

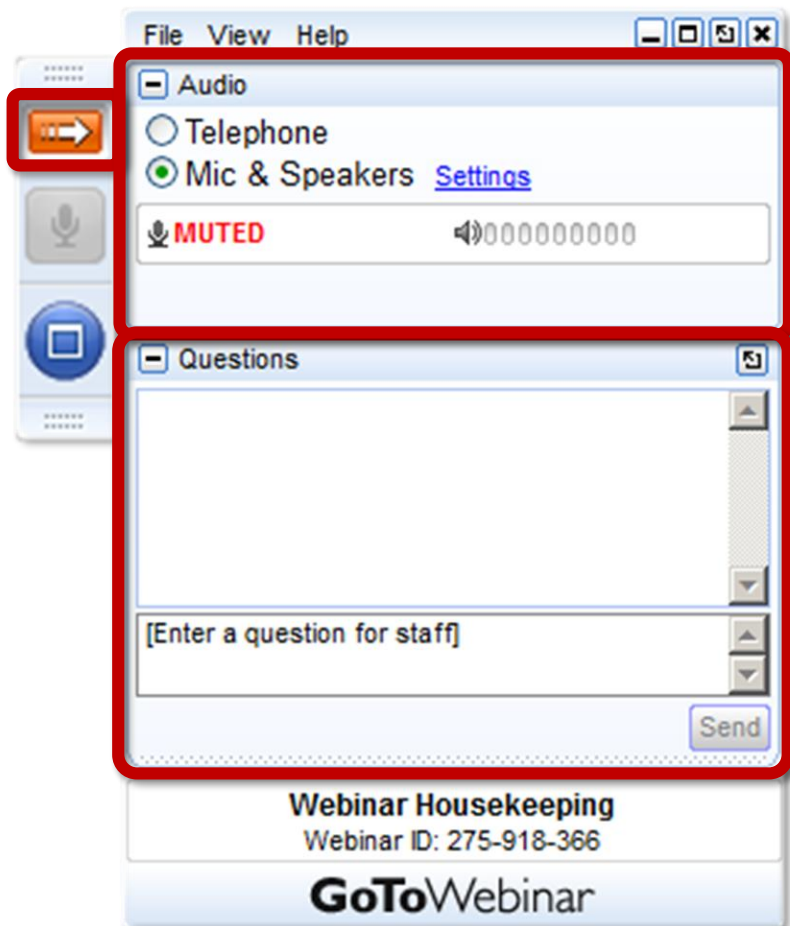
RPS Collaborative Webinar

The Status of Grid Modernization Efforts

Hosted by
Warren Leon, Executive Director, CESA

March 9, 2018

Housekeeping



Join audio:

- Choose Mic & Speakers to use VoIP
- Choose Telephone and dial using the information provided

Use the red arrow to open and close your control panel

Submit questions and comments via the Questions panel

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Celebrating 15 Years of State Leadership

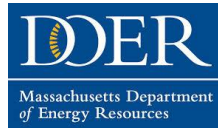
Clean Energy States Alliance



Illinois Department of Commerce & Economic Opportunity



NYSERDA



Office of the People's Counsel
District of Columbia
Advocating, Protecting and Educating DC Consumers



RPS Collaborative

- With funding from the Energy Foundation and the US Department of Energy, CESA facilitates the **Collaborative**.
- Includes **state RPS administrators, federal agency representatives**, and other stakeholders.
- Advances dialogue and learning about RPS programs by **examining the challenges and potential solutions** for successful implementation of state RPS programs, including **identification of best practices**.
- To sign up for the Collaborative listserv to get the **monthly newsletter** and announcements of **upcoming events**, see: www.cesa.org/projects/renewable-portfolio-standards



U.S. DEPARTMENT OF
ENERGY



The Status of Grid Modernization Efforts

- **Autumn Proudlove**, Manager of Policy Research, North Carolina Clean Energy Technology Center
- **Steve Hauser**, Chief Executive Officer, GridWise Alliance
- **Warren Leon**, Executive Director, Clean Energy States Alliance (moderator)



The Status of State Grid Modernization Efforts

Autumn Proudlove

NC Clean Energy Technology Center

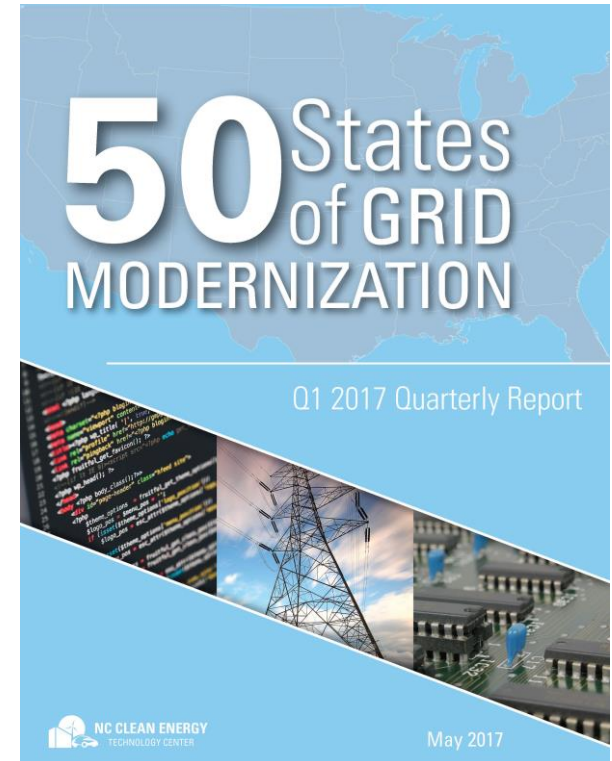
March 9, 2018

About the NC Clean Energy Technology Center

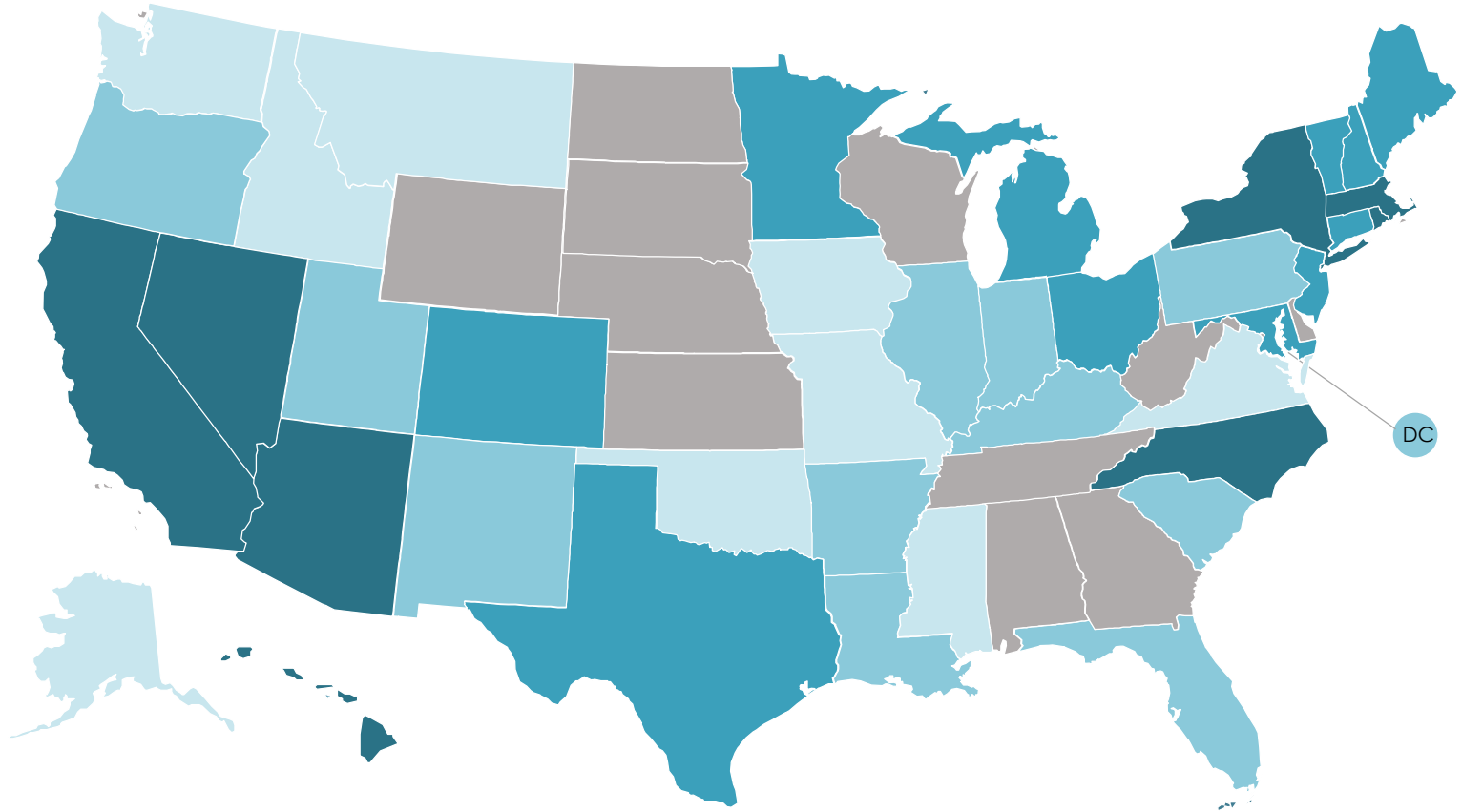
- UNC System-chartered Public Service Center administered by the College of Engineering at North Carolina State University
- Mission is to advance a sustainable energy economy by educating, demonstrating and providing support for clean energy technologies practices, and policies.
- Objective research, analysis, & technical assistance – no advocacy
- Manage the Database of State Incentives for Renewables and Efficiency (DSIRE – www.dsireusa.org)

About the 50 States of Grid Modernization

- Quarterly publication detailing state and utility grid modernization activities
 - Studies & Investigations
 - Planning & Market Access
 - Utility Business Model & Rate Reform
 - State Policies
 - Financial Incentives
 - Deployment
- Examines energy storage, smart grid, AMI, microgrids, and regulatory and rate reforms
- Regulatory and legislative activity



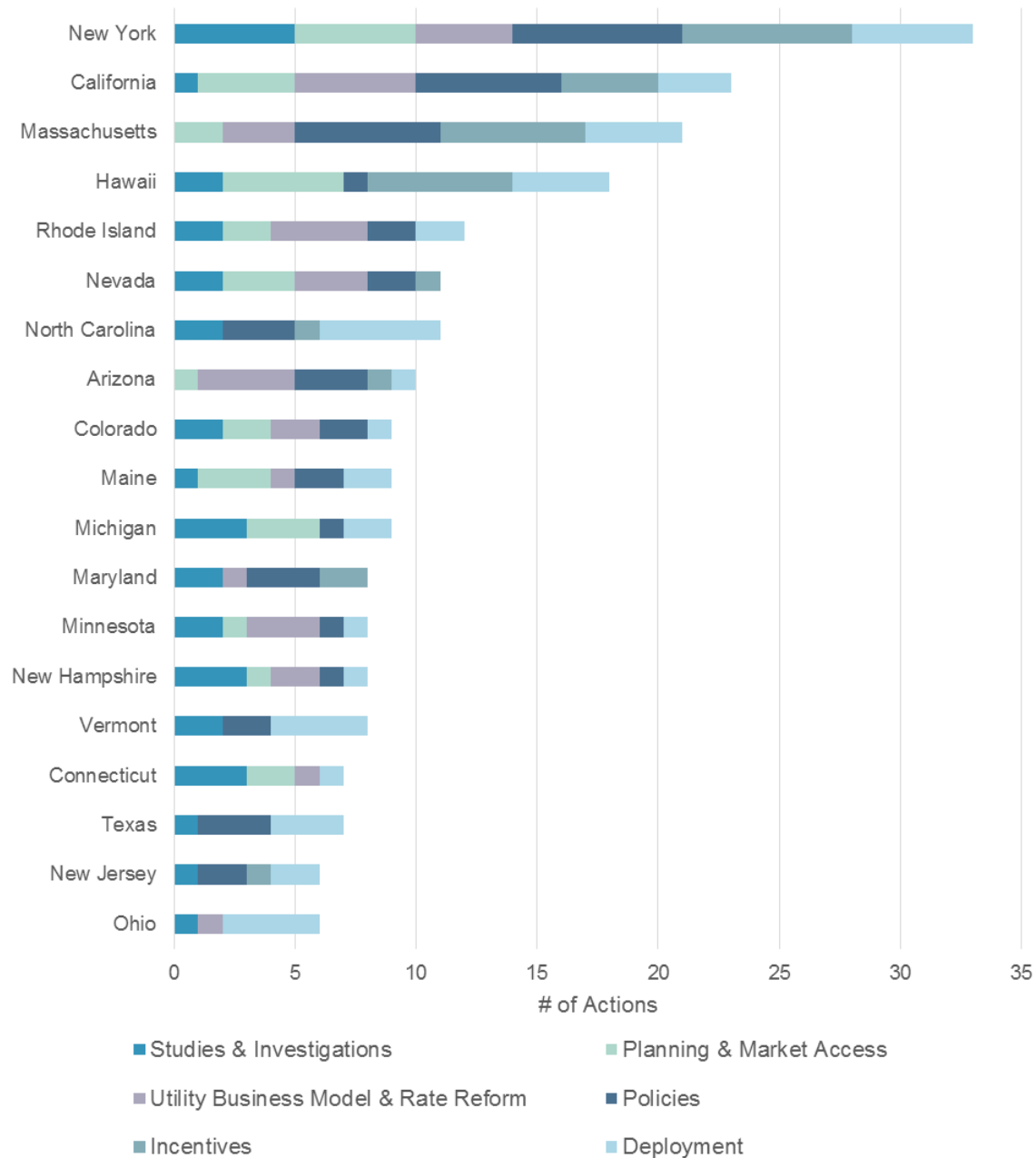
2017 Action on Grid Modernization, Energy Storage, and Utility Reform



