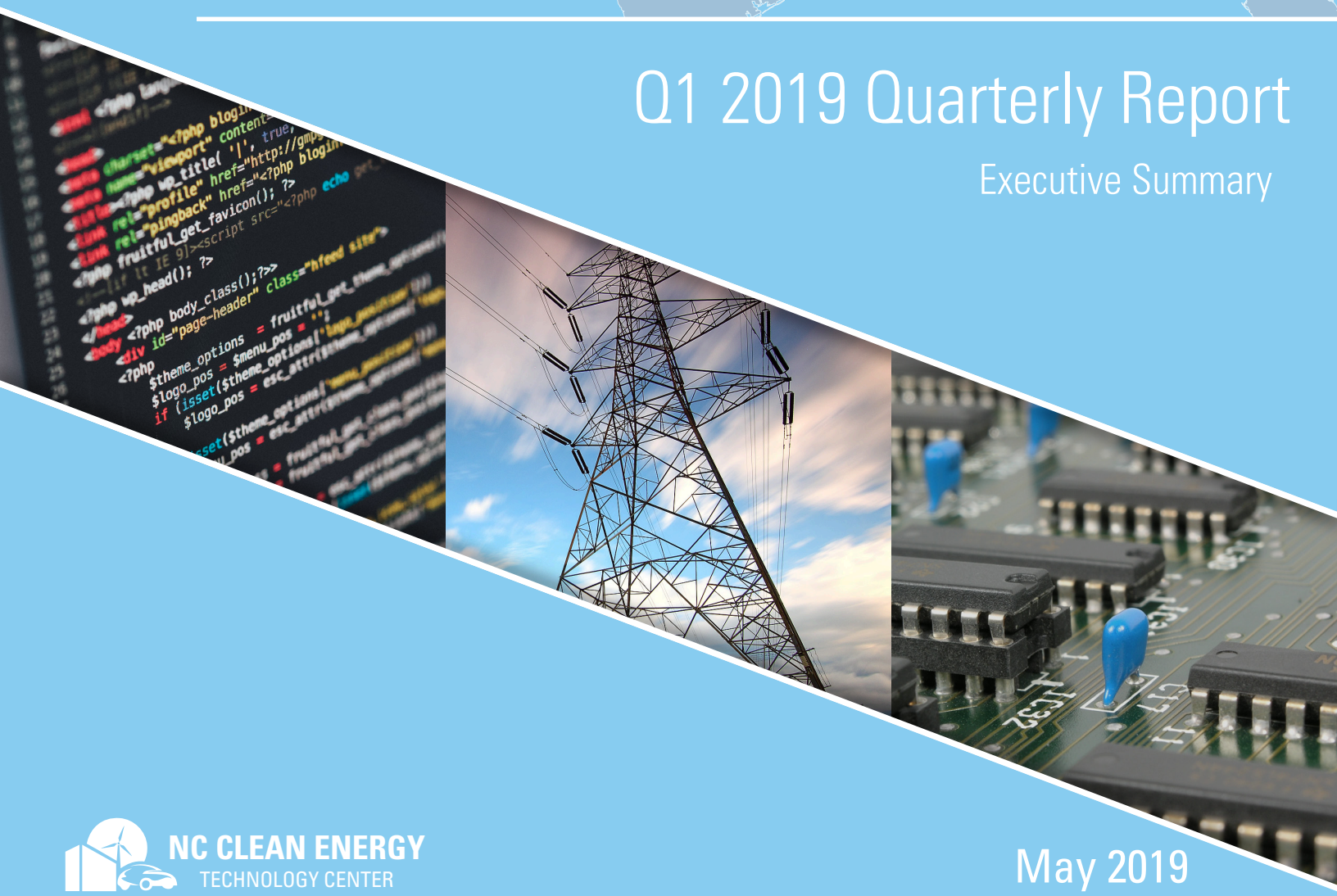
50 States of GRID MODERNIZATION

Q1 2019 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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Full editions of and annual subscriptions to the 50 States of Grid Modernization may be purchased here.

