit to specific climate stewardship practices may be helpful. Determining whether farmers meet the certification standard could be either performance-based, by building on tools such as COMET-Farm, or practice-based.

Recommendation: Congress should establish a new mechanism, such as a “climate-based producer” certification, to provide markets and incentives for improved climate stewardship. This legislation should empower USDA, in consultation with the Food and Drug Administration (FDA) and the U.S. Environmental Protection Agency (EPA), to (1) convene a federal advisory committee to bring together companies, farmers, nonprofits, and other key stakeholders to standardize meaningful climate-smart management systems and processes throughout the supply chain; (2) provide auditing and certification services through USDA’s Agricultural Marketing Service (AMS) and allow USDA-accredited organic certifying agencies to also serve as the certifiers for the climate-based producer program in order to facilitate the participation of certified organic operations; (3) provide technical assistance and cost-sharing through grants or loans to farmers and suppliers interested in transitioning practices to meet the new standard; and (4) waive climate-based certification costs for agricultural producers that have already paid the costs associated with organic certification. Government benefits could include: (1) preferred loan rates on purchases for land, infrastructure, and equipment; (2) crop insurance discounts; and (3) preference for federal procurement contracts.

Committee of Jurisdiction: Agriculture

Building Block: Incentivize Climate Stewardship Practices Through Crop Insurance

GAO has identified the Federal Crop Insurance Program (FCIP) as one way the federal government is exposed to climate change risks.¹⁰⁴⁵ To improve FCIP, GAO recommends that the federal government incentivize farmers to implement climate stewardship practices and empower them to adapt to the risks they face as a result of a changing climate.¹⁰⁴⁶ With approximately 90% of cropland covered by crop insurance, using the existing infrastructure of crop insurance could dramatically increase the number of farmers adopting climate stewardship practices.¹⁰⁴⁷ The federal government should reward

¹⁰⁴⁴ Aashna Aggarwal, et. al., *Achieving the Mid-Century Strategy Goals for Deep Decarbonization in Agriculture and Forestry* (Duke Nicholas Institute for Environmental Policy Solutions, July 2018): 24.

¹⁰⁴⁵ Government Accountability Office, GAO-19-157SP, *Limiting the Federal Government’s Fiscal Exposure by Better Climate Change Risks* (March 2019): 111-13.

¹⁰⁴⁶ Ibid.

¹⁰⁴⁷ Aashna Aggarwal, et. al., *Achieving the Mid-Century Strategy Goals for Deep Decarbonization in Agriculture and Forestry* (Duke Nicholas Institute for Environmental Policy Solutions, July 2018): 26.

farmers who proactively address climate change risks and implement practices that both reduce agriculture's impact on climate change and make farms more resilient – and therefore less vulnerable to risk – as temperatures warm.

Rep. Chellie Pingree (D-ME) introduced H.R. 5861, the Agriculture Resilience Act, which would authorize USDA's Risk Management Agency (RMA) to offer incentives for conservation practices and risk reduction-based premium discounts for producers who use risk-reduction farming practices, such as cover crops and resource-conserving crop rotations.

Recommendation: Congress should incentivize farmers through the crop insurance program to increase adoption of climate stewardship practices, including (1) crop insurance discounts for farmers who use risk-reducing farming practices, such as cover crops, diversified crop rotations, reduced tillage, and other proven climate stewardship practices, similar to Iowa's crop insurance premium reduction for cover crop program;¹⁰⁴⁸ (2) more USDA staff resources to work with farmers to increase enrollment in Whole Farm Revenue Protection and with insurance providers to ensure they understand and promote the product; (3) higher incentives for Whole Farm insurance in order to incentivize crop diversification; (4) adjusted federal crop insurance rates to incorporate and consider the impacts climate stewardship practices have on crop yields and resilience to extreme weather; (5) crop insurance adjustments to address new challenges farmers and ranchers will face as a result of climate change, such as smoke taint; (6) incentives for data collection on different conservation practices to be able to create actuarial sound crop insurance policies that incorporate a suite of practices in different regions across the country; and (7) direction to USDA to align conservation practices between NRCS programs and crop insurance programs to ensure that crop insurance does not disincentivize climate stewardship practices, such as cover crops.

Committee of Jurisdiction: Agriculture

Building Block: Enhance the Watershed and Flood Prevention Program

The NRCS Watershed Protection and Flood Prevention Program provides technical and financial assistance to states, local governments, and tribes for watershed projects to address flooding, erosion, water quality protection and improvement, recreation, ground water recharge, municipal and rural water supplies, and wildlife habitat. As a result of these partnerships, more than 2,000 watershed projects have been constructed, delivering more than \$2 billion in average annual benefits and helping communities across the country.¹⁰⁴⁹ This program is consistently oversubscribed. NRCS estimates that there is a need for more than \$1.4 billion in funding for watershed projects across the nation.¹⁰⁵⁰

¹⁰⁴⁸ Iowa Department of Agriculture & Land Stewardship, "Crop Insurance Discount Available for Farmers who Plant Cover Crops" (September 30, 2019), <https://iowaagriculture.gov/news/crop-insurance-discounts-available-farmers-who-plant-cover-crops>.

¹⁰⁴⁹ U.S. Department of Agriculture NRCS "Press Release: USDA Invests in \$650,000 in Local Watershed Project to Protect Communities and Vital Infrastructure" (October 4, 2018), <https://www.nrcs.usda.gov/wps/portal/nrcs/detail/ca/newsroom/releases/?cid=nrcseprd1423295>.

¹⁰⁵⁰ U.S. Department of Agriculture NRCS, "Report to Congress: USDA-NRCS Watershed Protection and Flood Prevention Program Multi-Year Plan" (December 2015), <http://www.watershedcoalition.org/wp-content/uploads/2016/02/Watershed-Protection-and-Flood-Prevention-Program-Multi-Year-Plan-2-22-16.compressed.pdf>.

Recommendation: Congress should increase funding to the Watershed Protection and Flood Prevention Program to help states, local governments, tribes, and territories overcome barriers to watershed-scale resilience planning and collaboration to address flood, drought, and erosion risks.

Committee of Jurisdiction: Agriculture

Reduce Agricultural Emissions

Agriculture contributes approximately 10% of total U.S. greenhouse gas emissions, primarily in the form of nitrous oxide from soil management practices for crop production and methane from the livestock digestive process and manure management.¹⁰⁵¹ Climate stewardship practices, such as rotational grazing and improved nutrient management, provide significant opportunities for agricultural producers to reduce emissions from their farming or ranching operations.

Building Block: Reduce Nitrous Oxide Emissions From Synthetic Fertilizer While Increasing Cost Savings to Farmers

Certain management practices on agriculture soils, such as the application of fertilizers, can lead to nitrous oxide emissions, accounting for almost half of all greenhouse gas emissions from the agricultural sector.¹⁰⁵² Improved nutrient management can reduce nitrous oxide emissions from fertilizer application and fossil fuel emissions associated with fertilizer production.¹⁰⁵³ Efficient and precise nitrogen fertilizer application also enhances water quality, increases crop yields, and provides cost savings for farmers.

USDA's NRCS nutrient management standard, known as Conservation Practice Standard 590, provides guidance to help producers apply fertilizer for maximum agricultural benefits and reduced environmental impacts.¹⁰⁵⁴ This standard delineates the steps that a producer must take in order to receive payments from conservation programs such as EQIP and CSP.

Rep. Deb Haaland (D-NM) and Sen. Cory Booker (D-NJ) introduced H.R. 4269/S. 2452, the Climate Stewardship Act of 2019, which would increase cost-share and financial incentives in EQIP and CSP for agricultural producers to carry out climate stewardship practices, such as nutrient management.

Rep. Cheri Bustos (D-IL) developed a Rural Green Partnership Framework, which calls for increasing funding to incentivize adoption and maintenance of precision agriculture and conservation

¹⁰⁵¹ U.S. Environmental Protection Agency, "Agriculture Sector Emissions," <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions#agriculture>. Accessed June 2020.

¹⁰⁵² Ibid.

¹⁰⁵³ U.S. Department of Agriculture, *USDA Building Blocks for Climate-Smart Agriculture and Forestry: Implementation Plan and Progress Report* (May 2016): 16; Joseph E. Fargione, et al., *Natural climate solutions for the United States* (Science Advances, November 14, 2018): 3.

¹⁰⁵⁴ U.S. Department of Agriculture, *USDA Building Blocks for Climate-Smart Agriculture and Forestry: Implementation Plan and Progress Report* (May 2016): 16; USDA NRCS, Conservation Practice Standard, Nutrient Management Code 590 (January 2012), https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1046433.pdf.

management farming practices that reduce runoff and optimize fertilizer inputs as part of systemic farm management.¹⁰⁵⁵

Recommendation: Congress should increase cost share and other financial incentives to improve nutrient management through EQIP, RCPP, and CSP. Congress should also draft legislation to reduce nitrous oxide emissions from soil management activities by (1) increasing NRCS resources and partnerships to improve and expand implementation of the Conservation Practice Standard for Nutrient Management, which helps farmers focus on the “4Rs”(right source, right rate, right time, and right place) through technical assistance, education and outreach, and development of precision agricultural systems and technology;¹⁰⁵⁶ (2) expanding research, development, and deployment of precision agriculture technologies to apply fertilizer more efficiently; (3) directing USDA to make and enhance crop- and region-specific recommendations for farmers to increase adoption of nutrient management strategies, and develop and distribute literature and educational materials on nutrient management to improve nutrient use efficiency, reduce emissions, and improve water quality; (4) directing USDA to prioritize nutrient management outreach, technical assistance, and financial incentives in areas with soil types that are prone to high nitrogen loss; and (5) providing technical and financial assistance for farmers to adopt climate-smart alternatives to synthetic fertilizer, such as crop rotation, cover cropping, and the use of non-synthetic fertilizers such as compost.

Committee of Jurisdiction: Agriculture

Building Block: Reduce Livestock Emissions and Increase Carbon Sequestration in Grazing Lands

Approximately 40% of all greenhouse gas emissions from the agricultural sector come from livestock manure management and the livestock digestive process.¹⁰⁵⁷ When livestock manure is treated and stored in typical pits or lagoons, decomposition results in large emissions of methane.¹⁰⁵⁸ In contrast, rotational grazing systems, where animals are raised on pasture, improve soil health and carbon sequestration, reduce runoff and soil erosion, and evenly distribute manure, increasing manure management effectiveness and efficiency.¹⁰⁵⁹ The quality of the pasture also makes a difference. Studies in Texas and Michigan show that management-intensive rotational grazing systems with high-quality forage can reduce methane by 30% per animal compared to continuous grazing systems.¹⁰⁶⁰

¹⁰⁵⁵ Office of Congresswoman Cheri Bustos, The Rural Green Partnership Framework (August 2019), <https://bustos.house.gov/wp-content/uploads/2019/08/Rural-Green-Partnership-1.pdf>.

¹⁰⁵⁶ U.S. Department of Agriculture, *USDA Building Blocks for Climate-Smart Agriculture and Forestry: Implementation Plan and Progress Report* (May 2016): 16.

¹⁰⁵⁷ U.S. Environmental Protection Agency, “Agriculture Sector Emissions,” <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions#agriculture>. Accessed June 2020.

¹⁰⁵⁸ U.S. Department of Agriculture, *USDA Building Blocks for Climate-Smart Agriculture and Forestry: Implementation Plan and Progress Report* (May 2016): 20.

¹⁰⁵⁹ U.S. Department of Agriculture Climate Hubs, “Managing Grazing to Improve Climate Resilience,” www.climatehubs.usda.gov/hubs/northeast/topic/managing-grazing-improve-climate-resilience. Accessed June 2020.

¹⁰⁶⁰ Paige L. Stanley, et al., *Impacts of soil carbon sequestration on life cycle greenhouse gas emissions in Midwestern USA beef finishing systems* (Agricultural Systems, May 2018): 256.

Landowners can manage their grazing lands to increase climate mitigation while meeting livestock production goals.¹⁰⁶¹ NRCS has developed Conservation Practice Standards related to prescribed grazing and pasture land; however, these practices are currently implemented on relatively few acres annually.¹⁰⁶² Accurate comparisons of climate impacts of different livestock production systems require a full lifecycle analysis, including factors such as carbon sequestration in pastures and grazing lands versus cropland for feed grains, carbon dioxide emissions for fertilizer production for growing grain, and nitrous oxide emissions from fertilized fields versus pasture.¹⁰⁶³

The Grazing Land Conservation Coalition is a nationwide consortium of individuals and organizations working to provide technical assistance to landowners and to maintain and improve the management, productivity, and health of the nation's privately-owned grazing land.¹⁰⁶⁴ NRCS supports the Coalition to coordinate efforts to identify priority issues, find solutions, and effect change on private grazing land.

Rep. Deb Haaland (D-NM) and Sen. Cory Booker (D-NJ) introduced H.R. 4269/S. 2452, the Climate Stewardship Act of 2019, which would increase cost-share and financial incentives in EQIP and CSP for agricultural producers to carry out climate stewardship practices, such as prescribed grazing and silvopasture. Rep. Chellie Pingree (D-ME) introduced H.R. 5861, the Agriculture Resilience Act, which would increase funding for the Grazing Lands Conservation Coalition and add new elements to the coalition's purpose, including soil health, grazing system resilience, and transitioning to managed grazing systems. This legislation would also create a new alternative manure management program that provides grants to farmers for non-digester dairy and livestock methane management strategies to reduce emissions.

Rep. Cheri Bustos (D-IL) developed a Rural Green Partnership Framework, which calls for incentives for integrated crop/livestock operations to maximize the soil carbon sequestered in croplands.¹⁰⁶⁵

Recommendation: Congress should significantly increase financial incentives and technical assistance to farmers and ranchers to implement rotational and prescribed grazing and silvopasture. Congress also should (1) create an alternative manure management program to provide additional funding and grants to farmers for non-digester manure and methane management strategies to reduce emissions, including conversion of non-pasture dairy and livestock operations to pasture-based management and alternative manure treatment and storage practices; (2) provide funding for the Grazing Lands Conservation Coalition and amend the program purpose to add soil health and grazing system resilience; (3) provide support for producers transitioning from confinement and feedlot systems or continuous grazing to managed grazing-based systems; (4) require that a significant portion of EQIP funding spent on livestock go toward climate-smart grazing systems; (5) direct USDA to collaborate

¹⁰⁶¹ U.S. Department of Agriculture, *USDA Building Blocks for Climate-Smart Agriculture and Forestry: Implementation Plan and Progress Report* (May 2016): 29.

¹⁰⁶² Ibid at 30.

¹⁰⁶³ National Sustainable Agriculture Coalition, *Agriculture and Climate Change: Policy Imperatives and Opportunities to Help Producers Meet the Challenges* (2019): 48-49.

¹⁰⁶⁴ U.S. Department of Agriculture NRCS, "National Grazing Lands Coalition," <https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1068389>. Accessed June 2020.

¹⁰⁶⁵ Office of Congresswoman Cheri Bustos, The Rural Green Partnership Framework (August 2019), <https://bustos.house.gov/wp-content/uploads/2019/08/Rural-Green-Partnership-1.pdf>.

with key partners, such as extension agents; land-grant universities, including HBCUs and tribal colleges; private and nonprofit entities; farmer-owned cooperatives; and state and local conservation districts to provide education, outreach, and technical assistance to farmers and ranchers to implement prescribed grazing; and (6) modify CSP and EQIP to prioritize, when ranking applications, Silvopasture Conservation Practice Standard (381) to increase carbon sequestration and help livestock producers adapt to warming temperatures by providing shade for animals.

Committee of Jurisdiction: Agriculture

Building Block: Develop Feed Additives to Reduce Livestock Emissions

Certain feeds can reduce methane emissions from livestock animals' digestive process. Grain-based feed, changes in grain-to-forage ratio, grinding and pelleting of feed, and the use of enzymes can all curb methane enteric emissions. Some early-stage research shows that adding seaweed to the diet can also reduce methane emissions from ruminants.¹⁰⁶⁶ There is a need for further research to determine how changes in feed or feed additives can reduce methane emissions from livestock enteric fermentation.

Recommendation: Congress should direct USDA to increase research and development to examine different feeds and feed additives and their impact on methane emissions from enteric fermentation.

Committee of Jurisdiction: Agriculture

Building Block: Support Community-Scale Energy Development Through Cooperative Methane Digesters to Help Small- and Mid-Scale Dairies and Other Livestock Operations Collectively Address Waste

Anaerobic digesters, which capture methane and either combust it for energy generation or process it as a replacement for natural gas, are one option for reducing methane emissions from manure management.¹⁰⁶⁷ While digesters are costly, EQIP and the Rural Energy for America Program (REAP) currently include financial assistance for installing anaerobic digesters through cost-share, grants, and loans. Despite this financial assistance, digesters are still often cost-prohibitive for small or mid-sized operations. Cooperative models allow small farms to pool their capital resources.¹⁰⁶⁸

Rep. Chellie Pingree (D-ME) introduced H.R. 5861, the Agriculture Resilience Act, which would move the AgSTAR program, an initiative that promotes the use of biogas recovery systems to reduce methane emissions from livestock waste, from EPA to USDA NRCS. Farmers are often more familiar and comfortable with USDA, which maintains service centers in counties across rural America.

Recommendation: Congress should direct USDA to increase research and development to make small scale digesters more affordable as well as provide technical assistance, community support, and

¹⁰⁶⁶ Carlos M. Duarte, et al, *Can Seaweed Farming Play a Role in Climate Change Mitigation and Adaptation?* (Frontiers in Marine Science, April 2017).

¹⁰⁶⁷ U.S. Department of Agriculture, *USDA Building Blocks for Climate-Smart Agriculture and Forestry: Implementation Plan and Progress Report* (May 2016): 20.

¹⁰⁶⁸ Ibid.

financial incentives and grants for small- and mid-scale farmers to partner together to build cooperative digesters.

Recommendation: Congress should move AgSTAR from EPA to USDA to increase farmer access and engagement.

Committees of Jurisdiction: Agriculture; Energy and Commerce

Building Block: Expand Investments in Rural Broadband to Support Precision Agriculture

Broadband has become essential for economic development, which has generated congressional interest in expanding broadband in rural areas. Broadband also is becoming an important tool for climate mitigation, even in the agricultural sector. Precision agriculture technology can help farmers increase yields and more efficiently apply inputs such as fertilizer, reducing agricultural greenhouse gas emissions.¹⁰⁶⁹ However, farmers can only utilize precision agriculture technology with reliable high-speed internet connectivity.¹⁰⁷⁰ In the report section titled “Prepare the Nation’s Telecommunications Network for Climate Impacts,” the majority staff for the Select Committee makes several recommendations for expanding broadband access to communities across the United States, including underserved, rural, and vulnerable communities.

The Energy and Commerce Committee Democrats’ Leading Infrastructure for Tomorrow’s America (LIFT America) Act, H.R. 2741, would invest in deployment of broadband internet service across the country.¹⁰⁷¹ This provision of the LIFT America Act was included in Section 31301 of the House Democrats’ infrastructure bill, H.R. 2, the Moving Forward Act, which would invest \$80 billion in broadband deployment.¹⁰⁷² The LIFT America Act and Moving Forward Act would also provide \$5 billion in low-interest financing for broadband infrastructure projects.¹⁰⁷³

Recommendation: Congress should expand broadband infrastructure in rural areas.

Committee of Jurisdiction: Energy and Commerce

¹⁰⁶⁹ U.S. Department of Agriculture, *A Case for Rural Broadband: Insights on Rural Broadband Infrastructure and Next Generation Precision Agriculture for Technologies* (April 2019): 18.

¹⁰⁷⁰ *Ibid* at 6.

¹⁰⁷¹ LIFT America Act, Title I, Subtitle A. Broadband Internet Access Service Program.

¹⁰⁷² Unless otherwise noted, mentions of H.R. 2 refer to the version of the bill contained in Rules Committee Print 116-54, dated June 22, 2020. The House of Representatives was preparing to debate H.R. 2 when the Select Committee’s report went to print. The Rules Committee Print is available at <https://rules.house.gov/sites/democrats.rules.house.gov/files/BILLS-116HR2-RCP116-54.pdf> and will not reflect any amendments made to the bill after June 22, 2020.

¹⁰⁷³ LIFT America Act, Title I, Subtitle C, Broadband Infrastructure Finance and Innovation; Moving Forward Act, Division G, Title I, Subtitle C, Chapter 2. Broadband Infrastructure Finance and Innovation.

Increase Federal Capacity to Provide Technical Assistance to Farmers

Enhanced technical assistance from trusted partners is critical to help farmers and ranchers maximize opportunities for improved climate stewardship. USDA, extension services, land-grant universities – including historically black colleges and universities (HBCUs) and tribal colleges – and key partners – such as NGOs, agricultural retailers, and producer cooperatives – must collaborate to provide farmers and ranchers with the full support and technical assistance necessary to ensure broad and timely adoption of climate stewardship practices.

Building Block: Increase NRCS and FSA Staff and NRCS Local Offices to Provide On-the-Ground Support and Technical Assistance to Farmers and Ranchers

Severe understaffing at NRCS and FSA and a decline in the number of NRCS local offices is impeding the delivery of technical assistance and on-the-ground support that farmers and ranchers need to implement climate stewardship practices. NRCS resources also are needed to help farmers overcome administrative barriers and ensure timely review of applications for and distribution of conservation funding.

Rep. Cheri Bustos (D-IL) developed a Rural Green Partnership Framework, which calls for expanding the number and availability of conservation technical experts capable of offering customized, one-on-one conservation advice to agricultural producers.¹⁰⁷⁴

Recommendation: Congress should significantly increase support for the NRCS Conservation Technical Assistance program, direct USDA to scale up hiring of NRCS staff, consider giving USDA direct hiring authority to increase staff as quickly possible, and open more NRCS local offices throughout the country. NRCS should provide Congress with updates on the status of staffing levels at NRCS in each office, including positions that have been vacant for more than six months and a workload analysis describing why staffing levels fall under the national staffing cap.

Committee of Jurisdiction: Agriculture

Building Block: Increase Support and Resources to Conservation Districts, Extension Services, Land-Grant Colleges, and Other Relevant Partners

As described above, technical assistance and on-the-ground support is crucial for farmers and ranchers to implement conservation and climate-smart practices. In addition to NRCS staff, conservation districts, extension services, NGOs, and land-grant universities, including HBCUs and tribal colleges, provide invaluable resources for farmers and ranchers to reduce their greenhouse gas emissions and improve soil health and carbon sequestration. These institutions need more resources to invest in research and deployment of agricultural climate solutions.

¹⁰⁷⁴ Office of Congresswoman Cheri Bustos, The Rural Green Partnership Framework (August 2019), <https://bustos.house.gov/wp-content/uploads/2019/08/Rural-Green-Partnership-1.pdf>.

Rep. Chellie Pingree (D-ME) introduced H.R. 5861, the Agriculture Resilience Act, which would set aside 1% of all Farm Bill conservation program funding for a technical assistance initiative delivered by NRCS and third parties to assist producers in mitigating and adapting to climate change.

Recommendation: Congress should provide more financial assistance and support for conservation districts; extension services; land-grant universities, including HBCUs and tribal colleges; and other third parties, such as NGOs and land trusts, specifically to focus on climate stewardship practices. Funding should support technical assistance to farmers and ranchers to mitigate and adapt to climate change as well as research and deployment of agricultural climate solutions.

Committee of Jurisdiction: Agriculture

Building Block: Coordinate Within and Across Agencies and Support Public-Private Partnerships to Facilitate Broad Adoption of Climate Stewardship Practices

Partnership efforts will facilitate broad adoption of climate stewardship practices by leveraging skills, resources, and shared goals to decrease greenhouse gas emissions and increase carbon sequestration.¹⁰⁷⁵ Engaging with trusted partners, such as private companies, agricultural retailers, NGOs, and extension services, will allow USDA to enhance and accelerate the deployment of technical and financial assistance to farmers and ranchers to increase climate stewardship practices. For example, agricultural producers may be more receptive to technical knowledge when it comes from a trusted source, such as extension experts and agricultural retailers. Additionally, many private companies and NGOs are eager to partner with USDA to invest their resources to boost agriculture's potential climate benefits.

Recommendation: Congress should direct USDA to coordinate within and across agencies, including the Department of the Interior (DOI), the Department of Commerce (DOC), and EPA, and with NGOs, land-grant universities, including HBCUs and tribal colleges, extension services, farmer-owned cooperatives, agricultural retailers, and private companies to develop a coordinated agricultural climate mitigation and resilience plan. These partnerships should facilitate broad adoption of climate stewardship practices, soil health guidelines, climate mitigation and resilience demonstration field sites, and training programs for farmers and service providers. This USDA-led agricultural climate mitigation and resilience plan should include funding for social science research and its application in outreach to farmers, ranchers, and foresters, as financial incentives alone may not be enough to drive behavioral change at scale without understanding the social factors behind producer decision-making and the most effective methods of persuasion.

Recommendation: Congress should direct USDA to develop partnerships with private entities to leverage resources to farmers and ranchers to increase climate stewardship practices.

Committee of Jurisdiction: Agriculture

¹⁰⁷⁵ U.S. Department of Agriculture, *USDA Building Blocks for Climate-Smart Agriculture and Forestry: Implementation Plan and Progress Report* (May 2016): 13.

Building Block: Increase Funding to USDA Research Agencies and Key Partners to Promote Innovation and Increase Agricultural Climate Benefits

Coordinated federal research will increase the agriculture sector's ability to implement climate stewardship practices and find innovative ways to sequester carbon, reduce emissions, and make farms more resilient to the impacts of climate change.

Several programs within USDA's National Institute of Food and Agriculture (NIFA) support agroecological research, such as the Sustainable Agriculture Research and Education Program (SARE), the Organic Agriculture Research and Extension Initiative (OREI), and the Agriculture and Food Research Initiative (AFRI). The Agricultural Research Service (ARS), USDA's in-house research agency, also conducts research on climate-smart agriculture.

Rep. Joe Neguse (D-CO) introduced H.R. 4134, the Sustainable Agriculture Research Act, to ensure the Agriculture Advanced Research and Development Authority (AGARDA) explicitly addresses carbon sequestration and reduction of emissions. Rep. Chellie Pingree (D-ME) introduced H.R. 5861, the Agriculture Resilience Act, which would add climate resilience to the overall purposes of the SARE grant program; add climate change adaptation and mitigation to the list of priorities for the extension, outreach, and professional development portion of the SARE program; authorize the ARS Long-Term Agroecological Research Network; create an ARS internship program for graduate students pursuing a degree or research related to climate change and agriculture; create a climate change adaptation and mitigation subprogram within AFRI; and add climate change to the list of the Specialty Crop Research Initiative's research priorities.

Recommendation: Congress should direct USDA to implement a department-wide climate research agenda and direct the Office of the Chief Scientist, in consultation and coordination with all the research-based USDA agencies, to develop and prioritize a coordinated research framework for climate mitigation and resilience. Additionally, Congress should (1) amend AGARDA to add goals that explicitly address carbon sequestration and pollution reduction; (2) reprioritize NIFA funding to increase climate-specific research, including research within SARE, OREI, and AFRI; (3) direct USDA to conduct research on regeneration practices to improve soil health; innovative climate stewardship farming practices, such as dry farming; development and deployment of alternatives to nitrogen fertilizer; strategies to reduce emissions from livestock, such as diet changes, feed additives, and grazing techniques; practices to reduce methane emissions from rice production; development and deployment of zero-emission farm equipment; evaluation of total lifecycle emissions of different livestock production systems; improved qualitative data collection and analytics on agricultural soil carbon capture and storage; and ways to make crops and farms more resilient to the impacts of climate change; (4) direct USDA to collaborate with Department of Energy (DOE) programs aimed at reducing agricultural emissions and increasing carbon stored in agricultural soils, such as the ARPA-E ROOTS program; (5) authorize the ARS Long-Term Agroecological Research Network and make climate research a priority; (6) expand research priorities for the Specialty Crop Research Initiative and OREI to include climate change; (7) create an ARS career development program for graduate students pursuing a degree or research related to climate change and agriculture; (8) create a climate change adaptation and mitigation subprogram within AFRI; and (9) prioritize funding to land-grant universities, including HBCUs and tribal colleges, and extension agents for climate mitigation and adaptation research.

Recommendation: Congress should direct the Mitigation Framework Leadership Group¹⁰⁷⁶ to convene a working group including NRCS, FSA, RMA, the Federal Emergency Management Agency (FEMA), and EPA to investigate and report to the Congress on the environmental, public health, food security, and economic risks associated with agricultural operations in flood- and wildfire-prone areas. The working group should identify actions within current authorities that agencies can undertake to mitigate those risks. Objectives should include reducing the installation of new operations in areas of risk and providing technical assistance, incentives, and funding support to help operators relocate from areas of risk.

Committees of Jurisdiction: Agriculture; Science, Space, and Technology

Building Block: Facilitate Farmer-to-Farmer Education and Outreach Programs to Encourage Farmers and Ranchers to Implement Climate Stewardship Practices

Farmers can benefit from knowledge-sharing regarding what practices are working for other farmers in their communities. The messenger can be as important as the message, and technical knowledge should come from a trusted source, such as other farmers, extension experts, and agricultural retailers. Demonstrating tangible examples of successful climate-smart agricultural practices such as diverse crop rotations, no-till farming, and prescribed grazing can be critical for other farmers to implement similar practices.

Recommendation: Congress should establish a pilot program to facilitate local knowledge-sharing through farmer-to-farmer and agricultural retailer-to-farmer education to determine what climate stewardship practices are working for other farmers in their communities. Congress should also establish a grant program for private, nonprofit, and community-based organizations to establish initiatives to facilitate and encourage farmer-to-farmer education and outreach for farmers and ranchers.

Committee of Jurisdiction: Agriculture

Building Block: Scale Up Climate Hubs to Provide Climate Mitigation and Resilience Data, Tools, and Support to Agricultural Producers and Communities

USDA's Climate Hubs are a collaboration of the Department's research and program agencies to develop and deliver region-specific tools and information to agricultural producers that enable climate-informed decision-making and provide assistance to implement those decisions.¹⁰⁷⁷ These regionally located hubs help farmers and ranchers adapt to climate change by better understanding

¹⁰⁷⁶ The Mitigation Framework Leadership Group (MitFLG) was established in support of and consistent with the National Preparedness Goal, the Presidential Policy Directive 8, and the Post-Katrina Emergency Management and Reform Act of 2006. The MitFLG is chaired by FEMA and provides senior-level coordination of hazard mitigation efforts across the federal government, facilitating information exchange, coordinating policy implementation, and engaging with states, local governments, tribes, and territories. <https://www.fema.gov/national-mitigation-framework>. Accessed June 2020.

¹⁰⁷⁷ U.S. Department of Agriculture Climate Hubs, "About Us," <https://www.climatehubs.usda.gov/about-us>. Accessed June 2020.

and managing climate risks. Research funding for the climate hubs has declined since 2016, and they are operating on limited staff.¹⁰⁷⁸

Rep. Chellie Pingree (D-ME) introduced H.R. 5861, the Agriculture Resilience Act, which would legislatively authorize a national network of regional hubs for risk adaptation and mitigation to climate change to deliver science-based, region-specific, and practical information and program support to farmers, ranchers, and foresters.

Recommendation: Congress should formally authorize regional USDA Climate Hubs, administered by ARS and the U.S. Forest Service (USFS) and in coordination with other USDA and federal agencies and in cooperation with educational institutions, NGOs, private entities, and state and local agencies. The purpose of the Hubs should be to deliver science-based, region-specific, cost-effective, and practical information and program support to farmers, ranchers, and forest landowners to support science-informed decision-making in light of the increased costs, opportunities, risks, and vulnerabilities associated with a changing climate. Congress should provide funding and direct USDA to hire dedicated Climate Hub staff and consider giving USDA direct hiring authority to achieve these goals.

Committee of Jurisdiction: Agriculture

Building Block: Develop Seeds, Crop Varieties, and Animal Breeds Adapted to Regional Climate Change

Helping farmers adapt to changing weather will make farms more resilient in the face of a warming climate. Some animal breeds are better able to withstand high temperatures, different crop varieties are better adapted to different climates, and certain tree species create more resilient forests. As farmers, ranchers, and foresters adjust to evolving climate realities, it is important to determine and produce crops, trees, and livestock breeds best suited to new and changing climates.

Rep. Chellie Pingree (D-ME) introduced H.R. 5861, the Agriculture Resilience Act, which would establish a Public Breed and Cultivar Research Activities Coordinator to coordinate a strategic plan that includes a focus on resource-efficient, stress-tolerant, regionally adapted livestock breeds and crop cultivars that are more resilient to climate change impacts.

Recommendation: Congress should increase funding for the appropriate research-based USDA agencies to determine and develop seeds, trees, and animal breeds adapted to climate change, accounting for regional differences. Congress should also direct USDA to establish a Public Breed and Cultivar Research Activities Coordinator to coordinate resilient livestock and plant breeding research activities, convene a working group within USDA, and promote collaboration among stakeholders. Recognizing that the climate will continue to change over time, this research should be ongoing.

Committee of Jurisdiction: Agriculture

¹⁰⁷⁸ Helena Bottemiller Evich, “I’m standing right here in the middle of climate change’: How USDA is failing farmers,” (Politico, October 15, 2019), <https://www.politico.com/news/2019/10/15/im-standing-here-in-the-middle-of-climate-change-how-usda-fails-farmers-043615>; NSAC, “Congressional Hearings Discuss Farm Bill Implementation, Relocation and Climate Change” (October 25, 2019), <https://sustainableagriculture.net/blog/congressional-hearings-discuss-farm-bill-implementation/>.

Building Block: Support Urban, Indoor, and Innovative Agricultural Production

Urban and indoor agriculture has important climate benefits, such as reducing the vulnerability of frontline communities, enhancing the resilience of communities to respond to disasters, and cutting greenhouse gas emissions. Rooftop and backyard gardens, indoor vertical farms, allotments, and community agricultural production in vacant lots and parks can supply produce for communities, cut food waste, and reduce emissions from transportation.¹⁰⁷⁹ Urban agriculture can also help address the heat island effect and improve control of stormwater runoff and flooding by increasing vegetative cover in cities.¹⁰⁸⁰

Rep. Tulsi Gabbard (D-HI) introduced H.R. 5266, the Urban Agriculture Healthy Food and Entrepreneur Act, which would establish an urban agriculture conservation easement program.

The 2018 Farm Bill created the Office of Urban Agriculture and Innovative Production within the USDA “to encourage and promote urban, indoor, and other emerging agricultural production practices.”¹⁰⁸¹ This office provides financial and technical assistance for aquaponics, hydroponics, and other sustainable growing methods, as well as urban and other innovative agricultural production.¹⁰⁸²

Recommendation: Congress should increase funding for the Office of Urban Agriculture and Innovative Production and create an agriculture land easement program tailored to the needs of urban agriculture in order to improve community food security and access to cropland for young, beginning, and socially disadvantaged farmers and ranchers.

Committee of Jurisdiction: Agriculture

¹⁰⁷⁹ UC Davis, “Agricultural Sustainability Institute,” <https://asi.ucdavis.edu/programs/ucsarep/about/what-is-sustainable-agriculture/practices/urban-agriculture>. Accessed June 2020; National Science Foundation, “Researchers outline the interconnected benefits of urban agriculture” (January 2018), https://www.nsf.gov/discoveries/disc_summ.jsp?cntn_id=244100; Thin Lei Win, “Urban farms ‘critical’ to combat hunger and adapt to climate change” (Reuters, January 11, 2019), <https://www.reuters.com/article/us-global-agriculture-urbanisation/urban-farms-critical-to-combat-hunger-and-adapt-to-climate-change-idUSKBN1F01A9>.

¹⁰⁸⁰ Ibid.

¹⁰⁸¹ 7 U.S.C. § 6923.

¹⁰⁸² Ibid.

Support On-Farm Renewable Energy and Energy Efficiency

A smaller but significant portion of agricultural greenhouse gas emissions comes from on-farm fuel consumption from routine energy usage and farm equipment.¹⁰⁸³ Farmers and ranchers can reduce their carbon dioxide emissions and save money by making energy efficiency improvements and investing in renewable energy projects on-farm.

Building Block: Help Farmers Make Energy Efficiency Improvements and Reduce On-Farm Fuel Use

Upgrading machinery and equipment and choosing energy-efficient buildings can reduce agricultural energy use, reducing greenhouse gas emissions and costs for farmers.¹⁰⁸⁴

USDA's REAP program provides two types of assistance: (1) grants and loans to farmers and rural businesses for energy efficiency improvements and renewable energy systems; and (2) grants to state and local governments, land-grant universities, rural electric cooperatives, and public utilities to assist farmers and rural businesses with energy audits to evaluate their energy usage and potential for incorporating efficiency improvements and renewable energy production systems.¹⁰⁸⁵

Rep. Cheri Bustos (D-IL) developed a Rural Green Partnership Framework, which calls for expanded grants and loans for farm and ranch operations that improve energy efficiency and energy generation.¹⁰⁸⁶

Rep. Deb Haaland (D-NM) and Sen. Cory Booker (D-NJ) introduced H.R. 4269/S. 2452, the Climate Stewardship Act of 2019, which would increase funding for REAP from \$50 million annually to \$3 billion by 2024. Rep. Chellie Pingree (D-ME) introduced H.R. 5861, the Agriculture Resilience Act, which would increase funding for REAP to \$400 million and add reduction of greenhouse gas emissions to the program purpose. The bill also would prioritize projects that would result in the greatest pollution reductions and make NGOs and producer cooperatives eligible for energy audit grants.

Recommendation: Congress should significantly increase funding for REAP; add greenhouse gas pollution reduction to the program's purpose; prioritize projects that achieve the largest net decrease

¹⁰⁸³ Iowa State University Extension and Outreach, *Global warming – agriculture's impact on greenhouse gas emissions* (AgDM Newsletter, April 2008), <https://www.extension.iastate.edu/agdm/articles/others/takapr08.html>.

¹⁰⁸⁴ U.S. Department of Agriculture SARE, "Cut Costs and Energy Use Through Efficiency," <https://www.sare.org/Learning-Center/Bulletins/Clean-Energy-Farming/Text-Version/Energy-Efficiency>. Accessed June 2020.

¹⁰⁸⁵ U.S. Department of Agriculture, "Rural Energy for America Program (REAP)", <https://rd.usda.gov/files/REAP%20fact%20sheet%20MA.CT .RI .pdf>; USDA, "Rural Energy for America Program Energy Audit & Renewable Energy Development Assistance Grants," www.rd.usda.gov/programs-services/rural-energy-america-program-energy-audit-renewable-energy-development-assistance; USDA, "Rural Energy for America Program Renewable Energy Systems & Energy Efficiency Improvement Guaranteed Loan and Grant Program," www.rd.usda.gov/programs-services/rural-energy-america-program-renewable-energy-systems-energy-efficiency. Accessed June 2020.

¹⁰⁸⁶ Office of Congresswoman Cheri Bustos, The Rural Green Partnership Framework (August 2019), <https://bustos.house.gov/wp-content/uploads/2019/08/Rural-Green-Partnership-1.pdf>.

in emissions; and authorize regional demonstration projects that incentivize agricultural producers to reduce their emissions through energy efficiency improvements and renewable energy projects.

Recommendation: Congress should direct USDA to provide additional regional and local support and resources for farmers transitioning to low-emissions equipment, such as grant funding or an equipment rental loan program, similar to the Alaska Association of Conservation Districts' program that loans or rents equipment at low cost to promote certain conservation practices.¹⁰⁸⁷

Committees of Jurisdiction: Agriculture; Energy and Commerce

Building Block: Build On-Farm Renewable Energy Projects While Ensuring Smart Siting to Maintain Affordable and Productive Farmland

Many farmers and ranchers are innovating by integrating renewable energy installations, such as solar panels, with their crops and livestock. On-farm renewable energy production, such as wind and solar power, allows farmers to develop new income sources, reduce energy costs, decrease greenhouse gas emissions, and eliminate the need to run electric lines or pipelines to remote locations. Expansion of renewable energy installations, however, can create increased competition for already expensive agricultural land.¹⁰⁸⁸ Smart siting and dual-use farming systems can ensure the expansion of renewable energy production while maintaining affordable and productive farmland.

Recommendation: Congress should direct USDA to study dual-use energy systems and increase efforts to provide education, outreach, and technical assistance for farmers to integrate renewable energy projects on land shared with crops or livestock.

Committees of Jurisdiction: Agriculture; Energy and Commerce

¹⁰⁸⁷ Alaska Association of Conservation Districts, "Agriculture Programs," www.alaskaconservationdistricts.org/programs/agriculture. Accessed June 2020.

¹⁰⁸⁸ American Farmland Trust, "To Combat Climate Change: Encourage Solar Energy that Doesn't Sacrifice Agricultural Land," <https://farmland.org/encourage-solar-energy-that-doesnt-sacrifice-agricultural-land/>. Accessed June 2020.

Support the Next Generation of Farmers to Create a Fair and Equitable Food System

Farmers and ranchers in the United States are aging, and over 370 million acres of farmland is expected to change hands over the next 15 years.¹⁰⁸⁹ This transition offers an opportunity to reshape the food system to prioritize climate stewardship in all communities; access to healthy, local, and culturally appropriate foods; and diversity among agricultural producers.

Building Block: Provide Support for Beginning, Young, and Socially Disadvantaged Farmers and Incorporate Climate-Smart Agriculture into New Farmers Programs

A survey conducted by the National Young Farmers Coalition found that a majority of young and beginning farmers describe their practices as “sustainable” and are more likely than the national average to have certified organic operations.¹⁰⁹⁰ As new and beginning farmers increasingly assume responsibility of agricultural production, they will need to acquire the skills, knowledge, and land stewardship values to practice climate-smart and sustainable agriculture.

Socially disadvantaged farmers and ranchers, including farmers of color, women, and military veterans, currently make up a disproportionately small share of agricultural producers and have historically faced systemic challenges and discriminatory lending practices when looking to start or maintain viable and resilient farming operations.¹⁰⁹¹ Black farmers, in particular, make up less than 2% of all U.S. farmers and ranchers.¹⁰⁹² Meaningful and consistent engagement with and among socially disadvantaged farmers and ranchers to ensure fair, equitable, and adequate support, outreach, lending, and technical and financial assistance can improve economic viability and facilitate adoption of climate stewardship practices.

The USDA Beginning Farmer and Rancher Development Program provides funding for the education and training of new and beginning farmers.¹⁰⁹³ The Outreach and Assistance for Socially Disadvantaged Farmers and Ranchers and Veteran Farmers and Ranchers Program provides outreach, education, and technical assistance to socially disadvantaged and veteran agricultural producers by funding organizations working to address the needs of these farmers and ranchers.¹⁰⁹⁴

¹⁰⁸⁹ American Farmland Trust, “Farm Legacy,” <https://farmland.org/project/farm-legacy/>. Accessed June 2020.

¹⁰⁹⁰ National Young Farmers Coalition, *Building a Future with Farmers: Results and Recommendations from the National Young Farmer Survey* (November 2017): 9, 28.

¹⁰⁹¹ Government Accountability Office, GAO-19-539, *Agricultural Lending: Information on Credit and Outreach to Socially Disadvantaged Farmers and Ranchers is Limited* (July 2019): 28-30; USDA National Agricultural Statistics Service, ACH17-2, *Farm Producers: Revised census questions provide expanded demographic information* (April 2019).

¹⁰⁹² Ibid.

¹⁰⁹³ U.S. Department of Agriculture NIFA, “Beginning Farmer and Rancher Development Program,” <https://nifa.usda.gov/program/beginning-farmer-and-rancher-development-program-bfrdp>. Accessed June 2020.

¹⁰⁹⁴ U.S. Department of Agriculture, “Outreach and Assistance for Socially Disadvantaged Farmers and Ranchers and Veteran Farmers and Ranchers Program,” <https://www.usda.gov/partnerships/socially-disadvantaged-farmers-and-ranchers>. Accessed June 2020.

Rep. Chellie Pingree (D-ME) introduced H.R. 5861, the Agriculture Resilience Act, which would increase the beginning and socially disadvantaged farmer and rancher set-aside in EQIP and CSP from 5% of funding for each to 30% of funding combined. It also would authorize USDA to provide incentives to establish a new generation of farmers and ranchers using the full array of climate-friendly practices from the outset of their farming careers.

In the 115th Congress, Rep. Earl Blumenauer (D-OR) introduced H.R. 4425, the Food and Farm Act, which would provide beginning farmers with funding and technical assistance. The bill includes permanent funding at a higher level for the Beginning Farmers and Ranchers Development program, provides more generous support for beginning farmers in certain conservation programs, and makes participation of beginning farmers in local food programs a priority.¹⁰⁹⁵ Also in the 115th Congress, Rep. Sean Patrick Maloney (D-NY) introduced H.R. 4201, the Young and Beginning Farmers Act, to address the barriers new and beginning farmers face in acquiring farmland, such as lack of access to affordable farmland, and to provide support for the next generation of farmers and ranchers, such as assistance in accessing Farm Bill programs and finding opportunities for training and business development.¹⁰⁹⁶

Recommendation: Congress should increase support and financial and technical assistance for beginning and socially disadvantaged farmers by expanding the Beginning Farmer and Rancher Development Program and the Outreach and Assistance for Socially Disadvantaged Farmers and Ranchers and Veteran Farmers and Ranchers Program. In expanding these programs, USDA should engage with socially disadvantaged farmers and ranchers in a meaningful process that solicits early input and feedback from representatives of those farmers and ranchers. Congress should incorporate climate mitigation and resilience into the programs. In addition, Congress should (1) increase the beginning and socially disadvantaged farmer and rancher set-aside in EQIP and CSP; (2) make government-owned farmland available as incubator farms for new, beginning, and socially disadvantaged farmers to provide low-cost leases, equipment-sharing, and technical assistance; (3) prioritize new, beginning, and socially disadvantaged farmers' and ranchers' participation in the Farmer's Market and Local Food Promotion Program; (4) provide a farmer tax credit for taxpayers who sell farming property to new, beginning, and socially disadvantaged farmers, and tax credits for new and beginning farmers who purchase agricultural property; (5) establish a federally backed land trust to buy land from retiring farmers and sell it interest-free to beginning and socially disadvantaged farmers; (6) increase USDA staff to provide on-the-ground support, conservation program assistance, and land succession planning; (7) provide student loan forgiveness for young, beginning, and socially disadvantaged farmers; and (8) require that all agencies provide technical assistance and training in multiple languages.

Committees of Jurisdiction: Agriculture; Ways and Means; Education and Labor

¹⁰⁹⁵ H.R. 4425, the Food and Farm Act, 115th Congress, <https://www.congress.gov/bill/115th-congress/house-bill/4425>.

¹⁰⁹⁶ H.R. 4201, the Young and Beginning Farmers Act, 115th Congress, <https://www.congress.gov/bill/115th-congress/house-bill/4201>.

Building Block: Coordinate with Tribal Nations and Ensure They Receive Full Financial and Technical Assistance to Implement Climate Stewardship Practices

Cultivation and preservation of agricultural products and practices have long been a priority for tribal communities. Enhanced federal support for agricultural activities through USDA conservation programs would generate significant benefits for tribes and help meet and achieve climate goals.¹⁰⁹⁷

The 2018 Farm Bill both expanded many existing USDA programs and established new programs and initiatives to support and invest in Native American communities and producers.¹⁰⁹⁸ Since Native American farmers and ranchers have been pushed to the margins of Farm Bill discussions for decades, increased coordination with and support for tribal nations is critical.

Recommendation: Congress should continue to promote strong tribal-federal government-to-government policies and collaborate on ways USDA can apply traditional knowledge and provide financial and technical assistance to tribal nations to implement climate stewardship practices. Technical assistance should incorporate indigenous and culturally relevant production practices when working with farmers and ranchers using traditional methods. Congress should ensure that tribes have fair and equitable access to, as well as representation and participation in, all climate stewardship initiatives, programs, and funding in which states, local governments, and other interested entities can participate. This should include recognizing when traditional conservation practices are substantively equivalent to NRCS Conservation Practice Standards and therefore eligible for funding from federal programs.

Committee of Jurisdiction: Agriculture

Building Block: Engage with and Support Environmental Justice Communities on Climate Stewardship Practices, Programs, and Policies to Create a Fair and Equitable Food System

Meaningful engagement with environmental justice communities to support climate stewardship practices and raise awareness of disproportionate impacts of food availability and distribution systems is essential to building a just and equitable food system. Environmental justice communities face unique challenges, including food insecurity; lack of access to healthy, fresh, and culturally appropriate food; disproportionate environmental impacts of food production systems; and a lack of representation among agricultural producers and distributors.

Recommendation: Congress should establish a commission with representatives from USDA, EPA, tribal nations, environmental justice communities, and NGOs to develop a comprehensive framework to build an equitable and just climate-friendly food system. This framework should address federal policies and programs aimed at increasing adoption of climate stewardship practices; improving local food systems; increasing access to healthy, fresh, and culturally appropriate foods; supporting socially disadvantaged farmers and ranchers; and studying the impacts of food production and agricultural operations on environmental justice communities.

Committee of Jurisdiction: Agriculture

¹⁰⁹⁷ Congress of American Indians, “Agriculture,” <http://www.ncai.org/policy-issues/land-natural-resources/agriculture>. Accessed June 2020.

¹⁰⁹⁸ CRS, CRS-IF11287, *2018 Farm Bill Primer: Support for Indian Tribes* (August 12, 2019).

Preserve Farmland from Development

Between 2001 and 2016, nearly 11 million acres of U.S. agricultural lands were converted to non-agricultural uses.¹⁰⁹⁹ The United States continues to lose farmland at a rate of 2,000 acres per day.¹¹⁰⁰ Farmland is a potential carbon sink, whereas industrial, commercial, or residential development can result in greenhouse gas emissions.¹¹⁰¹ Protecting current farmland from conversion averts pollution from urban development and reduces the need to convert undisturbed natural areas to new cropland. Slowing the rate of farmland loss reduces the pressure to cultivate sensitive working lands with high ecological value and marginal lands with the potential to be reforested, retired, and returned to natural landscapes.

Building Block: Help Keep Working Lands in Production

Federal, state, and local policies to protect farm and ranch land from conversion to non-farm uses include conservation easements, current use taxation, agricultural zoning protections, and the Farmland Protection Policy Act. The Farmland Protection Policy Act is intended to minimize the impact of federal programs on the conversion of farmland to nonagricultural uses. The Act requires that federal programs be administered to be compatible with state, local government, and private programs and policies to protect farmland.¹¹⁰²

ACEP helps landowners, land trusts, and other entities protect, restore, and enhance wetlands, grasslands, and working lands through conservation easements. Under ACEP, agricultural land easements help prevent conversion of productive working lands to non-agricultural uses.¹¹⁰³

Rep. Deb Haaland (D-NM) and Sen. Cory Booker (D-NJ) introduced H.R. 4269/S. 2452, the Climate Stewardship Act of 2019, which would increase funding for ACEP from \$450 million to \$900 million per year. Rep. Chellie Pingree (D-ME) introduced H.R. 5861, the Agriculture Resilience Act, which would strengthen the Farmland Protection Policy Act to limit the conversion of productive farm and ranch land by federal agencies or by projects using federal funds. The bill prohibits the conversion of farm or ranch land that is permanently protected farmland, farmland of national significance, or farmland significant to a state.

Recommendation: Congress should prevent the development of agricultural land by (1) increasing funding for ACEP; (2) implementing a “Debt for Working Lands” program based on the “Debt for Nature” program that would allow farmers in the path of development to cancel some or all of their FSA loan debt in return for an agricultural conservation easement; (3) directing USDA to work with local and state governments to implement zoning and planning laws that prevent farmland loss and

¹⁰⁹⁹ American Farmland Trust, *Farms Under Threat: The State of the States* (2020): 3.

¹¹⁰⁰ Ibid.; American Farmland Trust, “Farms Under Threat,” <https://farmland.org/project/farms-under-threat/>. Accessed June 2020.

¹¹⁰¹ CRS, CRS-IF11404, *Greenhouse Gas Emissions and Sinks in U.S. Agriculture* (January 9, 2020).

¹¹⁰² U.S. Department of Agriculture NRCS, “Farmland Protection Policy Act,” <https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/landuse/fppa/>. Accessed June 2020.

¹¹⁰³ U.S. Department of Agriculture NRCS, “Agricultural Conservation Easement Program,” <https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/acep/>. Accessed June 2020.

help keep farmers on the land; and (4) directing USDA to collaborate with land trusts to provide support and resources to prevent the conversion of agricultural land to private development.

Recommendation: Congress should prevent the federal conversion of farmland by limiting conversion of productive farm and ranch land by federal agencies or by projects using federal funds; prohibiting the conversion of farm or ranch land that is permanently protected farmland, farmland of national significance, or farmland significant to a state; and avoiding conversion of agricultural farm parcels that are in urbanized areas or consist of fewer than 10 acres of land.

Committee of Jurisdiction: Agriculture

Building Block: Prevent the Conversion of Natural Spaces, Wetlands, and Grasslands to Cropland

Avoiding conversion of forests, grasslands, and wetlands to cropland prevents the release of carbon sequestered in roots and soils.¹¹⁰⁴ Several programs exist to disincentivize the conversion of natural space to agricultural land such as USDA's "swampbuster" and "sodsaver" provisions and CRP.

ACEP's Wetland Reserve Easements provide landowners incentives to restore, protect, and enhance wetlands through easements. NRCS pays landowners a per-acre easement fee plus the cost to restore the agricultural lands back to natural wetland ecosystems. The landowner retains title and control of access but must protect and restore wetland ecosystems. The landowner can sell the land, but the easement remains in perpetuity.¹¹⁰⁵

Rep. Deb Haaland (D-NM) and Sen. Cory Booker (D-NJ) introduced H.R. 4269/S. 2452, the Climate Stewardship Act of 2019, which would increase the number of acres enrolled in CRP from 24 million acres to 40 million acres by 2030. The legislation prioritizes and focuses new enrollment on less productive and environmentally important farmland.

Recommendation: Congress should increase the number of acres enrolled in CRP and provide landowners incentives to restore land with high carbon sequestration potential. For example, Congress should increase funding for Wetland Reserve Easements under ACEP and direct USDA to prioritize efforts and initiatives to replant native grasslands. This should include additional incentives to plant prairie strips, such as the STRIPS program in Iowa, which provides technical and financial assistance to farmers to integrate small amounts of prairie strips into locations within corn and soybean fields.¹¹⁰⁶

Committee of Jurisdiction: Agriculture

¹¹⁰⁴ Joseph E. Fargione, et al., *Natural climate solutions for the United States* (Science Advances, November 14, 2018): 3.

¹¹⁰⁵ U.S. Department of Agriculture NRCS, "Wetlands,"

<https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/water/wetlands/?cid=stelprdb1043554>. Accessed June 2020.

¹¹⁰⁶ Iowa State University, "What Are Prairie Strips?," <https://www.nrem.iastate.edu/research/STRIPS/content/what-are-prairie-strips>. Accessed June 2020.

Reduce Food Waste and Transportation

Climate-smart agriculture does not end with on-farm climate stewardship practices. Food waste is responsible for 8% of global greenhouse gas emissions, including emissions from on-farm agriculture practices, energy use, and shipping of commodities and finished goods.¹¹⁰⁷ In the United States, 30-40% of all available food goes uneaten through loss or waste.¹¹⁰⁸ Local and regional food systems reduce the distance food travels and grow local food economies.

Building Block: Support Local and Regional Food Systems Through Federal Procurement

The federal government is responsible for providing food for public institutions such as schools, hospitals, and correctional facilities, spending more than \$20 billion annually on school meal and child nutrition programs alone.¹¹⁰⁹

Rep. Marcia Fudge (D-OH) and Sen. Patrick Leahy (D-VT) introduced H.R. 3562/S. 2026, the Farm to School Act of 2019, which would increase mandatory funding for the Farm to School Program to help schools procure local food. Rep. Chellie Pingree (D-ME) and Sen. Sherrod Brown (D-OH) introduced H.R. 3220/S. 1817, the Kids Eat Local Act, which would modify the requirements for the national school meal and child nutrition programs to allow program operators to use locally grown, locally raised, or locally caught as a product specification in food procurement.

Recommendation: Congress should increase funding for the Farm to School Program and modify requirements for the national school meal and child nutrition programs to allow schools to use locally grown as a product specification in food procurement. Additionally, Congress should direct interagency coordination and partnerships with small- and mid-sized farmers to collectively create supply chains to provide produce and other agricultural products to schools, hospitals, and other state and federal institutions, including the Department of Defense (DOD).

Committees of Jurisdiction: Agriculture; Education and Labor

Building Block: Build Local and Regional Food Systems by Expanding Market Opportunities

Farmers markets, food hubs, and other farmer-to-consumer markets create economic opportunities for small and mid-sized family farmers. Local and regional food systems also reduce the distance food travels, decreasing carbon emissions from trucking.

¹¹⁰⁷ Food and Agriculture Organization of the United Nations, *Food Wastage Footprint & Climate Change*, <http://www.fao.org/3/a-bb144e.pdf>. Accessed June 2020; World Resources Institute, “What’s Food Loss and Waste Got to Do with Climate Change? A Lot, Actually.” (December 11, 2015), <https://www.wri.org/blog/2015/12/whats-food-loss-and-waste-got-do-climate-change-lot-actually>.

¹¹⁰⁸ U.S. Environmental Protection Agency, EPA 530-F-19-004, *Winning on Reducing Food Waste Federal Interagency Strategy* (April 2019).

¹¹⁰⁹ Union of Concerned Scientists, *Purchasing Power: How Institutional “Good Food” Procurement Policies Can Shape a Food System That’s Better for People and our Planet* (November 20, 2017): 1.

The Farmers Market and Local Food Promotion Program (FMLPP) is a program under the Local Agriculture Market Program (LAMP) and is broken down into two subprograms, the Farmers Market Promotion Program (FMPP) and the Local Food Promotion Program (LFPP). The LFPP funds projects that develop and expand local and regional food markets and producer-to-consumer marketing,¹¹¹⁰ while FMPP funds projects that provide outreach, training, and technical assistance to agricultural producers to develop and expand producer-to-consumer markets and increase availability and access to local and regionally produced agricultural products.¹¹¹¹

Rep. Deb Haaland (D-NM) and Sen. Cory Booker (D-NM) introduced H.R. 4269/S. 2452, the Climate Stewardship Act of 2019, which would increase funding for LAMP by a factor of 10 and invest \$25 million per year in urban farms and community gardens in low-income areas. Rep. Chellie Pingree (D-ME) introduced H.R. 5861, the Agriculture Resilience Act, which would increase LAMP funding and provide grants for farm viability and local climate-resilient centers to expand markets for farm products that improve soil health and carbon sequestration through assistance with business plans, feasibility studies, marketing strategies, financial recordkeeping, and succession planning.

Recommendation: Congress should increase funding for LAMP and create a new grant opportunity to support efforts to develop markets and processing infrastructure for commodities and farm products that improve soil health and carbon sequestration.

Recommendation: Congress should direct USDA to strengthen partnerships with agricultural and industry groups, nonprofits, restaurants, food banks, corporations, and state and local governments to increase markets for locally grown agricultural products.

Committee of Jurisdiction: Agriculture

Building Block: Develop Goals and Incentives to Reduce Food Waste

In October 2018, USDA, EPA, and FDA launched the Winning on Reducing Food Waste Initiative to achieve a previously set national goal of reducing food loss and waste by 50% by 2030.¹¹¹² The agencies will coordinate food loss and waste reduction through education and outreach, research, community investments, voluntary programs, public-private partnerships, tool development, technical assistance, event participation, and policy discussion on the impacts and importance of reducing food loss and waste.¹¹¹³

Rep. Chellie Pingree (D-ME) and Sen. Richard Blumenthal (D-CT) introduced H.R. 3981/S. 2337, the Food Date Labeling Act of 2019, which would standardize date labels on food in order to help avoid unnecessary waste caused by consumer confusion. Reps. Chellie Pingree (D-ME) and Suzanne Bonamici (D-OR) introduced H.R. 5607, the School Food Recovery Act of 2020, to establish a grant program to provide funding for schools to implement food waste reduction programs. Reps. Julia

¹¹¹⁰ U.S. Department of Agriculture AMS, “Local Food Promotion Program,” <https://www.ams.usda.gov/services/grants/lfpp>. Accessed June 2020.

¹¹¹¹ U.S. Department of Agriculture AMS, “Farmers Market Promotion Program,” <https://www.ams.usda.gov/services/grants/fmpp>. Accessed June 2020.

¹¹¹² U.S. Environmental Protection Agency, EPA 530-F-19-004, *Winning on Reducing Food Waste Federal Interagency Strategy* (April 2019).

¹¹¹³ Ibid.

Brownley (D-CA) and Chellie Pingree (D-ME) introduced H.R. 6023, the COMPOST Act, which would add composting as a conservation Practice for USDA conservation programs like EQIP and CSP so that farmers can receive conservation program benefits for composting. Finally, Rep. Chellie Pingree (D-ME) introduced H.R. 5841, the Food Recovery Act of 2020, which would implement numerous initiatives to reduce food waste, including standardizing date labeling language, studying barriers that prevent the donation of surplus food, creating a new grant program to help schools reduce food waste, and increasing support for food waste-to-energy and composting projects and infrastructure at the farm, municipal, county, and state level.

Recommendation: Congress should increase support and investments in initiatives to reduce food waste at the consumer level, on the farm, in grocery stores and restaurants, in schools, throughout the government, and in landfills. Any legislation should also support implementation and funding for the Winning on Reducing Food Waste initiative and ensure it receives the necessary resources to achieve the national goal of reducing food waste by 50% by 2030, including making staff and financial resources available for USDA to support a Food Loss and Waste Reduction Liaison, as was specified but not funded in the 2018 Farm Bill.

Committees of Jurisdiction: Agriculture; Energy and Commerce; Education and Labor

MAKE U.S. COMMUNITIES MORE RESILIENT TO THE IMPACTS OF CLIMATE CHANGE

Communities are on the front lines of the climate crisis, contending with the effects of rising temperatures, increasingly severe storms, damaging wildfires, persistent droughts, acute river flooding, and chronic tidal inundation. Many local leaders are taking steps to prepare their communities for these impacts by adopting land use and development codes and standards and planning for transition where necessary. However, communities need a strong federal partner to confront the climate crisis with needed science-based expertise, guidance, and investments. Federal standards need to keep pace with the best available understanding of climate risks into the future and consider life-cycle costs as well as benefits that may accrue over time as climate impacts unfold.

Additional recommendations to promote infrastructure resilience appear in the section titled, “Invest in Infrastructure to Build a Just, Equitable, and Resilient Clean Energy Economy.”

Develop and Deploy Actionable Climate Risk Information

Governments, businesses, communities, and households need accurate and precise information to respond to climate-related risks, such as floods, droughts, heatwaves, and wildfires, that are expected to increase with climate change. This “climate risk information” – specific, accessible, and actionable information on current and projected climate-related risks – is critical to inform state, local, tribal, and territorial (SLTT) planning for climate resilience. To be useful and reliable for decision-makers, climate risk information needs to be backed by robust data collection, monitoring, and coordination among information producers. A strong foundation of climate science research must also support actionable climate risk information, as described in a separate section of this report, “Strengthen Climate Science.”

Data and analyses about natural hazards and climate risks emanate from multiple sectors, including federal agencies, states and local governments, academia, and private entities such as catastrophe modeling agencies and insurance firms. Federal action is needed to further develop authoritative risk information and to deploy that information, including guidance on climate-informed codes and standards, in ways that are accessible, reliable, and useful for decision-makers across sectors and at all levels of government, from federal program managers to private investors, and from community leaders to families.

Building Block: Establish the Climate Risk Information Service

The federal government already supports several broadly applicable climate risk information and data services, including National Climate Assessments, the Climate Resilience Toolkit, and the National Centers for Environmental Information. Federal departments and agencies also deploy climate risk information to address specific priorities; for example, the National Oceanic and Atmospheric Administration (NOAA) supports localized climate planning activities through Regional Integrated Sciences and Assessments, Regional Climate Centers, and National Estuarine Research Reserves. Other department- and agency-level climate risk information activities include U.S.

Department of Agriculture (USDA) Climate Hubs, U.S. Forest Service (USFS) Climate Change Resource Centers, Department of Interior (DOI) Landscape Conservation Cooperatives, U.S. Geological Survey (USGS) Climate Adaptation Science Centers, Environmental Protection Agency (EPA) Climate Adaptation Resource Centers, and the Centers for Disease Control and Prevention (CDC) Climate and Health Program. Federal science agencies currently coordinate their basic climate science activities through the U.S. Global Change Research Program (USGCRP), which publishes National Climate Assessments every four years (most recently in 2018) and manages a Climate Resilience Toolkit. The Federal Geographic Data Committee (FGDC) coordinates agency activities to make geospatial data, including climate projections, publicly accessible. Partnerships with non-federal entities expand the utility of federal climate information; these include the Climate Data Initiative (CDI) partnership among NOAA, the National Aeronautics and Space Administration (NASA), and private sector partners, and the Earth Science Information Partners (ESIP) federation of NOAA, NASA, USGS, academic, and nonprofit partners.

Despite these existing federal efforts, in 2015, the Government Accountability Office (GAO) identified barriers to decision-makers obtaining authoritative and actionable climate risk information, especially for state- and local-scale needs.¹¹¹⁴ In response to its findings, GAO recommended that the federal government develop authoritative climate projections delivered through a national climate information system.¹¹¹⁵ Given that low-income communities and communities of color are disproportionately affected by many climate impacts, efforts toward delivery of federal climate risk information should prioritize these groups.¹¹¹⁶ To address community needs, NOAA convened an Advisory Committee for the Sustained National Climate Assessment in 2015, to develop a framework for an “ongoing participatory process for engaging stakeholders and scientists in discovery, communication, and use of scientific knowledge on global change.”¹¹¹⁷ The Advisory Committee, which convened independently after being disbanded by President Trump, established a “Science for Climate Action Network (SCAN)” in 2019 to coordinate civil society efforts to provide ongoing, actionable climate assessments.¹¹¹⁸

Recommendation: Congress should establish an interagency working group on Climate Risk Information to coordinate development of authoritative planning-scale climate risk information across federal civilian science departments and agencies and unclassified programs within defense and intelligence agencies. The working group would complement existing efforts through the White House National Science and Technology Council Subcommittee on Global Change Research, which manages USGCRP, and the FGDC, and it would build on partnerships with nonfederal entities, such as through CDI and ESIP.

