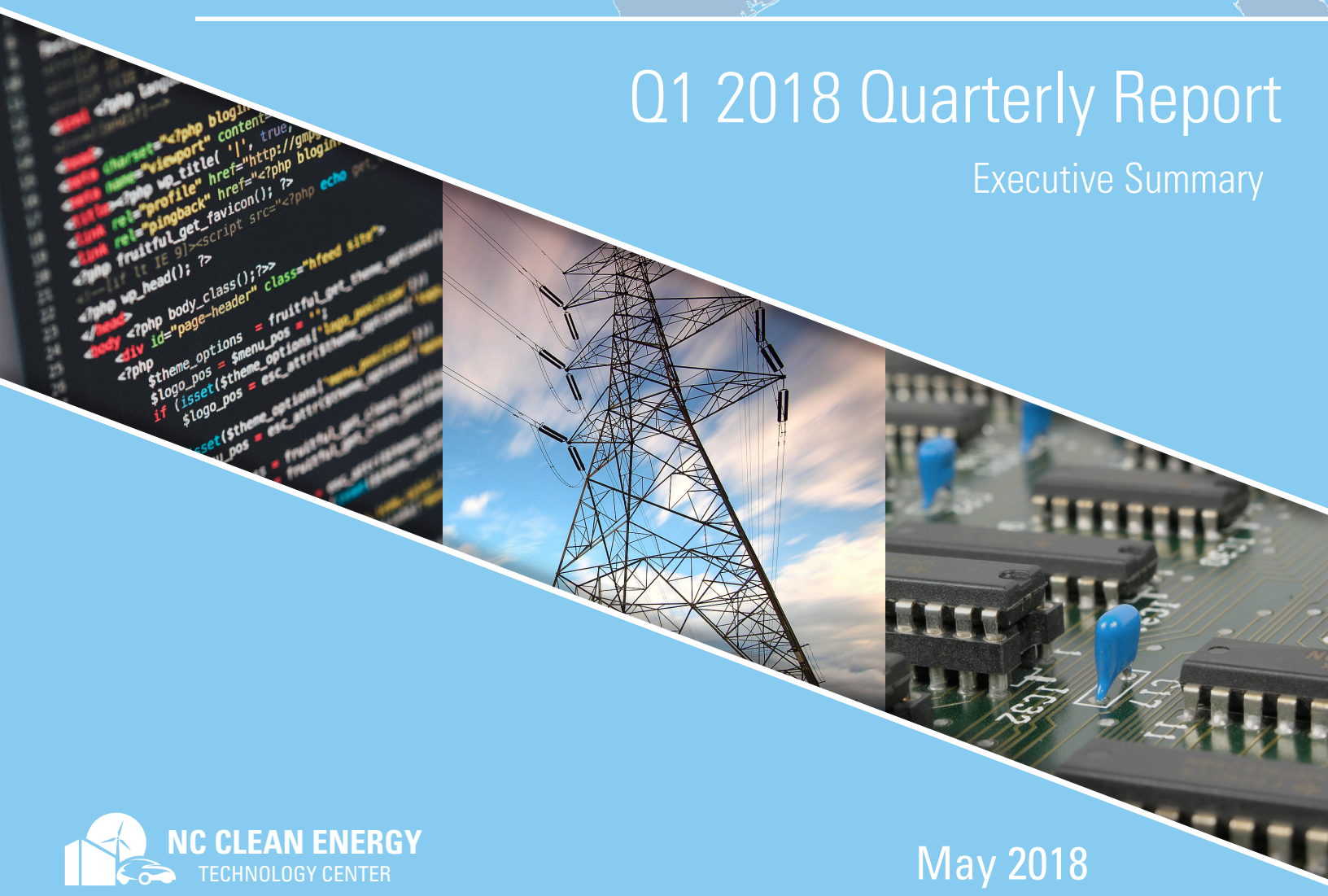
50 States of GRID MODERNIZATION

Q1 2018 Quarterly Report

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

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- Q4 2017 and 2017 Annual Review: Executive Summary
- Q3 2017: Full Report | Executive Summary
- Q2 2017: Full Report | Executive Summary
- Q1 2017: Full Report | Executive Summary

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*. Previous editions of these reports are available for download at www.nccleantech.ncsu.edu/the-50-states-reports/.