The 50 States of Grid Modernization is a quarterly publication. Previous executive summaries and older full editions of *The 50 States of Grid Modernization* are available 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

Q1 2019 GRID MODERNIZATION ACTION

In the first quarter of 2019, 44 states plus DC took a total of 395 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 395 actions catalogued, the most common were related to policies (104), planning and market access (68), and deployment (62).

Table 1. Q1 2019 Summary of Grid Modernization Actions

Type of Action	# of Actions	% by Type	# of States
Policies	104	26%	31
Planning and Market Access	68	17%	26 + DC
Deployment	62	16%	27
Studies and Investigations	60	15%	26 + DC
Business Model and Rate Reform	57	14%	28
Financial Incentives	44	11%	18
Total	**395**	**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 5 GRID MODERNIZATION DEVELOPMENTS OF Q1 2019

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

New Hampshire PUC Staff Releases Final Grid Modernization Report

The New Hampshire Public Utilities Commission Staff released its long-awaited grid modernization report in February 2019, following the efforts of a grid modernization working group that concluded in 2017. The report recommends that utilities file integrated distribution plans that include both grid modernization initiatives and least-cost integrated resource plans.

Oregon PUC Opens Distribution System Planning Proceeding

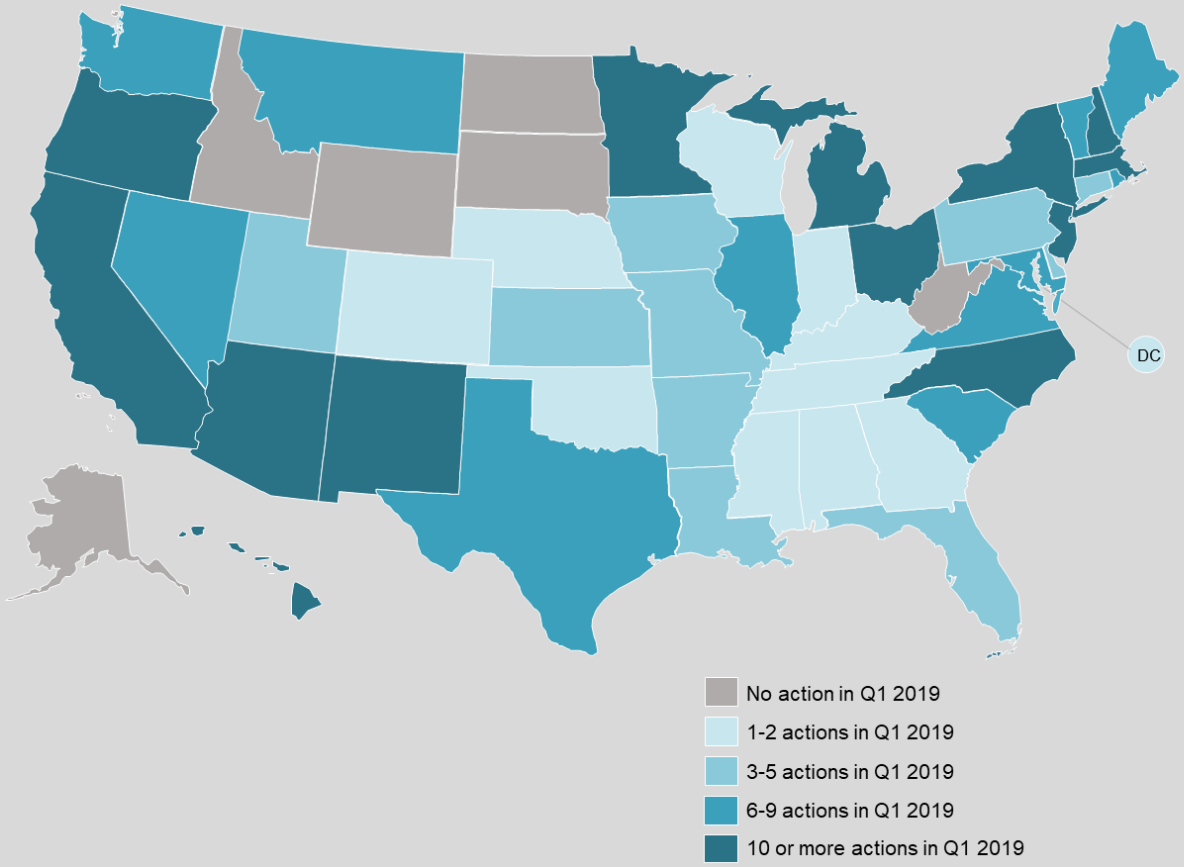
Oregon regulators opened a proceeding on distribution system planning in Q1 2019, following the Commission Staff's recommendation that the Commission undertake an investigation on distribution system planning and develop a transparent, robust, and holistic planning process.