Recommendation: Congress should establish a Climate Risk Information Service to develop and maintain a centralized portal for access to authoritative climate risk information geared toward public- and private-sector decision-makers. To ensure that the best available scientific, economic, and

¹¹¹⁴ Government Accountability Office, GAO-16-37, *Climate Information: A National System Could Help Federal, State, Local, and Private Sector Decision Makers Use Climate Information* (November 2015).

¹¹¹⁵ Ibid.

¹¹¹⁶ U.S. Global Change Research Program, *Fourth National Climate Assessment, Volume II* (November 2018).

¹¹¹⁷ National Oceanic and Atmospheric Administration, “Advisory Committee for the Sustained National Climate Assessment,” <https://sncaadvisorycommittee.noaa.gov/>. Accessed June 2020.

¹¹¹⁸ Richard Moss, et al., “Bridging the Gap with the Science for Climate Action Network” *Eos*, April 4, 2019.

social assessments inform Climate Risk Information Service products, the Service should work directly with the proposed interagency working group on Climate Risk Information. The Service should also partner with non-science federal agencies and with non-governmental groups, such as SCAN, to ensure that the development of risk information products occurs in close coordination with user and community needs.

Committee of Jurisdiction: Science, Space, and Technology

Building Block: Expand Real-Time Earth Monitoring and Data Collection for Public Safety and Climate Risk Modeling

Federal, state, and local officials rely on real-time Earth monitoring, observations, and derived products, including weather conditions, to support disaster response and resource management decisions. NOAA's National Weather Service is responsible for collecting Earth monitoring data, modeling weather and climate phenomena, and working through its local Weather Forecast Offices and Weather Service Offices to issue resulting extreme weather forecasts, including predictions of climate-influenced hurricane and typhoon trends in the territories. Earth monitoring records developed by NOAA, NASA, USGS, and other federal science agencies are also critical for generating long-term climate projections.

Federally supported Earth observation networks are essential for mapping and monitoring a variety of climate-influenced hazards, including flooding, drought, wildfire, extreme heat, and severe storms.¹¹¹⁹ Flood forecasts, for example, depend on USGS streamgages and NOAA weather and tide gage information, coordinated through the Advanced Hydrologic Prediction Service.¹¹²⁰ U.S. Drought Monitor forecasts depend on ground- and satellite-based observations produced by USDA and NOAA, coordinated through the National Integrated Drought Information Service (NIDIS).¹¹²¹ NOAA's Earth Prediction Innovation Center (EPIC) is improving the accuracy of weather forecasts by leveraging Earth observations and advanced computing resources,¹¹²² including advancements to weather and climate modeling on time scales ranging from subseasonal-to-seasonal (defined as 2 weeks to 3 months) up to decades.¹¹²³ All these efforts are enhanced by academic and private-sector partnerships, though the value of these Earth monitoring resources depends on the federal government sustaining free and unfettered access to data and forecast products.¹¹²⁴

Despite the significant safety, science, and financial dependencies on federal and federally funded Earth observations, sensors, and networks, inadequate funding limits the effectiveness of these

¹¹¹⁹ Louis W. Uccellini and John E. Ten Hoeve, "Evolving the National Weather Service to Build a Weather-Ready Nation: Connecting Observations, Forecasts, and Warnings to Decision-Makers through Impact-Based Decision Support Services," *Bulletin of the American Meteorological Society* 100, no. 10 (2019): 1923-1942.

¹¹²⁰ National Weather Service, "Advanced Hydrologic Prediction Service," <https://water.weather.gov/ahps/about/about.php>. Accessed June 2020.

¹¹²¹ U.S. Drought Portal, "What is NIDIS," <https://www.drought.gov/drought/what-nidis>. Accessed June 2020

¹¹²² National Oceanic and Atmospheric Administration, Weather Program Office, "Earth Prediction Innovation Center," <https://wpo.noaa.gov/Programs/EPIC>. Accessed June 2020.

¹¹²³ "Subseasonal" and "seasonal" are defined in Sec. 2 of the Weather Forecast and Innovation Act of 2017, Pub L No 115-25.

¹¹²⁴ Committee on Environment, Natural Resources, and Sustainability, *Common Framework for Earth-Observation Data* (National Science and Technology Council, March 2016).

monitoring products. For example, only about 3,600 of the more than 4,700 USGS Federal Priorities Streamgages used to monitor river flooding are currently funded,¹¹²⁵ and experts have recommended enhancements to this system.¹¹²⁶ In addition, high-resolution elevation maps of the land and seafloor, now commonly produced via LIDAR (“Light Detection and Ranging”), are critical to support predictions for flooding and other hazards.¹¹²⁷ Since 2016, the USGS 3D Elevation Program has been working toward generating a nationwide elevation map derived primarily from LIDAR, but this mapping remains incomplete.¹¹²⁸

Nationwide rainfall intensity probability mapping through the NOAA Atlas 14 program also remains incomplete, and funding is inadequate to perform Atlas 14 mapping updates every 5-10 years as recommended by the federal Advisory Committee on Water Information.¹¹²⁹ Federal survey programs support development of coastal land and seafloor maps for the entire U.S. coast delivered through various portals, including NOAA’s Digital Coast platform,¹¹³⁰ but more frequent mapping updates are needed to keep pace with coastal landscape change. The NOAA-led Integrated Ocean Observing System (IOOS) leverages the capacity of regional partners to provide coastal observations and forecasts in support of local public safety and environmental needs,¹¹³¹ but the system is strained by aging infrastructure elements, including high-frequency radar stations. Additional NOAA programs that support coastal observations and forecasts include the Center for Operational Oceanographic Products and Services, the National Geodetic Survey, and the Office of Coast Survey.

Several members have introduced bills to address gaps in coastal monitoring and mapping. Reps. Suzanne Bonamici (D-OR) and Don Young (R-AK), along with Sens. Sheldon Whitehouse (D-RI) and Lisa Murkowski (R-AK), introduced the Bolstering Long-Term Understanding and Exploration of the Great Lakes, Oceans, Bays, and Estuaries (BLUE GLOBE) Act (H.R. 3548/S. 933) to expand NOAA data collection and monitoring efforts and to establish an Interagency Ocean Exploration Committee. Reps. Young and Bonamici also introduced the Integrated Coastal and Ocean Observation System (ICOOS) Act Amendments of 2019 (H.R. 1314), which passed the House as part of Coastal and Great Lakes Communities Enhancement Act (H.R. 729). This bill would authorize \$47.5 million per year for ICOOS. The companion Senate bill (S. 914), introduced by Sens. Roger Wicker (R-MS) and Maria Cantwell (D-WA), would also provide statutory authority for the National Water Center, which coordinates NOAA, USGS, U.S. Army Corps of Engineers (USACE), and other federal agency activities on water resources and flood prediction. Rep. Dutch Ruppersberger (D-MD) and Sen. Tammy Baldwin (D-WI) introduced the bipartisan Digital Coast Act (H.R. 2189/S. 1069), which would provide statutory

¹¹²⁵ USGS Groundwater and Streamflow Information Program, “Federal Priorities Streamgages (FPS) Mapper,” <https://water.usgs.gov/networks/fps/>. Accessed June 2020.

¹¹²⁶ Committee on the Future Water Resource Needs for the Nation, *Directions of the U.S. Geological Survey Water Mission Area* (National Academies of Science, Engineering, and Medicine, 2018).

¹¹²⁷ National Oceanic and Atmospheric Administration, National Ocean Service, “What is LIDAR?” <https://oceanservice.noaa.gov/facts/lidar.html>. Accessed June 2020.

¹¹²⁸ USGS, “3D Elevation Program (3DEP): What is 3DEP?” <https://www.usgs.gov/core-science-systems/ngp/3dep/what-is-3dep>. Accessed June 2020.

¹¹²⁹ Advisory Committee on Water Information, *Extreme Rainfall Product Needs* (2018), https://acwi.gov/hydrology/extreme-storm/product_needs_proposal_20181010.pdf.

¹¹³⁰ National Oceanic and Atmospheric Administration, Office for Coastal Management, “About Digital Coast,” <https://coast.noaa.gov/digitalcoast/about/>. Accessed June 2020.

¹¹³¹ National Oceanic and Atmospheric Administration, “Integrated Ocean Observing System: About Us,” <https://ioos.noaa.gov/about/about-us/>. Accessed June 2020.

authority to the NOAA Digital Coast program to support accelerated mapping of the U.S. coastline. This bill also passed the House as part of H.R. 729.

Rep. Suzan DelBene (D-WA) introduced the National Landslide Preparedness Act (H.R. 1261), which would provide statutory authority for the USGS 3D Elevation Program and strengthen the existing Landslide Hazards Program within USGS for mapping, monitoring, and communicating landslide hazard risks in the United States. The bill passed the House; Sen. Maria Cantwell (D-WA) introduced companion legislation in the Senate (S. 529).

Recommendation: Congress should expand federal Earth observation activities, including ocean, ground-based, aerial, and satellite networks, to support real-time hazard monitoring, short-term weather forecasting, and long-range projections of climate risk. Private sector and academic partners can help to accelerate these efforts, so long as the federal government sustains free and open access to Earth observations and forecasting resources.

Recommendation: Congress should direct NOAA to partner with NASA and other agencies and leverage research and innovations of non-federal experts in order to develop the next generation of fully coupled Earth system models for seamless weather and climate prediction.

Recommendation: Congress should increase funding and use of new and emerging technologies to accelerate the creation and deployment of high-resolution land surface and seafloor maps, including maps of Insular Areas, and to support nationwide mapping of climate-influenced hazards, including intense rainfall, sea level rise, flood, wildfire, landslide, drought, and extreme heat.

Recommendation: Congress should establish a Climate Change Insular Research Grant Program for higher education institutions in the territories to monitor, collect, synthesize, analyze, and publish local climate change data.

Recommendation: Congress should direct the National Weather Service to enhance support of its Weather Forecast Offices and Weather Service Offices located in rural, tribal, and Insular Areas, such as the San Juan, Tiyan, and Pago Pago forecast offices. Priorities include updating and maintaining equipment, enhancing research on climate impacts on hurricane and typhoon trends in the territories, and improving weather data collection in order to produce more accurate tropical weather models and predictions.

Committees of Jurisdiction: Science, Space, and Technology; Natural Resources

Building Block: Provide Federal Guidance on Climate-Informed Codes and Standards

Codes and standards guide decisions about where and how to build new homes, buildings, and infrastructure, including critical facilities like hospitals. In 2016, GAO concluded that existing standards mostly depend on outdated historical observations rather than forward-looking climate projections.¹¹³² GAO recommended that the National Institute of Standards and Technology (NIST), in consultation with NOAA, USGCRP, the Mitigation Framework Leadership Group (MitFLG), and other

¹¹³² Government Accountability Office, GAO-17-3, *Improved Federal Coordination Could Facilitate Use of Forward-Looking Climate Information in Design Standards, Building Codes, and Certifications* (November 2016).

relevant federal agencies, provide authoritative climate projections, data, and maps to standards-developing organizations for development of design standards, building codes, and voluntary certifications.¹¹³³

Rep. Matt Cartwright (D-PA) introduced the Built to Last Act of 2020 (H.R. 5994), which would require NOAA to identify a set of best available forward-looking meteorological information and require that NIST convene an interagency effort to make that information available to standards-setting organizations for consideration in setting standards, codes, and voluntary certifications.

Recommendation: Congress should direct NOAA to identify best available forward-looking climate risk information and direct the MitFLG to convene an interagency working group to provide technical input and climate risk projections to standards-setting organizations to guide the development of codes and standards.

Committee of Jurisdiction: Science, Space, and Technology

Support Community Leadership in Climate Resilience and Equity

The effects and costs of climate change are already manifesting across the nation and are projected to intensify, even as governments, businesses, and individuals take steps to reduce carbon pollution.^{1134,1135} These effects take many forms, including rising temperatures, increasingly severe storms, damaging wildfires, persistent droughts, river flooding, and chronic tidal inundation.¹¹³⁶ Over the past 20 years, disasters have increased in frequency, severity, and cost.¹¹³⁷ On average, 24% of counties have experienced at least one disaster in each of the last three years.¹¹³⁸ The 2017-2019 hurricane and wildfire seasons in the United States included six hurricanes that cost a combined \$332 billion in damage and eight wildfires causing more than \$47 billion in damage.¹¹³⁹ All federal agencies must consider climate risk in the implementation of their programs, including those that can support SLTT leadership and adaptation capacity.

Communities are on the front lines of climate impacts. Acute humanitarian crises take hold when disasters strike, and chronic challenges lead to losses of revenues and tax base.¹¹⁴⁰ Climate risks also

¹¹³³ Ibid.

¹¹³⁴ U.S. Global Change Research Program, *Fourth National Climate Assessment, Volume II* (November 2018).

¹¹³⁵ Government Accountability Office, GAO-19-157SP, *Limiting the Federal Government's Fiscal Exposure by Better Managing Climate Change Risks* (March 2019).

¹¹³⁶ U.S. Global Change Research Program, *Fourth National Climate Assessment, Volume II* (November 2018).

¹¹³⁷ National Oceanic and Atmospheric Administration, National Centers for Environmental Information, "Billion-Dollar Weather and Climate Disasters: Overview," <https://www.ncdc.noaa.gov/billions/>. Accessed June 2020.

¹¹³⁸ *Emergency Management in County Government: A National Survey* (National Association of Counties, 2019).

¹¹³⁹ National Oceanic and Atmospheric Administration, National Centers for Environmental Information, "Billion-Dollar Weather and Climate Disasters: Events." <https://www.ncdc.noaa.gov/billions/summary-stats/2017-2019>. Accessed June 2020; *Emergency Management in County Government: A National Survey* (National Association of Counties, 2019).

¹¹⁴⁰ U.S. Global Change Research Program, *Fourth National Climate Assessment, Volume II* (November 2018).

exacerbate longstanding social, racial, and economic inequities, with our most vulnerable at the greatest risk and with the least capacity to adapt.¹¹⁴¹ Public policies are evolving to confront these issues and to help prepare and transition communities toward resilience, but much work remains to align public policies and investments with community needs and capabilities.

This section provides recommendations to help the nation adapt to the unavoidable impacts of climate change and build resilience in institutions and the built environment. Adaptation is defined as the “[a]djustment in natural or human systems to a new or changing environment that exploits beneficial opportunities or moderates negative effects.”¹¹⁴² Resilience refers to the “[c]apability to anticipate, prepare for, respond to, and recover from significant multi-hazard threats with minimum damage to social well-being, the economy, and the environment.”¹¹⁴³ Congress needs to strongly encourage local communities to plan, adapt, and develop climate resilience strategies to mitigate risk and guide expenditures of taxpayer resources.

Building Block: Establish a National Climate Adaptation Program and Commission

Despite increased investments to help communities prepare for and recover from disasters, the United States lacks a comprehensive plan to address the nation’s need to adapt and build resilience to the climate crisis. The country must be smarter and innovative in the expenditure of taxpayer dollars and in the public-private partnerships that build climate resilience.

Recommendation: Congress should establish a National Climate Adaptation Commission tasked with development of overarching principles, goals, and objectives and a National Climate Adaptation Plan that:

- Embeds adaptation into federal programs and activities;
- Integrates economic, social, and environmental issues equitably;
- Balances the needs of current and future generations;
- Uses appropriate methodologies and information to support decision-making;
- Seeks synergy between adaptation to and mitigation of climate change; and
- Ensures public engagement, transparency, and accountability.¹¹⁴⁴

Participation in the National Climate Adaptation Commission should include federal departments and agencies with climate science and community development missions, private sector partners, representatives from states, local governments, tribes, and territories, and leaders from communities that are on the front lines of the climate crisis. The Commission should also coordinate directly with the Climate Risk Information Service proposed in this report. The National Climate Adaptation Plan should aim to protect U.S. communities and people from extreme climate impacts and to strengthen resilience of key economic sectors, including agriculture, health care, manufacturing, and tourism.

¹¹⁴¹ Ibid. at 36, 324, 333, 341, 746.

¹¹⁴² U.S. Global Change Research Program, “Glossary,” <https://www.globalchange.gov/climate-change/glossary>. Accessed June 2020.

¹¹⁴³ Ibid.

¹¹⁴⁴ Adapted from ISO 14090:2019, *Adaptation to Climate Change: Principles, Requirements and Guidelines* (International Standards Organization, 2019).

Rep. Ted Deutch (D-FL) introduced the Climate Change Resiliency Fund for America Act of 2019 (H.R. 1689), which establishes a Climate Change Advisory Commission to develop recommendations, frameworks, and guidelines for projects to respond to the impacts of climate change. The Commission also would issue federal obligations, the proceeds of which shall be used to fund projects that aid in adaptation to climate change.

Recommendation: Congress should establish a National Climate Adaptation Program that provides grants, finance capacity, and skilled technical assistance to states, local governments, tribes, and territories to finance and insure projects identified through hazard mitigation and climate adaptation plans, prioritizing low-income communities and communities of color that have been disproportionately affected by climate impacts. Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Committees of Jurisdiction: Natural Resources; Transportation and Infrastructure; Science, Space, and Technology

Building Block: Provide Skilled Technical Assistance to Support State, Local, Tribal, and Territorial Planning, Resilience, and Adaptation

Decision-makers at all levels of government need actionable risk information and technical assistance to support adaptation planning and prioritization. Decision-makers also need data and information to support potential planned transition of existing populations from areas that will no longer support vibrant and economically sustainable occupation to receiving communities that have planned and prepared for increases in population.

Since most decisions regarding land use, development standards, and building codes are made at the state and local levels, those decision-makers need guidance on the integration of climate risk information and tools to support longer-range planning, taking into account the impacts of climate change that are anticipated to occur over longer timescales. This would help states and communities to develop Climate Resilience Plans that address both current conditions and extreme weather, as well as the longer-term effects that can no longer be avoided as sea levels continue to rise, extreme precipitation events increase, and hotter, drier conditions cause droughts and extend wildfire risk to longer seasons and a wider range of landscapes.

The federal government currently deploys several technical assistance resources to help states, tribes, territories, and communities address a range of extreme weather and natural threats, including programs through the Federal Emergency Management Administration (FEMA), USACE, EPA, NOAA, the Small Business Administration (SBA), USDA, and more. While many of these initiatives may not be specifically designed to support climate adaptation planning, they could be harnessed and modernized to better meet community adaptation planning needs. These agencies also participate on the MitFLG that was established in support of and consistent with the National Preparedness Goal,¹¹⁴⁵

¹¹⁴⁵ FEMA, “National Preparedness Goal,” <https://www.fema.gov/national-preparedness-goal>. Accessed June 2020.

the Presidential Policy Directive 8,¹¹⁴⁶ and the Post-Katrina Emergency Management and Reform Act of 2006.¹¹⁴⁷ The MitFLG is chaired by FEMA and provides senior-level coordination of hazard mitigation efforts across the federal government, facilitating information exchange, coordinating policy implementation, and engaging with states, local governments, tribes, and territories.¹¹⁴⁸

Rep. Matt Cartwright (D-PA) introduced the Preparedness and Risk Management for Extreme Weather Patterns Assuring Resilience and Effectiveness (PREPARE) Act of 2019 (H.R. 4347) to enhance federal planning and preparation for extreme weather and to disseminate best practices to help regional, state, and local efforts to develop their plans to respond to extreme weather.

Recommendation: Congress should require states, local governments, tribes, and territories to develop and obtain approval for Climate Resilience Plans, as part of existing Hazard Mitigation Planning requirements and processes, as a condition for eligibility for grants and loans through the National Climate Adaptation Program.¹¹⁴⁹ Congress should ensure that skilled technical assistance is made available to support the development of Climate Resilience Plans. In order to encourage the most efficient expenditure of tax dollars, those plans should assess climate risks to homes, public assets, infrastructure, major employers, public health, and vulnerable areas and populations, including identification of repeatedly flooded properties; assess risks to and resilience of services derived from natural resources like agriculture; identify resilience projects that address the identified risks; and identify funding needs and finance approaches they are pursuing. Congress also should ensure that climate resilience and hazard mitigation plans are informed by meaningful public engagement and input from environmental justice communities and integrated into broader community planning processes, including comprehensive plans, capital improvement plans, workforce development and housing plans, and finance strategies, and should facilitate regional or watershed-scale planning for climate adaptation.

Recommendation: Congress should establish a new initiative to provide skilled technical assistance to help states, local governments, tribes, and territories assess their climate risks, adopt and enforce land use and development codes and standards to increase community resilience, develop Climate Resilience Plans, and identify projects to increase resilience, prioritizing low-income communities and communities of color that have been and will be disproportionately affected by climate impacts. Technical assistance should enhance and harness local workforce capabilities and help states, local governments, tribes, and territories develop project funding strategies and prepare grant requests for funds through the National Climate Adaptation Program. A new Interagency Technical Assistance Program for Climate Resilience organized through the MitFLG could deploy multidisciplinary teams for extended site visits to conduct risk assessments and support local plan development and advise on project finance, insurance, and implementation, prioritizing regional initiatives addressing climate

¹¹⁴⁶ FEMA, “Learn About Presidential Policy Directive-8: National Preparedness,” <https://www.fema.gov/learn-about-presidential-policy-directive-8>. Accessed June 2020.

¹¹⁴⁷ Post-Katrina Emergency Management and Reform Act of 2006, Pub L No 109-925, 120 Stat. 1394.

¹¹⁴⁸ MitFLG, *Mitigation Framework Leadership Group (MitFLG) Charter* (October 2013).

¹¹⁴⁹ The Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), as amended by the Disaster Mitigation Act of 2000, and its implementing regulations require state, tribal, and local governments to develop and adopt FEMA-approved hazard mitigation plans as a condition for receiving certain types of non-emergency disaster assistance. 42 U.S.C. 5165; 44 C.F.R. Part 201. In March 2016, FEMA put into effect a State Mitigation Plan Review Guide with information pertinent to how states must consider climate change in their plans.

justice and equity. Congress should authorize the program for five years at \$2 billion per year to reach communities across the nation, prioritizing frontline communities at greatest risk.

Recommendation: Congress should direct the MitFLG to develop, deploy, and maintain an accessible inventory of resources as a knowledge bank for hazard mitigation and climate resilience training and education, including “train-the-trainer” materials to expand reach and impact to help achieve the objective of the National Climate Adaptation Program to build community capacity.¹¹⁵⁰

Committee of Jurisdiction: Transportation and Infrastructure

Building Block: Establish Climate Adaptation Grants and Loans for States, Tribes, and Territories

Communities on the front lines of growing climate risk need federal assistance to confront not just growing physical risk, but also the potential economic consequences of living in risky areas, especially on insurance costs, tax revenues, and access to capital. A recent study showed that African American and Latino households tend to lose wealth after disasters, whereas white households gain wealth; these inequalities are exacerbated when accounting for disaster magnitude, education level, and homeowner versus renter status.¹¹⁵¹ Coastal communities are particularly vulnerable to sea level rise, high tides, and coastal storms that have already amplified coastal flooding and erosion, and this trend is expected to continue.¹¹⁵² Shoreline counties host more than 42% of the population and nearly 50 million housing units,¹¹⁵³ with homes and businesses worth more than \$1.4 trillion sited within one-eighth of a mile of the coast.¹¹⁵⁴ While decisions about whether to transition toward less risky areas or to invest in protective infrastructure should be informed by local preference and risk tolerance, it will ultimately fall to the federal government to establish national evaluative frameworks to prioritize limited federal funds that will be available to support these local decisions.

Signed into law in 2018, the Disaster Recovery Reform Act¹¹⁵⁵ created the National Public Infrastructure Pre-Disaster Hazard Mitigation Fund, which is funded by a 6% set-aside from a portion of estimated annual disaster grant expenditures. FEMA created the Building Resilient Infrastructure and Communities (BRIC) program to administer the pre-disaster mitigation grants. While the 6% set-aside will provide a funding stream to help communities pay for infrastructure improvements and other pre-disaster mitigation activities, the BRIC funding level is likely to fluctuate year to year, depending on the prior year’s disaster activity. Additionally, the program does not focus specifically on climate adaptation and resilience, particularly the needs for skilled technical assistance and sustained funding to help states, territories, tribes, and regions develop and implement adaptation plans with longer-range timelines. While current programs provide some adaptation help,

¹¹⁵⁰ MitFLG, *National Mitigation Investment Strategy* (August 2019), Recommendation 1.2 – Increase Mitigation Investment by Building the Capacity of Communities to Address Their Risks.

¹¹⁵¹ Rebecca Hersher and Robert Benincasa, “How Federal Disaster Money Favors The Rich,” *NPR, All Things Considered*, March 5, 2019; Junia Howell and James R. Elliott, “As Disaster Costs Rise, So Does Inequality,” *Socius: Sociological Research for a Dynamic World*, 4, no. 1-34 (2018).

¹¹⁵² U.S. Global Change Research Program, *Fourth National Climate Assessment, Volume II* (November 2018), Chapter 8: Coastal Effects.

¹¹⁵³ Ibid.

¹¹⁵⁴ Ryan McNeill, Deborah J. Nelson and Duff Wilson, “The crisis of rising sea levels: Water’s Edge,” *Reuters Investigates*, September 4, 2014.

¹¹⁵⁵ FAA Reauthorization Act of 2018, Division D, Disaster Recovery Reform Act of 2018, Pub L No 115-254.

communities need support developing longer-term strategies, including options to relocate and resettle willing neighborhoods or communities.

Several members of Congress have introduced bills to provide additional funding to communities to support pre-disaster risk reduction. Rep. Angie Craig (D-MN) introduced the Resilience Revolving Loan Fund Act of 2019 (H.R. 3779), which would allow FEMA to provide capitalization grants to states and tribes for establishing revolving funds to assist in reducing disaster risks. Funds can also be used to support resilience planning efforts and to enhance building codes, standards, and development planning processes. The House Democrats introduced a comprehensive infrastructure bill in June 2020, the Moving Forward Act (H.R. 2).¹¹⁵⁶ Section 23002 of this bill incorporates the provisions of the Resilience Revolving Loan Fund Act of 2019. Rep. Ted Deutch (D-FL) introduced the Climate Change Resiliency Fund for America Act of 2019 (H.R. 1689), which would create a Climate Change Resiliency Fund to help states, communities, tribes, utilities, transit agencies, and other special districts carry out projects to reduce the economic, social, and environmental impacts of climate change. Rep. Sam Graves (R-MO) introduced the Resilient Communities Act of 2019 (H.R. 3531), which would allow the FEMA Administrator to provide capitalization grants to states to establish revolving funds to reduce the harmful impacts to people and property from multiple hazards, including flood, wildfire, and drought. Sens. Gary Peters (D-MI) and Ron Johnson (R-WI) introduced the Safeguarding Tomorrow through Ongoing Risk Mitigation (STORM) Act of 2020 (S. 3418), which would establish similar hazard mitigation revolving funds.

In order to address the particular needs of coastal communities, Rep. Harley Rouda (D-CA) introduced the Coastal Communities Adaptation Act (H.R. 1317), which would provide coastal states with capitalization grants to establish Community Resilience Revolving Funds to help communities conduct vulnerability assessments, protect and enhance natural flood risk mitigation features, and carry out other measures to reduce climate risks to coastal communities.

Recommendation: Congress should authorize a new long-term climate adaptation funding program that supports the National Climate Adaptation Plan. It should use a means-tested approach to provide a mix of grants and loan financing, prioritizing grants based on risk and need and providing loan financing for projects that will generate a return for repayment and relending in a revolving loan approach. Congress should ensure that funded projects drive equitable and resilient outcomes for the long-term through objective evaluative criteria that consider the trade-offs of relocation and protection. Eligibility for funds should be conditioned on applicant states, tribes, territories, and communities completing climate resilience planning that identifies and prioritizes projects for implementation. Federal support for projects also should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Committees of Jurisdiction: Transportation and Infrastructure; Science, Space, and Technology; Oversight and Reform; Financial Services; Natural Resources

¹¹⁵⁶ Unless otherwise noted, mentions of H.R. 2 refer to the version of the bill contained in Rules Committee Print 116-54, dated June 22, 2020. The House of Representatives was preparing to debate H.R. 2 when the Select Committee's report went to print. The Rules Committee Print is available at <https://rules.house.gov/sites/democrats.rules.house.gov/files/BILLS-116HR2-RCP116-54.pdf> and will not reflect any amendments made to the bill after June 22, 2020.

Building Block: Recognize Community Leadership in Climate Resilience and Preparedness

As communities compete to attract economic development, private investment, and talent for a vibrant workforce and sustainable tax base, community recognition programs provide an effective platform to reward achievements and ensure continued progress. They can also give community leaders a network to share ideas and demonstrate the achievability of benchmarks. Importantly, as communities collaborate across economic regions, watersheds, and shorelines, adaptation and resilience planning can become more integrated, ensuring each community's plan reflects shared values and objectives.

For example, FEMA ran Project Impact from 1997-2001 and provided technical assistance and project funds for community organizing and disaster preparedness.¹¹⁵⁷ The program focused on tailored risk assessment, achievable benchmarks, partnerships across sectors, and visible recognition. Project Impact projects continue to benefit participating communities in reducing disaster losses.¹¹⁵⁸

Today, the National Weather Service StormReady Program,¹¹⁵⁹ Firewise communities,¹¹⁶⁰ and the National Flood Insurance Program Community Rating System¹¹⁶¹ all provide guidance, incentives, and public recognition to participating communities. While each of these programs can help drive progress against current hazards and potentially reduce future risks and impacts, none address the range of climate risks and measurable steps of planned transition to help communities prepare for the foreseeable impacts.

Recommendation: Congress should create Climate-Ready Communities as a recognition program modeled after the Project Impact program for communities that complete resilience and adaptation plans and projects, adopt and enforce robust development plans, codes, and standards, and achieve risk-reduction benchmarks for climate preparedness and resilience.

Committee of Jurisdiction: Transportation and Infrastructure

Building Block: Harness the Power of Students and Volunteers to Support Community Resilience

In 2016, Cities of Service launched the Resilience AmeriCorps program as a pilot program in partnership with The Rockefeller Foundation and the Corporation for National and Community Service (CNCS) to increase resilience of U.S. cities and tribal communities.¹¹⁶² With increased capacity and support, these cities worked with residents to make their communities more resilient in the face

¹¹⁵⁷ FEMA, "Project Impact: Building A Disaster Resistant Community" (November 1999), <https://www.fema.gov/news-release/1999/11/22/project-impact-building-disaster-resistant-community>.

¹¹⁵⁸ Eric Holdeman and Ann Patton, "Recovery: Project Impact Initiative to Create Disaster-Resistant Communities Demonstrates Worth in Kansas Years Later," *Government Technology – Emergency Management*, December 12, 2008.

¹¹⁵⁹ National Weather Service, "NWS StormReady Program: Working Toward a Weather-Ready Nation," <https://www.weather.gov/StormReady>. Accessed June 2020.

¹¹⁶⁰ National Fire Protection Association, "Firewise USA: Residents Reducing Wildfire Risks," <https://www.nfpa.org/Public-Education/Fire-causes-and-risks/Wildfire/Firewise-USA>. Accessed June 2020.

¹¹⁶¹ FEMA, "National Flood Insurance Program Community Rating System," <https://www.fema.gov/national-flood-insurance-program-community-rating-system>. Accessed June 2020.

¹¹⁶² Corporation for National and Community Service, "Public-Private Partnership Launches New AmeriCorps Program to Help Communities Build Resilience," July 9, 2015, <https://www.nationalservice.gov/newsroom/press-releases/2015/public-%E2%80%93-private-partnership-launches-new-americorps-program-help>. Accessed June 2020.

of challenges they may face as the climate continues to warm, including flooding, lack of access to healthy food, and extreme heat.

Rep. Judy Chu (D-CA) introduced the Climate Resiliency Service Corps Act of 2019 (H.R. 5176), which would establish a new AmeriCorps program under the National and Community Service Act dedicated to supporting climate impacts education, proactive community resilience initiatives, and disaster recovery assistance, while providing participants with valuable work experience, education, training, and career guidance.

Recommendation: Congress should establish a Climate Resilience Service Corps within the CNCS to carry out national service projects that improve community adaptation, mitigation, preparedness, response, and recovery from disasters and other climate-driven threats. Service projects should prioritize frontline communities of color, build local workforce skills and capabilities, and provide volunteers from frontline communities with opportunities to contribute to the resilience planning and project implementation in their own communities. Congress should direct the CNCS to coordinate with the Department of Labor to ensure overarching federal coordination of voluntary and workforce policy.

Committee of Jurisdiction: Education and Labor

Partner with Tribes and Indigenous Communities for Climate Adaptation and Resilience

The climate crisis is already taking a devastating toll on Native lands and tribal nations, threatening sacred ancestral homelands, burial sites, and cultural traditions, health, and livelihoods. The National Climate Adaptation Program should aim to meet the planning and assistance needs at all levels of government but recognize the specific capabilities and needs of tribes and Indigenous communities. The federal government would benefit through work with tribes, Alaska Native, and Pacific Island Indigenous communities in government-to-government relationships¹¹⁶³ to promote collaboration and recognize the role of traditional ecological knowledge in understanding the changing climate.

Building Block: Remove Barriers to Tribal Adaptation

Many federal programs provide grants to states or local governments based on population size, asset valuation, or other criteria that under-prioritize rural and tribal applicants. Tribal grants are often competitive and make up a small percentage of the overall grant profile amount at funding levels that fall short of tribal needs. For example, in 2019, nearly \$2.5 billion was allocated through Homeland Security Preparedness Grants, but only 0.4% or \$10 million was allocated directly to eligible tribes through a Tribal Homeland Security Grant Program.¹¹⁶⁴ More than twice that amount is requested

¹¹⁶³ President George W. Bush, “Memorandum on Government-to-Government Relationship With Tribal Governments,” The American Presidency Project (Gerhard Peters and John T. Woolley, editors), September 23, 2004, <https://www.presidency.ucsb.edu/node/213783>.

¹¹⁶⁴ FEMA, National Advisory Council, *National Advisory Council Report to the FEMA Administrator* (November 2019).

annually. Moreover, very little is known by federal program managers about the adaptation needs and capabilities in Indian Country, as only approximately 50 tribes of the 573 federally recognized tribes apply for funding through the Tribal Homeland Security Grant Program annually due to grant requirements that disadvantage or disqualify under-staffed applicants and those without access to professional grant writers.¹¹⁶⁵

Recommendation: Congress should establish a Tribal Government Task Force to coordinate with federal departments and agencies that make community development, planning, and infrastructure grants to states, local governments, tribes, and territories to evaluate the full complement of programs to provide greater access and equitable baseline funding to tribal nations and Indigenous communities across their programs for climate adaptation and resilience. If statutory barriers impede implementation of this direction, the Tribal Government Task Force should identify those barriers to Congress.

Committee of Jurisdiction: Natural Resources

Building Block: Accelerate Tribal Adaptation and Transition and Honor Treaty Rights to Traditional Lands and Waters

Tribal communities face significant barriers to funds needed for climate adaptation planning and implementation, including the need for willing frontline communities to relocate from hazardous locations and resettle on safer ground that can continue to support traditional cultural ways of life. There is no federal relocation framework for the development and implementation of adaptation planning for tribes and Indigenous communities, including identification and prioritization of relocation and resettlement options. Tribal communities are facing current and existential threats to safety and traditional ways of life.

For example, in its December 2003 report, GAO found that most Alaska Native villages experience flooding and erosion to some extent.¹¹⁶⁶ However, these villages often have difficulty qualifying for federal assistance to combat their flooding and erosion problems. In December 2004, Congress waived the federal cost-sharing requirement for flooding and erosion projects for Alaska Native villages and authorized the Secretary of the Army to carry out, at full federal expense, projects for storm damage prevention and coastal erosion in Alaska, including relocation of affected communities and construction of replacement facilities.¹¹⁶⁷ Communities exploring relocation options have struggled to identify relocation sites and to assemble needed funding to meet significant relocation and resettlement costs.

It is also important to acknowledge traditional lands and waters that tribes access under their treaty rights and the federal government's historical injustices and failure to honor those rights. For example, the Columbia River In-Lieu and Treaty Fishing Access Sites Improvement Act, enacted in December 2019, authorizes the Secretary of the Interior to assess and update electricity, water, and

¹¹⁶⁵ Ibid.

¹¹⁶⁶ Government Accountability Office, GAO-04-142, *Alaska Native Villages: Most Are Affected by Flooding and Erosion, but Few Qualify for Federal Assistance* (December 2003).

¹¹⁶⁷ Consolidated Appropriations Act, 2005, Pub. L. No. 108-447, Div. C, Title I, Sec. 117, 118 Stat. 2944-45 (2004).

sewer infrastructure at existing Bureau of Indian Affairs (BIA) facilities that were constructed to provide four Columbia River Tribes access to traditional fishing grounds following significant flooding in the region.¹¹⁶⁸

Recommendation: Congress should direct the MitFLG to create a federal relocation framework in collaboration with tribes, Indigenous communities, and Insular Areas that provides for the planned transition for communities seeking relocation assistance and protects access to traditional lands and waters for tribes and Indigenous communities, as well as rights to culture, health, safe drinking water, food, and adequate housing.

Recommendation: Congress should create a new Tribal and Indigenous Communities Adaptation Grants program that awards funds based on risk and prioritizes relocation and resettlement for communities at greatest risk. The program should provide funds to tribes and Indigenous communities whose planned transition is pending funding to obtain private insurance protection that can provide rapid payout to support emergency actions, evacuation, and resettlement in the event of a disaster. Projects should maximize workforce development, including assuring life-sustaining wages and career development opportunities in Indian Country, and assure health and safety protections for all workers involved in grant-funded projects.

Committees of Jurisdiction: Transportation and Infrastructure; Natural Resources

Building Block: Increase Funds to Existing Programs to Build Tribal Resilience

Despite the pressing need for investments in resilient housing, infrastructure, natural resources, and services in Native American and Indigenous communities, programs in BIA, the Bureau of Reclamation, and other agencies that manage grant programs to build tribal resilience are underfunded.

For example, funding to the Bureau of Reclamation Water Settlements Fund, which advances water infrastructure projects in Native American communities, has been exhausted on a handful of Indian water rights settlements authorized by Congress over the past decade, falling far short of the need for investments. Research indicates that Native American households are 19 times as likely as white households to lack running water and indoor plumbing,¹¹⁶⁹ even though the federal government has a legal responsibility to help ensure tribal water access. This lack of access to running water adversely affects tribal health, education, and economic development opportunities. Congress created the Reclamation Water Settlements Fund during the 111th Congress to pay for Indian water rights settlements.¹¹⁷⁰ An extension of the Settlements Fund is needed for several dozen pending and future settlements that have yet to be finalized and authorized by Congress.

The BIA Resilience Program provides federal-wide resources to tribes, tribal consortia, and authorized tribal organizations to build resilience through competitive awards for tribally designed resilience training, adaptation planning, vulnerability assessments, supplemental monitoring, capacity building,

¹¹⁶⁸ Columbia River In-Lieu and Treaty Fishing Access Sites Improvement Act, Pub L No 116-99.

¹¹⁶⁹ U.S. Water Alliance, *Closing the Water Access Gap in the United States: A National Action Plan* (November 2019).

¹¹⁷⁰ Pub L No 111-11. Sec 10501. Reclamation Water Settlements Fund.

and youth engagement. The program supports planning, science, and tools, as well as capacity for tribal ocean and coastal management, including the Great Lakes.

The BIA Cooperative Landscape Conservation program provides technical assistance and funding support to help tribal leaders and trust land managers better understand and mitigate climate impacts to ecosystems and communities. The program develops information and tools to support planning and decision-making to address the potential for increased extreme weather events and to implement strategies that improve the preparedness and resilience of communities in the face of a changing climate. The program also enables tribal participation in ocean and coastal planning. Although the program provides for the competitive allocation of funds for short-term projects and planning, tribal communities need support for long-term capacity building and sustained project implementation.

Fisheries are subject to several factors that can cause sudden and unexpected losses, leading to serious economic impact for fishers and their communities, including tribes with treaty fishing rights. In these instances, the Secretary of Commerce can declare a fishery disaster, making emergency funds available to prevent the collapse of this important economic sector during difficult times.

Rep. Joe Neguse (D-CO) introduced the 21st Century Conservation Corps for Our Health and Our Jobs Act (H.R. 7264), which would provide \$195 million for the Bureau of Indian Affairs, including \$100 million for Land and Water Claims Settlements to ensure tribes have access to land and water to meet domestic, economic, and cultural needs and \$50 million to be used for deferred maintenance projects in Indian Country. Chair Raúl Grijalva (D-AZ) introduced the Indian Water Rights Settlement Extension Act (H.R. 1904) to permanently extend the Reclamation Water Settlements Fund, which provides grants for Indian water rights settlements that fund clean water and wastewater infrastructure across Indian Country. The House Democrats included this bill, as approved by the House Committee on Natural Resources, in Section 81101 of their infrastructure bill, the Moving Forward Act (H.R. 2).

Recommendation: Congress should permanently extend and increase funds to the Reclamation Water Settlements Fund to fund water infrastructure projects in tribal communities.

Recommendation: Congress should significantly increase appropriations to the BIA Tribal Resilience Program for parity with federal investments to support state and local resilience and raise caps for relocation projects.

Recommendation: Congress should increase appropriations to the BIA Cooperative Landscape Conservation from \$15 million to \$25 million to strengthen the capabilities of tribes, Indigenous communities, and Alaska Native Villages, consortia, and organizations to support climate resilience and preparedness in community- and program-level planning, training, technical support, development of tools, monitoring, and response.

Recommendation: Congress should provide ongoing appropriations to maintain and enhance the Fisheries Disaster Assistance Program to support a resilient national fishing fleet.

Committee of Jurisdiction: Natural Resources

Reduce Climate Disaster Risks and Costs

Since 2005, the United States has experienced more than 150 billion-dollar events with more than \$1.1 trillion in economic losses, more than 7500 deaths, and federal disaster assistance costs exceeding \$450 billion.¹¹⁷¹ The climate crisis will only exacerbate these trends of increasing risk and cost, slowing economic growth, increasing volatility, and depreciating value of businesses and property in risky areas.¹¹⁷² Researchers estimate that U.S. GDP will decline by 1.2% for every degree Celsius of additional warming—for context, 1.2% of GDP in 2017 was \$234 billion.¹¹⁷³

These impacts are hitting low-income households, farmers, and traditionally marginalized communities hardest, driving a downward trend in livability and social resilience. One recent study of the economic effects of disasters on families found that checking account inflows fall 20% and outflows fall by more than 30% after a disaster.¹¹⁷⁴ Research also found that consumers rely more heavily on credit to meet their day-to-day needs after disasters due to lower availability of cash on hand.¹¹⁷⁵ Low-income groups with lower credit scores are more likely to file for bankruptcy following disasters.¹¹⁷⁶

Low-income households are often concentrated in flood-prone areas or live in neighborhoods with less investment in flood mitigation and infrastructure to manage floods and stormwater.¹¹⁷⁷ Federal hazard mitigation investments are informed by benefit-cost analyses that calculate avoided damage to property, so property-wealthy areas tend to be prioritized over areas with lower property values.¹¹⁷⁸ Meanwhile, extreme weather and climate risk can further devalue property, as perceptions of risk and realities of increasing insurance cost erode market value. For example, a 2018 nationwide study found that homes vulnerable to sea level rise sell for an average of 7% less than comparable homes that are not exposed, even after accounting for proximity to beaches.¹¹⁷⁹

¹¹⁷¹ National Oceanic and Atmospheric Administration, National Centers for Environmental Information, “Billion-Dollar Weather and Climate Disasters: Summary Stats,” <https://www.ncdc.noaa.gov/billions/summary-stats/2005-2019>. Accessed June 2020; Government Accountability Office, GAO-20-183T, *Disaster Recovery: Recent Disasters Highlight Progress and Challenges* (October 2019).

¹¹⁷² Galina B. Hale, Òscar Jordà, and Glenn D. Rudebusch, “The Economics of Climate Change: A First Fed Conference,” *Federal Reserve Bank of San Francisco: Economic Letter*. December 16, 2019, <https://www.frbsf.org/economic-research/publications/economic-letter/2019/december/economics-climate-change-first-fed-conference/>.

¹¹⁷³ Solomon Hsiang, et al., “Estimating economic damage from climate change in the United States,” *Science* 356 no. 6345 (2017): 1362-1369; U.S. Bureau of Economic Analysis, “Gross Domestic Product [GDPA],” retrieved from FRED, Federal Reserve Bank of St. Louis, <https://fred.stlouisfed.org/series/GDPA>. Accessed June 2020.

¹¹⁷⁴ Diana Farrell et al., *Weathering the Storm: The Financial Impacts of Hurricanes Harvey and Irma on One Million Households* (J.P. Morgan Chase & Co. Institute, 2018).

¹¹⁷⁵ Brigitte R. Tran and Tamara L. Sheldon, “Same storm, different disasters: Consumer credit access, income inequality, and natural disaster recovery” (2017), working paper, www.aeaweb.org/conference/2018/preliminary/paper/KaN3Ar6t.

¹¹⁷⁶ Ibid.

¹¹⁷⁷ Timothy W. Collins, Sara Grineski, and Jayajit Chakraborty, “Environmental injustice and flood risk: A conceptual model and case comparison of metropolitan Miami and Houston, USA,” *Regional Environmental Change* 18 (2) (2018): 311-323.

¹¹⁷⁸ Christina Rosale, “In a segregated Houston, unequal neighborhoods means unequal flood protection,” Texas Low Income Housing Information Service, March 22, 2018.

¹¹⁷⁹ Alex Harris, “The risk of sea level rise is chipping away at Miami home values, new research shows,” *Miami Herald*, Apr. 24, 2018; Asaf Bernstein et al, *Disaster on the Horizon: The Price Effect of Sea Level Rise* (Journal of Financial Economics, 2018).

In response to recommendations from GAO for a federal investment strategy to enhance national resilience to future disasters,¹¹⁸⁰ the MitFLG published its National Mitigation Investment Strategy (NMIS) in 2019.¹¹⁸¹ The NMIS calls for embedding hazard mitigation into public investment decisions and for the federal government and nonfederal partners to “use and expand financial products and approaches for mitigation investment—including funding, incentives, and financial risk transfer opportunities.”¹¹⁸² The NMIS recommends that risk information be more accessible, funding be easier to access, and common measures be applied to aid decision-making.¹¹⁸³ The NMIS also calls for strengthening critical infrastructure and adopting and enforcing robust building codes and standards.¹¹⁸⁴

This section responds to these calls to action, focusing on buying down risk in advance of disasters and accelerating resilient recovery when disasters strike.

Building Block: Increase Pre-Disaster Mitigation Investment

Although pre-disaster mitigation investments provide an average sixfold return,¹¹⁸⁵ most federal disaster spending occurs after disasters with massive costs, loss to national and regional GDP, loss of jobs, and economic instability. The Disaster Recovery Reform Act of 2018, Section 1234, authorized the National Public Infrastructure Pre-Disaster Mitigation assistance program to be funded through the Disaster Relief Fund as a 6% set-aside from estimated disaster grant expenditures.¹¹⁸⁶ FEMA estimates that the program will be funded at \$300 million to \$500 million per year, with significantly greater amounts of money in years that have a high number of catastrophic disaster obligations.¹¹⁸⁷ For example, the pandemic disaster declaration and associated disaster spending may significantly increase funding to the BRIC program for FY2021. While a 6% set-aside supports investment in mitigation before a disaster, the program’s funding levels are based on the previous year’s disaster expenditures. This prevents the program from providing reliable levels of pre-disaster mitigation investment.

An increase in the percentage of grant expenditures that are set aside each year and establishment of a minimum funding level would improve FEMA’s capacity to meet the demand for essential pre-disaster mitigation strategies, including home elevation, buyout/relocation, and ecosystem restoration. These investments could also help scale up resilient infrastructure systems to better respond to the needs of a region in the event of a disaster. Congress needs to ensure FEMA prioritizes these lower-cost strategies over large-scale structural flood risk management projects by setting a funding cap on large infrastructure projects.

¹¹⁸⁰ Government Accountability Office, GAO-15-515, *Hurricane Sandy: An Investment Strategy Could Help the Federal Government Enhance National Resilience for Future Disasters* (July 2015).

¹¹⁸¹ MitFLG, *National Mitigation Investment Strategy* (August 2019), <https://www.fema.gov/media-library/assets/documents/181812>.

¹¹⁸² Ibid., Goal 3.

¹¹⁸³ Ibid., Goals 1 and 2.

¹¹⁸⁴ Ibid., Goal 3.

¹¹⁸⁵ National Institute of Building Sciences, *Natural Hazard Mitigation Saves: 2019 Report* (December 2019).

¹¹⁸⁶ FAA Reauthorization Act of 2018, Division D, Disaster Recovery Reform Act of 2018, Pub L No 115-254.

¹¹⁸⁷ Eric Holdeman, “Preparedness: BRIC: Expanding the Concepts of Federal Pre-Disaster Mitigation,” *Government Technology – Emergency Management*, September 25, 2019.

Rep. Joe Neguse (D-CO) introduced the 21st Century Conservation Corps for Our Health and Our Jobs Act (H.R. 7264), which would increase funds to FEMA's BRIC program to support states, local governments, tribes, and territories as they undertake hazard mitigation projects to reduce the risks they face from disasters and natural hazards.

Recommendation: In order to save substantial taxpayer dollars in the long run, Congress should increase the set-aside for the BRIC Pre-Disaster Mitigation program from 6% to 12% to provide funding and technical assistance to states, local governments, tribes, and territories. Congress should set a minimum funding level of \$2 billion for the BRIC program to ensure that FEMA maintains a steady funding stream and staffing capacity to support multi-year planning and implementation. Congress should direct FEMA to prioritize funding to support planning and projects in disadvantaged and vulnerable communities that are disproportionately affected by natural hazards and pollution. Congress also should cap BRIC funding at \$10 million for large infrastructure projects to enable funding to meet demand for the full range of pre-disaster mitigation projects across the United States. Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Committee of Jurisdiction: Transportation and Infrastructure

Building Block: Ensure Access to Affordable and Climate-Resilient Housing

Many communities across America are in the grips of an affordable housing shortage, and climate-influenced disasters are exacerbating the problem. Housing units for low- and moderate-income (LMI) families are disproportionately exposed to disasters, such as wildfires and floods, but they are less likely to be able to withstand disaster impacts.¹¹⁸⁸ After disasters, LMI communities are often the slowest to recover,¹¹⁸⁹ especially when replacement of destroyed public housing units is slow or non-existent.¹¹⁹⁰ Communities outside the disaster-ravaged areas often must absorb families who are forced to relocate. Meanwhile, land values and housing costs in less risky areas that were affordable when they were established are now rising along with demand.¹¹⁹¹ Embedding consideration of climate resilience in federal housing initiatives could help to increase the availability of affordable and resilient housing for all households.

The Department of Housing and Urban Development (HUD), USDA, and other federal agencies encourage affordable housing through lending support, rental assistance, and block grants to SLTT governments.¹¹⁹² Through its leverage over the range of housing programs, the federal government can ensure that affordable housing is also resilient to the impacts of climate change, including

¹¹⁸⁸ Laurie Schoeman, "Pre- and Post-Disaster Investments in Housing and Community Development Under the CRA," *Community Development Innovation Review* 14, no. 1 (2019).

¹¹⁸⁹ Caroline Ratcliffe et al., *Insult to Injury: Natural Disasters and Residents' Financial Health* (Urban Institute, 2019).

¹¹⁹⁰ Edgar Walters, "'It's our form of apartheid': How Galveston stalled public housing reconstruction in the 10 years after Ike," *Texas Tribune*, April 16, 2018.

¹¹⁹¹ Jesse M. Keenan et al., "Climate gentrification: from theory to empiricism in Miami-Dade County, Florida," *Environmental Research Letters* 13 (2018): 054001.

¹¹⁹² Congressional Research Service, *Overview of Federal Housing Assistance Programs and Policy* (March 2019).

worsening flooding and wildfires. For example, in January 2020, a group of six Democratic senators sent letters to Fannie Mae and Freddie Mac highlighting their responsibility to ensure consideration of climate resilience in lending to LMI households.¹¹⁹³ In addition to requiring resilience-based codes and standards in federally backed lending, federal housing programs can also direct technical and financial assistance toward making resilience-based construction and retrofits available to all families.

Chairwoman Maxine Waters (D-CA) introduced the Housing is Infrastructure Act of 2019 (H.R. 5187), which authorizes appropriations for the following HUD, USDA, and U.S. Treasury housing programs:

- Lending support. USDA Section 504 loans for low-income rural homeowners and U.S. Treasury Capital Magnet Fund support for Community Development Financial Institutions.
- Rental assistance. HUD Public Housing Capital Fund, USDA Rural Housing Service Rural Multifamily Preservation and Revitalization Demonstration program, HUD Section 202 housing for the elderly, and HUD Section 811 housing for persons with disabilities.
- Block grants. HUD Housing Trust Fund, Native American Housing Block Grant program, HOME Investment Partnerships program, and Community Development Block Grants.

For all the above programs, the bill requires at least 10% of appropriated funds be set aside for green housing investments toward improving water and energy efficiency. The bill also invests \$1 billion into the FEMA Flood Mitigation Assistance grant program, which supports flood resilience improvements to housing and businesses in communities that participate in the National Flood Insurance Program. The House Democrats included the Housing is Infrastructure Act in Division J of their infrastructure bill, the Moving Forward Act (H.R. 2).

Recommendation: Congress should reauthorize and leverage support for HUD, USDA, U.S. Treasury, and other federal housing assistance programs and ensure that loans for new construction and improvements are resilient against flood, wildfire, and other climate risks. Congress should increase housing assistance program funds, including the National Housing Trust Fund and the Community Development Financial Institutions Fund, to support affordable construction and retrofits to mitigate and adapt to the impacts of climate change. Congress should also establish a new National Housing Stabilization Fund to provide assistance to households facing property damage, displacement, or rising housing costs due to the impacts of climate change.

Recommendation: Congress should require that HUD, USDA, U.S. Treasury, and other agencies that manage federal housing initiatives provide clear guidance and technical assistance to housing assistance agencies and communities to enable adoption and enforcement of climate-resilient building and retrofitting practices for affordable housing, and ensure that home construction or retrofits supported through federal housing loans and grants use climate-resilient codes and standards for flooding, wildfire, extreme heat, and other climate-influenced disasters.

Recommendation: Congress should authorize and appropriate \$1 billion for the FEMA Flood Mitigation Assistance grant program, and it should ensure that Flood Mitigation Assistance grants for

¹¹⁹³ Senators Brown, Whitehouse, Schatz, Van Hollen, Shaheen, and Heinrich, Letters to Fannie Mae and Freddie Mac on Climate Risks, January 31, 2020,

<https://www.banking.senate.gov/imo/media/doc/Fannie%20Freddie%20Letters%20Climate%20Risks.pdf>.

multifamily, attached, and semi-attached residences balance flood mitigation and affordability concerns.

In each of these recommendations, federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Committees of Jurisdiction: Financial Services; Agriculture

Building Block: Increase the Resilience of Rural Communities

Rural areas may struggle to secure public resources if they lack community or economic development staff or organizations or cannot afford grant writers and lobbyists to assist them. Federal programs often also lack flexibility and are too narrow to lead to transformative solutions to a community's complex needs. For example, rural communities seeking to improve housing, modernize infrastructure, and address community health needs to increase resilience would need to pursue multiple federal grants and project authorizations across multiple federal agencies, each with unique administrative processes and eligibilities. Rural communities often do not qualify for grants designed for applicants with comprehensive community development capabilities, and struggle to compete with their urbanized neighbors for oversubscribed federal funds and technical assistance. With many disaster mitigation programs focused on metrics that prioritize population density and property wealth, rural communities are at a disadvantage. A national effort is needed to provide intentional focus on and prioritization of rural community needs in order to increase their resilience and better address the range of social and economic challenges that communities of all sizes confront.

Rep. Antonio Delgado (D-NY) introduced the Rebuild Rural America Act of 2019 (H.R. 4874), which would establish a Rural Future Partnership Fund to provide multi-year, flexible block grants to support regional revitalization and resilience for rural communities, including projects supporting infrastructure, main street revitalization, skills training and job placement, public services, disaster response, sustainability, and the establishment of new rural-urban connections.

Recommendation: Congress should create a new program to provide long-term federal investment to help rural communities overcome barriers to support comprehensive and locally driven community and economic development for resilience, including projects to strengthen housing, upgrade infrastructure, and provide skills training and job placement. Congress should also increase the availability of grants to address housing, wastewater, and public health challenges in rural areas experiencing persistent poverty. Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Committee of Jurisdiction: Agriculture

Building Block: Help Families and Small Businesses Prepare and Adapt to Climate Change

The SBA provides loan guarantees to financial institutions to incentivize lending to small businesses. SBA low-interest loans are the primary source of financial assistance for long-term disaster recovery for homeowners and renters as well as business owners.¹¹⁹⁴ Eligibility requirements on SBA loans help to incentivize resilient construction and rebuilding; for example, SBA requires that borrowers repairing flood damage obtain flood insurance whether they are located inside or outside a Special Flood Hazard Area.

Small businesses can use many of the SBA guaranteed loan programs for major fixed assets such as land, structures, machinery, and equipment. For small businesses looking to access capital to address climate change issues, such as mitigation measures to reduce energy use and emissions or by making improvements to be more resilient to climate impacts, the SBA loan guarantee programs may be a viable option. In recognizing that businesses may be looking to make costly energy infrastructure improvements to reduce emissions or increase use of renewable energy, the SBA 504/CDC loan guarantee program provides an increased loan limit of up to \$5.5 million, \$500,000 greater than the standard loan guarantee.¹¹⁹⁵

SBA also offers counseling and training services through partnerships with Small Business Development Centers, Women's Business Centers, SCORE, and Veterans Business Outreach Centers to help entrepreneurs launch and grow small businesses. With more than 1,000 centers and subcenters across the country, these resource partners are well-positioned to provide technical assistance and support to businesses seeking to address climate change.

Recommendation: Congress should direct SBA to promote more lending by banks and other lenders for projects that help small businesses adapt to climate change. Congress should also direct SBA to work with resource partners to provide support to small businesses that have experienced or will experience the impacts of climate change to ensure that their business models are considering these risks.

Committee of Jurisdiction: Small Business

Building Block: Expand the Emergency Watershed Protection Floodplain Easements Program

The USDA Natural Resources Conservation Service (NRCS) Emergency Watershed Protection Floodplain Easement Program was created as an option for landowners where acquiring an easement is the most economical and efficient approach to reduce threats to life and property. Floodplain easements help to reduce flood risk by restoring and preserving natural floodplain functions while providing co-benefits such as improvements to water quality, habitat, and groundwater recharge. Restoration techniques restore the flow and storage of floodwaters, control erosion, and improve management of the easement.

¹¹⁹⁴ SBA, "Disaster Loan Assistance: Federal Disaster Loans for Businesses, Private Nonprofits, Homeowners, and Renters," <https://disasterloan.sba.gov/ela/Home/Questions>. Accessed June 2020.

¹¹⁹⁵ SBA, "Office of Financial Assistance: Resources," <https://www.sba.gov/offices/headquarters/ofa/resources/4049>. Accessed June 2020.

In response to widespread and persistent flooding in Central and Midwestern states, NRCS opened \$217.5 million in funding for the purchase of conservation easements on land damaged by flooding in Arkansas, Illinois, Iowa, Louisiana, Minnesota, Missouri, Nebraska, North Carolina, South Dakota, Texas, and Wisconsin.¹¹⁹⁶ Funding for the easement program came from a supplemental disaster bill that provided USDA a total of \$4.5 billion for various disaster losses and repairs, as well as floodplain management.¹¹⁹⁷

Additionally, the NRCS programs that can help states reduce agricultural operations in flood-prone areas include the Watershed and Flood Prevention Program and the Emergency Watershed Protection Floodplain Easements Program. Following Hurricane Florence, the North Carolina Department of Agriculture and Consumer Services used NRCS program funds to implement the state's voluntary Swine Floodplain Buyout program for swine operations and waste lagoon conversion within the federally mapped 100-year floodplain, allowing the state to establish conservation easements on the properties.¹¹⁹⁸ In response to demand for assistance from the hurricane that spanned wider areas of damage, the state also requested \$75 million to expand the voluntary buyout program to make operations within the 500-year floodplain eligible for buyout assistance.¹¹⁹⁹

Recommendation: Congress should increase funds to the NRCS Emergency Watershed Protection Floodplain Easements Program to help communities quickly address serious and longstanding damage to infrastructure and land and help communities cope with adverse impacts of the climate crisis, without having to wait for a federal disaster declaration.

Recommendation: Congress should expand the NRCS Watershed and Flood Prevention Program and the Emergency Watershed Protection Floodplain Easements Program to target additional assistance specifically for the purposes of helping states establish and implement agricultural operation buyouts and waste lagoon conversion in flood- and wildfire-prone areas, including the 500-year floodplain.

Additional programs for increasing the resilience of agricultural lands appear in the section of this report titled “Increase Agricultural Carbon Sequestration and Resilience Through Climate Stewardship Practices.”

Committee of Jurisdiction: Agriculture

Building Block: Reduce the Risks and Costs of Toxic Releases in Storms

When Hurricane Harvey made landfall near Houston, Texas in 2017, the heavy rainfall not only inundated neighborhoods, it also flooded the city’s brownfields and Superfund toxic waste sites. Immediately after the storm, EPA reviewed aerial imagery and confirmed what concerned residents

¹¹⁹⁶ U.S. Department of Agriculture, NRCS, “NRCS Offers more than \$200 Million in Emergency Funding to Restore Flood-Prone Lands: 11 states identified to invest in floodplain easements,” July 24, 2019, <https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/newsroom/releases/?cid=NRCSEPRD1469823>.

¹¹⁹⁷ Additional Supplemental Appropriations for Disaster Relief Act, 2019, Pub L No 116-20.

¹¹⁹⁸ North Carolina Department of Agriculture and Consumer Services, “Swine Buyout Program,” <https://www.ncagr.gov/SWC/easementprograms/SwineFloodplainBuyout.html>. Accessed June 2020.

¹¹⁹⁹ North Carolina Governor Roy Cooper, “Hurricane Florence Recovery Recommendations: Building Communities Stronger and Smarter,” October 10, 2018, https://files.nc.gov/ncosbm/documents/files/Florence_Report_Full.pdf.

already suspected—that Harvey had flooded 13 of the 41 Superfund sites in Texas and caused “possible damage.”¹²⁰⁰ The hurricane also led to the release of at least 340 tons of air toxics, according to voluntary excess emissions reports filed by industrial facilities.¹²⁰¹ In Puerto Rico the same year, Hurricane Maria caused widespread and long-term damage. Among the effects, researchers found that soil levels of PCBs, toxic chemicals banned since 1979, tripled after the storm. That same study found that PCB levels in the bodies of local residents also rose significantly.¹²⁰² In North Carolina, Hurricane Florence in 2018 flooded two of Duke Energy’s coal ash sites. Coal ash is a toxic byproduct of coal combustion that utilities often store in large ponds.¹²⁰³

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), otherwise known as Superfund, makes polluters liable for the costs to clean up releases of environmental contamination at the nation’s worst toxic waste sites. Since enactment, this liability has not attached to releases that are attributable solely to an “Act of God.” The definition of that term is “an unanticipated grave natural disaster or other natural phenomenon of an exceptional, inevitable, and irresistible character,”¹²⁰⁴ and potentially includes hurricanes and other extreme weather events associated with climate change. This exemption from liability could complicate cleanup of contamination following extreme weather events and removes incentives to prevent releases in such events.

CERCLA also requires EPA to identify certain classes of facilities to establish and maintain “evidence of financial responsibility consistent with the degree and duration of risk associated with the production, transportation, treatment, storage, or disposal of hazardous substances.”¹²⁰⁵ The EPA proposed the first of these requirements in January 2017, identifying safeguards that hard-rock mining facilities could adopt to lower their risk of toxic releases. Under the proposal, facilities could lower their financial assurance obligations by adopting those safeguards. That structure incentivized facility improvements to avoid environmental contamination.¹²⁰⁶ Later that year, EPA published a decision not to finalize those requirements.

Section 621 of the Energy and Commerce Committee’s discussion draft of the Climate Leadership and Environmental Action for our Nation’s (CLEAN) Future Act changes the definition of “Act of God” in CERCLA to make clear that CERCLA liability applies to toxic releases following hurricanes and other climate change-related weather events.¹²⁰⁷

That section also builds on the financial responsibility requirements in current law by requiring EPA to identify classes of facilities that should meet financial responsibility requirements because of their risk

¹²⁰⁰ Jason Dearen and Michael Biesecker, “Toxic waste sites flooded in Houston area,” *Associated Press*, September 3, 2017.

¹²⁰¹ U.S. Environmental Protection Agency, Office of Inspector General, Report No. 20-P-0062, *EPA Needs to Improve Its Emergency Planning to Better Address Air Quality Concerns During Future Disasters* (December 16, 2019).

¹²⁰² Christopher Flavelle, “‘Toxic Stew’ Stirred Up by Disasters Poses Long-Term Danger, New Findings Show,” *New York Times*, July 15, 2019.

¹²⁰³ Will Doran and John Murawski, “Duke Energy confirms new coal ash spill in North Carolina,” *The News & Observer*, September 20, 2018.

¹²⁰⁴ 42 U.S.C. § 9601.

¹²⁰⁵ 42 U.S.C. § 9608.

¹²⁰⁶ 82 Fed. Reg. 3388.

¹²⁰⁷ Title VI, Section 621, CLEAN Future Act discussion draft.

of releasing pollution during and after extreme weather events.¹²⁰⁸ As in the 2017 proposed rule for financial responsibility requirements, EPA would identify adaptation measures facilities could undertake to reduce their risk and their commensurate regulatory burden. The draft directs EPA to prioritize classes of facilities that present the highest level of risk, as determined by the EPA administrator.

Section 622 of the discussion draft of the CLEAN Future Act¹²⁰⁹ and Section 33151 of the House Democrats' infrastructure bill, the Moving Forward Act (H.R. 2), authorize and extend funding for cleanup and reuse of contaminated properties.

Recommendation: Congress should establish financial assurance requirements under CERCLA for the toxic releases likely to occur at industrial facilities and coal ash ponds because of extreme weather associated with climate change.

Recommendation: Congress should increase funding at EPA to provide grants and technical assistance to communities, states, tribes, and others to clean up and reuse contaminated properties (brownfields).