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 deployment of 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.

Time-varying rate 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.

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 advanced 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 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. While actions taken by municipal utilities and electric cooperatives are not comprehensively tracked in this report, particularly noteworthy or high-impact actions will be covered. The report also excludes changes to policies and rate design for distributed generation customers and changes related to electric vehicles; these changes are covered in the 50 States of Solar and 50 States of Electric Vehicles quarterly reports, respectively.

EXECUTIVE SUMMARY

Q1 2018 GRID MODERNIZATION ACTION

In the first quarter of 2018, 37 states plus DC took a total of 259 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 258 actions catalogued, the most common were related to policies (73), studies and investigations (44), and deployment (42).

Table 1. Q1 2018 Summary of Grid Modernization Actions

Type of Action	# of Actions	% by Type	# of States
Policies	73	28%	32 + DC
Studies and Investigations	44	17%	26 + DC
Deployment	42	16%	24
Planning and Market Access	35	14%	20 (+ 5 RTOs)
Business Model and Rate Reform	35	14%	15 + DC
Financial Incentives	30	12%	14
Total	**259**	**100%**	**37 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 Q1 2018

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

Arizona Regulator Proposes Energy Storage Target and Clean Peak Standard

In January 2018, Commissioner Tobin filed a proposed Energy Modernization Plan, including an energy storage target of 3,000 MW by 2030, as well as a clean peak target. The proposal is currently under consideration as part of the Arizona Corporation Commission's proceeding examining the modernization of the state's Renewable Energy Standard.

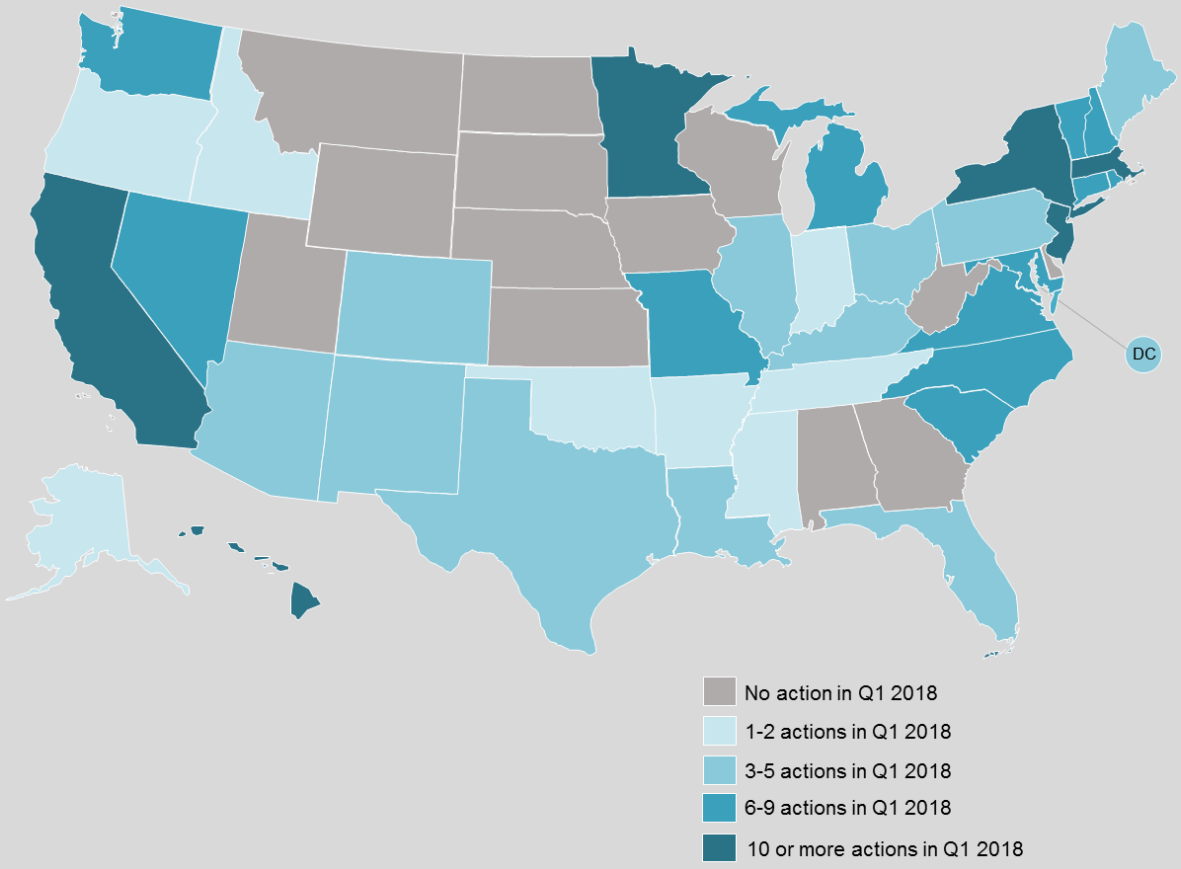
Hawaii Initiates Transition to Performance-Based Ratemaking

