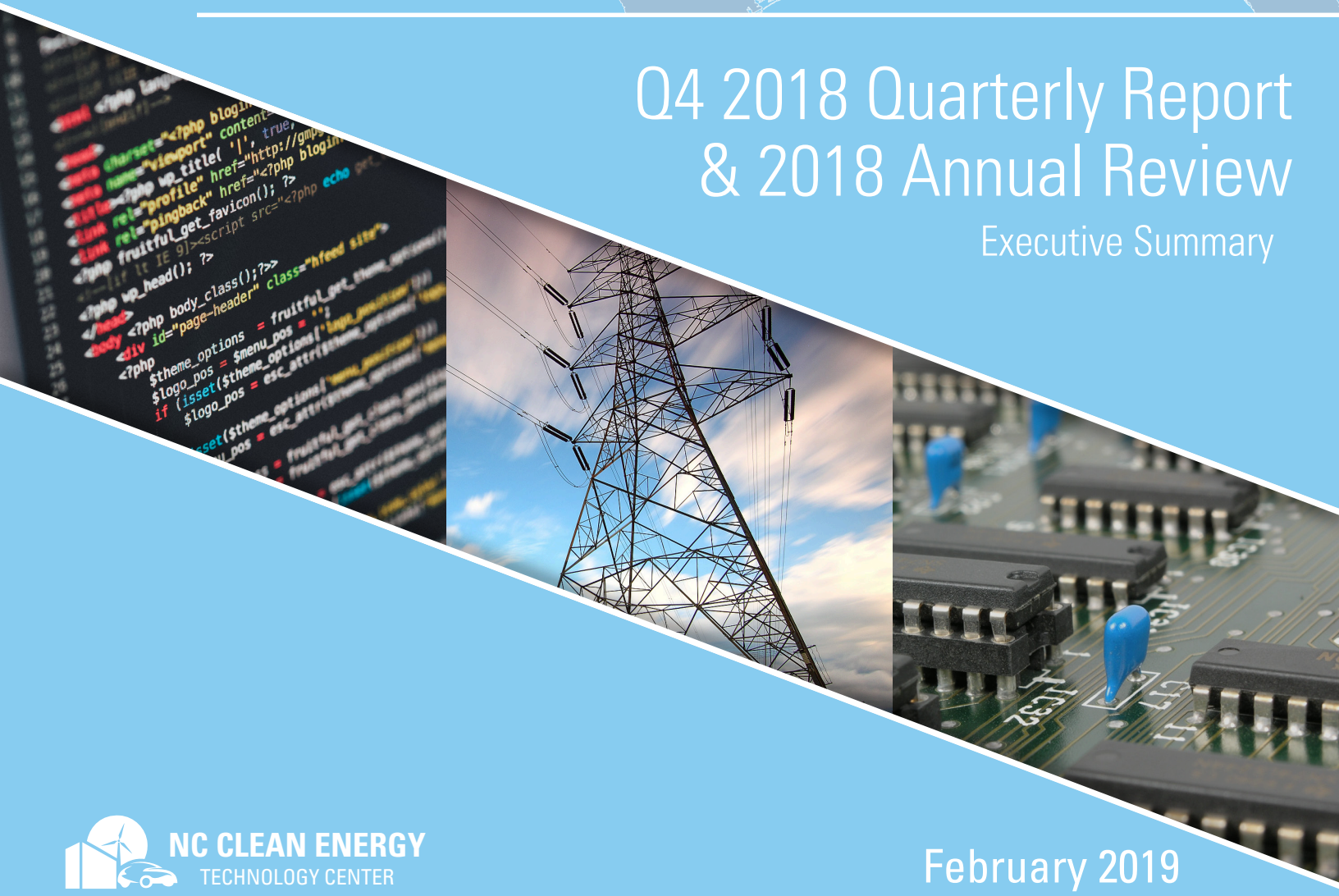
50 States of GRID MODERNIZATION

Q4 2018 Quarterly Report & 2018 Annual Review

Executive Summary



NC CLEAN ENERGY TECHNOLOGY CENTER

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The NC Clean Energy Technology Center is a UNC System-chartered Public Service Center administered by the College of Engineering at North Carolina State University. Its mission is to advance a sustainable energy economy by educating, demonstrating and providing support for clean energy technologies, practices, and policies. The Center provides service to the businesses and citizens of North Carolina and beyond relating to the development and adoption of clean energy technologies. Through its programs and activities, the Center envisions and seeks to promote the development and use of clean energy in ways that stimulate a sustainable economy while reducing dependence on foreign sources of energy and mitigating the environmental impacts of fossil fuel use.

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PREFERRED CITATION

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PREVIOUS EDITIONS AND OTHER 50 STATES REPORTS

Previous executive summaries and older editions of *The 50 States of Grid Modernization* are available for download here.

In addition to *The 50 States of Grid Modernization*, the NC Clean Energy Technology Center publishes additional quarterly reports called *The 50 States of Solar* and *The 50 States of Electric Vehicles*. These reports may be purchased at here. Executive summaries and older editions of these reports are available for download here.

ABOUT THE REPORT

WHAT IS GRID MODERNIZATION?

Grid modernization is a broad term, lacking a universally accepted definition. In this report, the authors use the term grid modernization broadly to refer to actions making the electricity system more resilient, responsive, and interactive. Specifically, in this report grid modernization includes legislative and regulatory actions addressing: (1) smart grid and advanced metering infrastructure, (2) utility business model reform, (3) regulatory reform, (4) utility rate reform, (5) energy storage, (6) microgrids, and (7) demand response.

PURPOSE

The purpose of this report is to provide state lawmakers and regulators, electric utilities, the advanced energy industry, and other energy stakeholders with timely, accurate, and unbiased updates about how states are choosing to study, adopt, implement, amend, or discontinue policies associated with grid modernization. This report catalogues proposed and enacted legislative, regulatory, and rate design changes affecting grid modernization during the most recent quarter.

The 50 States of Grid Modernization report series provides regular quarterly updates and annual summaries of grid modernization policy developments, keeping stakeholders informed and up to date.

APPROACH

The authors identified relevant policy changes and deployment proposals through state utility commission docket searches, legislative bill searches, popular press, and direct communications with industry stakeholders and regulators.

Questions Addressed

This report addresses several questions about the changing U.S. electric grid:

- How are states adjusting traditional utility planning processes to better allow for consideration of advanced grid technologies?
- What changes are being made to state regulations and wholesale market rules to allow market access for distributed energy resources?
- How are states and utilities reforming the traditional utility business model and rate designs?

- What policy actions are states taking to grow markets for energy storage and other advanced grid technologies?
- Where and how are states and utilities proposing and deploying advanced grid technologies, energy storage, microgrids, and demand response programs?

Actions Included

This report focuses on cataloguing and describing important proposed and adopted policy changes related to grid modernization and distributed energy resources, *excluding policies specifically intended to support only solar technologies*. While some areas of overlap exist, actions related to distributed solar policy and rate design are tracked separately in the *50 States of Solar report series,* and are generally not included in this report.

In general, this report considers an "action" to be a relevant (1) legislative bill that has been introduced or (2) a regulatory docket, utility rate case, or rulemaking proceeding. Only statewide actions and those related to investor-owned utilities are included in this report. Specifically, actions tracked in this issue include:

Studies and Investigations

Legislative or regulatory-led efforts to study energy storage, grid modernization, utility business model reform, or alternative rate designs, e.g., through a regulatory docket or a cost-benefit analysis.

