Power Up Training: From Acts to Action background memo

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PART 2: Inflation Reduction Act

The Climate Reality Project

Executive Summary

In the United States, two recent laws – the Infrastructure Investment and Jobs Act (IIJA), also known as the Bipartisan Infrastructure Law, signed into law on November 15, 2021; and the Inflation Reduction Act (IRA), signed into law on August 16, 2022 – represent historic opportunities to shift toward a cleaner, more just economy and society. Successful implementation of these laws can help put the US on track to achieve its 2030 commitment to cut emissions 50–52% below 2005 levels.[1]

Passed with broad support across party lines, the Bipartisan Infrastructure Law aims to revitalize the nation's aging infrastructure with $1.2 trillion in investments, of which $550 billion is directed to new spending on transportation, clean energy deployment, water infrastructure, and broadband internet access. Transportation represents the largest pot of funding with $20.4 billion available in the first year to advance public transit projects across nine states and Electric Vehicle Infrastructure Deployment Plans already approved for all 50 states, the District of Columbia, and Puerto Rico.[2] While this law has the potential to cut emissions, concerns remain over the flexibility afforded to states in deciding how to use these funds. In fact, the Bipartisan Infrastructure Law could result in a net *increase* in greenhouse gas emissions from transportation, due to outcomes such as highway expansions.[3]

Following a turbulent year for climate action, the IRA was enacted in 2022 and represents the single-largest package of climate and energy investments in US history.[4] The reconciliation process through which the law was passed required creative allocation of funding to inspire action across sectors from clean energy to agriculture that, in combination with existing efforts, could accelerate emissions reductions to 40% below 2005 levels by 2030.[5]

The law is expected to boost American manufacturing while advancing environmental justice through several grant programs to reduce emissions and spur economic activity in federally-designated disadvantaged communities (hereafter, "disadvantaged communities").[6] However, because this law is not a typical piece of policy legislation, it relies heavily on federal agencies to publish guidance and implement best practices to effectively carry out its provisions; many of these agencies have already collected comments from relevant industries, organizations, technical experts, and the public.

The IRA seeks to address many of President Biden's transportation priorities, including:

- Zero-emission vehicles constituting at least 50% of all car sales in 2030.
- Developing a sustainable supply of critical minerals such as for EVs.
- Expanding opportunities for sustainable fuels, including for aviation.[7]

The IRA is expected to supercharge the power grid with about 950 million new solar panels, 120,000 wind turbines, and 2,300 grid-scale battery systems by 2030, accelerating the trajectory to a net-zero economy. IRA measures will also save consumers money, such as $14,000 in direct consumer rebates to switch to heat pumps or energy efficient appliances and a new tax credit for rooftop solar that can shave about $9,000 off the lifetime costs of the system. Thanks in part to

these measures, household energy costs are expected to drop, saving families about $500 each year on average.[8]

Programs targeting the transportation and energy sectors stand to have the most impact on reducing US emissions, from deploying low- and zero-emission public transit to increasing electrification and energy efficiency. In addition to meeting climate targets and boosting US GDP, the Bipartisan Infrastructure Law and the IRA are projected to create millions of good jobs: nearly 800,000 jobs per year over 10 years from the IIJA, and up to 1.3 million new job-years in 2030 from the IRA.[9]

The Bipartisan Infrastructure Law commits over $90 billion to repair and modernize America's public transit infrastructure – potentially going a long way to addressing a wide range of issues including:

- The estimated $105 billion repair backlog.
- The insufficiency of transit options for many communities of color (who are twice as likely overall to utilize it).
- Improving accessibility for the elderly and people with disabilities.
- The necessary shift away from personal vehicles to reduce emissions.[10]

Another $66 billion is set for rail projects, including $36 billion for intercity passenger rail and nearly $22 billion for Amtrak infrastructure and fleet replacement, as well as accessibility updates.[11] The Bipartisan Infrastructure Law also includes up to $7.5 billion for electric vehicle (EV) charging infrastructure, which will be critical for improving EV accessibility and advancing a wide range of climate goals.[12] This charging infrastructure will also support the increase in EVs being driven by the IRA's tax credits for new and used clean passenger and commercial vehicles.[13]

Within the energy sector, the Bipartisan Infrastructure Law addresses the need to:

- Modernize the power grid.
- Shift to clean, reliable energy technologies, with attention to rural America, Indigenous lands, and energy communities.
- Strengthen energy supply chains and increase the sector workforce.
- Kickstart the country's energy storage industry.
- Boost critical energy efficiency measures.
- Clean up legacy fossil fuel pollution across the country.[14]

With a roughly $65-billion investment in the US electrical grid – the largest such investment to date – the Bipartisan Infrastructure Law pushes toward national clean energy goals and increases the reliability of the energy grid while protecting families from fossil fuel pollution and saving households and the country money on energy costs (the US economy loses about $70 billion each year to power outages).[15] The build-out of transmission infrastructure will be a crucial component in updating the electrical grid and bringing new clean energy online. Such changes would be impossible without these new historic laws – with their potential to mitigate transmission burdens by expanding federal siting authority, provide funding for increased transmission development capacity, and address regulatory resourcing concerns.

As of November 2022, over $185 billion in Bipartisan Infrastructure Law funding had been approved for more than 6,900 projects in over 4,000 communities across all 50 states, the District of Columbia, and US territories. Notable transportation-related funding projects that have been approved, totaling tens of billions of dollars, include:

- Over 5,000 new clean transit and school buses.
- About 75,000 miles of EV charging networks.
- Accessibility at transit stations across the country.
- Public transit projects in at least nine states.[16]

And notable energy-related funding approvals total nearly $8.5 billion to:

- Strengthen and modernize the power grid.
- Support residential home energy retrofitting and weatherization.
- Advance battery component production and critical materials processing.
- Help families pay outstanding heating and cooling bills.[17]

Several programs in these laws will allocate funding in accordance with President Biden's Justice40 Initiative, which aims to direct 40% of federal investments to benefit communities disproportionately impacted by pollution.[18] As of November 2022, the Department of the Interior has awarded $45 billion to 76 Tribes and eight Tribal organizations, with $20 billion sourced from the Bipartisan Infrastructure Law, for climate resilience projects that will support adaptation and climate management practices.[19] While many funds from the IRA have yet to become available, the Environmental Protection Agency has announced the first round of $100 million in funding for Environmental Justice Grants.[20]

With an emphasis on equitable distribution of funds, these policies have the potential to address environmental and socioeconomic burdens that have long plagued disadvantaged communities, while moving the country toward achieving substantial emission reductions by the end of the decade. However, the passage of these laws was only the start. The road ahead for effective implementation is complex and will require extensive coordination from local, state, and federal government entities. Neither of these laws are perfect, and both contain harmful provisions that benefit the oil and gas industries, so continued oversight from relevant agencies and the public will be critical to ensuring these laws achieve their maximum potential.

Now is not the time to settle in complacency with what has been accomplished. Implementation will continue over the next few years, and starting strong with constructive guidance is vital to ensuring that these laws achieve their climate goals. It's time to take advantage of this momentum and push for further action from our elected leaders, while holding them accountable for the promises they have already made. The future will depend on it.

PART 1: Infrastructure Investment and Jobs Act

Top-Line Numbers

The Infrastructure Investment and Jobs Act (IIJA) – or Bipartisan Infrastructure Law – allocated about $1.2 trillion in total funding, including $550 billion in new spending spread across the transportation sector, power infrastructure, broadband, water infrastructure, environmental resiliency and remediation, and more. More than half of the new funding ($284 billion) will go towards the transportation sector.[21]

Spending Category	New Funding
Roads, Bridges, Major Projects	$110 billion
Power Infrastructure and Grid Automation	$73 billion
Passenger and Freight Rail	$66 billion
Broadband	$65 billion
Water Infrastructure	$55 billion
Environmental Resiliency	$47 billion
Airports, Ports, and Waterways	$42 billion
Public Transit	$39 billion
Environmental Remediation	$21 billion
Electric Vehicle Infrastructure, Buses, and Transit	$15 billion
Safety	$11 billion
Other	$5 billion
Reconnecting Communities	$1 billion
Total new spending	$550 billion

Table 1: Total new spending in the IIJA[22]

Emissions

- The Bipartisan Infrastructure Law's many transportation- and energy-related programs have the potential to reduce America's emissions in some critical areas. However, depending on implementation, especially in the transportation sector, there is a real possibility of a net increase in GHG emissions overall.[23] Thus it will be critical to focus on climate-friendly projects.
    - The proportion of funding going into highway construction or expansion versus other projects is a primary driver of changes in emissions resulting from the law.[24]
    - A 2022 Princeton University study suggests that emissions could decrease (below 2005 levels) to 27% with or 26% without IIJA implementation by 2030. However, that study did not consider potential changes to freight and passenger miles traveled.[25]
    - Changes in emissions resulting from the Bipartisan Infrastructure Law will depend on spending decisions made at the federal, state, and local levels. For instance, adding more lanes to existing roadways or building more roads could

increase emissions. The law could "bend" the emissions curve in either direction given the spending discretion the law affords to policymakers.[26]

- The IIJA's various transportation programs should have a massive impact on national emissions reduction efforts. Many programs specifically mention the intent to reduce emissions (see below), while for many others a similar outcome is implied based on the types of eligible projects.
    - Among the many goals for public transit infrastructure ($91.2 billion) is reducing dependence on personal vehicles to reduce GHG emissions.[27]
        - For additional information, see the IIJA's Public Transportation section.
    - Provisions for electric vehicle charging infrastructure (up to $7.5 billion) includes specific mention of reducing emissions.[28]
        - For additional information, see the IIJA's Electric Vehicles, Buses, and Ferries section.
    - Airport Infrastructure Grant Program – $15 billion[29]
        - Includes a provision for projects that reduce airport emissions.
        - For additional information, see the IIJA's Airports and Federal Aviation Administration Facilities section.
    - Consolidated Rail Infrastructure and Safety Improvements Grant Program – $5 billion[30]
        - Eligible projects include those aiming to reduce locomotive emissions.
        - For additional information, see the IIJA's Passenger Rail and Freight section.
    - Port Infrastructure Development Program Grants – $2.25 billion[31]
        - Projects funded by this program should reduce or eliminate port-related criteria pollutant or GHG emissions, among other things.
        - For additional information, see the IIJA's Ports and Waterways section.
    - Reduction of Truck Emissions at Port Facilities – $400 million[32]
        - Grants available for projects that reduce truck idling and port-related emissions.
        - For additional information, see the IIJA's Ports and Waterways section.
    - Two other programs (both under IIJA's provisions for Roads, Bridges, and Major Projects, but neither elsewhere outlined in this memo) mention reducing emissions among their goals:
        - Congestion Mitigation and Air Quality Improvement Program – $13.2 billion[33]
            - Funding for this existing program is for projects in US states (including the District of Columbia) that reduce congestion and reduce the mobile source emissions for which an area has been designated nonattainment or maintenance for ozone, carbon monoxide, or particulate matter by the US Environmental Protection Agency (EPA).
            - The cost-share requirement is typically 80% federal-20% non-federal, but 90%-10% for interstate projects. Waivers are available for some circumstances.
            - Funds available for four years.

        - Carbon Reduction Program – $6.42 billion (approximately)[34]
            - This new program provides formula grants for US states (including the District of Columbia) to reduce transportation emissions or the development of carbon reduction strategies.
            - Eligible projects may include the construction, planning, and design of trail facilities for pedestrians, bicyclists, and other nonmotorized forms of transportation; public transportation projects; and congestion management technologies.
            - The cost-share requirement is typically 80% federal-20% non-federal, but 90%-10% for interstate projects.
            - Funding to remain available for four years.
- While most of the IIJA's clean energy and energy-related programs have implied emissions reduction outcomes, a few programs specifically mention reducing GHG emissions as a goal:
    - Advanced Energy Manufacturing and Recycling Grants – $750 million[35]
        - Among the program's aims include reducing emissions from industrial and manufacturing facilities.
        - For additional information, see the IIJA's Manufacturing, Recycling, and Energy Supply Chains section.
    - Energy Efficiency and Conservation Block Grant Program – $550 million[36]
        - This program aims to reduce fossil fuel emissions through energy efficiency and conservation.
        - For additional information, see the IIJA's Energy Efficiency section.
    - Clean Energy Demonstrations on Current and Former Mine Land – $500 million[37]
        - Eligible clean energy projects under this program include those providing the greatest net impact in avoiding or reducing GHG emissions.
        - For additional information, see the IIJA's Clean Energy section.
    - Energy Improvement in Rural or Remote Areas – $1 billion[38]
        - The program includes language on reducing emissions from energy generation in rural or remote areas.
        - For additional information, see the IIJA's Transmission section.

Transportation

- As of November 2022, IIJA funding for thousands of transportation projects has been approved, worth tens of billions of dollars. Select projects relevant to climate and justice include:[39]
    - $20.4 billion for public transit projects in at least nine US states: Arizona, California, Illinois, Indiana, Minnesota, New York, Pennsylvania, Tennessee, and Washington.
    - Over 5,000 new clean transit and school buses; EPA awarded nearly $1 billion in rebates to nearly 400 school districts spanning 50 states, the District of Columbia, and several Tribes and US territories.
    - More than $1.5 billion for about 75,000 miles of EV charging networks, with strong labor, safety, and workforce standards.

    - $1.75 billion to improve accessibility at transit stations nationwide.
- In January 2023, the Federal Transit Administration (FTA) announced $384.4 million to expand and improve ferry services across the country, as well as accelerate the transition to zero-emission transportation. Select projects include:[40]
    - The Alaska Department of Transportation & Public Facilities is receiving nearly $286 million to modernize and replace passenger ferries and make critical dock upgrades in several communities. Improvements will also be made to the 3,500-mile Alaska Marine Highway System, which serves 35 communities, some of which are remote with high transportation costs.
    - Through the Electric or Low-Emitting Ferry Program (see program details in the IIJA's Electric Vehicles, Buses, and Ferries section), the Maine Department of Transportation is receiving $28 million to replace an old ferry with a hybrid-electric vessel that will reduce GHG emissions and promote environmental sustainability for the rural community on Islesboro island.
    - Through the Urbanized Area Passenger Ferry Program (see program details in the IIJA's Public Transportation section), the Massachusetts Bay Transportation Authority is receiving $6.6 million to modernize and improve safety and accessibility for the Hingham Ferry dock, including upgraded lighting and increased ferry capacity.

Passenger and Freight Rail

- US passenger rail lags behind the rest of the world in reliability, speed, and coverage, in large part due to the lack of a multi-year funding stream to address existing and future needs, from deferred maintenance to building new lines.[41]
- The IIJA invests $66 billion – with up to $36 billion additional authorized over the next five years – for reliable, efficient, climate-friendly federal rail programs.[42]
- Amtrak grants – $21.75 billion[43]
    - Funding for capital projects for Amtrak infrastructure, fleet replacement, and Americans with Disabilities Act (ADA) updates.
    - Grants fall into two categories:
        - The Amtrak National Network Grants provide $15.75 billion to eliminate the backlog of deferred maintenance of rolling stock, facilities, stations, and infrastructure on the National Network.[44]
        - The Amtrak Northeast Corridor Grants provide $6 billion to eliminate the backlog of obsolete assets and deferred maintenance on the Northeast Corridor.[45]
    - Grants are available until expended and do not have federal cost-share requirements.[46]
- Federal-State Partnership for Intercity Passenger Rail Grant Program – $36 billion[47]
    - Grants for capital projects that reduce the backlog of repairs (e.g. replace, rehabilitate, or repair infrastructure, equipment, or a facility); improve performance (e.g. reduced trip time, increased train frequency, higher operating speed, improved reliability, expanded capacity, reduced congestion, electrification); expand or establish new intercity passenger rail service, including

those privately operated if an eligible applicant is involved; or the planning, environmental review, and final design of eligible projects.
    - Eligible recipients are US states or a group of states (including the District of Columbia); an interstate compact; a public agency or publicly chartered authority established by one or more states; a political subdivision; Amtrak, acting on its own behalf or under a cooperative agreement with one or more states; federally recognized Tribes; and any combination of the entities above.
    - The cost-share requirement is 80% federal, 20% non-federal.
    - Grants are available until expended.
- Consolidated Rail Infrastructure and Safety Improvements Grant Program – $5 billion[48]
    - Grants for projects to improve the safety, efficiency, and reliability of intercity passenger and freight rail. Some of the various eligible projects are: freight and passenger rail capital, safety technology deployment, planning, environmental analyses, research, workforce development, and training; preparation of emergency plans for communities through which hazardous materials are transported by rail; research, development, and testing to advance innovative rail projects; and rehabilitating, remanufacturing, procuring, or overhauling locomotives to reduce emissions.
    - This program leverages private, state, and local investments to support safety enhancements and general improvements to infrastructure.
    - Eligible recipients are US states or a group of states (including the District of Columbia); an interstate compact; a public agency or publicly chartered authority established by one or more states; a political subdivision of a state; Amtrak and other rail carriers providing intercity rail passenger transportation; Class II/III railroads and associations; rail carriers and equipment manufacturers in partnership with at least one of the above entities; federally recognized Tribes; Transportation Research Board; University Transportation Centers engaged in rail-related research; and non-profit labor organizations representing rail employees.
    - The cost-share requirement is 80% federal, 20% non-federal with statutory preference for 50/50 split.
    - Grants are available until expended.
- Railroad Crossing Elimination Grant Program – $3 billion[49]
    - Competitive grants for mitigating or eliminating hazards at highway-rail or pathway-rail crossings, where feasible, for the improved safety and mobility of people and goods.
    - Eligible recipients are US states (including the District of Columbia), Puerto Rico, and other US territories and possessions; a political subdivision of a state; a federally recognized Tribe; a unit of local government or a group of local governments; a public port authority; a metropolitan planning organization; and a group of entities described above.
    - The cost-share requirement is 80% federal, 20% non-federal.
    - Grants are available until expended.
- Restoration and Enhancements Grant Program – $250 million[50]

  - Competitive grants for operating assistance to initiate, restore, or enhance intercity passenger rail service.
  - Establishing new services; additional frequencies; service extensions; offering new on-board services.
  - Cost-share requirements:
    - Year 1 – 90% federal, 10% non-federal
    - Year 2 – 80% federal, 20% non-federal
    - Year 3 – 70% federal, 30% non-federal
    - Year 4 – 60% federal, 40% non-federal
    - Year 5 – 50% federal, 50% non-federal
    - Year 6 – 30% federal, 70% non-federal
  - Grants are available until expended.
- Corridor Identification and Development Program – up to 5% of the funding made available for the Fed-State Partnership grants program ($1.8 billion of $36 billion; see details in the IIJA's Fed-State program above).[51]
  - Provides funding to identify new intercity passenger rail corridors, develop the necessary service planning elements, and create a project pipeline for associated capital projects off the Northeast Corridor.
  - Per the notice of establishment of the program, eligible routes include: new or enhancement of an existing intercity passenger rail of less than 750 miles; the restoration of service over all or portions of intercity passenger rail formerly operated by Amtrak; and the increase of service frequency of a long-distance intercity passenger rail.[52]
  - The cost-share requirement is 80% federal, 20% non-federal (consistent with the Fed-State Partnership grants program).[53]
- Interstate Rail Compacts Grant Program[54]
  - Provides funding for interstate rail compacts' administrative costs and to conduct railroad systems planning, promotion of intercity passenger rail operations, and the preparation of grant applications.