Committee of Jurisdiction: Energy and Commerce

Building Block: Direct the Economic Development Administration to Consider Climate Resilience in Grant Applications for Public Works and Economic Adjustment Assistance

The Economic Development Administration (EDA) administers grants for “construction, non-construction, planning, technical assistance, and revolving loan fund projects” to support job creation in economically distressed communities.¹²¹⁰ Congress provided \$333 million in regular appropriations to EDA in FY2020, a 10% increase over FY2019.¹²¹¹ The two largest EDA grant programs supported through regular appropriations are for (1) Public Works and Economic Development Facilities and (2) Economic Adjustment Assistance (EAA), which includes Assistance to Coal Communities.¹²¹²

In its most recent Climate Change Adaptation Strategy issued in 2014, the Department of Commerce indicated that EDA would “finalize internal guidance on how to factor resilience (including resilience to the effects of climate change) into its grant-making investment decisions.”¹²¹³ However, the current FY2020 EDA Public Works and EAA Notice of Funding Opportunity, which sets eligibility requirements and programmatic priorities for grant applications, does not mention climate resilience or mitigation of disaster impacts.¹²¹⁴

¹²⁰⁸ Title VI, Section 621(b), CLEAN Future Act discussion draft.

¹²⁰⁹ Title VI, Section 622, CLEAN Future Act discussion draft.

¹²¹⁰ EDA, “Funding Opportunities,” <https://www.eda.gov/funding-opportunities/>. Accessed June 2020.

¹²¹¹ Consolidated Appropriations Act of 2020, Pub L No 116-93, Division B, Title I.

¹²¹² EDA, “Funding Opportunities,” <https://www.eda.gov/funding-opportunities/>. Accessed June 2020.

¹²¹³ Department of Commerce, *Climate Change Adaptation Strategy* (June 2014), http://www.osec.doc.gov/oefq/Documents/OSEEP/Annual%20Rpts%20&%20Scrards/Final%20DOC%20Adaptation%20Plan_Final_2014-6-10.pdf.

¹²¹⁴ Grants.gov, “FY 2020 EDA Public Works and Economic Adjustment Assistance Programs,” <https://www.grants.gov/web/grants/view-opportunity.html?oppId=321695>. Accessed June 2020.

Recommendation: Congress should direct EDA to include pre-disaster mitigation and climate resilience among programmatic priorities in its Public Works and EAA grant programs.

Committee of Jurisdiction: Transportation and Infrastructure

Building Block: Modernize Resilience Finance Standards for Government-Sponsored Enterprises

Government-sponsored enterprises (GSEs) are quasi-governmental entities established to enhance the flow of credit to specific sectors of the American economy.¹²¹⁵ For example, Fannie Mae and Freddie Mac guarantee loans against default with taxpayer dollars. The increasing climate risk to mortgages therefore embeds climate risk into the federally backed mortgage market, posing a potential threat to the stability of financial institutions. Experts warn that the fallout from climate-induced disasters could be on par with that of the 2008 financial crisis.¹²¹⁶ No agency or oversight body tracks whether federally backed loans are sufficiently secured with hazard insurance or monitors post-disaster default rates on federally backed loans. There is a need for federal action to ensure that GSE lending criteria require that housing meets federal standards for floods and wildfires and that loans are insured against these risks.

The FY2020 National Defense Authorization Act (NDAA) includes a provision requiring audits of the financial viability of privatized military housing units that have been affected by extreme weather events within the three years prior to 2020 NDAA enactment.¹²¹⁷ Similar audit requirements for GSEs would help characterize the risks and financial resilience of federally-backed mortgages against extreme weather and other effects of climate change.

Recommendation: Congress should require that GSEs perform audits of the financial viability of loans that have been affected by extreme weather and report on whether federally-backed loans in flood- and wildfire-prone areas are secured with hazard insurance as well as the post-disaster default trends on loans in their portfolios.

Recommendation: Congress should require that GSEs apply federal flood and wildfire standards in their lending criteria for new loans.

Committees of Jurisdiction: Transportation and Infrastructure; Agriculture; Financial Services

¹²¹⁵ The Federal National Mortgage Association and the Federal Home Loan Mortgage Corporation provide assistance to the secondary market for residential mortgages. The Federal Home Loan Banks assist thrift institutions, banks, insurance companies, and credit unions in providing financing for housing and community development. Institutions of the Farm Credit System, which include the Agricultural Credit Bank and Farm Credit Banks, provide financial assistance to agriculture. The Federal Agricultural Mortgage Corporation, also a Farm Credit System institution, provides a secondary market for agricultural real estate, rural housing loans, and certain rural utility loans, as well as for farm and business loans guaranteed by the U.S. Department of Agriculture.

¹²¹⁶ Amine Ouazad and Matthew E. Kahn, *Mortgage Finance in the Face of Rising Climate Risk* (National Bureau of Economic Research, September 2019), <https://www.nber.org/papers/w26322.pdf>.

¹²¹⁷ Sec. 3016, NDAA for FY2020, H. Rept. 116-333, 116th Congress, www.congress.gov/116/crp/116hrpt333/CRPT-116hrpt333.pdf.

Building Block: Account for the Future Value of Climate-Resilient Investment

Many federal programs that provide funding for resilience projects use a benefit-cost analysis methodology based on a discount rate – the interest rate used to convert benefits and costs occurring in different time periods to a common present value – to determine cost-effectiveness as a condition for receiving funds. A cost-effective project is one in which its future benefits exceed its cost. The higher the discount rate, the lower the calculated value of future benefits.

The GAO notes that the benefits from climate resilience projects may be realized far into the future as climate change becomes more pronounced.¹²¹⁸ The Office of Management and Budget (OMB) guidance to federal agencies on the development of regulatory analyses calls for special ethical considerations when comparing benefits and costs across generations and advises agencies to consider lower discount rates.¹²¹⁹ FEMA's National Advisory Council has concluded that the agency's discount rate of 7% is outdated and artificially high, presenting a significant impediment to hazard mitigation efforts that are cost-effective where the benefits may accrue well into the future.¹²²⁰ The Council recommends that FEMA lower the discount rate to 2%-3% or even as low as -1% to more accurately reflect the future value of the benefits of hazard mitigation investments and align with the current interest rates on federal long-term investments or with the practice of other countries that are aggressively addressing natural hazard mitigation.¹²²¹

Recommendation: Congress should direct FEMA to require use of the annually updated discount rates in benefit-cost calculations, as published in Appendix C of OMB Circular A-94, to more accurately reflect the future value of investments in hazard mitigation.

Committee of Jurisdiction: Transportation and Infrastructure

Building Block: Reform the Tax Code to Incentivize Resilience Investments

Despite billions of taxpayer dollars being spent on disaster recovery each year, Congress has provided few federal tax incentives to encourage hazard mitigation. FEMA grants to retrofit homes and buildings under the Stafford Act and Pre-Disaster Mitigation Grant programs are eligible for federal tax exemption, but state and locally funded grants and private grants to make homes and buildings more resilient are not eligible for this exemption. Several states sponsor these types of successful mitigation grant programs, including the California Brace and Bolt program for strengthening buildings to make them more earthquake resistant, the Strengthen Alabama Homes grants to upgrade homes to be more resilient against extreme winds and hurricanes, and the North Carolina Insurance Underwriting Association's Strengthen Your Roof wind mitigation grants program. Under current tax law, recipients of these state-funded grant programs are responsible for the tax liability of the amount of the grant, which reduces the amount of funds available to cover the cost of mitigation.

¹²¹⁸ Government Accountability Office, GAO-20-127, *Climate Resilience: A Strategic Investment Approach for High-Priority Projects Could Help Target Federal Resources* (October 2019).

¹²¹⁹ OMB Circular A-4, *Regulatory Analysis* (September 17, 2003).

¹²²⁰ FEMA, National Advisory Council, *National Advisory Council Report to the FEMA Administrator* (November 2019).

¹²²¹ Ibid.

Reps. Mike Thompson (D-CA) and Ken Calvert (R-CA) introduced the Catastrophe Loss Mitigation Incentive and Tax Parity Act of 2019 (H.R. 5494), which would eliminate individuals' tax liability for grants made under a state-based catastrophe loss mitigation program for the purpose of averting damage from windstorms, earthquakes, and wildfires. The House Democrats included this tax reform in Section 90501 of their infrastructure bill, the Moving Forward Act (H.R. 2).

Reps. Gus Bilirakis (R-FL) and Charlie Crist (D-FL) introduced the SHELTER Act (H.R. 3462), which would allow individuals and small businesses to write off 25% of qualifying hazard mitigation expenses up to an annual limit of \$5,000 per taxpayer. Sens. Michael Bennet (D-CO) and Bill Cassidy (R-LA) introduced an identical bill (S. 1958).

Recommendation: Congress should revise the federal tax code to make state and local disaster mitigation grants for projects to strengthen homes and businesses against flood, wildfire, earthquake, and windstorm hazards non-taxable for federal income tax purposes.

Recommendation: Congress should provide a tax deduction to individuals and small businesses for hazard mitigation expenditures to strengthen homes and buildings to better withstand flooding, wildfire, and windstorms.

Committee of Jurisdiction: Ways and Means

Accelerate Resilient Disaster Recovery

As the federal share of disaster recovery spending has increased over the past 25 years, states and local governments have come to rely more heavily on federal disaster aid. Recovery has grown more complex with authorities fragmented across multiple departments, agencies, and programs that each have unique administrative requirements, constraints, and timelines. Programs may work at cross purposes with requirements that may conflict, presenting barriers to rapid and resilient recovery for survivors and communities. In response to recommendations from GAO for a federal investment strategy to enhance national resilience to future disasters,¹²²² the MitFLG published its NMIS in August 2019.¹²²³ The NMIS seeks to align funding requirements and incentives to help communities tap the full range of public and private funds, including combining mitigation grants and loans with insurance that provides more rapid and complete recovery when disasters strike and rewards policyholders for reducing their risk.

When disasters strike, uninsured loss makes it more difficult for survivors to rebuild and continue to meet their mortgage payments. After Hurricanes Harvey, Irma, and Maria, serious mortgage

¹²²² Government Accountability Office, GAO-15-515, *Hurricane Sandy: An Investment Strategy Could Help the Federal Government Enhance National Resilience for Future Disasters* (July 2015).

¹²²³ MitFLG, *National Mitigation Investment Strategy* (August 2019).

delinquency rates tripled in affected areas of Texas and Florida and quadrupled in Puerto Rico,^{1224,1225} where fewer than 1% of survivors had flood insurance.¹²²⁶ Uninsured survivors from Hurricane Harvey received an average of \$4,000 of individual assistance.¹²²⁷ Conversely, survivors with insurance received an average payout of more than \$100,000.¹²²⁸

This section explores ways that federal policy can accelerate disaster recovery by aligning federal hazard mitigation and recovery programs, strengthening federal insurance schemes, and leveraging private insurance capacities.

Building Block: Permanently Authorize the Community Development Block Grants for Disaster Recovery

HUD administers the Community Development Block Grants-Disaster Recovery Program (CDBG-DR), designed to provide funds to address needs not met by FEMA and other federal disaster recovery programs in presidentially declared disasters. The flexibility of the program to fund a broad range of recovery activities enabled HUD to allocate CDBG-DR funds toward national rebuilding and resilience competitions and leverage philanthropic partnerships during the years following Superstorm Sandy.¹²²⁹

Despite the scale, flexibility, and innovative application of CDBG-DR funds, it is not a standing program. Following each disaster supplemental appropriation, HUD issues a Federal Register notice that sets the requirements and waivers for each funding tranche. Since the eligibility requirements can change with each allocation, grantees often need to design recovery programs after consulting the more than 60 Federal Register notices published by the HUD CDBG-DR program since Hurricane Katrina in 2005. This ad hoc and overly bureaucratic system results in different requirements and waivers for different grantees, confusion and frustration among grantees, and delays of several months or more than a year from when the disaster hits to when CDBG-DR funds begin to reach communities on the ground. The delays exacerbate uncertainty and human suffering for survivors, and we miss important opportunities to assure a more resilient recovery. As of March 2020, the CDBG-DR Portfolio included 137 grants totaling nearly \$90 billion to grantees across 34 states and territories and 30 local governments.¹²³⁰ HUD needs to establish a single office to support disaster recovery and community resilience, assist with community resilience planning, and help grantees develop their action plans after major disasters.

¹²²⁴ Amy Gromowski, “The Impact of Natural Catastrophe on Mortgage Delinquency,” CoreLogic Insights, September 28, 2018, www.corelogic.com/blog/2018/09/the-impact-of-natural-catastrophe-on-mortgage-delinquency.aspx. Accessed June 2020.

¹²²⁵ Michael Gerrity, “Mortgage Delinquencies Tripled in Recently Affected Natural Disaster Regions in U.S.,” *World Property Journal*, January 30, 2020.

¹²²⁶ Leslie Scism and Nicole Friedman, “Hurricane Maria Exposes a Common Problem for Puerto Rico Homeowners: No Insurance,” *The Wall Street Journal*, September 20, 2017.

¹²²⁷ U.S. Department of Homeland Security, Science & Technology, “Snapshot: S&T Supports FEMA with Comprehensive Flood Insurance Report,” September 7, 2018, <https://www.dhs.gov/science-and-technology/news/2018/09/27/st-supports-fema-comprehensive-flood-insurance-report>.

¹²²⁸ Ibid.

¹²²⁹ HUD, “Rebuild by Design,” <https://www.hudexchange.info/programs/cdbg-dr/rebuild-by-design/>; HUD, “National Disaster Resilience,” <https://www.hudexchange.info/programs/cdbg-dr/resilient-recovery/>. Accessed June 2020.

¹²³⁰ HUD, “Community Development Block Grant Disaster Recovery Overview,” March 5, 2020,

<https://files.hudexchange.info/resources/documents/CDBG-Disaster-Recovery-Overview.pdf>. Accessed June 2020.

Reps. Al Green (D-TX) and Ann Wagner (R-MO) introduced the Reforming Disaster Recovery Act of 2019 (H.R. 3702), which would authorize the Secretary of HUD to provide disaster assistance to states, Puerto Rico, local governments, and tribes under a community development block grant disaster recovery program. The bill passed the House of Representatives in November 2019.

Recommendation: Congress should permanently authorize the HUD CDBG-DR program and establish within HUD an Office of Disaster Recovery and Resilient Communities, prioritizing funds and technical assistance to low- and moderate-income survivors and ensuring funds are distributed equitably and benefit hardest hit communities.

Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Committee of Jurisdiction: Financial Services

Building Block: Ensure the Equitable Treatment of Low- and Moderate-Income Households Seeking Relocation Assistance

One of the greatest challenges confronting LMI families seeking relocation assistance following disasters is the need to find comparable replacement housing that is affordable and within commuting distance of jobs, schools, childcare, and important social and family networks. For many LMI households whose homes have been damaged by storms, their property values may not have kept pace with local market conditions or may have even depreciated due to increased or repeated storm-related damage or increased insurance cost.

The Uniform Relocation Assistance and Real Property Acquisition Policies Act provides important protections and assistance for people whose real property is acquired or who are displaced by federally funded projects,¹²³¹ including just compensation and relocation assistance. However, many of the benefits of this statute are not available to households that are seeking relocation or participating in a voluntary buyout and relocation program under FEMA's disaster recovery and hazard mitigation programs.

Recommendation: Congress should amend the Robert T. Stafford Disaster Relief and Emergency Assistance Act to provide protection and assistance to LMI people who are seeking federal disaster recovery assistance to relocate from flood- or wildfire-prone areas to comparable replacement housing in less risky areas.

Committee of Jurisdiction: Transportation and Infrastructure

¹²³¹ 42 USC § 4601 et seq.

Building Block: Help States, Local Governments, Tribes, and Territories Access Affordable Insurance for Public Facilities

The Robert T. Stafford Disaster Relief and Emergency Assistance Act (P.L. 93-288, as amended) requires applicants for Public Assistance (PA), as a condition of receiving PA grant funding, to obtain insurance on insurable facilities, such as public buildings, vehicles, and equipment, with the “type and extent” of insurance that is reasonably available.¹²³² For example, public facilities like schools and city-owned buildings damaged by hurricanes would be expected to obtain insurance against flood and wind hazards. In addition, applicants must maintain insurance on those facilities in order to be eligible for PA funding in future disasters.¹²³³ The FEMA Office of Inspector General (OIG) has identified problems with applicant compliance with insurance requirements¹²³⁴ and concluded that FEMA’s program actually provides a disincentive to carry insurance by not verifying that applicants are complying with the insurance requirement.¹²³⁵ FEMA OIG has found that FEMA’s inability to track compliance with insurance requirements has left restored public buildings uninsured that have received as much as \$17.8 billion distributed from the Disaster Relief Fund since 2001.¹²³⁶

Communities may face insurance affordability challenges, particularly following catastrophic disasters that can heighten risk awareness and constrain insurance capacity. Opportunities exist to help communities meet federal insurance requirements, while ensuring that those at greatest risk and facing repeated disasters have efficient and rapid access to funds to support resilient recovery that breaks the disaster cycle.

Recommendation: Congress should allow states, local governments, tribes, and territories to use pre-disaster mitigation funds and disaster recovery funds for the payment of insurance premiums and deductibles where payouts will be obligated toward community-based buyouts, relocation, and resettlement projects.

Recommendation: Congress should direct the MitFLG to investigate opportunities to use innovative insurance approaches such as catastrophe bonds, parametric insurance, and public climate risk pools across states, tribes, or communities facing a range of hazards to identify cost savings and efficiencies that can be achieved.

Committee of Jurisdiction: Transportation and Infrastructure

Building Block: Insure Public Assets Against Climate Risks to Drive Mitigation and Accelerate Disaster Recovery

Following disasters, insurance payouts tend to be the most efficient way to support a timely and complete recovery from disaster. Moreover, as credit rating agencies factor disaster risk into

¹²³² See 42 USC § 5154, 44 CFR 206.252, and 44 CFR 206.253.

¹²³³ 42 USC § 5154(b).

¹²³⁴ FEMA, Office of Inspector General, I-01-01, *Compliance with Public Assistance Program’s Insurance Purchase Requirement* (January 2001).

¹²³⁵ U.S. Department of Homeland Security, Office of Inspector General, OIG-12-18, *FEMA’s Process for Tracking Public Assistance Insurance Requirements* (December 2011).

¹²³⁶ U.S. Department of Homeland Security, Office of Inspector General, OIG-17-50-VR, *Verification Review: FEMA’s Lack of Process for Tracking Public Assistance Insurance Requirements Places Billions of Tax Dollars at Risk* (June 9, 2017) at 1.

municipal credit ratings, the role of insurance is essential to demonstrate that communities will have the liquidity needed to recover and resume normal operations while maintaining their financial obligations to repay bonds. Most importantly, the process of assessing risk and structuring an insurance solution reveals the true state of risk to the insurable asset, which can help communities adjust their plans, codes, and standards to reduce risk and insurance costs. This means that the mere structuring process of analyzing risk for insurance purposes can bring quantifiable benefits to a community, even if they never have a disaster or file a claim.

FEMA's Public Assistance Program currently functions as a no-limit, no-premium insurance policy for state and local governments, which disincentivizes self-protection and burdens taxpayers with the risky decisions made by state and local governments. By phasing in a transition for the most critical and insurable community assets—health facilities, schools, and public safety facilities—to private insurance markets, communities will be encouraged to manage their risk, including better land management and planning, purchasing insurance, and investing in hazard mitigation.

Recommendation: In order to reduce the risks and costs of climate impacts to insurable public assets and prioritize protection for frontline communities, Congress should direct FEMA to develop a strategy to incentivize insurance coverage against weather perils to Stafford Act Category E assets (public buildings and infrastructure), including schools, public health facilities, and public safety facilities, and to investigate and report to Congress on the trends in insurance available and being obtained to cover those assets. In addition, Congress should direct FEMA to evaluate and report on the use of innovative risk transfer mechanisms such as parametric insurance and catastrophe bonds to cover assets that are eligible for Stafford Act Category E funds.

Committee of Jurisdiction: Transportation and Infrastructure

Building Block: Help Families Obtain Extreme Weather Insurance

Following hurricanes and tropical storms, it can be difficult to differentiate between flood damage potentially covered by flood insurance and wind damage that is not covered by flood insurance but may be covered by homeowner's insurance. Increasingly, property insurers in wildfire-prone states are reconsidering how much property risk they are willing to take in areas susceptible to wildfire or withdrawing from markets altogether, setting the stage for potential market failure.¹²³⁷ Emergency and risk managers have been recommending development of all-hazards insurance policies that will cover property owners and communities from the full range of natural hazards, including earthquakes. There are opportunities for the federal government to collaborate with insurers to develop all-hazards policies that will meet mandatory purchase requirements of the National Flood Insurance Program (NFIP) and Stafford Act Public Assistance program and to make such all-hazards insurance products available for purchase directly from private insurers.

Recommendation: Congress should direct FEMA to collaborate with insurance industry experts to support the creation of a private all-hazards insurance program that would cover all natural hazards,

¹²³⁷ California Department of Insurance, *The Availability and Affordability of Coverage for Wildfire Loss in Residential Property Insurance in the Wildland-Urban Interface and Other High-Risk Areas of California: CDI Summary and Proposed Solutions* (January 2018).

be available for purchase directly from insurers, and meet the federal mandatory purchase requirements for flood insurance and disaster recovery programs.

Committee of Jurisdiction: Financial Services

Building Block: Restore Buyout Lands to Enhance Natural Benefits

Over the past 30 years, FEMA has funded the acquisition of more than 58,000 flood-damaged properties across the United States.¹²³⁸ By moving people and property out of harm's way and maintaining cleared flood-prone lands as open space in perpetuity, buyouts serve to lessen the economic and emotional toll of frequent or catastrophic flooding for communities and property owners alike. Buyouts also reduce the disruption and costs associated with continued floodplain occupation, including provision of utilities and city services, insurance costs to property owners, and disaster costs including evacuations, sheltering of survivors, and debris removal. Restored floodplains can create open space for recreation, restored wetlands, and other important coastal and riparian habitat that can enhance property values and quality of life.

However, federal buyout programs do not consistently provide funds for the removal of building slabs, roads, and other infrastructure no longer needed, and for the restoration of buyout lands to provide habitat and natural services of stormwater improvement and flood risk reduction.

Recommendation: Congress should increase funds to the FEMA Flood Mitigation Assistance Program to support floodplain, coastal, and stream restoration projects as part of buyout projects. Any additional cost for these ecosystem restoration activities should not figure in the buyout project benefit-cost ratio. Congress should also direct FEMA to allow SLTTs to use Flood Mitigation Assistance Grants and BRIC Grants for the establishment of open-space land trusts or similar arrangements for the ongoing management and maintenance of cleared lands. Congress should direct USACE to provide technical assistance to support ecosystem restoration project planning, design, and implementation.

Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant.

Committees of Jurisdiction: Financial Services; Transportation and Infrastructure

Building Block: Help Communities Build Back Better for Climate Resilience

In the Bipartisan Budget Act of 2018, Congress provided FEMA with flexibility to make repairs and replace infrastructure in Puerto Rico and the U.S. Virgin Islands to incorporate resilient design and features, regardless of the pre-disaster condition.¹²³⁹ However, this flexibility was granted only for critical assets and services, such as schools, hospitals, and utilities, and does not apply to noncritical

¹²³⁸ FEMA, “OpenFEMA Dataset: Hazard Mitigation Assistance Projects - V2,” <https://www.fema.gov/openfema-dataset-hazard-mitigation-assistance-projects-v2>. Accessed June 2020.

¹²³⁹ Bipartisan Budget Act of 2018, Pub L No 115-123

assets such as roads, bridges, stormwater infrastructure or public housing. In addition, this assistance cannot apply to damage caused by disasters declared after 2017, such as the recent earthquakes in Puerto Rico, without congressional action.

Reps. Stacey E. Plaskett (D-VI) and Jenniffer González-Colón (R-PR) introduced the Resiliency Enhancement Act of 2020 (H.R. 5756) to expand infrastructure eligible for this additional resilience assistance to include roads, bridges, ports, airports, affordable housing, and stormwater infrastructure as the islands build back, which would minimize the need for future taxpayer investments in disaster recovery. It would also apply this additional assistance to any major disaster declared in the Virgin Islands or Puerto Rico through FY2022.

Recommendation: Congress should direct FEMA to allow communities to repair damaged public buildings and infrastructure to be resilient to natural hazards, including more extreme weather due to the climate crisis.

Committee of Jurisdiction: Transportation and Infrastructure

Building Block: Accelerate Ecosystem Recovery and Restoration from Wildfires and Floods

After a wildfire disaster, the land is vulnerable to erosion without vegetation to help stabilize soils. Additionally, rains following wildfires can cause higher rates of runoff as post-wildfire landscapes absorb less rains and floodwaters. This increased runoff can combine with the loss of stabilizing vegetation to create significant flash flooding, erosion, and land- and mud-slide conditions that can threaten entire communities with loss of life and property. Rehabilitation and protection efforts need to happen quickly to avert further damage.

The NRCS Emergency Watershed Protection (EWP) Program is designed to allow communities to quickly mitigate damage to land and the built environment following wildfires, floods, and other catastrophes. EWP does not have to be triggered by a state or federal disaster declaration for funds to be available for projects that reduce risks to life and property, meet applicable engineering standards, and demonstrate that they are environmentally and economically sound. One of the barriers limiting the effectiveness of the EWP is that project approvals and funds may move too slowly for communities and land managers to be able to rapidly implement projects to mitigate damage, such as measures to reduce landslide and erosion risk following wildfires. There is a need for federal action to identify reimbursable watershed rehabilitation measures that communities can rapidly implement prior to project approval.

Reps. John Curtis (R-UT) and John Garamendi (D-CA) introduced the Making Access To Cleanup Happen (MATCH) Act of 2020 (H.R. 5627), which would identify emergency watershed protection measures that local project sponsors may incur prior to execution of a project agreement and a procedure for local sponsors to receive credit for allowed expenses incurred prior to the project agreement.

Recommendation: Congress should amend the Agricultural Credit Act of 1978 with respect to pre-agreement costs of emergency watershed protection measures and direct the USDA NRCS to develop a list of emergency watershed protection measures for which a sponsor may incur reimbursable cost

prior to entering into an agreement under the EWP Program, and establish a procedure for providing local project sponsor credit for those expenses, to enable communities to act quickly following wildfires and floods to mitigate further risks and harm.

Committee of Jurisdiction: Agriculture

Strengthen the National Flood Insurance Program for Climate Resilience

The NFIP offers federally backed flood insurance, produces maps of the nation's floodplains, and helps communities reduce flood risk through the adoption of floodplain management standards. Communities volunteer to participate in the NFIP in order to have access to federal flood insurance and, in return, adopt minimum standards to reduce flood risk. FEMA encourages communities to adopt standards that exceed federal minimum standards.¹²⁴⁰ Borrowers using federally backed loans must obtain flood insurance on properties located in Special Flood Hazard Areas (SFHAs) that correspond to the "100-year floodplain," areas that have a 1% chance of flooding in any given year based on the historical record of flooding.

The premium rate for most NFIP policies is intended to reflect the true flood risk. However, Congress has directed FEMA to subsidize flood insurance for properties built before production of the community's first Flood Insurance Rate Map. Congress also sought to reduce significant year-over-year variability by capping the increases that policyholders may experience. As a result, the program may not always have the cash reserves that would be required of a private insurer in order to pay anticipated claims and avoid insolvency. Although the program engaged in occasional borrowing to pay claims, it was consistently able to repay until Hurricane Katrina drove more significant borrowing during 2005-2006.¹²⁴¹ Active storm seasons since Katrina have resulted in additional borrowing, driving the program further into debt.¹²⁴² In October 2017, Congress cancelled \$16 billion of NFIP debt, making it possible for the program to pay claims for Hurricanes Harvey, Irma, and Maria.¹²⁴³ The NFIP currently owes \$20.5 billion to the U.S. Treasury.¹²⁴⁴

This section provides recommendations to help ensure that the NFIP continues to provide actionable information on current flood risk, prices that risk transparently, helps policyholders mitigate risks, and brings resources within reach of those on the front lines of the climate crisis and increasing flood risk.

¹²⁴⁰ 44 CFR 60.1(d).

¹²⁴¹ Congressional Research Service, *Introduction to the National Flood Insurance Program (NFIP)* (December 2019).

¹²⁴² Ibid.

¹²⁴³ Additional Supplemental Appropriations for Disaster Relief Requirements Act, 2017, Pub L No 115-72, Title III, § 308.

¹²⁴⁴ Government Accountability Office, "High-Risk Series: National Flood Insurance Program,"

https://www.gao.gov/highrisk/national_flood_insurance/why_did_study. Accessed June 2020.

Building Block: Enhance the Flood Risk Information Provided by FEMA and the National Flood Insurance Program

The NFIP uses the 1%-annual-chance (or 100-year) floodplain as the primary standard for land use management and insurance purchase requirements. To better reflect the climate-related changing frequency and severity of storms and flood events, the NFIP needs to provide more detailed information that includes the gradations of flood risk that can occur beyond the 1%-annual-chance floodplain. Studies have also shown that flood hazards for more than half of U.S. waterways and shorelines remain unmapped,¹²⁴⁵ and flood severity will worsen as climate change causes increasingly intense rainfall.¹²⁴⁶ By analyzing flood risk and making publicly available flood risk information for entire communities throughout the nation, communities and residents will be able to make more informed decisions about land use, hazard mitigation, emergency management, and preparedness strategies.

In response to growing concern regarding the effects of climate change on federal insurance programs, the GAO recommended that the Secretary of Homeland Security analyze the potential long-term fiscal implications of climate change for the NFIP.¹²⁴⁷ That analysis projects that the SFHAs will increase 45%-55% by the year 2100, with significant variations across the country.¹²⁴⁸ More detailed information about future flood risk is needed by federal program managers, state and local leaders, and the public, in order to inform decisions about development, post-disaster rebuilding, and even where to buy a home.

Chairwoman Maxine Waters (D-CA) introduced the National Flood Insurance Program Reauthorization Act of 2019 (H.R. 3167), which would provide \$500 million for each of fiscal years 2019-2023 to update and expand NFIP mapping.

Recommendation: Congress should increase funding for NFIP mapping and direct FEMA to enhance and ensure the technical integrity and usefulness of NFIP flood hazard and risk information taking into account changing storm and flood frequency and severity due to climate change, update and maintain maps, and expand flood risk analysis and mapping to the entire United States.

Recommendation: Congress should direct FEMA to develop and deploy accessible and multilingual educational materials along with flood hazard and risk information to help the public and community leaders interpret flood risk information and understand the limits of flood risk analysis, estimation, and prediction.

Recommendation: Congress should direct FEMA to collect, create, and share flood risk data in a dynamic, digital, and public environment that is functional across multiple platforms and that

¹²⁴⁵ Association of State Floodplain Managers, *Flood Mapping for the Nation: A Cost Analysis for Completing and Maintaining the Nation's NFIP Flood Map Inventory*. (January 2020), https://asfpm-library.s3-us-west-2.amazonaws.com/FSC/MapNation/ASFPM_MaptheNation_Report_2020.pdf.

¹²⁴⁶ Cindy L. Bruyère, et al., "Physically-based landfalling tropical cyclone scenarios in support of risk assessment," *Weather and Climate Extremes* 26 (2019): 100229.

¹²⁴⁷ Government Accountability Office, GAO-07-285, *Climate Change: Financial Risks to Federal and Private Insurers in Coming Decades Are Potentially Significant* (March 2007).

¹²⁴⁸ AECOM, *The Impact of Climate Change and Population Growth on the National Flood Insurance Program Through 2100* (June 2013), <https://www.aecom.com/fema-climate-change-report/>.

supports analyses of current and future coastal and inland flood hazards. Information on future flood risk should enable communities and the public to see forecasts of flood risk 30-50 years into the future to support decision-making about homebuying and infrastructure siting and design. This information should be publicly available and disclosed to borrowers for any federally supported loan so that buyers understand both current and future risks that may require mitigation and change the cost of insurance.

Committee of Jurisdiction: Financial Services

Building Block: Protect Homes and Small Businesses from Uninsured Flood Loss

Over the 50-year history of the NFIP, communities have used the Flood Insurance Rate Maps for purposes of regulating development and managing land uses in and around mapped floodplains. Unfortunately, communities, developers, and residents have misinterpreted maps, perceiving flood risk only in the mapped floodplain and assuming that areas not designated as SFHAs have no flood risk at all. However, floods are dynamic natural processes that can exceed the mapped floodplain where development has increased runoff or in flood events that exceed the “100-year flood.” Additionally, the effects of climate change are increasing flood frequencies and severity, with more areas experiencing flooding despite designation on Flood Insurance Rate Maps as being at lower risk. In effect, climate change is exacerbating risks and costs to communities and taxpayers.

About 70% of the residential losses from Hurricane Harvey¹²⁴⁹ and 85% of the residential losses from Hurricane Florence were uninsured.¹²⁵⁰ Much of this loss occurred outside the SFHA, which corresponds to the 100-year floodplain. From 1999 to 2009, 75% of flood damage in Houston’s southeast suburbs took place outside the SFHA.¹²⁵¹ According to FEMA, only one-third of U.S. residents who live in areas at the highest risk of flooding have flood insurance, leaving millions of people exposed to huge economic losses.¹²⁵² People outside of the SFHA file more than 33% of NFIP claims¹²⁵³ and receive one-third of disaster assistance for flooding.¹²⁵⁴

Uninsured flood risk not only exacerbates potential economic losses to uninsured survivors, it also reduces the availability of actionable information and motivation for flood hazard mitigation.

¹²⁴⁹ CoreLogic, “CoreLogic Analysis Estimates Total Residential Insured and Uninsured Flood Loss for Hurricane Harvey Between \$25 Billion and \$37 Billion,” August 31, 2017, <https://www.corelogic.com/news/media-advisory-corelogic-analysis-estimates-total-residential-insured-and-uninsured-flood-loss-for-hurricane-harvey-between-25.aspx>.

¹²⁵⁰ CoreLogic, “The Aftermath of Hurricane Florence is Estimated to Have Caused Between \$20 Billion and \$30 Billion in Flood and Wind Losses, CoreLogic Analysis Shows,” September 24, 2018, <https://www.corelogic.com/news/the-aftermath-of-hurricane-florence-is-estimated-to-have-caused-between-20-billion-and-30-billion-in-flood-and-wind-losses-cor.aspx>.

¹²⁵¹ Jane Boyd, Rice University, Office of Public Affairs, “Decade of data shows FEMA flood maps missed 3-in-4 claims,” September 11, 2017, <http://news.rice.edu/2017/09/11/decade-of-data-shows-fema-flood-maps-missed-3-in-4-claims-2/>; Russell Blessing, Antonia Sebastian, and Samuel D. Brody, “Flood Risk Delineation in the U.S.: How much loss are we capturing?” *Natural Hazards Review* 18, no. 3 (2017): 04017002, <https://doi.org/10.1061/%28ASCE%29NH.1527-6996.0000242>.

¹²⁵² Testimony of Peter Gaynor, FEMA Administrator, hearing of the House Transportation and Infrastructure Committee, Subcommittee on Economic Development, Public Buildings, and Emergency Management, “FEMA’s Priorities for 2020 and Beyond: Coordinating Mission and Vision,” March 11, 2020.

¹²⁵³ Congressional Research Service, *The National Flood Insurance Program: Selected Issues and Legislation in the 116th Congress* (December 2019).

¹²⁵⁴ FEMA, “Everything You Need to Know About Flood Insurance from NFIP,” <https://www.fema.gov/news-release/2019/10/16/everything-you-need-know-about-flood-insurance-nfip>. Accessed June 2020.

Property owners that are outside the SFHA may not be aware of their flood risk and may not purchase the lower-cost flood insurance that is available to them. As the climate crisis contributes to more frequent and extreme flood events into the future, more families and small businesses will need flood insurance that is not currently required under the NFIP. Securing all federal loans and loan guarantees with flood insurance would reduce the cost of insurance for all policyholders and protect all borrowers when floods strike.

Recommendation: Congress should direct agencies and GSEs that administer housing and small business loans and loan guarantees, including the USDA, HUD, the SBA, and the Department of Veterans Affairs (VA), to consider securing all federal loans and loan guarantees with flood insurance. Congress should also direct FEMA to ensure that flood insurance provided through the NFIP is rated accurately for property location, including for properties not located in the SFHAs.

Committees of Jurisdiction: Financial Services; Agriculture; Small Business; Transportation and Infrastructure; Veterans Affairs

Building Block: Provide Insurance Coverage Options Through Community-Wide Flood Insurance

Community-wide flood insurance policies can cover all properties in a community in a single policy, which can help reduce economic risk and insurance costs for all participants, including households that do not have a federally backed mortgage.¹²⁵⁵ Occupants of areas behind levees that are certified as providing at least the 100-year level of protection still face flood risk that may not be apparent since flood insurance is not currently required behind these levees.

Communities and levee owners alike have expressed interest in flood insurance policies that cover multiple properties, such as every building in the community or leveed area. This would reduce uninsured flood loss while providing decision-makers with more detailed information about the flood risk throughout the area and the mitigation actions that can both reduce risk and flood insurance cost.

Chairwoman Maxine Waters (D-CA) introduced the National Flood Insurance Program Reauthorization Act of 2019 (H.R. 3167), which would authorize a voluntary community-based flood insurance pilot program to make community-wide flood insurance policies under the NFIP available for purchase by participating communities.

Recommendation: Congress should create a community-wide flood insurance program under the NFIP available for purchase by communities, states, tribes, and territories, as well as by levee system owners, that would provide flood insurance coverage to meet federal lending requirements and also protect properties that do not have federally-backed loans.

Committee of Jurisdiction: Financial Services

¹²⁵⁵ Committee on Community-Based Flood Insurance Options. *A Community-Based Flood Insurance Option* (National Academies of Sciences, Engineering, and Medicine, 2015).

Building Block: Address Flood Insurance Affordability to Protect Frontline Communities

As flood insurance costs change, it can become more difficult for LMI policyholders and small businesses to afford their premiums. Research indicates that more than half of uninsured households in SFHAs are low-income.¹²⁵⁶ The NFIP currently uses discounted rates to deliver subsidies to certain policyholders but could develop a variety of flexible delivery mechanisms, including means-tested discounts, tax credits, grants, or loans. The NFIP could also charge policyholders in monthly installments, which could be easier for low-income policyholders to afford than an annual premium that is due all at once. Policyholders would benefit from having the option to purchase private insurance that offers lower premiums or other more favorable terms.

Chairwoman Maxine Waters (D-CA) introduced the National Flood Insurance Program Reauthorization Act of 2019 (H.R. 3167), which would authorize a demonstration program to provide means-tested premium discounts for low-income households, while ensuring disclosure of full-risk rates to policyholders. The bill would also provide for the monthly installment payment of premiums and create a revolving loan program for flood hazard mitigation.

Rep. Frank Pallone (D-NJ) introduced the National Flood Insurance Program Reauthorization and Reform Act of 2019 (H.R. 3872), which would address affordability through creation of means-tested vouchers and a cap on annual premium increases. The bill would also provide for monthly installments for payment of premiums, as well as hazard mitigation of high-risk properties, mitigation loans, and revolving loan funds to support flood hazard mitigation.

Recommendation: Congress should direct FEMA to address flood insurance affordability for low-income households and small businesses through a combination of means-tested discounts, mitigation loans, and revolving loans, and allow policyholders to pay flood insurance premiums in monthly installments. Information about the full risk rate should accompany discounts, so that discount recipients understand the full cost of their flood insurance. Congress also should direct FEMA to pilot a grant program to provide temporary premium assistance for policyholders who have requested buyouts that are pending funding and implementation.

Committee of Jurisdiction: Financial Services

Building Block: Support Community Leadership to Protect Open Space in Flood-Prone Areas

Many communities continue to permit new development of homes, businesses, and critical infrastructure in areas that are known to be flood-prone. Researchers found that between 2000 and 2016, occupation of these high-risk areas increased 14%—a faster growth rate than in areas outside of flood zones.¹²⁵⁷

Although FEMA provides incentives to encourage states and local governments to adopt regulatory standards that exceed the minimum requirements to participate in the NFIP, current federal rules rely on states and local governments to manage development in and around floodplains, with few

¹²⁵⁶ FEMA, *An Affordability Framework for the National Flood Insurance Program* (April 2018).

¹²⁵⁷ Mike Maciag, “Analysis: Areas of the U.S. With Most Floodplain Population Growth,” *Governing*, August 2018, <https://www.governing.com/gov-data/census/flood-plains-zone-local-population-growth-data.html>. Accessed June 2020.

restrictions on placement of new development in areas that are deemed at high risk of flooding. Regardless of whether communities take any steps to discourage risky developments, they still receive disaster relief assistance when devastation occurs.

Chairwoman Maxine Waters (D-CA) introduced the National Flood Insurance Program Reauthorization Act of 2019 (H.R. 3167), which would enhance the NFIP Community Rating System to better encourage effective floodplain management.¹²⁵⁸ The bill would also direct FEMA to conduct periodic estimates of the losses avoided nationally due to the adoption of floodplain management standards. It would be useful for those assessments to include reduced flood losses as a result of communities not allowing new development or redevelopment of the 1%-annual-chance floodplain and ways that the NFIP and Community Rating System can further incentivize communities to set aside their floodplain as open space.¹²⁵⁹

Recommendation: Congress should direct FEMA to conduct studies to estimate the avoided flood losses and other benefits of not allowing new development and redevelopment of SFHAs. Studies should also identify barriers and other challenges to implementing measures to preserve floodplains as open space. Congress also should direct FEMA to enhance incentives to states, local governments, tribes, and territories that adopt higher resilience standards, including prohibiting new development in SFHAs.¹²⁶⁰

Recommendation: Congress should direct FEMA to prioritize pre-disaster mitigation funds for projects that restore and protect flood-prone areas as open space, including providing funding and technical assistance for buyouts and relocation projects and for the establishment of land trusts to maintain open space as high-quality habitat and outdoor recreation areas.

Committees of Jurisdiction: Financial Services; Transportation and Infrastructure

Building Block: Make Flood Risk Information Transparent and Available to Buyers and Renters

Although nearly four million homes are in areas at high risk of flooding, prospective homebuyers may not be able to learn about this risk or the history of flooding or insurance claims on properties.¹²⁶¹ Many states do not require sellers or landlords to disclose a property's flood risk or previous flood damage, which prevents prospective buyers and renters from making risk-informed decisions about where they will live. Currently 29 states have some form of flood risk or flood history disclosure, but 21 states have no such requirements.¹²⁶² The FEMA Office of the Flood Insurance Advocate has acknowledged the challenges associated with the lack of uniform national flood risk disclosure laws,

¹²⁵⁸ Sec. 307. Community Rating System Improvements.

¹²⁵⁹ Sec. 308. Community Assistance Program for Effective Floodplain Management.

¹²⁶⁰ OMB, "Statement of Administration Policy, Substitute Amendment to H.R. 2874–21st Century Flood Reform Act," November 13, 2017, www.whitehouse.gov/sites/whitehouse.gov/files/omb/legislative/sap/saphr2874r_20171113.pdf.

¹²⁶¹ Miyuki Hino and Marshall Burke, *Does Information about Climate Risk Affect Property Values?*, (National Bureau of Economic Research, 2020).

¹²⁶² Natural Resources Defense Council, "How States Stack Up on Flood Disclosure," <https://www.nrdc.org/flood-disclosure-map>. Accessed June 2020.

noting the particular difficulties for homeowners who discover their flood risk as a result of uninsured flood loss.¹²⁶³

Chairwoman Maxine Waters (D-CA) introduced the National Flood Insurance Program Reauthorization Act of 2019 (H.R. 3167), which was amended to require that FEMA provide information about previous flood insurance claims to buyers under contract who request that information.¹²⁶⁴ Rep. Frank Pallone (D-NJ) introduced the National Flood Insurance Program Reauthorization and Reform Act of 2019 (H.R. 3872), which would require that sellers disclose known history of flood risk to purchasers.

Recommendation: Congress should require disclosure of flood hazards for properties for sale or lease, including flood insurance requirements, claims, and any known history of flood damage before contracts to lease or purchase property become binding.

Committee of Jurisdiction: Financial Services

Building Block: Address Urban Flooding to Reduce Climate Risks

Urban flooding occurs when stormwater in urban areas from heavy rainfall, storm surge, snow melt, or high tides exceeds the capacity of drainage systems to infiltrate stormwater into the soil or carry it away. Land development that disturbs natural drainage patterns and creates hardened surfaces that inhibit infiltration of stormwater increases runoff. Undersized stormwater systems also exacerbate urban flooding. Increased urbanization and population growth will converge with the impacts of the climate crisis, including chronic tidal flooding, sea level rise, and more frequent heavy precipitation events, to exacerbate urban flood problems.

There is a need for multi-agency and cross-jurisdictional collaboration to analyze and communicate urban flood risks, and to mitigate social impacts. A FEMA-commissioned National Academies report noted that established FEMA mapping methods for riverine and coastal flood hazards do not consider distinctive urban flood hazards, such as the limited capacity of stormwater systems and local drainage patterns.¹²⁶⁵

Chairwoman Maxine Waters (D-CA) introduced the National Flood Insurance Program Reauthorization Act of 2019 (H.R. 3167), which would direct FEMA to carry out an urban flooding pilot program, including the incorporation of climate trends into urban flooding risk assessments.

Recommendation: Congress should direct FEMA to consider urban flooding hazards in flood risk analyses, accounting for the effects of sea level rise, early reduced snowpack, and increasingly extreme precipitation events on urban drainage and stormwater systems.

Committee of Jurisdiction: Financial Services

¹²⁶³ FEMA Office of the Flood Insurance Advocate, *2019 Annual Report* (April 2020).

¹²⁶⁴ Amendment to NFIP Reauthorization Act of 2019, <https://financialservices.house.gov/uploadedfiles/bills-116-hr3167-w000187-amdt-5a.pdf>.

¹²⁶⁵ Committee on Urban Flooding in the United States, *Framing the Challenge of Urban Flooding in the United States* (The National Academies of Sciences, Engineering, and Medicine, 2019).

Reduce Wildfire Risks and Support Community Resilience Against Wildfires

According to the U.S. National Climate Assessment, increased warming, drought, and insect outbreaks, all caused by or linked to climate change, have exacerbated risks of wildfires, especially in the Western United States.¹²⁶⁶ Moreover, climate models project that wildfire risks will continue to increase in the future. In 2018, wildfires caused 106 deaths and \$24.5 billion in damage in the United States, and California experienced its costliest and deadliest wildfire year on record.¹²⁶⁷ Wildfires can cause significant impacts and damage to communities even in years of mild to moderate wildfire activity. The United States experienced more than \$5 billion in wildfire losses between 2008 and 2017.¹²⁶⁸ According to a reinsurance industry analysis, there were nearly \$45 billion in U.S. losses due to wildfire and extreme heat in 2017 and 2018, with approximately 25% of those losses being uninsured.¹²⁶⁹ In addition to advancing wildfire resilience-based codes and standards, the federal government can increase wildfire resilience by supporting community planning, technical assistance, and funding assistance.

Building Block: Develop a National Wildfire Mitigation Strategy and Support Community Resilience Against Wildfires

Despite staggering losses due to wildfires, the nation lacks an overarching federal strategy to reduce the risk of destructive wildfires. The USFS reports that people are moving into high fire hazard areas, also known as the wildland-urban interface (WUI), at a rate faster than any other area.¹²⁷⁰ More than four million U.S. homes are at high or extreme risk of wildfire, with more than two million in California alone.¹²⁷¹

Management of wildfire risk entails better land use planning to avoid new settlement of the WUI and the use of codes and standards for less combustible design and materials, along with the array of emergency management policies and safety-of-life practices, including coordination of restrictions on campfires and other outdoor burning. It is also important to ensure that public safety communications systems enable first responders to communicate with each other and the public and

¹²⁶⁶ U.S. Global Change Research Program, *Fourth National Climate Assessment, Volume II* (November 2018).

¹²⁶⁷ National Oceanic and Atmospheric Administration, National Centers for Environmental Information, “Billion-Dollar Weather and Climate Disasters: Summary Stats,” <https://www.ncdc.noaa.gov/billions/summary-stats/2018>. Accessed June 2020.

¹²⁶⁸ Arindam Samanta, “Key findings from the 2017 Verisk wildfire risk analysis,” (Verisk, July 2017), <https://www.verisk.com/insurance/visualize/key-findings-from-the-2017-verisk-wildfire-risk-analysis/>.

¹²⁶⁹ Munich Re NatCat Service, Overall and insured losses in US\$ for heatwave / wildfire events in the United States 1980 – 2018, available at <https://natcatservice.munichre.com/>. Accessed June 2020.

¹²⁷⁰ U.S. Forest Service, Northern Research Station, “New analyses reveal WUI growth in the U.S.,” July 16, 2018, <https://www.nrs.fs.fed.us/data/WUI/>. Accessed June 2020.

¹²⁷¹ Arindam Samanta, “Key findings from the 2017 Verisk wildfire risk analysis,” (Verisk, July 2017), <https://www.verisk.com/insurance/visualize/key-findings-from-the-2017-verisk-wildfire-risk-analysis/>.

that the Wireless Emergency Alert system does not impede notifications of other emergencies, such as the ShakeAlert earthquake warning system.¹²⁷²

The Wildland Fire Leadership Council is an intergovernmental committee of federal and SLTT officials convened by the Secretaries of the Interior, Agriculture, Defense, and Homeland Security to coordinate implementation of wildland fire policies and management activities. Additionally, several nonfederal fire risk mitigation programs provide technical assistance to communities working to reduce their wildfire risk. For example, the National Fire Protection Association's Firewise USA program provides public education on wildfire risk mitigation strategies and recognition for communities that complete wildfire risk assessment and other investments in wildfire risk reduction.¹²⁷³

Rep. Jared Huffman (D-CA) introduced the Wildfire Defense Act (H.R. 5091), which would support community planning and provide technical assistance and grant funding for plan development and implementation. The Wildfire Defense Act would also explore ways to support community insurability against wildfire risk and address radio communications challenges for wildland fire management.

Rep. Joe Neguse (D-CO) introduced the 21st Century Conservation Corps for Our Health and Our Jobs Act (H.R. 7264), a bill to increase funds for the National Fire Capacity program, which administers the Firewise program and helps communities build capacity for the prevention, mitigation, control, and suppression of wildfires on non-federal lands.

Recommendation: Congress should direct the Wildland Fire Leadership Council to develop a national wildfire mitigation strategy that leverages programs across the federal government to reduce the risk of loss of life, property, and natural resources to destructive wildfires and engages at all levels of government.

Recommendation: Congress should direct GAO to investigate programs across the federal government that are available to support community wildfire resilience and make recommendations to improve those programs and address any funding gaps. GAO also should study approaches to enhance community insurability against wildfire risk, including metrics for wildfire resilience and certification strategies that insurers may use to reflect resilience and mitigation achievements that reduce risk.

Recommendation: Congress should increase funds for the National Fire Capacity program and establish a community wildfire defense grant and technical assistance program to support community development and implementation of wildfire defense plans based on science-based forest restoration, including mitigation actions to reduce wildfire risk, prioritizing low-income communities in fire-hazard areas. The program should assist communities, as well as home and business owners, in the utilization of wildfire-resistant building materials, the assessment of hazards, and the sharing of best practices for wildfire risk reduction. Congress should also direct the USFS to establish protocols

¹²⁷² Letter from Sens. Dianne Feinstein (D-CA) and Maria Cantwell (D-WA) and 18 members of Congress to Chairman Ajit V. Pai, Federal Communications Commission, regarding the Wireless Emergency Alert (WEA) system, July 16, 2019,

<https://www.feinstein.senate.gov/public/index.cfm/press-releases?ID=535347CD-B1BC-4520-9A0C-53D01D7E534C>.

¹²⁷³ National Fire Protection Association, "Firewise USA," <https://www.nfpa.org/Public-Education/Fire-causes-and-risks/Wildfire/Firewise-USA/>. Accessed June 2020.

for coordination of restrictions on campfires and other outdoor fire bans with SLTT officials to assure members of the public receive consistent information.

Recommendation: Congress should direct the Federal Communications Commission to ensure that recent changes to the Wireless Emergency Alert system to improve location and geofencing information for wildfires do not impair other emergency communications systems. Congress should direct FEMA to work with federal, state, and local partners to prepare a report relating to insufficient radio frequencies and other barriers to radio communications for wildland fire management, including planning to ensure organizations are able to communicate during fire suppression for large fires.

Committees of Jurisdiction: Transportation and Infrastructure; Natural Resources; Agriculture; Energy and Commerce

Building Block: Map Wildfire Risk and the Wildland-Urban Interface

After a disaster, communities have to decide where and how to build, redevelop, and rebuild, but they do so without authoritative information about future risks that may threaten that development and the people who will live, work, and recreate in areas that are anticipated to face greater risks of wildfires.

Over the past century, extensive residential development has occurred in the outlying fringes of metropolitan areas and in rural areas with attractive recreational and aesthetic amenities, such as forests. This development is increasing the WUI, that area where structures and other human development meet or intermingle with undeveloped wildland.¹²⁷⁴ Since 1990, 43% of new homes have been built in the WUI.¹²⁷⁵ This expansion of the WUI has significant implications for wildfire management and impact.

The USFS maps the WUI in a spatial record of where homes and vegetation coincide.¹²⁷⁶ In addition to WUI maps, the USFS Rocky Mountain Research Station maintains a Wildfire Hazard Potential (WHP) index and map providing nationwide coverage of wildfire hazard risk for use in strategic wildland fuels and land management planning at broad scales.¹²⁷⁷ However, higher-resolution wildfire risk information, including parcel-level data, is needed to better inform community planning decisions.

Rep. Jared Huffman (D-CA) introduced the Wildfire Defense Act (H.R. 5091), which would provide for continuously updating wildfire hazard maps, among other resilience measures.

¹²⁷⁴ Wildland-urban interface is the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. Describes an area within or adjacent to private and public property where mitigation actions can prevent damage or loss from wildfire.

¹²⁷⁵ Volker C. Radeloff et al., “Rapid growth of the US wildland-urban interface raises wildfire risk,” *Proceedings of the National Academy of Sciences* 115, no. 13 (2018): 3314–3319.

¹²⁷⁶ U.S. Forest Service, Northern Research Station, “New analyses reveal WUI growth in the U.S.,” July 16, 2018, <https://www.nrs.fs.fed.us/data/WUI/>. Accessed June 2020.

¹²⁷⁷ U.S. Forest Service, “Classified 2018 WHP: GIS Data and Maps,” <https://www.firelab.org/document/classified-2018-whp-gis-data-and-maps>. Accessed June 2020.

Recommendation: Congress should direct the USFS to establish a wildfire risk mapping system that is adaptable to seasonal fire risk, integrates relevant data from states and private partners, and triggers requirements for the use of wildfire resilience codes and standards for federally supported projects. The maps and modeling should integrate information from NOAA's Hazard Mapping System Fire and Smoke Product. Congress should direct the USFS to ensure that risk information is available at a higher-resolution planning scale to inform siting and design of buildings and infrastructure. These maps should be publicly available and disclosed to borrowers for any federally supported loan so that buyers are aware of future risks that may require mitigation and insurance.

Committees of Jurisdiction: Natural Resources; Agriculture

Building Block: Reduce Wildland Fuels to Lower Risk to Communities and Ecosystems

Five federal land management agencies—the USDA's Forest Service and DOI's Bureau of Indian Affairs, Bureau of Land Management, Fish and Wildlife Service, and National Park Service—reduce vegetative fuels and the intensity of wildland fires on lands they manage using several methods, including careful thinning and prescribed burns. Appropriations in each of the fiscal years 2011 through 2020 for wildfire fuels reduction exceeded \$5 billion.¹²⁷⁸ However, GAO reports that the number of acres needing treatment is significantly larger than the agencies can treat annually.¹²⁷⁹ The agencies have estimated that more than 100 million acres they manage or administer are at high risk from wildfire; however, in FY2018, they treated just 3 million acres.¹²⁸⁰

Recommendation: Congress should significantly increase funding for wildland fuels reduction programs in the WUI.

Recommendation: Congress should increase funding for programs through the USFS, HUD, and FEMA to help communities prepare for wildfires and prioritize funding based on socioeconomic factors in addition to wildfire risk. State, tribal, territorial, and community Hazard Mitigation and Climate Adaptation Plans should identify the specific actions that the communities will undertake to mitigate wildfire risks to vulnerable populations. Congress should adjust cost-shared mitigation programs to discourage development in the WUI.

Committees of Jurisdiction: Transportation and Infrastructure; Natural Resources; Agriculture

¹²⁷⁸ Government Accountability Office, GAO-20-52, *Federal Agencies' Efforts to Reduce Wildland Fuels and Lower Risk to Communities and Ecosystems* (December 2019); Pub L No 116-94, Division D; Pub L No 116-6, Division E; Pub L No. 116-20, Title VII.

¹²⁷⁹ Ibid.

¹²⁸⁰ Ibid.

Build—and Rebuild—Using Resilience-Based Codes and Standards

Although there is no federal “building code,” federal agencies involved in the siting and design of the built environment, including post-disaster rebuilding, often require use of certain minimum specifications and standards from various sources and participate in the development of both performance-based and consensus-based codes and standards in partnership with standards-setting organizations. For example, Section 1234 of the Disaster Recovery Reform Act of 2018 (DRRA) requires FEMA to fund repair, restoration, reconstruction, or replacement of public facilities in conformity with “the latest published editions of relevant consensus-based codes, specifications, and standards that incorporate the latest hazard-resistant designs.”¹²⁸¹ The DRRA also requires that FEMA establish minimum criteria for the design, construction, and maintenance of homes that may be eligible for rebuilding and mitigation assistance under the Act.

In addition to the consensus-based codes developed by standard-setting organizations such as the International Code Council and the American Society of Civil Engineers, states and communities across the United States use enhanced standards that exceed the minimum criteria of model codes resulting from consensus-based negotiations.¹²⁸² For example, more than 20 states and more than 8,000 local governments already require flood resilience that exceeds federal minimum criteria under the NFIP.¹²⁸³ Four states mandate insurance discounts for use of the Insurance Institute for Business and Home Safety’s (IBHS) FORTIFIED standards that address high wind and hail.¹²⁸⁴ Innovative programs such as MyStrongHome leverage insurance discounts for homes and businesses that meet IBHS FORTIFIED standards to provide pre-disaster financing to retrofit existing homes for low-income families.¹²⁸⁵ Values for properties that meet standards for resilience can fetch higher prices, with one recent study finding an almost 7% increase in values for coastal Alabama properties that meet enhanced codes and standards.¹²⁸⁶ Since the additional cost of building or retrofitting homes to meet resilience standards is often less than 7% of home value, the benefits of that additional investment likely outweigh those costs.¹²⁸⁷

Scaling up these initiatives requires the federal government to establish clear, achievable national resilience building standards and require their use for federally supported construction, pre-disaster mitigation, and disaster recovery projects. This section identifies specific steps Congress can take to

¹²⁸¹ FAA Reauthorization Act of 2018, Division D, Disaster Recovery Reform Act of 2018, Pub L No 115-254.

¹²⁸² Christopher Flavelle, “Secret Deal Helped Housing Industry Stop Tougher Rules on Climate Change,” *New York Times*, October 26, 2019.

¹²⁸³ The National Flood Insurance Program Community Status Book (<https://www.fema.gov/national-flood-insurance-program-community-status-book>) lists the ratings and insurance discounts in communities that participate in the NFIP Community Rating System and conduct activities to reduce flood risk.

¹²⁸⁴ Insurance Institute for Business and Home Safety, “Regulatory Framework for FORTIFIED Insurance Incentives,” http://disastersafety.org/wp-content/uploads/FORTIFIED-Home-Incentives_IBHS.pdf. Accessed June 2020.

¹²⁸⁵ MyStrongHome is a benefit corporation that provides home upgrades that are certified IBHS FORTIFIED and leverages future savings on insurance costs to provide financing for resilience upgrades.

¹²⁸⁶ Sebastian Awondo et al., *Estimating the Effect of FORTIFIED Home Construction on Home Resale Value* (Alabama Center for Insurance Information and Research, 2018).

¹²⁸⁷ Ibid.

help communities build—and rebuild—with resilience and reduce the risk of loss of life and property in future climate disasters.

Building Block: Reform Federal Flood Risk and Resilience Standards

More than 20 states and thousands of communities across the nation have adopted higher standards to reduce flood losses, such as using higher elevation requirements and limiting development in flood-prone areas.¹²⁸⁸ The federal government encourages states, local governments, tribes, and territories to adopt higher standards for flood resilience. State, tribal, and local floodplain management criteria or regulations that are more restrictive or comprehensive take precedence over federal minimum standards for purposes of regulating development.¹²⁸⁹ Modernizing federal flood standards to better align with those of states and local governments that have adopted higher standards can help ensure that federally-supported development, redevelopment, and rebuilding will be flood-resilient.

In response to the rising risks and costs of flood disasters, President Obama issued Executive Order 13690¹²⁹⁰ requiring that federally supported projects adhere to a higher flood resilience standard of three feet above the base flood elevation¹²⁹¹ for critical actions¹²⁹² and two feet for all other actions. The Executive Order and implementation guidelines¹²⁹³ also provided the opportunity for federal departments and agencies to develop a climate-informed science approach for purposes of implementing their responsibilities under the Executive Order. This enabled agencies, including HUD, to implement the Executive Order using the higher elevation requirements in areas of known and mapped flood risk while continuing to develop the climate science needed for a more tailored approach based on localized conditions.

President Trump revoked Executive Order 13690, which established the Federal Flood Risk Management Standard, less than two weeks before Hurricane Harvey struck the Gulf Coast, causing devastating flooding and many deaths.¹²⁹⁴ The Trump administration committed to developing a new flood standard but has not done so to date. This has caused federal policy to revert to the 1970s-era standard for floodplain management, which is the 100-year flood.¹²⁹⁵ Flood risk management

¹²⁸⁸ FEMA, *NFIP Community Rating System Factsheet* (2020).

¹²⁸⁹ 44 CFR 60.1(d).

¹²⁹⁰ The White House, EO 13690, “Executive Order – Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input,” January 30, 2015.

¹²⁹¹ Base Flood Elevation (BFE) is the computed elevation to which floodwater is anticipated to rise during the base, or 1%-annual-chance, flood. BFEs are shown on Flood Insurance Rate Maps (FIRMs) and on the flood profiles. The BFE is the regulatory requirement for the elevation or floodproofing of structures.

¹²⁹² EO 13690 defined a “critical action” as “any activity for which even a slight chance of flooding would be too great.” Examples include hospitals, nursing homes, and critical infrastructure, such as water supply plants.

¹²⁹³ FEMA, “Guidelines for Implementing Executive Order 11988, Floodplain Management, and Executive Order 13690, Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input,” October 8, 2015.

¹²⁹⁴ The White House, EO 13807, “Presidential Executive Order on Establishing Discipline and Accountability in the Environmental Review and Permitting Process for Infrastructure,” August 15, 2017.

¹²⁹⁵ Even so, HUD has included a higher standard of two feet of freeboard above the base flood elevation for disaster recovery and hazard mitigation activities in the FEMA-Mapped Floodplain.

experts¹²⁹⁶ and business leaders¹²⁹⁷ have criticized this reversal and continue to call on the federal government to increase flood standards.

OMB reviewed just a portion of the inventory of federal government property and found more than \$80 billion federal assets located in designated flood zones.¹²⁹⁸ The John S. McCain National Defense Authorization Act (NDAA) for Fiscal Year 2019 requires that the Department of Defense (DOD) mitigate the flood risk of military construction projects to three feet above the base flood elevation for mission-critical buildings and two feet above the base flood elevation for non-mission-critical buildings.¹²⁹⁹ HUD regulations for CDBG-DR for new construction and repairs in flood hazard areas require use of a flood resilience standard of two to three feet above base flood elevation.¹³⁰⁰ A new federal flood policy would apply basic flood resilience standards immediately across all departments and agencies while tasking the Federal Interagency Floodplain Management Task Force with developing the climate risk-informed approach and guidance to agencies for implementation.

Recommendation: Congress should establish a federal flood policy that integrates modern science on flood and erosion risk into the minimum standards for federally supported activities, including federal facilities, grants, loans, loan guarantees, licensing, and other activities. Congress should direct federal departments and agencies to immediately implement a minimum federal flood standard for federally supported activities of three feet above the base flood elevation for critical actions within the 0.2%-annual-chance floodplain and two feet above the base flood elevation for all other actions within the 1%-annual-chance floodplain. While agencies can implement this simplified approach using flood risk maps and other currently available information, Congress should direct the Federal Interagency Floodplain Management Task Force to update the federal flood policy within three years and provide agencies with guidance to use best available data and methods that integrate current and future changes in flooding based on climate science and other factors affecting flood risk to determine the flood elevation standard in a manner appropriate to policies, practices, criticality, and consequences.

Recommendation: Congress should direct the General Services Administration to inventory all federal assets located in designated floodplains, including critical facilities in the 0.2% annual chance floodplain.

Committees of Jurisdiction: Transportation and Infrastructure; Financial Services

Building Block: Advance Wildfire Resilience-Based Codes and Standards for States, Local Governments, Tribes, and Territories

The National Institute of Building Sciences found that every dollar invested in wildfire resilience generates a \$4 savings in reduced wildfire losses.¹³⁰¹ The Mitigation Framework Leadership Group (MitFLG), composed of 14 federal agencies and departments, released the NMIS, which states “[u]p-to-

¹²⁹⁶ Pew Charitable Trusts, “Pew Among Broad Group Urging Stronger Federal Flood Standards,” August 26, 2019

¹²⁹⁷ Pew Charitable Trusts, “Small Business Leaders Call on Congress to Prioritize Flood Ready Infrastructure,” April 30, 2019;

Pew Charitable Trusts, “Business Owners Share Flood Stories in Call for Stronger National Standards,” April 29, 2019.

¹²⁹⁸ OMB, “Climate Change: The Fiscal Risks Facing the Federal Government, A Preliminary Assessment,” November 2016.

¹²⁹⁹ John S. McCain NDAA for Fiscal Year 2019, Pub L No 115-232.

¹³⁰⁰ HUD, “Allocations, Common Application, Waivers, and Alternative Requirements for Community Development Block Grant Mitigation Grantees,” 84 Fed. Reg. 45838, August 30, 2019.

