

Grid Modernization Index 2018

Key Indicators for a Changing Electric Grid





About Gridwise Alliance

The GridWise Alliance (GridWise) and our members believe that the electric grid and its supporting infrastructure is the foundational component of an advanced digital economy. Our goal is to champion the principal concepts, policies, and investments needed to transform the electricity grid and accelerate the prudent changes required to maintain the grid’s essential role in a robust economy.

GridWise uniquely serves the electricity industry by leveraging diverse stakeholder perspectives to articulate the numerous benefits of grid modernization. GridWise helps create a common understanding of the numerous and transformational operations-focused and policy-related changes taking place across the electricity industry. Our work ensures that emerging policy is aligned with industry best practices to facilitate effective and widespread change.

For more information, please visit www.gridwise.org.



About E9 Insight

E9 Insight brings visibility and insight to regulatory activities that most professionals find opaque and complicated. E9 Insight offers timely and comprehensive research into new and ongoing activities at regulatory commissions and other policy initiatives across the 50 states. Using a custom database, E9 Insight provides companies, investors, philanthropies, and government agencies with curated information allowing more informed business and advocacy strategies.

For more information, please visit www.e9insight.com.



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DISCLAIMER:

The state rankings included in the GridWise Alliance’s Grid Modernization Index (GMI) were developed based on publicly available information regarding state energy policies, utility programs and technology deployments, and electric grid operations. In addition to stakeholder responses, interviews with regulators, policy makers, and utility operations personnel were also used in the process of finalizing state rankings. The final state rankings reflect a summary of the inputs collected and are not intended to prescribe specific policy initiatives or grid modernization investment strategies.



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Foreword

Rate of Change Continues to Increase



On behalf of the members and staff of the GridWise Alliance, I am pleased to provide the **Grid Modernization Index 2018** for the electricity industry and its many stakeholders. This is the 5th update of the GMI that we've published, and we plan to publish a similar update annually going forward. I've spoken to dozens of stakeholders from many states this past year and appreciate the overwhelmingly positive feedback and support that we've received.

As the GridWise Alliance celebrates its 15-year anniversary, I am truly amazed at the changes taking place across the industry. Concepts that we discussed back in 2003 as long-term goals are now a reality in many parts of the country. Customers have access to data and tools that allow them to manage their energy use and cost while supporting more effective grid operations. Power is typically restored to customers much more quickly after an outage occurs thanks to faster and more accurate data, along with equipment that automatically responds to these interruptions. Customers are increasingly choosing to install their own energy systems and connect them to the grid and grid operators are modifying their own systems to accommodate these distributed resources, creating a more flexible and resilient grid.

Today, most states and most utilities are actively exploring options for modernizing their electric grid. Even states that score low in our index are beginning to explore how to modernize their grids. It's no longer an option, but a necessity. However, we also appreciate, more and more, the difficulty of changes taking place, as well as the unique opportunities and challenges being faced by each state.

GMI-2018 provides an overview of the changes taking place across the country by evaluating progress in each state. I trust that you as a stakeholder will use this information as intended to stimulate our collective thinking and encourage further prudent and positive change.

Steve Hauser, CEO, The GridWise Alliance.



About GMI-2018

The GridWise Alliance's Grid Modernization Index (GMI) assesses and evaluates all 50 states and the District of Columbia based upon their progress in modernizing their state's electric grid. Using data inputs from key industry stakeholders and publicly available information, the GMI benchmarks each state on a wide range of factors that influence grid modernization policies, investments, and accomplishments.

The first GMI Report was released in 2013, with updated editions appearing in 2014, 2016, and 2017. Now in its fifth iteration, GMI-2018, following the structure of the previous versions, assesses the states on factors in three broad categories:

- 1 STATE SUPPORT**, which is based on plans and policies that support grid modernization;
- 2 CUSTOMER ENGAGEMENT**, which evaluates states on their rate structures, customer outreach, and data collection practices;
- 3 GRID OPERATIONS**, which benchmarks the deployment of grid modernization technologies such as sensors and smart meters.

More than 75 metrics are examined across these three categories. Scores are assigned to each metric and totaled to create a score for each state in each of the three categories. The possible point totals are **32** for State Support, **31** for Customer Engagement and **37** for Grid Operations.