During Q1 2018, the Hawaii State House moved forward legislation initiating a transition to performance-based ratemaking in order to align utility regulatory policies with customers' interests and the state's public policy goals. The bill later passed the Senate and was signed into law in April 2018. The Public Utilities Commission is to establish performance incentives and penalty mechanisms for the state's investor-owned utilities by January 1, 2020.

Texas Regulators Deny AEP Proposed Battery Storage Project and Open New Proceeding

In January 2018, Texas regulators denied AEP Texas North Company's proposal to deploy two battery storage systems as non-wires alternatives. At issue is whether energy storage is categorized as generation or not because the state's deregulated utilities may not own generation assets. The Commission subsequently opened a rulemaking docket to establish a framework for energy storage.

Figure 1. Q1 2018 Legislative and Regulatory Action on Grid Modernization



Virginia Legislature Enacts Grid Modernization Legislation

The Virginia legislature enacted omnibus energy legislation in Q1 2018, which includes major provisions related to grid modernization. The bill defines electric distribution grid transformation project and declares that these are in the public interest. These projects include advanced metering infrastructure, distribution system modernization, energy storage, microgrids, cybersecurity measures, system hardening not including undergrounding, and several other types of measures

Public Utilities Commission of Ohio Concludes its PowerForward Proceeding

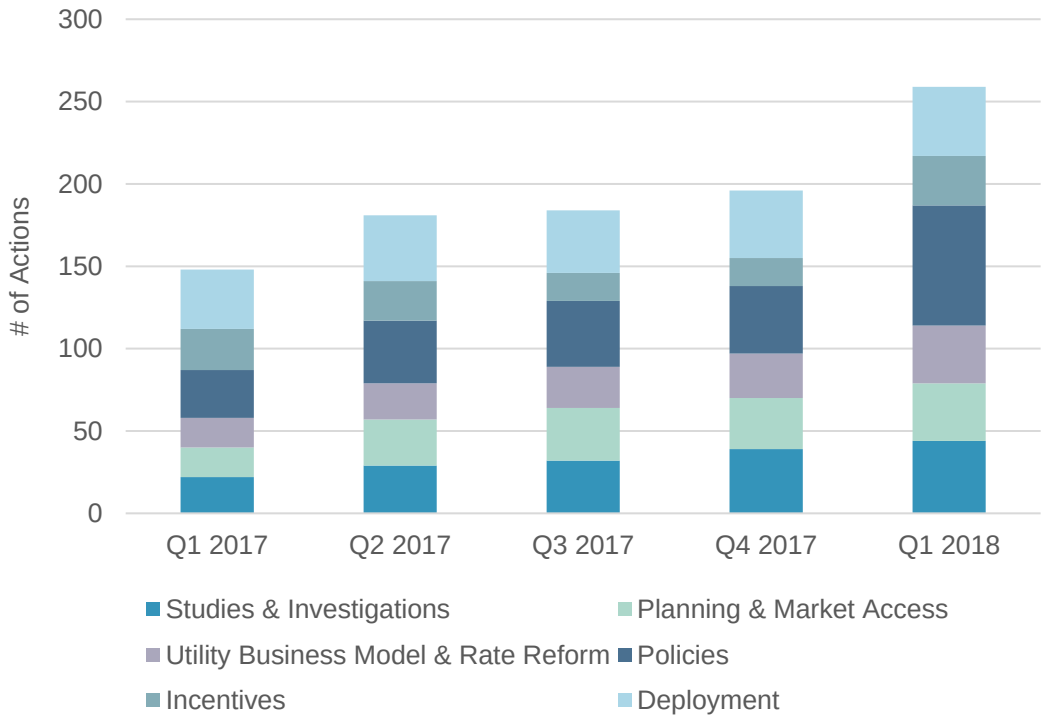
Ohio's PowerFoward grid modernization proceeding concluded in March 2018 with its third and final segment, examining ratemaking and regulation. The exploratory proceeding, which was first announced in March 2017, was focused on learning from industry experts and engaging stakeholders. No official policy recommendations came out of the proceeding, but it will inform future grid modernization activities in the state.