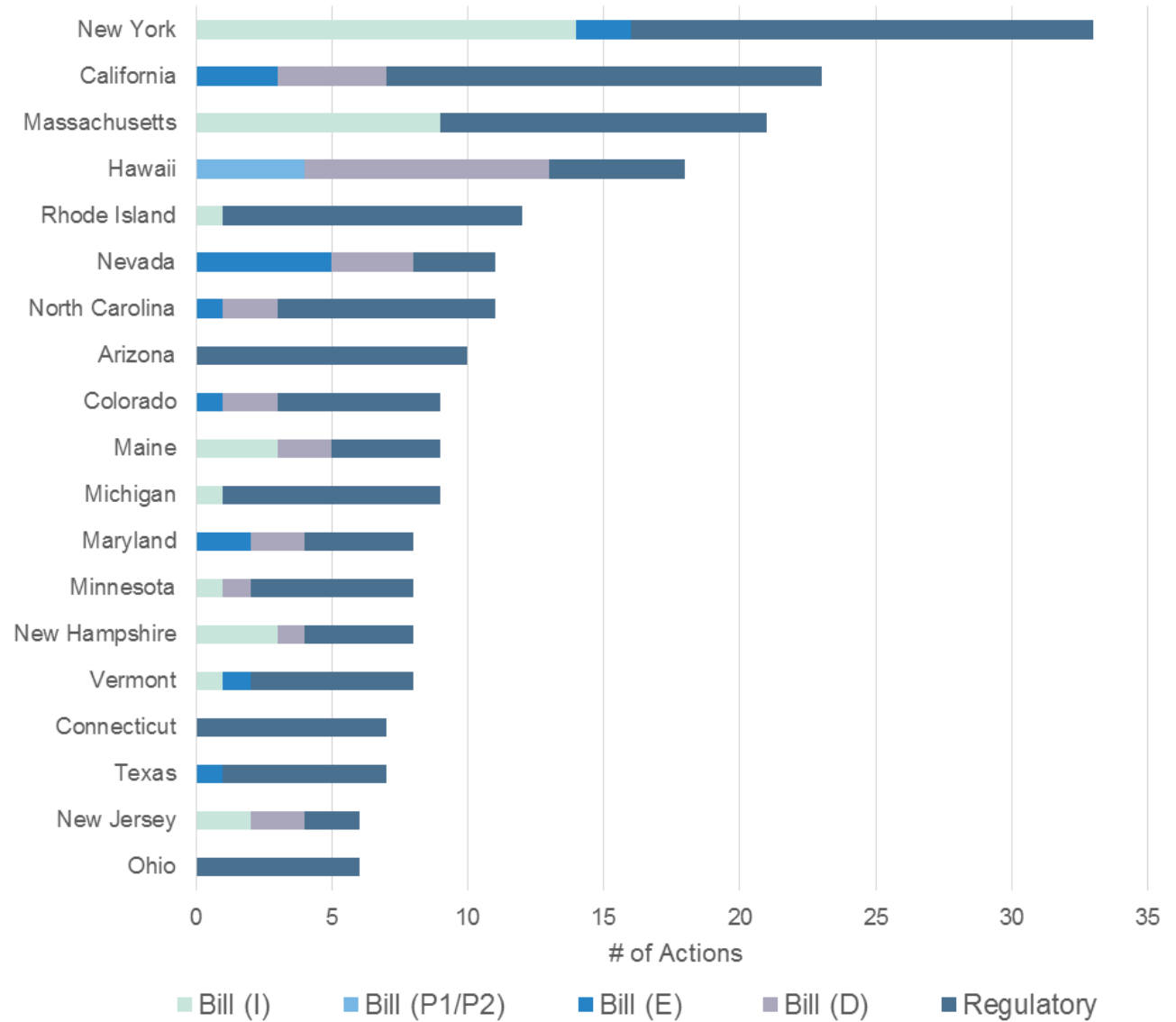
39 States + DC took action on grid modernization during 2017

- No action in 2017
- 1-2 actions in 2017
- 3-5 actions in 2017
- 6-9 actions in 2017
- 10 or more actions in 2017

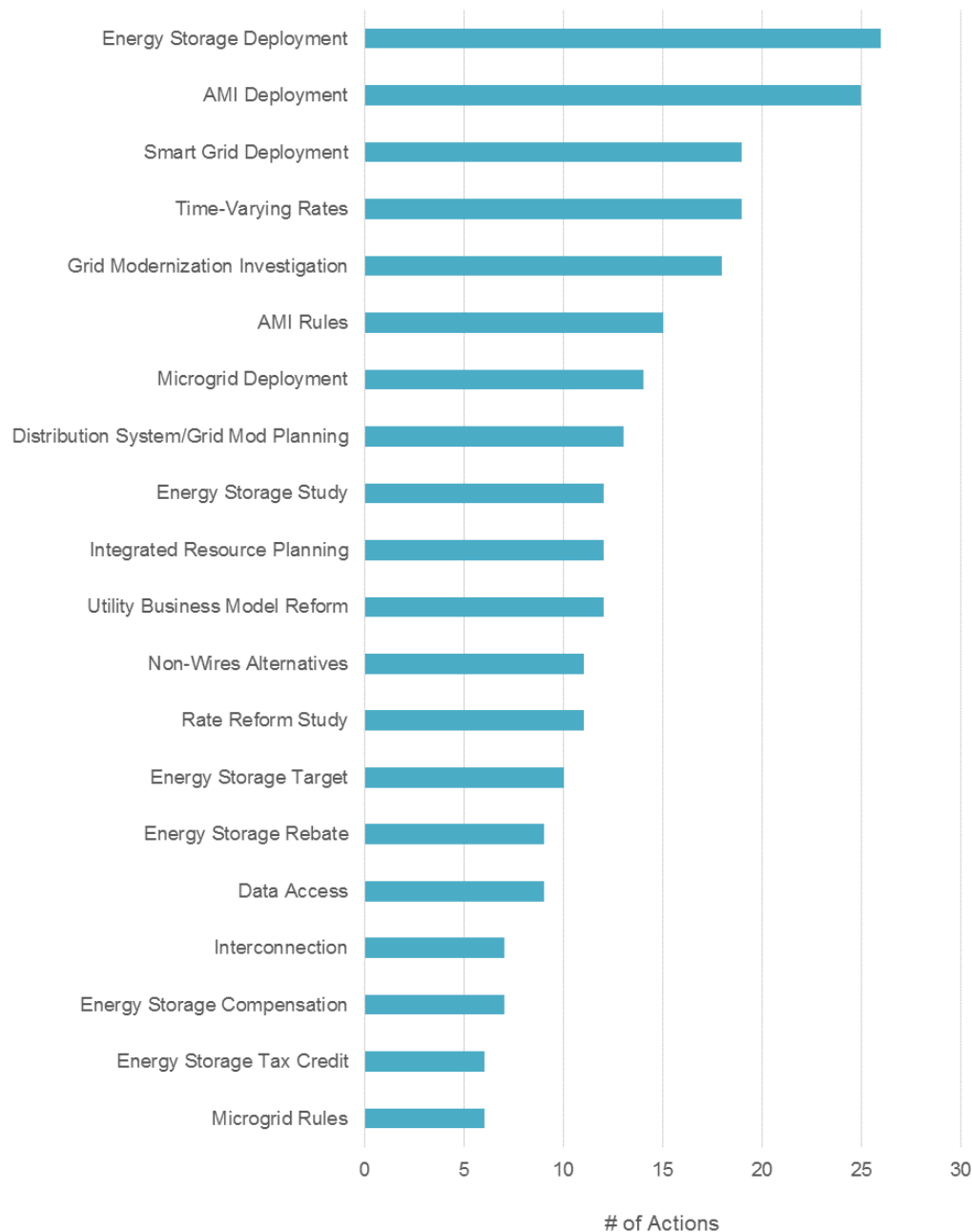
Most Active States of 2017, By Number of Actions Taken



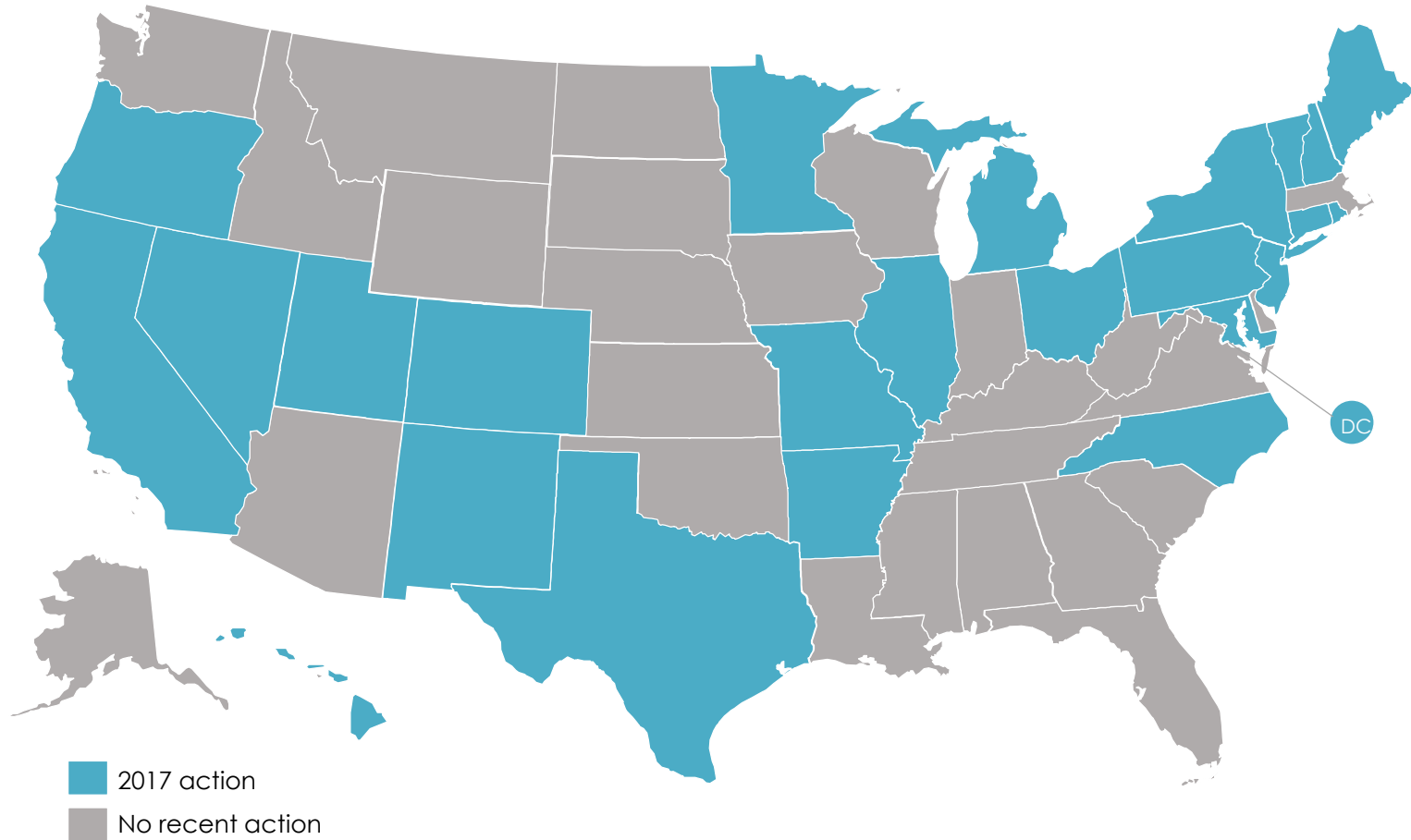
Most Active States of 2017, By Action Status