Diverse Approaches Strive For Common Outcomes

While grid modernization commonly strives to incorporate innovative new technologies into the electric system, how these efforts manifest from state to state varies widely. And that's appropriate, because each state is unique in its policies, demographics, regulatory structure, and market design. Because each state is unique, how grid modernization manifests will necessarily vary from state to state. Certainly, there are easy to identify parameters such as overall size and whether the state has restructured its wholesale or retail markets to support increased competition. But there are also subtle factors such as the dynamic between the legislature and the regulatory commission. Therefore, to the extent possible, GMI looks at each state in the context of the particular constraints and opportunities as they exist in each market.

To be sure, modernizing the grid includes making core improvements to the physical infrastructure, such as more efficient equipment and systems that enable multi-directional flows of energy and voltage management to support increasing distributed energy resources. But modernizing the grid includes the policy landscape as much as the physical systems, which are inextricably linked to efforts coming from state legislatures, public utility commissions regulating investor-owned utilities, and independent governing boards overseeing public and cooperative utilities. Not surprisingly, there is near unanimity about what consumers want – affordable, reliable, and clean power. The challenge lies in how those terms are defined and how the benefits of the desired changes are measured.

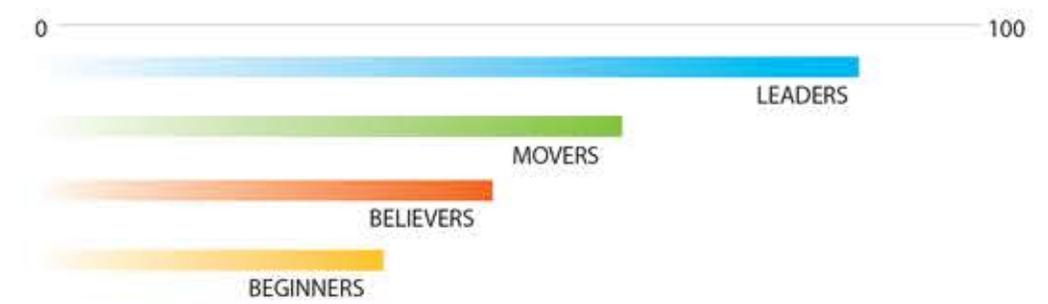
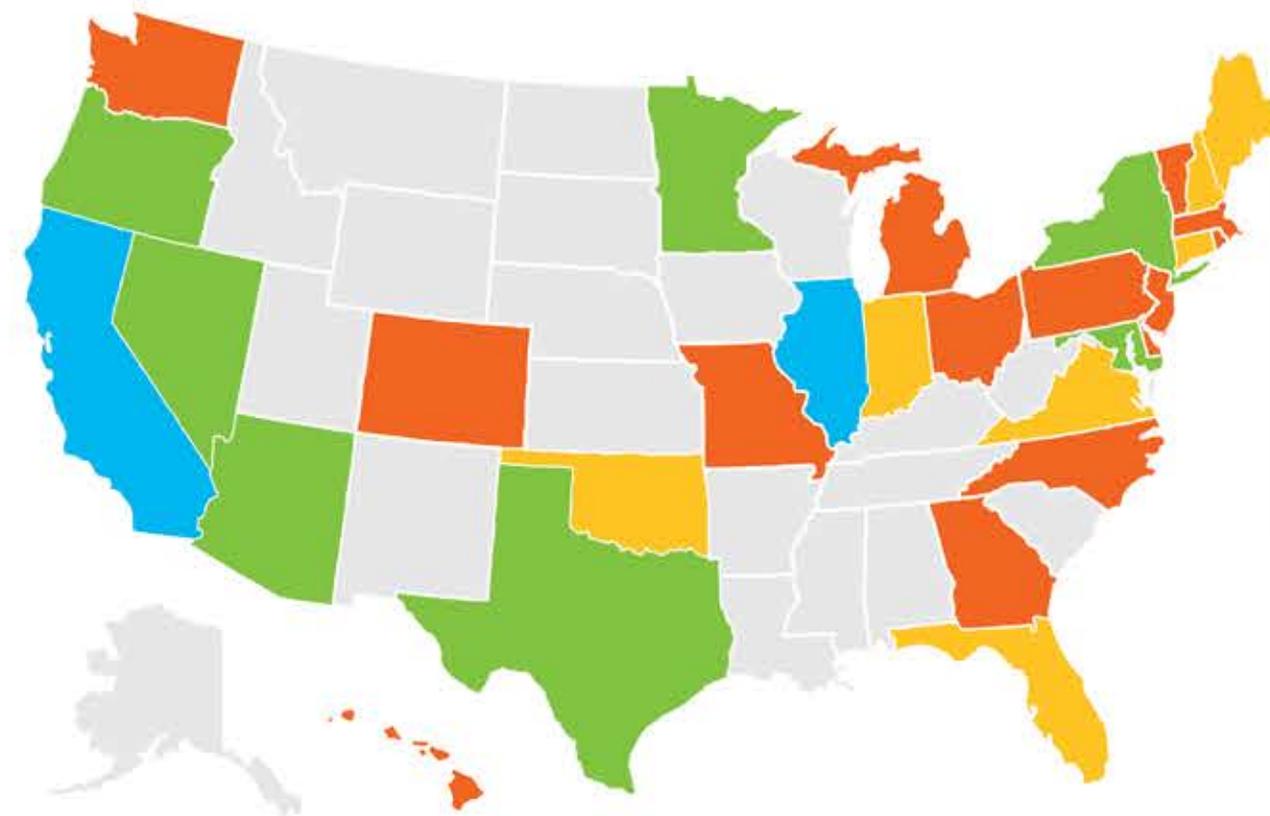
What then become the drivers and key objectives for “grid modernization?” In this regard, “success” in grid modernization may be as much a measure of how new business models are enabled as a measure of how the traditional business models are improved. Lower operating costs and higher asset utilization will drive energy affordability, but other benefits such as