The Staff published a white paper with a draft scope and proposed outcomes for the investigation.

Hawaii PUC Staff Files Performance-Based Regulation Recommendations

The Hawaii Public Utilities Commission Staff filed its performance-based regulation recommendations in February 2019. The Staff recommended new performance incentive mechanisms based on interconnection experience, customer engagement, and distributed energy resource asset effectiveness. The Staff's proposal also includes a five-year multi-year rate plan period and a revised earnings sharing mechanism.

Figure 1. Q1 2019 State and Utility Action on Grid Modernization



Ameren Missouri Proposes $6.3 Billion Smart Energy Plan

Ameren Missouri filed for approval of its $6.3 billion Smart Energy Plan in February 2019. The five-year plan includes investments in AMI, distribution automation, cybersecurity, and distributed solar paired with energy storage, as well as grid reliability and wind energy

investments. Pursuant to S.B. 564, enacted in 2018, the utility's rates are locked in until April 2020.

Virginia Regulators Direct Dominion Energy to Refile Grid Modernization Plan, Appalachian Power Withdraws Plan

In January 2019, Virginia regulators issued an order rejecting the majority of Dominion Energy's grid modernization plan (approving $154.5 million of the proposed $1.5 billion in Phase I investments) and directing the utility to refile the plan. Following this decision, Appalachian Power withdrew its proposed grid modernization plan to revise it based on the Commission's guidance to Dominion.

MOST ACTIVE STATES AND SUBTOPICS OF Q1 2019

The most common types of actions across the country related to energy storage deployment (38), distribution system planning (29), data access policies (28), smart grid deployment (26), and utility business model reforms (23). Grid modernization activity increased significantly in Q1 2019, with state legislators introducing over 170 bills related to grid modernization during the quarter. Grid modernization activity in Q1 2019 increased by 53% over Q1 2018 (259 actions) and by 167% over Q1 2017 (148 actions).

The states taking the greatest number of actions related to grid modernization in Q1 2019 can be seen in Figure 4. New York, California, and Massachusetts saw the most action during the quarter, followed by Minnesota, New Jersey, Hawaii, and New Hampshire. Overall, 44 states and DC took actions related to grid modernization in Q1 2019.