Most Common Types of Actions Taken in 2017



2017 Action on Grid Modernization Studies and Investigations



24 States + DC took action on Studies and Investigations during 2017

Studies & Investigations

- Several states undertaking *broad, stakeholder-based* grid modernization proceedings
 - DC, Illinois, Maryland, New Hampshire, Ohio, Rhode Island
- Some states undertaking *narrower* studies
 - **Energy storage** – Maryland, Nevada, North Carolina, Vermont
 - **Utility Business Models** – Hawaii, Michigan
 - **Demand Response** - Michigan

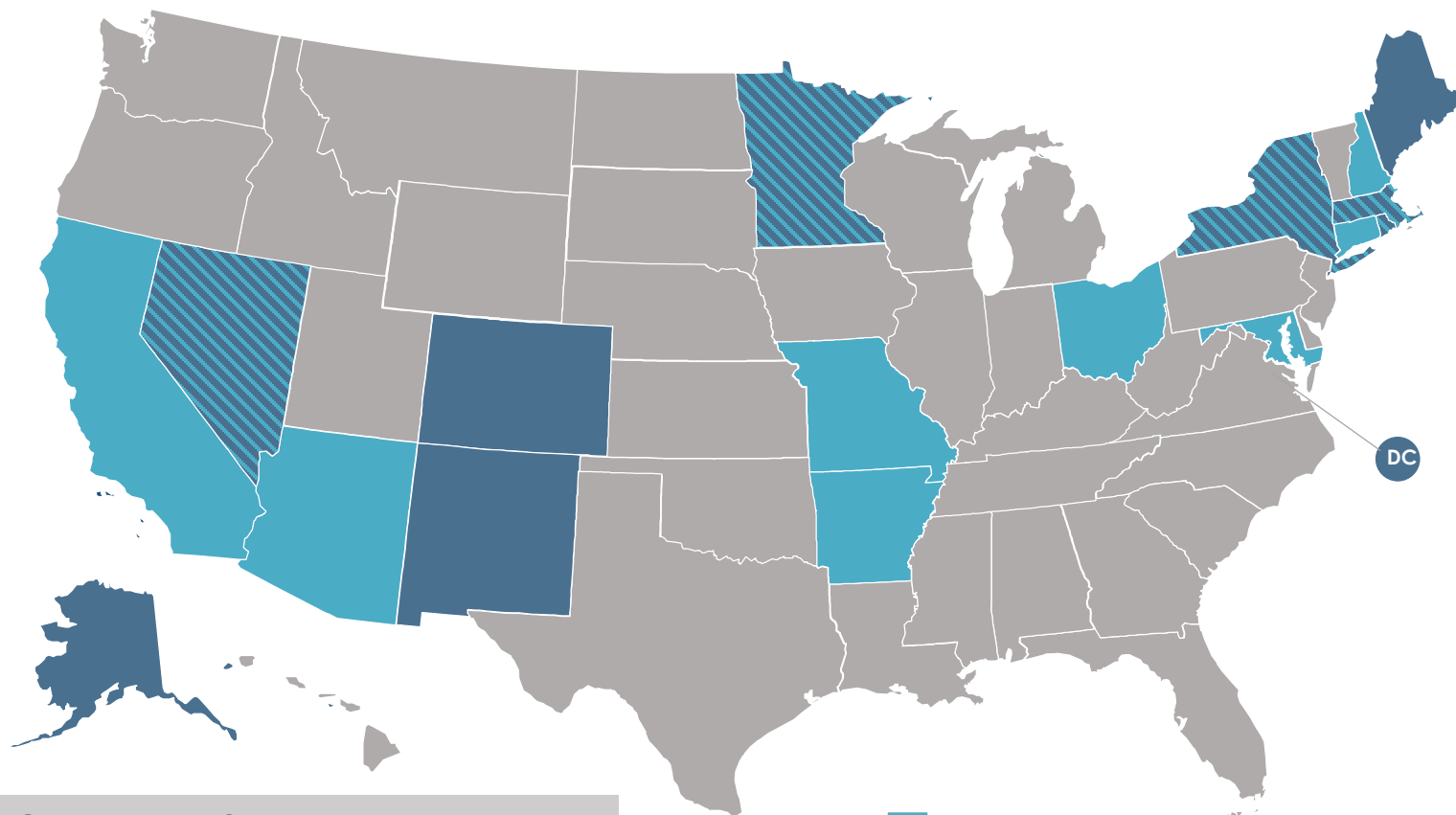
Planning & Market Access

- **Integrated Resource Planning**
 - How does storage fit in?
 - Arizona (APS), New Mexico, New Orleans, Washington
- **Distribution System Planning**
 - Identifying most beneficial locations on distribution grid for DERs
 - Hosting capacity maps
 - Connecticut, Michigan, New York, Rhode Island

Planning & Market Access

- **Evaluation of Non-Wires Alternatives**
 - Strategic deployment of DERs to defer, mitigate, or obviate T&D investments
 - Maine, New York, Rhode Island
- **Wholesale Market Rules**
 - Rules for market access and compensation
 - Demand response, energy storage
 - February 2018 FERC order

2017 Action on Rate Design & Utility Business Models



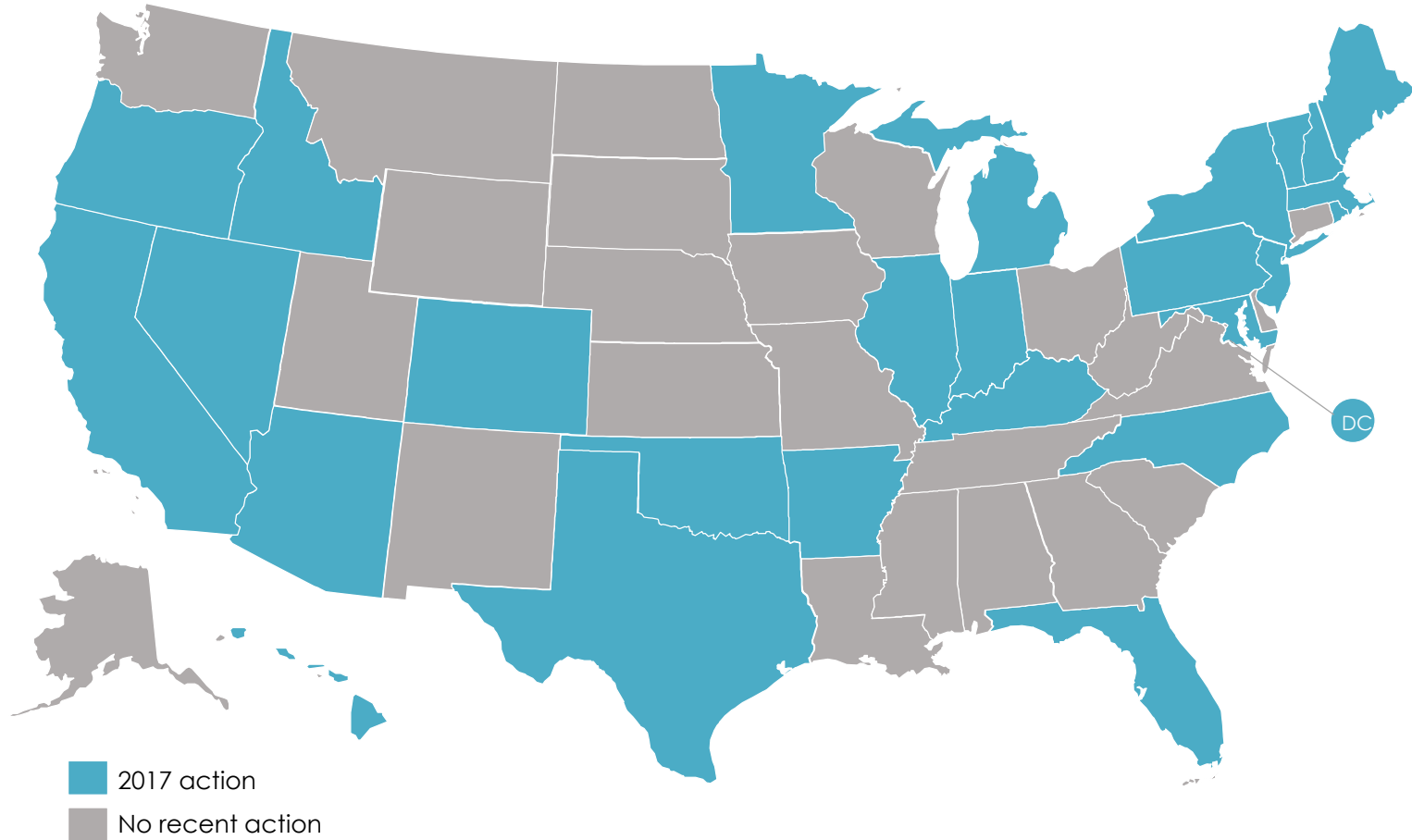
17 States + DC took action on Utility Business Model and Rate Reform during 2017

Rate Design Reforms
Utility Business Model Reforms

Utility Business Model & Rate Reform

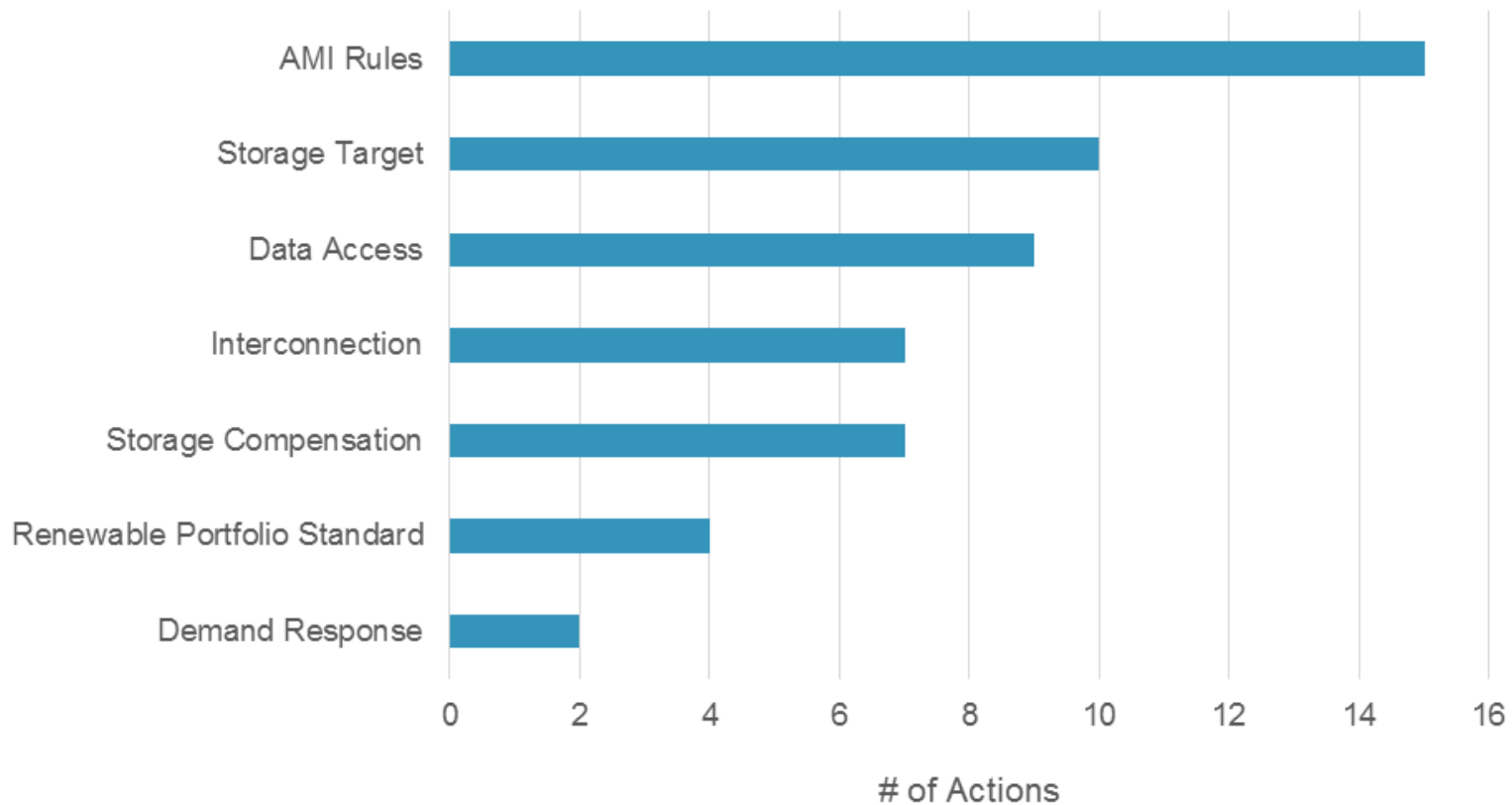
- Rates can encourage or deter tech adoption by consumers
 - Time-of-Use Rates
 - Demand Charges
 - Energy Storage Tariffs
- Utility Business Model Reforms
 - Decoupling
 - Performance-based ratemaking
 - Restructuring