Public Transportation

- The IIJA invests $91.2 billion for public transit infrastructure.[55]
  - Nationwide, more than 24,000 buses and vans, 5,000 rail cars, 200 passenger stations, 300 maintenance facilities, and thousands of miles of track, guideway, signals, and power systems are in need of repair or replacement.[56]
- Urbanized Area Formula Grants – $33.4 billion (approximately)[57]
  - Provides funding to urbanized areas (populations between 50,000 and 200,000 people, or with 100 or fewer buses) and to governors for transit capital and operating assistance in urbanized areas and for transportation-related planning.
  - Approximately $3.3 billion will also be provided from the Growing States and High-Density States formula factors.
  - Eligible recipients include US states, counties, cities / townships, special districts, and federally recognized Tribal governments.

    - Funding available for five years after the first year of allocation (for a total of six years).
- State of Good Repair Formula Grants – $21.6 billion (approximately)[58]
    - Funding for existing fixed guideway systems (including rail, bus rapid transit, and passenger ferries) and high-intensity motorbus systems (operating in high-occupancy vehicle lanes) to maintain a state of good repair and ensure public transit operates safely, efficiently, reliably, and sustainably.
    - Eligible recipients include US states, counties, cities/townships, special districts, and federally recognized Tribal governments.
    - The cost-share requirement is 80% federal, 20% non-federal.
    - Funding available for three years after the first year of apportionment (for a total of four years).
- Capital Investment Grants – $8 billion[59]
    - Provided to support new and expanded heavy rail, commuter rail, light rail, streetcars, and bus rapid transit – including New Starts for the construction of new systems and expansion of existing systems, Small Starts for projects with capital costs less than $400 million, and Core Capacity upgrading existing corridors to handle increased demand.
- Low or No Emission (Bus) Grants – $5.6 billion (approximately)[60]
    - Provided for state and local governments to the purchase or lease zero-emission and low-emission transit buses, including acquisition, construction, and leasing of required supporting facilitates.
    - 5% of zero-emission bus funding will also support workforce development training so transit operators and mechanics can learn how to maintain and operate zero-emission vehicles.
    - Eligible recipients include states, counties, cities/townships, special districts, and federally recognized Tribal governments.
    - Available for three years after the first year of allocation (for a total of four years).
- Formula Grants for Rural Areas – $4.1 billion (approximately)[61]
    - Improve, initiate, or continue public transportation in non-urbanized areas (rural areas and small cities under 50,000 in population); provide technical assistance for rural transportation; maintain and expand existing services in rural areas.
    - Various program goals include:
        - Enhancing access to health care, education, and employment in rural areas.
        - Assisting in the maintenance, development, improvement, and use of public transportation systems in rural areas.
        - Encouraging and facilitating the most efficient use of all transportation funds used to provide passenger transportation in rural areas.
        - Providing financial assistance to help carry out national goals related to mobility for all, including seniors, individuals with disabilities, and poor individuals.
        - Increasing availability and the development and support of intercity bus transportation.

        - Encouraging mobility management, employment-related transportation alternatives, joint development practices, and transit-oriented development.
        - Providing for the participation of private transportation providers in rural public transportation.
    - The Public Transportation on Indian Reservations Program is a set-aside from the Formula Grants for Rural Areas program that consists of both a formula and competitive grant program for federally recognized Tribes or Alaska Native villages, groups, or communities in rural areas.
    - Approximately $586 million will also be provided from the Growing States formula factors.
    - Eligible recipients include US states, counties, cities / townships, special districts, federally recognized Tribal governments, nonprofits with and without 501(c)(3) status, and private for-profit intercity bus carriers.
    - Funding available for two years after the first year of apportionment (for a total of three years).
- Bus and Bus Facilities Formula Grants – $3.2 billion (approximately)[62]
    - Provides capital funding to replace, rehabilitate, purchase, or lease buses and bus-related equipment; and to rehabilitate, purchase, construct, or lease bus-related facilities.
    - Eligible recipients include states, counties, cities/townships, special districts, and federally recognized Tribal governments.
    - Funding available for three years after the first year of apportionment (for a total of four years).
- Enhanced Mobility of Seniors and Individuals with Disabilities Formula Program – $2.2 billion (approximately)[63]
    - Increases funding to this existing program to provide mobility options to seniors and persons with disabilities where public transportation services are unavailable, insufficient, or inappropriate in all areas – large urban, small urban, and rural.
    - Eligible recipients are US states, counties, cities/townships, special districts, federally recognized Tribal governments, and nonprofits with and without 501(c)(3) status.
    - Available for two years after the first year of allocation (for a total of three years).
- Ferry Service for Rural Communities – $2 billion[64]
    - Funding available to US states to ensure basic essential ferry service is provided to rural areas that operated a regular service at any time during the five-year period ending March 1, 2020 and that served no less than two rural areas located more than 50 nautical miles apart.
    - Funding available through 2026.
    - In January 2023, the FTA announced $252.4 million to eight rural ferry projects in four states.[65]
- Bus and Bus Facilities Competitive Grants – $2 billion (approximately)[66]
    - Provides capital funding to replace, rehabilitate, purchase, or lease buses and bus-related equipment; and to rehabilitate, purchase, construct, or lease bus-related facilities.

  - Eligible recipients include states, counties, cities/townships, special districts, and federally recognized Tribal governments.
  - Funding available for three years after the first year of apportionment (for a total of four years).
- All Stations Accessibility Program – $1.75 billion[67]
  - Provides funding to eliminate rail station barriers by upgrading the accessibility of legacy rail fixed guideway public transportation systems for people with disabilities, including those who use wheelchairs.
  - Eligible recipients are US states and local government authorities.
  - The cost-share requirement is 80% federal, 20% non-federal.
  - Funding available through 2026.
- Rail Vehicle Replacement Grants – $1.5 billion[68]
  - Capital projects to US state and local government authorities for the replacement of rail rolling stock. Not more than three new competitive awards to eligible projects may be announced each fiscal year, but the FTA may select projects for multi-year awards.
  - The cost-share requirement is 80% federal, 20% non-federal; however, funds cannot exceed 50% of total cost.
  - Funding available for three years after the first year of apportionment (for a total of four years).
- Metropolitan Transportation Planning Program - $799.4 million (approximately)[69]
- University Transportation Centers (UTC) Program – $500 million[70]
  - Advance US technology and expertise in the many disciplines comprising transportation through education, solutions-oriented research and technology transfer, and the exploration and sharing of cutting-edge ideas and approaches; and to develop the next generation of transportation professionals.
- Strengthening Mobility and Revolutionizing Transportation (SMART) Grants – $500 million[71]
  - Grants to rural, midsized, and large communities to conduct demonstration projects focused on advanced smart city or community technologies and systems in a variety of communities to improve transportation efficiency and safety.
- Public Transportation on Indian Reservations Formula – $183.3 million (approximately)[72]
- Statewide Transportation Planning – $167 million (approximately)[73]
- Urbanized Area Passenger Ferry Program – $150 million[74]
  - In January 2023, the FTA announced $34.4 million to eight projects in six states and the US Virgin Islands.[75]
- Appalachian Development Public Transportation Assistance Program – $137.4 million (approximately)[76]
- Research, Development, Demonstration and Deployment Projects – $132.2 million (approximately)[77]
  - Funding for safe, efficient, equitable, climate-friendly, and socially-just public transportation, especially to improve services for transit-dependent individuals.
- Rural Transportation Assistance Program – $91.6 million (approximately)[78]
- Pilot Program for Transit Oriented Development – $68.9 million (approximately)[79]

    - Funding to local communities to integrate land use and transportation planning with a new fixed guideway or core capacity transit capital investment – improve economic development and ridership; foster multimodal connectivity and accessibility; improve transit access for pedestrian and bicycle traffic; engage the private sector; identify infrastructure needs; and enable mixed-use development near transit stations.
- Public Transportation on Indian Reservations Competitive – $45.8 million (approximately)[80]
- Transit Cooperative Research Program – $34.4 million (approximately)[81]
    - Funding for peer-reviewed academic research, development, and technology transfer activities to develop near-term, practical solutions to problems facing public transportation.
- Public Transportation Technical Assistance and Workforce Development – $27.5 million (approximately)[82]
- Pilot Program for Enhanced Mobility – $24.1 million (approximately)[83]
- National Rural Transportation Assistance Program – $13.7 million (approximately)[84]

Airports and Federal Aviation Administration Facilities

- The IIJA invests $25 billion to address repair and maintenance needs, reduce congestion and emissions, and modernize the US national aerospace system. No airport in the US ranks in the top 25 of airports worldwide.[85]
- Airport Infrastructure Grant Program – $15 billion[86]
    - Provides funding to approximately 3,100 airports across the country to invest in a variety of maintenance and improvement projects (e.g. runways and taxiways, noise, multimodal, and terminal buildings). The program includes a competitive $100 million funding pool ($20 million annually) for airport-owned contract airport traffic control towers.
    - Eligible recipients include public agencies, private entities, state and Tribal governments owning a public use National Plan of Integrated Airport Systems airport, airports eligible for Airport Infrastructure Grants include primary airports, certain cargo airports, and most general aviation/commercial service airports that are not primary airports but in the National Plan of Integrated Airport Systems.
    - Funds are available for five years. At the end of the fifth year, unobligated funds are available for a competitive discretionary grant program – the first $100 million for airport-owned contract airport traffic control towers and the remainder for projects that reduce airport emissions, noise impacts, dependence on the electric grid, or provide benefits to the surrounding community.
- Airport Terminal Program – $5 billion[87]
    - This new discretionary grant program is for airport terminal development; access roads and walkways; multimodal terminal development; projects for on-airport rail access; and projects for relocating, reconstructing, repairing or improving an airport-owned air traffic control tower.
    - Eligible recipients include public agencies, private entities, state and Tribal governments owning a public use National Plan of Integrated Airport Systems

airport, and the Secretaries of the Interior for Midway Island Airport, the Republic of the Marshall Islands, Federated States of Micronesia, and the Republic of Palau.
    - The federal cost-share requirement is a 20% match for large/medium hubs, and a 5% match for all others.
    - Funds are available for five years.
- Facilities and Equipment Program – $5 billion[88]
    - Provides funding for FAA-owned airport traffic control towers and FAA-owned contract towers.
    - This funding will allow the Federal Aviation Administration to place a down payment on the growing end-of-life backlog within the facilities portfolio.
    - The focus on lower-tier airport traffic control towers and specific facilities portfolio backlog items will help to improve safety, security, and environmental standards at facilities that infrequently receive the limited amount of yearly appropriated Facilities and Equipment Program dollars.
    - Funds are available until expended.

Ports and Waterways

- The IIJA invests over $16.7 billion to improve infrastructure at coastal ports, inland ports and waterways, and land ports of entry along our borders, and, in turn, helping strengthen US supply chains.[89]
- Army Corps of Engineers Operation and Maintenance – $4 billion[90]
    - Funding supports construction (coastal ports, inland waterways, and other water infrastructure) as well as inspection, operation, and maintenance of authorized Army Corps water resources projects, including navigation channels, navigation locks and dams, structures to reduce the risk of flood and storm damage (e.g., levees), and multi-purpose projects.
    - Funding includes $626 million for repair of damages caused by natural disasters and $40 million for snowpack monitoring.
    - Funds are available until expended.
- Port Infrastructure Development Program Grants – $2.25 billion[91]
    - Projects that improve the resiliency of ports to address sea-level rise, flooding, and extreme weather events (as well as earthquakes and tsunami inundation).
    - Projects that reduce or eliminate port-related criteria pollutant or GHG emissions, including port electrification or electrification master planning; worker training to support electrification technology; EV charge or hydrogen refueling infrastructure for drayage, and medium or heavy-duty trucks and locomotives that service the port and related grid upgrades; development of port or terminal micro-grids and anti-idling technologies; among others.
    - The cost-share requirement is 80% federal, 20% non-federal, with waivers available for small and rural projects.
    - Funding available for 10 years.
- Construction of Ferry Boats and Ferry Terminal Facilities – $912 million[92]

    - Among the eligible uses for these formula grants are replacing propulsion systems with newer cleaner and more energy-efficient power plants and improving access for the disabled.
    - The cost-share requirement is 80% federal, 20% non-federal.
    - Funds available until expended.
- Mississippi River and Tributaries – $808 million[93]
    - Funding for use by the Army Corps to plan, design, construct, operate, and maintain certain federal flood damage reduction projects in the lower Mississippi River alluvial valley below Cape Girardeau, Missouri; and includes $258 million for damage repairs.
    - Funds available until expended.
- Reduction of Truck Emissions at Port Facilities – $400 million[94]
    - Competitive grants for this existing program are intended to test, evaluate, and deploy projects that reduce truck idling and port-related emissions, including through the advancement of port electrification.
    - The cost-share requirement is 80% federal, 20% non-federal.
    - Funds available for four years.
- America's Marine Highway Program Grants – $25 million[95]
    - Grants to develop and expand marine highway service options and facilitate their further integration into the current US surface transportation system, especially where water-based transport is the most efficient, effective, and sustainable option.
    - The program seeks to procure zero- or near-zero emission equipment when available and practical.
    - The cost-share requirement is 80% federal, 20% non-federal.
    - Funds available for 10 years.

Electric Vehicles, Buses, and Ferries

- The IIJA includes up to $7.5 billion to help build out a national network of 500,000 electric vehicle chargers.[96]
    - EV chargers will be deployed within communities and along highway corridors to facilitate long-distance travel.
    - There are investments for specific vehicles to transition to electric: passenger vehicles, school buses, transit buses, and passenger ferries to reduce emissions for their riders, including children and poor families that bear the greatest burdens of transportation pollution.
- Low or No Emission (Bus) Grants – $5.6 billion (approximately; see program details in the IIJA's Public Transportation section)[97]
- National Electric Vehicle Charging Formula Program – $5 billion[98]
    - Provides for the strategic deployment of EV charging infrastructure for an interconnected network in and across US states (including the District of Columbia); to facilitate data collection, access, and reliability; proper operation and maintenance of EV charging infrastructure; and data sharing to ensure the long-term success of investments.

  - Sets aside 10% of funding for discretionary grants to state and local governments that require additional assistance.
  - The cost-share requirement is 80% federal, 20% non-federal.
  - Funds available until expended.
  - In November 2021, the US Department of Transportation (DOT) released state-by-state (and US territory) fact sheets highlighting how programs like this one will deliver.[99]
- Clean School Bus Program – $5 billion[100]
  - State and local governments, eligible contractors, Tribes, and nonprofit school transportation associations are authorized to receive 50% of funds for zero-emission school buses and 50% of funds for alternative fuels and zero-emission school buses.
  - Funds may be prioritized for rural or poor communities and entities that have matching funds available; and can cover up to 100% of the costs for bus replacement with EPA Administrator authorization.
  - No non-federal cost-share is required.
  - Funds available until expended.
- Charging and Fueling Infrastructure Grants – $2.5 billion[101]
  - Community Charging – $1.25 billion
    - Install EV charging and alternative fuel in publicly accessible locations (public roads, schools, parks, and public parking facilities), to be prioritized for rural areas, low- and moderate-income neighborhoods, and communities with low ratios of private parking, or high ratios of multi-unit dwellings; operating assistance (first five years after installation); traffic control devices.
    - Eligible recipients are US states and territories, a political subdivision of a state, local governments, a metropolitan planning organization, special purpose district or public authority with a transportation function, and Tribes.
    - The cost-share requirement is 80% federal, 20% non-federal.
    - Funds available for four years.
  - Corridor Charging – $1.25 billion
    - Deploy electric vehicle charging and fueling (hydrogen, propane, and natural gas) infrastructure along designated alternative fuel corridors and in communities.
    - Eligible recipients are US states and territories, a political subdivision of a state, local governments, a metropolitan planning organization, special purpose district or public authority in transportation, and Tribes.
    - The cost-share requirement is 80% federal, 20% non-federal.
    - Funds available for four years.
- Electric or Low-Emitting Ferry Program – $250 million[102]
  - Funding to support the transition of passenger ferries to low or zero-emission technologies.
  - In January 2023, the FTA announced over $97 million to seven projects in seven states.[103]

    - Any eligible designated or direct recipients of the FTA's Urbanized Area Formula Program or the Formula Grants for Rural Areas may apply.[104]
    - The cost-share requirement can vary, but is typically 80% federal, 20% non-federal.[105]
    - The period of availability has not been determined as of January 2023.
- Electric Drive Vehicle Battery Recycling and 2nd Life Apps – $200 million[106]
    - Funding goes to research, development, testing, evaluation, and demonstration of EV battery recycling and second-life applications for EV batteries.
    - Eligible recipients include institutions of higher education, national laboratories, nonprofit and for-profit private entities, state and local governments, and consortia of those entities.
    - Funds available until expended.
- Low or No Emission Vehicle Component Assessment Program (LoNO-CAP) – $26.2 million (approximately)[107]
    - Two qualified institutions of higher education will receive LoNO-CAP funding to conduct testing, evaluation, and analysis of low- or no-emission vehicles and vehicle components, including new and emerging technology components, intended for low- and zero-emission buses used to provide public transportation; and to conduct directed technology research, as well as operations, maintenance, testing, and evaluation.
    - The cost-share requirement is 50% federal, 50% non-federal.
    - The period of availability has not been determined as of January 2023.

Energy

- As of November 2022, many energy-related projects have been approved for IIJA funding, including:[108]
    - $2.3 billion in formula funding to strengthen and modernize the power grid.
    - Nearly $3.2 billion for residential home energy retrofitting and weatherization.
    - $2.8 billion to 20 companies in 12 states for advancing battery component production and critical materials processing.
    - $200 million to help families pay outstanding heating and cooling bills; and the Earth Mapping Resources Initiative receiving over $74 million to map critical materials for everyday technologies such as household appliances, batteries, and electronics.

Clean Energy

- $500 million for the Clean Energy Demonstrations on Current and Former Mine Land program, supporting up to five clean energy projects – at least two of which must utilize solar energy – on current and former mine lands in geographically diverse regions.[109]
    - Clean energy is defined as a project that demonstrates at least one of these technologies:
        - Solar.