¹³⁰¹ National Institute of Building Sciences, *Natural Hazard Mitigation Saves: 2019 Report* (December 2019).

date building codes and standard criteria should be required in federal and state grants and programs.”¹³⁰² The NMIS further recommends that the federal government and nonfederal partners commit to supporting the development, use, and enforcement of meaningful, up-to-date building codes, specifications, and standards.¹³⁰³ Communities have been encouraged specifically to employ a range of strategies to be more resilient to wildfire, including zoning and building policy, landscape regulations, vegetation and forestry management, and public education and preparedness campaigns.¹³⁰⁴

In response to rising wildfire risks, the International Codes Council (ICC) worked with experts and stakeholders through its consensus process to update the International Wildland-Urban Interface Code (IWUIC).¹³⁰⁵ The IWUIC establishes requirements for land use and buildings in designated WUI areas based on test data and fire incidents, technical reports, and mitigation strategies from around the world. Wildfire risks can vary from region to region and are highly dependent on the quality of statewide and local building codes, types of building styles, and topography. To address these unique risks, the Insurance Institute for Business and Home Safety developed regional guides that include risk assessment checklists and a cost estimator to help home and business owners prioritize necessary retrofit projects.¹³⁰⁶

Recommendation: Congress should direct the Departments of Housing and Urban Development, Agriculture, Treasury, Veterans Affairs, and Homeland Security to ensure that federally supported development, redevelopment, and rebuilding in the WUI use the minimum wildfire-resilient standards contained in the IWUIC. Congress should also direct MitFLG to convene a working group to assess and develop resilience strategies against wildfire risks to critical infrastructure such as transportation, water supplies, communications, and the electric grid. The section of the report titled “Make the Electric Grid More Resilient to Climate Impacts” goes into greater detail about policies to improve resilience of the U.S. electric grid to wildfire and other climate risks.

Committees of Jurisdiction: Transportation and Infrastructure; Homeland Security; Veterans Affairs; Agriculture; Financial Services

Building Block: Advance Wildfire Resilience-Based Codes and Standards for Federal Buildings

In May 2016, President Obama issued Executive Order 13728, “Wildland-Urban Interface Federal Risk Mitigation,” to reduce wildfire risks to federal buildings located in the WUI, minimize risks to people, and help minimize property loss to wildfire.¹³⁰⁷ The Executive Order directed agencies to ensure that federal buildings above 5,000 square feet on federal lands within the WUI comply with the IWUIC.

¹³⁰² MitFLG, *National Mitigation Investment Strategy* (August 2019).

¹³⁰³ *Id.* at 17.

¹³⁰⁴ Kristiane Huber, *Resilience Strategies for Wildfire* (Center for Climate and Energy Solutions (C2ES), November 2018), <https://www.c2es.org/site/assets/uploads/2018/11/resilience-strategies-for-wildfire.pdf>.

¹³⁰⁵ International Code Council (ICC), *2015 International Wildland-Urban Interface Code* (May 2014), https://codes.iccsafe.org/content/document/556?site_type=public.

¹³⁰⁶ DisasterSafety.org, “Regional Wildfire Retrofit Guides,” <https://disastersafety.org/wildfire/regional-wildfire-retrofit-guides/>. Accessed June 2020.

¹³⁰⁷ Executive Order 13728, “Wildland-Urban Interface Federal Risk Mitigation,” May 18, 2016.

MitFLG produced Implementation Guidelines for Executive Order 13728.¹³⁰⁸ However, it is unclear how many agencies have updated their standards and procedures to implement the Executive Order. In addition, opportunities remain to expand the scope of action to require that federally assisted infrastructure adopt the standards of the IWUIC to ensure wildfire resilience.

Recommendation: Congress should codify Executive Order 13728, “Wildland-Urban Interface Federal Risk Mitigation,” and direct federal departments and agencies to implement the requirements of the Executive Order to ensure that federal buildings are built to comply with the IWUIC, consistent with their missions and authorities, to help ensure the resilience of federal buildings against wildfires.

Committee of Jurisdiction: Transportation and Infrastructure

Building Block: Reduce the Loss of Life and Property in Windstorms

Every state in the country faces exposure to windstorm hazards from one or more storm types, including tornadoes, tropical cyclones, thunderstorms, nor'easters, winter storms, mountain downslope winds, derechos, and others. Congress established the National Windstorm Impact Reduction Program (NWIRP) “...to achieve major measurable reductions in the losses of life and property from windstorms through a coordinated Federal effort, in cooperation with other levels of government, academia, and the private sector, aimed at improving the understanding of windstorms and their impacts and developing and encouraging the implementation of cost-effective mitigation measures to reduce those impacts.”¹³⁰⁹ The National Institute for Standards and Technology is designated as the lead agency for the NWIRP, coordinating with FEMA, NOAA, and NSF. While not required to do so by statute, the Federal Highway Administration, HUD, USACE, and DOE also participate in the interagency discussions. Activities include supporting the development of performance-based engineering tools, coordinating federal post-windstorm investigations, and issuing recommendations to assist in the development of model building codes. NWIRP’s research on the effects of windstorms and ways to strengthen design standards can help reduce the risk of loss of life and property in tornados, hurricanes, and other severe storms.

However, much of the program’s work related to engineering design and building codes is based on the historical record of windstorms. Significant gaps remain in aspects of windstorm climatology and wind hazards and their interaction with the built environment.¹³¹⁰ The NWIRP needs additional funds to expand and help translate research on climate risk into engineering design principles and model building codes that will continue to keep communities safe.

Recommendation: Congress should reauthorize NWIRP to 2025 and increase its appropriations to improve research into climate system variability and change as it relates to wind hazards and to translate this research into better engineering design of the built environment. Additional appropriations will help agencies better collaborate with local decision-makers to increase

¹³⁰⁸ MitFLG, *Implementation Guidelines for Executive Order 13728 Wildland-Urban Interface Federal Risk Management* (undated), https://www.usfa.fema.gov/downloads/pdf/eo13728_guidelines.pdf. Accessed June 2020.

¹³⁰⁹ National Windstorm Impact Reduction Act Reauthorization of 2015, Pub L No 114-52, codified at 42 USC § 15701 et seq.

¹³¹⁰ Testimony of Scott Weaver, NIST NWIRP Director, Hearing of the Subcommittee on Research and Technology & Subcommittee on Environment, House Committee on Science, Space, and Technology, “Calm Before the Storm: Reauthorizing the National Windstorm Impact Reduction Program,” December 4, 2019.

understanding of the changing risks and promote the adoption of windstorm preparedness and mitigation measures.

Committees of Jurisdiction: Science, Space, and Technology; Transportation and Infrastructure

Building Block: Investigate Disaster Failures and Maximize Use of Robust Codes and Standards for Federal Disaster Recovery Programs

As the lead federal agency in pre-disaster mitigation and post-disaster recovery, FEMA and its Building Sciences Branch help develop and apply codes, specifications, and standards that can reduce risks of loss of life and property in climate disasters. FEMA needs more information regarding the benefits of prioritizing resilience when building homes and infrastructure and the savings achieved using resilience-based codes and standards. With this information, the agency and federal enterprise would be able to consider ways to improve standards and better prepare communities for the impacts of climate change.

When disasters strike the transportation sector, the National Transportation Safety Board deploys teams to investigate failures of engineering design or systems that contributed to risk or loss and to make recommendations to prevent future disasters. Similar investigations following weather-related catastrophes such as hurricanes, floods, and tornadoes that are expected to become more severe would support the development of engineering techniques, codes, and standards to ensure that communities are built and rebuilt to reduce the risk of loss of life and property when disasters strike.

Rep. Joe Neguse (D-CO) introduced the Climate Resilient Communities Act (H.R. 5709), which would require the GAO to evaluate and issue a report on the structural and economic impacts of climate resilience at FEMA, including recommendations on how to improve the building codes and standards that the agency uses to prepare for climate change and address resilience in housing, public buildings, and infrastructure such as roads and bridges.

Recommendation: Congress should direct the FEMA Building Sciences Branch to investigate major disasters and produce reports that are publicly available, including findings regarding failure modes of buildings and infrastructure and recommendations for changes to codes, standards, and risk management protocols to reduce the risk of loss of life and property in catastrophic weather events.

Recommendation: Congress should direct the GAO to investigate and report on the codes, specifications, and standards that FEMA uses and make recommendations on ways to improve them to address climate resilience in housing, public buildings, and infrastructure.

Committee of Jurisdiction: Transportation and Infrastructure

Building Block: Incentivize Community Adoption of Flood Resilience Standards Through Loan Forgiveness

The Community Disaster Loan (CDL) program, administered by FEMA under the Stafford Act, provides stopgap funding for local government services in the event of reduced revenue collection following a declared disaster. FEMA may cancel or partially cancel the loan repayment if financial conditions do

not improve over a period of three years. While the loan forgiveness is weighted on the economic recovery of the local government, there is currently no incentive to encourage communities to manage their risk as part of the consideration for loan forgiveness, such as adoption of land use measures, building codes, and standards that would reduce the risks and costs of future disasters.

Recommendation: Congress should modify Section 417 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act to encourage the adoption of higher standards and risk management practices as a prerequisite of repayment relief for the CDL program.

Committee of Jurisdiction: Transportation and Infrastructure

Make Climate Resilience Planning an Essential Element of Federal Agency Operations

The federal government manages more than a quarter of the land in the United States and more than 1 billion square feet of real estate.^{1311,1312} This confers a tremendous responsibility on the U.S. government to ensure these assets are resilient to the impacts of climate change but also affords an opportunity to lead by example. Federal agencies must work together on climate risk planning, especially for national defense, disaster preparedness, infrastructure, and public lands management. The responsibility, however, does not end at the U.S. border. Internationally, the United States should also lead efforts to mitigate the humanitarian impacts of climate change, which could affect U.S. national security interests at home and abroad.

Climate change is already affecting the operations of every agency in the federal government, and the impacts will continue to get worse. As climate-fueled extreme weather becomes more intense and frequent, federal agencies need to plan for how they will continue delivering essential services amidst climate disruptions. Coordination on climate planning must occur across federal agencies and in partnership with states, local governments, territories, tribes, and other stakeholders. In addition, federal agencies must be good stewards of their own assets, planning appropriately for climate change in their management of government-owned buildings and lands.

Building Block: Require Climate Adaptation Planning and Coordination for All Federal Agencies

In 2013, President Obama issued Executive Order 13653 requiring federal agencies to develop, implement, and maintain comprehensive plans that integrate consideration of climate change into agency operations and overall mission objectives.¹³¹³ The Executive Order established a Council on Climate Preparedness and Resilience to coordinate efforts to modernize federal programs to support climate resilient investment, reform federal policies and programs that increase risk, and support state and local preparedness and resilience efforts.¹³¹⁴ In 2017, President Trump repealed this

¹³¹¹ Congressional Research Service, *Federal Land Ownership: Acquisition and Disposal Authorities* (March 2019).

¹³¹² General Services Administration, “Federal Real Property Public Dataset,” <https://www.gsa.gov/node/127973>. Accessed June 2020.

¹³¹³ Executive Order 13653, “Preparing the United States for the Impacts of Climate Change,” November 1, 2013.

¹³¹⁴ Ibid.

Executive Order and disbanded the council. The Trump administration removed agency adaptation plans from the USGCRP website in October 2019.

In 2015, President Obama issued an Executive Order to promote federal greenhouse gas emissions reductions, resilience, and energy efficiency improvements as part of federal sustainability planning. Under the Executive Order, agencies were required to integrate climate resilient design for buildings and assets and to ensure that operations and facilities were prepared for the impacts of climate change.¹³¹⁵ President Trump revoked this Executive Order in 2018.

Several members of Congress have proposed legislation to reverse the Trump administration's actions and make federal adaptation a statutory duty. Sen. Amy Klobuchar (D-MN) introduced a bill (S. 2239) to codify Executive Order 13653, which would restart agency adaptation planning and reestablish the Council on Climate Preparedness and Resilience.

Rep. Joe Neguse (D-CO) introduced the Federal Labs Modernization Act of 2019 (H.R. 5356), which would direct GAO to complete a report every two years on the status of federal labs and related infrastructure, including climate control systems, functionality and usage of equipment, quality and resilience of buildings, and safety of materials used in construction of facilities. The bill calls for GAO to identify facilities in most need of repair or renovation, estimate the costs of those repairs or renovations, and evaluate whether facility occupancy is sufficient to meet agency needs. The bill would amend the America COMPETES (Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science) Act of 2007 to strengthen reporting requirements for the White House Office of Science and Technology Policy (OSTP) Director.

Rep. Scott Peters (D-CA) introduced the STRONG (Strengthening The Resiliency of Our Nation on the Ground) Act (H.R. 855), which would require OSTP to establish an interagency working group to develop a National Extreme Weather Resilience Action Plan. The interagency working group would also prepare follow-up reports every three years to update Congress on federal agency progress toward improving the nation's resilience to extreme weather.

Recommendation: Congress should direct federal departments and agencies to update their Climate Adaptation Plans and describe how agencies are (1) evaluating climate risks to their missions and operations, and (2) ensuring that program implementation does not exacerbate climate risks. Where program implementation entails use of benefit-cost analyses, Climate Adaptation Plans must describe how agencies incorporate climate risks into benefit-cost analyses, including the metrics and methodologies used. Plans should include identification of needed physical infrastructure improvements and evaluation of funding and resources needed for the improvements. Plans should also identify opportunities to address the disproportionate impacts of climate change on frontline communities and vulnerable populations. Departments and agencies that own or manage natural resources should include natural resource adaptation within their plans. Plans should also address federal workforce resilience against extreme weather risks.

Recommendation: Congress should reestablish the Council on Climate Preparedness and Resilience as the interagency coordinating mechanism for climate adaptation.

Committees of Jurisdiction: Energy and Commerce; Oversight and Reform

¹³¹⁵ Executive Order 13693, "Planning for Federal Sustainability in the Next Decade," March 19, 2015.

Building Block: Require Disclosure and Considerations of Emissions and Climate Risks in Federal Acquisition Processes and Procedures

As the largest buyer of goods and services in the world, the federal government—particularly DOD—can support both emissions reductions and climate resilience practices across operations and supply chains. The Federal Acquisition Regulation (FAR), finalized in 2016, articulates the procedures and guiding principles for federal procurement, which include satisfying the customer in terms of cost, quality, and timeliness of the delivered goods and services; minimizing operating costs; conducting business with integrity, fairness, and openness; and fulfilling public policy objectives.¹³¹⁶ The FAR currently requires vendors receiving \$7.5 million or more in federal contract awards to make certain declarations, including whether the vendor publicly discloses greenhouse gas (GHG) emissions or emissions reduction goals.¹³¹⁷

The FAR does not regulate any industry or mandate that these companies report GHG emissions or set emission reduction goals. Nor was the rule intended to affect the evaluation criteria for vendor selection decisions or put companies without such public disclosure at any competitive disadvantage. Instead, the intent was for the information obtained from the companies to help agencies develop strategies to better understand supply chain emissions. However, there is need for further federal action to generate a more comprehensive understanding of federal supply chain emissions and to help federal departments and agencies establish goals and measure progress for emissions reductions. Agencies also need additional information from vendors in order to better understand the physical climate risks to federal supply chains.

Recommendation: Congress should direct the Federal Acquisition Regulatory Council to require major suppliers, those who received \$7.5 million or more in federal contract awards in the previous year, to publicly disclose their greenhouse gas emissions and climate risks to their supply chains and operations, including risks posed by floods, wildfires, drought, and extreme heat. Congress should direct departments and agencies to consider emissions reduction and resilience in their contracting procedures. Federal support for projects should be conditioned on recipients meeting strong labor standards (including Buy America/n and Davis-Bacon prevailing wage requirements), complying with all labor, environmental, and civil rights statutes, and signing community benefit agreements and project labor agreements, where relevant. Any federal spending should also follow procurement policies that ensure the use of domestically produced, sustainable, and resilient materials made by corporations throughout the supply chain. Federal procurement of low-emission options would create a significant market, increasing their deployment and sending a clear signal to the private sector that investments in low-emission technologies would be profitable.

Committee of Jurisdiction: Oversight and Reform

¹³¹⁶ Federal Acquisition Regulation, 48 CFR § 1.102 (1995).

¹³¹⁷ Federal Acquisition Regulation, 48 CFR § 52.223-22 (2016), Public Disclosure of Greenhouse Gas Emissions and Reduction Goals, <https://www.acquisition.gov/content/5223-22-public-disclosure-greenhouse-gas-emissions-and-reduction-goals-representation>.

PROTECT AND RESTORE AMERICA'S LANDS, WATERS, OCEAN, AND WILDLIFE

The role of America's lands and waters in climate change is often overlooked, but nature is one of the most cost-effective and enduring solutions to the climate crisis. The country's forests, grasslands, and wetlands are significant carbon sinks, capturing and storing carbon in roots and soils. Natural features such as marshes, forests, and coral reefs serve as natural barriers – protecting communities from damaging floods and storm surges – and as filters, screening out harmful sediment, nutrients, and other pollutants.

The condition of nature in America, however, is rapidly declining as the country loses large swaths of natural areas to roads, urban sprawl, energy development, and other human activities. Moreover, the mismanagement of America's public lands and waters currently makes them a part of the climate change problem. Fossil fuel extraction on public lands and waters is responsible for nearly a quarter of total U.S. carbon dioxide emissions, making public lands a net-emitter of greenhouse gas pollution.¹³¹⁸ To transform public lands and waters into a cornerstone of the climate solution, the federal government needs to develop and implement a comprehensive, aggressive plan to reduce emissions from fossil fuel extraction, increase renewable energy development, and protect and restore natural landscapes across the country.

To capture the full potential of America's lands and waters to confront the climate crisis, private lands also must be a part of the solution. Half of all forest land in the United States, for example, is privately owned but still provides opportunities for carbon sequestration. Financial and technical assistance to protect and restore privately held lands can have a meaningful impact on carbon pollution reduction while providing critical habitat and connectivity for wildlife.

From protecting iconic landscapes to reducing emissions from fossil fuel development to increasing technical assistance for private landowners, America's public and private lands and waters offer countless opportunities to combat the climate and biodiversity crises.

Capture the Full Potential of Natural Climate Solutions

Conserving, protecting, and restoring natural landscapes and ecosystems such as forests, wetlands, and grasslands is critical to solving the climate and biodiversity crises. America's lands and waters offer "natural climate solutions" that, if maximized, have the potential to sequester up to one-fifth of net annual carbon dioxide emissions.¹³¹⁹ To achieve an economy-wide goal of net-zero emissions by midcentury, Congress will need to protect and restore America's lands and waters as a cornerstone of any comprehensive climate strategy. Storing carbon dioxide in natural systems is a proven, immediate, and cost-effective way to deliver large-scale emissions reductions and improve community and ecosystem resilience.

¹³¹⁸ USGS, SIR 2018-5131, *Federal Lands Greenhouse Gas Emissions and Sequestration in the United States: Estimates for 2005-14* (2018): 6.

¹³¹⁹ Joseph E. Fargione, *Natural climate solutions for the United States* (Science Advances, November 14, 2018): 1-3.

Protect and Conserve Large Landscapes and Biodiversity

Healthy landscapes and ecosystems are natural and efficient carbon sinks, storing carbon in plants and soils. Well-protected, intact ecosystems and wildlife migration corridors also help plant and animal species adapt to a changing climate by providing important habitat and connectivity. By expanding protections for America's lands, waters, and ocean, the U.S. government can reverse decades of deforestation, bolster the capacity of nature to capture and sequester carbon, and reduce greenhouse gas emissions that result from land disturbance and extractive activities.

Building Block: Protect at Least 30% of All U.S. Lands and Ocean Areas by 2030, Prioritizing High-Quality Conservation

Despite the widespread and significant climate benefits of large landscape conservation, the United States is losing a football field's worth of natural area every 30 seconds to human modification, such as urban development and energy infrastructure.¹³²⁰ To ensure the protection and restoration of forests, grasslands, wetlands, and other important habitat and natural spaces in order to maximize carbon sequestration and biodiversity benefits, the federal government should protect at least 30% of all U.S. lands and ocean areas by 2030.

Currently, just 12% of U.S. lands and 26% of the U.S. ocean are permanently protected, with protected lands found mostly in Alaska and the West and the vast majority of protected ocean area in the remote Western Pacific Ocean or northwestern Hawaii.¹³²¹ Despite constant development pressure, a substantial portion of America's lands and waters are still in a natural state, offering a significant opportunity to permanently protect America's most wild places. As of 2017, more than 262 million acres of protected and unprotected land remained in a wild state in the contiguous 48 states.¹³²² The climate benefits of land conservation are illustrated by Alaska, where a large portion of America's protected public lands are located and even more are in need of permanent protection. A 2018 U.S. Geological Survey (USGS) report stated that the "amount of carbon stored on Federal lands in Alaska was approximately 62 percent of the total carbon stored on Federal lands, indicating Alaska's importance in the overall U.S. carbon balance."¹³²³

Rep. Deb Haaland (D-NM) and Sen. Tom Udall (D-NM) introduced H.Res. 835/S.Res. 372, a resolution expressing the sense of the Senate and Congress that the U.S. government should establish a national goal of conserving at least 30% of the land and ocean areas in the United States by 2030, often referred to as "30x30."

In addition to this resolution, members of Congress have introduced numerous bills to expand and add protected areas and designate additional wilderness areas, national parks, and wild and scenic rivers. Some examples include:

¹³²⁰ Brett Dickson et al., *Methods and approach used to estimate the loss and fragmentation of natural lands in the conterminous U.S. from 2001 to 2017* (Conservation Science Partners, 2019): 6.

¹³²¹ H.Res. 835 and S.Res. 372, expressing the sense of the Senate and Congress that the Federal Government should establish a national goal of conserving at least 30% of the land and ocean in the United States by 2030, 116th Congress.

¹³²² Brett Dickson, et al., *Methods and approach used to estimate the loss and fragmentation of natural lands in the conterminous U.S. from 2001 to 2017* (Conservation Science Partners, 2019): 7.

¹³²³ USGS, SIR 2018-5131, *Federal Lands Greenhouse Gas Emissions and Sequestration in the United States: Estimates for 2005-14* (2018): 13.

- H.R. 823/S. 241, the Colorado Outdoor Recreation and Economy Act, introduced by Rep. Joe Neguse (D-CO) and Sen. Michael Bennett (D-CO), which would protect approximately 400,000 acres of public lands in Colorado, establishing about 73,000 acres of new wilderness area and nearly 80,000 acres of new recreation and conservation management areas.
- H.R. 2546, the Protecting America's Wilderness Act of 2019, introduced by Rep. Diana DeGette (D-CO), which would permanently protect more than 740,000 acres of land as designated wilderness, including areas surrounding Mesa Verde National Park, Black Canyon of the Gunnison National Park, and Curecanti National Recreation Area.
- H.R. 2250/S. 1110, the Northwest California Wilderness, Recreation, and Working Forests Act, introduced by Rep. Jared Huffman (D-CA) and Sen. Kamala Harris (D-CA), which would protect more than 260,000 acres in northwest California as wilderness and 379 miles of new Wild and Scenic rivers.
- H.R. 2215/S. 1109, the San Gabriel Mountains Foothills and Rivers Protection Act, introduced by Rep. Judy Chu (D-CA) and Sen. Kamala Harris (D-CA), which would expand the boundaries of the San Gabriel Mountain National Monument by nearly 110,000 acres; designate approximately 31,000 acres of wilderness and 45 miles of Wild and Scenic rivers; and establish the Puente-Chino Hills Wildlife Corridor south of the monument.
- H.R. 2199/S. 1111, the Central Coast Heritage Protection Act, introduced by Rep. Salud Carbajal (D-CA) and Sen. Kamala Harris (D-CA), which would protect approximately 244,000 acres of forest and grasslands as wilderness and 160 miles of rivers as Wild and Scenic in the Los Padres National Forest and Carrizo Plain National Monument.
- H.R. 2642/S. 1382, the Wild Olympics Wilderness and Wild and Scenic Rivers Act, introduced by Rep. Derek Kilmer (D-WA) and Sen. Patty Murray (D-WA), which would permanently conserve more than 126,000 acres of wilderness and add 19 rivers to the National Wild and Scenic Rivers System on Washington's Olympic Peninsula.
- H.R. 1321/S. 827, the Northern Rockies Ecosystem Protection Act, introduced by Rep. Carolyn Maloney (D-NY) and Sen. Sheldon Whitehouse (D-RI), which would protect approximately 23 million acres of public lands in the states of Idaho, Montana, Oregon, Washington, and Wyoming as permanent wilderness and biological corridors and 1,800 miles of rivers and streams as Wild and Scenic rivers.
- H.R. 871, the Bears Ears Expansion and Respect for Sovereignty Act, introduced by Rep. Ruben Gallego (D-AZ), which would restore protections for the original Bears Ears National Monument and expand it to the full 1.9 million acres of land identified by local tribes as sacred and significant.
- S. 247, the Virginia Wilderness Additions Act of 2019, introduced by Sen. Tim Kaine (D-VA), which would designate more than 5,000 acres of the George Washington National Forest as wilderness areas.
- H.R. 5999, the Udall-Eisenhower Arctic Wilderness Act, and S. 2461, the Arctic Refuge Protection Act of 2019, introduced by Rep. Jared Huffman (D-CA) and Sen. Edward Markey (D-MA), both of which would designate more than 1.5 million acres of land within the Coastal Plain of Alaska's Arctic National Wildlife Refuge as wilderness.

The House has passed many of these bills, which are awaiting action in the Senate. Additional sections throughout this report, such as “Expand Protections for Wild and Special Places” and “Protect and Restore Forests and Grasslands,” reference other bills that would help achieve a 30x30 goal by restoring and protecting wild places and habitat.

Recommendation: Congress should establish a national goal of protecting at least 30% of all U.S. lands and ocean areas by 2030, prioritizing areas with high ecological, biodiversity, and carbon sequestration value. Reaching this goal will require a comprehensive effort that involves working collaboratively with tribes, state governments, private landowners, and local communities. The Department of the Interior (DOI), in consultation with other land management agencies, should undertake a landscape-level evaluation, including the ocean, of priority conservation targets and consult with and increase funding for Landscape Conservation Cooperatives. This national 30x30 effort should also support and empower tribal nations and local communities, including environmental justice communities, early in the process to identify, develop, and implement strategies to protect and restore the natural places that are most essential and at risk, ensuring that this goal is achieved in a way that recognizes the geographic, social, and cultural diversity of the country.

Congress should prioritize conserving designated lands and waters through high-value protection designations and avoid designations that keep lands and waters open to industrial and extractive uses. On lands, this 30x30 effort should include incentives for high-quality conservation on private lands; encourage cross-jurisdictional collaboration at a landscape level with states, tribes, and local governments; expand the number and size of national parks, national monuments, and national wildlife refuges on public lands; establish wildlife corridors; and protect wilderness-quality lands managed by the Bureau of Land Management (BLM) and the U.S. Forest Service (USFS). DOI and other land management agencies should maintain protective measures for current Wilderness Study Areas; these areas should be a priority for congressional wilderness designation. For the ocean, Congress should emphasize Marine Protected Areas (MPAs) such as marine reserves, fully protected marine reserves, marine preserves, and Marine National Monuments.

Recommendation: Congress should direct relevant federal agencies to develop a National Nature Assessment. This comprehensive and periodic report should provide policymakers and the public with clear and actionable information on the condition of America's natural areas, wildlife, wildlife habitat, ocean health, watersheds and wetlands, and other natural systems. This National Nature Assessment should track and report on the nation's progress toward meeting a 30x30 goal.

Recommendation: Under existing law, federal natural resource agencies already have a responsibility and ample authority to manage lands for climate change and prioritize conservation. However, the organic statutes for America's natural resource agencies are decades old and were developed without the benefit of the current scientific understanding of human-caused climate change. Congress should review and, where applicable, update these laws to firmly and unequivocally establish that confronting climate change and conserving and restoring America's natural systems – for the benefit of all communities – should be an essential mandate for all U.S. natural resource agencies.

Committee of Jurisdiction: Natural Resources

Building Block: Fully and Permanently Fund the Land and Water Conservation Fund

Congress established the Land and Water Conservation Fund (LWCF) in 1965 to protect federal public lands and natural areas, including national parks, forests, and wildlife refuges; support voluntary conservation on private land; and provide grants to state and tribal governments to establish public

parks and other outdoor recreation opportunities.¹³²⁴ LWCF plays a powerful role in mitigating climate change and helping ecosystems, wildlife populations, and communities become more resilient to its impacts. For example, LWCF can help conserve and restore wetlands serving as hurricane storm buffers protecting communities; increase urban parks and tree canopy; protect habitat and wildlife migration corridors for species whose habitat is shifting and shrinking as a result of climate change; protect landscapes with high carbon sequestration value and potential; and mitigate fire risk by preventing development in fire-prone areas.¹³²⁵

In February 2019, Congress permanently reauthorized LWCF but failed to provide full, permanent funding for the program, which is currently authorized at \$900 million annually.¹³²⁶ Moreover, authorization levels for the program have not been updated since 1978 and, if indexed to inflation, LWCF would be authorized at \$3.6 billion today.¹³²⁷ LWCF is currently funded with revenues from offshore oil and gas development. As the United States transitions away from offshore oil and gas drilling, the LWCF will require a new funding stream.

Rep. Joe Cunningham (D-SC) and Sens. Cory Gardner (R-CO) and Joe Manchin (D-WV) introduced H.R. 7092/S. 3422, the Great American Outdoors Act, which would make full funding for LWCF permanent beginning in FY2021.

Recommendation: Congress should fully and permanently fund the Land and Water Conservation Fund as well as increase the program's annual authorization and index it to inflation.

Committee of Jurisdiction: Natural Resources

Building Block: Restore Abandoned Mines on Federal and Nonfederal Land for Climate Mitigation

Abandoned hardrock and coal mines litter the United States. The country lacks a national cleanup program or fund to cover the estimated \$50 billion necessary to reclaim as many as 500,000 abandoned hardrock mine sites across the United States.¹³²⁸ The Abandoned Mine Reclamation Fund helps to clean up abandoned coal mines, but the fee authority is set to expire in 2021 even though an estimated \$10 billion in reclamation work remains at the 5,000 abandoned coal mines across the country.¹³²⁹

¹³²⁴ U.S. Department of the Interior, “Land and Water Conservation Fund,” <https://www.doi.gov/lwcf>. Accessed June 2020.

¹³²⁵ The Wilderness Society, “5 Ways LWCF Can Help Confront the Impacts of Climate Change,” <https://www.wilderness.org/articles/blog/5-ways-lwcf-can-help-confront-impacts-climate-change>. Accessed June 2020.

¹³²⁶ John D. Dingell, Jr. Conservation, Management, and Recreation Act, Pub. L. 116-9 (March 2019).

¹³²⁷ Center for Western Priorities, “It’s time for Congress to Fund our most important park program” (June 19, 2019), <https://medium.com/westwise/its-time-for-congress-to-fund-our-most-important-parks-program-50d1f2a861ef>.

¹³²⁸ U.S. Environmental Protection Agency, 542-R-04-015, *Cleaning Up the Nation’s Waste Sites: Markets and Technology Trends, 2004 Edition* (September 2004): 11; AbandonedMines.gov, “Extent of the Problem,” <https://www.abandonedmines.gov/ep.html>. Accessed June 2020; Office of Senator Tom Udall, “Press Release: Udall, Senate Democrats: EPA Putting Taxpayers on the Hook for Hard Rock Mining Disasters” (January 17, 2018), <https://www.tomudall.senate.gov/news/press-releases/udall-senate-democrats-epa-putting-taxpayers-on-the-hook-for-hard-rock-mining-disasters>.

¹³²⁹ Testimony of Jason Walsh, Executive Director, BlueGreen Alliance, *Legislative Hearing on H.R. 4248 “Surface Mining Control and Reclamation Act Amendments of 2019*, Hearing Before the House Natural Resources Committee, Subcommittee on Energy and Mineral Resources, 116th Congress (November 14, 2019).

Mine reclamation mitigates existing and future environmental pollution, enhances natural carbon sequestration, and helps reduce methane leaks from mine sites. Investing in abandoned mine reclamation also creates jobs, stimulates local economies, and spurs new economic development.¹³³⁰

Rep. Matt Cartwright (D-PA) and Sen. Joe Manchin (D-WV) introduced H.R. 4248 and S. 1193, the Surface Mining Control and Reclamation Act Amendments of 2019 and the Abandoned Mine Land Reclamation Fee Extension Act, respectively. Both would reauthorize the Abandoned Mine Reclamation Fund, and H.R. 4248 would expand the payments from the fund for abandoned coal mine cleanups in certain states. The House Democrats introduced a comprehensive infrastructure bill in June 2020, H.R. 2, the Moving Forward Act.¹³³¹ Sections 84201-84203 of this bill include H.R. 4248.

To address abandoned hardrock mines, Chair Raúl Grijalva (D-AZ) introduced H.R. 2579, the Hardrock Leasing and Reclamation Act of 2019, which would establish strong reclamation standards for hardrock mines and create a fund to reclaim and restore abandoned mines and areas harmed by mining activities. Similarly, Sen. Tom Udall (D-NM) introduced S. 1386, the Hardrock Mining and Reclamation Act of 2019, which also would establish a fund dedicated to hardrock mining reclamation.

Recommendation: Congress should invest in local economies and address the significant national need to reclaim and restore abandoned coal and hardrock mine sites. This legislation should (1) reauthorize and increase the Abandoned Mine Reclamation Fund to restore abandoned coal mines; (2) create a fund to reclaim and restore abandoned hardrock mines and areas affected by mining activities; (3) establish strong reclamation standards for coal and hardrock mines; (4) prioritize climate and biodiversity benefits when restoring and reclaiming coal and hardrock mine sites, focusing on planting native trees and grasses; and (5) establish a fee on hardrock mining to fund remediation and reclamation.

Committee of Jurisdiction: Natural Resources

Building Block: Support the Efforts of Private Landowners to Conserve Natural Areas and Increase Financial Incentives for Private Land Conservation

From the farmers and ranchers who protect wildlife habitat on their lands to private foresters who maintain the health and productivity of their working lands, the United States has a long history of private land conservation. Yet, of all the acres of natural area lost from 2001 to 2017, the majority of those were private lands – 18.6 of 24 million acres.¹³³² Congress can and should do more to support the voluntary efforts of landowners to protect the lands, waters, and wildlife that they want to pass to future generations. If the United States is going to achieve a goal of protecting at least 30% of U.S. lands and waters by 2030, private lands must be a part of this strategy.

¹³³⁰ Ibid.

¹³³¹ Unless otherwise noted, mentions of H.R. 2 refer to the version of the bill contained in Rules Committee Print 116-54, dated June 22, 2020. The House of Representatives was preparing to debate H.R. 2 when the Select Committee's report went to print. The Rules Committee Print is available at <https://rules.house.gov/sites/democrats.rules.house.gov/files/BILLS-116HR2-RCP116-54.pdf> and will not reflect any amendments made to the bill after June 22, 2020.

¹³³² Matt Lee-Ashley et al., *The Green Squeeze* (Center for American Progress, October 22, 2019).

Conservation easements are an important tool for the conservation of private lands. A landowner can donate or sell land to a private organization or public agency under a legally binding agreement that limits certain types of uses or prevents development from taking place on the land in perpetuity.¹³³³ Some easements, such as agricultural easements, can include terms allowing for conservation of working lands and active forest management. Other easements are sold or donated for pure conservation purposes.

Recommendation: Congress should increase dedicated government funding for the purchase of conservation easements to protect private lands from development, increase wildlife habitat and connectivity, and increase the climate mitigation value and potential of those lands. This effort should include: (1) increasing funding for the Agricultural Conservation Easement Program (ACEP) to purchase additional acres of working land easements and provide additional technical assistance to landowners; (2) increasing funding for the Healthy Forest Reserve Program; (3) directing the U.S. Department of Agriculture (USDA) to prioritize the purchase of agricultural easements on lands managed for climate mitigation and biodiversity; (4) dramatically increasing dedicated funding levels for LWCF and DOI grants and programs to purchase conservation easements dedicated to pure conservation, climate, and biodiversity purposes, including migration corridors; (5) increasing tax benefits for landowners who opt to donate conservation easements to a land trust or government agency; and (6) expanding conservation easements to allow for instream water flow donations.

Committees of Jurisdiction: Natural Resources; Agriculture; Ways and Means

Building Block: Support and Consult Tribal Nations on Land Conservation and Indigenous Traditional Knowledge, With the Free, Prior, and Informed Consent of Indigenous Peoples

Tribal nations have generations of experience and knowledge regarding resource stewardship and conservation. Traditional ecological knowledge is unique to local environments and cultures and should be a critical part of the climate solution. Federal land management agencies should collaborate with and learn from tribal nations' traditional practices, including landscape conservation and healthy management of flora, fauna, land, air, and water.

Rep. Joe Neguse (D-CO) introduced H.R. 7264, the 21st Century Conservation Corps for Our Health and Our Jobs Act, which would provide \$195 million for the Bureau of Indian Affairs, including \$45 million for the Operation of Indian Programs to improve the health of public lands and support tribal forest restoration projects; \$100 million for Land and Water Claims Settlements to ensure tribes have access to land and water to meet domestic, economic, and cultural needs; and \$50 million to be used for deferred maintenance projects in Indian Country.

Recommendation: Congress should establish a commission to formally and meaningfully consult with tribal leaders to determine how to better support the conservation priorities and vision of tribal nations and develop a cooperative process to acknowledge, respect, and promote traditional

¹³³³ Land Trust Alliance, "Income Tax Incentives for Land Conservation," <https://www.landtrustalliance.org/topics/taxes/income-tax-incentives-land-conservation>. Accessed June 2020; The Nature Conservancy, "Private Lands Conservation," https://www.nature.org/en-us/about-us/who-we-are/how-we-work/private-lands-conservation/?tab_q=tab_container-tab_element_670. Accessed June 2020.

knowledge and stewardship practices on tribal and federal lands, centered on the principle of free, prior, and informed consent of Indigenous Peoples. Any legislation should ensure that tribes have fair and equitable access, representation, and participation in all climate initiatives, programs, and funding in which states, local governments, and other relevant entities can participate.

Recommendation: More than 40 federal natural resource funding programs omit or exclude tribes.¹³³⁴ Congress should create an interagency task force with representation of tribal leadership to identify gaps and ensure tribal inclusion in federal natural resource grants and programs designed for states. Federal resources should support increased tribal capacity for management and implementation.

Committee of Jurisdiction: Natural Resources

Building Block: Expand Environmental Justice Initiatives to Share Nature's Benefits More Equitably and Honor the Conservation Needs of All Communities

Residents of environmental justice communities often experience inequitable access to green spaces, public recreation opportunities, and nature generally. Affluent Americans are three times more likely to visit national parks compared with those from low-income communities, and roughly 80% of environmental justice communities in the West live in areas where the proportion of remaining natural area is lower than the state average.¹³³⁵ Similar access issues are often associated with America's coasts. As the coastal population increases and income inequality grows, wealthy coastal landowners in some areas are restricting the public's access to coastal land. Furthermore, equitable access to nature is not limited to geography – sharing nature's benefits more equitably also means ensuring an inclusive approach to access, restoration, and protection of natural spaces that reflects the people, cultures, and histories of environmental justice communities.

Rep. A. Donald McEachin (D-VA) and Chair Raúl Grijalva (D-AZ) introduced H.R. 5986, the Environmental Justice for All Act, which includes several initiatives to increase equitable access to nature.¹³³⁶ For example, the legislation includes H.R. 1184, the Every Kid Outdoors Act, introduced by Reps. Diana DeGette (D-CO) and Scott Tipton (R-CO), and H.R. 4273/S. 2467, the Transit to Trails Act of 2019, introduced by Reps. Jimmy Gomez (D-CA) and Steve Stivers (R-OH) and Sen. Cory Booker (D-NJ). The Every Kid Outdoors Act would permanently authorize the Every Kid in a Park program, which allows U.S. fourth-grade students and their families to visit any federally managed parks, lands, or waters for free for a year. The Transit to Trails Act would direct the Department of Transportation (DOT) to establish a grant program to fund accessible transportation systems in critically underserved communities to improve equitable access to parks, public lands, waters, and green spaces.

The Environmental Justice for All Act also includes a grant program similar to the one established in H.R. 4512/S. 1458, the Outdoors for All Act, introduced by Reps. Nanette Barragán (D-CA) and Mike Turner (R-OH) and Sen. Kamala Harris (D-CA). The Outdoors for All Act, which is similar to Sections 82201-82206 of the House Democrats' infrastructure bill, H.R. 2, the Moving Forward Act, would codify

¹³³⁴ Recommendations from ATNF, In Response to Request for Information, House Select Committee on the Climate Crisis, 116th Congress (November 22, 2019).

¹³³⁵ NCEL, "Environmental Justice," <https://www.ncel.net/environmental-justice/>. Accessed June 2020; Jenny Rowland-Shea, *Parks for All* (Center for American Progress, 2016).

¹³³⁶ H.R. 5986, the Environmental Justice for All Act, Sections 11-13, 116th Congress.

and establish a dedicated source of funding for the Outdoor Recreation Legacy Partnership to support projects that expand outdoor recreational opportunities in urban and low-income cities across the nation. To increase funding for these programs, Rep. Joe Neguse (D-CO) introduced H.R. 7264, the 21st Century Conservation Corps for Our Health and Our Jobs Act, which would invest \$80 million in the Every Kid Outdoors Program and provide \$500 million for the Outdoor Recreation Legacy Partnership.

Recommendation: Congress should develop and fund initiatives to ensure equitable access to parks, public lands, and other natural spaces.

Committee of Jurisdiction: Natural Resources; Transportation and Infrastructure

Building Block: Reestablish the Civilian Conservation Corps

Under the 1933 New Deal, the original Civilian Conservation Corps (CCC) planted 3 billion trees and employed 3 million workers.¹³³⁷ A new CCC could provide millions of jobs dedicated to restoring forests, coastal ecosystems, habitats, and natural spaces and planting new trees in both rural and urban areas.

Several members of Congress have introduced proposals to reestablish the CCC or a similar initiative. Rep. Marcy Kaptur (D-OH) introduced HR. 2358, the 21st Century Civilian Conservation Corps Act, which would authorize the President to establish a CCC to create jobs restoring forests and other natural resource projects. Rep. Joe Neguse (D-CO) introduced H.R. 7264, the 21st Century Conservation Corps for Our Health and Our Jobs Act, which would establish a fund for a land conservation corps to increase job training and hiring for resources management jobs. Similarly, Sen. Cory Booker (D-NJ) and Rep. Deb Haaland (D-NM) introduced S. 2452/H.R. 4269, the Climate Stewardship Act of 2019, which would establish a Stewardship Corps to provide young people from low-income communities, Indigenous communities, and communities of color with the opportunity to gain skills training and perform reforestation and wetlands restoration work on federal lands.

Recommendation: Congress should reestablish the Civilian Conservation Corps with a focus on recruiting and hiring individuals from environmental justice communities and other underserved populations. This legislation should direct the Department of Labor to work with relevant federal agencies to coordinate similar efforts.

Committees of Jurisdiction: Natural Resources; Education and Labor

¹³³⁷ Joseph M. Speakman, *Into the Woods: The First Year of the Civilian Conservation Corps* (Prologue Magazine, Fall 2006); U.S. Forest Service, *The Work of the Civilian Conservation Corps: Pioneering Conservation in Louisiana* (May 2012): 19.

Lift Up America's National Parks and Public Lands as Part of the Climate Solution

In addition to providing significant recreational value and natural beauty, America's treasured national parks and protected public lands must play an important role in any comprehensive climate strategy by protecting natural spaces and ecosystems with biodiversity, climate adaptation, and carbon sequestration value and potential. The network of protected public lands—including national parks, national wildlife refuges, national forests, and national conservation lands—plays a pivotal role in climate solutions. National parks, in particular, serve as anchors of broader ecosystems and therefore act as dynamic components of bigger systems of lands and habitats. These iconic and sensitive landscapes are also some of the most threatened by a changing climate.

Building Block: Increase Funding for the National Park Service and Other Land Management Agencies to Lift Up America's National Parks and Public Lands As Part of the Climate Solution

Due to long-term underinvestment, our land management agencies have significant maintenance and infrastructure needs and suffer from considerable backlogs. The National Park Service (NPS), for example, is facing a deferred maintenance backlog of \$12 billion, forcing repairs or maintenance on roads, buildings, utility systems, and other structures and facilities across the National Park Service to be postponed due to budget constraints.¹³³⁸ The maintenance challenges at other agencies are similarly pressing. In FY2018, the Forest Service estimated that it had \$5.2 billion in maintenance needs, while the Fish and Wildlife Service (FWS) estimated \$1.3 billion and BLM \$960 million.¹³³⁹ Without adequate funding, NPS, USFS, BLM, and FWS cannot maintain or repair America's treasured and iconic parks and public lands, even as they continue to face the threats of climate change, such as increasingly frequent and intense storms and sea level rise.

The four major land management agencies need more funding to resolve and prevent future maintenance backlogs, make parks and public lands more resilient to the impacts of climate change, and increase their carbon sequestration value. Additionally, the National Park Service could use funds to reduce energy use and pollution within the parks through energy efficiency projects, renewable energy upgrades, and procurement of zero-emission vehicles.

Rep. Joe Cunningham (D-SC) and Sens. Cory Gardner (R-CO) and Joe Manchin (D-WV) introduced H.R. 7092/S. 3422, the Great American Outdoors Act, which would allocate up to \$9.5 billion over five years to the land management agencies to address deferred maintenance needs across public lands.

Additionally, several members of Congress have introduced legislation to make America's national parks and public lands more climate-smart. Rep. Mike Levin (D-CA) and Sen. Catherine Cortez Masto (D-NV) introduced H.R. 3681/S. 2041, the Green Spaces, Green Vehicles Act of 2019, to convert the NPS and USFS vehicle fleets to zero-emission vehicles and expand charging infrastructure. Rep. Mike Quigley (D-IL) introduced H.R. 4236, the Reducing Waste in National Parks Act, which would restore

¹³³⁸ National Park Service, "What is Deferred Maintenance?" <https://www.nps.gov/subjects/infrastructure/deferred-maintenance.htm>. Accessed June 2020.

¹³³⁹ Congressional Research Service, R43997, *Deferred Maintenance of Federal Land Management Agencies: FY2009-FY2018 Estimates and Issues* (April 30, 2019): 3.

the Obama administration guidance banning the sale of single-use plastic water bottles in national park facilities.

Recommendation: Congress should significantly increase funding for NPS, USFS, FWS, and BLM, including funding for construction, operations, and cyclical and deferred maintenance. This legislation should require that construction, operations, and maintenance in parks and on public lands prioritize climate mitigation, green infrastructure, and adaptation benefits. A portion of this funding should be set aside to make climate-smart improvements to infrastructure and management at national parks and other protected public lands, including energy efficiency upgrades, procurements of zero-emission vehicles and infrastructure, zero waste initiatives, and shuttle transit options to reduce single occupancy vehicles.

Recommendation: Congress should direct the National Park Service to identify national parks landscapes eligible for native reforestation, reestablishment of native grasslands, and restoration of natural coastal infrastructure to maximize carbon storage and provide funding to carry out these projects.

Committee of Jurisdiction: Natural Resources

Building Block: Invest in Monitoring, Assessing, and Addressing Climate Impacts on National Parks Ecosystems and Identify Ways to Increase Their Climate Resilience

National parks are especially vulnerable to impacts of climate change because of their sensitive natural environments, plants, animals, glaciers, and historic and cultural resources.¹³⁴⁰ For example, as temperatures rise in Yellowstone National Park, pine beetle populations are multiplying, causing a massive decline in whitebark pine trees, a critical source of nutrition for grizzly bears.¹³⁴¹ Temperatures in national parks are warming at twice the rate of the United States as a whole, threatening the existence of namesake features at Glacier, Joshua Tree, and Saguaro National Parks.¹³⁴²

In 2016, the National Park Service under the Obama administration issued an order that called for a science-based approach to addressing climate change and other environmental changes in national parks and adopted the precautionary principle to protect natural and historic places. In August 2017, the Trump administration rescinded this order, known as Director's Order No. 100 (DO 100).

Recommendation: Congress should direct DOI to assess the National Park System for parks and sites most vulnerable to climate change, including economic damages and projections of future damages, in order to determine the scale and scope of the climate crisis as it applies to national parks. This legislation should require monitoring and research to better understand climate impacts on parks and how the federal government can increase climate resilience of park ecosystems. Using this data, NPS

¹³⁴⁰ Patrick Gonzalez et al., *Disproportionate magnitude of climate change in United States national parks*, (Environmental Research Letters, September 24, 2019): 6-10.

¹³⁴¹ Ibid at 9; Cecily M. Costello et al., *Influence of whitebark pine decline on fall habitat use and movements of grizzly bears in the Greater Yellowstone Ecosystem* (Ecology and Evolution, May 2014).

¹³⁴² National Parks Conservation Association, *Polluted Parks: How America is Failing to Protect our National Parks, People, and Planet from Air Pollution* (2019): 13.

should develop and implement a plan to address these vulnerabilities and report on the status of that plan at least every two years. This plan should include a landscape-scale study of existing and adjacent national park lands to assess expanding the National Park System to be more resilient to climate change with climate-related acquisitions. Any legislation should provide dedicated and robust funding for these efforts.

Recommendation: Congress should direct the National Park Service to reinstate DO 100 to require science-based decision-making in response to the challenge climate change poses to America's national parks and act with caution to protect sensitive ecosystems and cultural resources.

Committee of Jurisdiction: Natural Resources

Address the Biodiversity Crisis and Help Wildlife Adapt to Climate Change

In May 2019, the United Nations Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) released a draft report finding that nature is deteriorating globally at an unprecedented rate and that an estimated 1 million species are threatened with extinction, many within decades.¹³⁴³ The report ranked climate change among the top five leading direct drivers of species decline and projected that climate change will become an increasingly important driver of biodiversity loss as its impacts become more severe.¹³⁴⁴ According to the Fourth National Climate Assessment, “[w]ithout significant reductions in greenhouse gas emissions, extinctions and transformative impacts on some ecosystems cannot be avoided.”¹³⁴⁵ Meaningful protections for wildlife are critical to address this biodiversity crisis and provide species the resources and tools to survive in the face of a changing climate. At the same time, intact ecosystems are highly effective carbon sinks. Not only do natural systems and habitats store carbon in roots and soils, but some research suggests that ecosystems with predators and robust biodiversity sequester carbon at higher rates.¹³⁴⁶

Building Block: Establish a Wildlife Corridor and Connectivity System to Conserve Natural Spaces and Help Wildlife Adapt to the Impacts of Climate Change

Natural area loss is not limited to large tracts of land. Roads, fences, pipelines, oil fields, and other man-made barriers fragment habitats and natural spaces and restrict species' ability to move.¹³⁴⁷ Research shows that species with more fragmentated habitat are at greater risk of extinction.¹³⁴⁸

¹³⁴³ Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, *Summary for policymakers of the global assessment report on biodiversity and ecosystem services* (May 29, 2019): 4.

¹³⁴⁴ Ibid at 8.

¹³⁴⁵ U.S. Global Change Research Program, *Fourth National Climate Assessment, Volume II* (November 2018): 51.

¹³⁴⁶ Leslie Willoughby, *Can predators have a big impact on carbon emissions calculations?* (PNAS, March 6, 2018).

¹³⁴⁷ U.S. Fish and Wildlife Service, “Wildlife Corridors,” <https://www.fws.gov/refuges/features/wildlife-corridors.html>.

Accessed June 2020; Andrew F. Jakes, *A fence runs through it: A call for greater attention to the influence of fences on wildlife and ecosystems*, (Biological Conservation, 2018); National Wildlife Federation, “Connecting Wildlife Habitats,” <https://www.nwf.org/Our-Work/Habitats/Wildlife-Corridors>. Accessed June 2020.

¹³⁴⁸ Kevin R. Crooks et al., *Quantification of habitat fragmentation reveals extinction risk in terrestrial mammals* (PNAS, 2017).

Moreover, as temperatures rise, just 41% of the natural land area in the United States is connected enough to allow species to migrate to more suitable climates.¹³⁴⁹

A national goal of protecting 30% of all U.S. lands and waters by 2030 must include wildlife corridors to connect protected areas and habitats. Wildlife corridors facilitate migration, range expansion, and mating, all of which will be increasingly important in the face of climate change as habitats shift and shrink.¹³⁵⁰ In addition to land-based corridors, riparian network connectivity can play an important role in providing habitat connectivity for many species.¹³⁵¹ Preserving large landscapes and riparian networks from development for species migration and movement also has the climate co-benefit of increasing carbon sequestration and storage.

Rep. Don Beyer (D-VA) and Sen. Tom Udall (D-NM) introduced H.R. 2795/S. 1499, the Wildlife Corridors Conservation Act of 2019, which would establish a National Wildlife Corridors System and grant federal agencies the authority to designate wildlife corridors. The legislation would also establish a Wildlife Movement Grant Program to fund conservation efforts and improvement projects on state, tribal, and privately-owned lands to encourage natural wildlife movements. Additionally, the bill would establish Regional Wildlife Movement Councils to develop regional wildlife movement plans. Rep. Ruben Gallego (D-AZ) and Sen. Tom Udall (D-NM) also introduced H.R. 5179/S. 2891, the Tribal Wildlife Corridors Act of 2019, which would empower tribes to enhance native habitat connectivity on tribal lands by requiring the Forest Service to consider opportunities to link Tribal Wildlife Corridors to Forest Service-managed lands; requiring DOI to consult with tribes administering a recognized Tribal Wildlife Corridor and provide technical assistance to establish, manage, or expand a Tribal Wildlife Corridor; and establishing a grant program to encourage native species movement.

Sections 83201-83402 of the House Democrats' infrastructure bill, H.R. 2, the Moving Forward Act, includes the Wildlife Corridors Conservation Act. The bill also includes policies to establish wildlife highway and road crossings to avoid wildlife-vehicle collisions and increase habitat connectivity. For example, Section 1620 would impose requirements on states to use federal funds for projects that reduce vehicle-caused wildlife mortality or restore and maintain habitat connectivity, and Section 5107 of the bill would authorize a study on wildlife-vehicle collisions and habitat connectivity and require DOT to issue voluntary guidance to develop a joint plan for wildlife crossings among participating states. Similarly, Sen. John Barrasso (R-WY) introduced S. 2302, America's Transportation Infrastructure Act of 2019, which includes \$250 million in dedicated funds for a pilot program to construct wildlife roadway crossings such as overpasses, underpasses, and culverts.

Recommendation: Congress should direct DOI to establish and maintain a national wildlife corridor and connectivity system, including highway and road crossings, on federal lands and waters. DOI should also consult with tribes to enhance habitat connectivity on tribal lands, and Congress should establish a tribal wildlife corridor fund to provide funding for this effort. Additionally, Congress should develop a grant program for migration corridors on nonfederal land and establish regional councils to develop migration plans on a regional level. Any legislation to develop a national wildlife corridor and

¹³⁴⁹ Jenny L. McGuire, *Achieving climate connectivity in a fragmented landscape* (PNAS, 2016).

¹³⁵⁰ Wildlands Network, "Wildlife Corridors Conservation Act of 2019 Introduced in Congress with Bi-Partisan Support Following UN Report on Global Biodiversity Crisis," (May 16, 2019), <https://wildlandsnetwork.org/blog/wildlife-corridors-conservation-act-press-release-2019/>.

¹³⁵¹ Alexander K. Fremier et al., *A riparian conservation network for ecological resilience*, (Biological Conservation, 2015).

connectivity system should establish a commission to research, study, and develop a wildlife riparian connectivity network, as well as conduct research to map the path of species both today and in the future as climate change forces habitats, ecosystems, and corridors to shift and shrink.

Committee of Jurisdiction: Natural Resources

Building Block: Develop and Implement a National Landscape Conservation Strategy to Help Species Adapt to a Changing Climate

Climate change is among the leading threats to the long-term survival of species and habitats.¹³⁵² Increasingly warm temperatures are having widespread impacts on ecosystems and biodiversity around the globe, leading to species migration, extinctions, and changes in wildlife behavior.¹³⁵³ A comprehensive and coordinated national strategy based on science and long-term planning to protect, conserve, and connect habitats will be necessary to help species adapt to and survive the impacts of climate change.

Several members of Congress have introduced bills that would form a piece of this comprehensive strategy. As described above, Rep. Beyer and Sen. Udall introduced H.R. 2795/S. 1499, the Wildlife Corridors Conservation Act of 2019, which would establish a National Wildlife Corridors System and grant federal agencies the authority to designate wildlife corridors. Additionally, Rep. Gallego and Sen. Udall introduced H.R. 5179/S. 2891, the Tribal Wildlife Corridors Act of 2019, which would empower tribes to enhance native habitat connectivity on tribal lands.

Rep. Matt Cartwright (D-PA) and Sen. Sheldon Whitehouse (D-RI) introduced H.R. 2748/S. 1482, the Safeguarding America's Future and Environment Act, which would build on the National Fish, Wildlife, and Plants Climate Adaptation Strategy, an interagency plan to help safeguard America's natural resources and wildlife, to establish an integrated national approach to the impacts of climate change on America's wildlife and natural resources. Specifically, it would establish an interagency working group, composed of the natural resource agencies, to develop a national climate change adaptation strategy and require increased agency coordination to identify and prioritize specific conservation and management strategies and actions to respond to the impacts of climate change. It would also create the National Climate Change and Wildlife Science Center to develop and compile scientific information.

Rep. Debbie Dingell (D-MI) introduced H.R. 3742, the Recovering America's Wildlife Act of 2019, which would dedicate \$1.3 billion annually to state wildlife agencies to implement their wildlife action plans and more than \$97 million annually to tribal wildlife managers to conserve species on tribal lands and waters.

Recommendation: Congress should establish an interagency working group led by DOI and FWS to develop and implement a national landscape conservation strategy to plan for the long-term survival and adaptation of species in the face of a changing climate. As a part of this strategy, the land

¹³⁵² United Nations, “UN Report: Nature’s Dangerous Decline ‘Unprecedented’; Species Extinction Rates ‘Accelerating’,” <https://www.un.org/sustainabledevelopment/blog/2019/05/nature-decline-unprecedented-report/>. Accessed June 2020.

¹³⁵³ U.S. Global Change Research Program, *Fourth National Climate Assessment*, “Ecosystems, Ecosystem Services, and Biodiversity” (November 2018).

management agencies should identify lands that are essential to wildlife conservation and achieving the goal of protecting 30% of U.S. lands and ocean areas by 2030. In addition to habitat conservation and connectivity, this national strategy should include conservation and recovery plans for at-risk species that will be unable to shift to new locations as temperatures rise, such as island and mountain species. Finally, this strategy should coordinate conservation and climate resilience programs from agencies across the federal government that collectively can produce the connectivity, conservation, and habitat restoration necessary to provide species protection.

Recommendation: Congress should provide funding for states, tribes, and territories to increase wildlife conservation efforts and manage and recover Species of Greatest Conservation Need.

Committee of Jurisdiction: Natural Resources

Building Block: Support the Efforts of Private Landowners to Conserve Habitat and Help Wildlife Adapt to the Impacts of Climate Change

Private lands support more than two-thirds of the species listed as threatened or endangered under the Endangered Species Act (ESA).¹³⁵⁴ Therefore, conservation of forests, wetlands, grasslands, and other natural spaces on private lands is essential to species facing threats from climate change. Federal funding can support the voluntary efforts of landowners to protect wildlife and important habitat.

A significant amount of lands in the lower 48 states are managed for cropland, pastureland, or rangeland, making Farm Bill programs important for wildlife conservation.¹³⁵⁵ The Conservation Reserve Program (CRP), for example, is a land conservation program that pays farmers a yearly rental payment to remove environmentally sensitive land from production and plant long-term resource-conserving vegetative species, such as approved grasses or trees, to improve air and water quality, increase soil health, and enhance wildlife habitat.¹³⁵⁶ The State Acres for Wildlife Enhancement initiative is a practice under CRP aimed at improving, connecting, or creating high-quality wildlife habitat.¹³⁵⁷

The FWS administers other important initiatives for wildlife conservation on private lands. The Partners for Fish and Wildlife (PFW) Program, for example, is a voluntary, incentive-based program that provides technical and financial assistance in the form of cooperative agreements and grants to private landowners to restore and conserve fish and wildlife habitat.¹³⁵⁸ PFW staff coordinate with

¹³⁵⁴ U.S. Fish and Wildlife Service, “Working Together: Tools for Helping Imperiled Wildlife on Private Lands,” <https://www.fws.gov/endangered/esa-library/pdf/ImperiledWildlifeFinalDec2005.pdf>. Accessed June 2020.

¹³⁵⁵ U.S. Department of Agriculture ERS, “A Primer on Land Use in the United States,” <https://www.ers.usda.gov/amber-waves/2017/december/a-primer-on-land-use-in-the-united-states/>. Accessed June 2020.

¹³⁵⁶ U.S. Department of Agriculture FSA, “Conservation Reserve Program,” <https://www.fsa.usda.gov/programs-and-services/conservation-programs/conservation-reserve-program/>. Accessed June 2020.

¹³⁵⁷ U.S. Department of Agriculture FSA, “Conservation Fact Sheet: State Acres for Wildlife Enhancement (SAFE) Approved Projects – Conservation Reserve Program” (July 2015), https://www.fsa.usda.gov/Assets/USDA-FSA-Public/usdafiles/FactSheets/archived-fact-sheets/safe2015_jul2015.pdf.

¹³⁵⁸ U.S. Fish and Wildlife Service, “Partners for Fish and Wildlife Grant Opportunity,” <https://www.grants.gov/web/grants/view-opportunity.html?oppId=298219>. Accessed June 2020.

project partners, stakeholders, and other FWS programs to identify geographic focus areas and develop habitat conservation priorities.¹³⁵⁹

Rep. Joe Neguse (D-CO) introduced H.R. 7264, the 21st Century Conservation Corps for Our Health and Our Jobs Act, which would provide \$150 million for the PFW program.

Recommendation: Congress should increase financial and technical assistance for private landowners to help wildlife adapt to a changing climate, including expanding the number of acres enrolled in the State Acres for Wildlife Enhancement initiative within CRP; increasing funding for the PFW Program; and prioritizing species and regions most at risk from climate change.

Committees of Jurisdiction: Natural Resources; Agriculture

Building Block: Improve Implementation of the Endangered Species Act to Protect Endangered and Threatened Species from the Impacts of Climate Change

Climate change is a significant threat to biodiversity and species listed as threatened and endangered under the ESA. Federal agencies consider climate change to be a threat to 64% of listed species but have plans to mitigate climate-related risk for just 18%.¹³⁶⁰

In August 2019, the Trump administration announced that it would significantly weaken the ESA, eliminating key protections for threatened species, allowing economic considerations to override necessary protective measures, and making it more difficult to protect wildlife from the future threats posed by climate change. Chair Raúl Grijalva (D-AZ) introduced H.R. 4348, the PAW and FIN Conservation Act of 2019, which would repeal the Trump administration rule changes to the ESA, and thus restore critical protections for listed species confronting a warming climate.

Recommendation: Congress should require that federal agencies consider climate change as a factor in listing and delisting decisions; incorporate climate change considerations in ESA documents and plans; and address the threat of climate change in critical habitat designations and recovery actions. To address the growing need of consultations, Congress should direct DOI to hire enough biologists, ecologists, and National Environmental Policy Act (NEPA) staff to properly evaluate species' needs in a timely manner and propose recovery solutions as well as provide adequate funding to achieve this goal. Congress also should increase funding for the Cooperative Endangered Species Conservation Fund, which provides funding to states and territories for a variety of conservation projects for candidate, proposed, and listed species, as well as increase funding for federal species recovery initiatives by expanding the FWS Ecological Services budget and the National Oceanic and Atmospheric Administration (NOAA) Protected Resources Science and Management budget.

Recommendation: Congress should repeal the Trump administration 2019 rules that weakened the Endangered Species Act.

Committee of Jurisdiction: Natural Resources

¹³⁵⁹ Ibid.

¹³⁶⁰ Aimee Delach et al., *Agency plans are inadequate to conserve US endangered species under climate change* (Nature Climate Change, November 18, 2019): 3.

Protect and Restore Forests and Grasslands

One of the natural climate solutions that has the greatest potential to mitigate climate change is conservation and restoration of forests and trees.¹³⁶¹ Forests play a critical role in absorbing carbon emissions, accounting for more than 90% of land sector carbon storage.¹³⁶² When forests are degraded, harvested, or developed, not only have those forests lost the ability to sequester carbon, but carbon stored in the trees, roots, and soils is released into the atmosphere, making deforestation and forest degradation a significant source of land-based emissions. Forest restoration and prevention of forest conversion are therefore key to maintaining the ability of land to sequester carbon and prevent emissions.¹³⁶³

INCORPORATE CLIMATE INTO THE FOREST SERVICE MISSION

Building Block: Incorporate Climate Mitigation and Resilience into the Forest Service’s “Multiple Use” Policy and Planning

Pursuant to the Multiple-Use Sustained-Yield Act of 1960 (MUSYA), the Forest Service must manage the national forests and grasslands for multiple uses, such as outdoor recreation, grazing, timber, fish and wildlife, and wilderness, and ensure a sustained yield of the renewable resources of the national forests in perpetuity.¹³⁶⁴ This statute already gives USFS a responsibility and ample authority to manage federal lands for climate benefits and conservation. MUSYA, however, is decades-old and was enacted without the benefit of the current scientific understanding of human-caused climate change. Similarly, the National Forest Management Act directs USFS to engage in long-term land use and resource management planning but does not explicitly mention climate change.¹³⁶⁵

Recommendation: Congress should amend MUSYA and the National Forest Management Act to more directly emphasize climate mitigation and resilience as part of the Forest Service’s multiple use mission and planning. Additionally, Congress should direct USFS to require that all forest plans, projects, and associated NEPA analysis consider the impacts of forest management actions on the long-term sequestration of carbon and climate mitigation. In drafting this legislation, Congress should continue to reauthorize the Secure Rural Schools and Community Self-Determination Act and the Payment in Lieu of Taxes Program until a permanent county payment solution can be identified.

Committees of Jurisdiction: Natural Resources; Agriculture

¹³⁶¹ Joseph E. Fargione, *Natural climate solutions for the United States* (Science Advances, November 14, 2018): 3.

¹³⁶² Todd A. Ontl, et al., *Forest Management for Carbon Sequestration and Climate Adaptation* (Journal of Forestry, January 2020): 86; U.S. Environmental Protection Agency, EPA 430-R-16-002, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 – 2014* (April 15, 2016): ES-20; Joseph E. Fargione, *Natural climate solutions for the United States* (Science Advances, November 14, 2018): 1-3.

¹³⁶³ U.S. Forest Service, WO-95, *Considering Forest and Grassland Carbon in Land Management* (June 2017): 21-29.

¹³⁶⁴ Multiple Use and Sustained Yield Act of 1960, Pub. L. 86-517, 16 U.S.C. §§528-531, 16 U.S.C. §§583 et seq.; Congressional Research Service, R45688, *Timber Harvesting on Federal Lands* (April 12, 2019): 4.

¹³⁶⁵ National Forest Management Act: Pub. L. 94-588, 16 U.S.C. §§1600 et al.; 36 CFR Part 219 Subpart A.