2017 Action on Grid Modernization Policies



26 States + DC took action on Grid Modernization Policies during 2017

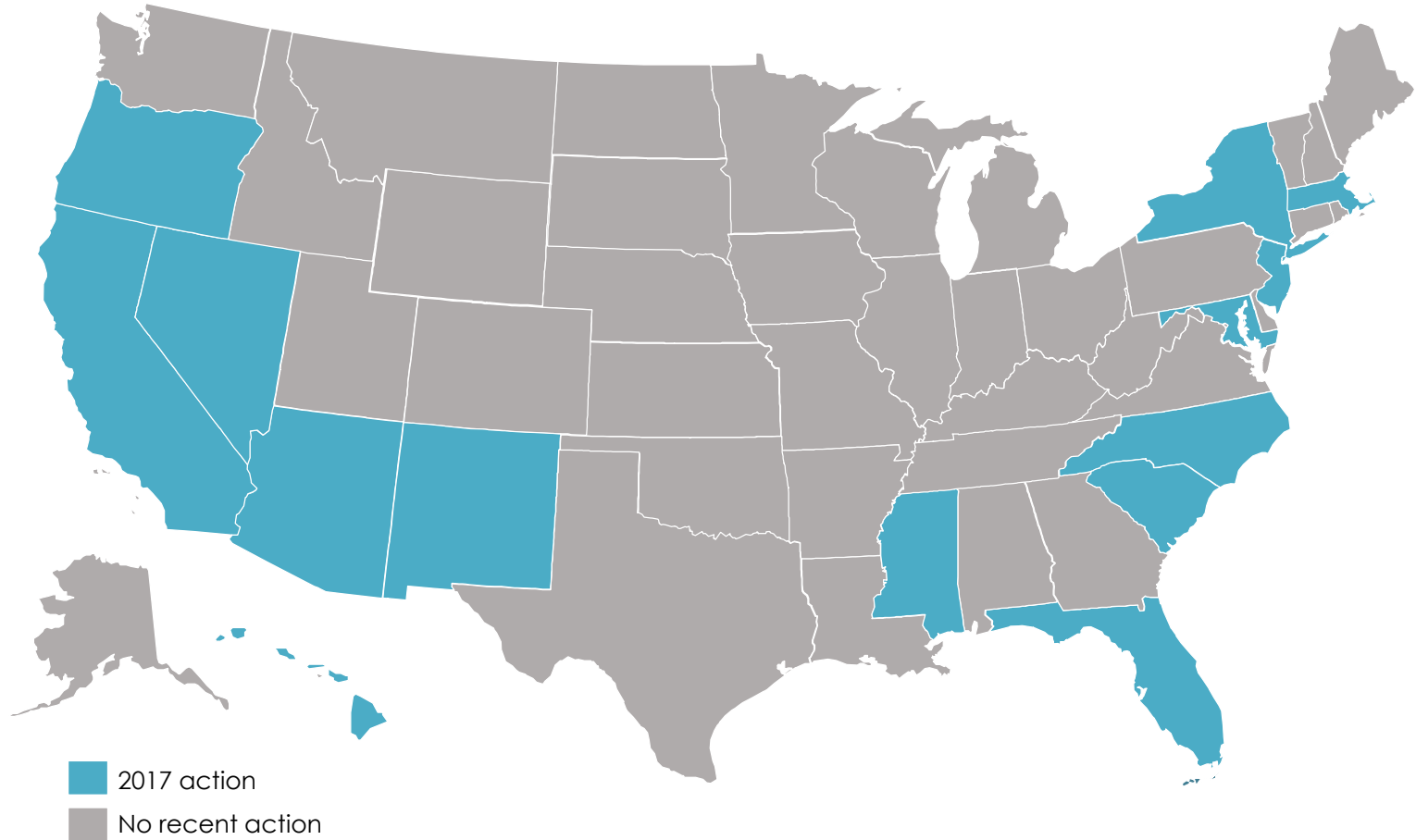
Grid Modernization Policies



Grid Modernization Policies

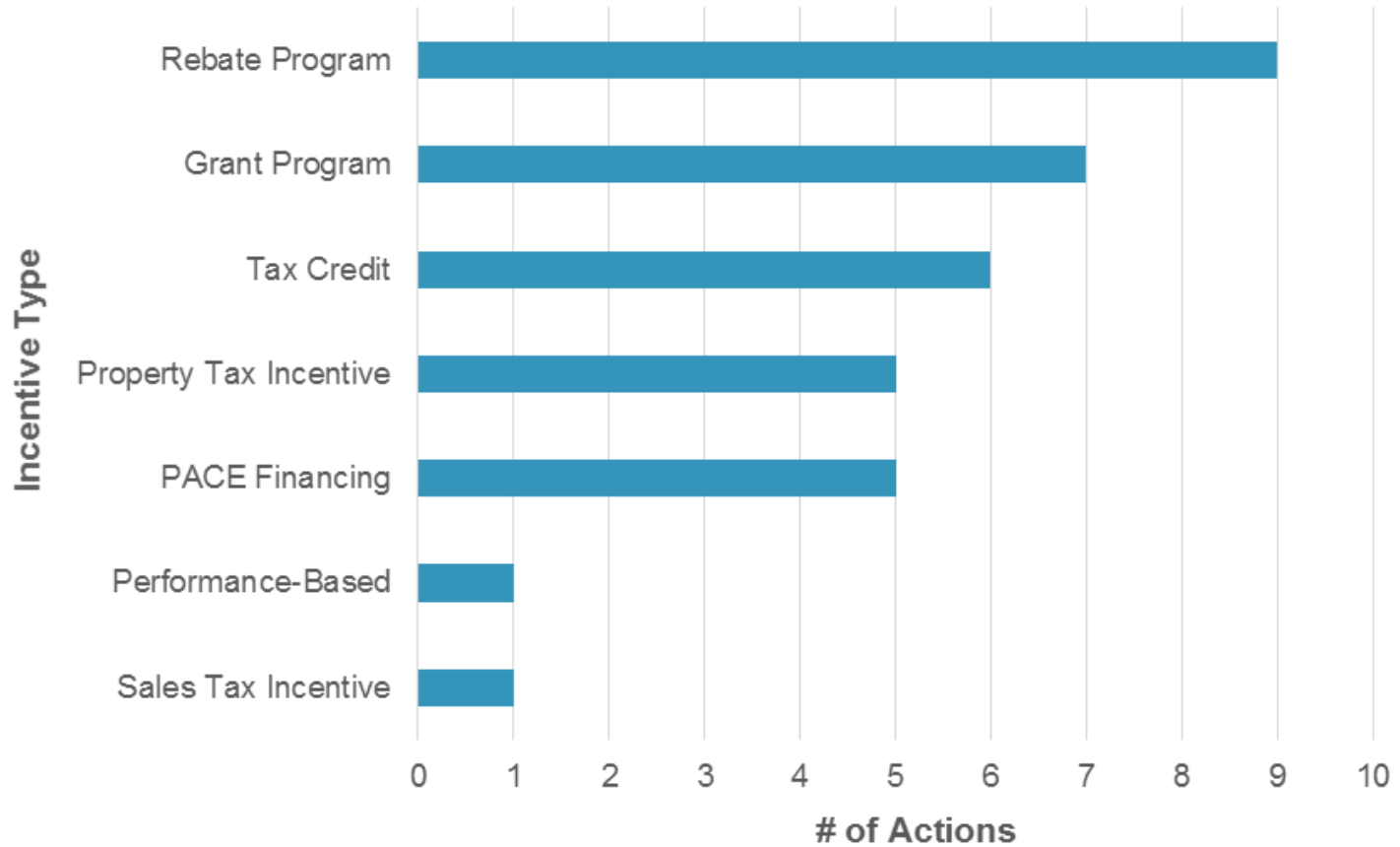
- New York enacted legislation adopting an **energy storage procurement target**
- Hawaii PUC approved a “**smart export**” **tariff** for solar + storage customers
- Arizona considering a “**clean peak standard**” requiring a certain percentage of peak load to be supplied by clean resources
- Multiple states examining **interconnection standards** for energy storage and customer **data access rules**

2017 Action on Grid Modernization Incentives



14 States took action on Grid Modernization Incentives during 2017

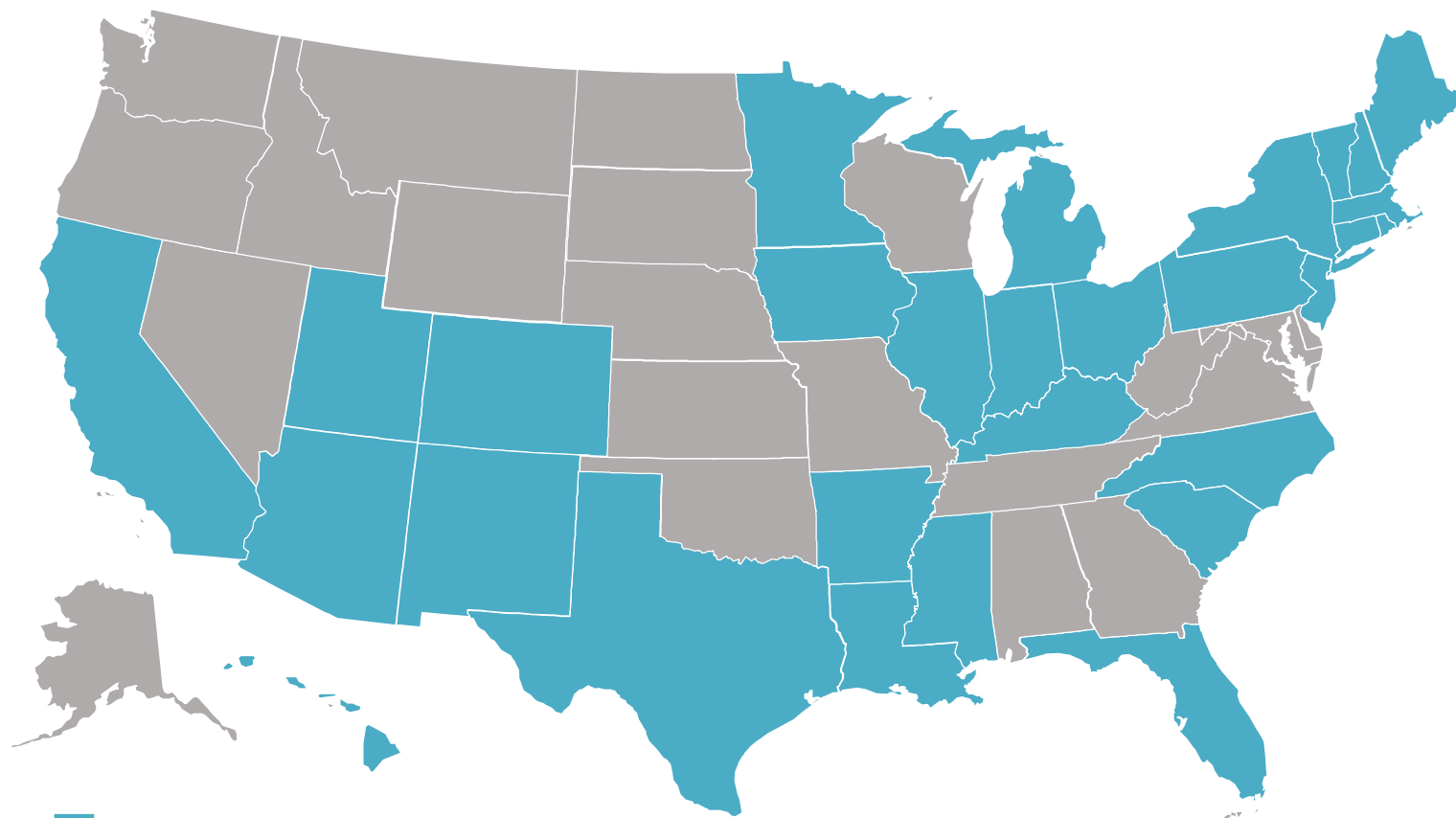
Financial Incentives



Financial Incentives

- Some proposals for new incentives, others expand eligibility for existing incentives
- **Maryland** – SB 758 (enacted May 2017) created the first state tax credit for energy storage in the country
- **Nevada** – SB 145 (enacted May 2017) creates new energy storage incentive program
- **Florida, New York** – property tax abatement for solar + storage or storage