        - Micro-grids.
        - Geothermal.
        - Direct air capture.
        - Fossil-fueled electricity generation with carbon capture, utilization, and sequestration.
        - Energy storage, including pumped storage hydropower and compressed air storage.
        - Advanced nuclear technologies.
    - In selecting clean energy projects for participation, the secretary of energy will prioritize clean energy projects that will:
        - Be carried out in a location where the greatest number of jobs can be created from the successful demonstration of the clean energy project.
        - Provide the greatest net impact in avoiding or reducing GHG emissions.
        - Provide the greatest domestic job creation (both directly and indirectly) during the implementation of the clean energy project.
        - Provide the greatest job creation and economic development in the vicinity of the clean energy project, particularly:
            - In economically distressed areas.
            - With respect to dislocated workers who were previously employed in manufacturing, coal power plants, or coal mining.
        - Have the greatest potential for technological innovation and commercial deployment.
        - Have the lowest levelized cost of generated or stored energy.
        - Have the lowest rate of GHG emissions per unit of electricity generated or stored.
        - Have the shortest project time from permitting to completion.
    - Cost-share requirements have not yet been determined.
    - Funding will remain available through 2026.

Solar

- $40 million to support research, development, demonstration, and commercialization activities to improve solar energy technologies.[110]
    - Funds are available to:
        - Award grants and awards, on a competitive, merit-reviewed basis.
        - Perform precompetitive research and development.
        - Establish or maintain demonstration facilities and projects, including through stewardship of existing facilities.
        - Provide technical assistance.
        - Enter into contracts and cooperative agreements.
        - Provide small business vouchers.
        - Establish prize competitions.
        - Conduct education and outreach activities.
        - Conduct workforce development activities.

        - Conduct analyses, studies, and reports.
- $20 million for research, development, demonstration, and commercialization projects to develop and innovate solar energy technology reuse and recycling practices.[111]
    - Funds may be used to:
        - Increase the efficiency and cost effectiveness of the recovery of raw materials from solar energy technology components and systems, including enabling technologies such as inverters.
        - Minimize potential environmental impacts from the recovery and disposal processes.
        - Advance technologies and processes to disassemble and recycle solar energy devices.
        - Develop alternative materials, designs, manufacturing processes, and other aspects of solar energy technologies and the disassembly and resource recovery process that enable efficient, cost-effective, and environmentally responsible disassembly of, and resource recovery from, solar energy technologies.
        - Implement strategies to increase consumer acceptance of, and participation in, the recycling of photovoltaic devices.
- $20 million to advance the research, development, demonstration, and commercialization of new solar energy manufacturing technologies and techniques.[112]
    - Funds may be used for manufacturing projects that:
        - Increase efficiency and cost effectiveness of:
            - The manufacturing process.
            - The use of resources, such as energy, water, and critical materials.
        - Support domestic supply chains for materials and components.
        - Identify and incorporate nonhazardous alternative materials for components and devices.
        - Operate in partnership with Tribal energy development organizations, Tribes, Tribal organizations, Native Hawaiian community-based organizations, minority-serving institutions, or territories or freely associated states.
        - Are in economically distressed areas.

Wind

- $60 million for research, development, demonstration, and commercialization activities to advance wind energy technologies.[113]
    - Eligible activities include:
        - Awarding grants and awards on a competitive, merit-reviewed basis.
        - Performing precompetitive research and development.
        - Establishing or maintaining demonstration facilities and projects, including through stewardship of existing facilities such as the National Wind Test Center.

        - Providing technical assistance.
        - Entering into contracts and cooperative agreements.
        - Providing small business vouchers.
        - Establishing prize competitions.
        - Conducting education and outreach activities.
        - Conducting professional development activities.
        - Conducting analyses, studies, and reports.
- $40 million for research, development, demonstration, and commercialization projects to develop and innovate wind energy technology reuse and recycling practices.[114]
    - Funds made be used to:
        - Increase the efficiency and cost effectiveness of the recovery of raw materials from wind energy technology components and systems, including enabling technologies such as inverters.
        - Minimize potential environmental impacts from the recovery and disposal processes.
        - Advance technologies and processes for the disassembly and recycling of wind energy devices.
        - Develop alternative materials, designs, manufacturing processes, and other aspects of wind energy technologies and the disassembly and resource recovery process that enable efficient, cost effective, and environmentally responsible disassembly of – and resource recovery from – wind energy technologies.
        - Develop strategies to increase consumer acceptance of, and participation in, the recycling of wind energy technologies.

Hydropower

- $10 billion in borrowing authority to construct, acquire, and replace the Federal Columbia River Power System in the Columbia River Basin in the Pacific Northwest.
    - Additional borrowing authority must not exceed $6 billion by fiscal year 2028.[115]
- $585 million to rehabilitate high-hazard dams that do not meet safety standards and risk life and property.[116]
    - Funds may be used to repair, remove, or rehabilitate structural or non-structural components of eligible dams.
- Over $553 million to incentivize owners or operators of hydroelectric dams to improve qualified facilities.[117]
    - Eligible facilities may use the funds to:
        - Improve grid resiliency.
        - Improve dam safety to ensure acceptable performance in static, hydrologic, and seismic conditions.
        - Implement environmental improvements.
- $215 million for states to create and maintain programs for dam safety, to protect human life and property, and improve existing dam safety programs.[118]

    - $148 million of the fund is for states until the funds are expended and $67 million is for program operations until September 30, 2026.
- $125 million for incentive payments for electricity generated and sold by qualified hydroelectric facilities.[119]
    - Payments are based on the kilowatt-hours generated in the calendar year at a rate of 1.8 cents per kilowatt-hour, up to $1 million per facility. Power generation information is determined by the Department of Energy.
    - Qualified facilities must:
        - Be located in a state or in US jurisdictional waters.
        - Have a water-powered turbine or other generating device (including conventional or new and innovative technologies capable of continuous operation).
        - Be owned or solely operated by a non-federal entity.
        - Have been producing hydroelectric energy for sale on or after October 1, 2005; and that either:
            - Has added generation capability, excluding maintenance, through the incorporation of new equipment, refurbished equipment, or both to an existing dam or conduit that was completed before November 15, 2021.
            - Have a generating capacity of not more than 20 megawatts.
                - For which the non-federal entity has received a construction authorization from the Federal Energy Regulatory Commission, if applicable.
                - That is also constructed in an area with inadequate electric service.
- $75 million in incentive payments for hydroelectric facility owners or operators to improve the efficiency of their facilities by at least 3%.[120]
    - Federal funds for capital investment are capped at 30%, up to a maximum of $5 million per facility.
- Over $70 million to research, develop, and demonstrate the improvement of marine energy technologies.[121]
    - Funds may be used to:
        - Assist technology development to improve the components, processes, and systems used for power generation from marine energy resources at a variety of scales.
        - Establish and expand critical testing infrastructure and facilities necessary to:
            - Demonstrate and prove marine energy devices at a range of scales in a manner that is cost-effective and efficient.
            - Accelerate the technological readiness and commercial application of such devices.
        - Address marine energy resource variability issues, including by using energy storage technologies.
        - Advance efficient and reliable integration of marine energy with the electric grid, which may include smart building systems.

- Identify and study critical short and long-term needs for maintaining a sustainable marine energy supply chain based in the US.
- Increase the reliability, security, and resilience of marine energy technologies.
- Validate the performance, reliability, maintainability, and cost of marine energy device designs and system components in an operating environment.
- Consider the protection of critical infrastructure, such as adequate separation between marine energy devices and submarine telecommunications cables, including through the development of voluntary, consensus-based standards for such purposes.
- Identify opportunities for crosscutting research, development, and demonstration programs between existing energy research programs.
- Identify and improve the environmental impact, including potential cumulative impacts, of marine energy technologies, including:
    - Potential impacts on fisheries and other marine resources.
    - Developing technologies, including mechanisms for self-evaluation, and other means available for improving environmental impact, including potential cumulative environmental impacts.
- Identify, in consultation with relevant federal agencies, potential navigational impacts of marine energy technologies and strategies to prevent possible adverse impacts, in addition to opportunities for marine energy systems to aid the United States Coast Guard, such as remote sensing for coastal border security.
- Develop numerical and physical tools, including models and monitoring technologies, to assist industry in device and system design, installation, operation, and maintenance, including methods to validate these tools.
- Support materials science as it relates to marine energy technology, such as the development of corrosive-resistant materials.
- Improve marine energy resource forecasting and general understanding of aquatic system behavior, including turbulence and extreme conditions.
- Develop metrics and voluntary, consensus-based standards for marine energy components, systems, and projects, including:
    - Measuring performance of marine energy technologies.
    - Characterizing environmental conditions.
- Enhance integration with hybrid energy systems, including desalination.
- Identify opportunities to integrate marine energy technologies into new and existing infrastructure.
- To develop technology necessary to support the use of marine energy:
    - For the generation and storage of power at sea.

        - For the generation and storage of power to promote the resilience of coastal communities, including in applications relating to:
            - Desalination.
            - Disaster recovery and resilience.
            - Community microgrids in isolated power systems.
- $40 million to assist in establishing new national marine energy centers and to continue and expand research, development, demonstration, testing, and commercial application activities at existing centers.[122]
    - Funds may be used to:
        - Advance research, development, demonstration, and commercialization of marine energy technologies in response to industry and commercial needs.
        - Support in-water testing and demonstration of marine energy technologies, including facilities capable of testing:
            - Marine energy systems of various technology readiness levels and scales.
            - A variety of technologies in multiple test berths at a single location.
            - Arrays of technology devices.
            - Interconnectivity to an electrical grid, including microgrids.
        - Collect and disseminate information on best practices in all areas relating to developing and managing marine energy resources and energy systems.
- $36 million to fund research, development, and demonstration activities to improve hydropower technologies.[123]
    - Funds must be used to improve the capacity, efficiency, resilience, security, reliability, affordability, and environmental impact, including potential cumulative environmental impacts, of hydropower systems.
- $10 million to administer a transportation network to sustain the health, diversity, and productivity of national forest lands for dams on National Forest System lands in need of maintenance.[124]

Geothermal

- $84 million to support four enhanced geothermal demonstration pilot projects in different geologic settings.[125]

Nuclear Energy

- $6 billion to create a Civil Nuclear Credit Program to sustain existing commercial nuclear reactors until the date of their intended retirement.[126]
    - Nuclear reactors in competitive electricity markets that are projected to shut down due to economic factors during FY 2022–2026 are eligible to apply for the credit.

- Nearly $2.5 billion for two large demonstrations of advanced nuclear reactors for electricity generation.[127]
    - Eligible recipients include:
        - Domestic nuclear industry partners.
        - National laboratories.
        - Engineering and construction firms.

Energy Storage

- $3 billion in grants for battery materials processing to jumpstart a domestic battery material processing industry and to grow domestic battery manufacturing and processing capacity.[128]
    - These funds will be available as $600 million annually from FY 2022 through FY 2026 until the funds are expended.
    - Eligible recipients are:
        - Institutions of higher education.
        - National laboratories.
        - Nonprofit and for-profit private entities.
        - State and local governments.
        - A combination of the above entities.
    - Recipients are responsible for at least 50% of the total project cost.
- $3 billion for domestic battery manufacturing and recycling demonstration projects, construction of commercial facilities, and retrofitting or retooling of existing facilities for battery component manufacturing, advanced battery manufacturing, and battery recycling.[129]
    - $600 million will be available as grants for each fiscal year from FY 2022 to FY 2026 until the funds are spent.
    - Eligible recipients are:
        - Institutions of higher education.
        - National laboratories.
        - Nonprofit and for-profit private entities.
        - State and local governments.
        - A combination of the above entities.
    - Recipients are responsible for at least 50% of the total project cost.
- $355 million for three energy storage demonstration projects.[130]
    - Funds may be used to:
        - Improve the security of critical infrastructure and emergency response systems.
        - Improve the reliability of transmission and distribution systems, particularly in rural areas, including high-energy cost rural areas.
        - Optimize transmission or distribution system operation and power quality to defer or avoid costs of replacing or upgrading electric grid infrastructure, including transformers and substations.
        - Supply energy at peak periods of demand on the electric grid or during periods of significant variation of electric grid supply.

        - Reduce peak loads of homes and businesses.
        - Improve and advance power conversion systems.
        - Provide ancillary services for grid stability and management.
        - Integrate clean energy resource production.
        - Increase the feasibility of microgrids (grid-connected or islanded).
        - Enable the use of stored energy in forms other than electricity to support the natural gas system and other industrial processes.
        - Integrate fast charging of electric vehicles.
        - Improve energy efficiency.
- $150 million for demonstration projects for the development of long-duration energy storage technologies.[131]
- $10 million to support project design, transmissions studies, power market assessments, and permitting for a pumped storage hydropower project to facilitate the long-duration storage of intermittent clean electricity.[132]
    - $2 million will be available each year from FY 2022 through FY 2026.
    - Eligible projects must:
        - Be designed to provide over 1 kilowatt of storage capacity.
        - Be able to provide energy and capacity for use in more than one organized electricity market.
        - Be able to store electricity generated by intermittent clean electricity projects located on Tribal land.
        - Have received a preliminary permit from the Federal Energy Regulatory Commission.

Transmission and Permitting

- The Bipartisan Infrastructure Law expands the Department of Energy's (DOE) scope and backstop siting authority for National Interest Electric Transmission Corridor designations, while directing the agency to study current and projected capacity constraints.[133]
    - There are a number of prospective advantages to this expanded authority, including economic benefits for consumers and increased ability of clean energy facilities to connect to the grid.[134]
    - However, the law has also been criticized for weakening the National Environmental Policy Act by speeding up the permitting review process at the expense of frontline communities.[135] It will be vital for agencies to strike a balance between efficiently scaling up clean energy technologies and prioritizing environmental justice concerns.
- $5 billion to transmission, storage, and energy distribution infrastructure to improve grid reliability and resilience in and across states.[136]
    - This funding is set to release annually in $1 billion increments from FY 2022 through FY 2026 and will be available to states, a combination of multiple states, Tribes, local governments, and public utility commissions.
    - Recipients are responsible for 20% of the costs for research and development activities and 50% of total costs for demonstration or commercial activities.

- $5 billion to improve the resilience of the electric grid and prevent outages.[137]
    - Grants will remain available until expended and are open to electric grid operators, electricity storage operators, electricity generators, transmission owners and operators, distribution providers, fuel suppliers, states, and Tribes.
    - Federal cost-share requirements are set at 15% for states, territories, and Tribes, one-third matching for small utilities, and 100% match for eligible entities.
- $3 billion for the Smart Grid Investment Matching Grant Program.[138]
    - $600 million will be available as grants for each fiscal year from FY 2022 to FY 2026 until the fund is depleted.
    - Eligible investments include:
        - Installation to allow buildings to utilize demand flexibility or smart grid functions.
        - Metering, control, and other devices, sensors, and software.
        - Communications and broadband technologies to support smart grid deployment.
        - Technologies and programs to integrate electric vehicles to the grid.
        - Devices and software for buildings support demand flexibility and other smart grid functions.
        - Operational fiber and wireless broadband communications networks enabling data sharing between distribution system components.
        - Advanced transmission technologies – including dynamic line rating, flow-control devices, advanced conductors, and network topology optimization – to increase the operational transfer capacity transmission networks.
    - Recipients are responsible for 50% of the total project cost.
- $2.5 billion in borrowing authority to facilitate the construction of electric power transmission lines and related facilities.[139]
    - Transmission developers are eligible to utilize this funding.
- $1 billion for the Energy Improvement in Rural or Remote Areas program to provide financial assistance for cities, towns, or unincorporated areas with a population less than 10,000 in rural or remote areas. Funds are to improve the resilience, safety, reliability, and availability of energy, in addition to protecting these areas by reducing emissions from energy generation.[140]
    - Eligible projects may support:
        - Increasing the cost-effectiveness of energy generation, transmission, or distribution.
        - Siting or upgrading transmissions and distribution lines.
        - Reducing emissions from energy generation.
        - Building or modernizing electric generation facilities.
        - Developing microgrids.
        - Increasing energy efficiency.
    - Federal cost-share requirements have not been determined as of January 2023.
    - Funding will become available in $200 million increments each year from FY 2022 through FY 2026.

- $1 billion to improve the resilience, safety, reliability, and availability of energy in rural or remote areas in addition to protecting against the adverse environmental impacts of energy generation.[141]
    - $200 million will be made available as grants, cooperative agreements, and other financial mechanisms each fiscal year from FY 2022 through FY 2026 until the funds are depleted.
    - Cities, towns, or unincorporated areas with populations of up to 10,000 inhabitants are eligible to receive funding.
    - These funds may be used for:
        - Improving the cost-effectiveness of energy generation, transmission, or distribution systems.
        - Siting or upgrading transmission and distribution lines.
        - Reducing GHG emissions from energy generation by rural or remote areas.
        - Providing or modernizing electric generation facilities.
        - Developing microgrids.
        - Increasing energy efficiency.
- $500 million for the Western Area Power administration to purchase power and transmission services, recover purchase power and wheeling services, and to transfer to the Colorado River Basins Power Marketing Fund.[142]
- $500 million for states for electric transmission and distribution planning and carbon reduction planning and programs.[143]
    - Funds can be used for:
        - Energy conservation.
        - Clean energy measures, including for buildings, industry, and transportation.
        - Carbon reduction measures for the transportation sector, including to accelerate the use of electrification and alternative transportation fuels for state government vehicles, fleet vehicles, taxis and ridesharing services, mass transit, school buses, ferries, and privately owned passenger and medium and heavy-duty vehicles.

Carbon Capture and Sequestration

- For the majority of the funding opportunities below, unless otherwise noted, the eligible recipients include:
    - Technology developers.
    - Industry.
    - Utilities.
    - Universities.
    - National laboratories.
    - Engineering and construction firms.
    - State and local governments.
    - Tribes.
    - Environmental groups.