AVOID DEFORESTATION AND INCREASE FOREST AND GRASSLAND RESTORATION

Building Block: Protect and Conserve Mature and Old Growth Forests

Some of America's forests with the highest carbon sequestration value and potential in the United States are currently at risk of development and degradation, such as Alaska's Tongass National Forest. Mature and old growth forests and trees, like those found within the Tongass, store and sequester large amounts of carbon, making them more effective at combating climate change than other types of forests.¹³⁶⁶ Old growth forests are ecosystems distinguished by old trees and related structural attributes, such as tree size, accumulations of large dead woody material, number of canopy layers, species composition, and ecosystem function.¹³⁶⁷ The Tongass, America's largest national forest and the largest intact temperate rainforest in the world, stores more than 650 million tons of carbon – about 8% of all carbon stored in U.S. national forests.¹³⁶⁸ For nearly two decades, the inventoried roadless areas of the Tongass have been protected from logging by the 2001 Roadless Rule, which prohibits the construction or expansion of roads on certain tracts of undeveloped land in national forests.¹³⁶⁹ On August 30, 2018, the Forest Service announced plans to repeal Roadless Rule protections across more than 9 million acres of the Tongass.¹³⁷⁰

Rep. Ruben Gallego (D-AZ) and Sen. Maria Cantwell (D-WA) introduced H.R. 2491/S. 1311, the Roadless Area Conservation Act of 2019, which would codify the 2001 Forest Service Roadless Rule to preserve roadless areas and limit roadbuilding and commercial logging in tens of millions of acres of undeveloped forests throughout the country.

Recommendation: Congress should codify the 2001 Forest Service Roadless Rule to protect mature and old growth forests.

Recommendation: Congress should direct the land management agencies to establish a coordinated strategy to protect mature and old growth forests as a federal Forest Carbon Reserve and prohibit the logging of these older forests. This strategy should include: (1) creating an inventory of mature and old growth forests on federal lands; (2) establishing protections for existing mature and old growth forests; and (3) developing guidance on how to restore and increase the extent of older forests for the purposes of biodiversity and climate mitigation and resilience.

Committees of Jurisdiction: Natural Resources; Agriculture

¹³⁶⁶ Dominick A. DellaSala, et al., *Analysis of Carbon Storage in Roadless Areas of the Tongass National Forest* (Forest Legacies, December 16, 2019): 1-3.

¹³⁶⁷ U.S. Forest Service, *Region 6 Interim Old Growth Definition* (June 1993): 1.

¹³⁶⁸ Ken Rait, *Comment period ending on White House proposal that skirts standard federal review process* (PEW Charitable Trusts, December 10, 2019); U.S. Forest Service, "Tongass National Forest: About the Forest,"

<https://www.fs.usda.gov/main/tongass/about-forest>. Accessed June 2020; U.S. Forest Service, PNW-GTR-889, *Storage and Flux of Carbon in Live Trees, Snags, and Logs in the Chugach and Tongass National Forests* (January 2014): 37.

¹³⁶⁹ 66 FR 3243.

¹³⁷⁰ 83 FR 44252; 84 FR 55522.

Building Block: Reduce Illegal International Deforestation by Restricting Access to U.S. Markets

Between 1990 and 2015, there was a net-decrease of approximately 129 million hectares of forests globally, an area roughly the size of South Africa.¹³⁷¹ Illegal deforestation is a significant source of greenhouse gas emissions and makes up almost half of all tropical deforestation globally, the majority of which is driven by land clearing for just four agricultural commodities – beef, soy, palm oil, and wood products.¹³⁷² In addition to the clear climate implications, illegal deforestation hurts U.S. agricultural producers. Agricultural and wood products produced through illegal deforestation reduce commodity prices, putting American farmers, ranchers, and timber producers at a disadvantage.¹³⁷³

Recommendation: Congress should restrict access to U.S. markets for commodities and products that originate from illegally deforested land.

Committee of Jurisdiction: Ways and Means

Building Block: Invest in Federal Forest Restoration for Maximum Climate Mitigation and Resilience

Healthy, ecologically sound forests are both more effective carbon sinks and more resilient to impacts of climate change such as fire, disease, insects, and drought. Forest managers can use prescribed burning, careful thinning to create desired forest conditions, habitat improvement, stream restoration, and replanting native trees and plants to maximize forests' climate and biodiversity benefits.

USFS estimates that between 65 and 82 million acres of Forest Service land would benefit from restoration treatment,¹³⁷⁴ but the agency reports that it only accomplishes between 2 to 6 million acres of restoration treatments annually.¹³⁷⁵ Inadequate funding is the largest obstacle USFS faces to forest management and restoration.¹³⁷⁶

The Forest Service manages numerous forest restoration programs. The Forest Service Collaborative Forest Landscape Restoration Program (CFLRP) encourages the collaborative, science-based ecological restoration of priority forest landscapes.¹³⁷⁷ The program has been a proven success and

¹³⁷¹ Food and Agriculture Organization of the United Nations, *Global Forest Resources Assessment 2015: How are the world's forests changing?* (2016): 3.

¹³⁷² Sam Lawson et al., *Consumer Goods and Deforestation: An Analysis of the Extent and Nature of Illegality in Forest Conversion for Agriculture and Timber Plantations* (Forest Trends, September 10, 2014): 1-3; Union of Concerned Scientists, "What's Driving Deforestation?" (February 8, 2016), <https://www.ucsusa.org/resources/whats-driving-deforestation>.

¹³⁷³ Shari Friedman, *Farms Here, Forests There: Tropical Deforestation and U.S. Competitiveness in Agriculture and Timber* (David Gardiner & Associates, May 2010): 1-3.

¹³⁷⁴ U.S. Forest Service, FS-1069, *From Accelerating Restoration to Creating and Maintaining Resilient Landscapes and Communities Across the Nation* (November 2015): 4.

¹³⁷⁵ Ibid.; Congressional Research Service, R43872, *National Forest System Management: Overview, Appropriations, and Issues for Congress* (September 5, 2019): 14.

¹³⁷⁶ Aashna Aggarwal et al., *Achieving the Mid-Century Strategy Goals for Deep Decarbonization in Agriculture and Forestry* (Nicholas Institute for Environmental Policy Solutions, July 2018): 27.

¹³⁷⁷ U.S. Forest Service, "Collaborative Forest Landscape Restoration Program Overview," <https://www.fs.fed.us/restoration/CFLRP/overview.shtml>. Accessed June 2020.

was reauthorized in the 2018 Farm Bill.¹³⁷⁸ The Joint Chiefs' Landscape Restoration Partnership is a collaboration between USFS and USDA's NRCS to improve the health of forests where public forests and grasslands connect to privately owned lands.¹³⁷⁹ Through this partnership, the two agencies restore landscapes, reduce wildfire threats to communities and landowners, and enhance wildlife habitat.¹³⁸⁰

Several other programs within the Forest Service have been historically underfunded, in part due to the rising cost of wildfire management. For example, the Vegetation and Watershed Management Program improves ecological conditions within forests, reduces the risk of flooding and erosion in forests affected by wildfires, and eradicates invasive species on forests and rangelands by restoring lands through post-wildfire restoration, planting, ecological thinning, and invasive species management; the Wildlife and Fisheries Habitat Management program works to maintain robust wildlife and fish populations and emphasizes the restoration and enhancement of ecosystems and forest conditions; the Legacy Roads and Trails program supports road decommissioning, road and trail repair and maintenance, and removal of fish passage barriers; the Land Management Planning, Assessment, and Monitoring Program works towards creating resilient and sustainable forests through long-term land use planning and establishing the management framework for the National Forest System lands; and the Forest Health Management – Federal Lands program provides technical knowledge and applied science innovation to assist forest managers in making insect and disease treatment decisions to improve forest health.¹³⁸¹

In addition to carrying out restoration projects internally, the Forest Service can collaborate with states, local governments, tribes, NGOs, and other individuals to increase the capacity to restore healthy forest ecosystems. Stewardship contracting allows USFS and BLM to pursue land management goals by combining a contract for restoration services with a contract for timber harvesting. Combining the two contracts allows the value of the harvested timber to offset the cost of service activities, essentially exchanging timber instead of cash payments to private companies for long-term restoration and forestry projects.¹³⁸²

Section 82401 of the House Democrats' infrastructure bill, H.R. 2, the Moving Forward Act, would authorize and fund the Legacy Roads and Trails Program and direct the Forest Service to prioritize projects that would protect or restore water quality, watersheds that feed public drinking water systems, or habitat for threatened, endangered, and sensitive fish and wildlife species. Additionally, Rep. Joe Neguse (D-CO) introduced H.R. 7264, the 21st Century Conservation Corps for Our Health and Our Jobs Act, which would provide a \$150 million increase in funding for the Collaborative Forest Landscape Restoration Program and an additional \$300 million for the Vegetation and Watershed Management Program.

¹³⁷⁸ U.S. Forest Service, "CFLRP Advisory Panel," <https://www.fs.fed.us/restoration/CFLRP/advisory-panel.shtml>. Accessed June 2020.

¹³⁷⁹ U.S. Department of Agriculture NRCS, "Joint Chiefs' Landscape Restoration Partnership," <https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/newsroom/features/?cid=stelprdb1244394>. Accessed June 2020.

¹³⁸⁰ Ibid.

¹³⁸¹ U.S. Forest Service, *FY 2020 Budget Justification* (March 2019): 37, 57, 59, and 62; USFS, "Legacy Roads and Trails Program Overview," https://www.fs.fed.us/restoration/Legacy_Roads_and_Trails/overview.shtml. Accessed June 2020.

¹³⁸² Congressional Research Service, R45696, *Forest Management Provisions Enacted in the 115th Congress* (April 2019): 28.

Recommendation: Congress should dramatically increase dedicated Forest Service and BLM funding for restoration activities to restore functioning and healthy forest ecosystems, including prescribed burning, tree planting, and restoring streams and natural fire regimes, in order to increase the climate benefits of America's forests. Specifically, Congress should increase funding for CFLRP; the Joint Chiefs' Landscape Restoration Partnership; the Vegetative and Watershed Management Program; the Wildlife and Fisheries Habitat Management program; the Land Management Planning, Assessment, and Monitoring program; and the Forest Health Management – Federal Lands program. Projects carried out under these programs should be for the primary purpose of increasing ecosystem health, biodiversity benefits, and climate mitigation and resilience, rather than for commercial purposes, and comply with NEPA, the ESA, and other bedrock environmental laws and regulations.

Recommendation: Congress should direct the Forest Service to establish an annual reporting requirement in order to collect data on the 65-82 million acres that the agency has identified for restoration. The Forest Service should then create a work plan to prioritize lands for restoration. This plan should focus on climate and biodiversity benefits, including watershed restoration and species conservation.

Recommendation: Congress should modify stewardship contracts by permanently reauthorizing the local preference authority to prioritize contracts with local firms in economically disadvantaged rural communities, creating local jobs and benefiting local communities. All projects carried out through stewardship contracts should serve the primary purpose of increasing ecosystem health, biodiversity benefits, and climate mitigation and resilience, and comply with NEPA, the ESA, and other bedrock environmental laws and regulations.

Recommendation: Congress should codify and provide robust funding for the Legacy Roads and Trails program to improve water quality, fish habitat, wildlife connectivity, climate mitigation and resilience, and create jobs.

Committees of Jurisdiction: Natural Resources; Agriculture

Building Block: Invest in Native Grassland Restoration for Maximum Climate Mitigation and Resilience

Native grasslands and prairie are highly effective carbon sinks and provide important habitat for grassland birds and wildlife. The perennial grasses that make up grasslands' extensive root systems can extend deep into soils, locking in carbon.¹³⁸³ Today, just a fraction of America's prairie remains. Grassland protection should be a critical component of an overall goal to protect at least 30% of U.S. lands and ocean areas by 2030. When grasslands are overgrazed or converted to agricultural land and other uses, soil carbon is released into the atmosphere, and the ability of those grasses to store carbon in the soil is lost.¹³⁸⁴ When grazing lands are properly managed, however, they have the potential to be a significant carbon sink. Avoiding future grassland conversion to cropland has the potential to reduce emissions by 107 million metric tons of carbon dioxide per year.¹³⁸⁵

¹³⁸³ U.S. Forest Service, WO-95, *Considering Forest and Grassland Carbon in Land Management* (June 2017): 30.

¹³⁸⁴ Judith D. Schwartz, *Soil as Carbon Storehouse: New Weapon in Climate Fight?* (Yale Environment 360, March 4, 2014); Joseph E. Fargione, *Natural climate solutions for the United States* (Science Advances, November 14, 2018): 3.

¹³⁸⁵ Joseph E. Fargione, *Natural climate solutions for the United States*, (Science Advances, November 14, 2018): 3.

Members of Congress have introduced legislation to mitigate some risks to grasslands. Rep. Adam Smith (D-WA) introduced H.R. 5737, the Voluntary Grazing Permit Retirement Act, which would provide grazing permit holders the option to voluntarily waive their permits to graze on public lands in exchange for market value compensation paid by private parties. The federal land management agency would then be directed to retire the associated grazing allotment from further activity.

Rep. Chellie Pingree (D-ME) introduced H.R. 5861, the Agriculture Resilience Act, which would establish a pilot program to enroll grasslands in CRP through a long-term 30-year conservation reserve contract to protect grassland that is exiting CRP or is at risk of conversion.

Recommendation: A patchwork of programs across multiple agencies complicates the protection, restoration, and sustainable management of grasslands. Congress should establish an interagency working group to develop a coordinated framework and strategy for the protection of existing native grasslands and restoration of grasslands where they historically existed. Congress should also provide robust and dedicated funding to carry out these policies. This strategy should include (1) financial incentives and technical assistance for replanting prairie on private lands; (2) grants for states, tribes, local governments, and NGO partners to restore and protect grasslands on nonfederal lands; (3) federal goals for prairie protection and restoration on public lands; and (4) options for grazing permit holders to waive their permits to graze on public lands in exchange for market value compensation, after which the grazing allotment would be retired from further activity.

Committees of Jurisdiction: Natural Resources; Agriculture

Building Block: Increase Investments in Conservation, Restoration, and Climate-Informed Management of Private Forests

Private forest owners own more than half of all forest-land in the United States, making private forestland a significant potential climate solution.¹³⁸⁶ Managing private forests for climate benefits, such as extended harvest cycles and reduced impact logging, has the potential to increase emissions reductions by 267 million metric tons of carbon dioxide per year.¹³⁸⁷

Development and wildfire threaten much of the non-industrial private forest-land in the United States. USFS found that 57 million acres of private forest-land could be threatened by residential development alone between 2000 and 2030.¹³⁸⁸ USFS administers two programs that protect and enhance private forestland threatened by development: the Forest Legacy Program (FLP) and the Community Forest and Open Space Conservation Program (CFP).

The FLP identifies and protects environmentally important forestland threatened by conversion to non-forest use by acquiring conservation easements or fee interest.¹³⁸⁹ USFS uses a competitive

¹³⁸⁶ U.S. Forest Service, NRS-INF-31-15, *Who Owns America's Trees, Woods, and Forests?* (March 2015): 3.

¹³⁸⁷ Joseph E. Fargione, *Natural climate solutions for the United States*, (Science Advances November 14, 2018): 3.

¹³⁸⁸ U.S. Forest Service, PNW-GTR-795, *Private Forests, Public Benefits: Increased Housing Density and Other Pressures on Private Forest Contributions* (December 2009): 13.

¹³⁸⁹ 16 U.S.C. §2103c, Pub. L. 101-624; U.S. Department of Agriculture, *USDA Building Blocks for Climate-Smart Agriculture and Forestry: Implementation Plan and Progress Report* (May 2016): 33.

process to select projects that have local support and national significance.¹³⁹⁰ Acres that are conserved through the program are protected in perpetuity and are managed in a manner consistent with the terms of the conservation easement and according to a multi-resource management plan.¹³⁹¹

The CFP secures a variety of community benefits through grants to local governments, tribal governments, and nonprofit organizations to acquire community forests through fee acquisition.¹³⁹² Community benefits include public access and recreational opportunities, wildlife habitat, climate resilience, demonstration sites for private forestland owners, and financial and community benefits from sustainable management.¹³⁹³

Rep. Joe Neguse (D-CO) introduced H.R. 7264, the 21st Century Conservation Corps for Our Health and Our Jobs Act, which would invest \$100 million in funding each for FLP and CFP. In the 115th Congress, Sen. Jeanne Shaheen (D-NH) introduced S. 2350, the Forest Incentives Program Act of 2018, which would establish an incentives program to achieve greenhouse gas emission reductions and carbon sequestration on private forest land in the United States through carbon incentives contracts and conservation easement agreements.¹³⁹⁴ The bill directs USDA to make payments to owners of eligible land for certain forestry practices that increase carbon sequestration and storage over a designated period and for conservation easements.

Recommendation: Congress should establish an incentives program to increase carbon sequestration on privately forested lands. These incentives should include carbon incentives contracts, conservation easements, financial and technical assistance for forestry practices that increase carbon sequestration, as well as cost-share and direct payments for tree restoration. This legislation should include significantly increased funding for and enrollment of private forestland acres in FLP and CFP and require that projects carried out under these programs are for the purpose of climate change mitigation and resilience, rather than commercial purposes, and deliver the greatest carbon sequestration value.

Committees of Jurisdiction: Natural Resources; Agriculture

Building Block: Partner with States to Maximize Restoration Resources and Ensure Climate-Informed Forest Management Across the United States

The federal government partners with states to manage national forests through formal agreements, grant programs, and technical assistance.

¹³⁹⁰ U.S. Department of Agriculture, *USDA Building Blocks for Climate-Smart Agriculture and Forestry: Implementation Plan and Progress Report* (May 2016): 33.

¹³⁹¹ Ibid.

¹³⁹² Ibid.; 16 U.S.C. § 2103d, Pub. L. 110-246.

¹³⁹³ U.S. Department of Agriculture, *Building Blocks for Climate-Smart Agriculture and Forestry: Implementation Plan and Progress Report* (May 2016): 33.

¹³⁹⁴ S. 2350, Forest Incentives Program Act, 115th Congress, <https://www.congress.gov/bill/115th-congress/senate-bill/2350>.

Good Neighbor Authority (GNA) allows USFS and BLM to enter into agreements with state forestry agencies, counties, and tribes to manage national forests.¹³⁹⁵ Under an approved GNA, states are authorized to perform restoration work on Forest Service and BLM lands, such as hazardous fuels reduction, fish and wildlife improvement projects, and tree planting.

The State and Private Forest Landscape Scale Restoration Program is a grant program that funds collaborative, science-based restoration projects on priority forest landscapes identified in State Forest Action Plans.¹³⁹⁶ States apply for grants and work directly with the landowner, state forester, and USFS.

The Forest Stewardship Program (FSP) encourages the long-term stewardship of state and private forest landscapes through state-directed technical assistance that provides landowners with the tools and resources to maintain healthy, resilient forests.¹³⁹⁷ The program focuses on three main areas: assisting landowners to actively manage their land; keeping land in productive and healthy conditions; and increasing the economic benefits of land while conserving the natural environment.¹³⁹⁸

Rep. Joe Neguse (D-CO) introduced H.R. 7264, the 21st Century Conservation Corps for Our Health and Our Jobs Act, which would invest \$100 million in the Landscape Scale Restoration Program.

Recommendation: Congress should increase and provide dedicated funding for GNA, the State and Private Forest Landscape Scale Restoration Program, and FSP and direct USFS to require that all activities carried out under these programs comply with core environmental safeguards, such as NEPA, and prioritize healthy forest restoration, climate mitigation, and forest resilience.

Recommendation: Congress should provide increased funding for states to increase forest restoration work, programs, and staff and require that all work carried out on state forests using federal funds comply with core environmental safeguards, such as NEPA, and prioritize healthy forest restoration, climate mitigation, and forest resilience. Any decision-making authority over federal lands should remain a federal action.

Committees of Jurisdiction: Natural Resources; Agriculture

¹³⁹⁵ 16 U.S.C. § 2113a, Pub. L. 113-79 as amended; National Association of State Foresters, “Good Neighbor Authority,” <https://www.stateforesters.org/state-defined-solutions/good-neighbor-authority/>. Accessed June 2020.

¹³⁹⁶ 16 U.S.C. § 2109a, Pub. L. 115-334; U.S. Forest Service, “Landscape Scale Restoration,” <https://www.fs.usda.gov/managing-land/private-land/landscape-scale-restoration>. Accessed June 2020.

¹³⁹⁷ 16 U.S.C. § 2103a, Pub. L. 101-624; U.S. Department of Agriculture, *Building Blocks for Climate-Smart Agriculture and Forestry: Implementation Plan and Progress Report* (May 2016): 33.

¹³⁹⁸ U.S. Forest Service, “Forest Stewardship,” <https://www.fs.usda.gov/managing-land/private-land/forest-stewardship>. Accessed June 2020.

MANAGE WILDFIRE FOR COMMUNITY SAFETY AND ECOLOGICAL HEALTH

Building Block: Provide Adequate Funding to Address Fires on Federal Lands While Maintaining Environmental Safeguards

Adequate funding is essential to supporting resources needed to address wildfires, especially as fires continue to increase in frequency and severity in the face of a warming climate. Wildfire costs have consumed increasing amounts of the Forest Service budget. In 1995, the Forest Service spent approximately 16% of its annual appropriated budget fighting wildfire, but by 2015, more than 50% of the agency's annual budget was dedicated to addressing fire.¹³⁹⁹ This has squeezed the Forest Service's budget for restoration projects to improve healthy forest ecosystems and reduce the risk of wildfires in the future.¹⁴⁰⁰

Congress included a “fire funding fix” as part of the bipartisan Wildfire Disaster Funding Act, which created a disaster fund to help ensure that agencies can fight wildfires without depleting funds from other parts of their budget, a process known as fire borrowing.¹⁴⁰¹ Congress added this legislation to the 2018 omnibus spending bill. Separate language in the spending package, however, created new exemptions to key environmental reviews and safeguards under NEPA and the ESA, allowing large and potentially ecologically harmful projects on federal forestland to bypass the public comment and review process and avoid consultations with FWS on the effects of those projects on newly listed species or designated critical habitat.

Fire management in forests on federal lands should focus on community safety while maintaining environmental safeguards, including robust NEPA analysis and ESA protections, and restoring natural fire regimes to create healthy forest ecosystems.

Recommendation: Congress should restore robust NEPA analysis, ESA protection, and other environmental safeguards for forest and fire management exempted by the 2018 omnibus spending bill.

Recommendation: Congress should provide land management agencies with adequate planning, research, and budgeting tools to manage for public safety, ecological health, climate benefits, and restoring natural fire regimes. This legislation should include increased funding for the Forest Service Hazardous Fuels Program and direct the agency to implement the program with a focus on improving community safety, forest health, resilience, and ecological and climate benefits. Additional resources for hazardous fuels reduction initiatives should focus on the wildland-urban interface (WUI) immediately surrounding communities. As fire management activities get farther from communities, fire management should provide noncommercial, ecological, and climate benefits and preserve intact forest landscapes to allow for safely managed fires and natural fire regimes. Congress should also

¹³⁹⁹ U.S. Forest Service, *The Rising Cost of Wildfire Operations: Effects on the Forest Service's Non-Fire Work* (Aug. 4, 2015): 2.

¹⁴⁰⁰ Former USDA Secretary Tom Vilsack, “The Cost of Fighting Wildfires is Sapping Forest Service Budget” (The Seattle Times, August 4, 2015), <https://www.seattletimes.com/opinion/the-cost-of-fighting-wildfires-is-sapping-forest-service-budget/>.

¹⁴⁰¹ Office of Senator Ron Wyden, “Press Release: Wyden, Crapo, Bipartisan Senators to Congress: Permanent Wildfire Funding Fix Must be a Top Priority,” (September 20, 2017), <https://www.wyden.senate.gov/news/press-releases/wyden-crapo-bipartisan-senators-to-congress-permanent-wildfire-funding-fix-must-be-a-top-priority>; H.R. 2862 and S. 1842, Wildfire Disaster Funding Act, 115th Congress, <https://www.congress.gov/bill/115th-congress/house-bill/2862> and <https://www.congress.gov/bill/115th-congress/senate-bill/1842>.

consider how to balance the need for prescribed burns for restoration and wildfire containment with a jurisdiction's ability to meet important federal, state, and local air quality standards.

Recommendation: Congress should direct USFS, BLM, and NPS to coordinate with relevant federal agencies to monitor the effects of particulate matter from wildfires on water quality on public lands.

Recommendation: Congress should increase funding and staff resources for conservation and restoration activities at the Forest Service that have experienced budget cuts due, in some part, to fire spending.

The report section titled “Reduce Wildfire Risks and Support Community Resilience against Wildfires” provides additional recommendations for addressing wildfire risks to communities in the WUI.

Committee of Jurisdiction: Natural Resources; Agriculture

Building Block: Ensure That All Categorical Exclusions from NEPA Are Informed by Science and Developed by Agency Experts

Categorical exclusions (CEs) exempt specified agency projects from certain NEPA requirements, including thorough environmental review of a project's impacts and lower-impact alternatives.¹⁴⁰² Under NEPA regulations, CEs should be reserved for categories of actions that do not have significant environmental impacts.¹⁴⁰³ However, CEs are sometimes used inappropriately to evade the purposes of NEPA. When CEs are designated through the legislative process, in particular, it eliminates the opportunity for public participation and comment and compromises the quality and transparency of agency decision-making.¹⁴⁰⁴

Recommendation: Congress should ensure that categorical exclusions are science-informed, consider climate impacts, and are developed by agencies' experts, not legislatively for political purposes.

Committees of Jurisdiction: Natural Resources; Agriculture

PROMOTE CLIMATE-INFORMED REFORESTATION AND AFFORESTATION

Reforestation – planting trees where forest has been harvested or degraded by fire, disease, or drought – is critical to expanding carbon sequestration on U.S. lands.¹⁴⁰⁵ Research shows that reforestation offers the single largest land sector pathway to carbon reductions, with the potential to store between 380 and 540 million metric tons of carbon dioxide per year if all historically forested areas are reforested without removing agricultural land from production.¹⁴⁰⁶

¹⁴⁰² 40 CFR §1508.4.

¹⁴⁰³ Ibid.

¹⁴⁰⁴ Congressional Research Service, RL33267, *National Environmental Policy Act: Streamlining NEPA* (January 9, 2007): 15.

¹⁴⁰⁵ Joseph E. Fargione, *Natural climate solutions for the United States* (Science Advances, November 14, 2018): 3

¹⁴⁰⁶ Research led by the Nature Conservancy found that reforestation offers the potential to store 381 million metric tons of carbon. Similarly, the World Resources Institute found that reforestation has the potential to store 540 million metric tons of carbon. Joseph E. Fargione, *Natural climate solutions for the United States* (Science Advances, November 14, 2018): 3;

Building Block: Invest in Reforestation on Public Lands and Reduce the Reforestation Backlog

Almost 400 years ago, the United States had an estimated 1,023 million acres of forests – 46% of the total land area.¹⁴⁰⁷ Since then, about 256 million acres have been converted to other uses.¹⁴⁰⁸ The federal government could mitigate climate change by strategically reforesting certain parts of this land. However, USFS does not have adequate funding or staffing to reforest the available areas at the scale necessary.¹⁴⁰⁹

In 1980, Congress created the Reforestation Trust Fund to eliminate the backlog of reforestation on National Forest System lands. The Forest Service may use up to \$30 million annually for a variety of activities related to reforestation such as seeding and tree planting.

Several members have introduced legislation to maximize the potential of the Reforestation Trust Fund. Rep. Deb Haaland (D-NM) and Sen. Cory Booker (D-NJ) introduced H.R. 4269/S. 2452, the Climate Stewardship Act of 2019, which would increase funding for the Reforestation Trust Fund. The legislation would ultimately require the planting of more than 4 billion trees by 2030 and 15 billion trees by 2050 on federal, state, local, tribal, and non-governmental lands. Rep. Jared Huffman (D-CA) introduced H.R. 5311, the Forestry Renewal Act, which would also expand the Reforestation Trust Fund by lifting the funding cap. Sen. Tom Udall (D-NM) introduced S. 3106, the Reforestation Act of 2019, which would direct the Forest Service to develop a plan to prioritize and reduce the backlog of reforestation needs on National Forest System lands within 10 years and double funding for the Reforestation Trust Fund from \$30 million to \$60 million per year.

Recommendation: Congress should significantly increase reforestation as one part of a comprehensive climate strategy. Congress should (1) increase authorized funding for the Reforestation Trust Fund and lift the funding cap; (2) establish national goals for reforesting 40 to 50 million acres of federal and nonfederal land and provide adequate funding to achieve those goals;¹⁴¹⁰ (3) direct land management agencies to guide reforestation using the best available science and focus on climate and biodiversity benefits when replanting, not commercial opportunities and interests; (4) direct land management agencies to avoid monocrops and nonnative-style reforestation efforts; focus replanting efforts on native species, to the extent that a specific native species is feasible for reforestation in the face of a changing climate and evolving biodiversity needs; consider an appropriate time period based on forest type and local biodiversity goals and expectations for regeneration; prioritize natural regeneration when possible; and require that all reforestation expenditures and projects be for the primary purpose of increasing ecosystem health, biodiversity benefits, and climate mitigation and resilience, rather than for commercial purposes, and comply with NEPA, ESA, and other bedrock environmental laws and regulations; (5) provide funding to update the national assessment of forest resources that identifies the areas of greatest potential for reforestation and climate and biodiversity benefits; and (6) support the development of native plant and seed banks to support regionally appropriate reforestation.

Alexander Rudee et al., *Federal Policy Options for a Carbonshot in Natural & Working Lands* (The World Resources Institute, January 2020): 18.

¹⁴⁰⁷ U.S. Forest Service, FS-1035, *U.S. Forest Resource Facts and Historical Trends* (August 2014): 7.

¹⁴⁰⁸ Ibid.

¹⁴⁰⁹ U.S. Department of Agriculture, *Building Blocks for Climate-Smart Agriculture and Forestry: Implementation Plan and Progress Report* (May 2016): 37.

¹⁴¹⁰ The White House, *United States Mid-Century Strategy for Deep Decarbonization* (November 2016): 72.

Committees of Jurisdiction: Natural Resources; Agriculture

Building Block: Provide Financial and Technical Assistance to Increase Reforestation on Nonfederal Lands

Replanting trees on private and other nonfederal lands that were once forests is another important component of a comprehensive climate strategy. Integrating trees into pasture and cropland alone could sequester 147 million metric tons of carbon dioxide annually in addition to providing numerous co-benefits, such as providing shade for livestock, increased soil health, improved water quality, and additional revenue streams for farmers.¹⁴¹¹

Private landowners could benefit from financial and technical assistance to plant the right trees in the right places to maximize the climate and biodiversity benefits of forests.

Rep. Deb Haaland (D-NM) and Sen. Cory Booker (D-NJ) introduced H.R. 4269/S. 2452, the Climate Stewardship Act of 2019, which would establish a new Reforest America Grant Program to provide grants to state, tribal, local, and NGO partners to plant over 6.5 billion trees by 2050.

Recommendation: Congress should provide additional financial and technical assistance to increase reforestation on state, local, tribal, and private lands. This legislation should (1) establish a new grant program to provide funding to states, tribes, local governments, and NGOs to increase reforestation efforts on nonfederal lands; (2) direct and fund the Forest Service and NRCS to provide financial and technical assistance to ensure that reforestation on nonfederal lands is guided by the best available science; prioritizes habitat preservation and connectivity, as well as climate mitigation and resilience; focuses on planting the right kinds of trees in the right places and at the right times; avoids monocrops and nonnative style reforestation efforts and instead focuses replanting efforts on native species, to the extent that a specific native species is feasible for reforestation in the face of a changing climate and evolving biodiversity needs; and (3) increase USFS regional staff to provide educational outreach and technical assistance for reforestation to private landowners as well as state, local, and tribal governments.

Committees of Jurisdiction: Natural Resources; Agriculture

Building Block: Invest in Afforestation of Lands

Planting new forests on land where there were none, known as afforestation, also offers opportunity for increased carbon sequestration, particularly when those forests are native tree species and planted on land that is suitable for tree canopy.¹⁴¹² Planting trees on disturbed or abandoned non-agricultural lands that are ecologically appropriate for trees, including parks, roadsides, and sparse

¹⁴¹¹ Alexander Rudee et al., *Federal Policy Options for a Carbonshot in Natural & Working Lands* (The World Resources Institute, January 2020): 19.

¹⁴¹² Forest-Climate Working Group, *Tapping into U.S. Forests to Mitigate Climate Change* (September 2018): 5.

suburban areas, has the potential to sequester up to 146 million metric tons of carbon dioxide across 53 million acres per year.¹⁴¹³

Recommendation: Congress should identify areas suitable for replanting native forest in areas where forests have not existed for an extensive time period. Lands that do not support tree canopy naturally and historically, such as native grasslands, should not be considered for afforestation. Instead, the focus should be on farm pasture, where integration of trees and grazing livestock is appropriate; parks; areas near rivers and streams where tree canopy can support fish habitat and manage water temperatures; brownfields; roadsides; urban areas; and degraded land such as abandoned mines. Congress should provide appropriate funding for carrying out afforestation efforts on those areas.

Committee of Jurisdiction: Natural Resources; Agriculture

Building Block: Increase Urban Forests and Tree Canopy

Urban forests offer significant climate mitigation benefits, covering more than 130 million acres collectively in the United States and delivering more than 10% of forest-based carbon storage.¹⁴¹⁴ The sequestration potential in urban forests has the capacity to grow, as many cities and suburban areas have tracts and fragments of vacant land available to add urban tree acreage.¹⁴¹⁵ Expanding urban forest patches and street trees by just 7-11% could sequester up to 23 million metric tons of carbon dioxide.¹⁴¹⁶ Trees in urban communities not only sequester carbon but also moderate the temperature in residential areas, reducing the need for residential energy use for cooling and heating homes.¹⁴¹⁷

Robust urban canopy also provides co-benefits such as managing stormwater, providing habitat for species, and improving air quality and public health.¹⁴¹⁸ One significant co-benefit of urban forests is providing canopy cover in environmental justice communities. Lack of tree cover exacerbates the effects of urban heat islands, where paved surfaces and the lack of natural areas cause cities to become warmer than their rural surroundings.¹⁴¹⁹ Equitable distribution of tree canopy will give more Americans access to the benefits that healthy urban forests provide.

The Forest Service manages multiple programs aimed at increasing urban forest cover. The Urban and Community Forestry (UCF) Program provides technical, financial, research, and educational services to state forestry agencies and nonprofit organizations to help communities increase urban tree canopy by performing tree inventories, preparing management plans and policies, and training staff

¹⁴¹³ Alexander Rudee et al., *Federal Policy Options for a Carbonshot in Natural & Working Lands* (The World Resources Institute, January 2020): 20.

¹⁴¹⁴ U.S. Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 – 2014* (April 15, 2016): 6-79; Forest-Climate Working Group, *Tapping into U.S. Forests to Mitigate Climate Change* (September 2018): 6.

¹⁴¹⁵ Forest-Climate Working Group, *Tapping into U.S. Forests to Mitigate Climate Change* (September 2018): 6.

¹⁴¹⁶ Alexander Rudee et al., *Federal Policy Options for a Carbonshot in Natural & Working Lands* (The World Resources Institute, January 2020): 19-20.

¹⁴¹⁷ U.S. Environmental Protection Agency, *Using Trees and Vegetation to Reduce Heat Islands*, "<https://www.epa.gov/heat-islands/using-trees-and-vegetation-reduce-heat-islands>". Accessed June 2020.

¹⁴¹⁸ Ibid.

¹⁴¹⁹ U.S. Environmental Protection Agency, "Learn About Heat Islands," <https://www.epa.gov/heat-islands/learn-about-heat-islands>. Accessed June 2020.

to plant and care for trees.¹⁴²⁰ Priorities of the program include integrating urban and community forestry into all scales of planning; strengthening urban and community forest health and biodiversity for long-term resilience; developing comprehensive programs, policies, and resources for enhancing urban forestry stewardship; and increasing funding and grants for urban community forestry.¹⁴²¹ The National Urban and Community Forestry Advisory Council is congressionally designated to advise the Secretary of Agriculture on urban forestry and related issues, develop a national urban and community forestry action plan, and recommend innovative urban and community forestry research, projects, and programs for funding.¹⁴²²

The Vibrant Cities Lab is a joint project of USFS, American Forests, and the National Association on Regional Councils to help city managers, policymakers, and advocates build urban forest programs and provide information and research on how healthy tree canopy can enrich their community.¹⁴²³ Implementing an urban forest management plan can help cities and localities successfully increase urban tree canopy. The Vibrant Cities Lab provides a toolkit to help local governments create their own plans.¹⁴²⁴

Several members have introduced legislation calling for increased urban tree canopy. Rep. Jared Huffman (D-CA) introduced H.R. 5311, the Forestry Renewal Act, which would renew the National Urban and Community Forestry Advisory Council and require that the Council not be terminated except by an act of Congress. Rep. Deb Haaland (D-NM) and Sen. Cory Booker (D-NJ) introduced H.R. 4269/S. 2452, the Climate Stewardship Act of 2019, which would require the planting of more than 100 million trees in urban neighborhoods by 2030 across the United States, with priority going to environmental justice communities. Rep. Doris Matsui (D-CA) introduced H.R. 5615, the TREES Act, which would create a new program within the Department of Energy (DOE) that provides grants to energy providers to offer homeowners free or reduced-cost tree-planting services to help shade homes, reduce energy use, and combat the climate crisis. Rep. Joe Neguse (D-CO) introduced H.R. 7264, the 21st Century Conservation Corps for Our Health and Our Jobs Act, which would provide \$100 million in funding to UCF.

Recommendation: Congress should increase trees planted in urban areas by (1) renewing the National Urban and Community Forestry Advisory Council; (2) increasing funding for the Urban and Community Forestry Program; (3) increasing funding for the Vibrant Cities Lab and providing financial incentives for cities to adopt Urban Forestry Management Plans; (4) establishing a Tree Equity program to increase tree canopy in environmental justice communities by providing grants for tree planting and prioritizing underserved cities and neighborhoods as a complement to the technical assistance provided by the UCF program; (5) investing in workforce development and training programs, such as AmeriCorps, and pre-employment programs that link underserved populations with urban forestry careers; (6) creating a new DOE grant program for energy providers to offer homeowners free or

¹⁴²⁰ 16 U.S.C. § 2105, Pub. L. 101-624; U.S. Forest Service, “Urban & Community Forestry Program,” (January 2018), https://www.fs.fed.us/ucf/supporting_docs/UCF-Brief-Jan2018.pdf.

¹⁴²¹ U.S. Forest Service, “Urban & Community Forestry Program” (January 2018), https://www.fs.fed.us/ucf/supporting_docs/UCF-Brief-Jan2018.pdf.

¹⁴²² U.S. Forest Service, “National Urban and Community Forestry Advisory Council,” <https://www.fs.usda.gov/managing-land/urban-forests/ucf/nucfac>. Accessed June 2020.

¹⁴²³ Vibrant Cities Lab, “About,” <https://www.vibrantcitieslab.com/about/>. Accessed June 2020.

¹⁴²⁴ Vibrant Cities Lab, “Planning: Best Practices in Urban Forestry,” <https://www.vibrantcitieslab.com/toolkit/plan-the-total-program/>. Accessed June 2020.

reduced-cost tree-planting services; and (7) supporting long-term staff in communities to continue to maintain and enhance reforestation efforts.

Committees of Jurisdiction: Natural Resources; Agriculture; Energy and Commerce

INCREASE CLIMATE BENEFITS OF FOREST MANAGEMENT AND WOOD PRODUCTS

Building Block: Measure the Success and Effectiveness of Forest Service Activities Based on Outcome-Based Metrics, Including Climate Benefits, Rather Than Output-Based Metrics, Such As Board Feet Harvested

Land management agencies should use timber harvest on public lands as a tool to achieve multiple public benefits, including forest restoration and climate mitigation. Stewardship contracting, for example, illustrates how the land management agencies can balance economically viable timber projects with ecological benefits by capturing the value of the byproducts of restoration activities. Stewardship contracts focus on ecosystem benefits and outcomes, rather than on what is removed from the land, while also meeting local and rural community needs, creating jobs, and generating value from the byproducts of restoration.

Forest Service forest management policies, plans, and projects on public lands should be designed to produce measurable ecological benefits, including carbon sequestration and climate resilience. These outcome-based metrics should define and measure the success and effectiveness of Forest Service activities, rather than output-based metrics, such as board feet harvested.

Recommendation: Congress should direct the Forest Service to measure the success and effectiveness of Forest Service activities, operations, programs, and policies with a priority on outcome-based metrics, such as watershed condition improvement, carbon sequestration, climate resilience, habitat conservation and connectivity, movement toward desired conditions for ecological integrity, restoration of natural fire regimes, and prevention of forest degradation and fragmentation, rather than output-based metrics, such as board feet harvested.

Committees of Jurisdiction: Natural Resources; Agriculture

Building Block: Develop Region-Specific Climate-Smart Forestry Practice Guidelines to Support Sustainable Forest Management and Timber Harvest on Nonfederal Lands

Managing forests sustainably means optimizing their benefits, including timber, in a way and at a rate that conserves and maintains forest ecosystems, biodiversity, productivity, and regenerative capacity.¹⁴²⁵ Well-managed, sustainable timber harvest through climate-smart forest management techniques and practices can provide both economic value and climate benefits.

Recommendation: Congress should direct the Forest Service to develop region-specific climate-smart forestry and timber harvesting practice guidelines for application on nonfederal lands. These guidelines should consider practices such as diameter limits, restrictions on clear cutting, extending

¹⁴²⁵ FAO, “Sustainable Forest Management,” <http://www.fao.org/forestry/sfm/en/>. Accessed June 2020.

forest rotations, biodiversity and sensitive habitat protections including habitat connectivity, limiting conversion of natural forests to plantations, and restocking rates. Congress should encourage these region-specific climate-smart timber harvesting practice guidelines through financial incentives on private lands, including federal procurement priority, cost share, and direct payments. The Forest Service should provide technical assistance to aid in implementing these practices.

Committees of Jurisdiction: Natural Resources; Agriculture

Building Block: Create Markets and Incentives for Innovative, Sustainable Wood Products That Utilize Timber Produced by Sustainable and Climate-Smart Forest Restoration Practices

When harvested using sustainable and climate-smart forestry practices, wood products can reduce greenhouse gas emissions by storing carbon and, at the same time, offsetting emissions from conventional carbon-intensive building materials.¹⁴²⁶ Long-lived wood products, in particular, are effective in storing carbon when compared to alternative products that are more fossil-fuel intensive.¹⁴²⁷ Promoting certain wood products from well-managed forests using timber byproducts and small diameter trees could provide a market-based incentive to stimulate forestry practices that achieve forest health and resilience.

The Wood Innovation Grant program and the Community Wood Energy and Wood Innovation program promote new and innovative uses for wood as a building material by accelerating the research and development of wood used for construction projects, such as cross-laminated timber (CLT).¹⁴²⁸ The use of CLT is leading the effort to replace concrete with wood in building construction in tall buildings.¹⁴²⁹ Among other provisions, the Timber Innovation Act includes grants to support state, local, university, and private sector education, outreach, and research that will accelerate the use of wood in tall buildings. The USDA Forest Products Lab also conducts research aimed at using wood resources wisely while also finding ways to conserve timber resources and byproducts, including CLT.

Recommendation: Congress should increase investments in research and development of climate-smart wood products such as CLT, including increasing funding for the USDA Forest Products Lab. Congress should also increase funding for wood innovation programs and establish carbon sequestration and climate mitigation as a priority in research, grants, and prizes. Congress should also consider ways to appropriately maintain existing small-scale mills and other timber production facilities to help them transition and to maintain a restoration wood products workforce.

¹⁴²⁶ U.S. Department of Agriculture, *Building Blocks for Climate-Smart Agriculture and Forestry: Implementation Plan and Progress Report* (May 2016): 41.

¹⁴²⁷ U.S. Forest Service, WO-95, *Considering Forest and Grassland Carbon in Land Management* (June 2017): 27-28.

¹⁴²⁸ Pub. L. 115-334; 7 U.S.C. § 7655d; 7 U.S.C. § 8113; U.S. Senate Committee on Agriculture, Nutrition, & Forestry, “Stabenow, Crapo Introduce Bipartisan Bill to Accelerate Research, Development of Wood Building Construction in United States” (May 2, 2016), <https://www.agriculture.senate.gov/newsroom/dem/press/release/stabenow-crapo-introduce-bipartisan-bill-to-accelerate-research-development-of-wood-building-construction-in-united-states>; U.S. Senate Committee on Energy & Natural Resources, “Cantwell Secures Bipartisan Bill to Accelerate the Use of Cross-Laminated Timber and Green Buildings” (December 11, 2018), <https://www.energy.senate.gov/public/index.cfm/2018/12/cantwell-secures-bipartisan-bill-to-accelerate-the-use-of-cross-laminated-timber-and-green-buildings>.

¹⁴²⁹ Ibid.

Recommendation: Congress should develop market incentives for climate-smart wood products derived from restoration activities and timber byproducts, such as encouraging wood building materials in federal buildings; providing education and technical assistance for architects and engineers to use wood in building construction; and directing federal agencies to work with state and local partners to update building codes and partner with the U.S. Green Building Council to incorporate the carbon storage value and reduced carbon emissions associated with wood building construction in LEED standards.

Committees of Jurisdiction: Natural Resources; Transportation and Infrastructure; Agriculture

Building Block: Invest in Lifecycle Analysis of Wood Use and Wood Products, Including Accurately Accounting for the Climate Impacts of Biomass

Depending on the source of biomass, the methods of converting it into energy, and the time horizon considered, the climate impacts of biomass can vary, and burning woody biomass is not always carbon neutral.¹⁴³⁰ Other uses of wood, such as long-lived wood products and buildings, have the potential to store carbon removed from well-managed forests. To better understand the climate impacts of wood products and biomass, the federal government needs a framework for comparing lifecycle carbon implications of wood products and biomass against a business-as-usual baseline.

In addition to understanding the climate impacts of biomass, Congress should also consider the effects biomass has on the biodiversity crisis. In some cases, biomass harvesting may negatively affect wildlife habitat and ecosystem health.

Recommendation: Congress should invest in research to better understand the lifecycle carbon implications of wood use and wood products, including accurately accounting for the climate impacts of biomass. This research should require (1) that methods used to evaluate climate impacts of biomass are transparent, predictable, replicable, and based on the best available science; (2) methods that employ the counterfactual scenario to assess additionality of biomass use; (3) evaluation of both positive emissions – releases of carbon – and negative emissions – carbon sequestered through the growth of biomass; (4) a life-cycle analysis from growth to harvest or collection, processing, and combustion of both direct and indirect sources of emissions; (5) inclusion of non-carbon emissions, such as methane and nitrogen oxide; (6) analysis of negative and positive emissions in a time frame relevant to what the IPCC identified for meeting the atmospheric carbon reductions needed to limit global warming to 1.5°C; and (7) consideration of other activities that compete for land use, such as food and timber production, habitat preservation, and reforestation.

Recommendation: Congress should establish safeguards to ensure woody biomass does not contribute to the biodiversity crisis, including restricting harvesting from sensitive habitat and ecosystems, preventing the conversion of natural forest habitat, and prohibiting the cultivation of invasive species for bioenergy feedstock.

Committees of Jurisdiction: Agriculture; Science, Space, and Technology; Natural Resources

¹⁴³⁰ Congressional Research Service, R41603, *Is Biopower Carbon Neutral?* (February 4, 2016): 10.

Building Block: Support Partnerships and Collaborations to Facilitate Broad Adoption of Climate-Smart Forest Management

Engaging with key partners, including communities, tribal governments, private landowners, nonprofit organizations, land-grant universities, and extension services, will allow federal land management agencies to increase the climate and biodiversity benefits of climate-smart forest management by leveraging skills, resources, and shared goals.¹⁴³¹ Strong, effective partnerships will allow federal agencies to enhance and accelerate the deployment of financial and technical assistance to private landowners, states, and local and tribal governments, as well as increase the capacity for forest restoration projects on federal lands.

Recommendation: Congress should establish a commission to facilitate partnerships and collaboration between federal agencies, communities, tribal governments, extension services, land-grant universities including historically black colleges and universities (HBCUs) and tribal colleges, private landowners, and industry and conservation groups to increase climate-smart forestry practices and provide education, outreach, and technical assistance to landowners.

Committees of Jurisdiction: Natural Resources; Agriculture

INCREASE THE CAPACITY TO MANAGE LANDS FOR CLIMATE AND BIODIVERSITY BENEFITS THROUGH RESEARCH, RESOURCES, AND STAFF

Building Block: Determine Where Forest Restoration Provides the Greatest Climate and Biodiversity Benefits Through Increased Data Collection

With millions of acres of forests in need of restoration, identifying priority landscapes and restoration projects is critical to increase climate mitigation and resilience.¹⁴³² But little data exists on where forest restoration would provide the greatest return of climate benefits. Setting clear restoration objectives and goals, conducting research to map forests and identify projects and areas that will provide the greatest opportunity to achieve those goals, and making that data public will help the Forest Service to better prioritize forest restoration efforts.

Recommendation: Congress should increase funding for Forest Service research and data collection to map forests and identify where restoration provides the greatest climate and biodiversity benefit. Congress should require the Forest Service, in coordination with other relevant federal agencies, to make this data public.

Committees of Jurisdiction: Natural Resources; Agriculture

¹⁴³¹ U.S. Department of Agriculture, *USDA Building Blocks for Climate-Smart Agriculture and Forestry: Implementation Plan and Progress Report* (May 2016): 35.

¹⁴³² U.S. Forest Service, “Research & Development,” <https://www.fs.fed.us/research/priority-areas/>. Accessed June 2020.

Building Block: Invest in Research, Data, and Model Development on Forest Health and Wildfire Behavior

Increased research, data, and modeling on forest and ecosystem health, climate mitigation and resilience, and wildfire potential and behavior can help forest managers maximize climate and biodiversity benefits and better manage for fire risk.

The USFS Forest and Rangeland Research program conducts research across private forests and landscapes to inform policy and land-management decisions and improve the conditions of forests and grasslands through sustainable management of these landscapes.¹⁴³³

The Forest Inventory and Analysis (FIA) program is a continuous forest census covering all 50 states and generates data on past, current, and projected tree numbers by species, size and health, tree growth, mortality, and harvest removals; loss of forested lands due to disturbances such as storms and fires; wood production; and forest landownership.¹⁴³⁴

The USGS Landsat Program has been providing data for 40 years about Earth's land use and cover and is the basis for numerous trend monitoring programs.¹⁴³⁵ Maintaining working satellites is key to assuring we have accurate data both about forests and other climate trends.

Recommendation: Congress should increase funding for land management agencies to frequently collect and update data on forest health and restoration as well as wildfire potential and behavior, including increasing funding for the Forest and Rangeland Research Program and the FIA Program. This data should be regionally tailored, focused on climate and biodiversity benefits, and publicly available.

Committees of Jurisdiction: Natural Resources; Agriculture

Building Block: Expand Research on Carbon Sequestration in Federal Forests, Grasslands, and Soils

There is currently limited understanding of carbon dynamics in forests, grasslands, and soils. More research will help identify opportunities, areas, and best management practices for greenhouse gas mitigation.

Rep. Joe Neguse (D-CO) introduced H.R. 4133, the Study on Improving Lands Act, which would require the USDA to study the state of soil health on federal lands and look at the impacts of grazing, wildfire, recreation, and invasive species. The bill would direct USDA to create a database of the information collected during the study.

Recommendation: Congress should increase support for and investments in research on carbon sequestration in U.S. lands, forests, and soils including (1) directing USDA, in consultation with DOI, to

¹⁴³³ U.S. Forest Service, *FY 2020 Budget Justification* (March 2019): 27.

¹⁴³⁴ Ibid at 27-28.

¹⁴³⁵ NASA Landsat Science, "About," <https://landsat.gsfc.nasa.gov/about/>. Accessed June 2020; USGS, "Landsat Missions," <https://www.usgs.gov/land-resources/nli/landsat>. Accessed June 2020.

conduct a study of the current state of soil health on federal lands; (2) increasing R&D funding for the land management agencies to map forests and grasslands and better understand how to achieve the maximum climate benefits and make this information available to the public; (3) directing USFS to report on their use of existing climate data in forest management, restoration, and reforestation activities; (4) improving FIA by increasing funding and implementing a forest carbon monitoring system to monitor activities that improve carbon sequestration, conduct sampling of stored carbon in restoration projects, and utilize technology such as remote sensing data to determine carbon storage, including data collected by other federal agencies, such as the National Aeronautics and Space Administration (NASA) and USGS; and (5) requiring the Forest Service to complete an assessments of lands that require restoration and make the report publicly available.

Committees of Jurisdiction: Natural Resources; Agriculture

Building Block: Increase Staff Resources and Funding at the Forest Service and Department of the Interior to Match Land Management Needs

Over the last couple decades, the number of non-fire personnel at the Forest Service declined by 39%, from 18,000 in 1998 to fewer than 11,000 in 2015.¹⁴³⁶ Adequate staffing is critical to tackling the millions of acres in need of restoration and conducting the research necessary to maximize the climate and biodiversity benefits of our nation's forests and grasslands.

Recommendation: Congress should significantly increase the number of non-fire full-time staff at USFS. To carry out the increased restoration work and conservation work that needs to be done, including addressing the maintenance backlog at USFS and BLM, Congress should dramatically increase funding for these agencies.

Committees of Jurisdiction: Natural Resources; Agriculture

¹⁴³⁶ Former USDA Secretary Tom Vilsack, "The Cost of Fighting Wildfires is Sapping Forest Service Budget" (The Seattle Times, August 4, 2015); U.S. Forest Service, *The Rising Cost of Wildfire Operations: Effects on the Forest Service's Non-Fire Work* (August 4, 2015): 2-7.

Protect and Restore Ocean and Wetland Ecosystems for Climate Mitigation and Resilience

Ocean and wetland ecosystems, including mangroves, sea grasses, and marshes, are highly effective carbon sinks and, although smaller in size, store carbon at a faster rate than terrestrial forests.¹⁴³⁷ In addition to their powerful ability to sequester carbon, wetlands also make coastal and riverine ecosystems and communities more resilient to the impacts of climate change, protecting shorelines from flooding and storms and providing cost savings to communities.¹⁴³⁸ When wetlands are degraded or converted for development, they release the carbon stored in marine roots and soils into the atmosphere, increasing emissions and reducing their ability to sequester carbon in the future.¹⁴³⁹ It is therefore critical to protect these “blue carbon” systems to mitigate climate change and protect ecosystems and communities from the impacts of a warming climate, such as ocean acidification and biodiversity decline, sea level rise, floods, and extreme weather.

CONSERVE AND RESTORE OCEAN AND WETLAND ECOSYSTEMS

Building Block: Protect and Conserve Existing Ocean and Wetland Ecosystems

Development, pollution, agriculture, and other human activities have resulted in the significant loss and degradation of wetlands in the United States.¹⁴⁴⁰ When wetlands disappear, so does their ability to sequester carbon, mitigate flood runoff, prevent erosion, improve water quality, recharge groundwater, provide valuable habitat, and support economically important tourism activities.

The federal government runs numerous programs and agency offices aimed at conserving and protecting wetland ecosystems. For example, the National Estuarine Research Reserve System, administered by NOAA’s Office for Coastal Management, is a network of estuarine areas established for long-term research, education, and coastal stewardship.¹⁴⁴¹ Similarly, the U.S. Environmental Protection Agency’s (EPA’s) National Estuary Program aims to protect and restore the water quality and ecological integrity of estuaries of national significance around the country.¹⁴⁴² NOAA’s Coastal and Estuarine Land Conservation Program (CELCP) protects threatened coastal and estuarine lands by direct purchase or conservation easements.¹⁴⁴³

¹⁴³⁷ National Oceanic and Atmospheric Administration, “What is Blue Carbon?” <https://oceanservice.noaa.gov/facts/bluecarbon.html>. Accessed June 2020.

¹⁴³⁸ National Oceanic and Atmospheric Administration, “Coastal Wetlands: Too Valuable to Lose,” <https://www.fisheries.noaa.gov/national/habitat-conservation/coastal-wetlands-too-valuable-lose>. Accessed June 2020.

¹⁴³⁹ Intergovernmental Panel on Climate Change, *The Ocean and Cryosphere in a Changing Climate: Summary for Policymakers* (September 2019): 30.

¹⁴⁴⁰ NASA, “Disappearing Wetlands,” https://www.nasa.gov/audience/foreducators/k-4/features/F_Disappearing_Wetlands.html. Accessed June 2020.

¹⁴⁴¹ National Oceanic and Atmospheric Administration, “Office for Coastal Management National Estuarine Research Reserves,” <https://coast.noaa.gov/herrs/>. Accessed June 2020.

¹⁴⁴² U.S. Environmental Protection Agency, “Estuaries and the National Estuary Program,” <https://www.epa.gov/nep>. Accessed June 2020.

¹⁴⁴³ National Oceanic and Atmospheric Administration, “The Coastal and Estuarine Land Conservation Program,” <https://coast.noaa.gov/czm/landconservation/>. Accessed June 2020.

Other programs, statutes, and agency offices aim to protect the ocean and wetlands as species habitat. Congress passed the North American Wetlands Conservation Act (NAWCA) to provide federal cost-share funding to projects that conserve North America's migratory birds, waterfowl, fish, and wildlife resources. NAWCA grants fund the protection, restoration, and enhancement of wetlands. NOAA's Office of Habitat Conservation also aims to protect and restore habitat to sustain fisheries, recover protected species, and maintain resilient coastal communities and ecosystems. Similarly, FWS's Coastal Program works to restore and protect fish and wildlife habitat on public and privately-owned lands through technical assistance for habitat conservation, design and planning, as well as financial assistance for habitat restoration and protection projects.

MPAs come in a variety of forms and different levels of protection, such as marine sanctuaries, national monuments, estuarine research reserves, ocean parks, and marine wildlife refuges, and are established for various reasons, including to protect ecosystems, preserve cultural resources such as archaeological sites, or sustain fish stocks.¹⁴⁴⁴ Approximately 26% of U.S. waters in the United States' jurisdiction is protected as an MPA, but only 3% of U.S. waters are protected by no-take MPAs that prohibit all extractive uses.¹⁴⁴⁵ Notably, nearly all of the MPA area in the United States is located in the remote Western Pacific Ocean and the northwestern Hawaiian Islands.¹⁴⁴⁶

Several members of Congress have introduced legislation aimed at protecting ocean and wetland ecosystems. Rep. Mike Thompson (D-CA) and Sen. Martin Heinrich (D-NM) introduced H.R. 925/S. 261, the North American Wetlands Conservation Extension Act, which reauthorizes the NAWCA. This bill passed the House in November 2019. Reps. Marc Veasey (D-TX) and Rob Wittman (R-VA) introduced H.R. 1747, the National Fish Habitat Conservation Through Partnerships Act, which codifies National Fish Habitat Partnerships, an initiative that promotes fish habitat conservation and restoration projects through strategic partnerships. This bill was included in the Coastal and Great Lakes Communities Enhancement Package, H.R. 729, that passed in the House in December 2019. Rep. Deb Haaland (D-NM) and Sen. Cory Booker (D-NJ) introduced H.R. 4269/S. 2452, the Climate Stewardship Act of 2019, which would restore or protect more than 2 million acres of coastal wetlands by 2030. Rep. Suzanne Bonamici (D-OR) introduced H.R. 5589, the Blue Carbon for Our Planet Act, which would, among other provisions, create an Interagency Working Group on Blue Carbon to assess the feasibility and potential of establishing a national goal of conserving at least 30% of U.S. ocean areas and coastal blue carbon ecosystems by 2030.

Additionally, in order to withstand the impacts of climate change, ocean and wetland ecosystems must be healthy and free of other stressors. Plastic pollution has significant impacts on aquatic ecosystems and wildlife. Plastics trap and entangle wildlife, are ingested in large volumes by wildlife, bioaccumulate across trophic levels, and contain toxic contaminants that disrupt normal

¹⁴⁴⁴ National Oceanic and Atmospheric Administration, "What is a Marine Protected Area?" <https://oceanservice.noaa.gov/facts/mpa.html>. Accessed June 2020.

¹⁴⁴⁵ National Oceanic and Atmospheric Administration, *Marine Protected Areas of the United States: Conserving our Oceans One Place at a Time* (January 2017): 1; H.Res. 835 and S.Res. 372, expressing the sense of the Senate and Congress that the Federal Government should establish a national goal of conserving at least 30% of the land and ocean in the United States by 2030, 116th Congress; NOAA's National Marine Protected Areas of the United States, *Marine Protected Areas 2020: Building Effective Conservation Networks* (2020): 2.

¹⁴⁴⁶ Ibid.

physiological processes in wildlife.¹⁴⁴⁷ In the section titled “Rebuild U.S. Industry for Global Climate Leadership,” this report describes bills and details recommendations to reduce plastic pollution and clean up marine debris, including H.R. 3969, the Save Our Seas 2.0 Act introduced by Rep. Suzanne Bonamici (D-OR), and H.R. 5845/S. 3263, the Break Free from Plastic Pollution Act of 2020, introduced by Rep. Alan Lowenthal (D-CA) and Sen. Tom Udall (D-NM).

Recommendation: Congress should establish a national goal of protecting at least 30% of U.S. ocean areas and coastal wetlands by 2030, including increasing MPAs while working to balance the needs of fisheries management systems. This effort should include (1) reauthorizing and increasing funding for NAWCA; (2) codifying the National Fish Habitat Partnerships; (3) codifying a strong federal “no net blue carbon loss” policy; (4) directing NOAA to establish and identify Coastal Carbon Areas of Significance to ensure the protection and enhancement of such coastal areas and provide guidance to relevant federal agencies to avoid adverse impacts and threats to these areas; (5) fully funding CELCP and expanding the program nationwide; (6) increasing federal investments and prioritizing climate and ecological benefits in ocean, coastal, and riverine conservation programs, including NOAA’s Office of Habitat Conservation, NOAA’s National Estuarine Research Reserve Program, EPA’s National Estuary Program, and FWS’s Coastal Program; (7) directing NOAA to provide technical assistance to enhance coastal management and climate change programs in the territories and submit an annual report to Congress on wetland conditions and climate change in the territories; (8) directing agencies to prioritize avoiding destruction of wetlands in flood-prone areas that help diminish the likelihood of flooding and erosion; and (9) preventing private wetland conversion to development, through easements, incentives, and regulation.

Committees of Jurisdiction: Natural Resources; Science, Space, and Technology; Transportation and Infrastructure

Building Block: Restore Lost and Degraded Ocean and Wetland Ecosystems

Approximately half of the wetlands in the contiguous United States have been lost or degraded, primarily to agricultural uses and human development.¹⁴⁴⁸ Restoring degraded wetlands to their natural functions includes reestablishing former wetlands and rehabilitating the functions of degraded wetlands.¹⁴⁴⁹ Restoring coastal wetlands increases carbon storage; delivers cost savings and helps protect coastal communities from the impacts of climate change, such as storms and sea level rise; filters pollutants and reduces flooding impacts in riverine systems; and provides numerous other benefits such as biodiversity and fishery health.

Rep. Suzanne Bonamici (D-OR) introduced H.R. 5589, the Blue Carbon for Our Planet Act, which would create an Interagency Working Group on Blue Carbon to establish a national-level map and inventory of blue carbon ecosystems; identify national restoration priorities that would produce the highest rate

¹⁴⁴⁷ House Natural Resources Memo, *Oversight Hearing, A Sea of Problems: Impacts of Plastic Pollution on Oceans and Wildlife* (October 2019).

¹⁴⁴⁸ NASA, “Disappearing Wetlands,” https://www.nasa.gov/audience/foreducators/k-4/features/F_Disappearing_Wetlands.html. Accessed June 2020; Congressional Research Service, RL33483, *Wetlands: An Overview of Issues*, (January 5, 2017): 4.

¹⁴⁴⁹ U.S. Environmental Protection Agency, “Basic Information about Wetland Restoration and Protection,” <https://www.epa.gov/wetlands/basic-information-about-wetland-restoration-and-protection>. Accessed June 2020.

of carbon sequestration and ecosystem benefits; and develop pilot programs to restore degraded blue carbon ecosystems through grants and technical assistance.

Other members have introduced legislation aimed at restoring wetlands for coastal resilience. Reps. Don Beyer (D-VA) and Francis Rooney (R-FL) introduced H.R. 4093, the National Ocean and Coastal Security Improvements Act of 2019, which would protect ecosystems and communities from coastal threats by supporting coastal conservation and restoration projects. Rep. Tom Malinowski (D-NJ) and Sen. Sheldon Whitehouse (D-RI) introduced H.R. 4044/S. 3171, the Protect and Restore America's Estuaries Act, which would increase funding for EPA's National Estuary Program from \$26.5 million to \$50 million per year, expanding the capacity of the program to restore and preserve estuaries and the storm buffering services they provide coastal communities. H.R. 4044 passed the House in February 2020 and is included in Section 22305 of the House Democrats' infrastructure bill, H.R. 2, the Moving Forward Act. Reps. Seth Moulton (D-MA) and Garret Graves (R-LA) introduced H.R. 3919, the Creating Opportunity and Sustainability Through Science (COASTS) Act, which would establish a program in NOAA for Coastal Resilience Research Competitive Grants for research and implementation of coastal resilience and restoration projects.

Recommendation: Congress should restore lost and degraded wetlands as one component of a comprehensive climate strategy. This should include (1) directing NOAA to identify national restoration priorities that would produce the highest rate of carbon sequestration and ecosystems benefits and providing funding for these efforts; (2) increasing funding for existing NOAA and EPA grant programs to provide financial and technical assistance to restore degraded nonfederal wetlands for climate mitigation and resilience; and (3) increasing federal investments in coastal and riverine ecosystem restoration, including NOAA's Office of Habitat Conservation, NOAA's National Estuarine Research Reserve Program, EPA's National Estuary Program, and FWS's Coastal Program.

Committees of Jurisdiction: Natural Resources; Science, Space, and Technology; Transportation and Infrastructure

Building Block: Restore, Strengthen, and Codify a National Ocean Policy and Incorporate Climate Mitigation

The National Ocean Policy, or Executive Order 13547, was signed into effect in 2010 to promote coordination among the state and federal government agencies that oversee marine health and development.¹⁴⁵⁰ The order established a national policy to ensure the protection, maintenance, and restoration of the health and biological diversity of ocean, coastal, and Great Lakes ecosystems; enhance the sustainability of ocean and coastal communities; and improve our understanding of and capacity to respond to climate change and ocean acidification. On June 19, 2018, the Trump administration repealed the National Ocean Policy and replaced it with a new policy focused on economic growth and national security and eliminated emphasis on responding to climate change and ocean acidification, as well as conservation and ecosystem management provisions. By ignoring the climate threats to our ocean, wetlands, and coastal communities,¹⁴⁵¹ the Trump administration policy leaves our ocean, coasts, and those that depend on them more vulnerable.