Planning and Market Access

Changes to utility planning processes, including integrated resource planning, distribution system planning, and evaluation of non-wires alternatives, as well as changes to state and wholesale market regulations enabling market access.

Utility Business Model and Rate Reform

Proposed or adopted changes to utility regulation and rate design, including performance-based ratemaking, decoupling, time-varying rates, and residential demand charges.

Grid Modernization Policies

New state policy proposals or changes to existing policies related to grid modernization, including energy storage targets, energy storage compensation rules, interconnection standards, and customer data access policies.

Financial Incentives for Energy Storage and Advanced Grid Technologies

New statewide incentives or changes to existing incentives for energy storage, microgrids, and other modern grid technologies.

Deployment of Advanced Grid Technologies

Utility-initiated requests, as well as proposed legislation, to implement demand response programs or to deploy advanced metering infrastructure, smart grid technologies, microgrids, or energy storage.

Actions Excluded

This report excludes utility proposals for grid investments that do not include any specific grid modernization component, as outlined above, as well as specific projects that have already received legislative or regulatory approval. Actions related exclusively to pumped hydroelectric storage or electric vehicles are not covered by this report (a separate report series available from the NC Clean Energy Technology Center covers electric vehicle actions). Time-varying and residential demand charge proposals are only documented if they are being implemented statewide, the default option for all residential customers of an investor-owned utility, or a notable pilot program. Actions related to inclining or declining block rates are not included in this report. While actions taken by municipal utilities and electric cooperatives are not comprehensively tracked in this report, particularly noteworthy or high-impact actions are included. The report also excludes changes to policies and rate design for distributed generation customers; these changes are covered in the 50 States of Solar quarterly report.

EXECUTIVE SUMMARY

2018 GRID MODERNIZATION ACTION

In 2018, 44 states plus DC took a total of 460 policy and deployment actions related to grid modernization, utility business model and rate reform, energy storage, microgrids, and demand response. Table 1 provides a summary of state and utility actions on these topics. Of the 460 actions catalogued, the most common were related to policies (113), followed by deployment (81), and planning and market access (78).

Table 1. 2018 Summary of Grid Modernization Actions

Type of Action	# of Actions	% by Type	# of States
Policies	113	25%	35 + DC
Deployment	81	18%	33
Planning and Market Access	78	17%	26 + DC
Studies and Investigations	75	16%	32 + DC
Business Model and Rate Reform	67	15%	25 + DC
Financial Incentives	46	10%	20
Total	**460**	**100%**	**44 States + DC**

Note: The "# of States/ Districts" total is not the sum of the rows because some states have multiple actions. Percentages are rounded and may not add up to 100%.

TOP TEN MOST ACTIVE STATES OF 2018

Ten states taking the greatest number of actions related to grid modernization, or some of the most impactful actions, are noted below.

New York

New York adopted an energy storage target of 1,500 MW by 2025 and 3,000 MW by 2030, while the Public Service Commission (PSC) Staff developed a roadmap for achieving these targets. The PSC also approved interconnection standards for energy storage systems and a Hybrid Tariff for compensating eligible generators paired with energy storage. Several bills related to grid modernization were also considered during the year.

Nevada

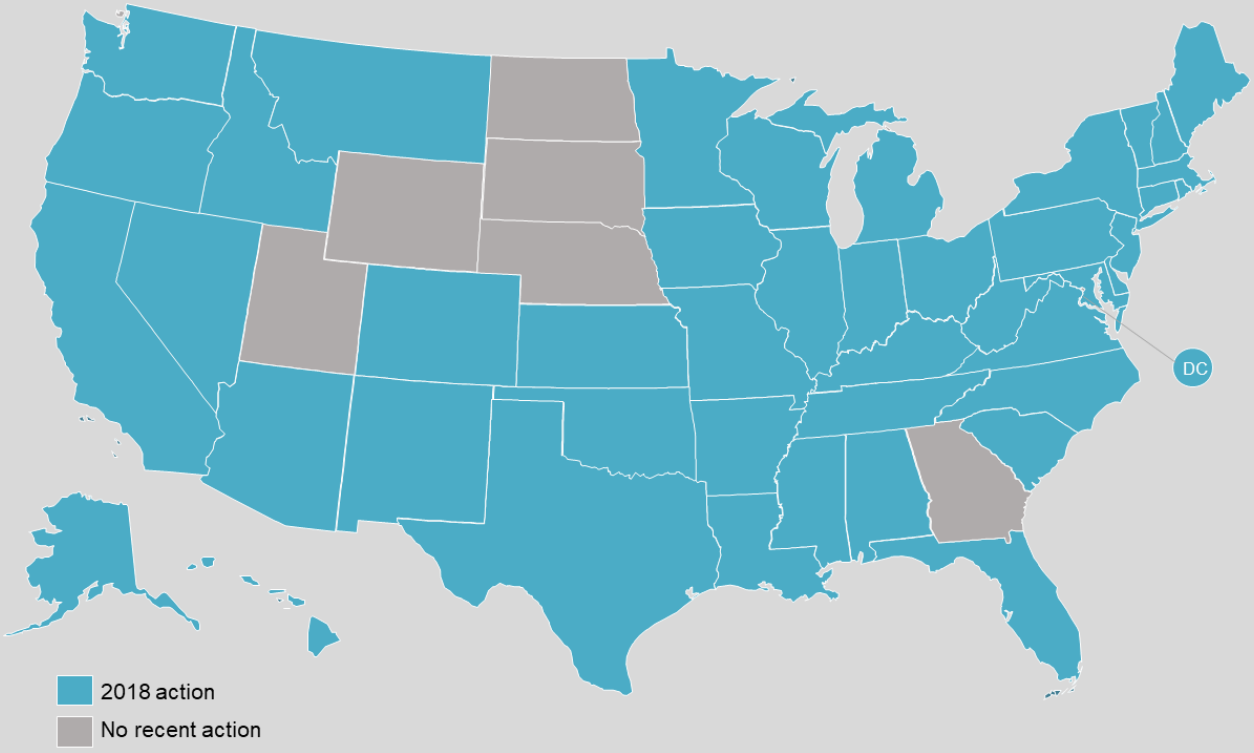
The Public Utilities Commission of Nevada approved distribution system planning rules in 2018, as well as a revised version of integrated resource planning rules. The Commission also

finalized NV Energy's energy storage rebate program, addressed interconnection issues for energy storage systems, and published an energy storage study, which found that 700 to 1,000 MW of utility-scale battery storage could be cost-effectively deployed by 2030.

Hawaii

Hawaii's investor-owned utilities filed their integrated grid planning report in 2018, proposing a new planning procedure that merges separate processes. The utilities also requested approval of their Phase 1 grid modernization projects, focusing on AMI, as well as multiple energy storage projects. Hawaii lawmakers enacted bills requiring a transition to performance-based ratemaking and directing the Public Utilities Commission to create a microgrid services tariff.