TOP GRID MODERNIZATION TRENDS OF Q1 2019

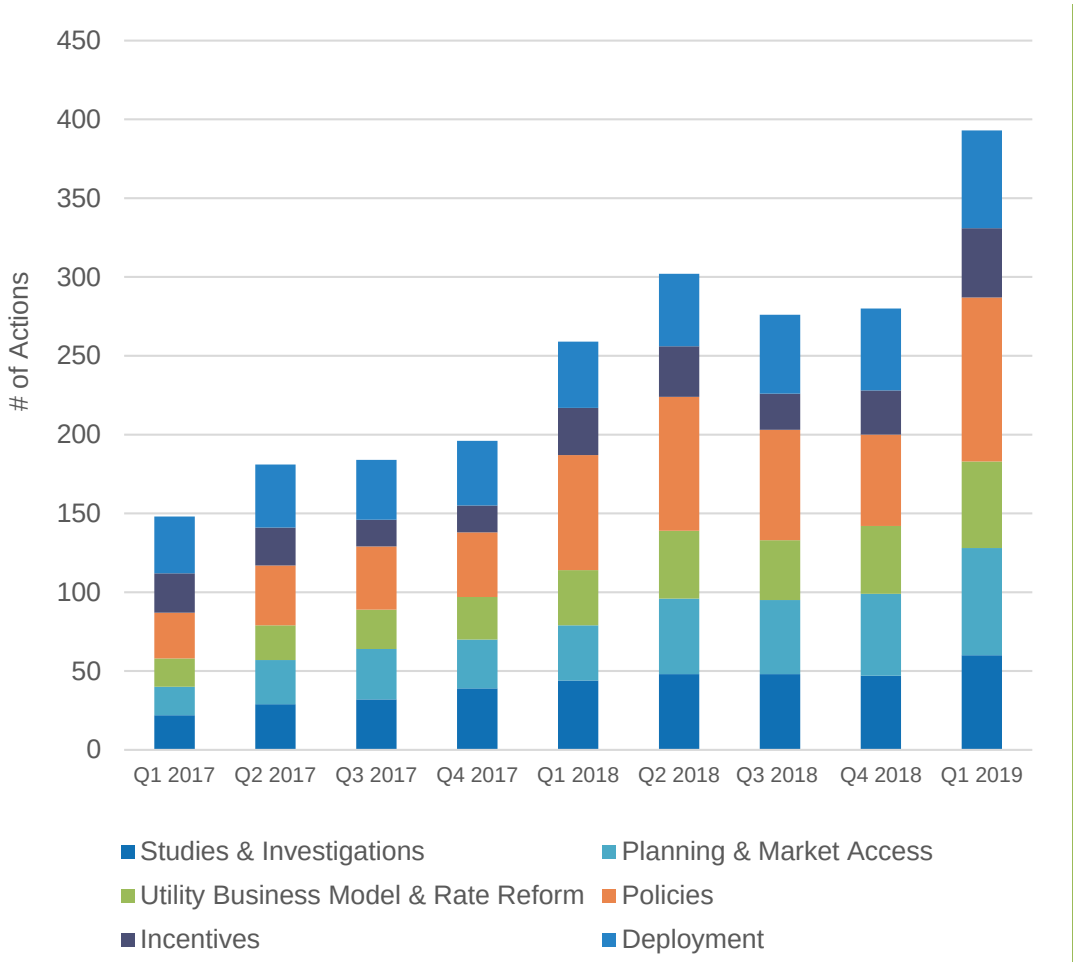
Regulators Seeking Greater Realization of Advanced Metering Potential

As utilities request approval to deploy advanced metering infrastructure (AMI), regulators in several states are indicating that the functionality of these meters needs to be more fully utilized in order to justify the expenditures. The Virginia Corporation Commission rejected Dominion Energy's AMI deployment proposal in January 2019 because the utility did not provide a plan to maximize the potential of AMI. Appalachian Power, which also requested approval for AMI deployment in Virginia, filed supplemental testimony in order to address the AMI concerns cited in Dominion's case, but later withdrew its plan with an intent to refile after addressing the Commission's standards. In Hawaii, regulators approved HECO's request to deploy AMI, but directed the utility to develop an advanced rate design strategy to help maximize the benefits of AMI. National Grid filed its proposed AMI implementation plan in New York, following a 2018 settlement that included a stakeholder process to develop the plan.

States Incorporating Energy Storage into Existing Policy and Incentive Frameworks

Several states took actions to incorporate energy storage into existing policies during Q1 2019. Some states, including Arkansas, California, New Hampshire, and South Carolina, considered the net metering eligibility of distributed generation systems paired with energy storage. North Carolina, Oregon, and South Carolina are addressing how the Public Utility Regulatory Policies Act (PURPA) applies to energy storage facilities, while a number of states considered legislation allowing renewable energy projects paired with energy storage to be eligible for renewable portfolio standard compliance. Other policy areas states are addressing are: updating interconnection rules to include energy storage systems and advanced inverter capabilities; considering requirements for evaluation of energy storage options in integrated resource planning; and extending solar energy incentives to apply to energy storage projects.