    - Community based organizations.
- $3.5 billion for four regional direct air capture hubs.[144]
    - These funds will be available in $700 million increments annually for FY 2022 through FY 2026 until expended.
    - The hubs must:
        - Facilitate the deployment of direct air capture projects.
        - Have the capacity to capture and sequester, utilize, or sequester and utilize at least 1 million metric tons of carbon dioxide from the atmosphere annually from a single unit or multiple interconnected units.
        - Demonstrate the capture, processing, delivery, and sequestration or end-use of captured carbon.
        - Have the potential to be developed into a regional or interregional carbon network to facilitate sequestration or carbon utilization.
- Over $2.5 billion for carbon capture demonstration projects.[145]
    - Funds will be available as cooperative agreements to establish six facilities to demonstrate carbon capture technologies for fossil fuel power, including in manufacturing and industrial facilities.
    - Two facilities must be designed for natural gas electric generation facilities, two for coal electric generation facilities, and two for non-power generation industrial facilities.
- $2.5 billion to research, develop, and demonstrate new or expanded commercial large-scale carbon sequestration projects and associated carbon dioxide transport infrastructure.[146]
    - Funds may also be used for the feasibility, site characterization, permitting, and construction stages of project development.
- $2.1 billion to establish and carry out a carbon dioxide transportation infrastructure finance and innovation program.[147]
    - Funds will be available as loans and grants for state, local, and public authorities.
    - Eligible projects must:
        - Be large-capacity, common carrier infrastructure.
        - Have demonstrated demand for use of the infrastructure by associated projects that capture carbon dioxide from anthropogenic sources or ambient air.
        - Enable geographical diversity in associated projects that capture carbon dioxide from anthropogenic sources or ambient air, with the goal of enabling projects in all major carbon dioxide-emitting regions of the United States.
        - Be sited within, or adjacent to, existing pipelines or other linear infrastructure corridors, in a manner that minimizes environmental disturbance and other siting concerns.
- $937 million to establish large-scale carbon capture programs to develop technologies that improve the efficiency, effectiveness, costs, emissions reductions, and

environmental performance of coal and natural gas use, including in manufacturing and industrial facilities.[148]
    - Projects must:
        - Be developed beyond laboratory development and bench scale testing, but not to the point of being tested under real operational conditions at commercial scale.
        - Be able to generate the operational data needed to understand the technical and performance risks of the technology before the application of that technology at commercial scale or in commercial-scale demonstration.
        - Are large enough:
            - To validate scaling factors.
            - To demonstrate the interaction between major components so that control philosophies for a new process can be developed and enable the technology to advance from large-scale pilot project application to commercial-scale demonstration or application.
- Over $310 million for state and local governments to procure and use commercial and industrial products that are created from captured anthropogenic carbon oxides.[149]
- $100 million to expand the Department of Energy's Carbon Capture Technology Program with a front-end engineering and design program for carbon dioxide transportation infrastructure.[150]
- $100 million to reauthorize the Commercial Direct Air Capture Technology Prize Competition to support large-scale direct air carbon capture pilot projects.[151]
- $15 million to reauthorize the Pre-Commercial Direct Air Capture Prize Competitions to advance the technical and commercial viability of direct air capture technologies.[152]

Hydrogen

- $8 billion towards developing at least four regional clean hydrogen hubs to improve clean hydrogen production, processing, delivery, storage, and end use.[153]
    - The subsequent "H2Hubs" plan, using $6–7 billion of the $8 billion available, will result in six to 10 clean hydrogen hubs. Applications are due by April 7, 2023.[154]
    - The IIJA defined clean hydrogen as releasing less than or equal to 2 kilograms of CO_2 per every kilogram of hydrogen produced.[155]
        - The Inflation Reduction Act's clean hydrogen production tax credit defines clean hydrogen as releasing less than or equal to 4 kilograms of CO_2 per kilogram of hydrogen produced over the life-cycle of hydrogen instead of merely during the production cycle.[156]
    - At least two of the hubs must be located in natural gas production regions, and at least one of the hubs must produce green, blue, and pink hydrogen.[157]

        - Green hydrogen is made by using a clean energy-powered (solar, wind, or hydropower) electrolyzer to extract hydrogen from water. This process has very low emissions.
        - Blue hydrogen is similar to gray hydrogen, which usually relies on a process called steam methane reformation to extract hydrogen from natural gas. Blue hydrogen uses carbon capture and storage (CCS) to store some of the emissions from the process. Gray hydrogen does not employ CCS.
        - Every kilogram of hydrogen created using natural gas results in about 9 kilograms of CO_2 emissions. Capturing all the CO_2 emitted during the blue hydrogen production process has yet to be achieved and remains theoretical.
        - Powering the CCS systems requires significant energy, which may be associated with its own emissions.
        - Blue hydrogen plants are expensive – a blue hydrogen project in Louisiana has about $4.5 billion invested in it.
        - Pink hydrogen also uses an electrolyzer to extract hydrogen from water, but the electrolyzer is powered by nuclear energy. This process is emissions-free.
- $1 billion to start a program to research, develop, demonstrate, and deploy efficient, durable, and cost-efficient commercial clean hydrogen electrolyzers.[158]
- $500 million to boost clean hydrogen production, processing, delivery, storage, and manufacturing technologies and techniques.[159]
    - Funds may be used to:
        - Increase the efficiency and cost-effectiveness of the recovery of raw materials from clean hydrogen technology components and systems.
        - Minimize the environmental impacts of recovery and disposal processes.
        - Address barriers to the research, development, demonstration, and commercialization of technologies and processes for the disassembly and recycling.
        - Develop alternative materials, designs, manufacturing processes, and other aspects of clean hydrogen technologies.
        - Develop alternative disassembly and resource recovery processes that enable efficient, cost-effective, and environmentally responsible disassembly of and resource recovery from clean hydrogen technologies.
        - Develop strategies to increase consumer acceptance of and participation in the recycling of fuel cells.

Manufacturing, Recycling, and Energy Supply Chains

- $750 million for the Advanced Energy Manufacturing and Recycling Grants program, providing grants for small- and medium-sized manufacturers to build or retrofit manufacturing and industrial facilities for the manufacturing or recycling of advanced

energy projects – such as for clean electricity, industrial decarbonization, clean transportation, clean fuels, and more; and to re-equip industrial and manufacturing facilities to reduce facility emissions – in communities where coal mines or power plants have closed.[160]
    - Eligible manufacturing firms must have:
        - Gross annual sales of less than $100 million.
        - Fewer than 500 employees at the plant site of the manufacturing firm.
        - Annual energy bills between $100,000 and $2.5 million.
    - Federal cost-share requirements have not been determined as of January 2023.
    - Funding is available until expended.
- $600 million in grants to start a program to research, develop, demonstrate, and commercialize alternatives to critical materials, to promote their efficient production and use, and to ensure a long-term secure and sustainable supply of them.[161]
    - The funds can be used for:
        - Alternative materials, particularly materials available in abundance within the United States and not subject to potential supply restrictions, that lessen the need for critical materials.
        - Alternative energy technologies or designs of existing energy technologies.
        - Technologies or process improvements that minimize the use and content, or lead to more efficient use, of critical materials across the full supply chain.
        - Innovative technologies and practices to diversify commercially viable and sustainable domestic sources of critical materials.
        - Technologies, process improvements, or design optimizations that facilitate the recycling of critical materials.
        - Advanced critical material extraction, production, separation, alloying, or processing technologies that decrease the energy consumption, environmental impact, and costs of those activities.
        - Commercial markets, advanced storage methods, energy applications, and other beneficial uses of critical materials.
        - Advanced theoretical, computational, and experimental tools necessary to support the crosscutting research and development needs of diverse critical minerals stakeholders.
- $320 million for integrated survey mapping to integrate and consolidate geospatial and resource data and to interpret underground critical mineral resources and those that could be reprocessed from mine waste sites.[162]
    - Funds will be appropriated each fiscal year for obligation for three years and funding will be available over four years starting in 2022.
- $167 million for a state academic institution, in collaboration with the Department of Interior, to design, construct, and build a federally owned facility to support energy and minerals research.[163]
- $140 million to demonstrate the feasibility of a full-scale integrated rare earth element extraction and separation facility and refinery.[164]
    - This facility will:

        - Provide environmental benefits through use of feedstock derived from acid mine drainage, mine waste, or other deleterious material.
        - Separate mixed rare earth oxides into pure oxides of each rare earth element.
        - Refine rare earth oxides into rare earth metals.
        - Provide for separation of rare earth oxides and refining into rare earth metals at a single site.
- $127 million for an industry partner to conduct a research and development program to improve the security of rare earth elements.[165]
    - The program must:
        - Develop and assess advanced separation technologies for the extraction and recovery of rare earth elements and other critical materials from coal and coal byproducts.
        - Determine and mitigate any potential environmental or public health impacts that could arise from the recovery of rare earth elements from coal-based resources.
- $125 million for research, development, and demonstration projects to create innovative and practical approaches to increase battery reuse and recycling.[166]
    - The projects must address:
        - Recycling activities.
        - Development of methods to promote the design and production of batteries that take into full account and facilitate the dismantling, reuse, recovery, and recycling of battery components and materials.
        - Strategies to increase consumer battery recycling participation and acceptance.
        - Extraction or recovery of critical minerals from batteries that are recycled.
        - Integration of increased quantities of recycled critical minerals in batteries and other products to develop markets for recycled battery materials and critical minerals.
        - Safe disposal of waste materials and components recovered during the recycling process.
        - The protection of the health and safety of all persons involved in, or in proximity to, recycling and reprocessing activities, including communities located near recycling and materials reprocessing facilities.
        - Mitigation of environmental impacts that arise from recycling batteries, including disposal of toxic reagents and byproducts related to recycling processes.
        - Protection of data privacy associated with collected covered battery-containing products.
        - Optimization of the value of material derived from recycling batteries.
        - The cost-effectiveness and benefits of the reuse and recycling of batteries and critical minerals.
    - Recipients must contribute at least 20% of the total project cost.

- $75 million to support the construction of a critical materials supply chain research facility to advance research, development, demonstration, and commercialization activities throughout the critical materials supply chain and to provide an integrated, rapidly reconfigurable research platform.[167]
- $10 million in rebates and grants for qualified extended product systems such as electric motors, electronic controls, and driven loads for commercial or industrial machinery.[168]
- $10 million for a prize for the recycling of lithium-ion batteries and to convene a task force on battery producer requirements.[169]

Energy Efficiency

- $3.5 billion in formula grants to fund the DOE's Weatherization Assistance Program to increase energy efficiency, reduce energy costs, and improve health and safety for poor occupied or owned homes, especially those with elderly and disabled occupants and children.[170]
    - This funding will be available until it is expended. There is no non-federal cost-share requirement.
    - The formula grants may be used to install weatherization materials such as attic insulation, caulking, weather-stripping, replacement furnaces, boilers, or air conditioners, furnace efficiency improvements, and certain mechanical improvements to heating and cooling systems.
    - Average funding for each home is expected to reach $8,009 in FY 2022. Up to 15% of the funds for grantees and subgrantees may go towards administrative expenses, and up to 7.5% may be used for the same purposes for state grants.
- $550 million for the Energy Efficiency and Conservation Block Grant Program, providing block grants and competitive grants for states, local governments, and Tribes to create and implement strategies to reduce energy use, reduce fossil fuel emissions, and improve energy efficiency.[171]
    - There is no non-federal cost-share requirement for this funding, which will remain available until expended.
    - Funding may be used to:
        - Develop and implement an energy efficiency and conservation strategy.
        - Retain technical consultant services to assist the eligible entity in the development of these strategies, including:
            - To develop energy efficiency, conservation, and usage goals.
            - Identify strategies to achieve those goals:
                - Through efforts to increase energy efficiency and reduce energy consumption.
                - By encouraging behavioral changes among the population served by the eligible entity.
            - Develop methods to measure progress in achieving the goals.
            - Develop and publish annual reports to the population served by the eligible entity describing:

    - The strategies and goals.
    - The progress made in achieving the strategies and goals during the preceding calendar year.
    - Other services to assist in the implementation of the energy efficiency and conservation strategy.
- Conduct residential and commercial building energy audits.
- Establish financial incentive programs for energy efficiency improvements.
- Provide grants to nonprofit organizations and governmental agencies for the purpose of performing energy efficiency retrofits.
- Develop and implement energy efficiency and conservation programs for buildings and facilities within the jurisdiction of the eligible entity, including:
    - The design and operation of the programs.
    - Identifying the most effective methods for achieving maximum participation and efficiency rates.
    - Public education.
    - Measurement and verification protocols.
    - Identification of energy efficient technologies.
- Develop and implement programs to conserve energy used in transportation, including:
    - Use of flex time by employers.
    - Satellite work centers.
    - Development and promotion of zoning guidelines or requirements that promote energy efficient development.
    - Development of infrastructure, such as bike lanes and pathways and pedestrian walkways.
    - The synchronization of traffic signals.
    - Other measures that increase energy efficiency and decrease energy consumption.
- Develop and implement building codes and inspection services to promote building energy efficiency.
- Apply and implement energy distribution technologies that significantly increases energy efficiency, including:
    - Distributed energy resources.
    - District heating and cooling systems.
- Increase participation and efficiency rates for material conservation programs, including source reduction, recycling, and recycled content procurement programs that lead to increases in energy efficiency.
- Purchase and implement technologies to reduce, capture, and – to the maximum extent practicable – use methane and other GHGs generated by landfills or similar sources.
- Replace traffic signals and street lighting with energy efficient lighting technologies, including:

        - Light emitting diodes (LEDs).
        - Any other technology of equal or greater energy efficiency.
    - Develop, implement, and install on or in any government building with onsite "clean" energy technology, including:
        - Solar energy.
        - Wind energy.
        - Fuel cells.
        - Biomass.
    - Finance energy efficiency, clean energy, and zero-emission transportation (and associated infrastructure), capital investments, projects, and programs. These may include loan programs and performance contracting programs, programs for leveraging additional public and private sector funds, and programs that allow rebates, grants, or other incentives for the purchase and installation of energy efficiency, clean energy, and zero-emission transportation (and associated infrastructure) measures.
    - Fund any other appropriate activity, as determined by the secretary of energy, in consultation with:
        - The administrator of EPA.
        - The secretary of transportation.
        - The secretary of housing and urban development.
- $500 million in competitive grants for public schools to implement energy efficiency, clean energy, and alternative fuel transportation upgrades.[172]
- $400 million for small and medium-sized manufacturers to improve energy efficiency, material efficiency, cybersecurity. or productivity. Or for waste, GHG, or non-GHG pollution-reduction measures.[173]
    - Recipients are responsible for 50% of project costs.
- $250 million in grants for federal agencies to assist with energy and water efficiency upgrades for federal buildings.[174]
- $250 million in formula grants for states to establish a revolving loan fund for residential and commercial energy efficiency audits, upgrades, and retrofits.[175]
- $225 million in competitive grants for states and regional partnerships to facilitate updating building codes that are cost effective, improve energy efficiency, and boost energy resilience.[176]
    - The grants may be used to:
        - Create or enable state or regional partnerships to provide training and materials to:
            - Builders, contractors and subcontractors, architects, and other design and construction professionals, relating to meeting updated building energy codes in a cost-effective manner.
            - Building code officials, relating to improving implementation of and compliance with building energy codes.

        - Collect and disseminate quantitative data on construction and codes implementation, including code pathways, performance metrics, and technologies used.
        - Develop and implement a plan for highly effective codes implementation, including measuring compliance.
        - Address various implementation needs in rural, suburban, and urban areas.
        - Implement updates in energy codes for:
            - New residential and commercial buildings (including multifamily buildings).
            - Additions and alterations to existing residential and commercial buildings (including multifamily buildings).
- $150 million for higher education-based industrial institutions with research and assessment centers to identify energy efficient and environmental performance improvements for manufacturing and other industrial facilities.[177]
    - The grants may be used to:
        - Provide assessments of small and medium-sized manufacturing plant sites to evaluate the facilities, services, and manufacturing operations.
        - Identify opportunities for optimizing energy efficiency and environmental performance, including implementation of:
            - Smart manufacturing.
            - Energy management systems.
            - Sustainable manufacturing.
            - Information technology advancements for supply chain analysis, logistics, system monitoring, industrial and manufacturing processes, and other purposes.
            - Waste management systems.
        - Promote applications of emerging concepts and technologies in small and medium-sized manufacturers (including water and wastewater treatment facilities and federally owned manufacturing facilities).
        - Promote research and development for the use of alternative energy sources to supply heat, power, and new feedstocks for energy-intensive industries.
        - Coordinate with appropriate federal and state research offices.
        - Provide a clearinghouse for industrial process and energy efficiency technical assistance resources.
        - Coordinate with state-accredited technical training centers and community colleges, while ensuring appropriate services to all regions of the United States.
- $50 million for nonprofits to purchase energy efficient materials.[178]
    - Materials covered by these grants include:
        - Roofs, lighting systems, or components of the systems.
        - Windows.
        - Doors, including security doors.

        - Heating, ventilation, or air conditioning systems or component of the system (including insulation and wiring and plumbing improvements needed to serve a more efficient system).
- $10 million in rebates for replacing qualified energy inefficient transformers with qualified energy efficient transformers.[179]
    - Industrial or manufacturing facility owners, commercial building owners, multifamily building owners, utilities, or energy service companies can apply for these rebates.

Justice

- Many climate change-related provisions in the IIJA will support frontline communities and advance the Justice40 initiative, which aims to ensure 40% of the benefits of federal investments in climate change, clean energy, and more serve disadvantaged communities.[180] The IIJA includes programs for clean energy, transportation, green buildings, workforce development, energy grid resilience and infrastructure, reducing methane emissions, recycling, and clean water that fall under the Justice40 initiative.[181]
    - Eligible entities for many of these programs include state and local governments, Tribes, nonprofits, and special districts.[182]
- Funding in the IIJA that will directly benefit frontline communities includes:
    - At least $21 billion is available for environmental remediation projects, reducing environmental harm through addressing legacy pollution, creating good-paying union jobs, and advancing environmental justice priorities. This funding will benefit communities of color, as Black, Asian, Hawaiian/Pacific Islander, and Hispanic Americans and those under the poverty level are disproportionately likely to live within three miles of Superfund and brownfield sites.[183] These programs represent the largest investment in addressing legacy pollution in American history.[184] Funding falls into four main programs:
        - $11.3 billion to the Department of the Interior (DOI) to provide grants for abandoned coal mine land reclamation. The funds will be disbursed to eligible states and Tribes by the Office of Surface Mining Reclamation and Enforcement (OSMRE).[185]
            - In addition, $25 million is provided to DOI for assisting states in updating their abandoned mine land inventories.[186]
        - $4.7 billion to DOI for establishing three new orphaned well plugging, remediation, and reclamation grant programs for eligible states and Tribes. Three types of grants – initial, formula, and performance-based grants – as well as funding for technical assistance are included in the provision.[187]
            - As of November 2022, about $1.2 billion in funding was made available to 26 states to begin cleaning up orphaned wells across the country, and $33 million for 277 wells on public lands.[188]
        - $3.5 billion to EPA for Superfund site cleanup and remedial actions while waiving the state cost-share requirements for funding.[189]

        - $1 billion of the total $3.5 billion is also allocated to clearing the backlog of previously unfunded sites and to accelerate cleanup at other locations.[190]
        - As of January 2023, EPA has announced plans to utilize these funds for cleanup activities at 49 Superfund sites spread across the country on the National Priorities List. Over 60% of these sites reside in historically underserved communities.[191]
    - $1.5 billion to EPA for expanding existing brownfield remediation and revitalization grant programs.[192]
- Of the $39 billion in new investments in public transportation modernization, there are two programs focused on accessibility improvement for older folks and people with disabilities, including:[193]
    - $1.75 billion in grants to DOT for the All Stations Accessibility Program (see further program details under the IIJA's Public Transportation section), which provides funding to upgrade existing public transportation systems to improve accessibility for those with disabilities, including those who use wheelchairs.[194]
        - In December 2022, DOT's Federal Transit Administration (FTA) announced 15 grants in nine states totaling $686 million as part of the first round of funding for this program.[195]
    - $2.2 billion to DOT for the existing Enhanced Mobility of Seniors and Individuals with Disabilities (see further program details under the IIJA's Public Transportation section) program to provide mobility options in areas lacking necessary public transportation services.[196]
    - Additionally, total funding for public transportation will benefit communities of color, which are twice as likely to take public transportation.[197]
        - Asian American and Black American workers are nearly four times as likely to take public transportation to work, and Black workers spend significantly more time commuting – for example, the average Black resident in New York City spends 110 more minutes commuting each week compared to the average white resident.[198]
        - Additional and improved transit options will reduce commute times and boost economic opportunities by connecting people with better jobs.[199]
- $55 billion to expand clean drinking water access, including by replacing lead service lines.[200] Communities of color and poor people are more likely to be exposed to lead drinking water pipes.[201]
    - See more on these provisions in the IIJA's Drinking Water subsection under Other Programs.
- Over $50 billion for weatherization and protection from droughts, heat, floods, and wildfires. People of color are more likely to live in areas most vulnerable to these climate-related disasters.[202]

- Specifically, the IIJA contains funding for several programs focused both on disaster preparedness and response and on building resilience to the effects of climate change.[203] Examples of significant programs include:
  - More than $16 billion toward resiliency in transportation through programs such as Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation (PROTECT) and the Rebuilding American Infrastructure with Sustainability and Equity (RAISE) Program.[204]
    - PROTECT received $8.7 billion in resilience improvement, community resilience and evacuation routes, and at-risk coastal infrastructure grants for assisting states and localities.[205]
    - RAISE was allocated $7.5 billion in grants for road, rail, transit, and other surface transportation projects, with special considerations for equity and community connectivity needs.[206]
  - $8.25 billion toward wildfire management through initiatives such as the Justice40-eligible Hazardous Fuels Management Program.[207]
  - $3.5 billion in grants to the Department of Homeland Security for the Flood Mitigation Assistance Program to provide financial and technical assistance to states and communities to reduce repetitive flood damage.[208]
  - $3.5 billion in grants to the DOE for the Weatherization Assistance Program to increase energy efficiency and lower energy costs for poor households.[209] For more information, see under the IIJA's Energy Efficiency section.