Figure 1. 2018 Legislative and Regulatory Action on Grid Modernization



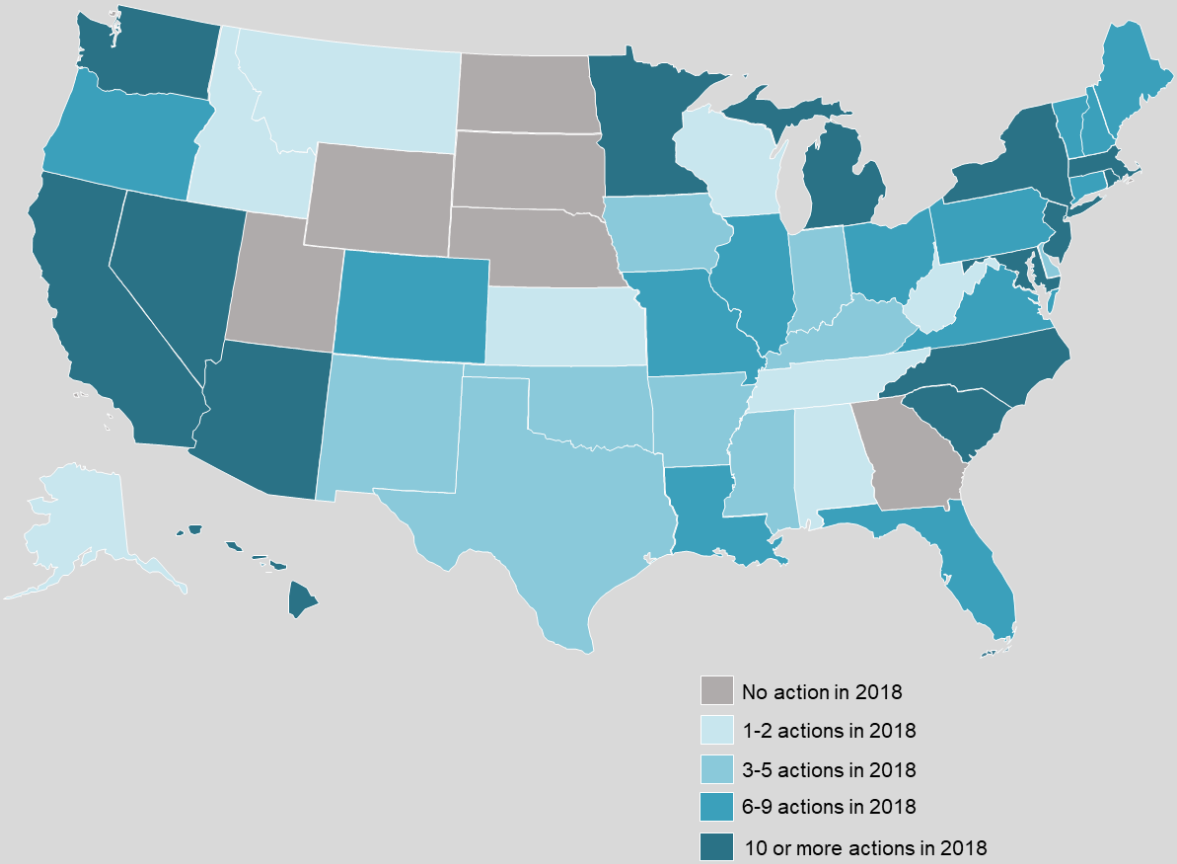
New Jersey

New Jersey lawmakers adopted an energy storage target of 2,000 MW by 2030 and initiated an energy storage study in 2018. Meanwhile, Atlantic City Electric, Jersey Central Power & Light, and PSE&G New Jersey proposed a variety of grid modernization investments and incentive programs. New Jersey is also developing its 2019 Energy Master Plan, which will incorporate several aspects of grid modernization.

California

California utilities requested approval for several energy storage and demand response projects in 2018. State lawmakers also enacted a bill to establish microgrid interconnection and compensation rules, and regulators considered distribution system planning, default time-varying rates, utility energy storage rebates for low-income customers, modifications to the Self-Generation Incentive Program, and more.

Figure 2. 2018 Grid Modernization Activity, by Number of Actions



Ohio

The Public Utilities Commission of Ohio (PUCO) concluded its PowerForward grid modernization investigation in 2018, opening three new dockets that relate to ongoing stakeholder efforts (the PowerForward Collaborative), distribution system planning, and data access. PUCO also considered smart grid and energy storage investment proposals from Ohio Power Company, Duke Energy Ohio, and Dayton Power & Light.

Massachusetts

The Massachusetts General Court adopted the country's first clean peak standard in 2018, while also expanding the state's energy storage target from 200 MWh by 2020 to 1,000 MWh by 2025. The Department of Public Utilities issued a decision on grid modernization investment plans from the state's three investor-owned utilities and considered performance-based incentive mechanisms for Eversource and National Grid.

Michigan

The Michigan Public Service Commission (PSC) published a report on performance-based regulation and also considered distribution system planning rules and customer data access standards during 2018. Consumers Energy and DTE filed distribution investment and maintenance plans, and Upper Peninsula Power Company filed an AMI deployment proposal. The PSC is also investigating interconnection and demand response aggregation issues.

Minnesota

The Minnesota Public Utilities Commission approved interconnection standards for energy storage systems, as well as integrated distribution planning requirements. The Commission is also working to develop performance incentive mechanisms and issued a decision on proposed grid modernization investments from Xcel Energy. State lawmakers considered several bills related to energy storage during 2018.

Arizona

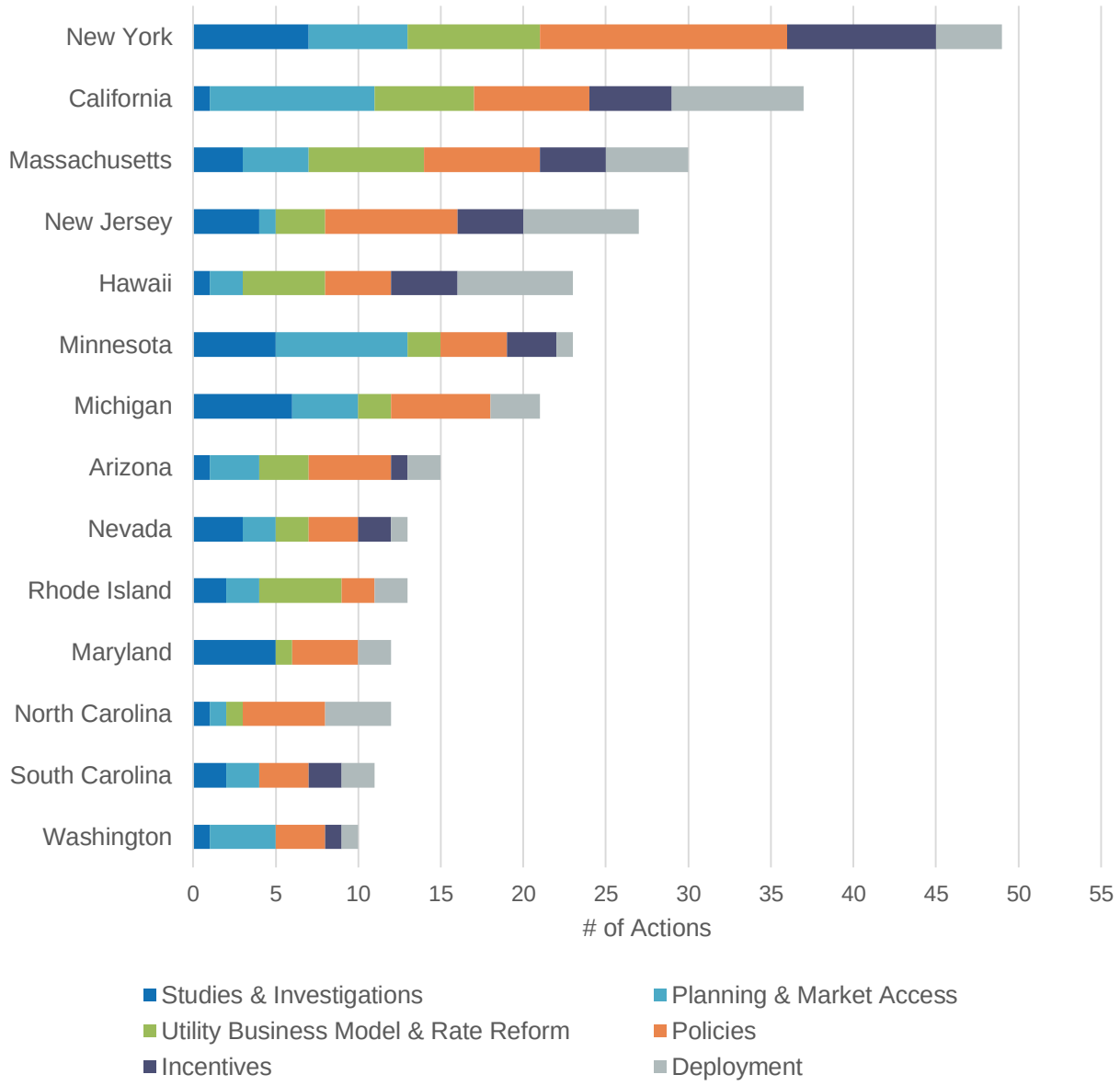
The Arizona Corporation Commission considered a broad Energy Modernization Plan put forward by Commissioner Tobin in 2018, later opening a rulemaking docket addressing several different energy modernization issues, including energy storage and blockchain technology. The Commission also worked to develop interconnection standards for energy storage and directed Tucson Electric Power and UNS Electric to file data access plans and rate tariffs for customers with multiple types of distributed energy resources.