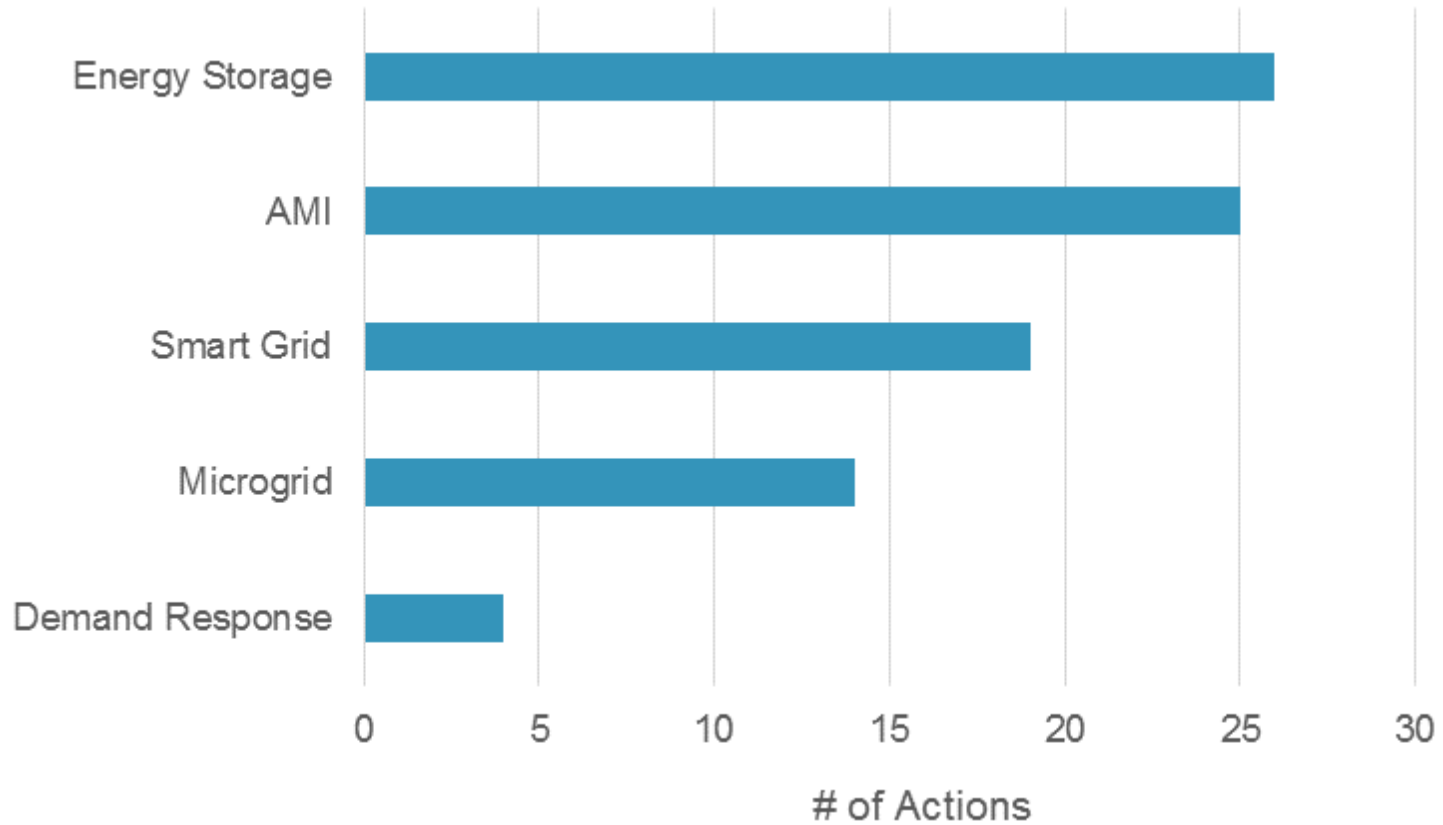
2017 Action on Deployment of Advanced Grid Technologies



■ 2017 action
■ No recent action

29 States took action on Deployment of Advanced Grid Technologies during 2017

Technology Deployment



Technology Deployment

- Many storage and microgrid proposals are for pilot projects
- A few proposals for utility-owned, residential customer-sited storage (Liberty Utilities, Green Mountain Power)
- Utility ownership in restructured states sometimes an issue for storage, microgrids (Ex. Maine, Texas)
- Cost is often a contentious issue for larger grid modernization packages

Takeaways

- Grid modernization is very complex – many different goals and options to weigh
- States are taking very diverse approaches to grid modernization
- Most states are in the earlier stages of grid modernization – much more grid modernization activity to come!

Thank you!

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afproudl@ncsu.edu

50 States of Grid Modernization:
[Exec Summary](#)
[Full Report \(Purchase\)](#)



The Status of State Grid Modernization Efforts: **GridWise Alliance Grid Modernization Index (GMI)**

Steven G. Hauser, CEO, The GridWise Alliance

Clean Energy States Alliance (CESA) Webinar
March 9, 2018

Grid Modernization Index (GMI)

Introduction and Overview

The GMI is a simple, easy to understand ranking of all 50 states and the District of Columbia in terms of progress on grid modernization. State rankings are based on scores in each of these three areas that then are combined into an overall ranking:

- **State Support:** State policies and regulatory mechanisms that facilitate grid investment;
- **Customer Engagement:** Investments throughout the state in customer-enabling technologies and capabilities; and,
- **Grid Operations:** Investments throughout the state in grid-enhancing technologies and capabilities.

GMI History

- **GMI-1:**
Published July 22, 2013
- **GMI-2:**
Published November 17, 2014
- **GMI-3:**
Published January 20, 2016
- **GMI-4:**
published November 8, 2017



About GMI-4 Scoring | Top 10 States

STATE SUPPORT
32PTS

- Grid Modernization Policy/Plan
- Data Access RPS/EERS
- Security Plans
- Education/Outreach/Measurement/Reporting Requirements
- DER Incentives/Mandates
- Workforce/Economic Development

CUSTOMER ENGAGEMENT
31PTS

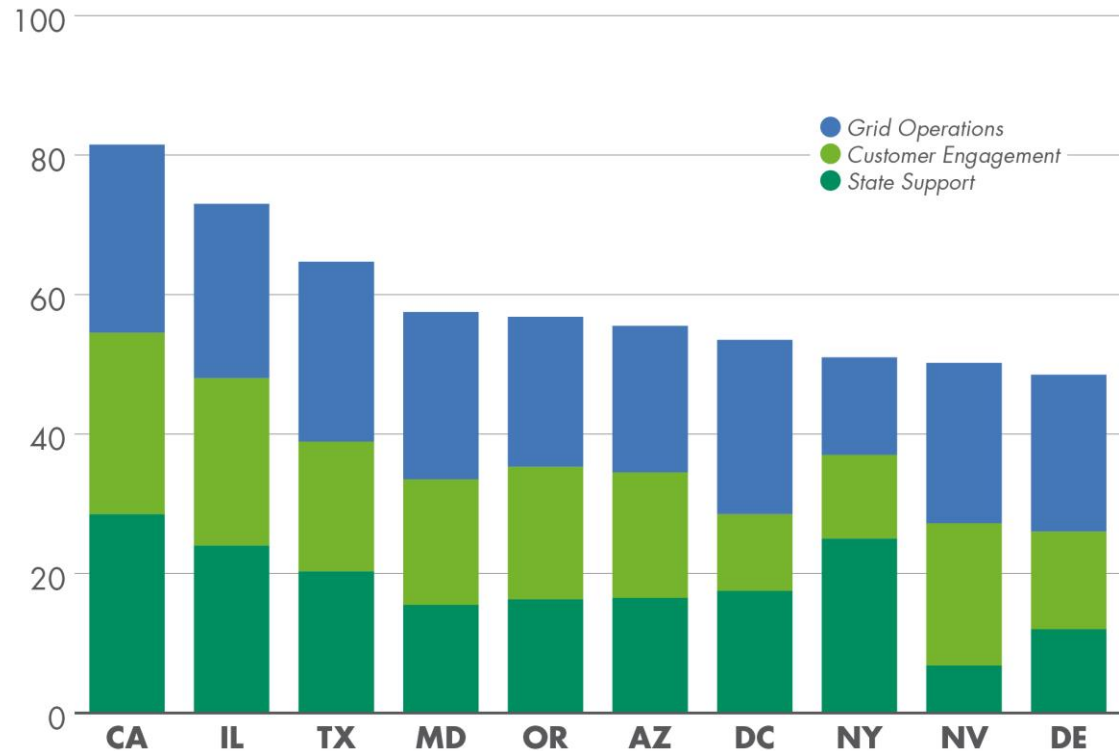
- Dynamic Tariffs/Rate Structures
- Communication with Customers
- DER Tariffs
- Data Access/Sharing
- Customer Segmentation/Analytics

GRID OPERATIONS
37PTS

- AMI Penetration/Integration
- Advanced Sensors for Transmission & Distribution
- Energy Storage & Microgrids
- Integration of Distribution Management Systems
- Probabilistic Planning
- Advanced GIS & Visualization

100 TOTAL POINTS

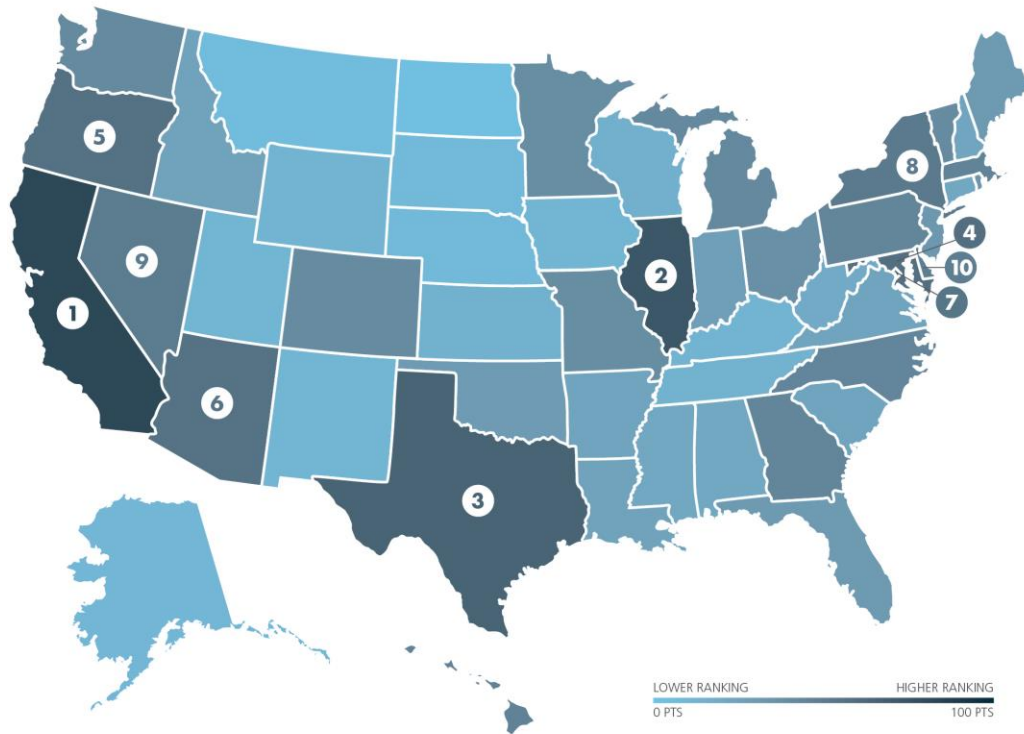
4TH GRID MODERNIZATION INDEX: TOP 10 STATES



Source: Grid Modernization Index, GridWise Alliance and Clean Edge, Inc.