- $1 billion to reconnect communities fractured by transportation infrastructure, such as highway construction.[210] In the 1950s, interstate highway system construction often cut through communities of color, sometimes intentionally, often cutting them off from resources.[211]
  - In October 2022, the application for the first round of funding, with $195 million available for the pilot program, was closed. Additional funding will be released in the future.[212]
  - The $1 billion in funding in the IIJA to repair this damage is a significant decrease from previous plans to allocate $20 billion or $15 billion to the program, called the Reconnecting Communities Pilot Program, but it is still seen as a promising start to repairing inequities caused by past highway construction.[213]
- $500 million in funding to the Department of Health and Human Services for the Low-Income Home Energy Assistance Program, which will help reduce energy costs for poor households through bill payment assistance, energy crisis, assistance, home energy repairs, and more.[214]
  - These funds supplement the significant appropriations toward the program through the American Rescue Plan Act and the September 2021 continuing resolution, bringing the total funding allocated in 2021 to

nearly $8 billion. Ensuring poor households can access energy is crucial in achieving energy justice.[215]

Justice Concerns

- Despite making historic progress toward addressing environmental injustices by advancing the Justice 40 Initiative and investing in aging infrastructure that disproportionately affects frontline communities, there are significant concerns that the IIJA falls short on equity.
    - The IIJA leaves many criteria for identifying disadvantaged communities up to states, resulting in ambiguity surrounding the laws potential impacts on frontline communities. A few states, such as California and New York, have crafted definitions for "environmental justice communities," but many have not. The lack of requirements for explicit funding for these communities risks advancing an inequitable distribution of funds.[216]
        - For example, even though lead service lines are disproportionately located in communities of color and the IIJA instructs disadvantaged communities to be given priority in fund allocation, states are left to establish their own criteria for defining disadvantaged communities.[217]
    - The IIJA has also undermined the National Environmental Policy Act (NEPA) by weakening permitting requirements, which are a crucial mechanism to protect frontline communities.[218]
        - Specifically, the IIJA makes permanent and augments FAST-41, a title in the 2015 FAST Act that aimed to speed up federal permitting and NEPA review of infrastructure projects, such as highways, whose air pollution disproportionately impacts communities of color.[219]
        - New provisions include limiting the review process to two years, a deadline of 90 days for authorization of a project after an environmental impact statement is completed, and the exclusion of some types of projects such as some oil and gas pipelines from NEPA review.[220]
    - Additionally, the IIJA also provided funding for false solutions, such as $12 billion toward carbon capture, utilization, and storage, which are largely unproven technologies that threaten to further entrench fossil fuel use that continue to disproportionately harm communities of color and those with low incomes.[221]

Jobs

- According to analysis by the Economic Policy Institute, the IIJA will provide funding support for nearly 800,000 jobs per year over 10 years.[222] Moody's Analytics similarly finds that it will create over 800,000 jobs at its peak time of impact.[223] According to DOT, it will create 175,000 each in manufacturing and construction jobs and 100,000 in transportation jobs.[224]
    - The following jobs (approximated) are estimated to be created per year:[225]
        - 196,000 in roads, bridges, and major projects.
        - 89,000 in resilience.

    - 81,000 in power infrastructure (including grid authority).
    - 80,000 in water infrastructure.
    - 73,000 in rail.
    - 70,000 in public transit.
    - 61,000 in broadband infrastructure.
    - 35,000 in environmental remediation.
    - 26,000 in airports.
    - 23,000 in ports and waterways.
    - 20,000 be in safety-related jobs.
    - 17,000 in EV infrastructure.
    - 2,000 in reconnecting communities.
- Importantly, these are touted as being "good-paying, union jobs."[226] Jobs will be guaranteed to be created in the United States, have fair wages and benefits, and the potential to employ underrepresented workers.[227]
    - Funds in the IIJA are subject to the Davis-Beacon Act of 1931, which requires that federally funded projects pay workers local prevailing wages.[228]
    - The IIJA supports apprenticeship programs, including in partnership with labor unions.[229] Apprenticeship programs can help bring more people of color, people with disabilities, and other underrepresented groups into good infrastructure jobs, and union-led apprenticeship programs have been shown to enroll more people of color.[230]
    - As an example of a pro-union measure in the IIJA, in January 2022, DOT announced $1.5 billion in Rebuilding American Infrastructure with Sustainability and Equity (RAISE) grants, specifying that funds are more likely to be awarded to programs creating jobs with "free and fair choice to join a union."[231]
- By one estimate, the IIJA is projected to modestly increase US GDP to 2.9% in 2023 as opposed to 2.3% if it had not been passed.[232] Transportation investment alone is estimated to add $488 billion to the GDP by 2027.[233]
- New jobs and higher wages due to the investments may increase disposable income by $69 billion (over $500 per household) by 2027.[234]

Other Programs

Regional Commissions Programs

- Regional commissions are federally charted entities that address economic distress in certain socioeconomic regions. These commissions are funded by the federal government and subject to Congressional oversight, with the goal of integrating federal and state economic development plans with the needs of local communities.[235] Under the IIJA, five of these programs received more than $1.3 billion.[236] Specific provisions are subject to match requirements and include:
    - The Appalachia Regional Commission received $990 billion to implement funding, allocate grants, support economic and community development projects, and build community capacity.[237]

- $150 million to the Delta Regional Authority for grants to plan future infrastructure, workforce development, and business development programs.[238]
- Nearly $75 million in different grants to the Denali Commission for job training and other economic development activities, increasing climate resilience, and workforce development in rural communities.[239]
- $150 million to the Northern Border Regional Commission to spur economic growth through grants.[240]
- The Southeast Crescent Regional Commission received $5 million.[241]

Drinking Water

- This law represents the United States' largest historical investment in clean drinking water at $55 billion. Included are major provisions to replace all of the nation's lead service pipes and clean up perfluoroalkyl or polyfluoroalkyl substance (PFAS) contamination.[242] Relevant agencies include EPA, DOI, the Department of Health and Human Services, and the Department of Commerce.[243] Funding is spread throughout seven major programs:
  - $23.43 billion for the Drinking Water and Clean Water State Revolving Funds to provide below market rate loans and grants for water infrastructure improvement plans.[244]
  - $15 billion for the Lead Service Lines program to replace all existing lead pipes and service lines.[245]
    - Replacing all lead pipes nationally could cost the US anywhere between $18-48 billion between 2015 and 2034.[246]
    - People of color and poor communities are disproportionately affected by lead poisoning, which is often caused by outdated water and housing infrastructure.[247]
  - $10 billion to the PFAS and Emerging Contaminants program for states and utility companies to treat PFAS pollution issues.[248]
  - $2.5 billion to the Department of Health and Human Services for the Indian Water Rights program to use for Indian water rights dispute settlements enacted as of November 2021.[249]
  - $3.5 billion to DOI for the Indian Health Service Sanitation program that provides American Indian and Alaska Native communities with water supply, sewage disposal, and solid waste disposal facilities.[250]
  - $1.25 billion for the Water and Sewer Tax.[251]
  - $8.3 billion for the Western Water program to fund water storage, recycling, conveyance, and reuse projects, along with repair and placement needs.[252]

Broadband Internet Access

- Around $65 billion was allocated to the Department of Commerce, Federal Communications Commission, Department of Agriculture, and Denali Commission to ensure that all Americans have access to affordable and reliable high-speed internet.

As evidenced by the COVID-19 pandemic, rural communities especially suffer from a lack of broadband infrastructure.[253]
    - Additionally, the programs aim to lower internet service prices and bridge the digital divide that bars disadvantaged Americans from making full use of different internet services.[254]

Threats to Funding

Funding Flexibility

- The IIJA has the potential to accelerate GHG emission reductions, but one major threat to the efficacy of the laws' climate ambitions is implementation decisions from local, state, and federal governments.[255]
    - Surface transportation funding is a piece of legislation that finances different transportation programs, such as transit and highways. These funds are reauthorized every few years by Congress; the IIJA secured funding for these investments through 2026.
    - While allocation levels are set by the federal government, states and localities have the authority to make decisions on how certain funds will be spent.
        - Certain programs, such as the Surface Transportation Block Grants, are at risk of being utilized to extend highway lanes and build more roads, rather than maintain existing roads and install electric vehicle infrastructure; this could lead to increased traffic and subsequent emissions.
            - One study from Georgetown Climate found that highway expansion decisions will have the largest impact on emission patterns from the IIJA.
        - Additionally, the Reconnecting Neighborhoods program (see more information under the IIJA's Justice section) has been criticized for the flexibility states have in implementation practices; some grant applications included proposals for "widening underpasses," which does not serve the intent of the fund.[256]
    - Continued guidance and technical assistance from federal agencies and the current Administration will be critical in mitigating these risks.[257]
        - In December 2021, the DOE and DOT announced the creation of a Joint Office of Energy and Transportation to provide technical assistance and support for the buildout of a national EV charging network and other related programs, especially in rural and disadvantaged areas, as outlined in the law.[258]
            - In September 2022, the Biden Administration announced that more than two-thirds of plans submitted by states to access funds from the National Electric Vehicle Infrastructure Formula Program had been approved with the assistance of the Joint Office.[259]
        - In January 2022, the Biden Administration announced the creation of the Building Performance Standards Coalition, which is joined by DOE and

EPA in providing technical assistance to state and local partners to design and implement cleaner and healthier building standards.[260]

- The goal is to upgrade 4 million buildings and 2 million homes by 2024.[261]

- Conversely, lack of flexibility in funding implementation for EV charging network has been reported as a potential barrier for Wyoming, and states with similar sparse populations and infrastructure dynamics. The state government doubts the demand for in-state electric vehicles will meet the requirements of the program to build out charging stations near major highways. Instead, Wyoming suggested utilizing funds for charging stations on smaller highways such as those serving national parks.[262]
    - This plan was supported by the director of the National Park Service. However, the state's plan was rejected by the Joint Office of Energy and Transportation.
    - No final decision has been reached to reconcile this issue.[263]
        - Provisions in the program dictate that funding intended for states declining to build charging infrastructure will be redirected to local cities and groups in the same area.[264]

Match Requirements

- While certain provisions in the law prioritize rural and disadvantaged communities, local match or cost-share stipulations implement barriers to access for these same groups by requiring investments they cannot afford. These communities are also more likely to lack the necessary resources to submit grant applications and may feel discouraged from applying for these vital funds whose aim is to uplift them, not exacerbate inequitable distribution issues.[265]
    - According to one analysis from Headwaters Economics, more than 60% of the IIJA's climate resilience funding requires a community match, with an additional 13% under certain conditions. These mandates do not account for a community's population, size, or tax base, all of which contribute to the ability of certain areas to raise funds for necessary projects.[266]
        - Specific provisions that require cost-share in the IIJA include the Building Resilient Infrastructure and Communities program and the Pollution Prevention program.[267]
    - To mitigate these burdens, Headwaters Economics has proposed three suggested solutions:[268]
        - Expanding the definition of local match to include long-term maintenance costs. This would prove community's dedication to the project, while lowering high upfront costs.
        - Encouraging states to create funding pools that would help communities in need meet the match requirements of federal programs.
            - This idea has been successfully piloted by Colorado, which allocated $80 million to an IIJA Cash Fund with specific resources to assist communities with local matches.
        - Eliminate local match requirements for climate resilience funding.

Agency Challenges

- Transportation received the largest allocation of funding through this law, and subsequently many important programs are headed by DOT. In October 2022, the inspector general sent a letter to the secretary of transportation outlining significant barriers to effectively implementing funds from the IIJA, including identifying potential fraud, mitigating workforce needs, and establishing clear guidelines for funding awards.[269]
    - DOT has previously acknowledged issues with maintaining adequate staff and contractors, who will be vital to properly overseeing implementation efforts for this historic law.
        - To mitigate these risks, the inspector general suggested prioritizing workforce flexibility practices and addressing long-term hiring goals to adequately keep up with demand beyond the next five years of funding allocation.
        - Shortages of skilled workers in construction trades and rising material prices may also affect DOT's staffs' ability to deliver funding in a timely manner.
    - Additionally, the agency has historically struggled with developing sufficient guidance for applicants to different funding opportunities. While the Government Accountability Office provided recommendations for different grants earlier in the year, a number of these suggestions have yet to be addressed.
        - DOT has attempted to remedy this challenge by issuing interim guidance to its internal Operating Administration (OA) on handling priority programs in the IJJA.
- However, funding within the law has also assisted agencies, such as EPA, in working through backlogs of workloads with boosts in funding toward existing programs.[270]

PART 2: Inflation Reduction Act

Top-Line Numbers

The Inflation Reduction Act (IRA) allocated $393.7 billion for energy security and climate change investments spread across many sectors, including energy, manufacturing, and the environment. Additional provisions include $108 billion in spending for extending the Affordable Care Act subsidies and other healthcare programs, and $281 billion in healthcare savings from prescription drug pricing reform. Total net deficit reductions are estimated at $237 billion over the next 10 years.[271]

Investment Category	Funding
Energy	$250.6 billion
Manufacturing	$47.7 billion
Environment	$46.4 billion
Transportation and Electric Vehicles	$23.4 billion
Agriculture	$20.9 billion
Water	$4.7 billion
Total new spending	$393.7 billion

Table 2: Total investments in energy and climate in the IRA[272]

Emissions

- The IRA includes billions of dollars for new clean energy, transportation, and other projects to cut GHG emissions and other air pollutants.[273]
    - The IRA could cut particulate matter, sulfur oxides, and nitrous oxides – with the potential to avoid up to 4,500 premature deaths; up to 119,000 asthma attacks; and up to 484,000 lost workdays annually in 2030.[274]
- In 2030, with the implementation of the IRA's programs, one projection shows US emissions dropping as much as 2.8 billion metric tons of carbon dioxide equivalent ($MTCO_2e$) below 2005 levels.[275]
    - Based on independent analyses, successful IRA implementation could accelerate US emissions reductions to between 30% and 43% below 2005 levels by 2030 (up from 24% to 35% without the IRA), closing 49–71% of the emissions gap.[276]
    - The range of emissions reductions is due to uncertainties relating to future oil and gas prices, how IRA provisions are implemented, and the rate of electrification.[277]
- One analysis found that for every ton of emissions generated by the IRA's gas and oil provisions, at least 28 tons will be avoided by the more climate-friendly provisions.[278]
- On its own, the IRA may cut annual emissions by up to 1.2 billion $MTCO_2e$ in 2030, despite oil and gas requirements.[279]
    - That's the equivalent of taking over 258 million gasoline-powered vehicles off the road or shuttering 321 coal-fired power plants (more than the current operating fleet of coal plants in the US) every year.[280]

- By 2030, with implementation of the IRA, modelling suggests that emissions from electric power will decrease the most of any sector – by as much as 51%. Other sectors' emissions reductions may take longer to be fully realized.[281]
    - Emissions reductions in the transportation sector may take much longer to accrue due to stock turnover and the limits of the funding and incentive programs.[282]
- Like the IIJA, the IRA has dozens of programs with implied GHG emissions reductions goals, resulting from the deployment of low- and zero-emission technologies in the energy, transportation, industry, buildings, and agriculture sectors. But numerous programs explicitly mention emissions reduction goals, including:
    - Greenhouse Gas Reduction Fund – $27 billion[283]
        - This program aims to reduce GHG emissions through clean energy and climate projects, of which at least 40% ($15 billion) must be dedicated to poor and disadvantaged communities to benefit from projects that reduce GHG emissions and other air pollution.
        - Eligible recipients include states, municipalities, Tribal governments, and certain nonprofits.
        - This program has no cost-share requirement.
        - Funds to remain available until September 30, 2024. Implementation of the grant program must begin by February 15, 2023.
        - See additional information about this program in the IRA's Justice section.
    - Methane Emissions Reduction Program – $1.55 billion[284]
        - Funding to provide financial and technical assistance to accelerate the reduction of methane and other GHG emissions from petroleum and natural gas systems by improving and deploying new equipment, supporting technological innovation, permanently shutting in and plugging wells, and other activities.
        - It also establishes a waste emissions charge for applicable facilities that report more than 25,000 $MTCO_2e$ per year and exceed waste emissions thresholds.
        - Eligible recipients include states, counties, cities/townships, special districts, territories, Tribal governments (federally recognized and others), public and private institutions of higher education, nonprofits (with and without 501(c)(3) status), businesses (small and other), and individuals.
        - This program complements the IIJA's nearly $4.7 billion to plug and remediate orphaned oil and gas wells.
        - This program has no cost-share requirement.
        - Funds to remain available until September 30, 2028.
    - Energy Infrastructure Reinvestment Financing – up to $250 billion[285]
        - See additional information about this program in the IRA's Clean Energy Manufacturing section.
    - Advanced Energy Project Credit – $10 billion[286]
        - See additional information about this program in the IRA's Clean Energy Manufacturing section.
    - USDA Assistance for Rural Electric Cooperatives[287]