MOST ACTIVE STATES AND SUBTOPICS OF Q1 2018

The most common types of actions across the country related to advanced metering infrastructure rules (22), followed by energy storage deployment (21), grid modernization investigations (17), and utility business model reforms (17). While deployment actions were the most common type of action taken through all of 2017, the most common types of actions taken in Q1 2018 related to policies and studies and investigations.

The states taking the greatest number of actions related to grid modernization in Q1 2018 can be seen in Figure 4. New York, California, and Massachusetts continued to see the most action during the quarter, followed by Hawaii, New Jersey, and Minnesota. The total number of grid modernization actions being taken by states is quickly increasing, with 75% more actions being taken in Q1 2018 over Q1 2017.

Figure 2. Total Number of Grid Modernization Actions by Quarter

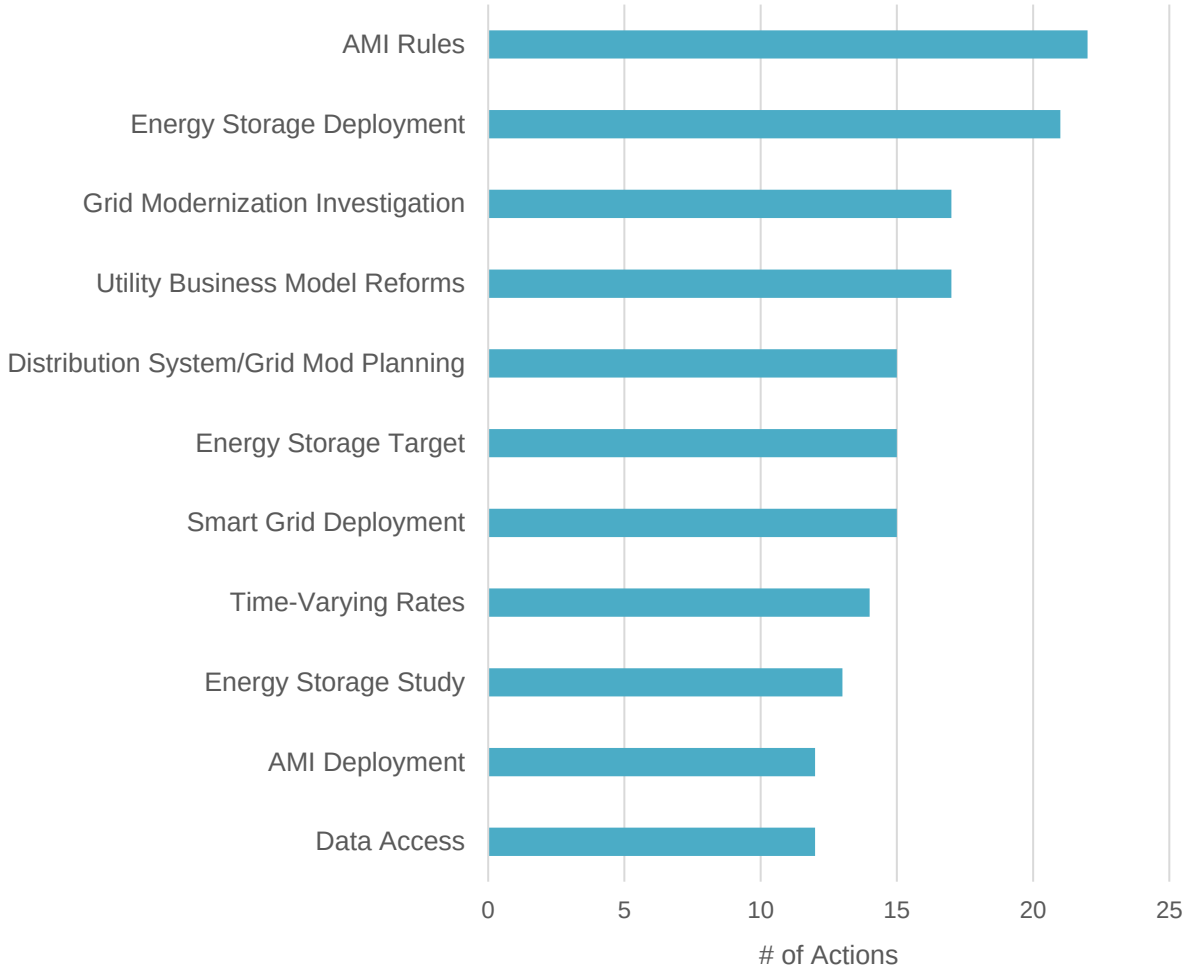