enabling customer choice, new technology adoption, and new service offerings are also key benefits of grid modernization.

Improved reliability drives increased automation and more real-time communication, not only with field crews, but also directly with customers. However, the path to reach higher reliability is different in Texas or Florida than in New Mexico or Iowa. Data centers, for example, require a much different solution to reliability than restaurants and retail stores. Hence, this diversity in grid modernization is not only expected but, in fact, necessary.

A modern grid will also strive to reduce impacts the electricity system has on the environment. It will provide innovative new approaches to increase the overall efficiency of the grid, actively identifying opportunities for customers to reduce their energy consumption as well as increase the efficiency of transmission and distribution equipment. A modern grid will also accommodate rapidly increasing clean technologies including solar, wind, and electrified transportation. The later adding significant new load to the system over the next decade and beyond.

The GridWise Alliance challenges state and local governments, public and private utilities, and other key stakeholders to take a holistic view of the need for modernizing the grid and continue to implement changes that create a grid that meets our future needs.



RANK	STATE	SCORE	CATEGORY
1	California	82	LEADERS
2	Illinois	77	
3	Maryland	62	
4	Arizona	60	MOVERS
5	Oregon	58	
6	Texas	57	
7	New York	54	
8	Nevada	51	
8	District of Columbia	51	
10	Minnesota	50	BELIEVERS
11	Michigan	48	
11	Massachusetts	48	
11	Georgia	48	
11	Colorado	48	
15	Hawaii	47	
16	Delaware	46	
17	Pennsylvania	45	
18	Ohio	44	
19	Rhode Island	43	
20	Vermont	42	
20	Missouri	42	
22	Washington	41	
23	North Carolina	40	
24	New Jersey	37	
25	Virginia	32	BEGINNERS
26	Maine	29	
26	Oklahoma	29	
26	Connecticut	29	
29	Florida	27	
29	Indiana	27	
29	New Hampshire	27	
32	Louisiana	24	
32	Idaho	24	
34	Arkansas	23	
34	South Carolina	23	
36	Mississippi	21	
36	Alabama	21	
38	West Virginia	19	
39	Wisconsin	15	
40	Kansas	14	
41	Tennessee	13	
42	Wyoming	12	
42	Kentucky	12	
44	New Mexico	11	
45	Iowa	11	
46	Utah	10	
47	Alaska	10	
48	South Dakota	9	
49	Nebraska	8	
50	Montana	6	
51	North Dakota	3	

States Are Making Substantial Progress

We are pleased that GMI-2018 indicates that most states across the country are increasing their efforts to modernize their grids. Thirty states provided data this year with almost all of them showing an increase in their scores from last year.

Given the multiple criteria that can be applied, GMI focuses the analysis on developing an “index,” rather than a “ranking.” That is, it is less focused on comparing one state against another, but rather on comparing each state to what its fullest potential might be – expressed in coordinated activities that span across legislation, state policy, customer engagement, and technology deployment. Increasingly, grid modernization is less about specific devices or equipment and more about how the pieces fit together to create a system capable of transforming the traditional grid and the way that customers interact with it.