Figure 2. Total Number of Grid Modernization Actions by Quarter



Efforts Spreading to Expand Customer Data Access

A growing number of states are working to increase access to customer energy usage data, both for customers themselves, and with customer permission for third-party designees, as

well as aggregated data. Bills expanding customer data access were under consideration in at least nine states during Q1 2019. The Montana State Legislature enacted a bill requiring data access for customers and customers' designees and authorizing utilities to disclose anonymous, aggregated data. Utah lawmakers enacted legislation requiring utilities to provide non-residential customers with access to their own usage data, but authorizing fees for accessing this data. Data access legislation also advanced in New Hampshire, while the North Carolina Utilities Commission opened a new proceeding to develop data access rules and the Vermont Public Utility Commission approved a data access standard put forward by Green Mountain Power and Efficiency Vermont.

Figure 3. Most Common Types of Actions Taken in Q1 2019

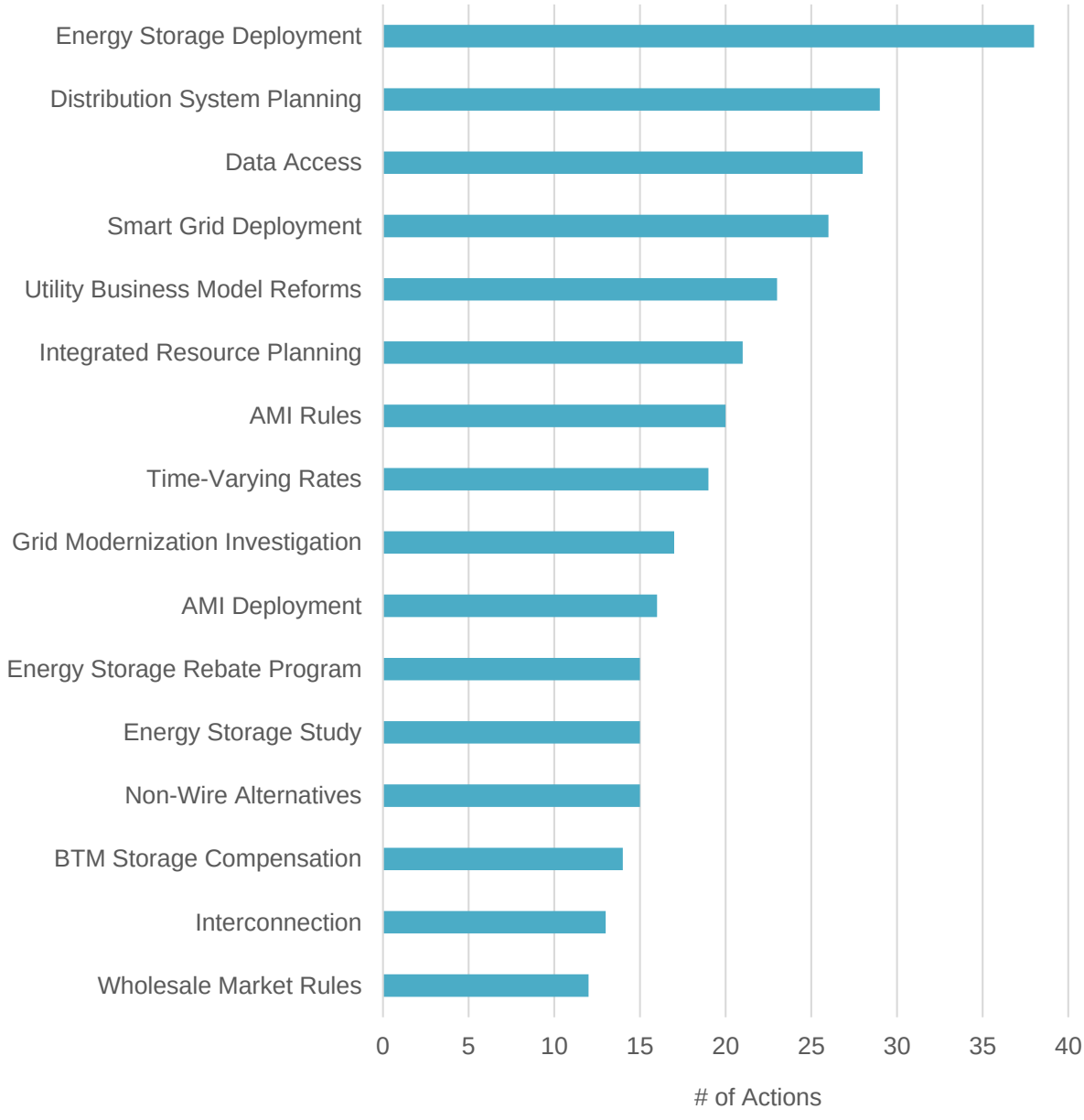


Figure 4. Most Active States of Q1 2019