TOP GRID MODERNIZATION TRENDS OF Q1 2018

Grid Resilience Planning Emerges as a New Area of Focus Among States

Grid resilience is becoming a growing priority among states, particularly after last year's devastating hurricane season. Three states – California, Florida, and Hawaii – considered legislation in Q1 2018 requiring states or utilities to undertake grid resilience planning. Florida and Hawaii also considered legislation creating incentive programs to boost grid resilience.

Figure 3. Most Common Types of Actions Taken in Q1 2018



States Working to Define the Scope of Grid Modernization

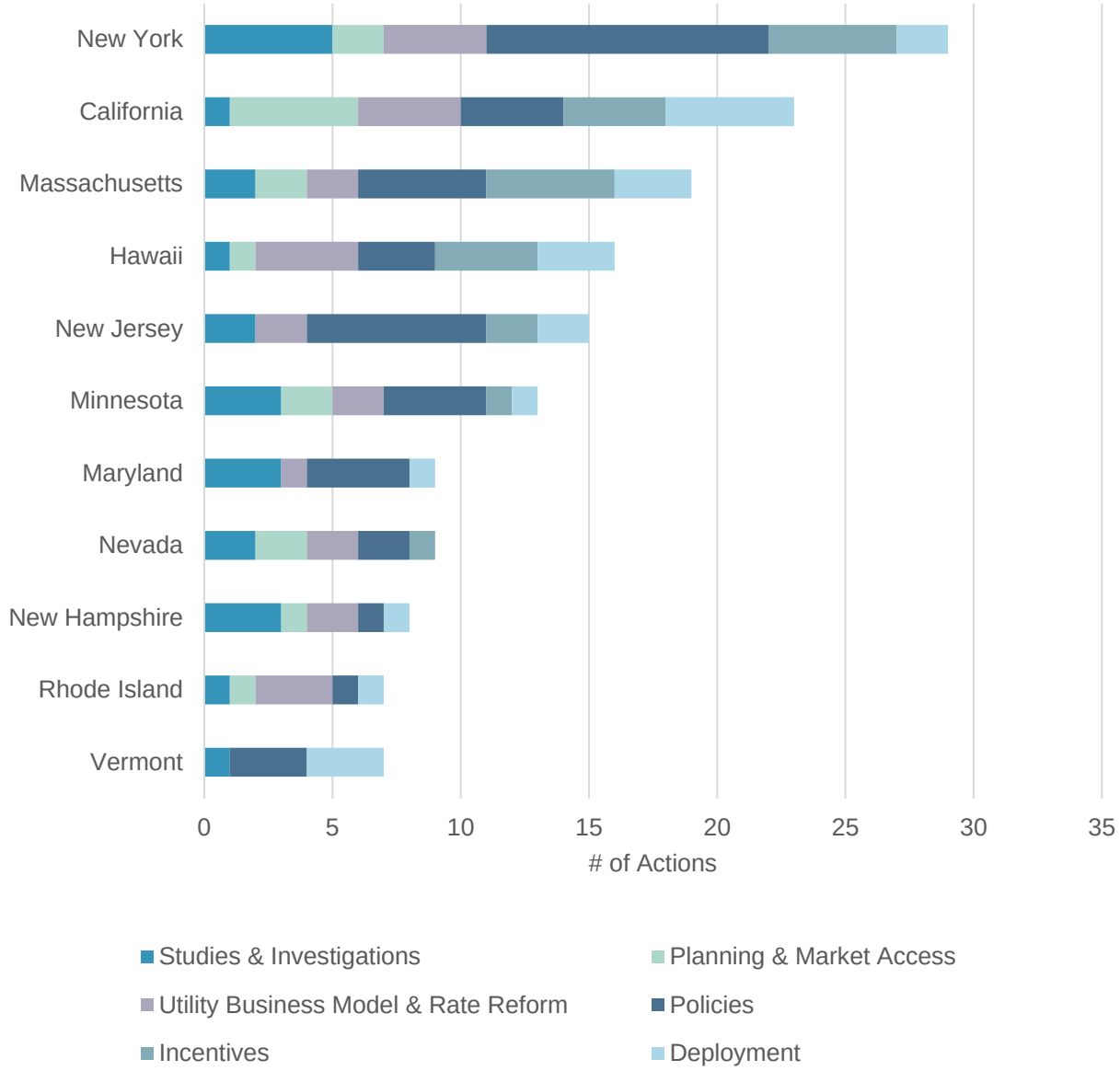
As more states, utilities, and energy industry stakeholders address the topic of grid modernization, it has become evident that a common definition of grid modernization does not exist within the industry. Several states are working to define grid modernization as part of their investigatory proceedings. The California Public Utilities Commission issued a