GMI-4: Overall Results

OVERALL RESULTS



| RANK | +/- | STATE | LEADERSHIP SCORE |
|------|-----|----------------------|------------------|
| 1 | 0 | California | 81.5 |
| 2 | 0 | Illinois | 73.0 |
| 3 | 0 | Texas | 64.6 |
| 4 | 0 | Maryland | 57.5 |
| 5 | 2 | Oregon | 56.8 |
| 6 | 3 | Arizona | 55.5 |
| 7 | -2 | District of Columbia | 53.5 |
| 8 | 8 | New York | 51.0 |
| 9 | 5 | Nevada | 50.1 |
| 10 | -4 | Delaware | 48.5 |
| 11 | 1 | Hawaii | 46.0 |
| 12 | 8 | Massachusetts | 44.8 |
| 13 | -5 | Pennsylvania | 44.0 |
| 14 | -4 | Georgia | 43.5 |
| 15 | -4 | North Carolina | 43.3 |
| 16 | -1 | Michigan | 41.7 |
| 17 | 12 | Washington | 40.5 |
| 18 | 17 | Colorado | 40.0 |
| 19 | -6 | Vermont | 39.6 |
| 20 | 2 | Missouri | 39.0 |
| 21 | -2 | Minnesota | 38.8 |
| 22 | 3 | Ohio | 36.8 |
| 23 | 25 | Rhode Island | 34.0 |
| 24 | 2 | New Jersey | 32.3 |
| 25 | -8 | Florida | 30.1 |
| 26 | -5 | Maine | 29.5 |
| 27 | -9 | Oklahoma | 29.0 |
| 28 | -4 | Indiana | 27.0 |
| 29 | 4 | Louisiana | 24.4 |
| 30 | 2 | Idaho | 23.9 |
| 31 | -8 | Virginia | 23.4 |
| 32 | -2 | Arkansas | 23.2 |
| 33 | 1 | South Carolina | 23.1 |
| 34 | -6 | New Hampshire | 21.6 |
| 35 | -4 | Connecticut | 21.4 |
| 36 | 7 | Mississippi | 21.3 |
| 37 | -10 | Alabama | 21.0 |
| 38 | -1 | West Virginia | 19.0 |
| 39 | 1 | Wisconsin | 15.1 |
| 40 | -4 | Kansas | 14.4 |
| 41 | 3 | Tennessee | 13.2 |
| 42 | -3 | Wyoming | 11.9 |
| 43 | 2 | Kentucky | 11.6 |
| 44 | -3 | New Mexico | 11.0 |
| 45 | 1 | Iowa | 10.7 |
| 46 | -8 | Utah | 10.5 |
| 47 | 0 | Alaska | 10.3 |
| 48 | -6 | South Dakota | 9.0 |
| 49 | 1 | Nebraska | 8.5 |
| 50 | -1 | Montana | 6.3 |
| 51 | 0 | North Dakota | 3.3 |

GMI-4: Movement +/-

STATES WITH GAINS OF AT LEAST FIVE POINTS OR FIVE RANKING SPOTS



RHODE ISLAND

↑25

↑24.0

Governor support with strategic energy goals and adoption of clean energy measures.



WASHINGTON

↑17

↑21.0

An aggressive Clean Energy Fund is supporting improvements to the grid.



COLORADO

↑12

↑16.8

Improved customer experience through upgraded forecasting techniques, clean energy analytics, and new offerings to customers.



NEW YORK

↑8

↑9.8

Improved customer experience through upgraded forecasting techniques, clean energy analytics, and new offerings to customers.



MASSACHUSETTS

↑8

↑10.3

State Support leadership leading to improvements in other categories. Increased smart grid planning.



MISSISSIPPI

↑7

↑7.5

TVA has incentivized commercial and residential consumers to be more price aware about energy.



NEVADA

↑5

↑8.4

Increased policy activity, improvements in AMI programs and Advanced Distribution Management Systems.



OHIO

↑3

↑10.3

Improved State Support, including reinstating renewable portfolio standard.



MISSOURI

↑2

↑8.0

Improvements in Customer Engagement and Grid Operations.



NEW JERSEY

↑2

↑6.0

Strong improvement in State Support, including incentives for storage. Improvement in Customer Engagement as well.

GMI-4: Key Takeaways

1 The pace of grid modernization efforts has accelerated, particularly on the policy front. Many states are undertaking grid modernization initiatives or proceedings, including facilitating the adoption of advanced metering infrastructure (AMI), DERs, implementing pricing schemes and demand response (DR) mechanisms, and enacting other related policies. These actions are aimed at expanding the use of renewable energy resources, storage, and electric vehicles; increasing operational efficiency; and improving resilience.

2 Recent hurricanes and other extreme weather events, as well as human-caused cybersecurity and physical security threats, are focusing attention on grid resilience. While some states are leading the way, GMI-4 shows that several states are actively planning for and incentivizing resiliency and security. These efforts will begin to expand to other states, ensuring that customers are less vulnerable to natural and man-made disasters.

3 Leading states continue to make progress toward comprehensive grid modernization. Each state follows its own approach to policy, business and regulatory models. Unique local and regional circumstances compel each state to develop its own approach to grid modernization. However, it is critical that states pioneering new ideas effectively communicate lessons learned to states that can build on their experience.

4 Many states are just beginning their own grid modernization efforts. As innovative new technologies become more cost-effective, additional states are joining the leaders in actively pursuing grid modernization agendas. As more and more initiatives and programs show clear benefits, additional states are actively engaging in the discussion and implementation of grid modernization efforts.

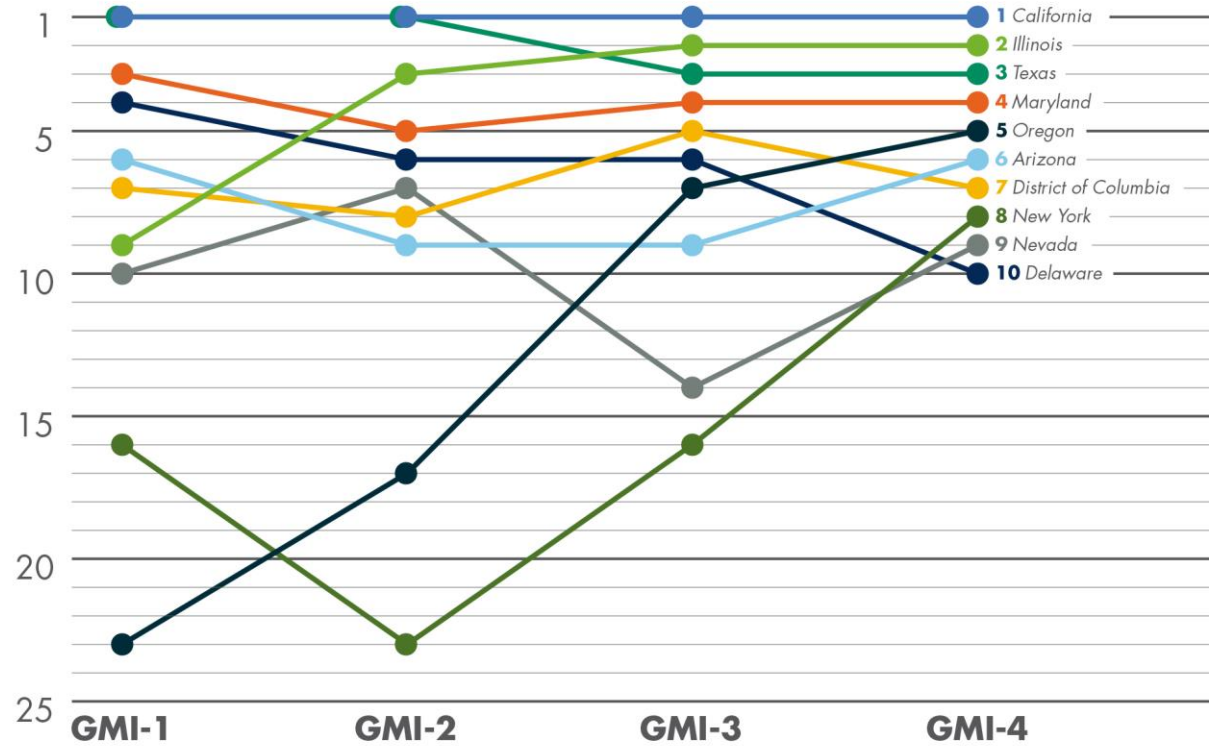
5 Some of the early movers may be seeing their momentum slow, particularly in the Grid Operations category. Some states that received an influx of American Recovery and Reinvestment Act (ARRA) funding to modernize their grid are being surpassed by states with ongoing, locally-funded efforts.

6 Utilities are prioritizing efforts to address customer demands for greater choice and the capability to manage their own energy usage. The trend is towards greater utility engagement and communications with customers. Investments in a range of technologies enable these efforts, providing greater visibility to customers and enhancing situational awareness for grid operators. Innovative utilities are creating better methods for communicating critical information to customers.

7 Clean energy targets by states, cities, and corporations are driving utility efforts to accommodate rapid growth in DERs. With some states, cities, and corporations now targeting up to 100% renewables, efforts by a growing number of utilities to meet these goals are impacting their long-range planning, product and service offerings, and grid operations.

GMI-4: Historical Analysis

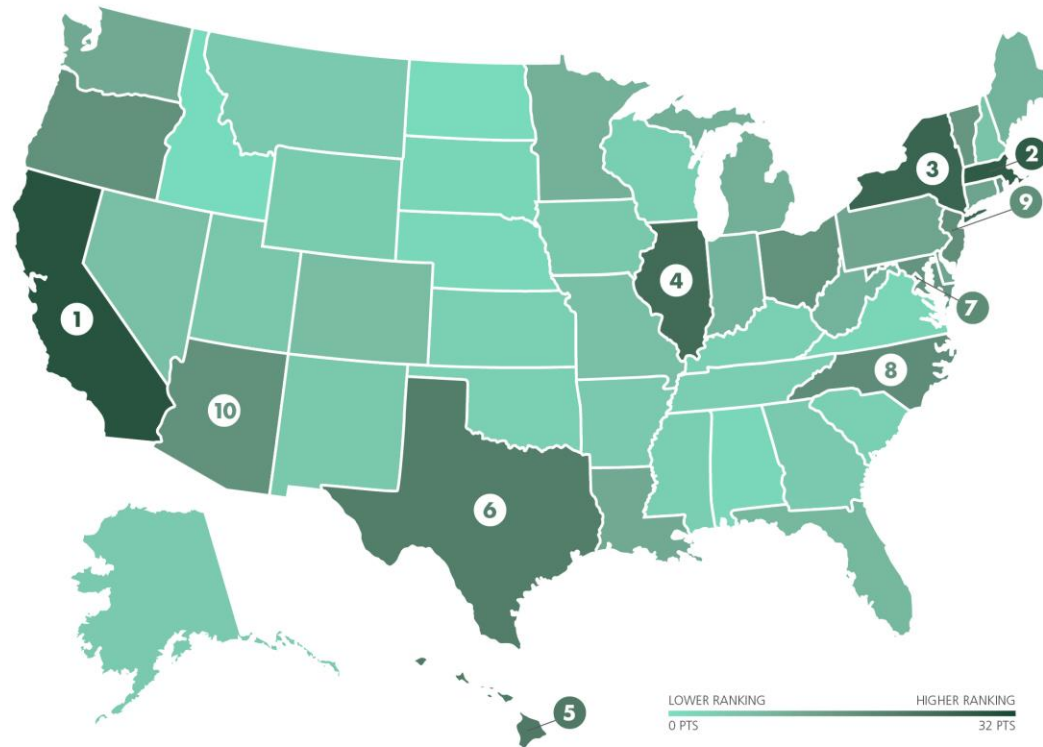
**GMI-4 TOP 10 OVERALL STATES
(INCLUDING HISTORICAL RANKINGS)**



Source: Grid Modernization Index, GridWise Alliance and Clean Edge, Inc.