        - See additional information about this program in the IRA's Clean Energy in Rural America and on Tribal Lands section.
    - Sustainable Aviation Fuel (SAF) Credit[288]
        - See additional information about this program in the IRA's Transportation Fuels section.
    - Fueling Aviation's Sustainable Transition through Sustainable Aviation Fuels (FAST-SAF) – $244.53 million[289]
        - See additional information about this program in the IRA's Transportation Fuels section.
    - Fueling Aviation's Sustainable Transition - Technology (FAST-Tech) – $46.53 million[290]
        - See additional information about this program in the IRA's Transportation Fuels section.
    - Advanced Industrial Facilities Deployment Program – $5.812 billion[291]
        - Provides financial support to industrial facilities in emissions-intensive sectors – such iron, steel, aluminum, cement, glass, paper, and chemicals – to complete projects that reduce GHG emissions through installation or implementation of advanced industrial technologies.
        - This program complements the $500 million for Industrial Emissions Demonstration Projects that test and validate technologies that reduce industrial emissions.
        - Eligible recipients include owners or operators of domestic, non-federal, non-power industrial, or manufacturing facilities engaged in energy-intensive industrial processes.
        - The cost-share requirement is at least 50%.
        - Funds to remain available through September 30, 2026.
    - Environmental and Climate Justice Block Grants – $3 billion[292]
        - See additional information about this program in the IRA's Justice section.
    - Climate Pollution Reduction Grants – $5 billion
        - Provided to Tribes, states, air pollution control agencies, and local governments to develop and implement plans for reducing GHG emissions.[293]
        - This program has no cost-share requirements.
        - Planning grant funds to remain available until September 30, 2031; implementation grant funds to remain available until September 30, 2026.
    - Diesel Emissions Reductions – $60 million[294]
        - Funding provided to identify and reduce diesel emissions resulting from goods movement facilities and vehicles servicing goods movement facilities in poor and disadvantaged communities to address the health impacts of such emissions on such communities.
        - This program has no cost-share requirements.
        - Funding to remain available until September 30, 2031.
    - Funding to Address Air Pollution at Schools – $50 million[295]
        - Funding to monitor and reduce pollution and GHG emissions at schools in poor and disadvantaged communities; and provide technical assistance in

developing school air and environmental quality plans and identify and mitigate ongoing air pollution hazards.
    - This program has no cost-share requirements.
    - Funding to remain available until September 30, 2031.
- Low Emissions Electricity Program – $87 million[296]
    - Funding included for assessments of anticipated GHG reductions from changes in domestic electricity generation and use, and to ensure that GHG reductions are achieved through the existing authorities of the Clean Air Act.
    - This program has no cost-share requirements.
    - Funding to remain available until September 30, 2031.
- Funding to Address Air Pollution: Methane Monitoring – $20 million[297]
    - Funding to monitor methane emissions from significant sources not covered by other parts of the IRA, such as flaring and fugitive sources.
    - This program has no cost-share requirements.
    - Funding to remain available until September 30, 2031.
- Greenhouse Gas Corporate Reporting – $5 million[298]
    - Funding to improve corporate climate action commitments and plans to reduce GHG emissions.
    - This program has no cost-share requirements.
    - Funding to remain available until September 30, 2031.
- Regional Conservation Partnership Program – $4.95 billion[299]
    - Funding can be used to support implementation of conservation projects that reduce, capture, avoid, or sequester CO_2, methane, or nitrous oxide emissions associated with agricultural production.
- Environmental Quality Incentives Program (EQIP) – $8.45 billion[300]
    - Funding can be used to support practices that reduce, capture, avoid, or sequester CO_2, methane, or nitrous oxide emissions associated with agricultural production.
    - This program has no cost-share requirements.
    - Funding to remain available until September 30, 2031.
- Agricultural Conservation Easement Program (ACEP) – $1.4 billion[301]
    - Funding can be used to support easements or interests in land that will most reduce, capture, avoid, or sequester CO_2, methane, or nitrous oxide emissions.
    - The cost-share requirement varies.
    - Funding to remain available until September 30, 2031.
- Credit for Carbon Oxide Sequestration[302]
    - Tax credit for CO_2 sequestration, injection for enhanced oil recovery (EOR), or utilization, for facilities placed in service by 2032.
        - Base credit is $17/metric ton of CO_2 captured and sequestered, or $36/metric ton for direct air capture (DAC); and $12/metric ton for CO_2 injected for EOR or utilized, or $26/metric ton for DAC.
        - Facilities meeting prevailing wage and registered apprenticeship requirements may be eligible for five times the base credit.

Transportation

- The IRA tackles multiple transportation-related priorities set by President Biden, including:
    - The sale of at least 50% of all new passenger cars and light trucks to be zero-emission vehicles in 2030.[303]
    - Securing a reliable and sustainable supply of critical minerals used for EVs (as well as for power) as outlined in the American Battery Materials Initiative.[304]
    - Expanding biofuels infrastructure, opening new market opportunities for sustainable fuel sources, and lowering energy costs for American families.[305]
    - Producing sustainable aviation fuels on a commercial scale, in connection to the joint-agency Sustainable Aviation Fuel Grand Challenge.[306]
- The IRA's investments build on the $7.5 billion provided by the IIJA to deploy a national network of 500,000 electric vehicle chargers; more than $7 billion for critical minerals and other components for domestic battery manufacturers; and $10 billion for clean transit and school buses.[307]

Clean Vehicles

- Clean Vehicle Credit[308]
    - Provides up to $7,500 in tax credit for consumers purchasing new qualifying clean vehicles, including battery electric, plug-in hybrid, or fuel cell electric vehicles.
        - $3,750 for vehicles meeting critical minerals requirements: containing a threshold percentage of critical minerals extracted or processed in the US or in a country with which the US has a free trade agreement, or recycled in North America.
        - $3,750 for vehicles with a threshold percentage of battery components manufactured or assembled in North America. Vehicles must meet other requirements, including final assembly in North America and MSRP limits (generally $55,000; for vans, SUVs, and pickups $80,000).
            - Starting in 2024, qualifying vehicles cannot have battery components manufactured or assembled by a foreign entity of concern.
            - Starting in 2025, qualifying vehicles' batteries cannot contain critical minerals extracted, processed, or recycled by a foreign entity of concern.
    - Starting in 2024, buyers may transfer credit to dealers in exchange for a reduction in price at the point of sale.
    - The credit is limited to consumers who have adjusted gross incomes below: $300,000 for couples, $225,000 for heads of household, or $150,000 for singles.
    - Generally available for vehicles placed in service from 2023-2032.

- Credit for Previously-Owned Clean Vehicles[309]
  - Supports the purchase of used electric vehicles with a tax credit in the amount of $4,000, or 30% of sales price, whichever is less.
  - Individuals can claim only once per three years.
  - Vehicles must be sold by a dealer; the sale price must be $25,000 or less; and it can only be claimed once per vehicle.
  - Starting in 2024, buyers may transfer credit to dealers in exchange for a reduction in price at the point of sale.
  - The credit is limited to consumers who have adjusted gross incomes below: $150,000 for couples, $112,500 for heads of household, or $75,000 for singles.
  - Generally available for vehicles placed in service from 2023-2032.
- Credit for Qualified Commercial Clean Vehicles[310]
  - Provides a tax credit for the purchase of commercial clean vehicles. The credit amount is the lesser of (a) 15% of the vehicle's cost to the purchaser or 30% for vehicles without internal combustion engines, or (b) the amount the purchase price exceeds the price of a comparable internal combustion vehicle.
  - Credits is capped at $7,500 for vehicles under 14,000 pounds and $40,000 for all other vehicles.
  - States, political subdivisions, tax-exempt organizations (other than co-ops described in section 521), and Indian Tribal governments can elect to receive these tax credits in the form of direct payments.
  - Available for vehicles placed in service beginning in 2023 and acquired by 2032.
- Alternative Fuel Vehicle Refueling Property Credit[311]
  - Provides a tax credit for alternative liquid fuel vehicle refueling and electric vehicle charging property in poor and rural areas. The credit covers:
    - 6% of the cost and limited to a $100,000 credit per item for businesses.
    - 30% of the cost and limited to $1,000 for individuals.
  - Alternative fuels include electricity, ethanol, natural gas, hydrogen, biodiesel, and others.
  - Businesses meeting prevailing wage and registered apprenticeship requirements can claim a 30% credit for projects.
  - Tax-exempt organizations, states, political subdivisions, the Tennessee Valley Authority, Indian Tribal governments, Alaska Native Corporations, and rural electricity co-ops can elect to receive these tax credits in the form of direct payments.
  - Available for projects installed from 2023-2032.
- Advanced Technology Vehicle Manufacturing Loan Program (ATVM) – $3 billion[312]
  - A modified existing program providing loans for the manufacture of clean vehicles and their components domestically, including newly authorized uses from the IIJA such as medium- and heavy-duty vehicles, locomotives, maritime vessels including offshore wind vessels, aviation, and hyperloop.
  - The IRA removes the $25 billion cap on ATVM loans.

    - Eligible recipients are manufacturers of eligible vehicles or of components or materials that support eligible vehicles' fuel economy performance.
    - Funds may be used for direct loans for reequipping, expanding, or establishing a US manufacturing facility to produce low- or zero-emission vehicles.
    - Loan amount cannot exceed 80% of eligible project costs.
    - ATVM loans to remain available through September 30, 2028.
- Domestic Manufacturing Conversion Grants – $2 billion[313]
    - Provides 50% cost-shared grants for the domestic production of efficient hybrid, plug-in electric hybrid, plug-in electric drive, and hydrogen fuel cell electric vehicles or components for these vehicles.
    - Eligible recipients include small businesses, businesses (other than small businesses), and/or individuals manufacturing for eligible vehicle types.
    - Grants to remain available through September 30, 2031.
- Advanced Manufacturing Production Credit[314]
    - A tax credit equal to 10% of costs for domestic production and sale of qualified components for clean energy projects, including critical minerals used in renewable energy generation, storage, and related manufacturing.
    - Per the IEA: "The credit for critical mineral production begins in 2023 and is exempt from the phaseout that is applied to other eligible components beginning in 2030."[315]
- Clean Heavy-Duty Vehicle Program – $1 billion[316]
    - Grants and rebates to help offset the cost of replacing heavy-duty commercial vehicles with zero-emission vehicles; to deploy supporting infrastructure to charge, fuel, or maintain these vehicles; and to train and develop the necessary workforce.
    - Eligible Recipients: (1) a state; (2) a municipality; (3) an Indian Tribe; (4) a nonprofit school transportation association.
    - At least 40% of funding ($400 million) must go to areas not meeting national air quality standards.
    - Funding to remain available until September 30, 2031.

Transportation Fuels

- Tax Credits for Biodiesel and Renewable Diesel[317]
    - Extended through 2024, providing a base credit of $1.00 per gallon for biodiesel, biodiesel mixtures, and renewable diesel; a $0.10 credit for small agri-diesel producers; and a $1.00-per-gallon excise tax credit for biodiesel and renewable diesel mixtures.
- Tax Credits for Alternative Fuels[318]
    - Extended through 2024, providing a $0.50-per-gallon excise tax credit for alternative fuels and alternative fuel mixtures.
- Second-Generation Biofuel Incentives[319]
    - Extended through 2024, providing a $1.01-per-gallon income tax credit for second-generation biofuel production.
- Clean Fuel Production Credit[320]

  - Provides a tax credit for domestic production of qualifying clean transportation fuels, including sustainable aviation fuels, with less than 50 kilograms of CO_2e per million BTU.
  - The base credit is $0.20-per-gallon for non-aviation fuels and $0.35-per-gallon for aviation fuels, multiplied by the fuel's CO_2 "emissions factor". Facilities meeting prevailing wage and registered apprenticeship requirements may be eligible for five times the base credit (aviation $1.75/gallon, non-aviation $1/gallon).
  - Credits will be adjusted for inflation after 2024.
  - Tax-exempt organizations, states, political subdivisions, the Tennessee Valley Authority, Indian Tribal governments, Alaska Native Corporations, and rural electricity co-ops can elect to receive these tax credits in the form of direct payments.
  - Available for fuels produced beginning in 2025 and used by 2027.
- Higher Blend Infrastructure Incentive Program (Biofuel Infrastructure and Agriculture Product Market Expansion) – $500 million[321]
  - Provides grants to expand infrastructure for higher blends of ethanol (greater than 10% ethanol, e.g. E15 or higher) and biodiesel (greater than 5% biodiesel, e.g. B20 or higher) derived from US agricultural products, and by sharing 25% of the costs related to building out biofuel-related infrastructure.
  - Eligible for transportation fueling and fuel distribution facilities, such as fueling stations, convenience stores, hypermarket fueling stations, fleet facilities (including rail and marine), terminal operations, depots, and midstream partners.
  - Grants to remain available through September 30, 2031.
- Funding Section 211(o) of the Clean Air Act – $15 million[322]
  - Competitive grants and direct federal spending to support investments in advanced biofuels and implement the Renewable Fuel Standard. Investments can support activities including:
    - Developing tests and protocols regarding effects of fuel and fuel additives.
    - Collecting data.
    - Updating analyses of lifecycle GHGs of a fuel.
    - Conducting analyses of transportation fuels related to their environmental and public health effects, especially in poor and disadvantaged communities.
    - Awarding grants to industry and other related activities to support investments in advanced biofuels.
  - Funding to remain available until September 30, 2031.
- Sustainable Aviation Fuel (SAF) Credit[323]
  - Provided for domestic producers and blenders of qualified SAF-kerosene fuel mixtures that achieve a lifecycle GHG emissions reduction of at least 50% compared to petroleum-based jet fuel.
  - Both production and aircraft fueling must occur in the US.
  - The base credit is $1.25/gallon, plus an additional credit up to $0.50/gallon depending on lifecycle emissions reduction.

    - Tax credits available from 2023-2024.
- Fueling Aviation's Sustainable Transition through Sustainable Aviation Fuels (FAST-SAF) – $244.53 million[324]
    - Funding for eligible entities to facilitate and scale fuel production, transportation, blending, or storage of SAF; and the exploration and identification of supply chains, infrastructure, and distribution needs by key proponents.
    - The federal cost-share is 75% of the total proposed project costs, but increases to 90% if the eligible entity is a small or non-hub airport.
    - Eligible recipients are:
        - A state or local government, including the District of Columbia, other than an airport sponsor.
        - An air carrier.
        - An airport sponsor.
        - An accredited institution of higher education.
        - A research institution.
        - A person or entity engaged in the production, transportation, blending, or storage of SAF in the US or feedstocks in the US that could be used to produce SAF.
        - A person or entity engaged in the development, demonstration, or application of low-emission aviation technologies.
        - Nonprofit entities or nonprofit consortia with experience in SAF, low-emission aviation technologies, or other clean transportation research programs.
    - Grants available until September 30, 2026.
- Fueling Aviation's Sustainable Transition - Technology (FAST-Tech) – $46.53 million[325]
    - Provides grants for the design, prototyping, development, demonstration, testing, and application of low-emission aviation technologies that significantly improve fuel efficiency or reduce GHG emissions during the operation of civil aircraft.
    - The federal cost-share is 75% of the total proposed project costs, but increases to 90% if the eligible entity is a small or non-hub airport.
    - Eligible recipients are:
        - A state or local government, including the District of Columbia, other than an airport sponsor.
        - An air carrier.
        - An airport sponsor.
        - An accredited institution of higher education.
        - A research institution.
        - A person or entity engaged in the production, transportation, blending, or storage of SAF in the US or feedstocks in the US that could be used to produce SAF.
        - A person or entity engaged in the development, demonstration, or application of low-emission aviation technologies.

        - Nonprofit entities or nonprofit consortia with experience in SAF, low-emission aviation technologies, or other clean transportation research programs.
    - Grants available until September 30, 2026.

Energy

Clean Energy

- Extended and modified Production (PTC) and Investment Tax Credits (ITC) for clean and nuclear energy for 10 years, which will spur growth and drive down prices. These tools helped reduce costs for solar and wind by ~90% and ~70%, respectively, since 2009.[326]
    - These tax credits are eligible for direct pay, transferability, and are available for Tribal governments.[327]
    - The PTC and ITC for clean energy projects have wage requirements to ensure that contractors and subcontractors are paid prevailing wages during construction, repair, and alteration stages of the project during the tax credit period. Failing to meet these requirements results in a correction of wages in addition to per-worker compensation and interest charges.[328]
    - These tax credits have apprenticeship requirements as a percentage of total labor hours during the construction phase, and sometimes for the alteration and repair of the project.[329]
    - The credits can be further increased by 10% if the project meets domestic content requirements for steel, iron, and manufactured products.[330]
    - Up to 10% added for projects in:
        - Certain communities near brownfield sites.
        - Areas that had a 0.17% or greater direct employment or over 25% in tax revenues related to coal, oil, or natural gas extraction, processing, transport, or storage.
        - An unemployment rate at or above the national rate for the previous year.
        - Areas where a coal mine has closed since December 31, 1999, or near a coal-generated plant that has retired since December 31, 2009.[331]
    - Up to 20% added for projects in certain poor communities, to poor residential buildings or building projects, or on Indigenous lands.[332]
- The IRA could double the pace of growth for wind (to 39 GW/year) and increase annual utility-scale solar installations by five times (to 49 GW/year) relative to the 2020 pace by 2025.[333]
- One study projects that the IRA could help accelerate annual investment in US clean energy from $64 billion in 2022 to nearly $114 billion by 2031 while cutting costs for clean energy equipment by 20% to 60%.[334]
- $27 billion for the Greenhouse Gas Reduction Fund to reduce GHG emissions by financing clean energy and climate projects with at least 40% of the benefits going to poor and disadvantaged communities.[335] See additional information in the IRA's Emissions and Justice sections.