TOP GRID MODERNIZATION TRENDS OF 2018

States and Utilities Undertaking Distribution System Planning Efforts

Regulators in several states, including Michigan, Missouri, Nevada, and Washington, considered distribution system planning rules in 2018. The Public Utilities Commission of Nevada formally adopted rules, while the Minnesota Public Utilities Commission established integrated distribution planning requirements. Regulators in Delaware and Ohio initiated dockets on distribution system planning in 2018 as well.

Figure 3. Most Active States of 2018



States Studying the Value of Energy Storage and Policy Options

Three states – Maryland, Nevada, and North Carolina – completed studies focused on energy storage in 2018, while New York published an energy storage roadmap. Although each study has a different goal, they all consider policy options to encourage storage development. Legislation was enacted in New Jersey and Virginia in 2018 initiating energy storage studies.

Regulators Rejecting and Scaling Back Utility Grid Modernization Proposals

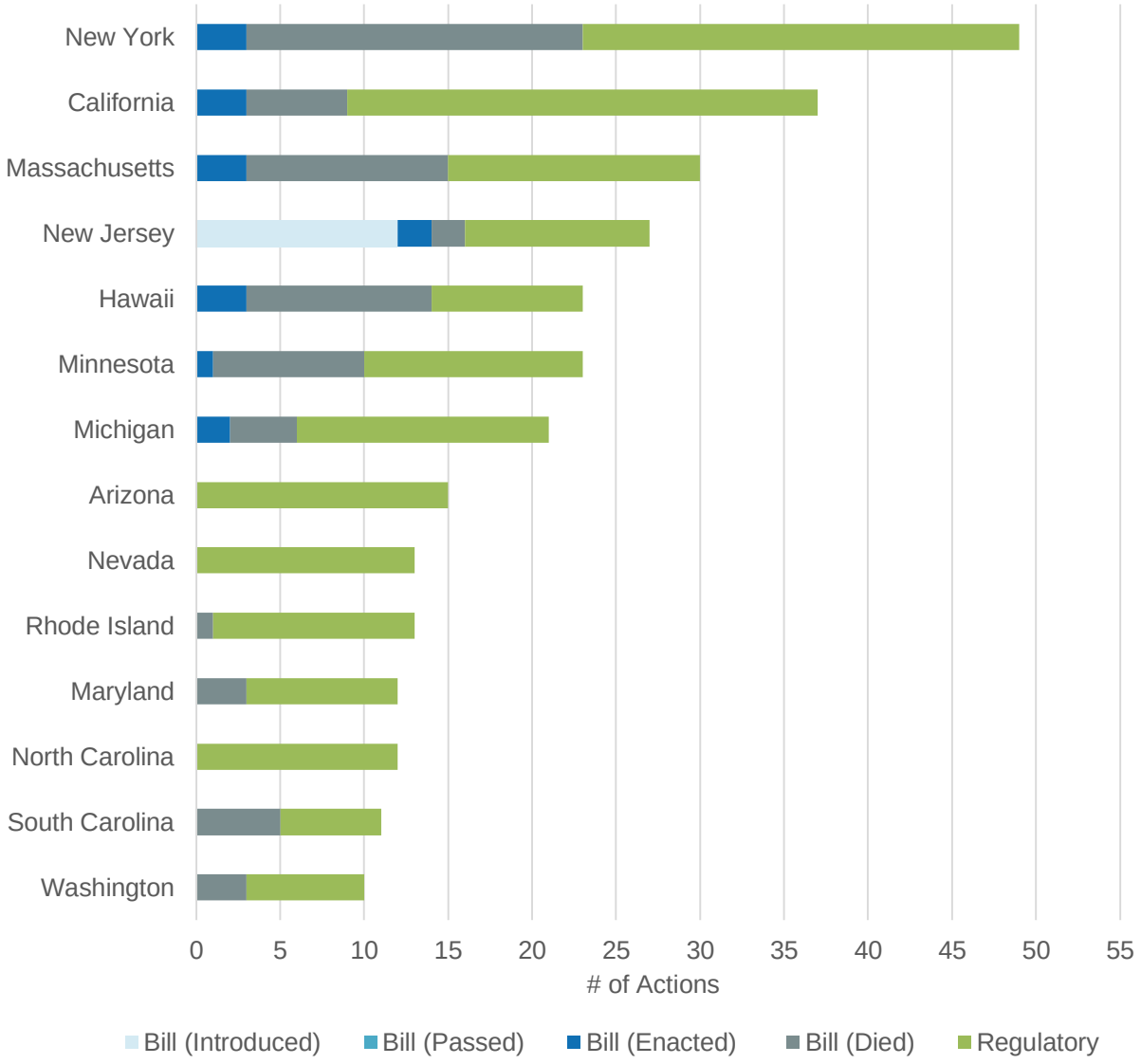
Many of the grid modernization investment plans put forward by utilities in 2018 were rejected or significantly scaled back by regulators. AMI proposals in Kentucky, Massachusetts, and

New Mexico were rejected, while expansive grid modernization plans put forward by utilities in North Carolina, Rhode Island, and Virginia were scaled back substantially, with some regulators urging utilities to present revised plans and budgets for the rejected elements.

Growing Movement Toward Performance-Based Regulation

States are increasingly considering performance-based regulation as an alternative to traditional cost-of-service regulation. Massachusetts regulators evaluated performance incentive mechanisms put forward by Eversource and National Grid, and the Hawaii State Legislature enacted a bill requiring a transition to performance-based ratemaking. Michigan, Minnesota, Oklahoma, and Rhode Island also saw action related to performance-based regulation in 2018.

Figure 4. Most Active States of 2018, by Action Status



Utilities Requesting Special Ratemaking Treatment for Grid Investments

Several utilities requested special ratemaking treatment for grid modernization investments in 2018. Duke Energy Carolinas requested approval for a new grid rider for its PowerForward grid investment plan in North Carolina, which regulators rejected in 2018. Three New Jersey utilities – Atlantic City Electric, Jersey Central Power & Light, & PSE&G New Jersey – all proposed new riders in 2018 as well, which are currently under consideration.