GMI-4: State Support

STATE SUPPORT



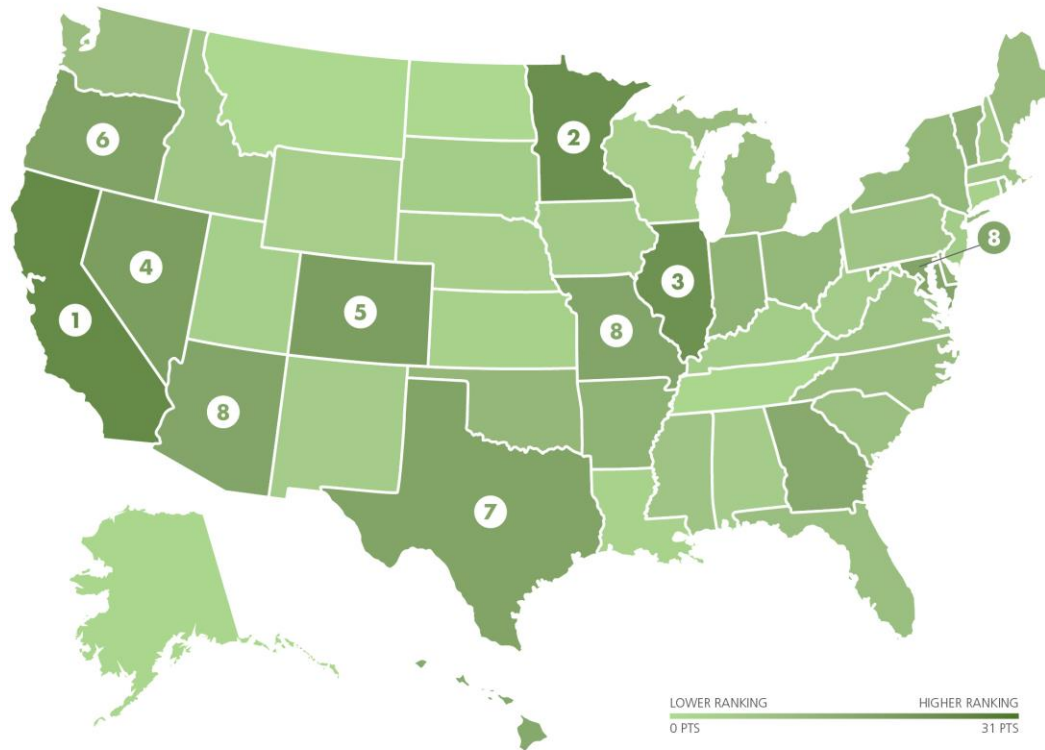
| RANK | +/- | STATE | LEADERSHIP SCORE |
|------|-----|----------------------|------------------|
| 1 | 1 | California | 28.5 |
| 2 | 1 | Massachusetts | 27.0 |
| 3 | 4 | New York | 25.0 |
| 4 | -3 | Illinois | 24.0 |
| 5 | 1 | Hawaii | 21.1 |
| 6 | 2 | Texas | 20.3 |
| 7 | 3 | District of Columbia | 17.5 |
| 8 | 1 | North Carolina | 17.0 |
| 9 | 31 | New Jersey | 16.8 |
| 10 | 9 | Arizona | 16.5 |
| 11 | -7 | Oregon | 16.3 |
| 12 | 8 | Ohio | 16.0 |
| 13 | -2 | Maryland | 15.5 |
| 13 | 19 | Rhode Island | 15.5 |
| 15 | -2 | Vermont | 15.3 |
| 16 | 2 | Connecticut | 12.5 |
| 17 | -3 | Delaware | 12.0 |
| 17 | -12 | Pennsylvania | 12.0 |
| 19 | 2 | Louisiana | 11.5 |
| 19 | 23 | Washington | 11.5 |
| 21 | -4 | Michigan | 10.3 |
| 22 | -7 | Minnesota | 10.0 |
| 23 | -11 | Indiana | 9.0 |
| 23 | 2 | Maine | 9.0 |
| 23 | 6 | West Virginia | 9.0 |
| 26 | 8 | Florida | 8.5 |
| 27 | -4 | Colorado | 7.5 |
| 28 | -12 | Missouri | 7.0 |
| 29 | -3 | Nevada | 6.8 |
| 30 | -8 | New Hampshire | 6.0 |
| 31 | -7 | Utah | 5.3 |
| 32 | -2 | Iowa | 5.0 |
| 32 | -4 | New Mexico | 5.0 |
| 34 | 1 | Arkansas | 4.8 |
| 34 | 4 | Montana | 4.8 |
| 36 | -3 | Alaska | 4.5 |
| 36 | 0 | Georgia | 4.5 |
| 38 | -11 | Wyoming | 4.3 |
| 39 | 9 | Tennessee | 4.0 |
| 40 | 7 | Mississippi | 3.8 |
| 40 | -3 | Wisconsin | 3.8 |
| 42 | -3 | Oklahoma | 3.5 |
| 43 | 3 | Kentucky | 3.4 |
| 44 | -13 | Kansas | 3.3 |
| 44 | -3 | South Carolina | 3.3 |
| 46 | -2 | Virginia | 2.5 |
| 47 | -2 | South Dakota | 2.3 |
| 48 | 3 | Alabama | 2.0 |
| 48 | -5 | Nebraska | 2.0 |
| 50 | 0 | North Dakota | 1.3 |
| 51 | -2 | Idaho | 0.9 |

GMI-4: State Support – Themes and Trends

- The highest-ranked states in this category are taking a more comprehensive approach to policies and regulatory proceedings that encourage grid modernization. Areas of primary focus include EVs, integration of DERs, energy storage, resiliency and reliability, cyber and physical security, and changes in regulatory models, including rate design structures.
- Incentives and mandates to encourage the deployment of energy storage technologies are becoming a popular policy option for supporting utility operations.
- Utilities are tailoring their modeling and planning efforts to meet increasingly aggressive EV infrastructure and RPS goals (50-100% renewables for some states).
- Regulatory approval is a long process, requiring utilities to engage early and often with regulators and other stakeholders, and to articulate clear business cases for reform. However, general awareness of the need for grid modernization has increased among state energy offices, legislators, and commissions, resulting in an acceleration of activities.
- Significant education, outreach and technical assistance regarding these complex issues must continue for legislators, regulators, and staff.

GMI-4: Customer Engagement

CUSTOMER ENGAGEMENT



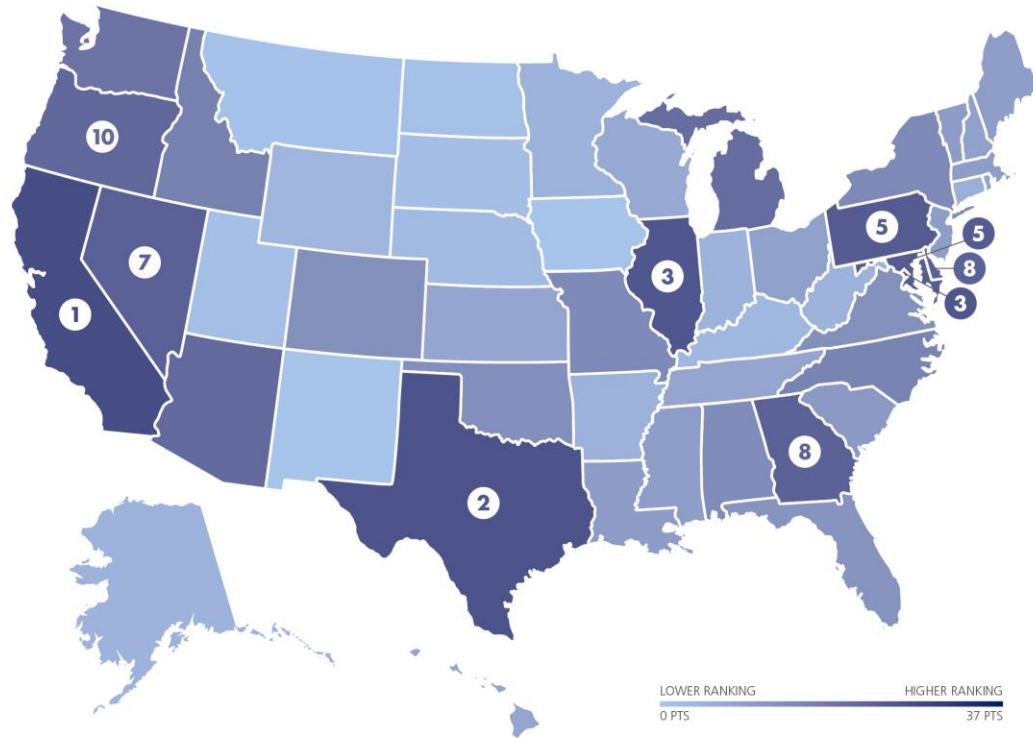
| RANK | +/- | STATE | LEADERSHIP SCORE |
|------|-----|----------------------|------------------|
| 1 | 0 | California | 26.0 |
| 2 | 15 | Minnesota | 24.5 |
| 3 | -1 | Illinois | 24.0 |
| 4 | 0 | Nevada | 20.4 |
| 5 | 28 | Colorado | 20.0 |
| 6 | 9 | Oregon | 19.0 |
| 7 | -4 | Texas | 18.6 |
| 8 | -3 | Arizona | 18.0 |
| 8 | -1 | Maryland | 18.0 |
| 8 | 19 | Missouri | 18.0 |
| 11 | -1 | Hawaii | 17.1 |
| 12 | -3 | Georgia | 16.5 |
| 13 | -1 | Vermont | 14.3 |
| 14 | -8 | Delaware | 14.0 |
| 15 | 14 | Indiana | 13.7 |
| 15 | 2 | Arkansas | 13.7 |
| 17 | -9 | Oklahoma | 12.6 |
| 18 | 2 | New York | 12.0 |
| 18 | 5 | Ohio | 12.0 |
| 20 | -9 | District of Columbia | 11.0 |
| 20 | -2 | Michigan | 11.0 |
| 20 | -9 | Maine | 11.0 |
| 23 | -1 | North Carolina | 10.7 |
| 24 | 2 | Washington | 10.0 |
| 25 | -4 | Florida | 9.7 |
| 26 | 19 | Rhode Island | 9.5 |
| 27 | -2 | South Carolina | 9.2 |
| 28 | -14 | Virginia | 8.4 |
| 29 | 12 | Massachusetts | 8.0 |
| 29 | 21 | Mississippi | 8.0 |
| 29 | -13 | Pennsylvania | 8.0 |
| 32 | -9 | Idaho | 7.0 |
| 33 | -5 | New Hampshire | 6.7 |
| 34 | 10 | New Jersey | 6.0 |
| 35 | -3 | Iowa | 5.7 |
| 36 | -6 | New Mexico | 5.5 |
| 36 | 0 | West Virginia | 5.5 |
| 38 | -7 | Alabama | 5.3 |
| 39 | -4 | Kentucky | 5.0 |
| 39 | -6 | South Dakota | 5.0 |
| 41 | 2 | Wisconsin | 4.2 |
| 42 | 4 | Nebraska | 4.0 |
| 42 | -3 | Wyoming | 4.0 |
| 44 | -6 | Utah | 3.7 |
| 45 | -8 | Kansas | 3.5 |
| 45 | -7 | Connecticut | 3.5 |
| 47 | -5 | Louisiana | 3.0 |
| 48 | -1 | Alaska | 1.5 |
| 48 | 1 | Tennessee | 1.5 |
| 50 | 1 | North Dakota | 1.0 |
| 51 | -3 | Montana | 0.8 |

GMI-4: Customer Engagement – Themes and Trends

- Leading utilities are offering customized energy programs and enhanced service levels that leverage foundational investments in AMI and apply data analytic frameworks to deliver new value streams to customers. Examples of such benefits include automatic system connection and disconnection, new approaches to outage status updates, and fault detection.
- Utilities are tailoring innovative communication strategies and programs to meet the requirements of increasingly diverse, engaged, and informed customer classes. At the same time, all customers are expecting faster recovery and new communications strategies from utilities to address wide-scale outages.
- Extreme weather events are causing many customers, including hospitals and military facilities, to demand greater reliability and resilience (such as backup generators and microgrids) to protect critical infrastructure.
- Successful programs are increasingly based on broader community input and outreach, leveraging external stakeholder groups and focusing on customers' needs.