- $40 billion in loan authority and $3.6 billion in credit subsidy for loan guarantees for innovative clean energy projects such as renewable energy systems, carbon capture, nuclear energy, and critical minerals processing, manufacturing, and recycling. This tax credit is eligible for direct pay and transferability.[336]

Clean Energy Manufacturing

- Up to $250 billion in new loan authority to retool, repower, repurpose, or replace nonoperational energy systems or to avoid, reduce, use, or sequester GHGs.[337]
    - The details of eligibility are yet to be determined as of January 2023. The funding will be available through September 30, 2026.[338]
- Over $60 billion toward domestic clean energy and vehicles manufacturing to spur clean energy growth, independence, and security, which could create hundreds of thousands of US manufacturing jobs.[339]
- $10 billion expansion and extension of the Advanced Energy Project Credit to:[340]
    - Re-equip, expand, or establish an industrial or manufacturing facility for the production or recycling of a range of clean energy and energy efficiency equipment, carbon capture equipment, and advanced vehicles.
    - Re-equip an industrial or manufacturing facility with equipment designed to reduce GHG emissions by at least 20%.
    - Re-equip, expand, or establish an industrial facility for the processing, refining, or recycling of critical materials.[341]
    - At least 40% of the qualified investments must go towards communities where a coal mine or a coal-fired electric generating unit has closed.[342]
        - This tax credit is eligible for direct pay, transferability, and are available for Tribal governments. At least $4 billion most go towards energy communities.[343]
- Established a production tax credit for domestically manufacturing critical clean energy components for wind, solar, inverters, batteries, and critical materials.[344]
    - This tax credit is eligible for direct pay, transferability, and for Tribal governments. It will be available to the full extent of the credit between 2023–2029 and will phase down over 2030–2032.[345]
- $500 million to carry out the Defense Production Act (DPA) and, by a presidential determination, proposed up to $250 million from this fund toward the domestic manufacturing of electric heat pumps.[346]
    - Eligibility has not yet been determined as of January 2023.
    - Applicants are limited to requesting up to 50% of the cost of the project.
- $700 million to support the High-Assay Low-Enriched Uranium (HALEU) Availability Program activities directed in section 2001 of the Energy Act of 2020. This will support the two advanced reactor deployment projects funded by the IIJA.[347]
    - Recipients are responsible for 20 to 50% of total costs.[348]
        - $200 million is available for cost-share financial assistance. [349]

Oil and Methane Reform

- $1.5 billion for EPA to help companies reduce methane emissions.[350]
- Methane fee of up to $1,500 per ton for specific facilities, providing a strong incentive for industry to get fugitive emissions under control.[351]
- Raises oil lease royalty rates to a minimum 16.66%, up from 12.5% for the next 10 years.[352]

Transmission and Permitting

- According to a September 2022 report by Princeton's Zero Lab, the US will need to grow its transmission infrastructure at an average rate of about 2.3% each year (more than double the average rate over the last decade) to fully utilize the 2030 emissions reductions accelerated by the IRA.[353]
    - An annual transmission growth rate of only 1% could result in the US losing over 80% of the IRA's potential 2030 emissions reductions. However, at a growth rate of 1.5%, the US may lose just 25% of that potential.
    - A low transmission growth rate may result in additional coal use – particularly from increased electricity demand for buildings and in the electrification of the transportation sector – to the tune of 110 million tons in 2030 relative to a no-IRA case.[354]
    - It could also increase US reliance on natural gas. With only 1% per year of transmission expansion, natural gas use may increase to 4% above 2021 levels in 2030 and remain elevated through at least 2035.[355]
    - But speeding transmission build-out would have the opposite effect, increasing wind and solar generation at the expense of natural gas consumption, which could fall by 17% in 2030 (relative to 2021 levels).[356]
- One study found that 97% of the US coal power plant fleet is more expensive to operate than its clean energy counterparts sited within about 30 miles, and 99% of all US coal-fired plants are more expensive to operate than transitioning to clean energy projects. For more than three-quarters of the US coal fleet, clean energy would be at least one-third cheaper to operate.[357] Nearly a quarter of the current fleet is set to retire by 2029.[358]
    - This study's conclusions hinge the rate of clean energy transition on transmission growth and interconnection improvements. Recommended solutions include interconnection reform to address extensive interconnection queues such as those of regional transmission operators PJM and Midcontinent Independent System Operator (MISO), which had about three times more clean energy capacity in the interconnection queue than their existing coal capacity in 2022. PJM expects it will be unable to review interconnection requests until 2026.[359]
- The IRA includes over $750 million spread across agencies including the Department of Energy, Department of the Interior, Council on Environmental Quality, Federal Energy Regulatory Commission, and others to perform more efficient and timely environmental reviews.[360]
    - The law also includes important tax credits for clean energy, such as modified and extended investment tax credits (ITC) and production tax credits (PTC) for clean

energy for 10 years. Starting in 2025, the credits for wind will be replaced with technology-neutral credits for low-carbon electricity generation. Projects must meet apprenticeship and prevailing wage requirements to utilize the full extent of the credits.[361]
    - Additional credits are available for meeting domestic content thresholds, locating facilities in fossil fuel "energy communities," and for small facilities (under 5 MW) in low-income communities, on Tribal lands, or as part of low-income residential building and economic benefit projects.[362]
- Towards transmission infrastructure and related permitting, the IRA provides:
    - $2 billion for the construction or modification of electric transmission facilities designated to be of national interest under the Federal Power Act.[363]
    - $760 million in grants to siting authorities to expedite the siting and permitting process for transmission projects. Grants are also available for state, local, or Tribal government entities to support economic development activities in communities impacted by the construction or operation of transmission projects.[364]
        - Cost-share applies to siting authorities for participation in regulatory proceedings in other jurisdictions and at FERC and must not exceed 50% on the federal government's behalf.[365]
    - $100 million for transmission planning, modeling, and analysis of interregional electricity transmission and transmission of electricity generated by offshore wind and for stakeholder engagement on these issues.[366]

Clean Energy in Rural America and on Tribal Lands

- $9.7 billion to build electric distribution, transmission, renewable energy generation facilities, and carbon capture and storage systems for rural electric cooperatives as well as demand side management and energy conservation programs for rural communities.[367]
    - Demand side management and energy conservation programs and system improvements and replacements to reduce carbon dioxide, methane, and nitrous oxide emissions in rural areas are also included.
    - Eligible recipients:
        - Electric cooperatives that are or have been Rural Utilities Service borrowers.
        - Electric cooperatives serving a predominantly rural area.
        - Or a wholly or jointly owned subsidiary of such cooperatives.
    - Cost-share varies by product.
- $1 billion towards rural and Tribal electric distribution, transmission, and clean energy generation facilities (solar, wind, hydropower, biomass, or geothermal) as well as demand side management, energy conservation programs, and on-grid and off-grid renewable energy systems.[368]
    - Applicants can request up to 50% of the cost of the project, but it is possible to waive the cost-share limit.[369]
- Over $1.7 billion for renewable energy systems and energy efficiency improvements for agricultural producers and rural small businesses.[370]

    - Renewable energy systems include:
        - Biomass (e.g., biodiesel and ethanol, anaerobic digesters, solid fuels).
        - Geothermal for electric generation or direct use.
        - Hydropower below 30 MW.
        - Hydrogen.
        - Wind generation.
        - Solar generation.
        - Ocean (tidal, current, thermal) generation.
    - Energy efficiency improvements include:
        - High-efficiency heating, ventilation and air conditioning systems (HVAC).
        - Insulation.
        - Lighting.
        - Cooling or refrigeration units.
        - Doors and windows.
        - Electric, solar, or gravity pumps for sprinkler pivots.
        - Switching from a diesel to electric irrigation motor.
        - Replacing energy-inefficient equipment.
    - Recipients must contribute up to 50% of project costs.
- $150 million to electrify unelectrified Tribal homes with zero-emissions energy systems, to convert electrified Tribal homes to zero-emissions energy systems, and for the repair and retrofitting associated with the installation of these systems.[371]
    - These funds do not have cost sharing requirements.
- $75 million in loan guarantees for Tribal energy projects in the form of direct and partial loans. Total loan authority was increased to $20 billion and will be available until September 30, 2026.[372]
    - Eligible energy projects include:[373]
        - Electricity generation, transmission and/or distribution facilities, utilizing clean or fossil fuel energy sources.
        - Energy storage facilities.
        - Energy resource extraction, refining, or processing facilities.
        - Energy transportation facilities, including pipelines.
        - District heating and cooling facilities.
        - Cogeneration facilities.
        - Distributed energy project portfolios, including portfolios of smaller distributed generation and storage facilities employed pursuant to a unified business plan.[374]

Household Savings

- The IRA includes numerous rebates and tax credits for individual households aimed at reducing energy consumption and transitioning houses to clean energy over the next 10 years. Many of these rebates are targeted at poor households and will lower energy costs for families, while reducing emissions across the country.[375]

- Tax rebates are sums of money credited to participating customers after qualifying transactions. To receive a rebate from the IRA, customers must choose a participating contractor, who will then provide a direct discount on the qualifying purchase.[376]
  - Participation rules may differ on a state-by-state basis.[377]
- Tax credits from the IRA will either reduce the amount of taxes owed or increase a refund on filed taxes, depending upon the individual for qualifying expenses. Documentation of the expense is required.[378]
  - Tax credits have been criticized for not being beneficial for certain poor households who do not pay federal income tax and therefore cannot take advantage of the credits.[379]
- Certain energy efficient tax rebates and electrification credits can be used in conjunction with each other.[380]

Electrification Rebates

- The High-Efficiency Electric Home Rebate (HEEHR) program targets low- and moderate-income households for discounts, capped at $14,000 per household, for electrification projects through the Department of Energy.[381]
  - Qualifying poor households make under 80% of the area median income and moderate-income households fall between 80% and 150% of area median income.[382]
    - Income limits are set by the Department of Housing and Urban Development, whose website provides income limit summaries for every county in the United States.[383]
  - Qualifying projects and purchases include[384]:
    - Electric panel upgrades
      - A discount up to $4,000.
    - Electric stoves
      - A discount up to $840.
    - Electric wiring
      - A discount up to $2,500.
    - Heat pump water heaters
      - A discount up to $1,750.
    - Heat pump air conditioner/heaters
      - A discount tup to $8,000.
    - Heat pump clothes dryer
      - A discount up to $840.
    - Weatherization (upgrades for air sealing, ventilation, insulation)
      - A discount up to $1,600.
- The Whole Home Energy Reduction Rebates (HOMES)
  - Efficiency rebates are available to households looking to reduce their energy use through efficiency retrofits. Unlike HEEHR, HOMES is available to high-income and low- to moderate-income households. These rebates are particularly useful for low- to moderate-income households with electric resistance heating because they

do not otherwise qualify for HEEHR. Rebates are available based on a tiered system:[385]
    - $4,000 or 50% of project costs are available for retrofits that achieve energy system savings of 35%.[386]
    - $2,000 or 50% of project costs are available for retrofits that achieve energy system savings of 20-34%.[387]
    - A rate per kWh up to $2,000 for retrofits that achieve energy system savings of not less than 15%.[388]
  - These discounts will apply to up to 80% of project costs for poor households (less than 80% of Area Median Income).[389]

Tax Credits

- Certain tax credits in 25C and 25D, overlap in applicability depending upon what project installations are combined. Projects that qualify for both credits cannot be combined and the credit with greater value should be chosen. Capped credits are reset each year.[390] Qualifying projects include:[391]
  - Battery storage installations[392]
    - An uncapped 30% credit (an estimated value of $4,800) is available under 25D.[393]
  - Geothermal heating installations[394]
    - An uncapped 30% credit (an estimated value of $7,200) is available under 25D.
  - Electric panels[395]
    - A capped 30% credit at $600/year is available under 25C.
      - Electric panel upgrades must be combined with other 25C credits, such as those for heat pumps.
      - All 25C credits for panel upgrades and weatherization projects are capped at $1,200/year.
    - An uncapped 30% credit is available under 25D.
      - Electric panel upgrades under this credit must be done in conjunction with rooftop solar projects.
  - Heat pump air conditioner/heater[396]
    - A capped 30% credit at $2,000/year is available under 25C.
  - Heat pump water heater[397]
    - A capped 30% credit at $2,000/year is available under 25C.
  - Rooftop solar installation[398]
    - An uncapped 30% credit (an estimated value of $4,600) is available under 25D.
    - An additional 10-20% credit for community solar and leased rooftop solar developers may be able available pending supplemental guidance from the Internal Revenue Service.
  - Weatherization (upgrades for air sealing, ventilation, insulation)[399]
    - A capped 30% credit under 25C is available. Caps differ based on the type of project.

        - $1,200/year cap for insulation and air sealing.
        - $250/year cap per door, up to $500/year in total.
        - $600/year cap for windows.
        - $150/year cap for energy audits.
- In addition, the existing Energy Efficient Homes Credit for homebuilders to construct new energy efficient homes, under 45L, was retroactively extended with new provisions for homes acquired after 2022. Specific provisions include[400]:
    - $2,500 for new Energy Star homes and $500 per unit in multifamily Energy Star buildings.
    - $5,000 for certified zero-energy ready homes and $1,000 per unit in zero-energy multifamily buildings.

Justice

- While far less than the original $160 billion outlaid in the Build Back Better Act, there is an estimated $60 billion in this law to address the needs of disadvantaged and frontline communities as they deal with the disproportionate impacts of the climate crisis.[401] Notable programs and provisions within the law include:
    - The Greenhouse Gas Reduction Fund allocates $27 billion to speed up the deployment of low-carbon technologies, of which $7 billion must go toward investments in zero-emission technologies and $8 billion toward financial and technical assistance for other projects to reduce GHG emissions in disadvantaged communities.[402] This law meets the requirements of the Justice40 initiative.[403]
        - EPA is currently (as of January 2023) deciding on allocation avenues for funding**.** Possible avenues for allocation include nonprofits, community development financial institutions, and state and local green banks.[404]
        - Funding must be distributed by September 2024, which is a very tight deadline for EPA.[405]
            - In January of 2023, the Environmental Financial Advisory Board submitted guidance to EPA on best practices for effective implementation. Recommendations include highlighting the importance of balancing equity and access goals with goals for leverage and operability, collaboration between components of the program, a competitive application process, increased time for Tribal applications, reliance on intermediaries to address complex issues, and considerations for future funding requests from Congress.[406]
    - Environmental and Climate Justice Block Grants include $3 billion for community-led projects, which are important to address the individualized needs of different frontline communities. These grants will be overseen by the new EPA Office of Environmental Justice and External Civil Rights.[407]
        - In January 2023, EPA announced the first round of environmental justice grants, with $100 million in total are available to apply for through April 10, 2023 with project start dates to begin in October 2023.[408] Timelines for future funding availability are to be determined.

- EPA's Environmental Justice Government-to-Government (EJG2G) program, which "provides funding at the state, local, territorial, and tribal level to support government activities that lead to measurable environmental or public health impacts in communities disproportionately burdened by environmental harms", anticipates awarding around $40 million in IRA appropriations, split evenly between local governments and Tribal governments partnering with community-based nonprofit organizations (CBOs).[409]
- EPA's Environmental Justice Collaborative Problem-Solving (EJCPS) Cooperative Agreement Program, which "provides financial assistance to eligible organizations working to address local environmental or public health issues in their communities", anticipates awarding about $30 million of IRA funding to CBOs through 83 cooperative agreements.[410]

- Neighborhood Access and Equity Grants include $3.2 billion through DOT to support neighborhood equity, walkability, safety, and affordable transportation access with competitive grants to reconnect communities divided by existing infrastructure barriers, mitigate negative impacts of new transportation facilities or construction projects on disadvantaged or underserved communities, and support equitable transportation planning and community engagement activities.[411]
- Over $750 million is spread across agencies including the Department of Energy, Department of the Interior, Council on Environmental Quality, Federal Energy Regulation Commission, and others to perform more efficient and timely environmental reviews.[412]
  - NEPA is a bedrock environmental law with strong ties to the civil rights movement. It stipulates that federal agencies must study and disclose the potential environmental, economic, and public health impacts of a proposed project on surrounding communities and provide opportunities for public input. Increasing funding to relevant agencies has the potential to bring affected communities in earlier in the decision-making process for projects.[413]
- $3 billion in rebates and grants to reduce air pollution at ports and to support the purchase and installation of zero-emission equipment and technology at ports.[414]
  - Funding can be used for a range of endeavors from permitting zero-emission installation projects to developing qualified climate action plans.[415]
  - More than 39 million people, disproportionately poor communities and people of color, are estimated to live within 3 miles of a port or freight hub.[416]
- Under the new petroleum Superfund excise tax, domestic crude oil and imported petroleum products are taxed at $0.164 per barrel (rate is indexed annually for inflation).[417] Revenues raised from the tax finance the Hazardous Substance Superfund Trust Fund, which pays for the cleanup of sites where responsible

parties cannot be identified or do not have the ability to pay.[418] Revenues raised from the funds are estimated at $11.7 billion over the next 10 years.[419]
    - The statutory definition of crude oil includes natural gasoline, whereas the definition of petroleum product does not explicitly mention other products outside of crude oil.[420]
    - This tax adds to the existing $0.09 per barrel oil spill tax imposed on domestic crude and imported petroleum producers.[421]
    - An EPA study from 2020, found that people of color and poor communities disproportionately reside within 3 miles of a Superfund site.[422]
- Other avenues of funding for environmental justice related projects include:
    - $87 million to EPA for low-emissions electricity generation, including in poor and disadvantaged communities.[423]
    - $32.5 million to the Council on Environmental Quality to track disproportionate burdens of pollution and climate change on frontline communities and improve outcomes for those communities in the decision-making process.[424]
    - $25 million to both the Office of Management and Budget and Government Accountability Office to track labor, equity, and environmental standards and the distribution of funding impacts in the law, respectively.[425]
    - $350 million for the Federal Permitting Improvement Steering Council to coordinate environmental reviews across agencies and resolve issues in line with climate, economic, and equity goals during the permitting process.[426]
    - $225 million to the Department of the Interior for Tribal climate resilience, which may include community-driven relocation efforts.[427]
    - $25 million to the Department of the Interior for Native Hawaiian climate resilience. Activities include natural and cultural resource management and protection, adaptation planning, and technical assistance for related projects.[428]
    - $12.5 million to the Department of the Interior for Tribal emergency drought relief.[429]
    - $837.5 million in grants and loans to the Department of Housing and Urban Development for improving water and energy efficiency; indoor air quality and sustainability; zero-emission electricity, low-emission building materials or processes, energy storage, or building electrification; and climate resilience for affordable housing.[430]
        - Total loan authority appointed to the agency is $4 billion.[431]
    - $60 million to EPA to reduce diesel emissions in poor and disadvantaged communities.[432]
    - $117.5 million to EPA to enhance fenceline community air monitoring, especially for poor, disadvantaged, and Tribal communities.[433]
    - $50 million to EPA for multipollutant monitoring stations.[434]
    - $3 million to EPA for air quality sensors in poor and disadvantaged communities.[435]
    - $15 million to EPA to address emissions from wood heaters.[436]
        - Wood-burning heaters can emit fine particle pollution, carbon monoxide, volatile organic compounds, nitrogen oxides, benzene, and formaldehyde,

which can lead to serious health concerns such as heart attacks, stroke, and premature death. Children, the elderly, and those with pre-existing conditions are especially vulnerable.[437]