¹⁴⁵⁰ 75 FR 43023.

¹⁴⁵¹ 83 FR 29431.

Dozens of state and federal agencies, often with overlapping jurisdictions, make decisions about offshore development and activity, which makes coordination and oversight of the many marine interests – including shipping, energy development, fisheries management and aquaculture, biodiversity, and climate mitigation and resilience – complicated.¹⁴⁵² Under the Obama-era National Ocean Policy, state and federal agencies worked together to achieve ocean management successes. Two regions, the Mid-Atlantic and Northeast, developed the first-ever regional ocean plans using the best available data to responsibly develop ocean areas with extensive input from and coordination between states, industry, regional fisheries managers, tribes, and federal agencies.¹⁴⁵³ Despite the success of this regional collaboration, the Trump administration replacement no longer requires federal entities to coordinate and plan with states and tribes for ocean protection and healthy ocean ecosystems.¹⁴⁵⁴

Rep. Charlie Crist (D-FL) and Sen. Roger Wicker (R-MS) introduced H.R. 5390/S. 2166, the Regional Ocean Partnership Act, which would formally authorize Regional Ocean Partnerships (ROPs) as partners with the federal government to address ocean and coastal issues and provide consistent funding for supporting ocean and coastal health, sustainability, and resilience.

Rep. Suzanne Bonamici (D-OR) and Sen. Sheldon Whitehouse (D-RI) introduced H.R. 3548/S. 933, the Bolstering Long-Term Understanding and Exploration of the Great Lakes, Oceans, Bays, and Estuaries (BLUE GLOBE) Act, which would codify the executive Ocean Policy Committee to foster high-level coordination across ocean management agencies.

Recommendation: Congress should formally authorize ROPs as partners with the federal government. Additionally, Congress should codify a National Ocean Policy, building on Executive Order 13547, that includes strong interagency and tribal coordination in the form of the White House-level Ocean Policy Committee. This legislation should strengthen the prior National Ocean Policy by prioritizing ocean stakeholder engagement and focusing on ocean health, conservation, and climate change mitigation and resilience.

Committee of Jurisdiction: Natural Resources; Science, Space, and Technology

Building Block: Strengthen the National Coastal Zone Management Program and Other Programs That Increase Capacity Building for Coastal Communities

The National Coastal Zone Management Program provides a framework for coastal states and territories to comprehensively address pressing coastal issues, including climate change. The program is a voluntary partnership between the federal government and coastal and Great Lakes states and territories to address national coastal issues, providing states the flexibility to design region-specific programs that best address their coastal challenges as well as financial assistance,

¹⁴⁵² U.S. Commission on Ocean Policy, *An Ocean Blueprint for the 21st Century, Appendix 6: Review of U.S. Ocean and Coastal Law: The Evolution of Ocean Governance Over Three Decades* (2004): 2-3.

¹⁴⁵³ The White House, “The Nation’s First Ocean Plans,” (December 7, 2016), <https://obamawhitehouse.archives.gov/blog/2016/12/07/nations-first-ocean-plans>.

¹⁴⁵⁴ The White House, “Executive Order Regarding the Ocean Policy to Advance the Economic, Security, and Environmental Interests of the United States,” (June 19, 2018), <https://www.whitehouse.gov/presidential-actions/executive-order-regarding-ocean-policy-advance-economic-security-environmental-interests-united-states/>.

such as grants. Authorized by the Coastal Zone Management Act (CZMA), the program provides the basis for protecting, restoring, and responsibly developing coastal communities and resources.¹⁴⁵⁵

In addition to the CZMA, NOAA also administers several other important coastal technical assistance programs, including the NOAA Sea Grant program, which supports federal-university partnerships in coastal states and territories (including those in the Great Lakes region),¹⁴⁵⁶ and the NOAA National Estuarine Research Reserves (NERRS),¹⁴⁵⁷ which is a network of 29 coastal estuary sites that supports federal-state partnerships on estuary research, education, and training. The Sea Grant and NERRS programs have established strong ties to the coastal communities that they serve, functioning as trustworthy sources of science-based information about local ecosystems and educational enrichment with K-12 and higher education partners.

Rep. Jared Huffman (D-CA) and Sen. Roger Wicker (R-MS) introduced H.R. 2405/S. 910, the National Sea Grant College Program Amendments Act of 2019, which would reauthorize and increase funds to the NOAA Sea Grant program through Fiscal Year 2025. This bill was included as part of H.R. 729, the Coastal and Great Lakes Communities Enhancement Act, which passed the House in December 2019.

Recommendation: Congress should increase funding for the National Coastal Zone Management Program, NOAA's National Estuarine Research Reserve System, and the National Sea Grant program. Any expansion of these programs should direct NOAA to prioritize climate benefits, including mitigation potential, coastal restoration, adaptation planning, and natural infrastructure, in grants and state programs carried out under the CZMA.

Committees of Jurisdiction: Natural Resources; Science, Space, and Technology

INCREASE CLIMATE RESILIENCE OF OCEAN AND COASTAL ECOSYSTEMS AND AQUATIC WILDLIFE

Building Block: Scale Up Ocean-Based Renewable and Marine Energy While Minimizing Impacts on Marine Mammals, Fisheries, Ocean Ecosystems, and Cultural Resources

Ocean-based renewable energy, such as offshore wind and marine energy, can help replace carbon-intensive energy sources. By increasing offshore wind, the ocean can play yet another important role in the climate solution. Done improperly, however, wind farm construction and operation could have adverse impacts on ocean wildlife, interfering with their ability to feed, breed, and communicate.¹⁴⁵⁸

¹⁴⁵⁵ National Oceanic and Atmospheric Administration Office of Coastal Management, “About the National Coastal Zone Management Program,” <https://coast.noaa.gov/czm/about/>. Accessed June 2020.

¹⁴⁵⁶ National Oceanic and Atmospheric Administration, “Sea Grant is a Federal-University partnership program that brings science together with communities for solutions that work,” <https://seagrant.noaa.gov/About>. Accessed June 2020.

¹⁴⁵⁷ National Oceanic and Atmospheric Administration, “National Estuarine Research Reserves: Overview,” <https://coast.noaa.gov/nerrs/about/>. Accessed June 2020.

¹⁴⁵⁸ U.S. Department of Energy, Wind Energy Technologies Office, “Environmental Impacts and Siting of Wind Projects,” <https://www.energy.gov/eere/wind/environmental-impacts-and-siting-wind-projects>. Accessed June 2020; Natural Resources Defense Council, *Harnessing the Wind: How to Advance Wind Power Offshore* (July 2019): 2; Lena Bergstrom et al., *Effects of offshore wind farms on marine wildlife – a generalized impact assessment* (Environmental Research Letters, March 19, 2014).

To minimize impacts on fisheries and marine mammals, DOI should ensure offshore renewable energy projects are sited and operated with appropriate safeguards to protect wildlife and ecosystems.

The section of the report titled “Build a Cleaner and More Resilient Electricity Sector” recommends several policies to incentivize the development of offshore wind and renewable energy projects.

Recommendation: Congress should encourage DOI to take a regional approach to offshore planning and leasing and direct the agency to require that such development avoids and minimizes environmental impacts and conflicts with ocean wildlife, ecosystems, cultural resources, and other marine activities to the maximum extent practicable by (1) thoughtfully siting projects with input from multiple stakeholders, including scientists and other ocean users; (2) taking appropriate precautions when constructing and operating offshore renewable energy projects; and (3) committing to understanding and protecting marine life.

Committees of Jurisdiction: Natural Resources; Science, Space, and Technology

Building Block: Address Ocean and Coastal Acidification and Biodiversity Decline

The ocean absorbs approximately 30% of the carbon dioxide in the atmosphere.¹⁴⁵⁹ As carbon levels in the ocean increase, seawater becomes more acidic, threatening coral reefs, shellfish, finfish, and biodiversity.¹⁴⁶⁰ Coral reef decline also has impacts on coastal resilience. Shallow-water coral reefs help dissipate wave energy and attenuate wave heights, reducing the destructive capacities of coastal storms.¹⁴⁶¹

Several members of Congress have introduced bills calling for aggressive action and increased research to combat ocean acidification and its impacts on coral reefs, biodiversity, and coastal resilience.

- Rep. Suzanne Bonamici (D-OR) introduced H.R. 1237, the Coastal and Ocean Acidification Stressors and Threats (COAST) Research Act of 2019, which would strengthen scientific research and monitoring efforts across federal agencies on ocean and coastal acidification in the context of other environmental stressors and direct federal agencies to assess adaptation and mitigation strategies. The legislation would reauthorize and expand NOAA’s Ocean Acidification Program, designate NOAA as the lead federal agency responsible for implementing the federal response to ocean and coastal acidification, and expand the ocean acidification activities of NASA to include efforts to research and monitor the effects of coastal acidification. The House of Representatives passed this bill on June 5, 2019.
- Rep. Bill Posey (R-FL) introduced H.R. 988, the National Estuaries and Acidification Research (NEAR) Act of 2019, which would direct the Department of Commerce to arrange for the National Academies of Sciences, Engineering, and Medicine to conduct a study that examines

¹⁴⁵⁹ National Oceanic and Atmospheric Administration, “What is Ocean Acidification?”, <https://oceanservice.noaa.gov/facts/acidification.html>. Accessed June 2020.

¹⁴⁶⁰ National Oceanic and Atmospheric Administration, “Ocean Acidification,” <https://www.noaa.gov/education/resource-collections/ocean-coasts-education-resources/ocean-acidification>. Accessed June 2020.

¹⁴⁶¹ Filippo Ferrario et al., *The effectiveness of coral reefs for coastal hazard risk reduction and adaptation* (Nature Communications, May 13, 2014).

the science of ocean acidification in estuarine environments and provide recommendations for improving future research on ocean acidification with respect to estuarine environments. The House of Representatives passed this bill on June 5, 2019.

- Rep. Chellie Pingree (D-ME) and Sen. Lisa Murkowski (R-AK) introduced H.R. 1716/S. 778, the Coastal Communities Ocean Acidification Act of 2019, which would require NOAA to conduct and update an ocean acidification coastal community vulnerability assessment at least once every seven years. The House of Representatives passed this bill on June 5, 2019.
- Rep. Derek Kilmer (D-WA) introduced H.R. 1921, the Ocean Acidification Innovation Act of 2019, which would authorize federal agencies to develop a program that awards prizes competitively for innovative efforts to research or respond to ocean acidification. This bill passed in the House of Representatives on June 5, 2019.
- Rep. Ed Case (D-HI) introduced H.R. 3384, the Coral Reef Sustainability Through Innovation Act of 2019, which would support practices to preserve, sustain, restore, monitor, understand, and research coral reef ecosystems by directing the 12 federal agencies on the U.S. Coral Reef Task Force to fund and administer a coral prize competition. Rep. Case also introduced H.R. 6738, the Coral Reef Conservation Reauthorization Act of 2020, which would reauthorize and modernize the Coral Reef Conservation Act of 2000, including strengthening the response to coral bleaching and other impacts; expanding grants for local coral reef conservation projects; and authorizing DOI to research and conserve coral resources.

Recommendation: Congress should increase federal research, monitoring, forecasting, mitigation, and adaptation efforts for ocean and coastal acidification. As part of this effort, Congress should designate NOAA as the lead federal agency responsible for implementing a government-wide response to ocean and coastal acidification, establish an Advisory Board to strengthen our understanding of the socio-economic effects of ocean acidification, direct the NAS to conduct a study on the effects of ocean acidification on estuaries, require NOAA to conduct and update vulnerability assessments, and incentivize innovative research on ocean acidification.

Recommendation: Congress should direct the relevant federal agencies to carry out a program to award prizes competitively for the purpose of stimulating innovation to advance the understanding of coral reef systems, including those in the territories, and prioritize programs that address communities, environments, or industries that are in distress due to coral reef damage or decline. Priority programs should advance the development of scientific research and monitoring to better understand the causes of coral reef decline, including ocean acidification; the development of adaptation options to alleviate economic harm and job loss caused by damage to coral reef ecosystems; measures to help vulnerable communities; and adaptation and management options for impacted communities and tourism industries.

Recommendation: Congress should reauthorize the Coral Reef Conservation Act and direct NOAA to periodically update the National Coral Reef Resilience Strategy to address the continuing and emerging threats to the resilience of U.S. coral reef ecosystems. The relevant federal agencies should produce Federal Coral Reef Action Plans to outline coral reef conservation and restoration activities.

Recommendation: Congress should establish a new grant program to support the development of State Coral Reef Action Plans and to help states to carry out coral reef management and restoration strategies.

Recommendation: Ocean acidification and other marine climate change impacts will affect marine mammals. Congress should direct NOAA to identify and monitor marine mammal species and populations that will be harmed by climate change impacts, as well as develop and implement a conservation management plan for each of these species.

Committees of Jurisdiction: Natural Resources; Science, Space, and Technology

Building Block: Address Harmful Algal Blooms and Hypoxia

Harmful algal blooms (HABs), including red tides, brown tides, and blue-green algae, affect marine, coastal, estuarine, and freshwater systems in all 50 states and U.S. territories. HABs can occur naturally but are becoming a more common phenomena in response to increased nutrient runoff and pollution, changes in water flow, reduced pollutant-filtering capacity of diminished riparian systems, and rising water temperatures. As algae die and decompose, they consume oxygen, leaving waterways in a hypoxic or anoxic state that can result in the formation of “dead zones” where marine life cannot survive. According to the Intergovernmental Panel on Climate Change (IPCC), the ocean is losing oxygen at an unprecedented rate.¹⁴⁶² Without intervention, HABs and hypoxic events will wreak havoc on our coastal communities, endanger access to safe drinking water, and threaten public health.¹⁴⁶³

In 2018, Congress passed and the President signed S. 2200, which included legislation led by Reps. Suzanne Bonamici (D-OR) and Bill Posey (R-FL) to reauthorize the Harmful Algal Bloom and Hypoxia Research and Control Act. The bill established a process for NOAA and EPA to declare an “Event of National Significance” to allow states and local governments to access certain funds when hypoxia or HABs will likely have detrimental environmental, economic, subsistence use, or public health consequences.¹⁴⁶⁴

Recommendation: Congress should address harmful algal blooms by (1) reauthorizing the Harmful Algal Bloom and Hypoxia Research Control Act to increase authorizations for NOAA and add specific authorizations for EPA and other agencies; (2) clarifying that scientific assessments of marine and freshwater harmful algal blooms required under current law should have a regional focus, as HAB species and their impacts vary significantly from region to region; (3) establishing pilot programs to improve forecasting and monitoring of HABs and hypoxia with the Integrated Ocean Observing System; (4) rapidly scaling up research, development, and deployment of technologies to prevent, control, and mitigate HABs; (5) creating a separate authorization for research on hypoxia to recognize the distinct effects on our marine ecosystems; and (6) increasing grant funding available to coastal states, tribes, and communities to reduce the risk of harmful algal blooms and respond to harmful algal blooms when they occur.

Committees of Jurisdiction: Science, Space, and Technology

¹⁴⁶² Intergovernmental Panel on Climate Change, *The Ocean and Cryosphere in a Changing Climate: Summary for Policymakers* (September 2019): 18-22.

¹⁴⁶³ Ibid.

¹⁴⁶⁴ S. 2200, the National Integrated Drought Information System Reauthorization Act of 2018, 115th Congress, <https://www.congress.gov/bill/115th-congress/senate-bill/2200/>.

Building Block: Incorporate Climate Adaptation into Fisheries Management

Rising ocean temperatures are having widespread impacts on fisheries as marine species move toward the poles to stay within their preferred temperature ranges.¹⁴⁶⁵ Shifts in geographic distribution and abundance are causing ecosystem disruption for marine wildlife, economic challenges for commercial fishing, and obstacles to effective fisheries management.¹⁴⁶⁶

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) governs fisheries management in the U.S. Exclusive Economic Zone (EEZ), up to 200 miles offshore.¹⁴⁶⁷ The law established eight Regional Fishery Management Councils, which develop fishery management plans for fisheries within their respective geographic jurisdictions.¹⁴⁶⁸ The National Marine Fisheries Service is responsible for implementing the MSA and ensuring U.S. fisheries comply with conservation and management requirements set forth in the law.¹⁴⁶⁹ In particular, the MSA includes provisions to prevent overfishing, rebuild overfished fish stocks, and establish annual catch limits.¹⁴⁷⁰

Under the MSA, the United States has a strong fisheries management system, combating overfishing and successfully rebuilding more than 45 stocks from previously depleted levels.¹⁴⁷¹ However, America's fisheries now face new challenges as the planet warms and ocean temperatures rise.¹⁴⁷² Additional research, monitoring, and data are necessary to determine how fish stocks are changing and how the American fisheries management system can prepare and adapt to climate change.

The MSA established 10 National Standards that lay out principles to be followed in any fishery management plan to ensure sustainable and responsible fishery management.¹⁴⁷³ The law also requires NOAA to produce guidance based on the National Standards and to assist regional fishery management councils in developing fishery management plans.¹⁴⁷⁴ The statute does not set a National Standard for how fishery managers should address climate change; as a result, the regional fishery management councils have addressed climate change in different ways – or not at all.¹⁴⁷⁵ Establishing standards, tools, and requirements to incorporate climate change into the management

¹⁴⁶⁵ National Oceanic and Atmospheric Administration Fisheries, “Understanding Our Changing Climate” (June 18, 2017), <https://www.fisheries.noaa.gov/insight/understanding-our-changing-climate>; NOAA, NMFS-F/SPO-188, *Accounting for Shifting Distributions and Changing Productivity in the Fishery Management Process: From Detection to Management Action* (November 2018): 3-6.

¹⁴⁶⁶ Ibid.

¹⁴⁶⁷ Congressional Research Service, *Magnuson-Stevens Fishery Conservation and Management Act (MSA): Reauthorization Issues for the 115th Congress* (July 27, 2018).

¹⁴⁶⁸ Ibid.

¹⁴⁶⁹ Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. §§1801 et seq.

¹⁴⁷⁰ Ibid ; National Oceanic and Atmospheric Administration Fisheries, “Laws & Policies: Magnuson-Stevens Act,” <https://www.fisheries.noaa.gov/topic/laws-policies#magnuson-stevens-act>. Accessed June 2020.

¹⁴⁷¹ National Oceanic and Atmospheric Administration Fisheries, “2018 Report to Congress on the Status of U.S. Fisheries,” <https://www.fisheries.noaa.gov/national/2018-report-congress-status-us-fisheries>. Accessed June 2020.

¹⁴⁷² Office of Jared Huffman, “Strong Fisheries Management will Keep Seafood on Florida’s Dinner Tables” (February 10, 2020), https://huffman.house.gov/media-center/in-the-news/strong-fisheries-management-will-keep-seafood-on-floridas-dinner-tables_opinion.

¹⁴⁷³ 16 U.S.C. § 1851; NOAA Fisheries, “National Standard Guidelines,” <https://www.fisheries.noaa.gov/national/laws-and-policies/national-standard-guidelines>. Accessed June 2020.

¹⁴⁷⁴ Ibid.

¹⁴⁷⁵ 16 U.S.C. § 1851; Government Accountability Office, GAO-16-827, *Federal Fisheries Management: Additional Actions Could Advance Efforts to Incorporate Climate Information into Management Decisions* (September 2016): 24-31.

process would help fishery management councils to prepare for the challenges of climate change while still allowing for regional flexibility.

Rep. Joe Cunningham (D-SC) introduced H.R. 4679, the Climate-Ready Fisheries Act of 2019, which would direct GAO to submit a report to Congress examining what actions have been taken by fishery managers, identifying any knowledge or funding gaps that are hindering action, and providing recommendations to better adapt fishery management and prepare fishing communities for the impacts of climate change.

Recommendation: Congress should direct GAO to determine what actions fishery managers have already taken to adapt to climate change and provide recommendations to prepare fishery management and fishing communities for the impacts of climate change.

Recommendation: Congress should consider establishing an 11th national standard on climate change resilience and impacts under the MSA for regional fishery management councils and establish additional tools and requirements to ensure the impacts of climate change are fully considered and integrated into the management process.

Recommendation: Congress should direct NOAA to provide research, capacity, and management recommendations to fisheries management councils on how to adapt to a changing climate and tools for incorporating climate change consideration into management plans.

Committee of Jurisdiction: Natural Resources

Building Block: Increase Investments in Natural Infrastructure for Coastal and Riverine Resilience

As temperatures continue to climb, coastal and riverine ecosystems and communities face threats such as sea level rise and increasingly intense and frequent storms. Combating these effects of climate change requires a comprehensive view of infrastructure, including natural resources and processes. Nature-based infrastructure, such as living shorelines, wetlands, oyster reefs, and dunes, buffers the impacts of storms and sea level rise in a cost-effective way while providing valuable co-benefits such as climate mitigation, wildlife habitat, water quality, and recreation opportunities.

NOAA's Coastal Resilience Grants program¹⁴⁷⁶ provides funds through the federally sponsored National Coastal Resilience Fund, which is administered by the congressionally created nonprofit National Fish and Wildlife Foundation and leverages private and local funds toward projects to restore and protect natural systems that increase coastal resilience and improve coastal ecology.¹⁴⁷⁷ However, additional funding support is needed to help build and sustain local coastal community capacity through technical assistance and planning to achieve long-lasting community resilience capability and to connect local leaders with practitioners with science-based advice on coastal resource and risk management practices.

¹⁴⁷⁶ National Oceanic and Atmospheric Administration, "NOAA Coastal Resilience Grants Program," <https://coast.noaa.gov/resilience-grant/>. Accessed June 2020.

¹⁴⁷⁷ National Fish and Wildlife Foundation, "National Coastal Resilience Fund," <https://www.nfwf.org/programs/national-coastal-resilience-fund>. Accessed June 2020.

Rep. Joe Neguse (D-CO) introduced HR 7264, the 21st Century Conservation Corps for Our Health and Our Jobs Act, which would provide \$2 billion for the National Coastal Resilience Fund. Additionally, Members of Congress have introduced several bills to establish new coastal resource resilience programs. Rep. Derek Kilmer (D-WA) introduced H.R. 729, the Coastal and Great Lakes Communities Enhancement Act, which passed the House in December 2019. This bipartisan bill would establish multiple new grant programs in NOAA, including tribal coastal planning grants, living shorelines grants, “working waterfronts” grants to preserve economically valuable coastal resources, and coastal climate planning and preparedness grants. The House Democrats also included the living shoreline grant program in Section 83102 of their infrastructure bill, H.R. 2, the Moving Forward Act. Section 83101 of H.R. 2 also authorizes a coastal resiliency fund to provide funding for shovel-ready coastal restoration projects that restore fish and wildlife habitat or help ecosystems and communities to adapt to climate change. Similarly, Rep. Harley Rouda (D-CA) introduced H.R. 1317, the Coastal Communities Adaptation Act, which would provide capitalization grants to coastal states to establish community resilience revolving loan funds for coastal planning and restoration activities.

Recommendation: Congress should increase investments in natural infrastructure for coastal resilience by (1) creating new or enhancing existing federal grant programs to help state and local governments, tribal nations, and NGOs optimize natural resource benefits by implementing nature-based infrastructure for resilience and adaptation such as living shorelines, working waterfronts planning, coastal climate preparedness planning, coastal planning, and wetlands restoration; (2) establishing a Natural Infrastructure Resilient Communities Revolving Loan Fund, which would provide low- or no-interest loans for communities to protect themselves from the impacts of climate change through the use of natural infrastructure, including a mechanism to ensure access to the program for lower-income communities; (3) codifying the Coastal Resilience Grants Program and increasing funding for that program to support coastal communities’ ability to prepare for and respond to extreme weather, climate risks, and changing ocean conditions by delivering technical assistance, increasing local planning capacity, and supporting coastal research, resilience, and restoration; (4) increasing funding for the National Coastal Resilience Fund for project support and implementation; (5) prioritizing nature-based infrastructure, when possible, over built infrastructure through permitting and increasing investments for the implementation of these projects; (6) prioritizing nature-based infrastructure on federally owned land, including DOD property, where appropriate; (7) promoting interagency coordination of natural infrastructure efforts to encourage information sharing, identify and address research gaps, and facilitate the completion of natural infrastructure projects; and (8) directing NOAA to provide increased education, outreach, and technical assistance to state and local governments and property owners to increase awareness of nature-based infrastructure opportunities and assistance to implement them.

The section of this report titled “Invest in Infrastructure to Prevent Catastrophic Flooding” provides additional recommendations for integrating green infrastructure and nonstructural flood risk reduction into projects for coastal and riverine resilience.

Committees of Jurisdiction: Natural Resources; Science, Space, and Technology; Transportation and Infrastructure

Building Block: Expand the Coastal Barrier Resources Act to Cover More Biologically Sensitive Areas

The Coastal Barrier Resources Act (CBRA) established the John H. Chafee Coastal Barrier Resources System (CBRS), a set of coastal barrier units along the Atlantic, Gulf of Mexico, Great Lakes, U.S. Virgin Islands, and Puerto Rico coasts, to encourage conservation of flood-prone, biologically sensitive areas.¹⁴⁷⁸ The CBRA prohibits new federal expenditures and financial assistance that incentivize the development or modification of undeveloped coastal barriers.¹⁴⁷⁹ However, development can still occur within the CBRS if that development is conducted with nonfederal funds.¹⁴⁸⁰ The purpose of the CBRA is “to minimize the loss of human life; wasteful expenditures of federal revenues; and the damage to fish, wildlife, and other natural resources associated with coastal barriers.”¹⁴⁸¹ If temperatures and sea levels continue to rise, more areas will become hurricane-prone and at risk of flooding. With a few minor exceptions, only Congress has the authority to modify the boundaries of the CBRS.¹⁴⁸²

The CBRS currently includes 585 System Units, amounting to 1.4 million acres of land and associated aquatic habitat.¹⁴⁸³ The FWS maintains the official CBRS maps and is responsible for modernizing these maps to ensure that they are updated, usable, and accurately depict CBRS boundaries.¹⁴⁸⁴ To determine if a mapping error exists, FWS conducts a comprehensive map review, including the historical maps, land ownership information, development status, and any materials submitted by interested parties.¹⁴⁸⁵ A significant portion of the CBRS maps are still in need of comprehensive modernization.¹⁴⁸⁶

Recommendation: Congress should expand the CBRA nationwide to identify and protect more biologically sensitive areas vulnerable to sea level rise, storm surges, and hurricanes and to increase habitat for aquatic and coastal species. This should include (1) funding for FWS to complete comprehensive map modernization and improve map accuracy on the remaining 70% of the CBRA Systems not already updated; (2) expanding the definition of “undeveloped coastal barrier” to include areas that are vulnerable to coastal hazards, such as flooding, storm surge, wind, erosion, and sea level rise; and (3) including hazard-prone areas along the Pacific Coast in the CBRS.

Committee of Jurisdiction: Natural Resources

¹⁴⁷⁸ U.S. Fish and Wildlife Service, “Coastal Barrier Resources System: Overview,” <https://www.fws.gov/CBRA/>. Accessed June 2020.

¹⁴⁷⁹ FEMA, “Coastal Barrier Resources System: Changes to Flood Insurance Rate Maps,” https://www.fema.gov/media-library-data/1549644052036-2d4a827900bd0d5a0ff05cd33ad580e5/FEMA_USFWS_CBRS_Fact_Sheet_REVISED_01312019_508.pdf. Accessed June 2020.

¹⁴⁸⁰ Ibid.

¹⁴⁸¹ U.S. Fish and Wildlife Service, “Coastal Barrier Resources System: Limitations on and Exceptions to Federal Expenditures,” <https://www.fws.gov/cbra/Limitations-and-Exceptions.html>. Accessed June 2020.

¹⁴⁸² U.S. Fish and Wildlife Service, “CBRS Boundary Modifications,” <https://www.fws.gov/CBRA/maps/Boundary-Modifications.html>. Accessed June 2020.

¹⁴⁸³ U.S. Fish and Wildlife Service, “Coastal Barrier Resources Systems,” <https://www.fws.gov/CBRA/maps/index.html>. Accessed June 2020.

¹⁴⁸⁴ U.S. Fish and Wildlife Service, *Budget Justifications and Performance Information: Fiscal Year 2016 (2016): ES-22*.

¹⁴⁸⁵ U.S. Fish and Wildlife Service, “CBRS Boundary Modifications,” <https://www.fws.gov/CBRA/maps/Boundary-Modifications.html>. Accessed June 2020.

¹⁴⁸⁶ U.S. Fish and Wildlife Service, *Budget Justifications and Performance Information: Fiscal Year 2016 (2016): ES-22*.

ADVANCE UNDERSTANDING OF BLUE CARBON POTENTIAL

Building Block: Advance Understanding of Ocean and Coastal Ecosystems' Climate Benefits

Significant gaps remain in scientists' understanding of the potential of ocean and coastal ecosystems to mitigate and adapt to climate change. Currently, the federal government does not maintain a comprehensive national dataset identifying or mapping ocean and coastal ecosystems, resulting in a lack of knowledge about where wetlands exist, the potential for restoration, and their carbon sequestration value. This knowledge is critical to maximizing the climate benefits of ocean and coastal areas and ecosystems and protecting communities, habitats, and wildlife from the impacts of climate change.

Rep. Suzanne Bonamici (D-OR) and Sen. Sheldon Whitehouse (D-RI) introduced H.R. 3548/S. 933, the BLUE GLOBE Act, to enhance data collection and monitoring of the Great Lakes, oceans, bays, estuaries, and coasts. The legislation would direct existing ocean-focused interagency committees to improve coordination and enhance data management, storage, and accessibility. The BLUE GLOBE Act would also establish an Interagency Ocean Exploration Committee to improve understanding and monitoring of the oceans and assess the potential for an Advanced Research Project Agency-Oceans (ARPA-O) to pave the way for high-risk, high-reward ocean research.

Rep. Bonamici also introduced H.R. 5589, the Blue Carbon for Our Planet Act, which would require an interagency working group to maintain a national map, inventory, and data relating to blue carbon ecosystems through the Smithsonian's Coastal Carbon Data Clearinghouse, which would process and store data from federal, state, or local agencies, tribes, academics, and other organizations. The legislation would also require NOAA to coordinate with the National Academies of Science, Engineering, and Medicine to conduct a comprehensive marine ecosystems assessment on the long-term effects of carbon containment in a deep seafloor environment.

Rep. Dutch Ruppersberger (D-MD) and Sen. Tammy Baldwin (D-WI) introduced H.R. 2189/S. 1069, the Digital Coast Act, which would codify and revise NOAA's Digital Coast program to focus on filling data needs and gaps for critical coastal management issues and coordinate the acquisition and integration of key data sets needed for coastal management. This bill passed the House as part of H.R. 729, the Coastal and Great Lakes Communities Act.

Recommendation: Congress should support and invest in increased scientific understanding of the impacts of climate change on the ocean, wetlands, and other blue carbon ecosystems as well as the climate benefits these blue carbon ecosystems can provide. This should include (1) directing NOAA and the National Academies of Science, Engineering, and Medicine to assess the potential for an Advanced Research Project Agency-Oceans; (2) codifying and focusing NOAA's Digital Coast program on the most important data gaps; (3) directing an interagency working group to research and map coastal wetlands, maintain data relating to blue carbon ecosystems, and better understand how to maximize their carbon sequestration and climate benefit potential; (4) improving data and monitoring efforts through other programs, such as NOAA's Integrated Ocean Observing System, National Estuarine Research Reserves, National Sea Grant Program, and EPA's National Estuary Program; and (5) reauthorizing the National Oceanographic Partnership Program as a mechanism for funding critical ocean research and supporting public-private partnerships.

The section of this report titled “Strengthen Climate Science” provides additional recommendations for federal investments in climate science research to better understand the role of the ocean in Earth’s climate system.

Committees of Jurisdiction: Natural Resources; Science, Space, and Technology; Transportation and Infrastructure

Building Block: Expand Research on the Ocean Carbon Cycle

Carbon moves continuously through different environments, such as the atmosphere, soil, and the ocean, in what is called the carbon cycle. Two-way carbon exchange can occur especially quickly between the ocean’s surface waters and the atmosphere. In fact, the current ocean uptake of carbon dioxide is primarily a response to rising atmospheric carbon dioxide concentrations and, conversely, oceans contain a large reservoir of carbon that is exchangeable with the atmosphere.¹⁴⁸⁷

The overexploitation of fish and marine mammals not only affects biodiversity but may also have impacts on ocean carbon sequestration.¹⁴⁸⁸ For example, recent research indicates that whales may play a role in capturing carbon from the atmosphere.¹⁴⁸⁹ Each great whale sequesters an average of 33 tons of carbon dioxide; when they die and sink to the bottom of the ocean, they take the carbon out of the atmosphere for centuries.¹⁴⁹⁰ Another study has shown that declining shark populations disrupt the food chain, reducing vegetation and the ocean’s climate mitigation potential.¹⁴⁹¹

Recommendation: Congress should increase funding for NOAA to expand research on the ocean carbon cycle, including the effects of declining marine mammal and fish populations on blue carbon sequestration.

Committees of Jurisdiction: Natural Resources; Science, Space, and Technology

¹⁴⁸⁷ National Oceanic and Atmospheric Administration PMEL Carbon Program, “Ocean Carbon Uptake,” <https://www.pmel.noaa.gov/co2/story/Ocean+Carbon+Uptake>. Accessed June 2020.

¹⁴⁸⁸ High Level Panel for a Sustainable Ocean Economy, *The Ocean as a Solution to Climate Change* (2019): 22.

¹⁴⁸⁹ Ralph Chami, *Nature’s Solution to Climate Change* (Finance & Development, December 2019): 36.

¹⁴⁹⁰ Ibid at 35.

¹⁴⁹¹ Elisabeth K.A. Spiers et al., *Potential role of predators on carbon dynamics of marine ecosystems as assessed by a Bayesian belief network* (Ecological Informatics, November 2016): 80.

Make Public Lands and Waters a Part of the Climate Solution

America's public lands must be a key component of any comprehensive climate strategy for the United States to achieve net-zero emissions by 2050.

Currently, fossil fuel extraction on public lands is responsible for nearly a quarter of total U.S. carbon dioxide emissions, making public lands a significant net-emitter of greenhouse gas pollution.¹⁴⁹² To make public lands part of the climate solution, the federal government must slash emissions from fossil fuel development on public lands and waters by plugging methane leaks from oil and gas drilling, eliminating subsidies and handouts for the fossil fuel industry, and protecting places that are too special to drill or mine. With world-class wind and solar resources, public lands and waters can pivot away from fossil fuel extraction to renewable energy production.

Advancing the clean energy transition is just one way public lands can help solve the climate crisis. By conserving large landscapes and protecting and restoring natural spaces, the federal government can absorb and sequester large amounts of carbon in America's public lands. National forests, wilderness areas, wildlife refuges, national parks, and other protected wild and natural places provide tremendous ecosystem and recreational value but are also vital to achieving a national goal of net-zero emissions by 2050. With a comprehensive public lands climate plan, America's treasured public lands can be a powerful part of the climate solution while providing benefits for species and generations to come.

Reduce Greenhouse Gas Pollution from Public Lands and Waters

Energy production from federal lands and waters accounts for approximately 40% of the coal, almost a quarter of the oil, and 13% of the natural gas produced in the United States.¹⁴⁹³ Total production and consumption of fossil fuels extracted from public lands and the ocean account for nearly 24% of all U.S. carbon dioxide emissions annually, making the federal government's management of public lands a significant contributor to the climate crisis.¹⁴⁹⁴ By improving land management as part of a comprehensive climate strategy, America's public lands can go from a source of emissions to a powerful carbon sink.

¹⁴⁹² USGS, SIR 2018-5131, *Federal Lands Greenhouse Gas Emissions and Sequestration in the United States: Estimates for 2005-14* (2018): 6.

¹⁴⁹³ Congressional Research Service, R43429, *Federal Lands and Related Resources: Overview and Selected Issues for the 116th Congress* (April 25, 2019): 12.

¹⁴⁹⁴ USGS, SIR 2018-5131, *Federal Lands Greenhouse Gas Emissions and Sequestration in the United States: Estimates for 2005-14* (2018): 6.

Building Block: Incorporate Climate Mitigation and Conservation into the BLM Multiple-Use Policy and Other Public Land and Water Agencies

BLM manages approximately 245 million surface acres, as well as minerals on approximately 700 million subsurface acres.¹⁴⁹⁵ Pursuant to the Federal Land Policy and Management Act (FLPMA), BLM manages these lands under a multiple-use and sustained-yield mission. FLPMA defines multiple use as “the management of the public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people,” including, but not limited to, timber, recreation, minerals, wildlife habitat, and historical values.¹⁴⁹⁶

Under existing law, BLM already has a statutory responsibility and ample authority to manage federal lands for climate change and conservation and protect against undue and unnecessary degradation. FLPMA, however, is decades old and was enacted without the benefit of the current scientific understanding of human-caused climate change. FLPMA should be reviewed and, where necessary, updated to firmly and unequivocally establish that confronting climate change and conserving and restoring America’s natural systems is an essential component of BLM’s mission.

Recommendation: Congress should update FLPMA’s multiple-use mission to reflect the current and future needs of the country by incorporating climate mitigation and resilience into the BLM multiple-use mission and directing BLM to conserve and restore America’s public lands for the benefit of all communities, to transition to a clean energy future, and to help protect the nation against the impacts of climate change. This legislation should require that all BLM land use planning consider the impacts of land use management actions on greenhouse gas emissions and climate change mitigation. Congress should amend other major governing statutes for public land and water agencies, such as the Outer Continental Shelf Lands Act, to explicitly incorporate climate mitigation and resilience, greenhouse gas emissions reductions, and renewable energy production as priorities.

Committee of Jurisdiction: Natural Resources

Building Block: Achieve a Goal of Net-Zero Emissions on Public Lands and Waters by 2040 at the Latest

In order to avoid the most extreme consequences of the climate crisis and achieve net-zero emissions economy-wide by 2050 in line with the IPCC 1.5°C report, the United States must reduce emissions from fossil fuels on public lands and waters at a rapid pace. To achieve this goal, DOI and the Forest Service, in consultation with NOAA and other natural resource agencies, must develop a comprehensive public lands climate plan, using all of the available authorities within their jurisdictions, to aggressively cut emissions from fossil fuel production, increase carbon sequestration in natural spaces, and produce responsibly sited renewable energy. A comprehensive climate strategy to achieve net-zero emissions on public lands should envision, as a guiding principle, a goal of eventually achieving net-negative emissions so that America’s public lands become a carbon sink.

¹⁴⁹⁵ U.S. Department of the Interior, Bureau of Land Management, “What We Manage,” <https://www.blm.gov/about/what-we-manage/national>. Accessed June 2020.

¹⁴⁹⁶ The Federal Land Policy and Management Act of 1976, Pub. L. 94-579, codified at 43 U.S.C. § 1702.

Chair Raúl Grijalva (D-AZ) introduced H.R. 5435, the American Public Lands and Waters Climate Solution Act of 2019, which would require the Secretary of the Interior and the Chief of the Forest Service to reduce net emissions from fossil fuel extraction and use from public lands by 35% by 2025; 60% by 2030; 80% by 2035; and achieve net-zero emissions by 2040. The bill would require the National Academies to examine how the federal government can meet the emissions reductions targets and provide legislative and executive action recommendations. It would also require that DOI and USFS develop and publish a Public Lands Greenhouse Gas Reduction Strategy every four years, which would include actions to reduce net emissions and meet the reduction targets. To ensure enforcement, if the established targets are not being met, DOI would be prohibited from approving new fossil fuel permits or holding new lease sales until emissions are below the target level.

Recommendation: Congress should establish a national goal to achieve net-zero emissions on public lands and waters by 2040 at the latest, including ambitious interim target goals. To achieve this goal, Congress should direct DOI and USFS, in consultation with other natural resource agencies, to develop and publish a comprehensive public lands climate plan, using all available authorities and resources within their jurisdictions, including reducing fossil fuel extraction, investigating retirement and buyouts of existing leases, investing in conservation and restoration of natural landscapes, and accelerating responsibly sited clean energy deployment. This legislation should require that DOI and USFS publish the written strategy every two years, which should include plans, actions, and progress reports to reduce net emissions and meet the reduction targets. Congress should also direct the land management agencies to update their goals periodically to reflect changes in fossil fuel demand and production due to other recommendations in this report. This legislation should establish an office within DOI dedicated to overseeing and enforcing the implementation of programs to achieve a goal of net-zero emissions.

Committee of Jurisdiction: Natural Resources

Building Block: Prioritize Reductions of Greenhouse Gas Emissions and Co-Pollutants That Affect Environmental Justice Communities

All communities deserve to be pollution-free and have the right to breathe clean air and drink clean water. To ensure a just and equitable shift away from fossil fuels on public lands, federal policies also must address the historic inequality that has disproportionately harmed environmental justice communities, including communities of color, low-income communities, and tribal or Indigenous communities.

Chair Raúl Grijalva (D-AZ) introduced H.R. 5435, the American Public Lands and Waters Climate Solution Act of 2019, which would require that when taking any action to meet the emissions reductions targets set out in the legislation, DOI and USFS should prioritize reductions of greenhouse gas emissions and co-pollutants that will affect environmental justice communities and ensure that these actions do not result in a net increase of co-pollutant emissions in environmental justice communities.

Recommendation: Congress should direct federal land management agencies to prioritize reducing greenhouse gas emissions and co-pollutants that will affect environmental justice communities and ensure that any actions taken to meet a goal of net-zero emissions on public lands and waters do not

result in a net increase of co-pollutant emissions or have any other disparate impacts on environmental justice communities. To help achieve this policy objective, federal land management agencies should implement an inclusive stakeholder process that solicits early input and feedback from representatives living in environmental justice communities.

Committee of Jurisdiction: Natural Resources

Building Block: Enact a Moratorium on New Fossil Fuel Leases on Public Lands and Implement Robust Economic Transition Initiatives

More than 25 million acres of federal land are under lease to oil and gas developers, and just half of those acres are currently producing.¹⁴⁹⁷ Oil and gas producers hold enough federal land acreage to continue producing for decades.¹⁴⁹⁸

A moratorium on any new fossil fuel leases on public lands would pause the sale of onshore leases and allow the land management agencies to develop and implement a strategy to achieve a goal of net-zero emissions on public lands and waters by 2040 at the latest.

Some energy-producing states and counties, however, depend on fossil fuel extraction for jobs and revenue. Royalties and fees associated with fossil fuel leasing often support state budgets and provide funding for education and other public services. Robust transition assistance and economic development should accompany a moratorium to support workers and their communities.

Chair Raúl Grijalva (D-AZ) introduced H.R. 5435, the American Public Lands and Waters Climate Solution Act of 2019, which would implement a pause on new lease sales for coal, oil, or gas for one year after enactment of the legislation and until the Secretary of the Interior determines that additional fossil fuel leasing on public lands is not inconsistent with achieving net-zero greenhouse gas emissions from public lands by 2040 and releases a Public Lands Greenhouse Gas Reduction Strategic Plan.

Recommendation: Congress should implement a moratorium on all new onshore fossil fuel leases, including lease sales for coal, oil, and gas, on public lands, for one year and until DOI develops a comprehensive public lands climate plan, which includes a determination that additional leasing is not inconsistent with achieving net-zero emissions on public lands by 2040 at the latest. To ensure that communities are not left behind, the moratorium should be accompanied by meaningful economic transition assistance and initiatives for states, localities, and workers that have been

¹⁴⁹⁷ U.S. Department of the Interior, Bureau of Land Management, “About the BLM Oil and Gas Program,” <https://www.blm.gov/programs/energy-and-minerals/oil-and-gas/about>. Accessed June 2020; Bureau of Land Management, “Oil and Gas Statistics,” <https://www.blm.gov/programs/energy-and-minerals/oil-and-gas/oil-and-gas-statistics>. Accessed June 2020.

¹⁴⁹⁸ Nathan F. Jones & Liba Pejchar, *Comparing the Ecological Impacts of Wind and Oil & Gas Development: A Landscape Scale Assessment* (PLoS One, November 27, 2013): 9; Pennsylvania State University, “Natural Gas Production Decline Curve and Royalty Estimation” (October 30, 2014), <https://extension.psu.edu/natural-gas-production-decline-curve-and-royalty-estimation>; Bloomberg Wire, *The Permian Basin is getting gassier as wells age and oil outputs decline* (The Dallas Morning News, December 24, 2019), <https://www.dallasnews.com/business/energy/2019/12/24/the-permian-basin-is-getting-gassier-as-wells-age-and-oil-output-declines/>; Southwest Pennsylvania Environmental Health Project, “Understanding Unconventional Oil and Gas Development” <https://www.environmentalhealthproject.org/what-is-uogd>. Accessed June 2020; Subrata Chakrabarti, et al., *Historical Development of Offshore Structures* (Handbook of Offshore Engineering, 2005).

dependent on fossil fuel extraction on public lands for jobs and revenues. The subsection below titled “Invest in State and Local Communities in Economic Transition” provides more detail on the potential shape of that transition assistance.

Committees of Jurisdiction: Natural Resources; Education and Labor

Building Block: Prohibit New Offshore Oil and Gas Leasing

Offshore oil and gas development poses threats to America’s coastal communities, economies, and ecosystems. In addition to the environmental harm of routine oil and gas development and chronic pollution, there are significant risks of catastrophic oil blowouts, spills, and leakage, which are economically and environmentally devastating. The BP *Deepwater Horizon* blowout, for example, was an economic and environmental disaster for America’s Gulf Coast communities and natural resources. In response to the BP *Deepwater Horizon* disaster, the Obama administration adopted well control safety standards for blowout preventers and more. The Trump administration gutted these important safeguards in 2019.¹⁴⁹⁹ Similarly, in 2016, the Obama administration permanently protected large portions of the Arctic and Atlantic from offshore oil and gas drilling and exploration.¹⁵⁰⁰ Despite the dangers of offshore drilling, the Trump administration proposed a plan to open nearly all federal waters to oil and gas extraction, including permanently protected areas.¹⁵⁰¹

Members of Congress have introduced multiple bills to protect America’s coasts from oil and gas drilling and exploration, including:

- Chair Kathy Castor (D-FL) and Rep. Francis Rooney (R-FL) introduced H.R. 286, the Florida Coastal Protection Act, and H.R. 205, the Protecting and Securing Florida’s Coastline Act of 2019, respectively. These bills would both permanently extend the moratorium on oil and gas leasing, preleasing, and related activities in the eastern Gulf of Mexico off the coast of Florida. In September 2019, the House of Representatives passed the Protecting and Securing Florida’s Coastline Act.
- Rep. Joe Cunningham (D-SC) introduced H.R. 1941, the Coastal and Marine Economies Protection Act, which would permanently ban oil and gas leasing off the Atlantic and Pacific coasts. In September 2019, the House of Representatives passed this legislation.
- Rep. A. Donald McEachin (D-VA) introduced H.R. 337, the Defend Our Coast Act, which would permanently ban oil and gas leasing off the Mid-Atlantic coast.
- Rep. Jared Huffman (D-CA) and Sen. Dianne Feinstein (D-CA) introduced H.R. 310/S. 1318, the West Coast Ocean Protection Act of 2019, which would permanently ban offshore oil and gas leasing off the Pacific coast.

¹⁴⁹⁹ U.S. Department of the Interior, “Press Release, BSEE Finalizes Improved Blowout Preventer Rule and Well Control Regulations” (May 2, 2019), <https://www.doi.gov/pressreleases/bsee-finalizes-improved-blowout-preventer-and-well-control-regulations>.

¹⁵⁰⁰ The White House, “Press Release: Statement by the President on Actions in the Arctic and Atlantic Oceans,” (December 20, 2016), <https://obamawhitehouse.archives.gov/the-press-office/2016/12/20/statement-president-actions-arctic-and-atlantic-oceans>.

¹⁵⁰¹ U.S. Department of the Interior, “Press Release: Secretary Zinke Announces Plan for Unleashing America’s Offshore Oil and Gas Potential” (January 4, 2018), <https://www.doi.gov/pressreleases/secretary-zinke-announces-plan-unleashing-americas-offshore-oil-and-gas-potential>.

- Rep. Don Beyer (D-VA) and Sen. Cory Booker (D-NJ) introduced H.R. 1606/S. 828, the Atlantic Seismic Airgun Protection Act, which would permanently ban seismic testing for oil and gas exploration off the Atlantic Coast.
- Rep. Jared Huffman (D-CA) and Sen. Jeff Merkley (D-OR) introduced H.R. 309/S. 1523, the Stop Arctic Ocean Drilling Act of 2019, which would prohibit DOI from issuing or renewing a lease or any other authorization for the exploration, development, or production of oil, natural gas, or any other mineral in the Arctic Ocean, including the Beaufort Sea and the Chukchi Sea Planning Areas.
- Rep. A. Donald McEachin (D-VA) introduced H.R. 5695, the Offshore Accountability Act of 2020, which would require operators of offshore oil and gas facilities to report failures of critical safety systems to DOI and require the Secretary to publicly disclose these incident reports.
- Rep. Nanette Barragán (D-CA) introduced H.R. 1335, the Safe Coasts, Oceans, And Seaside Towns (Safe COAST) Act, which would codify the common-sense offshore drilling safety regulations implemented after the 2010 *Deepwater Horizon* explosion that the Trump administration rolled back in 2019.¹⁵⁰²

Recommendation: Congress should prohibit any new offshore oil and gas leasing in any region of the Outer Continental Shelf. Additionally, Congress should codify and strengthen drilling safety standards for existing wells, prohibit high-intensity seismic testing in any region of the Outer Continental Shelf outside of those areas that were available for sales in the 2017-2022 Outer Continental Shelf Oil and Gas Leasing Proposed Final Program, implement reporting requirements for failures of critical safety systems, improve monitoring of pollution near wells, and strengthen bonding and reclamation requirements for all offshore oil and gas development.

Recommendation: Congress should prohibit funding R&D programs for the commercial development of methane hydrates for natural gas.

Committee of Jurisdiction: Natural Resources

Building Block: Reduce Methane Pollution from Oil and Gas Production on Public Lands

The energy sector is the leading source of emissions of methane, a powerful greenhouse gas over 80 times more potent than carbon dioxide over a 20-year timeframe.¹⁵⁰³ Under the Obama administration, DOI took steps to reduce methane leaks and emissions from oil and gas production on public lands. The Methane Waste Prevention Rule was designed to limit leaking, venting, and flaring from oil and natural gas operations, which would have the additional benefit of generating more royalties for taxpayers through the capture and sale of methane—the principal component of natural

¹⁵⁰² U.S. Department of the Interior, “Press Release, BSEE Finalizes Improved Blowout Preventer Rule and Well Control Regulations” (May 2, 2019), <https://www.doi.gov/pressreleases/bsee-finalizes-improved-blowout-preventer-and-well-control-regulations>.

¹⁵⁰³ Energy Information Administration, DOE/EIA-0573(2009), *Emissions of Greenhouse Gases in the U.S.* (March 2011): 35; UN Environment Programme, “Oil and gas sector can bring quick climate win by tackling methane emissions” (June 27, 2019), <https://www.unenvironment.org/news-and-stories/story/oil-and-gas-sector-can-bring-quick-climate-win-tackling-methane-emissions>.

gas—that would otherwise have been lost or flared.¹⁵⁰⁴ The Trump administration rolled back the BLM methane rule, allowing for the continued methane leakage and depressing royalties for states and tribes.¹⁵⁰⁵

Rep. Diana DeGette (D-CO) introduced H.R. 2711, the Methane Waste Prevention Act of 2019, which would reinstate the BLM methane waste rule. The bill would require oil and gas producers to capture 85% of all gas produced on public lands within three years of enactment and 99% of all gas produced on public lands within five years of enactment. Additionally, the legislation would ban the venting of any natural gas on public lands and prohibit methane flaring at any new wells drilled beginning not later than two years after the passage of the bill.

Recommendation: Congress should reinstate the BLM methane waste prevention rule. In the section of this report titled “Plug Leaks and Cut Pollution from America’s Oil and Gas Infrastructure,” this report establishes a national methane pollution reduction standard.

Committee of Jurisdiction: Natural Resources

Building Block: Direct DOI to Track, Measure, and Report Emissions and Oil and Gas Production from Public Lands and Waters to Guide Federal Decision-Making

Although greenhouse gas emissions associated with oil, gas, and coal from public lands amount to nearly one-fourth of total U.S. carbon dioxide emissions, the federal government does not adequately or routinely track, measure, or report emissions from energy development on public lands.¹⁵⁰⁶ Without transparency or accurate measurements, the federal government cannot manage lands effectively or be held accountable to manage resources equitably.

Rep. Alan Lowenthal (D-CA) introduced H.R. 5636, the Transparency in Energy Production Act of 2020, which would require companies that hold or are seeking a lease to drill on federal lands or waters to record and report the resulting emissions that come from those activities. The bill would mandate that DOI disclose to Congress and the public the amount of greenhouse gas emissions from energy leasing on public lands as well as the exact sources of emissions.

Recommendation: Congress should direct DOI to track, measure, and report production and greenhouse gas emissions from public lands and make those findings publicly available. This legislation should include a requirement that companies with fossil fuel leases on public lands use

¹⁵⁰⁴ 81 FR 83008; Office of Senator Tom Udall, “Press Release: Udall, Grijalva Lead 51 Lawmakers in Challenging Trump Roll Back of Methane Waste Prevention Rule” (June 20, 2019) <https://www.tomudall.senate.gov/news/press-releases/udall-grijalva-lead-51-lawmakers-in-challenging-trump-roll-back-of-methane-waste-prevention-rule>.

¹⁵⁰⁵ 83 FR 49184; Bureau of Land Management, “Press Release: BLM Offers Revision to Methane Waste Prevention Rule” (February 12, 2018), <https://www.blm.gov/press-release/blm-offers-revision-methane-waste-prevention-rule>; U.S. Department of the Interior, “Press Release: Interior Department Finalizes New Waste Prevention Rule” (September 18, 2018), <https://www.doi.gov/pressreleases/interior-department-finalizes-new-waste-prevention-rule>; Lisa Friedman, “Trump Administration Formally Rolls Back Rule Aimed at Limiting Methane Pollution,” *New York Times*, September 18, 2018.

¹⁵⁰⁶ Government Accountability Office, GAO-16-607, *Interior Could Do More to Account for and Manage Natural Gas Emissions* (July 2016): 12; Office of Congressman Alan Lowenthal, “Press Release: Congressman Lowenthal Introduces Legislation Mandating Reporting of Emissions from Energy Production on Federal Lands,” (January 16, 2020), <https://lowenthal.house.gov/media/press-releases/congressman-lowenthal-introduces-legislation-mandating-reporting-emissions>.

industry best practices to record and report emissions from activities on the leased parcel and end-use combustion of the coal, oil, or gas produced. Congress should require DOI to disclose such data to Congress and the public. Congress should invest in a new and user-friendly interface system to allow DOI to track emissions, make them available to the public, and integrate data with decision-making. DOI should consult and coordinate with EPA to ensure this reporting system complements the EPA Greenhouse Gas Inventory.

Committee of Jurisdiction: Natural Resources

Building Block: Eliminate the Requirement That BLM Hold Lease Sales Quarterly and Shorten the Length of Lease Terms

The Mineral Leasing Act (MLA) requires that DOI issue oil and gas leases for an initial term of 10 years,¹⁵⁰⁷ which is considerably longer than state or private leases and encourages speculation while making land management more difficult and creating extended uncertainty for communities near federal oil and gas leases. Additionally, the MLA contains language that many administrations have interpreted as a requirement for BLM to conduct lease sales at least quarterly in each state.¹⁵⁰⁸

Chair Raúl Grijalva (D-AZ) introduced H.R. 5435, the American Public Lands and Waters Climate Solution Act of 2019, which would amend the MLA to eliminate the language regarding quarterly lease sales. Additionally, Rep. Mike Levin (D-CA) introduced H.R. 3225, the Restoring Community Input and Public Protections in Oil and Gas Leasing Act of 2019, which would reduce the number of required lease sales in each state from four times per year to a maximum of three and would require that lease sales be rotated so that no BLM field office can hold more than one lease sale per year. The legislation also limits initial lease terms from 10 years to five years.

Recommendation: Congress should amend the MLA to eliminate the language regarding quarterly lease sales. Additionally, Congress should shorten lease terms from 10 years to five years or less. When the initial term of the lease expires, oil and gas companies should bear the burden of proving the need for extension and showing they are diligently seeking to develop and produce oil and gas on the parcel under lease. If the company fails to prove that an extension is warranted after the initial lease term, the lease term should be terminated.

Committee of Jurisdiction: Natural Resources

Building Block: Expand Renewable Energy Development and Production on Public Lands and Waters, While Ensuring Responsible Siting to Protect Wildlife

Public lands account for just 5% of installed utility-scale wind and solar energy capacity¹⁵⁰⁹ even though some of the nation's best wind and solar resources are found on public lands. Expanding

¹⁵⁰⁷ 30 U.S.C. § 266(e).

¹⁵⁰⁸ 30 U.S.C. § 266(b)(1)(A).

¹⁵⁰⁹ U.S. Department of the Interior, Bureau of Land Management, "Wind Energy," <https://www.blm.gov/programs/energy-and-minerals/renewable-energy/wind-energy>. Accessed June 2020; Brownstein Hyatt Farber Schreck, "Bipartisan Bill Could Renewable Energy Development on Public Lands," (July 26, 2019), <https://www.jdsupra.com/legalnews/bipartisan-bill-could-increase-30724/>; Energy Information Administration, "Table 4.3 Existing Capacity by Energy Source, 2018,"

carefully sited renewable energy on public lands can help improve local economies, create new job opportunities, and generate additional revenue streams for states and local governments.

Any climate strategy for public lands should include increasing renewable energy generation on public lands and waters. However, if not sited properly, large renewable energy projects have the potential to disrupt wildlife habitat and conflict with other public land uses. Siting of renewable energy projects should be such as to avoid and minimize impacts on vulnerable species and habitats by identifying renewable energy and infrastructure zones upfront. Smart siting should begin early in the planning process and identify areas with high energy potential and low environmental conflict, which will expedite renewable energy permitting and avoid costly and time-consuming deliberations over inappropriately sited projects that could harm wildlands, wildlife habitats, and cultural resources. In the section titled “Capture the Full Potential of Natural Climate Solutions,” this report outlines the importance of responsibly sited offshore renewable energy projects to avoid or minimize potential conflicts with fisheries, marine wildlife, and ocean ecosystems.

Reps. Mike Levin (D-CA) and Paul Gosar (R-AZ) and Sens. Martin Heinrich (D-NM) and Martha McSally (R-AZ) introduced H.R. 3794/S. 2666, the Public Land Renewable Energy Development Act of 2019, which would promote the development of renewable energy on public lands. Specifically, the bill would establish a national Renewable Energy Coordination Office to implement a program to improve federal permit coordination with respect to renewable energy projects and would create a renewable energy production goal for DOI to permit a total of 25 gigawatts of renewable energy on public lands by 2025. Additionally, the bill would direct DOI to establish more priority areas for leasing and development, which would ensure that proposed projects are sited in the most suitable locations. The bill would also establish a revenue sharing mechanism that eliminates the fiscal incentive for states and counties to prefer fossil fuel projects to renewable energy development; currently, states receive roughly half of all fossil fuel revenues, but nothing from renewable energy. H.R. 3794 would allocate 25% of the revenues derived from renewable energy for the counties where the projects are located, 25% for the home state, 25% into a fish and wildlife conservation fund, 15% for the purposes of more efficiently processing permit applications, and 10% for deficit reduction. Sections 84401-84412 of the House Democrats’ infrastructure bill, H.R. 2, the Moving Forward Act, include similar initiatives.

Recommendation: Congress should pass legislation to increase and expedite renewable energy development on public lands while ensuring smart-from-the-start siting to avoid harm to wildlife, wildlands, and cultural resources. Congress should also increase investments in scientific resources, including biologists, ecologists, and NEPA staff, to properly plan and develop these projects.

Committee of Jurisdiction: Natural Resources

https://www.eia.gov/electricity/annual/html/epa_04_03.html. Accessed June 2020; Office of Congressman Paul Gosar, “Press Release: Reps. Gosar, Levin, LaMalfa, Lowenthal, Tipton, Huffman, and Bishop Introduce Bill to Increase Renewable Energy on Public Lands” (July 18, 2019), <https://gosar.house.gov/news/documentsingle.aspx?DocumentID=3851>.

Expand Protections for Wild and Special Places

Drilling in wild and special places—such as the Arctic National Wildlife Refuge, national parks and monuments, and parks-adjacent lands—threatens ecosystems, wildlife populations, public health, tribal cultures, historical preservation, and outdoor economies. The significance and value of certain places make them too special to allow any drilling or mining.

Building Block: Protect Wild and Special Places from Drilling and Mining

The Trump administration has taken steps to undo protections for some of America’s last remaining wild landscapes, irreplaceable cultural sites, and meaningful national monuments, even though more than 25 million acres are currently leased to oil and gas companies and approximately half presently sit idle.¹⁵¹⁰

Members of Congress have introduced multiple bills to protect special and wild places from drilling and mining.

- Rep. Jared Huffman (D-CA) introduced H.R. 1146, the Arctic Cultural and Coastal Plain Protection Act, which would repeal the provision in the 2017 Tax Cuts and Jobs Act that mandated oil and gas lease sales on the Coastal Plain of the Arctic National Wildlife Refuge in Alaska. The Arctic National Wildlife Refuge is one of the last pristine and wild landscapes on Earth and is home to diverse and unique wildlife populations, including polar and grizzly bears, wolves, beluga and bowhead whales, and the Porcupine Caribou Herd.¹⁵¹¹ In September 2019, the House of Representatives passed this legislation.
- Rep. Ben Ray Luján (D-NM) and Sen. Tom Udall (D-NM) introduced H.R. 2181/S. 1079, the Chaco Cultural Heritage Area Protection Act of 2019, which would withdraw any federal land within a 10-mile buffer around New Mexico’s Chaco Cultural National Historical Park from future oil and gas leasing. Chaco Canyon is a sacred site that is home to thousand-year-old dwellings and artifacts of the Pueblo and Navajo Nation culture. It is protected as a National Cultural Historic Park and is designated as a United Nations World Heritage Site. In October 2019, the House of Representatives passed this legislation.
- Chair Raúl Grijalva (D-AZ) and Sen. Krysten Sinema (D-AZ) introduced H.R. 1373/S. 3127, the Grand Canyon Centennial Protection Act, which would permanently protect more than 1 million acres of public lands surrounding Grand Canyon National Park from new mineral extraction. The Greater Grand Canyon Watershed is one of America’s most iconic landscapes and is culturally significant to many Indigenous peoples. There is a current 20-year moratorium on new mining activity, which this legislation would make permanent. In October 2019, the House of Representatives passed this legislation.

¹⁵¹⁰ Bureau of Land Management, “Oil and Gas Statistics,” <https://www.blm.gov/programs/energy-and-minerals/oil-and-gas/oil-and-gas-statistics>. Accessed June 2020; Center for Western Priorities, “Story Map: America’s Public Lands Giveaway” (September 19, 2019), <https://medium.com/westwise/story-map-americas-public-lands-giveaway-dad328ca5423>.

¹⁵¹¹ Office of Congressman Jared Huffman, “Press Release: Huffman, Fitzpatrick, 100 Lawmakers Introduce Bipartisan Bill to Restore Arctic National Wildlife Refuge Protections” (February 12, 2019), <https://huffman.house.gov/media-center/press-releases/huffman-fitzpatrick-100-lawmakers-introduce-bipartisan-bill-to-restore-arctic-national-wildlife-refuge-protections>.

- Rep. Ruben Gallego (D-AZ) introduced H.R. 871, the Bears Ears Expansion and Respect for Sovereignty Act, which would expand the boundaries of the Bears Ears National Monument and protect that area from drilling and mining. In 2017, the Trump administration took steps to shrink Bears Ears National Monument, opening the area to drilling and mining activity.¹⁵¹² This bill would restore and protect the original land previously designated under the Obama administration as well as expand Bears Ears to the full 1.9 million acres of land identified by local tribes as containing sacred artifacts and cultural resources. The bill would also restore tribal consultation by requiring federal land managers to use tribal expertise to manage the monument's lands and protect more than 100,000 archaeological and cultural sites.
- Rep. Betty McCollum (D-MN) introduced H.R. 5598, the Boundary Waters Wilderness Protection and Pollution Prevention Act, which would protect Minnesota's Boundary Waters Canoe Area Wilderness by permanently protecting more than 234,000 acres of federal land and waters within the Superior National Forest from certain dangerous mining activities.

Recommendation: Congress should protect special places from drilling, mining, and related activities. Places that are too wild or special to drill include areas and landscapes with high climate mitigation, biodiversity, and cultural value. To ensure special places are protected, Congress should draft legislation to ban extraction in these areas and update the planning process to make national parks and federal lands adjacent to parks, wilderness areas, wildlife refuges, national conservation lands, and other protected places off-limits to oil and gas development. Congress should also ensure that the National Park Service has an official role in all leasing decisions that affect park landscapes.

Committee of Jurisdiction: Natural Resources

Building Block: End Drilling and Mining in Important Habitat Onshore and Offshore

Oil and gas development is shrinking, disturbing, and fragmenting wildlife habitat. The sage-grouse, for example, whose population numbers have declined 30% since 1985, is particularly susceptible to habitat fragmentation caused by oil and gas development and other infrastructure.¹⁵¹³ The Obama administration reached a compromise with Western states and landowners, agreeing not to list the species under the ESA but putting management plans in place to protect the sage-grouse and its habitat while still allowing for new energy development.¹⁵¹⁴ However, the Trump administration rolled back those protections, weakening the sage-grouse conservation plans and opening priority habitat to more oil and gas development.¹⁵¹⁵ The sage-grouse is not the only species whose habitat is at risk

¹⁵¹² The White House, “Presidential Proclamation Modifying the Bears Ears National Monument” (December 4, 2017), <https://www.whitehouse.gov/presidential-actions/presidential-proclamation-modifying-bears-ears-national-monument/>; Julie Turkewitz, “Trump Slashes Size of Bears Ears and Grand Staircase Monuments,” *New York Times*, December 4, 2017.; Sarah Kaplan & Juliet Eilperin, “These southern Utah sites were once off-limits to development. Now, Trump will auction the right to drill and graze there,” *The Washington Post*, February 6, 2020.