States Concluding Grid Modernization Investigations, Identifying Next Steps

Ohio and Oregon concluded their grid modernization investigations in 2018, publishing final reports with findings and recommended next steps. The Illinois Commerce Commission also published a draft final report on its NextGrid initiative in 2018. Proceedings in Colorado and Connecticut are also ending, and rulemakings and decisions have been coming out of Maryland's PC 44 proceeding.

States Establishing Clear Standards for Energy Storage Interconnection

Several states are reexamining interconnection rules in order to create clear requirements for energy storage systems. The Minnesota Public Utilities Commission approved revised rules including energy storage provisions in 2018, and the Public Utilities Commission of Nevada resolved certain energy storage interconnection issues. Rulemaking proceedings are also open in Arizona and Maryland, where energy storage interconnection standards are under consideration.

Regulators Considering Rules for Access to Customer Usage Data

Rules governing access to customer energy usage data are coming under consideration in several states, especially as AMI is more fully deployed. The Michigan Public Service Commission required utilities to file data privacy tariffs, and the Public Utilities Commission of Ohio opened a new proceeding on data access in 2018. A proceeding is also open in Maryland, and Arizona regulators directed certain utilities to develop a data access process for customers.

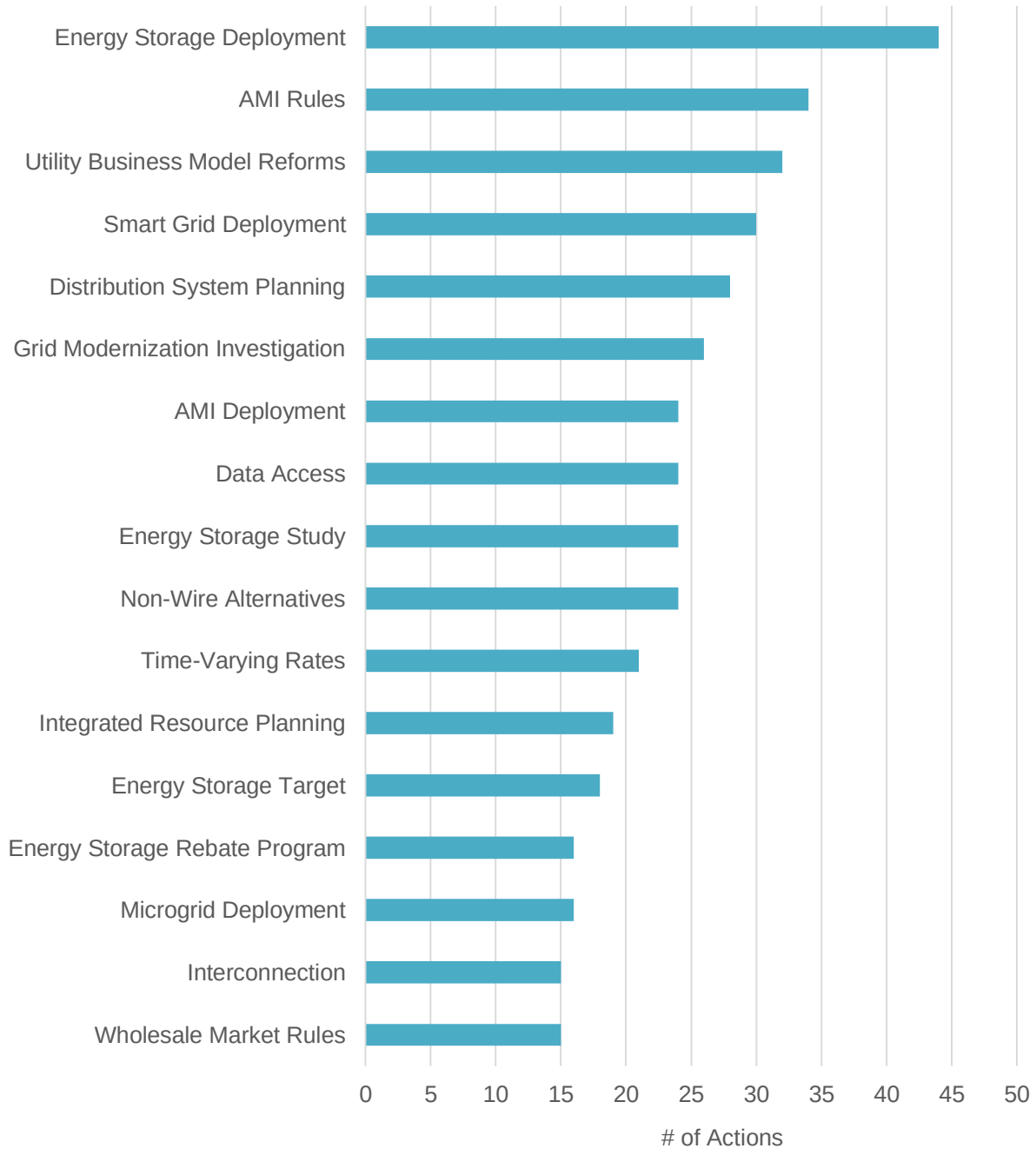
Utilities Proposing AMI Opt-Out Tariffs and Fees

As utilities continue to deploy AMI, the issue of opt-out options for customers is being addressed more frequently. In 2018, regulators considered opt-out tariffs for at least 11 utilities, with upfront opt-out fees ranging from $0 to $170 and monthly fees ranging from $5.00 to $25.89. Some utilities are also proposing additional provisions, such as requiring customers to provide meter readings or requiring statements from medical physicians.

Wholesale Market Operators Revising Rules to Expand Energy Storage Participation

The Federal Energy Regulatory Commission issued Order 841 in February 2018, directing wholesale market operators (Independent System Operators and Regional Transmission Organizations) to establish rules that enable energy storage resources to participate in energy, capacity, and ancillary services markets. ISOs and RTOs filed their plans to comply with the order in December 2018, and the changes will need to be implemented by December 3, 2019.

Figure 5. Top Grid Modernization Actions of 2018



IN COMPARISON: 2017 VS. 2018

Total grid modernization action increased by 60% over the past year, with states and utilities taking approximately 288 actions in 2017 and 460 actions in 2018. In 2018, activity increased in every category tracked by this report by the following amounts: Studies & Investigations: 70%, Planning & Market Access: 73%, Utility Business Model & Rate Reform: 68%, Policies: 85%, Incentives: 31%, and Deployment: 29%. The number of states taking actions in each grid modernization category also increased from 2017 to 2018.