- $20 million to EPA for methane monitoring from flaring and fugitive sources.[438]
- $25 million to EPA for Clean Air Act grants to monitor air pollution and research and develop air pollution prevention and control programs.[439]
- $5 million to EPA for grants to states to adopt and implement California's GHG and zero-emission standards for mobile sources.[440]
- $50 million to EPA to address air pollution at schools in poor and disadvantaged communities.[441]
- $87 million for education, technical assistance, and partnerships, including within poor and disadvantaged communities, to reduce GHG emissions that result from domestic electricity generation and use.[442]
- A permanent extension of the tax rate to fund the Black Lung Disability Trust Fund.[443]
    - Funding covers health care costs and small stipends to certain miners who are disabled with black lung, or coal workers' pneumoconiosis, which is characterized by impaired breathing from scarred lung tissue as a result of their occupation.[444]
- $15.9 million to the Department of the Interior to provide technical assistance to territories, including American Samoa, Guam, the Commonwealth of the Northern Mariana Islands, the US Virgin Islands, and Puerto Rico for climate change mitigation, adaptation, resilience, and planning projects.[445]
- $1.5 billion to the Department of Agriculture for the Urban and Community Forestry Assistance program, which plants trees and performs other related activities to ensure a resilient and equitable tree canopy.[446]
- $550 million to the Department of the Interior to provide disadvantaged communities or households with domestic water supplies.[447]

Justice Concerns

- While the law has allocated historic funding toward environmental justice efforts, concerns remain. The IRA includes giveaways to the fossil fuel industry, with billions of dollars included for CCS and other technologies and practices that will prolong the presence of polluters in frontline communities.
    - CCS projects are designed to trap and store carbon dioxide emissions from fossil fuel-fired power plants and other polluting industrial facilities, preventing those emissions from entering the atmosphere. These processes have been criticized for their costliness, (currently) ineffective technologies, and for enabling continued fossil fuel use.[448]
    - The IRA has expanded and enhanced existing tax credits for CCS, ultimately making the credits more lucrative and easier to access. There are certain criteria a facility must meet to be eligible for the expanded tax credits, such as being fully operational before eligibility begins, but, in general, the incentives have increased.[449]

- One of the chairs of the White House Environmental Justice Advisory Council expressed concerns that despite the Council on Environmental Quality's guidance on CCS deployment, responsible deployment is often hard to achieve and that it requires "meaningful public engagement early in the review and deployment process" and measures to protect public health.[450]
- Last-minute provisions added to the IRA during final negotiations in the Senate support continued leasing of federal lands and waters for oil and gas development. Environmental and climate justice advocates are concerned about how these lease sales will directly harm communities and ecosystems.[451]
    - In November of 2022, the Bureau of Ocean Energy Management (BOEM) announced it will offer 193 blocks – around 958,200 acres – in the Cook Inlet in Alaska, spanning from Kalgin Island in the north to Augustine Island in the south. Environmentalists have been pushing back on these lease sales in Alaska, but the Biden administration ultimately could not cancel the sales as they are now included in the IRA.[452]
    - Lease sales in the Gulf of Mexico were also included in the passage of the IRA, with proposed lease sale areas stretching as far west as Texas and as far east as Florida.[453]
- In addition to these fossil fuel concessions, the IRA also includes language that prevents the Department of the Interior (DOI) from leasing federal land for wind and solar projects unless it has also offered leases for oil and gas development.[454]
    - The IRA requires DOI host a lease sale within four months of issuing new onshore wind and/or solar rights of way.[455]
    - It is also mandated that at least one offshore oil and gas lease sale of 60 million acres or more be held within the year preceding a new offshore wind sale.[456]
    - However, there is no requirement in the IRA that these oil and gas leases actually be sold – DOI is only mandated to *offer* the offshore land for oil and gas before it can issue an offshore wind lease. The issuance of these oil and gas leases are also contingent on bids being deemed "acceptable".[457]
- Environmental justice advocates are wary about the distribution of funding for some programs outlined in the IRA. While billions of dollars are directed toward environmental justice and benefiting disadvantaged communities, much of the funding is not specified and will depend on the forthcoming details of implementation.[458]
    - Some advocates worry that the IRA's funding for environmental justice and disadvantaged communities could be misused by going to well-funded mainstream organizations or by paying for projects that will instead be harmful to vulnerable populations.[459]

Jobs

- According to a conservative estimate by Energy Innovation Policy & Technology LLC, the IRA could create up to 1.3 million new job-years in 2030, primarily in manufacturing,

construction, service, and trade, and increase US GDP between 0.65% and 0.77% by 2030.[460]

- Another estimate from the BlueGreen Alliance and the Political Economy Research Institute at the University of Massachusetts Amherst predicts as many as 9 million by 2032 from the climate-related investments alone.[461] This estimate assumes public spending will be equally matched by private spending for programs that involve incentives for private spending such as tax credits.
    - The largest number of jobs (nearly 600,000 annually) may be created by the electricity programs, which are estimated to mobilize $66.3 billion in public and private spending combined over the next decade.[462]
        - These include programs like the Greenhouse Gas Reduction Fund, which is estimated to create over 18,000 jobs per year through public-only investment, and the Renewable Energy Production Tax Credit, which is estimated to create nearly 70,000 jobs annually if public spending is doubled by private investment.[463]
    - This is followed by jobs associated with the manufacturing programs, mobilizing $12.8 billion total, which may create over 100,000 jobs per year.[464]
    - Programs related to environmental justice and community resilience are estimated to create the fewest number of jobs out of all categories examined but still may mobilize $1.1 billion, resulting in nearly 15,000 jobs annually.[465]
- $2 billion will be available through grants to convert existing auto manufacturers into clean vehicle producers, which is touted as a way of keeping manufacturing jobs in the US[466]
- $200 million will be allocated to states to provide training to contractors in the energy efficiency and electrification sector.[467]
- Like the IIJA, the IRA uses prevailing wage and apprenticeship requirements, making the jobs it creates better quality and the workforce more diverse.[468] Clean energy tax credits are larger for projects based in communities historically dependent on fossil fuel economies, to support a just transition.[469]
- Avoided air pollutions from the measures in the IRA could avoid up to 484,000 lost workdays in 2030.[470]

Other Programs

United States Postal Service

- The United States Postal Service (USPS) was allocated $3 billion to purchase zero-emission vehicles and associated infrastructure, with $1.3 billion for the former and $1.7 billion for the latter.[471]
    - In early 2022, before passage of the IRA, USPS disappointingly pledged to electrify just 10% of its fleet, but later raised this number to 40% following criticism from environmental organizations, such as The Climate Reality Project, and government officials.[472]

- In December 2022, USPS announced they would invest $9.6 billion, which includes funding from the IRA, over the next six years to electrify 75% of its Next Generation Delivery Vehicles and buy 100% electric after 2026.[473]
    - The postal service has the largest government fleet, at over 200,000 vehicles, which contribute to the disproportionate impact frontline communities face from transportation emissions. Investments in zero-emission vehicles will not only exceed the requirements of President Biden's executive order for federal agencies to purchase only electric vehicles by 2035, but advance environmental justice priorities by reducing government emissions. [474]

Agriculture

- Agriculture accounted for an estimated 11% of total US GHG emissions in 2020.[475] To account for the critical role farmers and ranchers will play in addressing the climate crisis, the law includes nearly $20 billion for the Department of Agriculture (USDA) to invest in nature-based solutions and climate-smart agricultural practices with the goal of reducing GHG emissions, spurring economic growth in rural areas, and increasing rural resilience to climate disasters.[476]
    - Over $18 billion directed toward existing conservation programs within the Farm Bill, including the Environmental Quality Incentives Program (EQIP), the Regional Conservation Partnership Program (RCPP), the Conservation Stewardship Program (CSP), and the Agricultural Conservation Easement Program (ACEP).[477]
        - The $8.45 billion for EQIP will assist the program in providing technical and financial assistance to agricultural producers looking to address individual conservation concerns.[478]
        - $4.95 billion to the RCCP, which aims to support agricultural producers' conservation efforts, including emission-reduction practices.[479]
        - $3.25 billion to CSP, which offers eligible applicants technical and financial assistance in implementing conservation practices across a farm's entire operation to address issues such as crop resiliency, grazing conditions, and soil loss.[480]
        - $1.4 billion to the ACEP to support private and Tribal landowners, as well as land trusts and other entities, in preventing productive land from being converted into non-agricultural uses and protecting, restoring, and enhancing wetlands.[481]
    - In addition to funding for different programs within the Farm Bill, $3.1 billion was allocated to the Farm Service Agency to expedite assistance for distressed borrowers who have guaranteed loans and whose operations face financial risk without intervention until September 30, 2031.[482]
    - Also included in the law is $2.2 billion for a new program in the Department of Agriculture to provide financial assistance to producers who have experienced discrimination through the agency's farm lending programs prior to 2021.[483]

- In October 2022, the department issued a Request for Information (RFI) on how to best design and implement the program.
- In response to reported concerns from Black farmers over the efficacy of this program, the Secretary of Agriculture, Tom Vilsack, highlighted the importance of utilizing funds for cooperator groups; these groups have preexisting relationships with farmers of color and can assist them in accessing the full array of benefits and opportunities provided by the agency.[484]

Forestry

- Forests represent the largest terrestrial sink in the United States and offset nearly 12% of the country's total GHG emissions. The IRA allocated $5 billion to the Forest Service for forest management planning and restoration activities for federal and nonfederal forests.[485]
  - $1.8 billion for the US Forest Service to complete hazardous fuels reduction projects to protect communities and benefit the health of our forest system; projects include using prescribed fires to reduce overgrown vegetation.[486]
  - Spread throughout different grants and other financial assistance provisions is $2.75 billion. These grant programs target underserved forest landowners, and support climate mitigation activities on nonfederal markets and aid participation in forest carbon markets.[487]
    - Forest carbon markets allow forest landowners to sell the carbon uptake from their land to other entities looking to offset their emissions. The presumed benefits are long-term incentives for landowners to keep forests intact.[488] However, the process is complicated and has been criticized for allowing companies to achieve their climate goals without undertaking emission reduction policies.[489]
  - $50 million to the US Forest Service to establish definitions of old-growth forests, conduct inventories, and develop policies to conserve existing forest land.[490]
    - Defining old-growth forests is a complicated process for the Forest Service because no one definition captures the full diversity of factors that contribute to old-growth ecosystems.[491]
      - Since climate change contributes to more frequent and severe disturbances to forest ecosystems, the scientific community has taken a broader approach to include earlier stage forests, known as mature forests, in management practices.[492]
    - In April 2022, the Biden Administration released an executive order for the Departments of Agriculture and the Interior to define old-growth and mature forests on federal lands and create policies to address threats based on their findings.[493]
      - Public comments were collected before passage of the IRA in July 2022.[494]

Coastal Resilience

- $2.6 billion was allocated to the National Oceanic and Atmospheric Administration (NOAA) within the Department of Commerce to support coastal resilience, coastal communities, and different management efforts to protect these fragile habitats through direct federal spending, grants, technical assistance, and more.[495]
    - With the frequency of severe storms on the rise, the ability of communities to prepare and adapt is critical. NOAA assists communities by providing decision support, technical assistance and training, and data collection.[496]

Weather Forecasting

- The effects of climate change are apparent today through the number of increasing severe weather occurrences that wreak havoc on the environment, public health, and the economy.[497] To better prepare the United States ability to understand, model, and track potential climate impacts, the law allocates over $500 million to four related programs, three at the National Oceanic and Atmospheric Administration (NOAA) and one at the US Geological Survey (USGS).[498]
    - These programs include research and forecasting for weather and climate; computing capacity and research for weather, oceans, and climate; acquisition of hurricane forecasting aircraft; and the USGS3D Elevation Program.[499]

Threats to Funding

Opposition Backlash

- The IRA was passed on party lines – not a single Republican from the Senate or House of Representatives voted in favor of the law.[500] Several lawmakers voiced interest in repealing certain provisions of the IRA, though many have remained silent on attempting the very hard job of repealing it wholesale in 2025.[501] This is partly due to how the law was structured in getting grants out the door quickly, but also because red states are seeing immense benefits from the law.[502] Regardless, threats to spending, new congressional rules, and impending fights over must-pass legislation pose barriers to implementation.
    - The reintroduction of "the Holman Rule" by the 118th US House of Representatives represents a larger, albeit unlikely, threat to the efficacy of federal agencies. This rule allows lawmakers to reduce the number of federal workers or salaries for employees, such as the Cabinet members, at specific agencies as a provision to an appropriations bill.[503]
        - The last time this rule was implemented, it failed to become law both times it was brought to the floor, and the outlook remains the same in the current Congress.[504]
    - Part of the new rules for the House of Representatives included promises to attempt rollbacks on discretionary spending to 2022 levels, which would cut about $130 billion from current spending levels.[505]

    - As of January 2023, the impending fight of the US debt ceiling poses another outside risk to the IRA because the House has vowed to not raise the limit until the White House and Democrats agree to negotiate federal budget cuts and changes to the spending process. At risk of cuts are agencies, such as EPA and the Department of the Interior, that are funded through discretionary spending.[506]
        - Specific demands from House leadership remain unknown at this time, but the impending fight threatens the ability of vital agencies to carry out their duties in allocating, guiding, and providing technical assistance for IRA investments.[507] See more information under the IRA's Agency Challenges section.
  - The IRA's provision to provide $79.6 billion (through FY 2031) to the Internal Revenue Service is split amongst four priority areas – taxpayer services, enforcement, operations support, and business systems modernization. This provision is vital to the success of the law itself, as the main sources of program funding come from taxpayer dollars from the wealthy and closed tax loopholes exploited by large corporations.[508]
      - In January 2023, the House approved a bill – though unlikely to pass the Senate – that would "repeal funding for the 87,000 new IRS agents" who would be hired to work on advancing the priority areas receiving funding through the IRA. The new IRS jobs include a mix of enforcement agents and employees hired to improve information technology and customer service. The "87,000 new agents" figure was taken from a 2021 Treasury report unrelated to the IRA. The Biden administration has yet to release its strategic plan relating to the exact use of IRS funding and the number of agents it will hire for enforcement, ultimately contradicting contrarian claims.[509]

Agency Challenges

- Federal agencies are key players in distributing money from the IRA. Unfortunately, relevant agencies, such as EPA, have long suffered from chronic underfunding that has resulted in understaffing and large workloads.[510]
    - EPA in particular has experienced a decline in staff over the past few decades, and in recent years experienced a mass exodus of 1,200 scientists and policy experts during the Trump Administration.[511] To meet the president's goal of cutting climate pollution in half by 2030, EPA must promulgate additional rules to reduce emissions, while enforcing existing regulations, and administering programs from the Bipartisan Infrastructure Law and IRA. A lot of these new rules must be finalized by mid-2024, and IRA grants are already on their way out the door.[512]
        - It's been reported that EPA's greatest hiring needs include technical personnel with backgrounds in air emissions and fuels to assist in creating guidance for the pollution monitoring and emission reduction program, along with regional grant specialists and environmental engineers.[513]

- A November 2022 memorandum from the DOE inspector general expressed concern over the challenges that will come with the distribution of IRA funding. The memo asks if the spending bills will allow DOE to create oversight infrastructure large enough to ensure the funds are delivered as Congress intended, as DOE has been historically "underfunded and understaffed as compared to other Federal agencies." It also asks if the bills allow the Department's Office of Inspector General (OIG) to execute its statutory obligations to protect said funds – as the OIG has also been underfunded.[514]
  - DOE is concerned that without the OIG receiving appropriate amounts of funding, insufficient oversight for existing programs and the newly established programs under the IRA and Bipartisan Infrastructure Law will become commonplace. Critical areas such as research security, clean energy, grid deployment, and others, will not receive appropriate OIG oversight and the office will not be able to provide near-term audit and inspection assistance that was requested to minimize fraud.[515]
- To protect against rollback attempts, the law was structured to get money allocated quickly. While a positive in some regards, this structuring adds additional pressure for agencies to quickly propose guidance on numerous complicated provisions.[516]
  - The law did allocate money for staff and other administrative needs, but the results are unevenly distributed across agencies.[517]

Supply Chain Imbalances

- The law is projected to greatly increase demand for solar, wind, and EV components. While this is great news for the clean energy sector, supply chain issues threaten to slow deployment. Certain provisions in the law stipulate raw material sourcing within the US, and these markets are not yet fully fledged.[518]
  - Existing gaps in solar module manufacturers and solar specialty glass have put the US manufacturing industry behind the rest of the world.[519] A report from US Solar Market Insights reported that the solar industry will likely remain supply-constrained through the end of 2023.[520]
    - Once relieved of supply chain issues, SEIA expects annual solar installations to reach 30-40 GW_{dc} beginning in 2024.[521]
    - However, in December 2022, the Department of Commerce issued a preliminary ruling on anticircumvention tariffs, which may negatively impact these forecasts.[522]
  - EV makers are currently racing to onshore their battery supply chains, as stipulated in the law which mandates a certain percentage of critical minerals be extracted, processed, and manufactured in the US. In December 2022, the Department of Treasury announced it was not ready to issue guidance on sourcing mandates, but would allow the rule to go into effect in the interim.[523]
    - Senator Manchin has threatened to introduce legislation that would prevent the Treasury's decision from taking place. The bill would bar credits for vehicles not compliant with sourcing requirements and prohibit

vehicles purchased after January 2023 from eligibility for tax credits. Support for the bill remains unclear as of January 2023.[524]

Workforce Shortages

- Building and maintaining a large green workforce is vital to deploying clean energy across the country. There have been an estimated 100,000 new green job openings since the law was enacted in August 2022, with some reports estimating over 500,000 new energy transition jobs by end of the decade. However, record low unemployment rates are creating a hiring bottleneck.[525]
    - The Bureau of Labor Statistics (BLS) reported that the construction and manufacturing sectors were short 413,000 and 764,000 workers respectively at the end of 2022.[526]
    - BLS also expects that there will be an estimated 80,000 electrician job openings per year until 2031.[527]
        - This estimate largely accounts for replacing the existing workforce. [528]
        - With a multitude of electrification incentives in the law (see Household Savings), the need for more workers in this sector is only expected to grow in the coming years.[529]
- Recognizing this gap, the Inflation Reduction Act included different workforce development provisions, including prevailing wage and apprenticeship requirements, along with prioritization for projects that employ dislocated manufacturing and coal workers.[530] However, despite attractive worker incentives, industry and government leaders are concerned about filling these jobs.[531]
    - Median average wages and unionization rates in the clean energy sector have historically lagged behind the oil and gas industry. Breaking down these barriers is crucial to ensuring the clean energy sector can encourage skilled fossil fuel workers transition to green jobs over the next decade.[532]
- While there is no one solution to address this issue, some groups have pointed to examples, such as California's High Road Training Partnerships, which creates workforce development programs that focus on low-income communities.[533] Other targeted outreach and increased education opportunities should be considered to reach the maximum number of interested workers and students.

The Climate Reality Project

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