¹⁵¹³ U.S. Fish and Wildlife Service, “The Greater Sage-grouse: Facts, figures, and discussion,” https://www.fws.gov/greatersagegrouse/factsheets/GreaterSageGrouseCanon_FINAL.pdf. Accessed June 2020; Michael R. Conover & Anthony J. Roberts, *Declining populations of greater sage-grouse: where and why* (Human-Wildlife Interactions, Fall 2016): 3-7.

¹⁵¹⁴ U.S. Department of the Interior, “Press Release: Historic Conservation Campaign Protects Greater Sage-Grouse,” (September 22, 2015), <https://www.doi.gov/pressreleases/historic-conservation-campaign-protects-greater-sage-grouse>.

¹⁵¹⁵ National Audubon Society, “New Report Funds Increased Oil and Gas Leasing and Drilling in Priority Sage-Grouse Habitat” (August 2, 2019), <https://www.audubon.org/news/new-report-finds-increased-oil-and-gas-leasing-and-drilling->

from oil and gas activity. Nearly one-fifth of Western oil and gas leases offered since 2016 are in important migration corridors or priority areas for species such as the mule deer, elk, and pronghorn.¹⁵¹⁶

Additionally, the oil industry is responsible for killing a significant number of birds each year.¹⁵¹⁷ Birds are especially vulnerable to oil spills and oil pits, which many birds mistake for ponds until they are trapped in the sticky oil. Oil pits kill between 500,000 and 1 million birds each year, and more than 1 million birds died in the *BP Deepwater Horizon* disaster alone.¹⁵¹⁸ Yet, the Trump administration weakened protections for birds under the Migratory Bird Treaty Act, announcing that individuals or companies would not be held responsible for the incidental take of migratory birds and allowing oil and gas companies to kill or injure birds without penalty.¹⁵¹⁹ Rep. Alan Lowenthal (D-CA) introduced H.R. 5552, the Migratory Bird Protection Act of 2020, which would affirm that the Migratory Bird Treaty Act's prohibition on the unauthorized take or killing of migratory birds includes incidental take by commercial activities, including energy development.

Recommendation: Congress should restore the 2015 National Greater Sage-Grouse Planning Strategy and its original implementing guidance. Any legislation to protect the greater sage-grouse should include repealing the FY2015 appropriations rider prohibiting FWS from writing and issuing rules related to the sage-grouse, effectively preventing the ability to provide the species protection under the ESA. Additionally, Congress should direct DOI to study how drilling and mining on public lands interferes with species habitat, migration, and survival and implement a strategy to minimize harm to wildlife to the maximum extent possible, including restricting drilling and mining in wildlife migration corridors.

Recommendation: Congress should restore protections rescinded by the Trump administration for migratory birds by amending the Migratory Bird Treaty Act to affirm that the prohibition on the unauthorized take or killing of migratory birds includes incidental take by commercial activities.

Committee of Jurisdiction: Natural Resources

priority-sage-grouse; Coral Davenport, "Trump Administration Loosens Sage Grouse Protections, Benefiting Oil Companies," *New York Times*, March 15, 2019.

¹⁵¹⁶ Ryan Richards et al., *Trump Administration is Selling Western Wildlife Corridors to Oil and Gas Industry* (Center for American Progress, 2019).

¹⁵¹⁷ U.S. Fish and Wildlife Service, "Entrapment, Entanglement & Drowning," <https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds/entrapment-entanglement-drowning.php>. Accessed June 2020; Darryl Fears & Juliet Eilperin, "A controversial Trump legal opinion weakened a law to protect birds. Now it might be made permanent," *Washington Post*, January 30, 2020.

¹⁵¹⁸ Ibid.

¹⁵¹⁹ Ibid; 85 Fed. Reg. 5915.

End Unfair Government Subsidies for Oil and Gas Production on Public Lands

Every year, fossil fuel companies receive billions of dollars in federal subsidies in the form of tax breaks, royalty relief, and other favorable policies, costing taxpayers and incentivizing more fossil fuel extraction.

Building Block: Eliminate Unnecessary Tax Breaks for Oil and Gas Companies

The U.S. tax code provides the oil and gas sector billions of dollars in tax deductions and other incentives that make it more difficult for zero-carbon energy sources to compete.

For example, oil and gas companies can deduct intangible drilling costs—the costs associated with preparing a well for production that contributes 60% to 80% of the total cost of a well—up-front rather than over the lifetime of the asset or project. This provides a boost to cash flow at the front end of a major project.¹⁵²⁰ The law allows independent oil and gas producers to deduct 100% of their intangible drilling costs in the first year. Integrated oil companies can deduct 70% of these costs in the first year and then amortize the rest over five years.¹⁵²¹ In 2016, the Joint Committee on Taxation estimated that eliminating this tax break would generate \$1.59 billion in revenue in 2017 and \$13 billion over the next 10 years.¹⁵²² As another example, the tax code allows independent oil and gas producers to deduct 15% of their gross income from oil and gas produced from a well each year.¹⁵²³ Because this deduction is not based on capital costs, a company's total deductions can exceed capital costs.¹⁵²⁴ In 2016, the Joint Committee on Taxation estimated that eliminating this tax break would generate \$12.1 billion over the next 10 years.¹⁵²⁵

Recommendation: Congress should ensure that the U.S. tax code aligns with the national goal of achieving net-zero emissions by no later than 2050. As a start, Congress should repeal unnecessary tax breaks for the oil and gas industry.

Committee of Jurisdiction: Ways and Means

Building Block: Reform the Onshore Oil and Gas Royalty System to Increase the Royalty Rate and End Handouts for Fossil Fuel Companies

Companies drilling for oil and gas on federal lands pay royalties to the resource owner, the American taxpayer, based on the value of production.¹⁵²⁶ Forty percent of royalty revenues go to the

¹⁵²⁰ Peter Erickson et al, “Why fossil fuel subsidies matter,” *Nature* 578, E1–E4 (2020).

¹⁵²¹ 26 U.S.C. § 263(c).

¹⁵²² Joint Committee on Taxation, *Estimated Budget Effects of the Revenue Provisions Contained in the President's Fiscal Year 2017 Budget Proposal* (March 24, 2016).

¹⁵²³ 26 U.S.C. § 613A.

¹⁵²⁴ Environmental and Energy Study Institute, “Fact Sheet: Fossil Fuel Subsidies: A Closer Look at Tax Breaks and Societal Costs,” July 29, 2019, <https://www.eesi.org/papers/view/fact-sheet-fossil-fuel-subsidies-a-closer-look-at-tax-breaks-and-societal-costs>.

¹⁵²⁵ Joint Committee on Taxation, *Estimated Budget Effects of the Revenue Provisions Contained in the President's Fiscal Year 2017 Budget Proposal* (March 24, 2016).

¹⁵²⁶ Congressional Research Service, R43891, *Mineral Royalties on Federal Lands: Issues for Congress*, (January 19, 2015): 2.

Reclamation Fund to fund water projects in the Western states, roughly 10% goes to the U.S. Treasury, and roughly half goes to the state where the development occurred.¹⁵²⁷ The current onshore oil and gas royalty rate is just 12.5%, a number that has not been updated since 1920.¹⁵²⁸ Many states and private landowners assess royalty rates as high as 25%.¹⁵²⁹ DOI raised offshore oil and gas royalty rates to 18.75% in 2008.¹⁵³⁰ Low federal royalty rates are effectively a subsidy to oil and gas producers for operating on public land.

Rep. Ben McAdams (D-UT) introduced H.R. 4364, the Taxpayer Fairness for Resource Development Act of 2019, which would increase onshore oil and gas royalties from the current 12.5% to 18.75%. Sens. Tom Udall (D-NM) and Chuck Grassley (R-IA) have also introduced legislation, S. 3330, the Fair Returns for Public Lands Act of 2020, which would also increase federal royalty rates for onshore oil and gas drilling to 18.75%.

Recommendation: Although DOI has the legislative authority to raise royalty rates without congressional intervention, Congress should direct DOI to increase onshore oil and gas royalty rates from 12.5% to no less than 18.75% with flexibility for the Secretary of the Interior to establish higher royalty rates as appropriate to guarantee a fair return to taxpayers.

Committee of Jurisdiction: Natural Resources

Building Block: Reform the Offshore Oil and Gas Royalty System and Close Loopholes for Oil and Gas Companies

The Outer Continental Shelf Lands Act (OCSLA) authorizes DOI to establish a royalty rate for oil and gas leasing and production in federal waters. OCSLA requires a royalty rate of no less than 12.5%, although DOI may reduce or eliminate royalties on a case-by-case basis if necessary to make production economic.¹⁵³¹ In 2008, DOI raised offshore oil and gas royalty rates to 18.75%.¹⁵³² In 2017, DOI lowered royalty rates for new shallow-water leases (leases located in water depths less than 200 meters) back to 12.5%, but maintained a royalty rate of 18.75% for new deepwater leases.¹⁵³³

¹⁵²⁷ The Mineral Leasing Act, 30 U.S.C § 191; Congressional Research Service, R43891, *Mineral Royalties on Federal Lands: Issues for Congress* (January 19, 2015): 6.

¹⁵²⁸ The Mineral Leasing Act, 30 U.S.C. § 226; Office of Senator Chuck Grassley, “Press Release: Udall, Grassley Introduce Bill to Ensure Taxpayers Get Fair Share for Public Lands Leasing” (February 25, 2020), <https://www.grassley.senate.gov/news/news-releases/udall-grassley-introduce-bill-ensure-taxpayers-get-fair-share-public-lands>.

¹⁵²⁹ Office of Senator Chuck Grassley, “Press Release: Udall, Grassley Introduce Bill to Ensure Taxpayers Get Fair Share for Public Lands Leasing” (February 25, 2020); Congressional Research Service, R43891, *Mineral Royalties on Federal Lands: Issues for Congress* (January 19, 2015): 3.

¹⁵³⁰ Government Accountability Office, GAO-14-50, *Oil and Gas Resources: Actions Needed for Interior to Better Ensure a Fair Return* (December 2013): 13-14; Congressional Budget Office, *Options for Increasing Federal Income from Crude Oil and Natural Gas on Federal Lands* (April 2016): 10; Congressional Research Service, *The OCS Royalty Rate: Statutory Requirements and General Guidance* (September 14, 2017): 1.

¹⁵³¹ 43 U.S.C. § 1337.

¹⁵³² Government Accountability Office, GAO-14-50, *Oil and Gas Resources: Actions Needed for Interior to Better Ensure a Fair Return* (December 2013): 13-14; CBO, *Options for Increasing Federal Income from Crude Oil and Natural Gas on Federal Lands* (April 2016): 10; Congressional Research Service, *The OCS Royalty Rate: Statutory Requirements and General Guidance* (September 14, 2017): 1.

¹⁵³³ BOEM, “Press Release: BOEM Completes Analysis of Royalty Rates for Offshore Oil and Gas Leases” (July 6, 2017), <https://www.boem.gov/newsroom/notes-stakeholders/boem-completes-analysis-royalty-rates-offshore-oil-and-gas-leases>.

Although deepwater leases carry a higher royalty rate, 22% of oil production from deepwater federal leases in the Gulf of Mexico are currently royalty-free.¹⁵³⁴ A loophole in the Deepwater Royalty Relief Act of 1995 allowed oil and gas companies to avoid paying royalties when oil prices dip below a certain threshold.¹⁵³⁵ The oil and gas industry successfully sued DOI, securing a royalty holiday regardless of the price of oil.¹⁵³⁶ GAO estimates that oil and gas companies have avoided paying \$18 billion in royalties since 1995 as a result.¹⁵³⁷

Chair Raúl Grijalva (D-AZ) and Sen. Edward Markey (D-MA) introduced H.R. 5186/S. 2906, the Stop Giving Big Oil Free Money Act of 2019, which would repeal the loophole in the Deepwater Royalty Relief Act.

Recommendation: Unless and until the prohibition on new offshore oil and gas leasing and development takes effect, Congress should amend OCSLA to implement a royalty rate of no less than 18.75% for all offshore oil and gas production, regardless of water depth. Additionally, Congress should end royalty relief for offshore development, including repealing the loophole in the Deepwater Royalty Relief Act that has allowed fossil fuel companies to avoid paying offshore oil and gas royalties.

Committee of Jurisdiction: Natural Resources

Building Block: End Noncompetitive Oil and Gas Leasing on Public Lands

BLM manages the subsurface mineral rights on approximately 700 million acres throughout the country and, under the authorization of the MLA, sells and manages oil and gas leases on those lands.¹⁵³⁸ The MLA requires BLM to lease lands through a competitive bidding process; however, if any lands are offered competitively at auction but do not receive a bid, BLM may issue noncompetitive leases on a first-come, first-served basis.¹⁵³⁹ On these acres, BLM waives the minimum bid requirement of \$2 per acre; instead, applicants must only pay an administrative fee and the first year's advance rental of \$1.50 per acre.¹⁵⁴⁰

Leases sold noncompetitively rarely end up in production, allowing oil and gas companies to acquire leases at a nominal cost and sit idle on the rights to drill on millions of acres of public lands.¹⁵⁴¹ In fact, a 2016 Congressional Budget Office (CBO) report found that just 3% of parcels leased

¹⁵³⁴ Hiroko Tabuchi, “Government Loophole Gave Oil Companies \$18 Billion Windfall,” *New York Times*, October 24, 2019.

¹⁵³⁵ Office of Congressman Raúl Grijalva, “Press Release: Chair Grijalva, Rep. Lowenthal Release GAO Report Finding Fossil Fuel Companies Have Avoided Paying Billion in Taxpayer Royalties from Offshore Drilling” (October 24, 2019), <https://grijalva.house.gov/press-releases/chair-grijalva-rep-lowenthal-release-gao-report-finding-fossil-fuel-companies-have-avoided-paying-billions-in-taxpayer-royalties-from-offshore-drilling/>.

¹⁵³⁶ Ibid.

¹⁵³⁷ Ibid.; Government Accountability Office, GAO-19-531, *Offshore Oil and Gas: Opportunities Exist to Better Ensure a Fair Return of Federal Resources* (September 2019): 45.

¹⁵³⁸ U.S. Department of the Interior, Bureau of Land Management, “What We Manage,” <https://www.blm.gov/about/what-we-manage/national>. Accessed June 2020; Mineral Leasing Act, 30 U.S.C. § 181 et seq.

¹⁵³⁹ U.S. Department of the Interior, Bureau of Land Management, “General Oil and Gas Leasing Instructions,” <https://www.blm.gov/programs/energy-and-minerals/oil-and-gas/leasing/general-leasing>. Accessed June 2020.

¹⁵⁴⁰ Ibid.

¹⁵⁴¹ CBO, *Options for Increasing Federal Income from Crude Oil and Natural Gas on Federal Lands* (April 2016): 2; Taxpayers for Common Sense, *Locked Out: The Cost of Speculation in Federal Oil and Gas Leases* (October 3, 2017).

noncompetitively between 1996 and 2003 entered production by the end of their 10-year lease term.¹⁵⁴² Additionally, giving away public lands at a lower rate and tying them up indefinitely in oil and gas leases prevents BLM from managing these lands for other purposes, such as conservation, wildlife habitat, climate mitigation and resilience, and cultural resource management.

Rep. Mike Levin (D-CA) introduced H.R. 3225, the Restoring Community Input and Public Protections in Oil and Gas Leasing Act of 2019, which would eliminate noncompetitive leasing.

Recommendation: Congress should eliminate noncompetitive leasing.

Committee of Jurisdiction: Natural Resources

Building Block: Increase Minimum Bid Requirements and Rental Rates for Both Competitive and Noncompetitive Oil and Gas Leases

Under the MLA, BLM offers oil and gas leases through a competitive auction system. The minimum bid required is only \$2 per acre.¹⁵⁴³ Once a lease is obtained, to maintain the rights to drill, the leaseholder is required to pay an annual rental fee of just \$1.50 per acre for the first five years of the lease and \$2 per acre thereafter.¹⁵⁴⁴ BLM established these price levels in 1987 and has not adjusted them for inflation since.

Such low prices incentivize companies to lease public lands, regardless of the potential for oil and gas development, making those lands unavailable for other uses, such as conservation, wildlife habitat, cultural resource management, and climate mitigation. Approximately 90% of all public lands managed by BLM are open for oil and gas development, leaving just 10% for other uses.¹⁵⁴⁵

Rep. Ben McAdams (D-UT) introduced H.R. 4364, the Taxpayer Fairness for Resource Development Act of 2019, which would increase rental rates from \$1.50 per acre in the first five years to \$3 per acre and from \$2 per acre thereafter to \$5 per acre. Additionally, the bill would increase the minimum bid from \$2 per acre to \$5 per acre. Similarly, Rep. Mike Levin (D-CA) introduced H.R. 3225, the Restoring Community Input and Public Protections in Oil and Gas Leasing Act of 2019, which would increase the minimum bid price from \$2 per acre to \$5 per acre and give DOI the discretion to increase the national minimum acceptable bid once every four years and at any time if the Interior Secretary finds that a higher amount is necessary to enhance financial returns to the United States or to promote more efficient management of oil and gas resources on federal lands. Additionally, the legislation increases minimum annual rental rates from \$1.50 per acre in the first two years to \$3 per acre and from \$2 per acre thereafter to \$5 per acre.

¹⁵⁴² CBO, *Options for Increasing Federal Income from Crude Oil and Natural Gas on Federal Lands* (April 2016): 2.

¹⁵⁴³ 30 U.S.C. § 226(b); U.S. Department of the Interior, Bureau of Land Management, “General Oil and Gas Leasing Instructions,” www.blm.gov/programs/energy-and-minerals/oil-and-gas/leasing/general-leasing. Accessed June 2020.

¹⁵⁴⁴ 30 U.S.C. § 226(d); U.S. Department of the Interior, Bureau of Land Management, “General Oil and Gas Leasing Instructions,” www.blm.gov/programs/energy-and-minerals/oil-and-gas/leasing/general-leasing. Accessed June 2020.

¹⁵⁴⁵ Testimony of Jamie Williams, President, The Wilderness Society, *Oil and Gas Development: Impacts of Business-as-Usual on the Climate and Public Health*, Hearing Before the House Natural Resources Subcommittee on Energy and Minerals, 116th Congress (July 16, 2019).

Recommendation: Congress should increase minimum bid requirements to at least \$5 per acre and rental rates to at least \$3 per acre in the first five years and \$5 per acre thereafter. This legislation should direct DOI to increase the national minimum acceptable bid every four years and at any time the Interior Secretary finds that a higher amount is necessary to improve the management of oil and gas resources on federal lands.

Committee of Jurisdiction: Natural Resources

Building Block: End Speculative Leasing and Anonymous Industry Nominations and Adopt a Comprehensive Planning Process

Currently, the process for determining which lands are available for oil and gas drilling is driven by oil and gas companies that nominate parcels of land to be sold at auction, often anonymously.¹⁵⁴⁶ This anonymous nomination process limits transparency and enables companies to abuse the system, allowing for speculation.¹⁵⁴⁷ When deciding which nominated lands it will ultimately offer for leases, BLM does not consider the likelihood of a lease entering production. This leads to speculative leasing on low-potential lands, locking up areas that could be used for wildlife preservation or climate mitigation and resilience.¹⁵⁴⁸ Speculative leasing also harms Western communities that depend on public lands for other activities such as hunting and fishing, tourism, outdoor recreation, and renewable energy development.

In 2010, the Obama administration implemented master leasing plans (MLPs), which were a collaborative planning process instituted to determine the best way to manage federal lands across a landscape to protect multiple uses and special places.¹⁵⁴⁹ The Trump administration eliminated MLPs, claiming that they created duplicative layers of NEPA review.¹⁵⁵⁰

Rep. Mike Levin (D-CA) introduced H.R. 3225, the Restoring Community Input and Public Protections in Oil and Gas Leasing Act of 2019, which would require companies that nominate lands for oil and gas leasing and bid on leases to disclose their identities. Companies would also be required to pay a fee to nominate lands for leasing. The legislation would also reinstate the requirement for DOI to adopt and implement a master leasing plan to govern the issuance of oil and gas leases on public lands and better protect lands where drilling conflicts with other uses.

¹⁵⁴⁶ Bureau of Land Management, “Expression of Interest,” <https://www.blm.gov/programs/energy-and-minerals/oil-and-gas/leasing/parcel-nominations>. Accessed June 2020; Center for Western Priorities, *Who’s nominating your public lands for oil and gas leasing? Most of the time, there’s no way to tell* (November 5, 2018), <https://medium.com/westwise/whos-nominating-your-public-lands-for-oil-and-gas-leasing-d68af59a7025>.

¹⁵⁴⁷ Office of Congressman Mike Levin, “Press Release: Representative Levin Introduces Legislation to Strengthen Public Land Protections and Increase Community Participation in Federal Oil and Gas Leasing Program” (June 14, 2019), <https://mikelevin.house.gov/media/press-releases/representative-levin-introduces-legislation-strengthen-public-land-protections>.

¹⁵⁴⁸ Office of Senator Catherine Cortez Masto, “Press Release: Cortez Masto Introduces Legislation to Prohibit Oil and Gas Speculation on Low Potential Lands” (January 17, 2020), <https://www.cortezmasto.senate.gov/news/press-releases/cortez-masto-introduces-legislation-to-prohibit-oil-and-gas-speculation-on-low-potential-lands>.

¹⁵⁴⁹ Bureau of Land Management, IM 2010-117, “Oil and Gas Leasing Reform Land Use Planning and Lease Parcel Reviews” (May 17, 2010), <https://www.blm.gov/policy/im-2010-117>.

¹⁵⁵⁰ Bureau of Land Management, IM 2018-034, “Updating Oil and Gas Leasing Reform – Land Use Planning and Lease Parcel Reviews” (January 31, 2018), <https://www.blm.gov/policy/im-2018-034>.

Sen. Catherine Cortez Masto (D-NV) introduced S. 3202, the End Speculative Oil and Gas Leasing Act of 2020. This legislation would prohibit oil and gas leasing on public lands that BLM determines have low or no potential for development and reprioritize BLM's administration of these lands for other purposes, like wildlife habitat preservation and outdoor recreation.

Recommendation: Congress should require companies that nominate lands for oil and gas leasing and bid on leases to disclose their identities, as well as pay a fee to nominate lands for leasing.

Recommendation: Congress should prohibit oil and gas leasing on public lands that BLM determines have low or no potential for oil and gas development and direct BLM to reprioritize these lands for other uses, including wildlife conservation and connectivity, climate mitigation and resilience, cultural resource protection, outdoor recreation, and clean energy development.

Recommendation: For existing leases and until the prohibition of speculative and noncompetitive leasing goes into effect, Congress should establish a retirement program for low-potential leases and parcels that were leased noncompetitively and remove these parcels from future leasing plans.

Recommendation: Congress should direct BLM to manage any nonproducing leased parcel without proposed oil and gas activity for multiple uses, such as recreation and conservation.

Recommendation: Congress should reinstate the requirement for DOI to adopt and implement a master leasing plan to better manage oil and gas leases on public lands and protect lands where drilling interests conflict with other uses.

Committee of Jurisdiction: Natural Resources

Establish and Maintain Robust Environmental Review, Requirements, and Restoration

Where fossil fuel extraction does occur on public lands, stringent environmental safeguards and robust environmental review, including analysis of climate concerns, are critical to ensure companies minimize their environmental impact and remediate and reclaim any damage they cause. The Trump administration, however, has taken steps to weaken environmental review under NEPA and reduce transparency and public participation.

Building Block: Require Robust Environmental Review and Safeguards for Oil and Gas Leasing and Production

To expand fossil fuel production, the Trump administration has weakened environmental review under NEPA for oil and gas development on public lands. In 2018, the Trump administration issued BLM Instruction Memorandum 2018-034, which revised and rolled back numerous Obama administration environmental protections for oil and gas leasing.¹⁵⁵¹ For example, the new guidance

¹⁵⁵¹ Bureau of Land Management, IM 2018-034, "Updating Oil and Gas Leasing Reform – Land Use Planning and Lease Parcel Reviews" (January 31, 2018), <https://www.blm.gov/policy/im-2018-034>.

expanded the use of “determinations of NEPA adequacy,” which allow BLM to bypass new environmental reviews by using existing, and sometimes outdated, NEPA documents and forgo parcel-specific NEPA analysis.¹⁵⁵²

Rep. Mike Levin (D-CA) introduced H.R. 3225, the Restoring Community Input and Public Protections in Oil and Gas Leasing Act of 2019, which would codify sections of the Obama administration’s BLM Instruction Memorandum No. 2010-117, including a requirement that all lease sales have parcel-specific NEPA compliance, as opposed to only a Resource Management Plan-level NEPA compliance.

In addition to reversing Trump administration attacks on bedrock environmental laws, members of Congress have proposed new safeguards for existing oil and gas production on public lands. For example, to protect water resources on public lands from oil- and gas-related wastes and byproducts, Rep. Jared Huffman (D-CA) introduced H.R. 6112, the Oil and Water Don’t Mix Act of 2020, which would require baseline water testing and public disclosure on public lands. The bill also would require oil and gas operators on public lands to submit a robust water management plan to BLM and replace water supplies when their operations negatively affect the quality or quantity of surface or ground water.

Recommendation: Congress should restore robust environmental review under NEPA for oil and gas leasing by codifying sections of the Obama administration’s BLM Instruction Memorandum No. 2010-117, including a requirement that all lease sales have parcel-specific NEPA compliance. To ensure compliance with existing environmental rules and safeguards, Congress should direct DOI to hire sufficient staff for enforcement, inspection, and compliance and provide adequate funding to support this directive.

Recommendation: Congress should require oil and gas operators on public lands to conduct baseline water testing and public disclosure, submit a water management plan to BLM, and replace water supplies when oil and gas operations negatively affect water quality or quantity.

Committee of Jurisdiction: Natural Resources

Building Block: Restore Public Participation and Comment in Oil and Gas Leasing Decisions

The Trump administration has taken steps to reduce public participation in the decision-making process regarding oil and gas development and public lands management. Some of these policy reforms include shortening public comment periods, cutting protest period times, and making opportunities for public participation optional during the NEPA review process.¹⁵⁵³

Rep. Mike Levin (D-CA) introduced H.R. 3225, the Restoring Community Input and Public Protections in Oil and Gas Leasing Act of 2019, which would undo actions taken by the Trump administration to cut public participation in oil and gas leasing decisions and shorten public comment periods. Additionally, the legislation would require a surface use agreement between the oil and gas operator and the surface landowner, if not the federal government, that includes environmental safeguards

¹⁵⁵² Ibid.

¹⁵⁵³ Bureau of Land Management, IM 2018-034, “Updating Oil and Gas Leasing Reform – Land Use Planning and Lease Parcel Reviews” (January 31, 2018), <https://www.blm.gov/policy/im-2018-034>.

such as a requirement that the operator pay damages to the landowner if the site is not properly reclaimed.

Recommendation: Congress should restore robust public participation in oil and gas leasing decisions and provide protections for surface landowners.

Committee of Jurisdiction: Natural Resources

Building Block: Increase Oil and Gas Bonding and Fees to Hold Industry Accountable for Cleanup and Reclamation and End Self-Bonding in the Coal Industry

Before an oil and gas company can drill on federal lands, it must post a bond to cover the costs of cleanup and reclamation when the well stops producing or is no longer in use.¹⁵⁵⁴ If the operator's bond is not sufficient to cover the reclamation costs, the well becomes orphaned.¹⁵⁵⁵ The minimum nationwide bond requirement, which was set in 1951 and has not been updated since, allows a company to secure a nationwide bond for all its oil and gas wells on public lands for just \$150,000.¹⁵⁵⁶ Such a minuscule bond is often inadequate to cover the costs of cleanup and reclamation of oil and gas wells. If adjusted to 2016 dollars, nationwide bond requirements would be more than \$1.1 million.¹⁵⁵⁷

Additionally, under current law, coal companies can practice "self-bonding," which allows them to pledge to cover future mine reclamation and restoration costs without putting up sureties or collateral. In 2015-2016, Alpha Natural Resources, Arch Coal, and Peabody Energy filed for bankruptcy and left \$2.3 billion in outstanding self-bonds and taxpayers on the hook for reclamation costs.¹⁵⁵⁸ Companies such as these must be held accountable for the cleanup of their orphaned mines and not discharge this liability to federal and state taxpayers.

Rep. Alan Lowenthal (D-CA) introduced H.R. 4346, the Bonding Reform and Taxpayer Protection Act of 2019. House Democrats included this bill in Section 84102 of their infrastructure package, H.R. 2, the Moving Forward Act. The bill would increase the bond amounts that oil and gas developers must post before being allowed to drill on public land, and update amounts regularly for inflation. The legislation would increase the bond amount for an individual lease from \$10,000 to \$50,000; the amount for all of an operator's wells in a state from \$25,000 to \$250,000; and the amount for all of an operator's wells nationwide from \$150,000 to \$1 million. The bill would also require oil and gas companies to develop and present a reclamation plan to BLM before any development can occur on leased public land.

¹⁵⁵⁴ 30 U.S.C. § 226(g); Government Accountability Office, GAO-18-250, *Oil and Gas Wells: Bureau of Land Management Needs to Improve its Data and Oversight of Its Potential Liabilities* (May 2018): 2.

¹⁵⁵⁵ Ibid.

¹⁵⁵⁶ Ibid at 29.

¹⁵⁵⁷ Ibid.

¹⁵⁵⁸ Office of Congressman Matt Cartwright, "Press Release: Cartwright, Dingell Introduce Bill to Protect American Taxpayers, Clean Up Coal Mines" (September 20, 2019), <https://cartwright.house.gov/media-center/press-releases/cartwright-dingell-introduce-bill-to-protect-american-taxpayers-clean-up>.

Reps. Matt Cartwright (D-PA) and Debbie Dingell (D-MI) introduced H.R. 4435, the Coal Cleanup Taxpayer Protection Act of 2019, to end coal company self-bonding and establish guardrails around other forms of bonding.

Recommendation: Congress should increase the amount of the bonds that oil and gas developers must post before being allowed to drill on public land, incorporate consideration of the number of wells on each bond and their characteristics, and mandate that bond amounts be indexed to inflation on a continuing basis. Additionally, Congress should require oil and gas companies to develop interim and final reclamation plans for any oil and gas wells on public land.

Recommendation: Congress should establish an annual fee on oil and gas wells that have not been in production for one or more years and have not been permanently plugged and remediated. The fee should sufficiently incentivize operators to timely and permanently close and remediate idle wells.

Recommendation: Congress should pass legislation to end self-bonding in the coal industry, increase bonds to meet the cost of remediation in present dollars, and regulate other forms of bonding to prevent abuse.

Committee of Jurisdiction: Natural Resources

Building Block: Invest in Orphaned Oil and Gas Well Reclamation and Remediation on Federal and Nonfederal Lands

When oil and gas operators abandon wells, they become “orphaned,” leaving taxpayers responsible for the costs of reclamation. Improperly plugged and unreclaimed wells can leak oil, brine, and methane, contaminating groundwater and contributing to the climate crisis. The exact number of abandoned and orphaned wells is unknown, but BLM has identified more than 200 orphaned wells on federal lands.¹⁵⁵⁹ States have reported more than 56,000 documented orphaned wells and estimated the number of undocumented orphaned wells is between 210,000 and 746,000.¹⁵⁶⁰ The EPA estimates that more than 3 million abandoned and/or orphaned wells litter the country in total.¹⁵⁶¹

Abandoned wells can leak greenhouse gases into the atmosphere; when well sites are restored to natural landscapes, however, the reclaimed lands act as natural carbon sinks, storing carbon in roots and soils. A federal program to reclaim and restore abandoned wells across the country can serve as a solution to the climate crisis while also providing high-quality jobs.

Section 84101 of the House Democrats’ infrastructure bill, H.R. 2, the Moving Forward Act, would establish a federal orphaned well remediation program and authorize \$2 billion over five years to remediate, reclaim, and close orphaned oil and gas wells on federal, tribal, state, and private lands.

¹⁵⁵⁹ Government Accountability Office, GAO-18-250, *Oil and Gas Wells: Bureau of Land Management Needs to Improve its Data and Oversight of Its Potential Liabilities* (May 2018): 14.

¹⁵⁶⁰ Interstate Oil & Gas Compact Commission, *Idle and Orphan Oil and Gas Wells: State and Provincial Regulatory Strategies* (2019): 12-14.

¹⁵⁶¹ U.S. Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2016: Abandoned Oil and Gas Wells* (April 2018), https://www.epa.gov/sites/production/files/2018-04/documents/ghgemissions_abandoned_wells.pdf at 3.

Recommendation: Congress should establish a reclamation fund to remediate and reclaim orphaned oil and gas wells. This program should provide funding for federal land management agencies to remediate and reclaim orphaned wells on public lands and waters as well as for states, tribes, and territories to remediate and reclaim orphaned wells on state, private, tribal, and territorial lands. Additionally, this program should establish strong reclamation standards for abandoned well sites both onshore and offshore and prioritize climate and biodiversity benefits.

Recommendation: BLM's inspection and enforcement program is responsible for ensuring safe and responsible resource development, including stopping methane leaks, spills, and unsafe drilling and mining practices. Congress should increase funding for BLM's inspection and enforcement efforts, which should include detecting and inventorying abandoned and orphaned wells on public lands. Congress should direct DOI to establish a database and maps of all identified wells and prioritize reclamation efforts. Additionally, Congress should provide funding to state and territorial oil and gas regulatory offices and agencies for inspection, enforcement, and detection efforts within their jurisdictions.

Committee of Jurisdiction: Natural Resources

Invest in State and Local Communities in Economic Transition

Some states, counties, and communities are reliant on fossil fuel extraction for jobs and revenue. Any plan to achieve net-zero emissions on public lands must include a robust economic transition plan for these communities.

Building Block: Assist Historically Fossil Fuel-Dependent States, Communities, and Workers During the Economic Transition

States receive revenue from oil and gas drilling on public lands through royalties, bonus bids, and other rental fees. Onshore, approximately half of the revenues collected from oil and gas development go to the states where the extraction occurs.¹⁵⁶² Offshore, states typically receive either 27%¹⁵⁶³ or 37.5%¹⁵⁶⁴ of the revenue, depending on where the lease is located, with states receiving higher portions of the revenue for far offshore leases in the Gulf and smaller portions of the revenue for near offshore leases. These revenues often undergird state budgets, provide funding for public schools and other public services, and can generate budget surpluses when oil prices are high.

Chair Raúl Grijalva (D-AZ) introduced H.R. 5435, the American Public Lands and Waters Climate Solution Act of 2019, which would establish the Federal Energy Transition Economic Development Assistance Fund. The bill fills the fund by increasing royalty rates and implementing an annual Conservation of Resources Fee of \$4 per acre on producing onshore and offshore oil and gas leases and an annual Speculative Leasing Fee of \$6 per acre on nonproducing onshore and offshore oil and

¹⁵⁶² The Mineral Leasing Act, 30 USC § 191; CBO, *Options for Increasing Federal Income from Crude Oil and Natural Gas on Federal Lands* (April 2016): 8-9.

¹⁵⁶³ Outer Continental Shelf Lands Act, 43 U.S.C. § 1337; CBO, *Options for Increasing Federal Income from Crude Oil and Natural Gas on Federal Lands* (April 2016): 8-9.

¹⁵⁶⁴ Gulf of Mexico Energy Security Act, 43 U.S.C. § 1331; CBO, *Options for Increasing Federal Income from Crude Oil and Natural Gas on Federal Lands* (April 2016): 8-9.

gas leases. In addition to these fees, half of all additional royalties collected would be deposited into the transition fund, with the other half going back to the states where the production occurred. Funds could be used for a variety of initiatives, including building partnerships to attract and invest in the economic future of historically fossil fuel-dependent communities; guaranteeing pensions and retirement security; providing education, retraining, and retooling support for individuals and communities; providing a bridge of wage support until a displaced worker either finds employment or reaches retirement; and environmental remediation of lands and waters impacted by fossil fuel extraction and mining. The legislation would also establish a Just Transition Advisory Committee to assist in the management and allocation of the transition funds.

In the section titled “Invest in America’s Workers and Build a Fairer Economy,” this report outlines recommendations and policies to ensure America’s workforce benefits from the transition away from fossil fuels and toward a clean economy.

Recommendation: Congress should provide financial and technical assistance to states, communities, and workers in order to transition away from fossil fuel extraction on public lands. This transition assistance should include:

- (1) establishing a transition fund, using revenues and fees from fossil fuel extraction on public lands, for economic development and transition initiatives for states, communities, and workers;
- (2) providing energy-producing states the option of a buyout, in which the federal government offers these states a one-time cash payout based on projected revenues from future oil and gas extraction on federal lands located within the state over a specified number of years and, in exchange, all future leasing and production revenue generated on public lands in that state would be directed to the federal government;
- (3) for states that do not opt for a buyout, developing a state fund matching program in which states have the option to deposit revenues from existing fossil fuel extraction activity into a “rainy day” fund, which the federal government would match, to aid in the transition away from fossil fuel development;
- (4) prioritizing renewable energy development, forest and natural space restoration, and carbon sequestration projects on federal lands in states that have the most fossil fuel extraction on public lands; and
- (5) directing the relevant federal agencies to provide technical assistance to communities in developing plans to transition local economies away from fossil fuel extraction on public lands and waters.

Committees of Jurisdiction: Natural Resources; Education and Labor

Building Block: Reward State and Local Governments and Communities for Climate and Ecosystems Benefits Provided by Public Lands

Federal lands cannot be taxed by state or local governments.¹⁵⁶⁵ Because local governments’ discretionary budgets often come in large part from property or sales taxes, the inability to tax federal lands can significantly affect the revenues of those counties and localities. Congress created the

¹⁵⁶⁵ Congressional Research Service, CRS RL31392, *PILT (Payments in Lieu of Taxes): Somewhat Simplified* (October 5, 2017).

Payments in Lieu of Taxes (PILT) program to provide compensation to local jurisdictions that contain federal land to make up for the losses in property taxes.¹⁵⁶⁶

Similarly, the Secure Rural Schools and Community Self-Determination Act of 2000 (SRS) provides funding for more than 775 rural counties and 4,400 schools located near national forests across the United States.¹⁵⁶⁷ Counties with national forest lands or certain BLM lands have historically received a percentage of agency revenues; however, when timber revenue began to decline in the 1990s, Congress enacted the SRS program to provide temporary funding to supplement the agency revenue-sharing programs for schools, roads, and services.¹⁵⁶⁸

Federal lands and forests provide a public benefit through carbon storage, climate resilience, ecosystems services, and outdoor recreation. States and counties with federal lands, however, do not receive compensation for the public benefits they offer.

Rep. Ann Kirkpatrick (D-AZ) introduced H.R. 3043, the Permanently Authorizing PILT Act, which would permanently reauthorize the Payment in Lieu of Taxes Program. Rep. Joe Neguse (D-CO) introduced H.R. 3048, to extend the Secure Rural Schools and Community Self-Determination Act of 2000, which would extend SRS through FY2020. This bill was signed into law in December 2019, securing payments through April of 2021.

Recommendation: In addition to extending the Secure Rural Schools and Community Self-Determination Act beyond 2021, Congress should reauthorize the PILT program.

Recommendation: Congress should build upon PILT and SRS to provide state and local governments with increased funding based on the amount of conserved and protected intact public lands and forests within their jurisdiction to fairly compensate these governments for providing climate benefits, ecosystems services, outdoor recreation opportunities, and other public benefits. Congress should structure these programs to encourage greater stewardship of public lands and waters and provide additional incentives for communities that conduct collaborative processes with adjacent states, communities, and federal jurisdictions to plan restoration.

Committee of Jurisdiction: Natural Resources

¹⁵⁶⁶ Ibid.

¹⁵⁶⁷ U.S. Senate Committee on Energy & Natural Resources, “Cantwell: We Must Support Our Rural Communities” (May 2, 2017), <https://www.energy.senate.gov/public/index.cfm/2017/5/cantwell-we-must-support-our-rural-communities>; Office of Congressman Peter DeFazio, “Press Release: DeFazio Leads Bipartisan Effort to Extend Secure Rural Schools Program” (October 22, 2019), <https://defazio.house.gov/media-center/press-releases/defazio-leads-bipartisan-effort-to-extend-secure-rural-schools-program>.

¹⁵⁶⁸ Congressional Research Service, CRS R41303, *Reauthorizing the Secure Rural Schools and Community Self-Determination Act of 2000* (April 21, 2020): 1.

CONFRONT CLIMATE RISKS TO AMERICA'S NATIONAL SECURITY

In February 2020, a panel of national security, military, and intelligence experts from the Center for Climate and Security released a comprehensive report warning of high-to-catastrophic threats to security environments, infrastructure, and institutions from unmitigated climate change and its impacts. These experts looked at multiple threats to each region of the world, including social and political instability and risks to U.S. military missions and infrastructure. They concluded that “even at scenarios of low warming, each region of the world will face severe risks to national and global security in the next three decades. Higher levels of warming will pose catastrophic, and likely irreversible, global security risks over the course of the 21st century.”¹⁵⁶⁹ This new report reiterates what many national security experts have been saying for more than a decade: Climate change poses a national security threat to the United States and its interests abroad.¹⁵⁷⁰

This section identifies specific ways Congress can mitigate these risks to national security while simultaneously acting aggressively to achieve a net-zero economy by 2050.

Advance Climate Resilience and Preparedness for a Strong National Defense

The Department of Defense (DOD) maintains approximately 585,000 facilities located on 4,775 sites worldwide.¹⁵⁷¹ DOD real property is worth more than \$1.2 trillion and is critical to U.S. national security.¹⁵⁷² Increasing extreme weather, rising sea levels, and the associated global instability tied to these events are all consequences of climate change that can threaten DOD infrastructure and the well-being of service members, their families, and veterans. DOD has recognized the threat of climate change in National Defense Strategies and Quadrennial Defense Reviews since the George W. Bush administration.¹⁵⁷³

The National Defense Authorization Act (NDAA) for FY2018 required the DOD to report on the effects of climate change on the Department's operations.¹⁵⁷⁴ In the findings associated with this requirement, then-Secretary of Defense James Mattis is quoted, stating, “I agree that the effects of a changing

¹⁵⁶⁹ The National Security, Military, and Intelligence Panel on Climate Change, *A Security Threat Assessment of Global Climate Change* (The Center for Climate and Security, 2020).

¹⁵⁷⁰ See, for example, *National Security and the Threat of Climate Change* (The CNA Corporation, 2007).

¹⁵⁷¹ The term “facilities” include buildings, structures, and linear structures. U.S. Department of Defense, *Base Structure Report – Fiscal Year 2018 Baseline, A Summary of the Real Property Inventory Data* (2018), at p. DoD - 2.

¹⁵⁷² Government Accountability Office, GAO-19-453, *Climate Resilience: DOD Needs to Assess Risk and Provide Guidance on Use of Climate Projections in Installation Master Plans and Facilities Designs* (June 2019).

¹⁵⁷³ U.S. Department of Defense, *National Defense Strategy* (June 2008); U.S. Department of Defense, *Quadrennial Defense Review Report* (February 2010); U.S. Department of Defense, *Quadrennial Defense Review 2014* (March 2014); U.S. Department of Defense, Office of the Under Secretary of Defense for Acquisition and Sustainment, *Report on Effects of a Changing Climate to the Department of Defense* (January 2019); Brig. Gen. Stephen A. Cheney, *Witness Testimony of Stephen A. Cheney to U.S. House Committee on Financial Services* (September 11, 2019).

¹⁵⁷⁴ NDAA for Fiscal Year 2018, Pub L No 115-91. Sec. 335. Report on Effects of Climate Change on Department of Defense.

climate—such as increased maritime access to the Arctic, rising sea levels, desertification, among others—impact our security situation.”¹⁵⁷⁵ Similarly, the Office of the Director of National Intelligence has stated, “Many countries will encounter climate-induced disruptions—such as weather-related disasters, drought, famine, or damage to infrastructure—that stress their capacity to respond, cope with, or adapt. Climate-related impacts will also contribute to increased migration, which can be particularly disruptive if, for example, demand for food and shelter outstrips the resources available to assist those in need.”¹⁵⁷⁶ Citing the concerns of these and other Defense leaders, the provision expressed the sense of Congress that “climate change is a direct threat to the national security of the United States.” DOD delivered the required report in January of 2019. Acknowledging that the “effects of a changing climate are a national security issue with potential impacts to [DOD] missions, operational plans, and installations,”¹⁵⁷⁷ the report noted that about two-thirds of the 79 installations reviewed are vulnerable to flooding, more than half are vulnerable to drought, and roughly half are vulnerable to wildfires.¹⁵⁷⁸

In 2018, the risk to military installations from increasingly extreme weather events caused by climate change came into stark relief. Hurricane Florence caused \$3.6 billion in damage to Camp Lejeune and other Marine Corps facilities in North Carolina, and Hurricane Michael caused \$3 billion in damage to Tyndall Air Force Base in Florida.¹⁵⁷⁹ The Fourth National Climate Assessment highlighted flooding, storm surge, drought, and wildfires as significant climate-related threats to military installations.¹⁵⁸⁰ In June 2019, the Government Accountability Office (GAO) found that, despite exemplary efforts in specific cases, DOD installations have not systematically addressed climate threats.¹⁵⁸¹ GAO recommended that DOD issue guidance on addressing climate risks in its installation master plans, including the use of climate projections in facility siting and design.¹⁵⁸² GAO has also recommended that DOD systematically track the costs associated with extreme weather events and climate change effects on their installations, facilities, and operations.¹⁵⁸³

Mindful of these costs, building on the work of previous NDAs that focused on building energy resilience through master planning and authorities that encourage public-private partnership to achieve conservation gains and energy resilience, the enacted NDAA for FY2020 levied significant requirements on DOD to address the costs and impacts of climate change on installation resilience.¹⁵⁸⁴ The FY2020 NDAA requires DOD to develop installation master plans that assess and plan for mitigating the risks to installations from extreme weather and other climate impacts, including sea

¹⁵⁷⁵ Ibid.

¹⁵⁷⁶ Ibid.

¹⁵⁷⁷ U.S. Department of Defense, Office of the Under Secretary of Defense for Acquisition and Sustainment, *Report on Effects of a Changing Climate to the Department of Defense* (January 2019) at 2.

¹⁵⁷⁸ Ibid. at 16.

¹⁵⁷⁹ Government Accountability Office, GAO-19-157SP, *High-Risk Series: Substantial Efforts Needed to Achieve Greater Progress on High Risk Areas* (March 2019).

¹⁵⁸⁰ U.S. Global Change Research Program, *Fourth National Climate Assessment, Volume II* (November 2018), Chapter 16.

¹⁵⁸¹ Government Accountability Office, GAO-19-453, *Climate Resilience: DOD Needs to Assess Risk and Provide Guidance on Use of Climate Projections in Installation Master Plans and Facilities Designs* (June 2019).

¹⁵⁸² Ibid.

¹⁵⁸³ Government Accountability Office, GAO-18-206, *Climate Change Adaptation: DOD Needs to Better Incorporate Adaptation into Planning and Collaboration at Overseas Installations* (November 2017).

¹⁵⁸⁴ NDAA for Fiscal Year 2020, H. Rept. 116-333 (116th Congress), <https://www.congress.gov/116/crp/116hrpt333/CRPT-116hrpt333.pdf>, Secs. 326, 327, 328, and 2801.

level rise, flooding, and wildfires, and to prepare an annual report of completed master plans. To reinforce the importance of master planning for climate resilience, the NDAA also limits DOD's ability to spend planning and design funds for military construction projects in FY2020 until it initiates the process of updating the building standards for military construction for energy and climate resilience at military installations. Further, the Secretary of Defense or Secretary of a military department must certify that all proposals for future military construction projects consider potential long-term changes in environmental conditions and increasingly frequent extreme weather events.¹⁵⁸⁵

In addition, the FY2020 NDAA requires the DOD to deploy a climate risk assessment tool to aid facility planners; assess the feasibility of a climate change-focused model for sea level rise to quantify flood risk; create a direct air capture and blue carbon removal research and development program; and to begin to budget for the mitigation of effects of extreme weather on military networks, systems, installations, facilities, and other assets and capabilities of the Department in a dedicated budget line.¹⁵⁸⁶ Finally, the NDAA also expressed strong support for the DOD's Energy Resiliency and Conservation Investment Program, which supports infrastructure investments targeted at improving the energy resilience, efficiency, and conservation of military facilities. The FY2020 NDAA authorized a total of \$283 million, \$133 million above the budget request, to increase the use of this program.¹⁵⁸⁷

This section identifies ways that DOD can further address climate risks to its missions and readiness, while enhancing collaboration among military installation commanders and neighboring communities.

Building Block: Require That DOD Installations Coordinate with Local Communities on Climate Planning

Military installations are often deeply embedded in their local communities, which provide essential support for military installation access, operations, supplies, and personnel.¹⁵⁸⁸ State, tribal, territorial, and local jurisdictions that host military installations are required to prepare Hazard Mitigation Plans that are approved by the Federal Emergency Management Agency (FEMA) as a precondition for federal disaster aid. Installation commanders and planners may coordinate with adjacent SLTT governments to develop Hazard Mitigation Plans that address climate-related risks to their facilities, but currently they are not required to do so. Additionally, GAO has found that DOD has made little progress in its efforts to identify and address environmental justice issues, acknowledging that it has not prioritized environmental justice efforts.¹⁵⁸⁹

Recommendation: Congress should direct DOD to require that domestic military installations coordinate their resilience planning with hazard mitigation and climate resilience planning by state, tribal, territorial, and local governments adjacent to and within commuting distance of their facilities.

¹⁵⁸⁵ Ibid., Secs. 2801a, 2801b, 2804, and 2805.

¹⁵⁸⁶ Ibid., Secs. 326, 2806, 223, and 328.

¹⁵⁸⁷ Ibid., Sec. 2402; U.S. Department of Defense, *Department of Defense Budget Fiscal Year 2020: Construction Programs* (C-1) (March 2019), https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2020/fy2020_c1.pdf.

¹⁵⁸⁸ Maria McCollester, Michelle E. Miro, and Kristin Van Abel, *Building Resilience Together: Military and Local Government Collaboration for Climate Adaptation* (RAND Corporation, 2020).

¹⁵⁸⁹ GAO, GAO-19-543, *Environmental Justice: Federal Efforts Need Better Planning, Coordination, and Methods to Assess Progress* (September 2019).

DOD also should coordinate with stakeholders, including environmental justice communities and other community organizations where installation plans and activities affect community resources, such as drainage or environmental impact. FEMA should only approve Hazard Mitigation Plans that include such coordination.

Committees of Jurisdiction: Armed Services; Transportation and Infrastructure

Building Block: Require Consideration of Climate Risk in DOD Procurement, Logistics, and Supply Chain Management

The DOD spends more than \$300 billion per year on federal contracts for goods and services, including weapons, vehicles, food, uniforms, and operational support.¹⁵⁹⁰ Contractor support to logistics and supply chains is thus critical to U.S. national defense.

In 2016, DOD issued DOD Directive 4715.21 to identify and consider “the risks climate change poses to logistics infrastructure, materiel acquisition and supply (including critical suppliers and critical components), key transportation modes and routes, and storage and stockpile activities.”¹⁵⁹¹

In 2019, Rep. Veronica Escobar (D-TX) and Sen. Elizabeth Warren (D-MA) introduced the Department of Defense Climate Resiliency and Readiness Act (H.R. 2759/S. 1498). This bill includes provisions for DOD to consider climate risks in its procurement processes, including relevant corporate governance and energy efficiency practices for contractors.¹⁵⁹²

Recommendation: Congress should codify DOD Directive 4715.21 to ensure DOD has the authority and resources necessary to adapt current and future procurement, logistics, and supply chain management operations to address the impacts of climate change. Contractors must be required to evaluate climate change risks.

Recommendation: Congress should re-establish the position of Assistant Secretary of Defense for Energy, Installations, and Environment to ensure integrated and synergistic development of policies related to climate resilience and direct DOD to update the 2014 Climate Change Adaptation Roadmap. Strategic decisions regarding military installations must consider risks associated with climate change.

Recommendation: Congress should direct GAO to review DOD’s compliance with the climate mitigation and adaptation provisions of the FY2020 NDAA, including measures instituting master planning and calling for updates to the Unified Facilities Criteria to promote military installation energy and climate resiliency.

Committee of Jurisdiction: Armed Services

¹⁵⁹⁰ Congressional Research Service, *Defense Acquisitions: How and Where DOD Spends Its Contracting Dollars* (July 2018).

¹⁵⁹¹ U.S. Department of Defense Directive 4715.21, *Climate Change Adaptation and Resilience* (January 14, 2016; updated August 31, 2018).

¹⁵⁹² Sec. 6. Climate-conscious Contracting of Department of Defense.

Prepare for the Security Impacts of Climate Change

Climate change threatens our nation's security, both inside and outside our borders. Intensifying extreme weather events increase the risk of massive suffering and hardship. These shocks could destabilize communities, threaten the financial system, and expose the federal government to massive unplanned spending. Developing countries are especially ill-prepared to face the impacts of climate change. The resulting humanitarian and refugee crises, if unchecked, have the potential to become national security threats.

Building Block: Require the Department of Homeland Security and FEMA to Plan for Climate Risks

The Department of Homeland Security (DHS) is responsible for protecting the nation from risks within our borders. The 2013 DHS Climate Action Plan identifies major climate-related homeland security challenges.¹⁵⁹³ These include protecting critical infrastructure, preparing for disease outbreaks, and managing disaster aid. DHS has not updated its Climate Action Plan since it issued an addendum in 2014.

Within DHS, FEMA is the key entity for supporting pre-disaster preparedness and post-disaster aid. Effectively deployed, FEMA assistance and insurance programs can help reduce the negative impacts of disasters. However, GAO has noted that a lack of clear and decisive leadership has hampered FEMA's ability to prepare for and respond quickly to major disaster events.¹⁵⁹⁴ GAO also has concluded that spiraling costs of disaster recovery are a major fiscal risk for the federal government, and particularly for agencies like FEMA.¹⁵⁹⁵ The current FEMA strategic plan does not even mention climate-related risks.¹⁵⁹⁶

Rep. Yvette Clarke (D-NY) introduced the FEMA Climate Change Preparedness Act (H.R. 4823). This bill would require FEMA to explicitly address climate change threats in its strategic planning. Rep. Clarke also introduced the Department of Homeland Security Climate Change Research Act (H.R. 4737). This bill, which passed the House on February 10, 2020, would require the DHS Under Secretary for Science and Technology to evaluate federal research addressing the effects of climate change on homeland security. The bill focuses primarily on climate change impacts on terrorist threats and natural disasters. It does not address some other major homeland security concerns, including critical infrastructure, public health, infectious disease, and water and food security.

Recommendation: Congress should direct DHS to investigate and report to the Congress within two years on the implications of climate impacts to domestic security and the homeland, including safeguarding critical infrastructure, protecting public health, combating infectious disease, securing

¹⁵⁹³ U.S. Department of Homeland Security, *DHS Climate Action Plan* (September 2013); DHS, *DHS Climate Action Plan Addendum* (June 2014).

¹⁵⁹⁴ Government Accountability Office, GAO-06-365R, *Statement by Comptroller General David M. Walker on GAO's Preliminary Observations Regarding Preparedness and Response to Hurricanes Katrina and Rita* (February 2006).

¹⁵⁹⁵ Government Accountability Office, GAO-19-157SP, *High-Risk Series: Substantial Efforts Needed to Achieve Greater Progress on High Risk Areas* (March 2019).

¹⁵⁹⁶ FEMA, *FEMA 2018-2022 Strategic Plan* (March 2018).

water and food, and preparing the homeland for internal and cross-border migration driven by climate change.

Recommendation: Congress should require FEMA strategic planning to explicitly account for climate-related risks in its mission areas. These include identifying the increased concentration of populations in and around high-risk areas, advancing interagency coordination through the Mitigation Framework Leadership Group (MitFLG), and ensuring that the emergency management community adapts policies and practices to strengthen risk identification, mitigation, and emergency response and disaster recovery.

Committees of Jurisdiction: Homeland Security; Transportation and Infrastructure

Building Block: Enhance Interagency Coordination on Climate Risk and National Security

A 2016 Presidential Memorandum established a Climate and National Security Working Group, with participation of 20 federal agencies, to identify U.S. national security priorities related to climate change.¹⁵⁹⁷ President Trump revoked this 2016 Presidential Memorandum in 2017.

Rep. Stephen Lynch (D-MA) introduced the Climate Change National Security Strategy Act of 2019 (H.R. 1201), which would reestablish the Climate and National Security Working Group and authorize it to work in close collaboration with the U.S. Global Change Research Program (USGCRP) to fulfill its mission.

The enacted FY2020 NDAA takes the first step to reestablish interagency coordination on climate risk and national security through the creation of a Climate Security Advisory Council (CSAC).¹⁵⁹⁸ Composed primarily of U.S. intelligence officials from the Central Intelligence Agency (CIA), the Department of State, the National Geospatial-Intelligence Agency, the Department of Energy (DOE), and DOD, the CSAC will assess global security implications of climate change and facilitate exchange of relevant climate information across agencies. The CSAC's success requires strong coordination among the intelligence, diplomatic, development, and research capabilities within the U.S. government. However, the enacted NDAA does not mandate the participation of specific federal science agencies; instead, it requires only the inclusion of three unspecified federal civilian officials with climate expertise in the CSAC. Thus, compared to the previous Climate and National Security Working Group, CSAC may lack the civilian climate science expertise it needs to fully assess climate-related national security risks.

Recommendation: Congress should authorize the USGCRP to support the CSAC's mission to assess the global security implications of climate change and facilitate the exchange of relevant climate information. Congress also should direct the USGCRP to engage the climate science and policy-related capacities and capabilities of the National Academies of Sciences, Engineering, and Medicine to support the CSAC's mission. In addition, Congress should direct federal civilian science agencies to appoint high-level officials to CSAC, including representatives from the Department of Interior, the Department of Agriculture, the Department of Commerce, the Department of Health and Human

¹⁵⁹⁷ The White House, *Presidential Memorandum 568: Climate Change and National Security* (September 2016).

¹⁵⁹⁸ NDAA for FY2020, H. Rept. 116-333 (116th Congress), Sec. 5321. Establishment of Climate Advisory Council.

Services, DHS, the U.S. Environmental Protection Agency (EPA), and the National Aeronautics and Space Administration (NASA).

Committees of Jurisdiction: Intelligence; Foreign Affairs; Science, Space, and Technology

Building Block: Incorporate Climate Change Information for Stress Testing in National Security Planning

The 2019 National Intelligence Strategy acknowledges that increasing migration and urbanization of populations can strain the capacities of governments, and the climate crisis can be a source of additional pressure.¹⁵⁹⁹ The intelligence community already engages in stress testing to consider the ability of foreign governments and societies to withstand various kinds of social, economic, and political stresses to help identify potential national security threats. By incorporating the potentially disruptive conjunctions of climate risks, socioeconomic issues, and political conditions into periodic stress tests, the intelligence community could better inform national security decision-makers to prioritize high-risk areas for efforts to reduce risk or to improve resilience. Stress testing could be applied to countries or regions of particular security concern, or to global systems that meet critical needs such as food supply systems, global public health systems, and supply chains for critical materials and disaster relief. To support this stress testing, the availability of relevant and actionable climate change information is essential. While a tremendous amount of such climate change information exists, there are few protocols and platforms for the incorporation of this information into national security analysis and policy.¹⁶⁰⁰

Several members of Congress introduced bills in the 116th Congress to ensure national security planning includes consideration of climate risks. Rep. Veronica Escobar (D-TX) and Sen. Elizabeth Warren (D-MA) introduced the Department of Defense Climate Resiliency and Readiness Act (H.R. 2759/S. 1498), which includes a provision requiring the DOD to consider climate change in its broader planning and defense strategy.¹⁶⁰¹ Rep. Denny Heck (D-WA) introduced the Climate Security Intelligence Act of 2019 (H.R. 3110), which would establish a Climate Security Intelligence Center within the Office of the Director of National Intelligence. Rep. Joe Neguse (D-CO) introduced the Climate Readiness Act of 2020 (H.R. 6119), which would require the Secretary of Defense to prepare a report to Congress on the national security implications associated with the climate crisis and strategies for response. The report would provide an overview of how the climate crisis may affect U.S. Armed Forces missions, global conflicts, and geopolitical instability, along with recommendations to address national security threats.

Recommendation: Congress should direct the Climate Security Advisory Council to oversee periodic, scenario-based stress testing of countries, regions, and critical systems to measure their ability to cope with potentially disruptive climate events of concern. Stress tests should include scenarios with potentially disruptive interactions between climate events and social, economic, and political conditions. Stress test findings related to vulnerabilities and data collection needs should inform interagency research and development priorities.

¹⁵⁹⁹ Office of the Director of National Intelligence, *National Intelligence Strategy of the United States* (2019).

¹⁶⁰⁰ National Research Council, *Climate and Social Stress: Implications for Security Analysis* (National Academies Press, 2013).

¹⁶⁰¹ Sec. 9. Incorporation of Climate Resiliency into Existing Strategies of the Department of Defense.

Recommendation: Congress should task the Climate Security Advisory Council with developing a strategy and procedures to connect the research, development, and analysis capabilities present in unclassified environments to support the full range of national security assessments needed by the intelligence community. Possible unclassified partners include universities, national labs, federal agencies, and the private sector.

Recommendation: Congress should require DOD to prepare a comprehensive update to the 2014 Climate Change Adaptation Roadmap and report their findings to Congress. This update should include analysis on the effects of the climate crisis on U.S. national security, Armed Forces missions, global conflicts, and geopolitical instability, as well as recommendations to address national security threats that may be exacerbated by the climate crisis.

Committees of Jurisdiction: Armed Services; Intelligence

RESTORE AMERICA'S LEADERSHIP ON THE INTERNATIONAL STAGE

American leadership in international engagement is crucial to addressing the climate crisis. The opportunity to advance climate solutions must be a priority for the United States in our multilateral, bilateral, international development, and humanitarian efforts. The consequences of climate change are dire for vulnerable people and countries around the world, exacerbating pre-existing challenges such as food insecurity and competition for land, water, and natural resources. These in turn increase the danger of humanitarian crises and the risk of conflicts, threatening regional and global security. Helping to advance climate solutions globally will enhance American national security. By supporting climate-smart development and partnering with countries on climate solutions, the United States can help countries address their own circumstances and foster partnerships that have security and economic benefits for all.

In December 2015, Paris was the scene of an international climate breakthrough. After years of trying, the countries of the world finally negotiated a climate agreement genuinely applicable to all. The key to the Paris Climate Agreement is that each country determines how they can best contribute to solving the climate crisis and provides a mechanism for the reporting and verification of these contributions. The agreement's structure anticipates countries raising their ambition to meet the global goal of "holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels."¹⁶⁰² The Paris Outcome Statement also acknowledges the contributions that sub-national governments, businesses, and civil-society can make to reinforce global climate action.¹⁶⁰³ This historic international agreement brought more than 190 countries together to find clean energy and climate solutions to help avert catastrophic climate consequences and to respond to the impacts that are already apparent. President Trump called for the withdrawal of the United States from the Paris Climate Agreement, and in November 2019, Secretary of State Pompeo initiated the one-year withdrawal process.¹⁶⁰⁴ Effective November 4, 2020, the United States will be the only country not participating in the Paris Climate Agreement.¹⁶⁰⁵

America played a critical role in the successful negotiation of the Paris Climate Agreement, and President Trump's plan to withdraw from it undermines our global leadership. With a bipartisan vote in May 2019, the House of Representatives confirmed the importance of keeping America in the Paris Agreement by passing H.R. 9, the Climate Action Now Act. There is far-reaching support for the Paris Agreement from state, local, and tribal elected officials, business leaders, and consumer, health, and labor organizations. More than 2,000 businesses and investors, 289 cities and counties, and 10 states

¹⁶⁰² United Nations, *Report of the Conference of the Parties on its twenty-first session, held in Paris from 30 November to 13 December 2015* (January 29, 2016).

¹⁶⁰³ Ibid.

¹⁶⁰⁴ U.S. Department of State, "On the U.S. Withdrawal from the Paris Agreement," November 4, 2019, <https://www.state.gov/on-the-u-s-withdrawal-from-the-paris-agreement/>.

¹⁶⁰⁵ Niall McCarthy, Forbes, "As the U.S. withdrawals, which countries are participating in the Paris Climate Agreement?", November 6, 2019, <https://www.forbes.com/sites/niallmccarthy/2019/11/06/as-the-us-withdraws-which-countries-are-participating-in-the-paris-climate-agreement-infographic/#7e25754a38f0>.

have independently pledged to meet the U.S. contribution under the Paris Climate Agreement.¹⁶⁰⁶ AFL-CIO President Richard Trumka argued that the United States should stay in the agreement “so we can achieve the best outcomes for America’s workers.”¹⁶⁰⁷ The U.S. Chamber of Commerce supports U.S. participation in the Paris Agreement,¹⁶⁰⁸ and even ExxonMobil has called the Paris Agreement “an important step forward by world governments in addressing the serious risks of climate change.”¹⁶⁰⁹

The majority staff for the Select Committee anticipates a future president committed to climate action will rejoin the Paris Climate Agreement, but, in the meantime, Congress can take steps to ensure that the United States continues to support global climate solutions. This section discusses a few of the many opportunities for U.S. international climate engagement.

Building Block: Bolster U.S. Participation in International Climate Finance Programs

The Green Climate Fund was established to provide financial support to developing countries to counter climate change. President Obama committed \$3 billion to the Green Climate Fund in 2014, of which the United States has transferred \$1 billion so far.¹⁶¹⁰ Since announcing his intention to withdraw the United States from the Paris Climate Agreement, President Trump has refused to provide additional U.S. support for the Green Climate Fund.

Rep. Adriano Espaillat (D-NY-13) introduced the Green Climate Fund Authorization Act of 2019 (H.R. 4986), which authorizes U.S. appropriations to the international Green Climate Fund, emphasizing the “responsibility of the U.S. government to work with its global partners to promote environmental justice and climate justice.” The bill also articulates a statement of U.S. policy to provide climate financing that advances gender equality and upholds the principles of environmental justice and climate justice in support of programs and projects that are developed by recipient communities with the free, prior, and informed consent of Indigenous peoples.

Recommendation: Congress should contribute the funds necessary to meet our financial commitment to the Green Climate Fund.

Committee of Jurisdiction: Foreign Affairs

Building Block: Advance Climate Resilience and Security in International Missions and Programs

Despite their limited historical contribution to the increase of carbon pollution in the atmosphere, developing nations are on the front line of climate impacts. Emerging climate threats include

¹⁶⁰⁶ We Are Still In, <https://www.wearestillin.com/signatories>. Accessed June 2020.