Figure 6. Number of Grid Modernization Actions 2017-2018

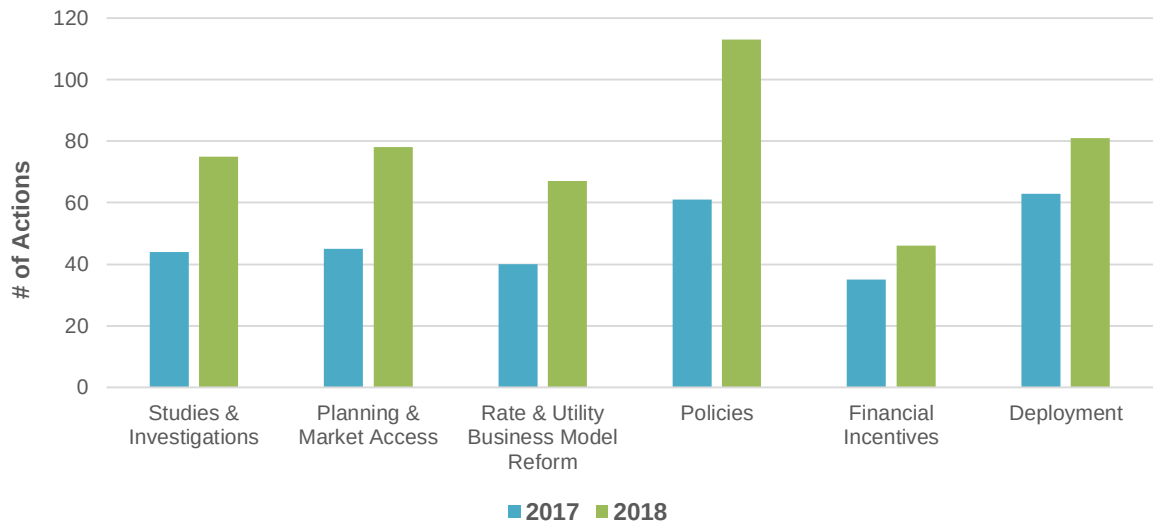


Figure 7. Number of States Taking Grid Modernization Actions 2017-2018

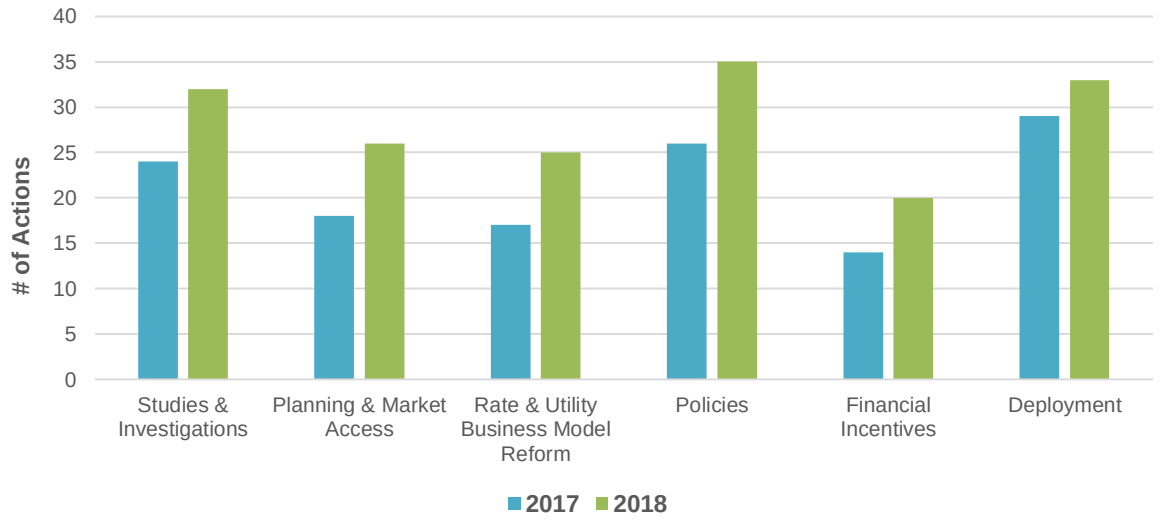
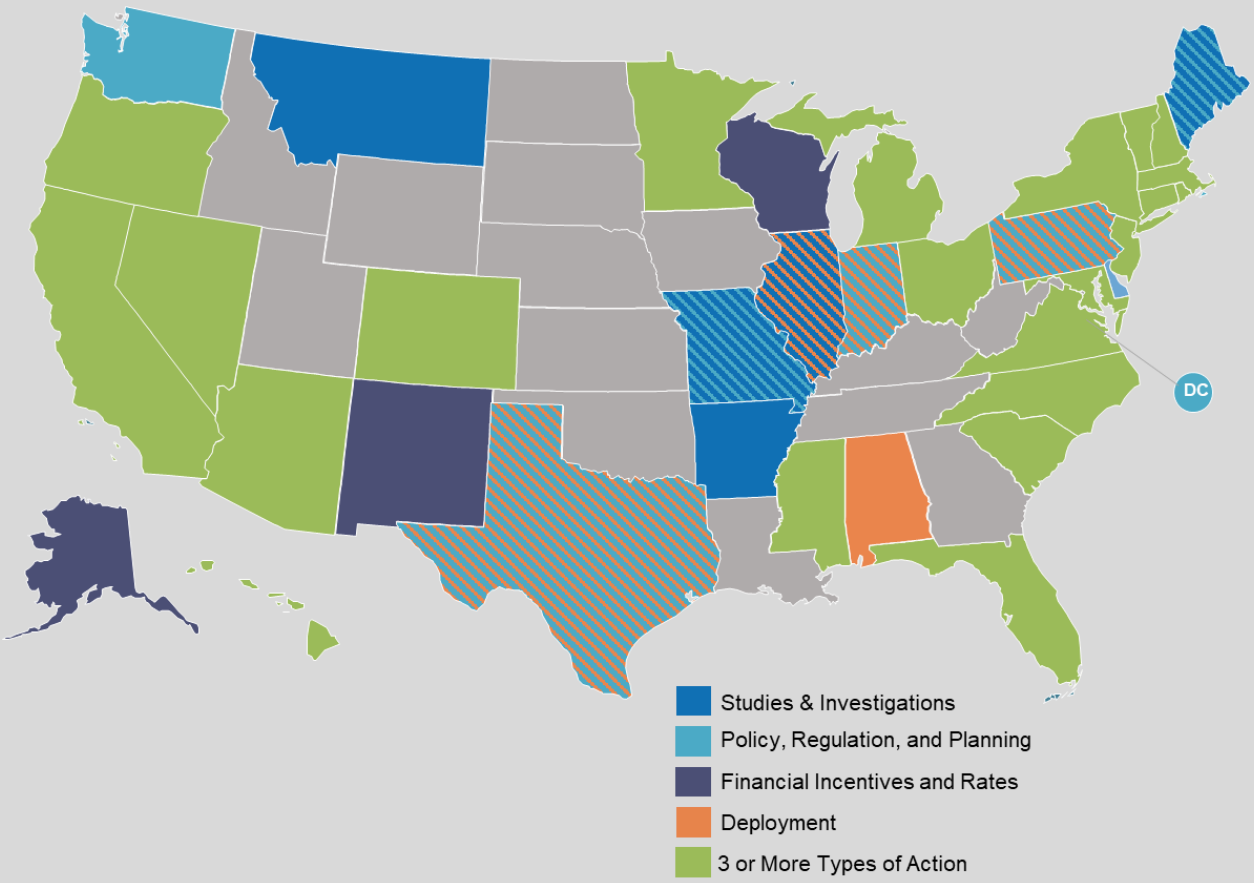


Figure 8. 2018 Energy Storage Action, by Type of Action



Q4 2018 GRID MODERNIZATION ACTION

In the fourth quarter of 2018, 39 states plus DC took a total of 280 policy and deployment actions related to grid modernization, utility business model and rate reform, energy storage, microgrids, and demand response. Table 2 provides a summary of state and utility actions on these topics. Of the 280 actions catalogued, the most common were related to policies (58), followed by deployment (52), and planning and market access (52).

Table 2. Q4 2018 Summary of Grid Modernization Actions

Type of Action	# of Actions	% by Type	# of States
Policies	58	21%	21 + DC
Deployment	52	19%	25
Planning and Market Access	52	19%	20 + DC
Studies and Investigations	47	17%	27 + DC
Business Model and Rate Reform	43	15%	22
Financial Incentives	28	10%	12
Total	**280**	**100%**	**39 States + DC**

Note: The "# of States/ Districts" total is not the sum of the rows because some states have multiple actions. Percentages are rounded and may not add up to 100%.