Our evaluation relies on certain guiding questions: What requirements has the state established regarding grid planning? Are there policies that encourage distributed energy? What data are available to consumers about their energy use? What data are available to other service providers about how the distribution system operates? Are utility investments being planned with an eye toward enabling new services? Or, are those investments merely using new tools to deliver the same service?

Rarely do these questions, and others being used, have straightforward answers. However, overall progress toward a more modern grid is most easily understood when described in clusters of states with similar scores reflective of both the specific actions in each state and also the degree to which those actions are aligned with the desired outcomes. These clusters are shown in the map on page 7, color coded and matched to the overall scores.

TWO STATES CONTINUE TO BE OUT FRONT (THE LEADERS)

Two states stand out for their coordination of policy, consumer and utility action: California and Illinois. Both have established legislative mandates and incentives that are driving utility action and have established technology platforms – such as advanced metering infrastructure – that provide direct consumer benefits. But beyond that, both states have proactively sought to establish policy frameworks that address the access, usage, and protection of customer data. In Illinois, the Future Energy Jobs Act established numerous requirements and incentives for renewable energy, storage, long-term planning, and energy efficiency, including peak demand reduction. Earlier this year, the Illinois Commerce Commission (ICC) issued a ground-breaking order to establish regulatory accounting treatment for cloud-based computing solutions, seen by many observers as a key pathway to move toward a service orientation (versus the traditional infrastructure focus core to most regulatory regimes). California, through its legislative public utility commission and other state agencies, has been a grid modernization pioneer. The utilities in the state have responded in kind, implementing distribution system planning processes, competitive solicitations for distributed energy, non-wires alternatives and new rate designs. Together, these “leaders” represent a bit more than 15 percent of the total U.S. electricity revenue.



California

California continues to be the grid modernization trailblazer recently, instituting distribution system planning requirements and many other leading grid modernization efforts. Most recently, California’s SB 100 accelerated its Renewable Portfolio Standard to achieve a 60 percent target by 2030 and a 100 percent renewable and zero-carbon resource target by 2045. Senate Bill 350 codified California’s goal of doubling energy efficiency across the state, with rolling demand-side management portfolios and demand response auction mechanisms. California uses a multi-pronged approach to support distributed energy

resources (DER), including competitive solicitations, multiple DER demo projects, a self-generation incentive program, a net metering tariff, and an energy storage target and default TOU rates. California has also reformed some aspects of utility business models, prioritizing third-party engagement, and customer choice.



Illinois

Illinois continues to implement instruments of a modernized grid. The ICC hosted NextGrid working groups—releasing preliminary drafts and reports in 2018, offering guidance on regulatory and business model reform, technology deployment and metering, and communication and customer data. Policies from the state’s Future Energy Jobs Bill were also rolled out in 2018, including the Illinois Power Agency’s Final Long-Term Renewable Procurement Plan, utility energy efficiency and peak demand reduction plans, and additional instruments of customer control – including smart inverter rebates for distributed generation customers. In May 2018, the ICC issued an order establishing regulatory accounting treatment for cloud-based computing solutions to integrate DER, while the commission continues to examine the topics of electric vehicles, smart utility apps, and energy storage.

EIGHT STATES SHOW SERIOUS PROGRESS (THE MOVERS)

Eight states – representing over 20 percent of U.S. electricity revenue – are clustered together representing states that have significant activity but may not reflect comprehensive or coordinated grid modernization or they may be in the early stages of implementing regulatory and policy changes. Many of these states have been active for many years emphasizing specific policies and programs. Arizona, for example, has been reviewing resource planning rule changes and has a strong foundation of advanced metering

infrastructure. However, high-profile political battles at the Commission and across the state have limited a coordinated approach. Similarly, Maryland has launched an ongoing investigation focused on transforming the distribution system, including rate design, electric vehicles, competitive markets, interconnection, storage, and distribution system planning. All of these activities complement a strong foundation of advanced meters. New York, often heralded for the ambitious nature of their “Reforming the Energy Vision” initiative, has led efforts to move toward new rate structures and performance-based incentives for utilities, but progress has slowed primarily due to from leadership changes at the Commission. At the same time, utilities in the state have led innovative procurements of non-wires alternatives, such as the Brooklyn/Queens Demand Management (BQDM) program. Other states in this group – Oregon, Texas, Nevada, Minnesota, and the District of Columbia – have similar combinations of promising activities that we look forward to seeing develop more fully in the years ahead.