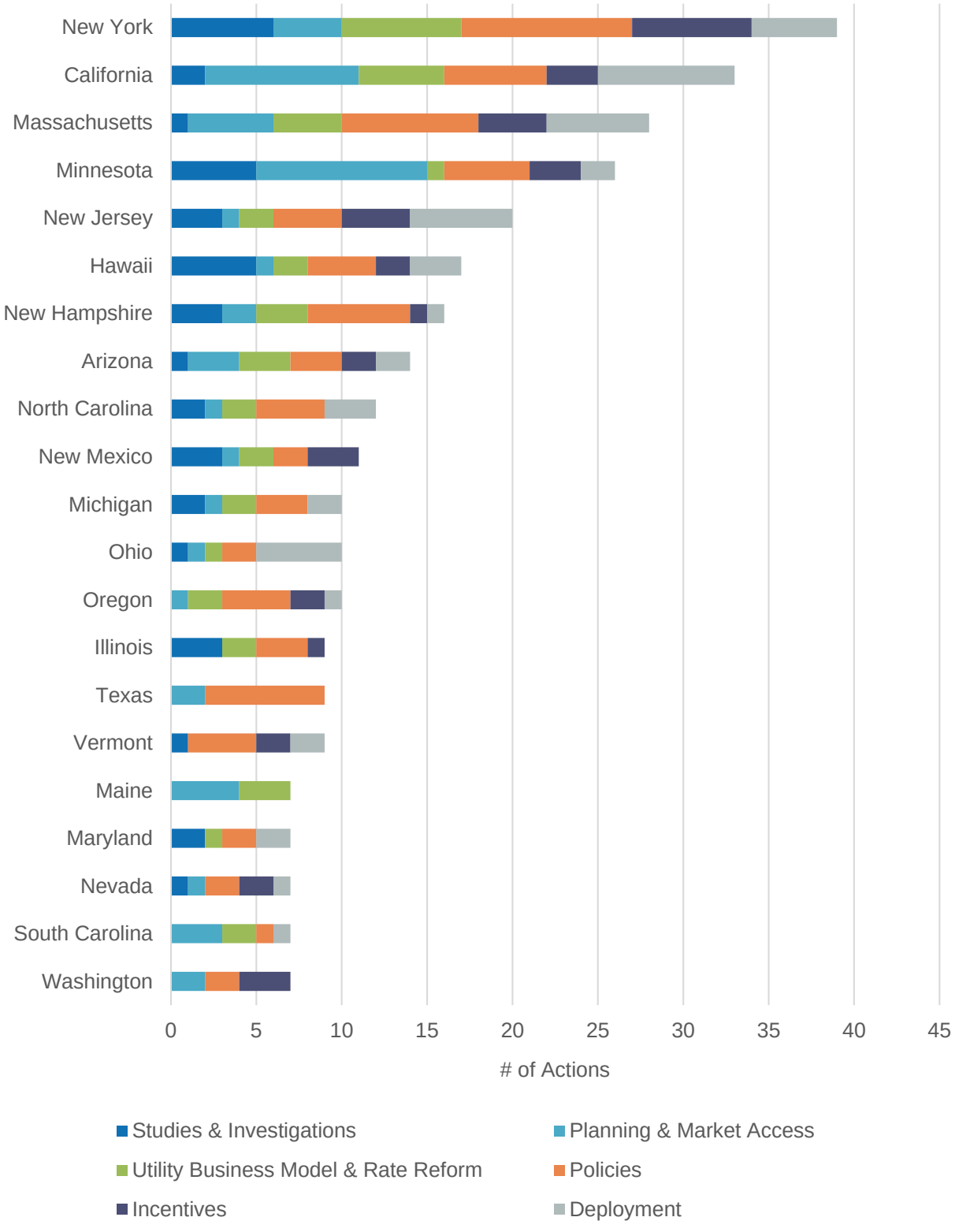
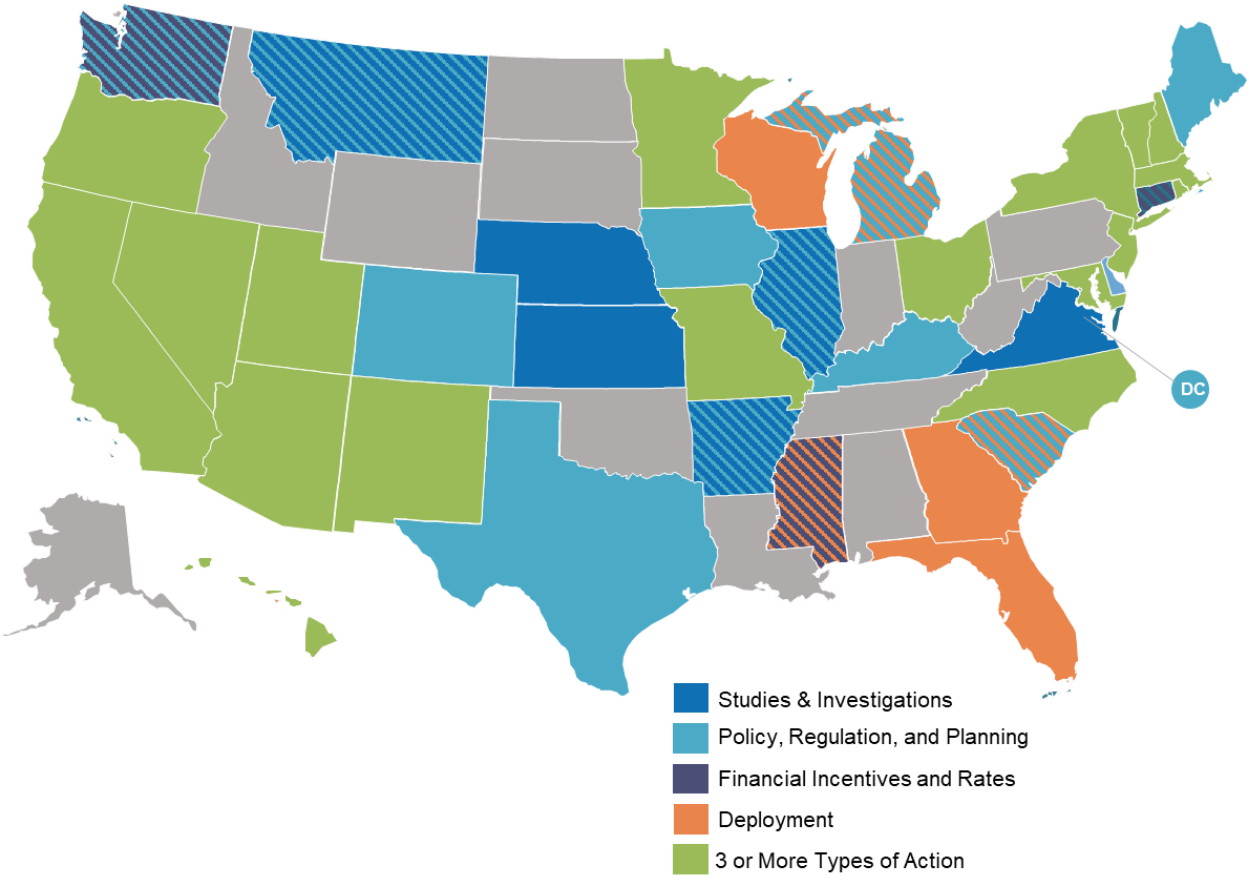


Figure 5. Q1 2019 Energy Storage Action, by Action Type



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.

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

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- 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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Subscription Type	Annual Subscription	Single Report
50 States of Grid Modernization Report	$1,500	$500
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