TOP 5 GRID MODERNIZATION DEVELOPMENTS OF Q4 2018

Five of the quarter's top policy developments are highlighted below.

Energy Storage Studies Published in Maryland, Nevada, and North Carolina

Energy storage studies were published in Maryland, Nevada, and North Carolina during Q4 2018. Maryland's study focused on policy options for expanding storage development in the state, while North Carolina's study quantified the potential value of various storage applications and presented policy options to prepare for, facilitate, and accelerate storage deployment. Nevada's study determined that 700 to 1,000 MW of utility-scale battery could be deployed cost-effectively by 2030.

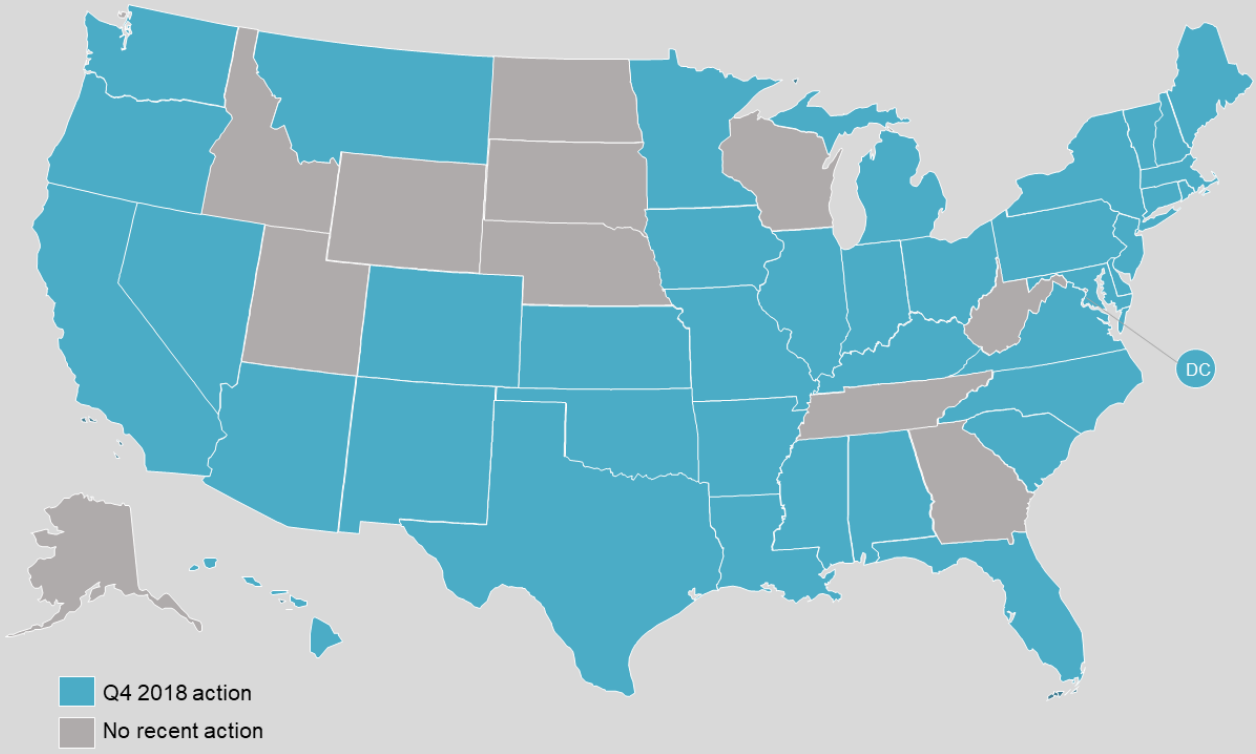
Duke Energy Requests Approval for Grid Improvement Plan in South Carolina

As part of general rate cases filed by Duke Energy Carolinas and Duke Energy Progress in South Carolina in November 2018, the utilities requested approval for their $455 million Grid Improvement Plan. The plan includes a variety of investments in smart grid technologies, as well as AMI and energy storage. The plan also includes development of a new integrated system operations planning process.

New York PSC Approves Energy Storage Goal and Roadmap

In December 2018, the New York Public Service Commission formally adopted an energy storage goal of 3,000 MW by 2030. The Commission also approved a roadmap to achieve this target. The roadmap includes competitive direct procurement, a system efficiency target, non-wires alternatives preparation, an incentive plan, a distributed energy resource data platform, and value stack tariff refinement.

Figure 9. Q4 2018 Legislative and Regulatory Action on Grid Modernization



Wholesale Market Operators File FERC Order 841 Compliance Plans

In December 2018, California ISO, ISO New England, Midcontinent ISO, New York ISO, PJM Interconnection, and the Southwest Power Pool filed plans to comply with Federal Energy Regulatory Commission (FERC) Order 841, issued in February 2018. FERC Order 841 requires wholesale market operators to establish rules allowing energy storage resources to participate in energy, capacity, and ancillary services markets.

Ohio Regulators Open Three New PowerForward Grid Modernization Dockets

Following the release of the PowerForward Roadmap, the Public Utilities Commission of Ohio opened three new dockets related to the PowerForward grid modernization initiative in October 2018. One docket is for the PowerForward Collaborative, a continued stakeholder engagement effort, while the other two dockets relate to distribution system planning and data access issues.

MOST ACTIVE STATES AND SUBTOPICS OF Q4 2018

The most common types of actions across the country related to energy storage deployment (30), followed by smart grid deployment (21), distribution system planning (18), time-varying rates (18), and utility business model reforms (18). The states taking the greatest number of actions related to grid modernization in Q4 2018 can be seen in Figure 11. New York, California, and New Jersey took the greatest number of actions during the quarter, followed by Massachusetts, Michigan, Arizona, and Minnesota.