GMI-4: Grid Operations

GRID OPERATIONS



LOWER RANKING 0 PTS HIGHER RANKING 37 PTS

| RANK | +/- | STATE | LEADERSHIP SCORE |
|------|-----|----------------------|------------------|
| 1 | 1 | California | 27.0 |
| 2 | -1 | Texas | 25.8 |
| 3 | 4 | District of Columbia | 25.0 |
| 3 | 3 | Illinois | 25.0 |
| 5 | -2 | Maryland | 24.0 |
| 5 | 10 | Pennsylvania | 24.0 |
| 7 | 16 | Nevada | 23.0 |
| 8 | -3 | Delaware | 22.5 |
| 8 | -4 | Georgia | 22.5 |
| 10 | 4 | Oregon | 21.5 |
| 11 | 0 | Arizona | 21.0 |
| 12 | 0 | Michigan | 20.5 |
| 13 | 6 | Washington | 19.0 |
| 14 | 6 | Idaho | 16.0 |
| 15 | -2 | North Carolina | 15.6 |
| 16 | 5 | Missouri | 14.0 |
| 16 | 11 | New York | 14.0 |
| 18 | -8 | Alabama | 13.8 |
| 19 | -1 | Oklahoma | 12.9 |
| 20 | 23 | Colorado | 12.5 |
| 20 | -3 | Virginia | 12.5 |
| 22 | -14 | Florida | 11.8 |
| 23 | 2 | South Carolina | 10.7 |
| 24 | -8 | Vermont | 10.1 |
| 25 | 9 | Louisiana | 9.9 |
| 26 | 12 | Massachusetts | 9.8 |
| 27 | 3 | Maine | 9.5 |
| 27 | -5 | Mississippi | 9.5 |
| 27 | -18 | New Jersey | 9.5 |
| 30 | 19 | Rhode Island | 9.0 |
| 31 | -2 | New Hampshire | 8.9 |
| 32 | -4 | Ohio | 8.8 |
| 33 | 0 | Hawaii | 7.8 |
| 34 | -3 | Kansas | 7.7 |
| 34 | -8 | Tennessee | 7.7 |
| 36 | -1 | Wisconsin | 7.1 |
| 37 | -5 | Connecticut | 5.4 |
| 38 | -1 | Arkansas | 4.7 |
| 39 | -3 | West Virginia | 4.5 |
| 40 | 2 | Alaska | 4.3 |
| 40 | 0 | Indiana | 4.3 |
| 40 | -16 | Minnesota | 4.3 |
| 43 | 1 | Wyoming | 3.6 |
| 44 | -3 | Kentucky | 3.2 |
| 45 | 2 | Nebraska | 2.5 |
| 46 | -7 | South Dakota | 1.8 |
| 47 | -2 | Utah | 1.5 |
| 48 | 2 | North Dakota | 1.0 |
| 49 | -3 | Montana | 0.8 |
| 50 | -2 | New Mexico | 0.5 |
| 51 | 0 | Iowa | 0.0 |

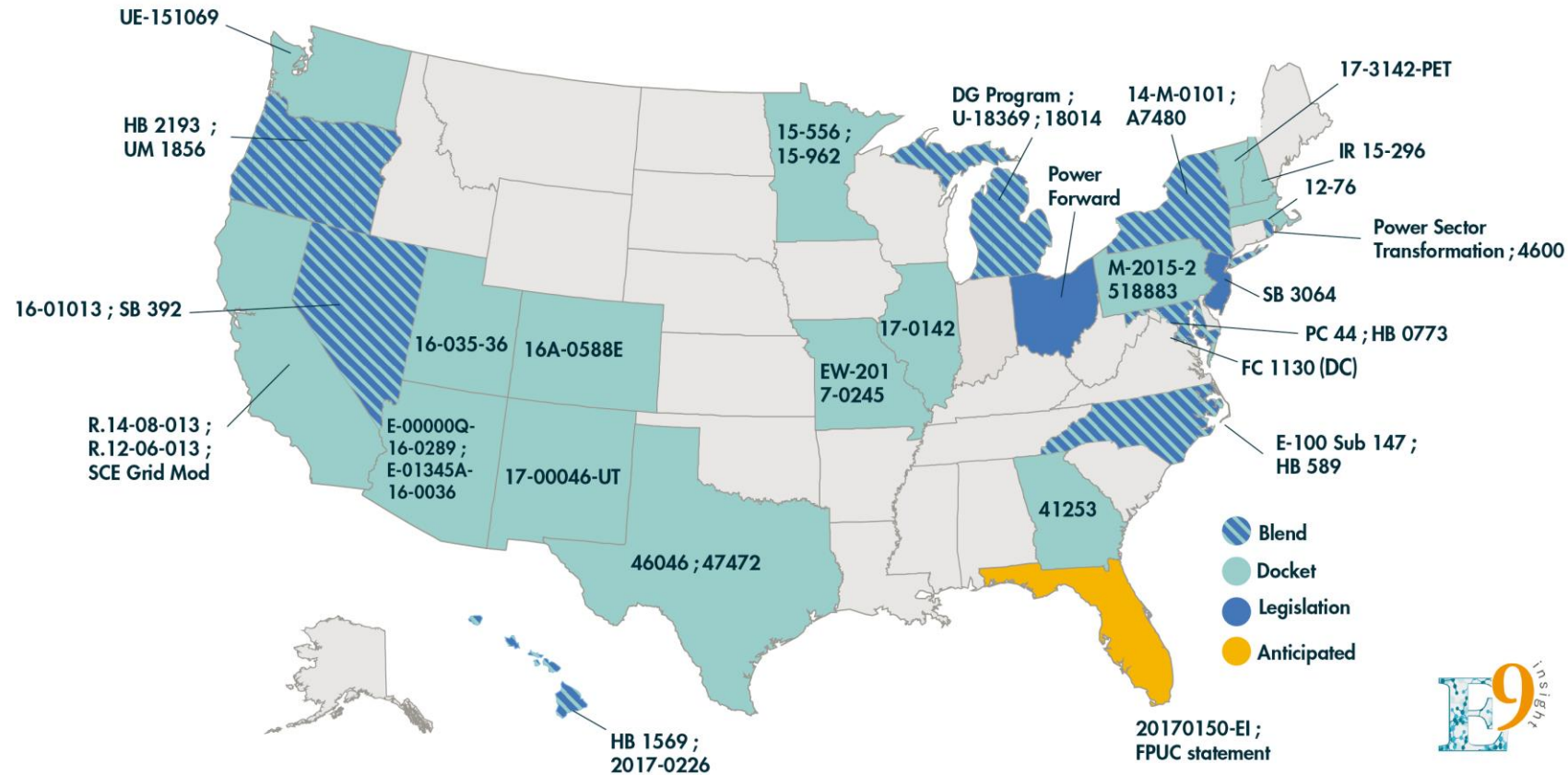
GMI-4: Grid Operations – Themes and Trends

- AMI remains a critical, foundational component of a modernized grid, with leading utilities implementing AMI programs that support diverse operational improvements and capture a wide range of customer benefits.
- More data from AMI, sensors, and new IT systems provide rich data streams for advanced analytical tools that enable enhanced decision-making capabilities. Visibility from these technologies enables utilities to improve performance across various utility functions, including customer service, metering, distribution, outage management, asset management, and market operations.
- New technologies and systems are being deployed incrementally, with utilities waiting until they can demonstrate the value of such technologies and systems, and proficiency using them, before adopting them on a more widespread basis.
- The increased penetration of DERs has made grid operations more complex. New software platforms and control systems are being deployed by a diverse group of utilities to automate grid operations and increase system efficiency and situational awareness.

GMI-4: Active Proceedings

GRID MODERNIZATION PROCEEDINGS BY TYPE (AS OF OCTOBER, 2017)

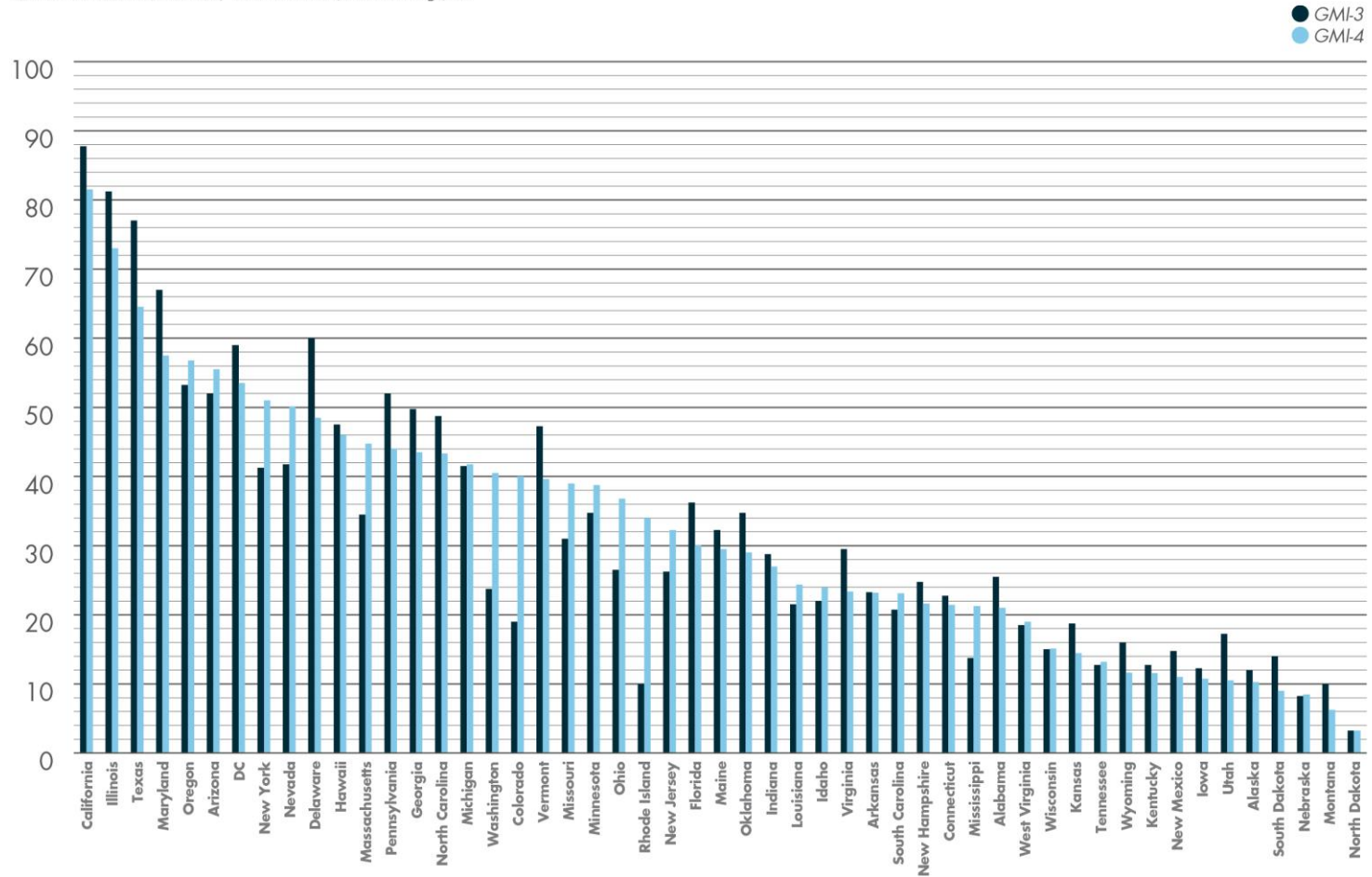
Source: E9 Insights



GMI-4: Comparison

OVERALL SCORES (GMI-3 VS GMI-4)

Source: Grid Modernization Index, GridWise Alliance, and Clean Edge, Inc.



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THANK YOU!

Thank you for attending our webinar

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