¹⁶⁰⁷ Statement of Richard Trumka, President, AFL-CIO, “Paris Climate Agreement Withdrawal a Failure of American Leadership,” June 1, 2017, <https://aflcio.org/press/releases/paris-climate-agreement-withdrawal-failure-american-leadership>.

¹⁶⁰⁸ U.S. Chamber of Commerce, “Our Approach to Climate Change,” <https://www.uschamber.com/climate-change-position>. Accessed June 2020.

¹⁶⁰⁹ ExxonMobil, “Statements on Paris climate agreement: Statement on agreement entering into force,” November 4, 2016, <https://corporate.exxonmobil.com/energy-and-environment/environmental-protection/climate-change/statements-on-paris-climate-agreement#statementOnAgreementEnteringIntoForce>.

¹⁶¹⁰ Congressional Research Service, *Green Climate Fund: Resource Mobilization, Recent Projects* (November 21, 2019).

spreading disease, heat stress, food insecurity, and intensifying disasters. In poor and fragile nations, these climate-driven shocks can also drive political instability and refugee movements. U.S. foreign policy and aid can help to address the global humanitarian threats of climate change before they become national security threats.

Within U.S. federal agencies, several programs are already doing work that addresses the foreign policy and humanitarian implications of climate change. For example, the State Department Office of Conservation and Water coordinates U.S. foreign policy on ecosystems and water resources.¹⁶¹¹ The Famine Early Warning System Network (FEWS NET), led by the U.S. Agency for International Development (USAID), and coordinated among several federal science agencies, monitors food insecurity in developing countries around the world.¹⁶¹²

President Obama issued Executive Order 13677 on Climate-Resilient International Development, which requires agencies to factor climate-resilience considerations into the U.S. government's international development work and to help advance a similar approach with multilateral entities.¹⁶¹³ The Executive Order is intended to promote climate resilience through the federal government's international development programs and investments and complement efforts to reduce greenhouse gas emissions.

Given the range of potential impacts on U.S. development aid and financing projects, development agencies need to factor climate change into their decision-making processes. USAID has developed climate risk screening and management tools that help evaluate and address climate risk.¹⁶¹⁴ Utilizing tools and policies to manage climate-related vulnerabilities will improve the success of development projects in the face of climate change, stretching U.S. development investments.

Rep. Nydia Velázquez (D-NY) introduced the Climate Displaced Persons Act of 2019 (H.R. 4732). This bill would require the Secretary of State and USAID Administrator to develop a Global Climate Resilience Strategy. The bill would designate a State Department Coordinator of Climate Resilience to manage federal efforts to address international climate impacts. In addition, the bill would afford formal protections to climate-displaced persons (CDPs), admitting at least 50,000 CDPs to the U.S. per year, on top of existing U.S. refugee programs.

Sen. Robert Menendez (D-NJ) introduced the Climate Security Act of 2019 (S. 745), which would establish a Climate Security Envoy within the State Department. This envoy would be responsible for developing strategies for improving the integration of climate change science, data, and forecasting in U.S. foreign policy and national security. The Climate Security Envoy would also be responsible for facilitating collaborations among federal science and security agencies.

¹⁶¹¹ U.S. Department of State, Office of Conservation and Water, "Our Mission," <https://www.state.gov/bureaus-offices/under-secretary-for-economic-growth-energy-and-the-environment/bureau-of-oceans-and-international-environmental-and-scientific-affairs/office-of-conservation-and-water/>. Accessed June 2020.

¹⁶¹² Famine Early Warning System Network, <https://fews.net/>. Accessed June 2020.

¹⁶¹³ The White House. (2014) *President Obama announces new actions to strengthen global resilience to climate change and launches partnership to cut carbon pollution* [factsheet]. <https://obamawhitehouse.archives.gov/the-press-office/2014/09/23/fact-sheet-president-obama-announces-new-actions-strengthen-global-resil>

¹⁶¹⁴ U.S. Agency for International Development, "Climate Risk Screening and Management Tools," <https://www.climatelinks.org/resources/climate-risk-screening-management-tool>. Accessed June 2020.

Recommendation: Congress should establish a Climate Security Envoy in the State Department and expand programs within the State Department, USAID, and the Peace Corps, including Fulbright and other educational and cultural affairs initiatives, to address the international humanitarian and security impacts of climate change.

Recommendation: Congress should establish a program in the State Department to monitor climate and social conditions to anticipate and prevent climate and environmental stressors from evolving into national security risks. Congress also should direct the State Department to address climate risks in its Quadrennial Diplomacy and Development Review.

Recommendation: Congress should require the Secretary of State and USAID Administrator to develop a Global Climate Resilience Strategy, designate a State Department official to manage federal efforts to address international climate impacts, and provide formal protections to CDPs, admitting at least 50,000 CDPs to the United States per year, on top of existing U.S. refugee programs.

Recommendation: Congress should increase foreign aid for international climate resilience through USAID and other U.S. development finance agencies to support the Global Climate Resilience Strategy. Congress should direct international development programs and investments to incorporate climate resilience considerations into agency decision-making, including strategies to support international capacity building and to ensure that U.S. investments result in climate-resilient buildings and infrastructure.

Committee of Jurisdiction: Foreign Affairs

Building Block: Empower Women and Girls in Developing Countries to Adapt to Climate Change and Build Resilience

Climate change is exacerbating extreme weather events such as floods, droughts, and storms and is already impacting vulnerable communities in developing countries, leading to resource scarcity and contributing to conflict and instability.¹⁶¹⁵ The changing climate particularly affects the world's poorest and most vulnerable populations, especially women and girls.¹⁶¹⁶ Around the world in most poor communities, women are usually the main food producers and walk to collect food, water, and fuel. They are also caretakers who look after the children, elderly, sick, and even the family's assets. Women's roles and responsibilities, however, usually disadvantage them in preparing for climate change's impacts, as they have fewer resources, are less likely to leave their home unattended, and are unlikely to migrate for shelter and work when disaster hits. When disasters strike, women are at greater economic risk and are more likely than men to die.¹⁶¹⁷

Rep. Barbara Lee (D-CA) introduced H.R. 1880, the Women and Climate Change Act, to provide coordinated and comprehensive strategies to mitigate the effects of climate change on women and

¹⁶¹⁵ Kemal Derviș, Brookings Institution, "Climate Change and Vulnerable Societies," July 23, 2009, <https://www.brookings.edu/testimonies/climate-change-and-vulnerable-societies/>.

¹⁶¹⁶ United Nations Women, "In Focus: Climate action by, and for, women," <https://www.unwomen.org/en/news/in-focus/climate-change>. Accessed June 2020.

¹⁶¹⁷ Oxfam America, "Climate Change & Women," fact sheet, <https://www.oxfamamerica.org/static/media/files/climatechangewomen-factsheet.pdf>. Accessed June 2020.

girls around the world. This legislation would affirm the commitment to include and empower women in economic development planning and climate change solutions to help communities pursue clean and sustainable development.

Recommendation: Congress should establish a Federal Interagency Working Group on Women and Climate Change within the U.S. Department of State to implement a coordinated, evidence-based strategy on women and climate change.

Committee of Jurisdiction: Foreign Affairs

Building Block: Reduce Black Carbon Emissions

The incomplete combustion of fossil fuels and biomass forms fine particles known as black carbon. Cookstoves, diesel engines, and coal-fired power plants are all typical sources of black carbon. It has adverse impacts on human health, ecosystems, and visibility and is a powerful, short-lived heat-trapping pollutant that contributes to increased temperatures, accelerated ice and snow melt, and disruptions to precipitation patterns.¹⁶¹⁸ When deposited on snow and ice, black carbon reduces the amount of sunlight that would ordinarily be reflected, increasing the rate of melting, which is particularly concerning for the Arctic region and Alaskan Native communities.¹⁶¹⁹

Given the health and climate impacts of black carbon globally, the United Nations Environment Program, the United States, and 5 other countries initiated the Climate and Clean Air Coalition (CCAC) in 2012. It now has 130 partners from governments, intergovernmental organizations, businesses, scientific institutions, and civil society working together to reduce short-lived climate pollutants, including black carbon. The United States works with the CCAC through programs supported by the Environmental Protection Agency (EPA) and USAID.

Rep. Scott Peters (D-CA) and Rep. Matt Gaetz (R-FL) introduced H.R. 4143, the Super Pollutants Act of 2019, to address the climate impacts of short-lived climate pollutants, including black carbon. Section 5 of the legislation directs the Secretary of State, in collaboration with other federal agencies, to support international efforts to reduce black carbon emissions. The Energy and Commerce Committee Democrats' CLEAN Future Act discussion draft directs EPA to examine the adequacies of existing rules and regulations to cut black carbon pollution.¹⁶²⁰ If EPA finds them to be inadequate, then the draft legislation empowers EPA to craft new regulations. The discussion draft also directs EPA to support international activities to reduce black carbon emissions and to help Alaska Native communities address the impacts of black carbon.

Recommendation: Congress should direct EPA to evaluate the sufficiency of current regulations to reduce black carbon pollution and to develop new regulations if it finds the current ones inadequate. Congress should direct the State Department, USAID, and EPA to identify and support additional opportunities for international black carbon reduction assistance.

Committees of Jurisdiction: Foreign Affairs; Energy and Commerce

¹⁶¹⁸ U.S. Environmental Protection Agency, *Report to Congress on Black Carbon* (March 2012).

¹⁶¹⁹ U.S. Environmental Protection Agency, "Black Carbon Diesel Initiative in the Russian Arctic,"

<https://www.epa.gov/international-cooperation/black-carbon-diesel-initiative-russian-arctic>. Accessed June 2020.

¹⁶²⁰ Title VII, Section 711, CLEAN Future Act discussion draft.

Building Block: Stop International Deforestation and Forest Degradation

Forests serve a critical role in Earth's climate system as they help produce and regulate the world's temperatures and fresh water flows.¹⁶²¹ Forests cover nearly 30% of the world's land surface and provide critical ecological, economic, and social services to natural systems and people.¹⁶²² It is estimated that 1.6 billion people depend on forests for subsistence, livelihood, employment, and income generation as forests provide ecosystem services such as timber, food, fuel, and shelter while simultaneously contributing to soil and water conservation, clean air, and carbon storage.¹⁶²³ Forests play an important role in climate change mitigation by capturing the carbon dioxide from the atmosphere and converting it into biomass, such as tree trunks and leaves, and by storing carbon in forest soils. These natural buffers against climate change have removed nearly one-third of man-made carbon dioxide emissions from the atmosphere.¹⁶²⁴

Urbanization, infrastructure development, and agriculture expansion lead to the clearing of forests. Deforestation contributes to climate change, negates future carbon sequestration, and releases the carbon stock that has accumulated in trees and soil. According to a 2019 Intergovernmental Panel on Climate Change (IPCC) report, nearly 23% of all man-made greenhouse gas emissions can be attributed to agriculture, forestry, and other land use changes.¹⁶²⁵ Of that figure, deforestation and peatland degradation contributes to about 13% of greenhouse gas emissions.¹⁶²⁶ Forest degradation also contributes to climate change when logging, wood fuel extraction, fires, and grazing reduce carbon stocks at a faster rate than they can naturally recover.¹⁶²⁷ The health of forests and their ecosystems are also harmed by the changing climate as it directly and indirectly affects the growth and productivity of forests through changes in temperature, rainfall, weather, and other factors.¹⁶²⁸

Ending deforestation and forest degradation are essential parts of a comprehensive climate strategy. Keeping forests intact also preserves their critical social, ecological, and economic services.

Recommendation: Congress should increase funding for international assistance programs, such as USAID's Office of Forestry and Biodiversity and Global Environment Facility, to stop illegal logging and deforestation and encourage reforestation and sustainable forestry efforts.

Recommendation: Congress should support innovative investments and financing of international forest conservation and restoration as effective ways to provide funding for building the resilience of

¹⁶²¹ Duncan Brack, *Forests and Climate Change* (United Nations Forum on Forests, March 2019), 11, <https://www.un.org/esa/forests/wp-content/uploads/2019/03/UNFF14-BkgdStudy-SDG13-March2019.pdf>.

¹⁶²² Gordon B. Bonan, Forcings, "Feedbacks, and the Climate Benefits of Forests," *Science Magazine* (June 2008), 1444.

¹⁶²³ United Nations, "Forests play vital role in empowering people, promoting economic growth and combating climate change," May 6, 2019, <https://www.un.org/development/desa/en/news/forest/forum-on-forests-14th-session.html>.

¹⁶²⁴ Ibid.

¹⁶²⁵ Intergovernmental Panel on Climate Change, *Climate Change and Land* (August 2019), 4, https://www.ipcc.ch/site/assets/uploads/2019/08/4_SPM_Approved_Microsite_FINAL.pdf.

¹⁶²⁶ Frances Seymour and David Gibbs, "Forests in the IPCC Special Report on Land Use: 7 Things to Know," *World Resources Institute Blog* (August 8, 2019), <https://www.wri.org/blog/2019/08/forests-ipcc-special-report-land-use-7-things-know>.

¹⁶²⁷ Duncan Brack, *Forests and Climate Change* (United Nations Forum on Forests, March 2019), 6-7, <https://www.un.org/esa/forests/wp-content/uploads/2019/03/UNFF14-BkgdStudy-SDG13-March2019.pdf>.

¹⁶²⁸ U.S. Environmental Protection Agency, "Climate Impacts on Forests," January 2017, https://19january2017snapshot.epa.gov/climate-impacts/climate-impacts-forests_.html.

vulnerable communities, lower the cost of mitigation for governments, and sequester carbon. Critical to these efforts will be ensuring the protection of Indigenous rights and the meaningful participation of local communities in the development of projects. Governments and landowners will also need to know how to facilitate and attract investment and establish verification of the societal, economic, and climate benefits of these programs.

Committees of Jurisdiction: Foreign Affairs; Agriculture; Natural Resources

Building Block: Improve Arctic Diplomacy and Engagement

Some of the most significant effects of the climate crisis are occurring in the Arctic region. It is warming at a rate more than double most other locations on the planet,¹⁶²⁹ leading to thawing permafrost, loss of sea ice, and disruption of weather patterns.¹⁶³⁰ These impacts do not remain confined to the Arctic; they help increase global temperatures and drive extreme storms throughout the Northern Hemisphere.

Because the United States—by virtue of Alaska—is an Arctic nation, the federal government engages with international partners on the important issues facing the rapidly changing Arctic region. The United States conducts Arctic diplomacy through several different Arctic treaty and organizational bodies, including the Arctic Council, a high-level intergovernmental body. Through the council, Canada, Denmark, Finland, Iceland, Norway, the Russian Federation, Sweden, and the United States coordinate activities across the Arctic Ocean and the polar region. U.S. Arctic diplomacy is guided by an Obama administration policy, most recently updated in May 2013, that supports National Security Presidential Directive-66 signed by President Bush in 2009.¹⁶³¹ In 2019, the Department of Defense updated its strategic objectives in the “Defense of Arctic Strategy” to Congress noting the changing physical environment as a “key dynamic” to address.¹⁶³²

To successfully address the climate crisis and respond to its impacts, the United States must work with the seven other Arctic nations that make up the Council, as well as the Inuit Circumpolar Council and other Indigenous representatives. Engagement with Indigenous nations is of particular importance to Alaska Native tribes and the thousands of people who depend on subsistence hunting, fishing, and gathering to feed their communities. Climate change affects several industries in the Arctic region—such as fisheries, oil and gas, timber, and minerals—making it crucial for U.S. national, economic, and environmental security for the country to have high-level representation in negotiations concerning the Arctic Ocean and region. Outside of economic concerns, the United States’ treaty obligations to scientific exploration, global trade regimes, and search and rescue can only be upheld through actions that reduce climate uncertainty and increase investment for adaptation to environmental change in the Arctic.

¹⁶²⁹ Brooks Hays, “NOAA: Arctic warming at twice the rate of the rest of the planet,” *United Press International*, December 12, 2018.

¹⁶³⁰ C. Markon, et al, 2018: Alaska. In *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* U.S. Global Change Research Program, Washington, DC, USA, pp. 1185–1241.

¹⁶³¹ The White House, National Strategy for the Arctic Region (May 2013), https://obamawhitehouse.archives.gov/sites/default/files/docs/nat_arctic_strategy.pdf.

¹⁶³² Department of Defense, *Report to Congress Department of Defense Arctic Strategy* (June 2019).

In 2014, then-Secretary of State John Kerry created a U.S. special representative for the Arctic, which the Trump administration later eliminated.¹⁶³³ Now the Office of Ocean and Polar Affairs (OPA) in the State Department's Bureau of Oceans and International Environmental and Scientific Affairs (OES) handles the formulation and implementation of U.S. Arctic policy. Currently, a senior Foreign Service official represents the United States at the Arctic Council while most other countries are represented by ambassador-level officials.¹⁶³⁴

Rep. Jim Sensenbrenner (R-WI) introduced H.R. 3493, the United States Ambassador at Large for Arctic Affairs Act, to establish an ambassadorship to represent the United States interests on Arctic affairs at the Arctic Council, the United Nations, and other international organizations. This legislation would elevate the importance and improve the effectiveness of U.S. Arctic engagement.

Recommendation: Congress should establish an Ambassador at Large for Arctic Affairs to lead policy formulation and development and represent the United States in international diplomatic negotiations on Arctic issues.

Committee of Jurisdiction: Foreign Affairs

¹⁶³³ Sabrina Shankman, "U.S. Is Eliminating Its Arctic and Climate Envoys. What Message Does that Send?" *Inside Climate News*, August 30, 2017.

¹⁶³⁴ Rachel Waldholz, "Tillerson proposes scrapping Arctic and climate envoys," Alaska Public Media, August 31, 2017.

STRENGTHEN CLIMATE SCIENCE

Climate science is a critical foundation of national and international efforts to address the climate crisis. Federal involvement in observations and monitoring important to climate science stretches back to the earliest years of the nation, from President Jefferson's 1807 request for a systematic survey of the coastline and tides¹⁶³⁵ to Congress directing the army to take and distribute weather observations in 1870¹⁶³⁶ to the installation of the first U.S. Geological Survey (USGS) streamgage in 1889.¹⁶³⁷ In 1957, the federal government initiated support for monitoring the atmospheric concentration of carbon dioxide,¹⁶³⁸ and the first U.S. meteorological satellite was launched in 1960.¹⁶³⁹ From these beginnings, weather and climate science activities occur across the federal government to this day. To better organize these efforts, Congress enacted the Global Change Research Act (GCRA) of 1990, which established an overarching federal framework for coordinating U.S. climate science research and international cooperation.¹⁶⁴⁰

Climate science serves as the foundation for federal activities to provide useful weather and climate information to the public and decision-makers. From storm warnings to the National Climate Assessments, a robust weather and climate science enterprise supports a strong economy and safe communities. A separate section of this report, "Develop and Deploy Actionable Climate Risk Information," describes the translation of climate science for decision support.

The need for robust climate science will grow as communities and our economy experience the increasing effects of climate change. Monitoring the climate system requires sustained investments in observations, modeling, and research. Understanding the important effects of climate change on natural and human systems also requires robust government support. Finally, a strong climate science enterprise depends on a well-trained and diverse climate science workforce, free to do its job without political interference.

Building Block: Strengthen National and International Climate Assessments

Climate assessments are essential science-based tools for understanding the current state of the climate system, projecting future climate vulnerability, and informing policy responses. The Intergovernmental Panel on Climate Change (IPCC) publishes assessment reports that inform international climate diplomacy under the United Nations Framework Convention on Climate Change (UNFCCC). The U.S. Global Change Research Program (USGCRP) publishes National Climate Assessments (NCAs) that review the current state of climate science and assess national and regional

¹⁶³⁵ Amy Dusto, "Reading between the tides," NOAA, August 4, 2014, <https://www.climate.gov/news-features/climate-tech/reading-between-tides-200-years-measuring-global-sea-level>.

¹⁶³⁶ National Weather Service, "History of the National Weather Service," <https://www.weather.gov/timeline>. Accessed June 2020.

¹⁶³⁷ USGS, "First USGS Streamgage Records 125 Years of Measuring New Mexico's Vital Water Resources," April 22, 2014, www.usgs.gov/news/first-usgs-streamgage-records-125-years-measuring-new-mexico%20%99s-vital-water-resources.

¹⁶³⁸ Rob Monroe, "The History of the Keeling Curve," Scripps Institution of Oceanography, April 3, 2013, <https://scripps.ucsd.edu/programs/keelingcurve/2013/04/03/the-history-of-the-keeling-curve/>.

¹⁶³⁹ NASA, "Missions: Historical Missions," <https://eospso.nasa.gov/mission-category/2>. Accessed June 2020.

¹⁶⁴⁰ Pub L No 101-606, codified at 15 USC § 2921 et seq.

impacts, risks, and adaptation to climate change in the United States. IPCC and USGCRP assessments are authoritative, consensus reports written by interdisciplinary teams of leading climate scientists, and they are based upon extensive federal agency input, the peer-reviewed climate science literature, and public comment.

Historically, Congress appropriated \$10 million per year in explicit line-item funding for the IPCC and UNFCCC, through “International Organizations & Programs” at the Department of State.¹⁶⁴¹ However, in 2017, Congress appropriated no money for the IPCC and UNFCCC.¹⁶⁴² FY2020 appropriations for IPCC and UNFCCC were only \$6.4 million.¹⁶⁴³

The USGCRP is authorized under the GCRA of 1990, which requires coordination of climate change research activities at 13 federal departments and agencies, and mandates publication of quadrennial NCAs.¹⁶⁴⁴ Among its provisions, the GCRA authorizes NCAs to project major trends in climate change 25-100 years into the future. NCAs, including the most recent report published in 2018, provide valuable information for climate planning. However, the Trump administration has signaled its intention to weaken the next NCA by limiting consideration of high warming scenario 100-year climate projections.¹⁶⁴⁵ Individual science agencies in the United States that contribute to NCAs have also reportedly considered limiting the scope of future projections of climate impacts; for example, the USGS has indicated that it will limit the use of climate models to only 2040.¹⁶⁴⁶

Recommendation: Congress should restore full dedicated funding support for international climate assessments, including the IPCC, and direct federal agencies to ensure unfettered and fully funded participation of federal scientists on international climate assessments.

Recommendation: Congress should codify USGCRP’s authority to include the full range of scientifically derived climate scenarios, including high warming scenarios, in NCAs, consistent with international climate activities.

Recommendation: Congress should direct federal agencies to use models of climate impacts, especially those that inform decision making, that are based on the full range of scientifically derived climate projections, including high warming scenarios projected 100 years into the future.

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¹⁶⁴¹ For example, P.L. 114-113, “Consolidated Appropriations Act, 2016,” 114th Congress.

¹⁶⁴² Brenda Ekwurzel, “US Abandons Global Science Leadership, Zeroes Out IPCC Funding,” Union of Concerned Scientists, August 8, 2017, <https://blog.ucsusa.org/brenda-ekwurzel/us-abandons-global-science-leadership-zeroes-out-ipcc-funding>.

¹⁶⁴³ Division G – Department of State, Foreign Operations, and Related Programs Appropriations Act, 2020, <https://docs.house.gov/billsthisweek/20191216/BILLS-116HR1865SA-JES-DIVISION-G.pdf>.

¹⁶⁴⁴ Pub L No 101-606, codified at 15 USC § 2921 et seq.

¹⁶⁴⁵ Coral Davenport and Mark Landler, “Trump Administration Hardens Its Attack on Climate Science,” *New York Times*, May 27, 2019.

¹⁶⁴⁶ Ibid.

Building Block: Expand and Sustain Federally Supported Research, Observations, Monitoring, and Modeling of Earth’s Climate System

Federal support for climate research, observations, monitoring, and modeling is essential for understanding Earth’s climate system and projecting future climate change. Ongoing Earth-observing activities, including ocean, ground-based, aerial, and satellite studies, provide essential baseline monitoring support for climate research,¹⁶⁴⁷ and they also provide valuable benefits to private-sector entities.¹⁶⁴⁸ Global and regional climate models operated on supercomputers, including those at the Department of Energy (DOE), the National Aeronautics and Space Administration (NASA), the National Oceanic and Atmospheric Administration (NOAA), and the federally supported National Center for Atmospheric Research (NCAR), produce authoritative climate projections for the USGCRP, IPCC, and other climate assessments.¹⁶⁴⁹ These models are continually being improved to account for advancements in scientific understanding and technical capacity, such as the application of artificial intelligence to parse rapidly expanding data streams,¹⁶⁵⁰ including those generated by low-cost CubeSats.¹⁶⁵¹

Climate science is continually evolving to address frontier research challenges, such as downscaling global climate model predictions to the local scale, attributing the frequency and severity of extreme weather to climate change, and obtaining new ground- and satellite-based observations to understand interdependencies in Earth’s climate system, including the role of Antarctica and the Arctic.¹⁶⁵² U.S. participation on international climate science collaborations, such as the U.S.-supported global MOSAiC (Multidisciplinary drifting Observatory for the Study of Arctic Climate) study of atmosphere-ocean-ice dynamics in the Arctic, are helping to fill critical knowledge gaps to inform improved climate models and climate attribution.¹⁶⁵³ Furthermore, as research on Earth’s integrated climate system depends increasingly on collaboration across scientific disciplines, it is essential that federal agencies sustain efforts toward making federally supported research data findable, accessible, interoperable, and reusable (FAIR).¹⁶⁵⁴ Federal science agencies are also building productive collaborations with private-sector data and technology providers, but such collaborations must ensure continuing public access to critical data products.¹⁶⁵⁵

The success of climate research, monitoring, and modeling projects, which often take many years to plan and execute, depends on sustained federal support for science programs. However, federally supported climate science programs are continually threatened with budget cuts. For example, the President’s FY2021 budget proposes substantial across-the-board cuts to Earth and climate science

¹⁶⁴⁷ Committee on the Decadal Survey for Earth Science and Applications from Space. *Thriving on Our Changing Planet: A Decadal Strategy for Earth Observation from Space* (National Academies of Sciences, Engineering, and Medicine, 2018).

¹⁶⁴⁸ National Science & Technology Council, Committee on the Environment, U.S. Group on Earth Observations Subcommittee, *2019 National Plan for Civil Earth Observations* (December 2019).

¹⁶⁴⁹ Intergovernmental Panel on Climate Change, AR5: *Climate Change 2013: The Physical Science Basis*. (Sept. 2013), Chapter 9: Evaluation of Climate Models.

¹⁶⁵⁰ Paul Voosen, “Science insurgents plot a climate model driven by artificial intelligence,” *Science*, July 26, 2018.

¹⁶⁵¹ John Fialka, “New Wave of Mini Satellites Could Boost Climate Research,” *Scientific American*, January 29, 2018.

¹⁶⁵² U.S. Global Change Research Program, *Fourth National Climate Assessment, Volume I* (October 2017).

¹⁶⁵³ Henry Fountain, “Scientists to Drift With Arctic Ice to Study Climate Change,” *New York Times*, September 19, 2019.

¹⁶⁵⁴ Government Accountability Office, GAO-20-81, *Federal Research: Additional Actions Needed to Improve Public Access to Research Results* (November 2019).

¹⁶⁵⁵ Mariel Borowitz, “Government data, commercial cloud: Will public access suffer?” *Science*, February 8, 2019.

programs at DOE, NASA, the National Science Foundation (NSF), NOAA, the U.S. Environmental Protection Agency (EPA), and USGS, including proposed 40% cuts to NOAA's Office of Oceanic and Atmospheric Research and EPA's Office of Research and Development.¹⁶⁵⁶ Furthermore, the President's budget proposes eliminating important climate observing programs, including NASA's Climate Absolute Radiance and Refractivity Observatory (CLARREO) Pathfinder and Plankton, Aerosol, Cloud, ocean Ecosystem (PACE) Mission, which helps to monitor harmful algal blooms.¹⁶⁵⁷ Federal agencies under the Trump administration have also experienced significant attrition of skilled scientific staff, reducing their capacity to effectively sustain their Earth and climate science missions.¹⁶⁵⁸ Long-term climate science projects, including critical observations and monitoring from satellites and at international terrestrial, ocean, and polar monitoring sites, also can be disrupted by budgetary and operational uncertainty caused by economic downturns, such as the economic fallout associated with the COVID-19 pandemic.

Reps. Kendra Horn (D-OK) and Brian Babin (R-TX) introduced the NASA Authorization Act of 2020 (H.R. 5666). This bill would mandate continuing development of the CLARREO Pathfinder and PACE missions, and it would require NASA to study the applied uses of Earth observation data, including for commercial applications.

Reps. Suzanne Bonamici (D-OR) and Don Young (R-AK), along with Sens. Sheldon Whitehouse (D-RI) and Lisa Murkowski (R-AK), introduced the Bolstering Long-Term Understanding and Exploration of the Great Lakes, Oceans, Bays, and Estuaries (BLUE GLOBE) Act (H.R. 3548/S. 933) to advance and deploy emerging technologies to rapidly accelerate the collection, management, and dissemination of data on the ocean, Great Lakes, bays, estuaries, and coasts. Reps. Young and Bonamici also introduced the Integrated Coastal and Ocean Observation System (ICOOS) Act Amendments of 2019 (H.R. 1314), which passed the House as part of Coastal and Great Lakes Communities Enhancement Act (H.R. 729). This bill would reauthorize the 11 regional association networks of NOAA's Integrated Ocean Observing System and strengthen the use of satellites, buoys, underwater gliders, and tide gauges to deliver accurate and continuous data on our oceans and coasts.

Recommendation: Congress should expand and sustain funding to federal agencies, including NSF, NOAA, NASA, EPA, USGS, and DOE, to support robust climate science research, observations, monitoring, and modeling activities, prioritizing support for Earth observations, climate model development, international collaboration, and improvements in data and computing infrastructure. Funding support should include provisions to ensure equitable and open data access and adequate staffing of skilled scientists at federal agencies. Funding support should also be sufficient to ensure continuity of research activities and data collection amidst systemic economic uncertainty, including for space-based monitoring and for observations at domestic and international field sites.

Committee of Jurisdiction: Science, Space, and Technology

¹⁶⁵⁶ American Institute of Physics, "Federal Science Budget Tracker: 2021," <https://www.aip.org/fyi/federal-science-budget-tracker/FY2021>. Accessed June 2020; U.S. Environmental Protection Agency, *Fiscal Year 2021 Justification of Appropriation Estimates for the Committee on Appropriations*.

¹⁶⁵⁷ Alexandra Witze, et al., "NASA soars and others plummet in Trump's budget proposal," *Nature*, February 10, 2020.

¹⁶⁵⁸ Annie Gowen, et al., "Science ranks grow thin in Trump administration," *Washington Post*, January 23, 2020.

Building Block: Expand and Sustain Federally Supported Research on Climate Change Impacts on Natural and Human Systems

Climate change is causing pronounced changes to natural systems—i.e., plant, animal, and microbial communities, and the atmospheric, oceanic, terrestrial, and polar environments in which they reside.¹⁶⁵⁹ Climate change also poses threats to human systems—i.e., the built environment and interconnected health, financial, and political systems critical for sustaining human life and social stability.¹⁶⁶⁰ These systems are deeply intertwined through human dependence on natural resources, and they can be affected by climate change in unexpected and complex ways.¹⁶⁶¹ Understanding the influence of climate-driven disruptions on natural and human systems, especially in vulnerable communities and ecosystems least prepared to adapt, can help to inform societal responses to looming climate threats.

As required under the GCRA, NCAs already broadly address climate change impacts on linked natural and human systems, including “the natural environment, agriculture, energy production and use, land and water resources, transportation, human health and welfare, human social systems, and biological diversity.”¹⁶⁶² NCAs also address climate change impacts not explicitly described in the GCRA, including impacts on invasive species, extreme heat, wildfire, and national security, and the propagation of these impacts across specific regions of the United States. High-level coordination on NCA assessment areas is facilitated through the interagency Subcommittee on Global Change Research within the White House National Science and Technology Council (NSTC). Going forward, it is essential that USGCRP be empowered to continue assessing the full range of climate change impacts on human and natural systems, including national and regional impacts not explicitly mentioned in the GCRA, and that NCAs be able to evolve to address emerging climate change impacts like ocean acidification.

Federal agency programs also advance research on specific climate change threats to natural and human systems. For example, NSF’s Coastlines and People program supports research to identify coastal environmental hazard impacts on populated coastal regions. Research on specific climate impacts is sometimes coordinated through interagency working groups, such as the NSTC Interagency Working Group on Ocean Acidification.¹⁶⁶³ The federal government also supports climate change impacts research through federal-university partnership programs, including the NOAA Sea Grant network and Cooperative Institutes. Given the wide-ranging impacts of climate change on natural and human systems, it is vital that all federal research programs, regardless of their specific focus area, have the authority and the resources to support the nexus of these research areas with climate impacts and are able to draw broadly from physical, social, and biological sciences, as well as citizen science and Indigenous knowledge. Important emphasis areas for such crosscutting research include

¹⁶⁵⁹ U.S. Global Change Research Program, *Fourth National Climate Assessment, Volume II* (November 2018), Chapters 3, 5, 6, 7, 8, and 9.

¹⁶⁶⁰ The National Security, Military, and Intelligence Panel on Climate Change, *A Security Threat Assessment of Global Climate Change* (The Center for Climate and Security, 2020).

¹⁶⁶¹ U.S. Global Change Research Program, *Fourth National Climate Assessment, Volume II* (November 2018), Chapters 17: Sector Interactions, Multiple Stressors, and Complex Systems

¹⁶⁶² 15 USC § 2936.

¹⁶⁶³ Interagency Working Group on Ocean Acidification, *Strategic Plan for Federal Research and Monitoring of Ocean Acidification* (National Oceanic and Atmospheric Administration, 2014).

risk and resilience to extreme events and natural hazards, sustainable chemistry, and the food-energy-water system.

Recommendation: Congress should direct USGCRP to ensure that the full range of climate change impacts on natural and human systems are considered in NCAs, including national and regional impacts not explicitly mentioned in the GCRA but included in recent assessments, as well as emerging climate change impacts like ocean acidification.

Recommendation: Congress should expand and sustain federal research support, including through NSF, NOAA, NASA, EPA, USGS, and DOE, for studying climate impacts on natural and human systems. Congress should ensure that federal agencies that support research and monitoring on natural and human systems have explicit authority and direction to consider climate impacts and to coordinate their climate activities with appropriate federal, academic, and community partners.

These recommendations address high-level considerations for developing foundational scientific understanding of climate change impacts on natural and human systems. Other parts of this report, including sections on public health, national security, and lands, oceans, waters, and wildlife, consider these impacts and potential legislative responses in greater detail.

Committee of Jurisdiction: Science, Space, and Technology

Building Block: Expand and Sustain Federally Supported Programs for Educating and Training a Diverse Climate Science Workforce

Advancements in climate science depend on a highly skilled and diverse workforce of scientists and engineers. Furthermore, as the effects of climate change are felt across the economy and government, all sectors of the workforce require some level of climate literacy.¹⁶⁶⁴ Students and youth have been particularly outspoken leaders and activists in favor of climate action and understanding, with a majority of teens expressing fear and anger over climate change, and nearly a quarter having walked out of school or taken a climate-related political action within the past three years.¹⁶⁶⁵ However, there is currently a shortage of climate-informed workers and citizens to adequately support community responses to climate impacts.¹⁶⁶⁶ Furthermore, the current climate and Earth science workforce is among the least diverse of the physical sciences, inhibiting the perspectives of women, people of color, and Indigenous populations in climate research.¹⁶⁶⁷

Acknowledging these challenges, Rep. Barbara Lee (D-CA) introduced a resolution supporting the teaching of climate change in schools (H.Res. 574). Despite the need for climate education and training, the President's FY2021 budget proposes substantial cuts for STEM (science, technology, engineering, and mathematics) education programs, including elimination of NOAA's Sea Grant College program, elimination of NASA's Office of STEM Engagement, elimination of EPA's Science to

¹⁶⁶⁴ Amanda Ruggeri, "How climate change will transform business and the workforce," *BBC Future*, July 9, 2017.

¹⁶⁶⁵ Sarah Kaplan and Emily Guskin, "Most American teens are frightened by climate change, poll finds, and about 1 in 4 are taking action," *Washington Post*, September 16, 2019.

¹⁶⁶⁶ Caroline Lewis, "Embracing the Challenge of Climate Education and Engagement," *Community Development Innovation Review* 14, no. 1 (2019).

¹⁶⁶⁷ Emma Goldberg, "Earth Science Has a Whiteness Problem," *New York Times*, December 23, 2019.

Achieve Results (STAR) grant program, and significant reductions to Graduate Research Fellowships and broadening participation programs at NSF.¹⁶⁶⁸

To fill the climate skills and participation gap, the federal government must expand and sustain efforts to support education and workforce training in climate science and STEM. Important needs include developing participatory climate science curricula, building interdisciplinary connections between scientists and policymakers, and broadening participation in STEM. At the university level, broadening participation efforts must address factors leading to the disproportionate loss of women and minorities at every educational transition and career milestone. These factors include sexual harassment, financial barriers, academic culture, and visa delays for international students. Minority Serving Institutions (MSIs), including Historically Black Colleges and Universities, Hispanic Serving Institutions, Tribal Colleges and Universities, and Asian American and Native American Pacific Islander-Serving Institutions, can serve as valuable resources for expanding STEM opportunities for underrepresented groups.¹⁶⁶⁹ Beyond colleges and universities, climate and STEM education should occur across grade levels and education pathways, including workforce training for rural and blue-collar workers. As an example, the state of New Jersey recently announced that climate change would be directly incorporated into education guidelines for K-12 schools.¹⁶⁷⁰ Some advocates also promote the integration of arts and design into STEM education, known as STEAM (science, technology, engineering, arts, and mathematics), to support creativity and critical thinking.

Reps. Debbie Dingell (D-MI) and Julia Brownley (D-CA) and Sen. Edward Markey (D-MA) introduced the Climate Change Education Act (H.R. 2349/S. 477), which would direct NOAA to establish a Climate Change Education Program to increase climate literacy and to issue grants to K-12 and higher education institutions for climate change training and education. Rep. Suzanne Bonamici (D-OR) introduced the Building STEAM Education Act of 2019 (H.R. 3308) to expand federal investments in STEAM education.

Recommendation: Congress should expand and sustain federal support for climate literacy for STEM and career and technical education, with an emphasis on removing barriers and broadening participation for underrepresented groups.

Recommendation: Congress should direct NSF to support research on methodologies and approaches to improve the effectiveness of education and training of the next generation of climate scientists.

Committees of Jurisdiction: Science, Space, and Technology; Education and Labor

¹⁶⁶⁸ American Institute of Physics, “Federal Science Budget Tracker: 2021,” <https://www.aip.org/fyi/federal-science-budget-tracker/FY2021>. Accessed June 2020; U.S. Environmental Protection Agency, *Fiscal Year 2021 Justification of Appropriation*.

¹⁶⁶⁹ Committee on Closing the Equity Gap, *Minority Serving Institutions: America’s Underutilized Resource for Strengthening the STEM Workforce*, (National Academies of Sciences, Engineering, and Medicine, 2019).

¹⁶⁷⁰ State of New Jersey, Governor Phil Murphy, “First Lady Tammy Murphy Announces Initiative to Incorporate Climate Change into Education Guidelines for K-12 Schools,” October 11, 2019.

Building Block: Invest in Research on the Risks and Governance for Atmospheric Climate Intervention

If global efforts to mitigate carbon emissions falter, and as the impacts of climate change continue to worsen, governments may consider alternative approaches to intervene in the atmospheric climate system.

One possibility is the deployment of atmospheric climate intervention (ACI), which aims to reduce global temperature by directly reflecting sunlight away from the Earth, by, for example, injecting aerosols into the stratosphere. ACI offers the possibility of reducing global temperatures, but it fails to address significant negative impacts of increasing atmospheric carbon dioxide, such as ocean acidification. In addition, there are significant risks that deployment of ACI could cause unintended negative impacts on climate and weather systems, natural and managed ecosystems, and communities. Because of these risks, it is essential to prioritize carbon pollution mitigation to address climate change. Deploying ACI would be, at best, a modest complement. Nonetheless, the possibility of future deployment of ACI, including by foreign governments or non-state actors, necessitates consideration of the risks and governance of ACI. In FY2020, Congress appropriated \$4 million to NOAA for ACI-related research.¹⁶⁷¹ The National Academies of Sciences, Engineering, and Medicine are currently undertaking a study on research priorities and governance approaches for ACI research, which is expected to be released later in 2020.¹⁶⁷²

Rep. Jerry McNerney (D-CA) introduced the Atmospheric Climate Intervention Research Act (H.R. 5519), which would establish a program within NOAA to study potential approaches to ACI and to provide reporting oversight for climate intervention experiments.

Recommendation: Congress should draw upon the findings of the forthcoming National Academies of Sciences, Engineering, and Medicine study to establish a research program to investigate potential ACI approaches, their risks, and governance frameworks.

Committee of Jurisdiction: Science, Space, and Technology

Building Block: Strengthen the Integrity of Federal Science Activities

Federally supported science activities are essential for understanding and addressing the climate crisis; as such, their integrity and independence from political interference are critical. However, federal science agencies have experienced a harmful onslaught under the Trump administration. In 2019, the Government Accountability Office (GAO) found that EPA violated its own ethics rules in dismissing academic scientists from advisory panels and replacing them with industry

¹⁶⁷¹ Adria Schwarber, “Final FY20 Appropriations: National Oceanic and Atmospheric Administration,” *FYI: Science Policy News from AIP*, January 28, 2020.

¹⁶⁷² National Academies of Sciences, Engineering, and Medicine, “National Academies Launching New Study on Sunlight-Reflection Research,” October 16, 2018.

representatives.¹⁶⁷³ The GAO recently issued a report recommending actions to strengthen the integrity of federal research.¹⁶⁷⁴

Rep. Paul Tonko (D-NY) introduced the Scientific Integrity Act (H.R. 1709), which would require federal science agencies to adopt scientific integrity policies that ensure the ability of federal scientists to perform scientific research and share research findings. The bill would also require appointment of Scientific Integrity Officers at all covered agencies, to be coordinated through the White House Office of Science and Technology Policy (OSTP). The House passed the Scientific Integrity Act as part of the Health and Economic Recovery Omnibus Emergency Solutions (HEROES) Act (H.R. 6800).

Reps. Joe Neguse (D-CO), Suzanne Bonamici (D-OR), and Sean Casten (D-IL) introduced the Stop Climate Censorship Act of 2019 (H.R. 5355) to require any political appointee at a federal agency seeking to remove content regarding climate change in a scientific study or public communication to publicly provide the underlying scientific reason for doing so.

Recommendation: Congress should require federal science agencies to adopt strong scientific integrity policies, protect the conduct and sharing of research by federal scientists, and ensure the independence of scientific advisory panels and climate assessments. Congress should also require that each science agency appoint a scientific integrity officer (SIO). SIOs should be career employees with backgrounds in science, and they should be vested with adequate authority and convening power to enforce agency scientific integrity policies.

Committee of Jurisdiction: Science, Space, and Technology

Building Block: Ensure that Federal Agencies Act on the Best Available Science

Scientists and the public broadly recognize the value of open and transparent scientific publications and data, which can accelerate discovery and enhance science-informed policy.¹⁶⁷⁵ In 2013, OSTP issued a memo directing all federal science agencies to adopt plans to increase public access to federally funded scientific research and data.¹⁶⁷⁶

Despite continuing federal progress on strengthening public access to research and data,¹⁶⁷⁷ the Trump administration has weaponized the concept of “open science” to exclude high-quality scientific evidence from federal rulemaking. In 2018, the EPA proposed a rule, “Strengthening Transparency in Regulatory Science.”¹⁶⁷⁸ The proposed rule would impede, if not eradicate, the EPA’s

¹⁶⁷³ Government Accountability Office, GAO-19-280, *EPA Advisory Committees: Improvements Needed for the Member Appointment Process* (July 2019).

¹⁶⁷⁴ Government Accountability Office, GAO-19-265, *Scientific Integrity Policies: Additional Actions Could Strengthen Integrity of Federal Research* (April 2019).

¹⁶⁷⁵ Committee on Toward an Open Science Enterprise, *Open Science by Design: Realizing a Vision for 21st Century Research* (National Academies of Science, Engineering, and Medicine, 2018).

¹⁶⁷⁶ John P. Holdren, OSTP, *Memorandum for the Heads of Executive Departments and Agencies: Increasing Access to the Results of Federally Funded Scientific Research*, February 22, 2013.

¹⁶⁷⁷ Government Accountability Office, GAO-20-81, *Federal Research: Additional Actions Needed to Improve Public Access to Research Results* (November 2019).

¹⁶⁷⁸ U.S. Environmental Protection Agency, “Strengthening Transparency in Regulatory Science,” April 30, 2018, 83 FR 18768.

ability to protect Americans from significant risks to human health and the environment by limiting the scope of research that the EPA could consider in making decisions. The proposed rule is inconsistent with EPA's statutory obligation to use the best available science as required in the Clean Air Act, Toxic Substances Control Act, Safe Drinking Water Act, Clean Water Act, and other statutes. Experts have detailed how the administration's rule is illegal and contrary to congressional intent and therefore likely to be struck down in court.¹⁶⁷⁹ The administration's effort comes in the wake of several failed attempts by House Republicans, led by former Chairman Lamar Smith (R-TX) and the House Science, Space, and Technology Committee, to legislatively modify evidentiary requirements for EPA rulemaking. Reports indicate that the Department of the Interior (DOI) will release a proposed "Promoting Open Science" rule, which appears to have a similar objective to the EPA's proposed rule.¹⁶⁸⁰

Under the Administrative Procedure Act and environmental statutes, Congress has clearly spoken and directed agencies to use the best available science when promulgating rules, including those that protect public health and the environment. Congress, however, can and should continue to review how the federal government is interpreting and implementing that direction.

Recommendation: Congress should direct OSTP to work with the National Academies of Sciences, Engineering, and Medicine to assess efforts by federal agencies to censor science in regulatory decision making and to identify protocols for federal agencies to incorporate the best available science in regulatory decision making.¹⁶⁸¹

Recommendation: Congress should establish an interagency working group, informed by broad input from scientists and the public, to clarify agency obligations under environmental statutes to ensure continuing consideration of the best available science in federal policies and rulemaking.

Committee of Jurisdiction: Science, Space, and Technology

Building Block: Increase Science and Technology Capacity in Congress to Better Inform on Technical Matters Related to Climate Mitigation and Resilience Policy

From 1972 to 1995, the Office of Technology Assessment (OTA) provided non-partisan, comprehensive technical analysis of emerging scientific and technology issues for congressional policy support. Since its closure, technology has become increasingly relevant to nearly all aspects of the economy and society. Yet, congressional capacity to understand the impacts of new technologies and to craft policies that ensure these technologies are beneficial to society has diminished. The Congressional Research Service (CRS) and the GAO, which can provide some science and technology support, also

¹⁶⁷⁹ James Goodwin, "The EPA's 'Censored Science' Rule Isn't Just Bad Policy, It's Also Illegal," Union of Concerned Scientists, November 22, 2019, <https://blog.ucsusa.org/guest-commentary/the-epas-censored-science-rule-isnt-just-bad-policy-its-also-illegal>.

¹⁶⁸⁰ Michael Doyle, "Interior Department moves to impose new rules on use of science in decision-making," *Science*, February 27, 2020.

¹⁶⁸¹ See, for example, letter from Reps. Suzanne Bonamici (D-OR) and Mikie Sherill (D-NJ) to Dr. Marcia McNutt, President of the National Academy of Sciences, November 13, 2019, https://bonamici.house.gov/sites/bonamici.house.gov/files/documents/191113_FINAL_Request_to_NAS_Proposed_Censored_Science_Rule.pdf.

have experienced budget cuts. As a result, Congress currently lacks the resources to obtain high-quality, non-partisan, and timely information and analyses of important technological challenges.

Climate change is one of the complex challenges facing Congress today that requires technical expertise to deeply understand both the science behind climate risks and impacts and the technological solutions for mitigating and adapting to climate change. Reviving a modernized OTA and increasing funding for congressional support agencies would help Congress address the climate crisis by providing technical analyses of policy options that are fact-based.

The House FY2020 Legislative Branch Appropriations Act (H.R. 2779) included \$6 million to restart OTA, but this line item dropped from the final bill. Reps. Mark Takano (D-CA) and Bill Foster (D-IL) introduced the Office of Technology Assessment Improvement and Enhancement Act (H.R. 4426), which would improve OTA by making it more accessible and responsive to the needs of Congress. Sens. Mazie Hirono (D-HI) and Thom Tillis (R-NC) introduced a Senate companion (S. 2509).

Recommendation: Congress should enhance congressional access to timely, non-partisan science and technology expertise by reviving OTA through annual appropriations and updating its mandate to increase accessibility and responsiveness.

Recommendation: Congress should increase funding for existing congressional support agencies, such as CRS and GAO, to better address science and technology issues.

Committee of Jurisdiction: House Administration

ASSESS THE TRUE VALUE OF FEDERAL CLIMATE ACTION

Federal investments to mitigate and adapt to climate change will return benefits for human health, economic productivity, and avoided disaster damage that far outweigh the cost of federal spending. For example, a study by the National Institute of Building Sciences has shown that each dollar spent in pre-disaster mitigation investments yields an average sixfold return.¹⁶⁸² Government systems to set regulations, analyze legislation, and implement executive branch policies depend heavily on benefit-cost analyses to justify expenditure of federal tax dollars. However, benefit-cost analyses often do not consider the full range of long-term benefits and costs, diminishing the perceived value of policies to address the climate crisis and hindering federal action to fight climate change.

Congress must ensure that it weighs the full benefits of climate action relative to the costs of inaction. Federal offices that calculate benefits and costs of proposed policies, including the Congressional Budget Office (CBO) for legislative action and the Office of Management and Budget (OMB) for executive action and rulemaking, need to establish benefit-cost methodologies that fully account for climate change, including the long-term benefits of avoided disasters. Where existing benefit-cost methodologies are inadequate, the federal government should invest in scientific and economic research to improve these methodologies. In addition, lawmakers need access to adequate scientific and technical capacity to fully weigh the climate costs and benefits of proposed policies.

Building Block: Direct the Executive Branch to Consider the True Cost of Carbon Pollution in Federal Rulemakings

When a federal agency uses its statutory authority to issue or revise a rule, such as a pollution standard, the agency must conduct a benefit-cost analysis to show that the rule's intended benefits justify the costs. The U.S. Environmental Protection Agency (EPA) has developed methods to quantify the benefits of cutting pollution and protecting public health, such as reducing acid rain and averting asthma attacks. In 2009, the Obama administration launched an interagency working group to develop the Social Cost of Carbon (SCC), an estimate of the "monetized damages associated with an incremental increase in carbon emissions in a given year."¹⁶⁸³ The SCC reflects "changes in net agricultural productivity, human health, property damages from increased flood risk, and the value of ecosystem services due to climate change," as well as other factors.¹⁶⁸⁴ The working group's goal was to develop an SCC that federal agencies could use to monetize the benefit of rules to cut carbon pollution and mitigate climate change.

On March 28, 2017, President Donald Trump signed a sweeping executive order to rescind several climate-related rules proposed or finalized by the Obama administration. The executive order nullified the working group's SCC and directed agencies to use a methodology that would significantly devalue

¹⁶⁸² National Institute of Building Sciences, *Natural Hazard Mitigation Saves: 2019 Report* (December 2019).

¹⁶⁸³ Interagency Working Group on Social Cost of Greenhouse Gases, *Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866* (August 2016).

¹⁶⁸⁴ Ibid.

the SCC.¹⁶⁸⁵ This will make it harder for the EPA and other agencies to justify actions that reduce carbon pollution. Following President Trump's executive order, Resources for the Future, an independent, nonprofit research institution, established an initiative to carry forward the efforts of the Obama-era SCC working group.¹⁶⁸⁶

In the 115th Congress, Rep. A. Donald McEachin (D-VA) and Sen. Michael Bennet (D-CO) introduced the Pollution Transparency Act (H.R. 3981/S. 1930), which would require federal agencies to use consistent, science-based figures to quantify the long-term costs of greenhouse gas emissions in their rulemaking and procurement decisions.¹⁶⁸⁷

Recommendation: Congress should direct the next administration to reconstitute an interagency working group to develop a new SCC that reflects the best available climate science; acknowledges that U.S. greenhouse gas emissions have a global impact; and factors in the impact of current policy on the future generations that will bear the brunt of unmitigated climate change. The working group should consult with external stakeholders that have been reviewing and refining the SCC, including the National Academies of Science, Engineering, and Medicine¹⁶⁸⁸ and Resources for the Future.

Committees of Jurisdiction: Science, Space, and Technology; Oversight and Reform

Building Block: Develop Methodologies for Considering the Fiscal and Economic Impacts of Proposed Legislation Related to Climate Risk

The CBO has evaluated the costs of climate change in limited cases through the lens of expected annual economic loss and policies that might reduce expected losses and federal costs.¹⁶⁸⁹ However, CBO does not currently have the capability to develop and apply methodologies for calculating returns on federal resilience investments that account for the avoided costs to the federal government and longer range benefits that may accrue over time, both within and beyond a 10-year budget window.

On January 29, 2019, the Senate Committee on the Budget convened a hearing at which Keith Hall, Director of the CBO, testified.¹⁶⁹⁰ After the hearing, Ranking Member Bernie Sanders (I-VT) and other members of the Committee submitted questions for the record regarding the anticipated effects of the climate crisis on the nation's economy and federal budget. Director Hall's response discussed the challenges that the CBO faces in working with uncertainties about climate impacts that grow substantially in the more distant future and noted that CBO has not assessed the magnitude of costs

¹⁶⁸⁵ White House Office of the Press Secretary, "Presidential Executive Order on Promoting Energy Independence and Economic Growth," March 28, 2017, <https://www.whitehouse.gov/presidential-actions/presidential-executive-order-promoting-energy-independence-economic-growth/>.

¹⁶⁸⁶ Resources for the Future, "The Social Cost of Carbon Initiative," <https://www.rff.org/social-cost-carbon-initiative/>. Accessed June 2020.

¹⁶⁸⁷ H.R. 3981 and S. 1930, "Pollution Transparency Act," 115th Congress.

¹⁶⁸⁸ National Academies of Sciences, Engineering, and Medicine, "Assessing Approaches to Updating the Social Cost of Carbon," https://sites.nationalacademies.org/DBASSE/BECS/CurrentProjects/DBASSE_167526. Accessed June 2020.

¹⁶⁸⁹ Congressional Budget Office, *Expected Costs of Damage from Hurricane Winds and Storm-Related Flooding* (April 2019).

¹⁶⁹⁰ See testimony of Keith Hall, Director, Congressional Budget Office, before the Senate Committee on the Budget, *The Budget and Economic Outlook: 2019 to 2029* (January 29, 2019).

at the end of the century. Mr. Hall explained that the sources and nature of abrupt changes to climate, their likelihood, and their potential impacts remain “very poorly understood.”¹⁶⁹¹

Recommendation: Congress should support expanding CBO’s capacity to model and analyze the fiscal and economic effects of major climate risk impacts expected from proposed legislation, including potential savings from avoided costs and reduced risks associated with federal resilience investments.

Committee of Jurisdiction: Budget

Building Block: Enhance the Federal Government’s Scientific and Economic Capacity for the Evaluation of Climate Impacts on Federally Supported Projects

For OMB to appropriately evaluate climate risk, federal agencies need reliable methods for measuring climate impacts in federal policies, priorities, and projects. However, it remains difficult to quantify the full benefit of certain “natural” climate resilience solutions, whereas the long-term costs of traditional “hard” infrastructure projects are often inadequately considered. Approaches to managing flood risk provide a good example. Wetlands restoration, living shorelines, and reforestation are proven natural solutions for holistically addressing flood risk, but their specific benefits are often difficult to quantify.¹⁶⁹² In contrast, hard infrastructure, like seawalls and levees, can provide demonstrable local benefits, but these solutions may cost more over time due to ongoing maintenance costs and displacement of flood risk to other communities.¹⁶⁹³ A recent economic study calculated an average \$1.8 million per square kilometer flood control benefit for coastal wetlands, demonstrating the potential of such studies to quantify climate impacts and green infrastructure benefits.¹⁶⁹⁴

Recommendation: Congress should direct OMB to enter into an agreement with the National Academies of Science, Engineering, and Medicine to assess the state of scientific knowledge on evaluation of climate-related benefits and costs in federally supported projects, such as risks of flooding, wildfire, and extreme weather. The National Academies should also recommend priorities for research activities to improve metrics and methodologies for evaluating these risks.

Committees of Jurisdiction: Oversight and Reform; Science, Space, and Technology

Building Block: Modernize OMB Guidance to Agencies for the Evaluation of Climate Impacts

Longstanding executive guidance from the OMB requires federal agencies to develop Regulatory Impact Analyses (RIAs) that consider all costs and benefits of major policy actions, including

¹⁶⁹¹ Congressional Budget Office, *Answers to Questions for the Record Following a Hearing on The Budget and Economic Outlook: 2019 to 2029 Conducted by the Senate Committee on Budget* (March 29, 2019), <https://www.cbo.gov/system/files/2019-03/54991-QFRs.pdf>.

¹⁶⁹² U.S. Environmental Protection Agency, “Overcoming Barriers to Green Infrastructure,” <https://www.epa.gov/green-infrastructure/overcoming-barriers-green-infrastructure>. Accessed June 2020.

¹⁶⁹³ Samuel E. Munoz, et al., “Climatic control of Mississippi River flood hazard amplified by river engineering,” *Nature* 556 (2018): 95-98.

¹⁶⁹⁴ Fanling Sun and Richard T. Carson, “Coastal wetlands reduce property damage during tropical cyclones,” *Proceedings of the National Academy of Sciences* 117, no. 11 (2020): 5719-5725.

“qualitative measures of costs and benefits that are difficult to quantify.”¹⁶⁹⁵ However, OMB’s current approach to RIAs may not fully consider climate change impacts, such as increased flood, wildfire, or extreme weather risk, on federal projects and policies.¹⁶⁹⁶ For example, a December 2019 Government Accountability Office (GAO) letter identified the limited set of criteria currently used by OMB and the U.S. Army Corps of Engineers to evaluate water resources development projects.¹⁶⁹⁷ In addition, studies have shown that benefit-cost analyses underlying RIAs tend to prioritize property valuations over the social value of keeping communities intact, thus discounting the value of federal climate resilience investments for low-income communities.¹⁶⁹⁸

Recommendation: Congress should direct OMB to consider climate impacts and risks, including flooding, wildfire, tropical storms, and extreme heat, in the development and evaluation of federal programs and regulations, and to update guidance to agencies on the development of regulatory analyses. Federal benefit-cost analyses should evaluate the exposure of federal investments and assets to climate impacts, as well as how federal action can increase or reduce climate impacts.

Committees of Jurisdiction: Oversight and Reform; Transportation and Infrastructure

¹⁶⁹⁵ Regulatory Planning and Review, Exec. Order No. 12866 (September 30, 1993).

¹⁶⁹⁶ Government Accountability Office, GAO-20-127, *Climate Resilience: A Strategic Investment Approach for High-Priority Projects Could Help Target Federal Resources* (October 2019).

¹⁶⁹⁷ Government Accountability Office, GAO-20-113R, *U.S. Army Corps of Engineers: Information on Evaluations of Benefits and Costs for Water Resources Development Projects and OMB’s Review* (December 2019).

¹⁶⁹⁸ Katharine J. Mach, et al., “Managed retreat through voluntary buyouts of flood-prone properties,” *Science Advances* 5, no. 10 (2019).

STRENGTHEN THE COUNTRY'S DEMOCRATIC INSTITUTIONS

All recommendations in this report will be more difficult to implement if entrenched moneyed interests—those that do not want to transition to zero-carbon energy sources—continue to have a greater say in the political process than average Americans.

It is beyond the scope of the Select Committee's charge to provide specific policy recommendations for building a healthier, more responsive democracy, but two bills passed by the House of Representatives in 2019 illustrate the type of change that is necessary.

In March 2019, the House of Representatives, led by Speaker Nancy Pelosi, passed H.R. 1, the For the People Act of 2019, on a partisan vote of 234 – 193. The bill, which has not advanced in the Senate, tackles three issues: campaign finance reform, voting rights, and federal ethics laws. On campaign finance reform, the bill establishes public financing of campaigns with an emphasis on small-dollar donations; supports a constitutional amendment to end *Citizens United*, the Supreme Court case that unleashed millions of dollars in dark money spending in U.S. elections; and requires super PACs and dark money political organizations to disclose their donors, among other provisions. To expand Americans' voting rights, the bill creates a national automatic voter registration program; promotes early voting and same-day voter registration; makes Election Day a holiday for federal workers and provides incentives for the private sector to offer the same; ends partisan gerrymandering; and prohibits purging of voter rolls. The bill also reforms federal ethics laws to promote transparency and discourage conflicts of interest in all three branches of the U.S. government.

In December 2019, the House also passed H.R. 4, the Voting Rights Advancement Act of 2019. The bill seeks to undo the damage caused by the Supreme Court's 2013 decision in *Shelby County v. Holder*, which invalidated a portion of the Voting Rights Act and thereby made it easier for towns, counties, and states to enact measures discriminating against voters of color and other politically marginalized populations. The bill restores the full protections of the bipartisan Voting Rights Act and establishes a targeted process for federal oversight of jurisdictions imposing measures that historically have led to voter discrimination, such as voter ID laws.

Polls consistently show that a majority of Americans support action to address climate change and build a just and equitable clean energy economy.¹⁶⁹⁹ To elevate these voices above those seeking to block action, Congress needs to pursue reforms to strengthen America's democratic institutions alongside the recommendations outlined in this report.

¹⁶⁹⁹ Yale Program on Climate Communication and George Mason University Center for Climate Change Communication, *Politics & Global Warming* (November 2019).

CONCLUSION

This report draws the direct connection between the warming world and the resulting threats to American lives and livelihoods. Solving the climate crisis provides the opportunity to acknowledge and commit to correcting the systemic economic and racial inequalities that plague our communities today and exacerbate the impacts of climate change. That is why justice and equity are at the core of the solutions put forward.

Confronting the climate crisis requires action across sectors and at all levels of government. The recommendations made by the majority staff of the Select Committee in this report will not only advance federal climate solutions, they will also provide the policy support for tribes, territories, states, and local governments to strengthen communities so that they will thrive in the coming decades. These actions are designed to advance climate science, spur technological innovation, create family-sustaining jobs, reverse economic losses due to disasters, attract private investment in resilient economies, and propel our nation's economic recovery forward.

The climate crisis is inextricably linked to the social, economic, and environmental challenges that afflict the nation and world today. But by working together, we can avert the worst impacts of climate change and build a stronger, healthier, and fairer America for everyone. What we choose to do now shapes the future for young people and Americans on the front lines of the climate crisis.

Now is the time for Congress to implement these recommendations with urgent and decisive action.

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APPENDICES

Appendix 1. Methodology for Modeled Emissions Reductions

The majority staff for the Select Committee previewed its draft policy recommendations with the non-partisan think tank Energy Innovation: Policy and Technology LLC (“Energy Innovation”). Energy Innovation used their open-source Energy Policy Simulator to model the emissions reductions and co-benefits from implementing a subset of the Select Committee’s recommendations.

Some of the recommendations in the Climate Crisis Action Plan that would help reduce greenhouse gas emissions are not easily quantified. Energy Innovation modeled recommendations that include quantifiable benchmarks or for which they could use existing literature to make reasonable assumptions about technology deployment and emissions reductions.

Energy Innovation modeled recommendations in the Climate Crisis Action Plan that cover the following sectors:

- Electricity – clean energy standard; improving planning, cost allocation, and siting to expand transmission; energy efficiency resource standard; clean energy tax credits
- Transportation – vehicle greenhouse gas emissions standards, zero emission sales mandates for light- and heavy-duty vehicles, low carbon fuel standard, zero emission vehicle tax credits
- Buildings – rebates for building electrification, incentives for net-zero emissions building code adoption, net-zero emissions federal buildings requirement, energy performance requirement for federal facilities, energy efficiency tax incentives, rebates for home energy retrofits
- Industry – tradable emissions performance standard, low-emission heat standard, Buy Clean program for federal procurement, carbon capture for process emissions, methane abatement from oil and gas systems, HFC phasedown, increased product efficiency and recyclability, industrial efficiency tax credits
- Agriculture – climate stewardship practices, advanced grazing management, improved nutrient management
- Natural climate solutions – large landscape conservation, reforestation and forest restoration

Sectors with Remaining Emissions in 2050

In 2050, the model shows that remaining greenhouse gas emissions are concentrated in industrial processes, heavy-duty and off-road (freight rail, shipping, and aviation) transportation, and agriculture. The Climate Crisis Action Plan includes additional policies to address these hard-to-abate sectors, such as robust RD&D, new incentives for advanced fuels, and incentives for farmers, but these recommendations were too speculative for Energy Innovation to model.

This modeling exercise also underscores how difficult it is to eliminate emissions economy-wide, that a suite of solutions is necessary, and why climate action is needed now for new technologies to progress along the learning curve in time for widespread deployment before mid-century.

Appendix 2. Key Wholesale Power Market Reforms

In the section of the report titled “Build a Cleaner and More Resilient Electricity Sector,” the majority staff for the Select Committee recommends that the Federal Energy Regulatory Commission use its existing authorities to conduct a rulemaking to review energy, reliability, and capacity market reforms that would better integrate renewable energy, battery storage, storage-as-transmission, hybrid resources, distributed energy resources, and demand response in wholesale power markets. Experts have outlined potential reforms in the studies listed below.

- Jacob Mays, David P. Morton & Richard P. O’Neil, *Asymmetric Risk and Fuel Neutrality in Capacity Markets* (January 22, 2019).
- Michael Goggin, Rob Gramlich, Steven Shparber, and Alison Silverstein, *Customer Focused and Clean: Power Markets for the Future* (Wind Solar Alliance, 2018).
- Energy Innovation, *Wholesale Electricity Market Design for Rapid Decarbonization* (June 2019).
- Robbie Orvis and Sonia Aggarwal, *A Roadmap for Finding Flexibility in Wholesale Markets: Best Practices for Market Design and Operations in a High Renewables Future* (October 2017).
- Rob Gramlich et al., *Future Electricity Markets: Designing for Massive Amounts of Zero-Variable-Cost Renewable Resources* (November 2019).
- Rob Gramlich, Michael Goggin, and Jason Burwen, *Enabling Versatility: Allowing Hybrid Resources to Deliver Their Full Value to Customers* (September 2019).