Figure 10. Most Common Types of Actions Taken in Q4 2018

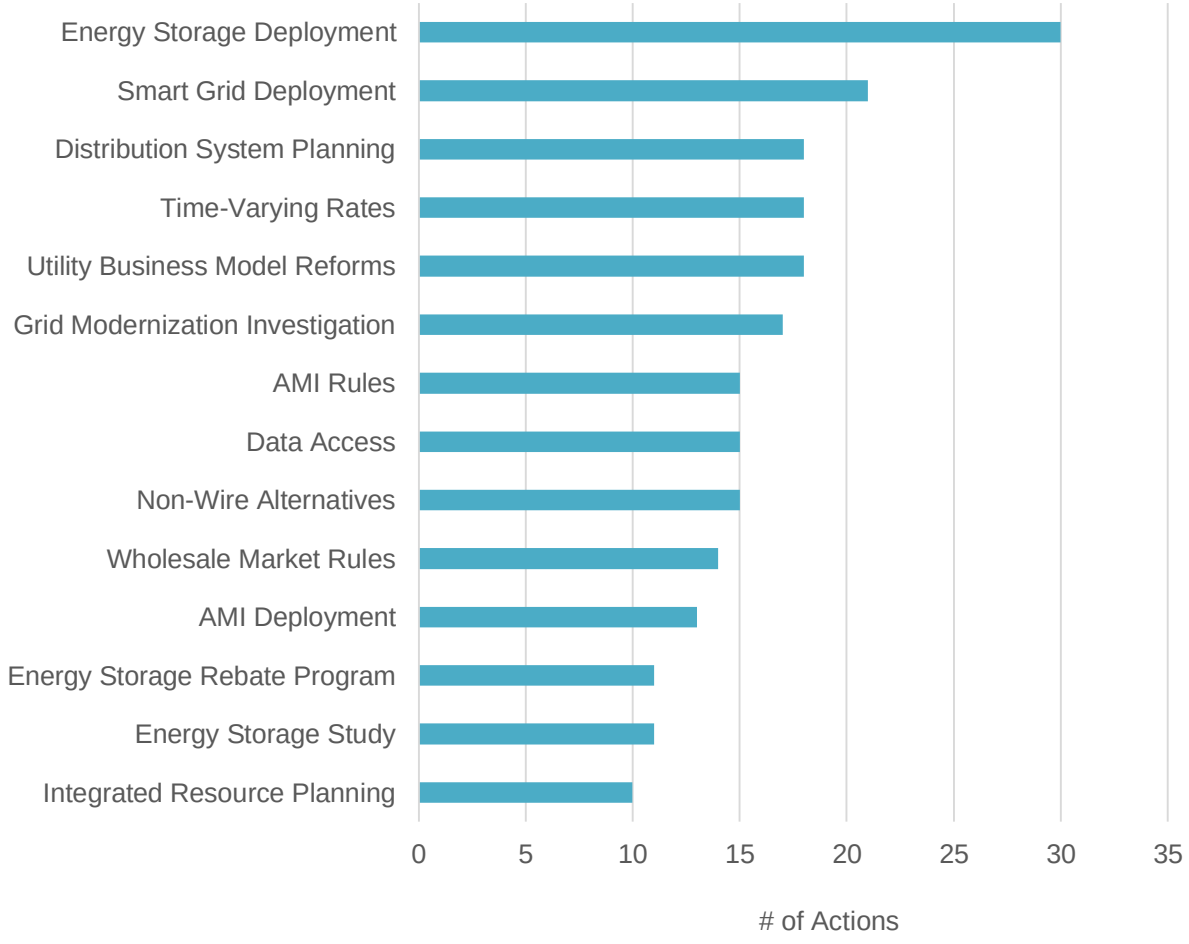
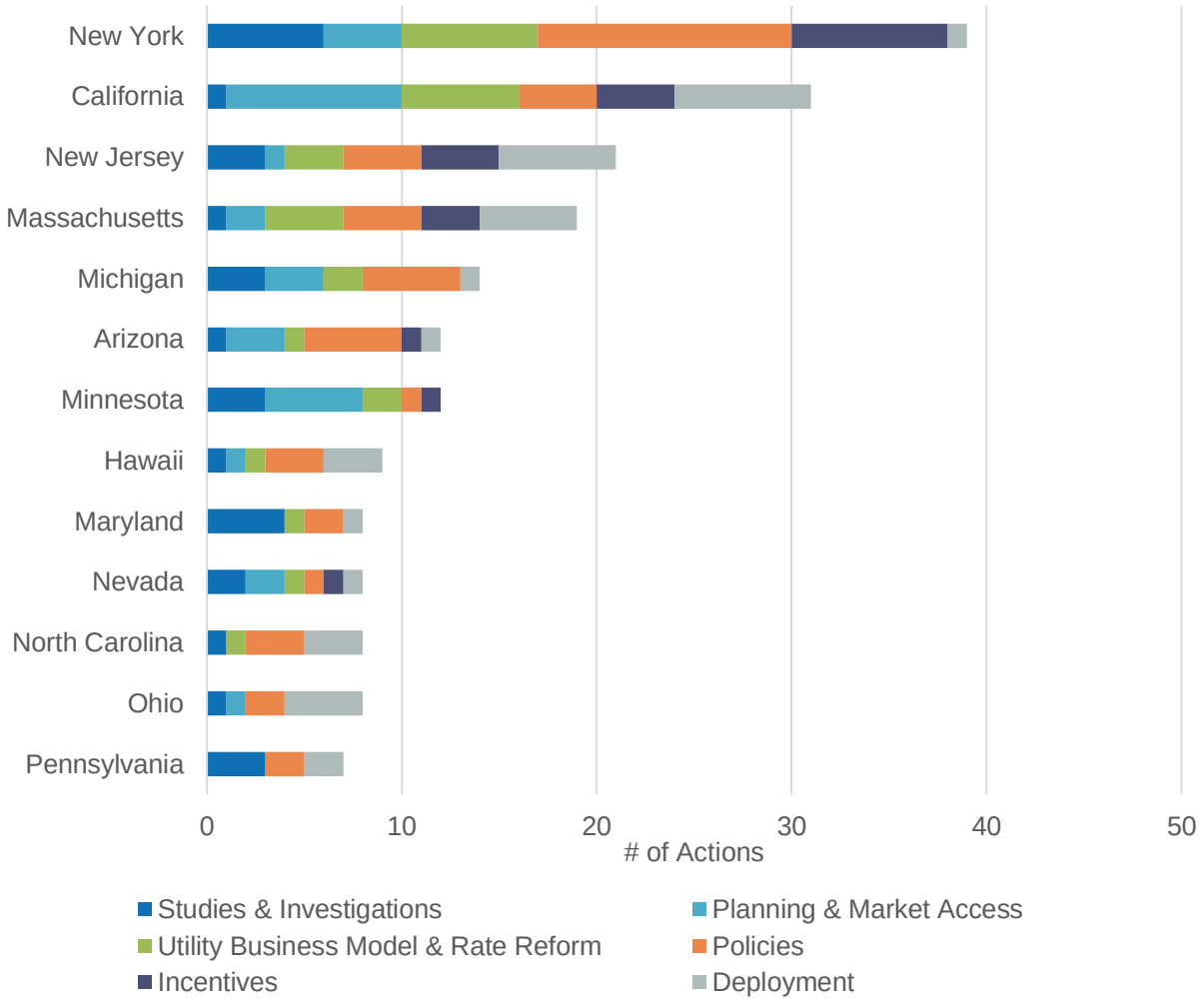


Figure 11. Most Active States of Q4 2018



FULL REPORT DETAILS & PRICING

FULL REPORT DETAILS

Content Included in the Full Quarterly Report:

- Detailed tables describing each pending and recently decided state and utility grid modernization action addressing: (1) smart grid and advanced metering infrastructure, (2) utility business model reform, (3) regulatory reform, (4) utility rate reform, (5) energy storage, (6) microgrids, and (7) demand response. Actions are broken out into the following categories:
    - Studies and Investigations
    - Planning and Market Access
    - Utility Business Model and Rate Reforms
    - Policies
    - Financial Incentives
    - State and Utility Deployment
- Links to original legislation, dockets, and commission orders for each legislative and regulatory action
- Excel spreadsheet file of all actions taken during the quarter and separate Powerpoint file of all summary maps available upon request
- Qualitative analysis and descriptive summaries of grid modernization policy action and trends
- Outlook of action for the next quarter

WHO SHOULD PURCHASE THIS REPORT

The 50 States of Grid Modernization allows those involved in the electric industry to easily stay on top of legislative and regulatory changes. The report provides a comprehensive quarterly review of actions. At a cost of $500 per issue (or $1,500 annually), the 50 States of Grid Modernization offers a significant time and financial savings. With direct links to original sources for all actions, customers may stay on top of policy developments between quarterly reports.

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- Identify active utility investment proceedings

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- Learn about the outcomes of other states' policy decisions
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- Access valuable data requiring a vast amount of time to collect first-hand
- Identify research needs to inform grid modernization proceedings
- Cite an objective source in your own research and analysis

PRICING

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