decision in March 2018 establishing a definition for grid modernization and a classification framework to standardize the terms used for different grid modernization investments.

Growing Number of States Addressing Access to System and Customer Data

Access to data – both distribution system data and customer usage data – has emerged as a key aspect of grid modernization. A growing number of states are undertaking distribution system planning efforts and hosting capacity analyses to increase the availability of system data, while many states are also considering customer data access rules, including rules for third party access to customer data.

Figure 4. Most Active States of Q1 2018



States Express Support For and Concerns About Advanced Metering Infrastructure

In Q1 2018, the most common type of action related to advanced metering infrastructure (AMI) rules, such as opt-out provisions and fees. Proposed rules have taken very different approaches, ranging from requiring utilities to deploy AMI to imposing a moratorium on AMI deployment. Legislators in multiple states have proposed studies examining the public health impacts of AMI, while regulators continue to consider deployment proposals from utilities, with the majority of these proposals being approved.

Most U.S. States Taking Action on Energy Storage

Of the 37 states taking grid modernization actions during Q1 2018, 32 states took actions related to energy storage. A wide range of actions were taken, including conducting studies, proposing incentive programs, and revising planning processes. The majority of grid modernization legislation considered in Q1 2018 related to energy storage, with energy storage incentives, procurement targets, and studies being key topics of interest to state legislators.

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
- Summary maps of action for each policy category above, including a separate Powerpoint file of all summary maps
- 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, saving weeks and thousands of dollars in staff time. At a cost of $500 per issue (or $1,600 annually), the 50 States of Grid Modernization offers an significant time and financial savings. With direct links to original sources for all actions, customers may stay on top of legislative and regulatory developments between quarterly reports.

Advanced Energy Technology Businesses

- Identify new market opportunities, as well as changing and risky markets
- Stay on top of state policy developments relevant to your business
- Give your own team a head start in tracking legislative and regulatory proceedings

Investor-Owned and Public Power Utilities

- Learn about the approaches being taken by other utilities facing similar opportunities and challenges
- Stay on top of relevant state policy developments
- Utilize an objective source of information in legislative and regulatory proceedings

Investors and Financial Analysts

- Identify new investment opportunities and emerging areas of growth, as well as risky investments
- Identify active utility investment proceedings

Advocacy Organizations

- Learn about the diverse grid modernization actions occurring across the country
- Learn about the outcomes of other states' policy decisions
- Utilize an objective source of information in legislative and regulatory proceedings

Researchers and Consultants

- 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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