Arizona

As Arizona progresses a wholesale review of resource planning rules, the state moves into fourth place overall. Strong commission support for grid modernization activity is rooted in customer engagement opportunities as the state is served by 77 percent advanced meter deployment, including dynamic rate schedule options. The Commission is actively considering a proposed Clean Energy Standard Rule that would include a clean peak standard to quantify existing levels of clean energy resources deployed during peak periods; incrementally increasing that baseline annually through 2030. Part of the investigation will consider the potential role of blockchain technology to facilitate transactive energy markets, tracking of renewable energy credits, and applications for distributed ledger technologies on the grid.



Maryland

Maryland has several well-established efforts pushing the state toward a modern electric grid and the state is continuing to explore further. Maryland requires distribution system planning and has deployed advanced metering infrastructure (AMI) on 72 percent of its meters and VVO on a quarter of its circuits. The Commission's ongoing process to address reliability and service quality approved riders to accelerate upgrades to the distribution system for increased grid resilience. Maryland has a well-established EE program (EmPOWER Maryland) with a robust demand response component. The Commission's ongoing investigation, Transforming Maryland's Electric Grid, addresses rate design, electric vehicles, competitive markets, interconnection, storage, and distribution system planning.



Colorado

Colorado has been steadily implementing grid modernization best practices. Governor Hickenlooper established a GHG goal through executive order, which in part motivated Xcel's stakeholder developed Clean Energy Portfolio (CEP) in their ERP. The CEP led to the closing of two coal units early, adding 1,100 MW of wind, 700 MW of solar, and 275 MW of storage. The commission adopted Xcel's Advanced Grid Intelligence and Security initiative, which set Xcel approved AMI, integrated volt-var optimization, and an advanced communications network. Colorado has done most of its work incrementally but has opened a stakeholder investigation into revamping ERPs and Net-metering and Distribution Resource Planning.



Rhode Island

Rhode Island has significant commitments to grid modernization through policy, which has led to efficient investments in grid modernization in the future. In 2017, Governor Raimondo initiated the Power Sector Transformation Initiative, which laid the foundation for National Grid's Power Sector Transformation (PST) Plan which was approved in August 2018. National Grid's PST includes cybersecurity, a system data portal, distribution-feeder monitoring, data system control enhancements, GIS enhancements to integrate and utilize DERs, AMI deployment beginning in 2020, and storage incentives. The commission also completed an Investigation into the Changing Distribution System that set goals, rate design principles, and a Benefit-Cost Framework for all future decisions.



SEVEN STATES ARE GETTING SERIOUS (THE BEGINNERS)

Finally, seven states – representing 15 percent of all retail electric revenues – have exhibited promising new efforts or early-stage actions to support grid modernization, but do not yet have comprehensive roadmaps or coordinated activity around grid modernization. We will continue to monitor and support these state efforts and will especially welcome their efforts to build connections between the various activities underway.



Connecticut

Connecticut is actively investigating the best practices of a modernized grid. With cross functional levels of legislative and regulatory support, the state is examining how to best integrate and optimize planning objectives, metrics, solutions, performance incentives, oversight, and procurement mechanisms. In 2018, Connecticut Governor Malloy signed SB-9, expanding the state RPS and launching a statewide shared clean energy program, moving the state closer to the goals established in CEEP's Comprehensive Energy Strategy (CES). In December 2017, the Public Utilities Regulatory Authority launched an investigation into distribution system planning and has since approved pilot demonstration projects for hosting capacity and analysis mapping, distributed energy load forecasting, and localized targeting of DER proposals. In 2018, Connecticut is trending up.



Virginia

In 2018, Virginia made a step towards grid modernization with the Grid Transformation Act, signed into law in March. The bill requires grid modernization plans, storage pilots, and requirements for three GW of solar and wind. In June, Dominion Energy filed its first phase of the Grid Transformation Plan to enhance the reliability, resiliency, and security of the electric distribution grid; improve service for customers; and provide them with more options for communications and control, as well as tools for managing their energy use. The plan will also facilitate the integration of distributed energy resources into the system, including full AMI deployment.

“The Rhode Island Department of Public Utilities and Carriers (DPUC) views the Grid Modernization Index as a valuable resource for collaborative learning across regulatory boundaries. This helps us solve a significant structural challenge built into the state by state regulatory infrastructure.”

*Macky McCleary, Administrator
Rhode Island DPUC*

“The PUCO's PowerForward Roadmap is an important piece of Ohio's electricity policy, and resources like the Grid Modernization Index help us keep up to date on the latest advancements in grid mod policy.”

Commissioner M. Beth Trombold, Ohio