

# 50 States of GRID MODERNIZATION

Q4 2019 Quarterly Report  
& 2019 Annual Review

Executive Summary

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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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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

## 2019 GRID MODERNIZATION ACTION

In 2019, 46 states plus DC took a total of 612 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 612 actions catalogued, the most common were related to policies (155), followed by deployment (118), and business model and rate reform (100).

**Table 1. 2019 Summary of Grid Modernization Actions**

Type of Action	# of Actions	% by Type	# of States
Policies	155	25%	38
Deployment	118	19%	37
Business Model and Rate Reform	100	16%	35 + DC
Planning and Market Access	91	15%	28 + DC
Studies and Investigations	82	13%	30 + DC
Financial Incentives	66	11%	24
<b>Total</b>	<b>612</b>	<b>100%</b>	<b>46 States + DC</b>

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 2019

Ten states taking the greatest number of particularly impactful actions are noted below.

### North Carolina

In 2019, Duke Energy requested approval for its Grid Improvement Plan and worked to develop its new integrated system operations planning process. The North Carolina Utilities Commission approved Duke Energy's dynamic rate pilots, initiated an energy storage investigation, considered customer data access rules, examined interconnection rules for storage, and evaluated rules for retrofitting existing PURPA qualifying facilities with storage. State legislators also considered bills related to multi-year rate plans and joining an RTO.

### New Hampshire

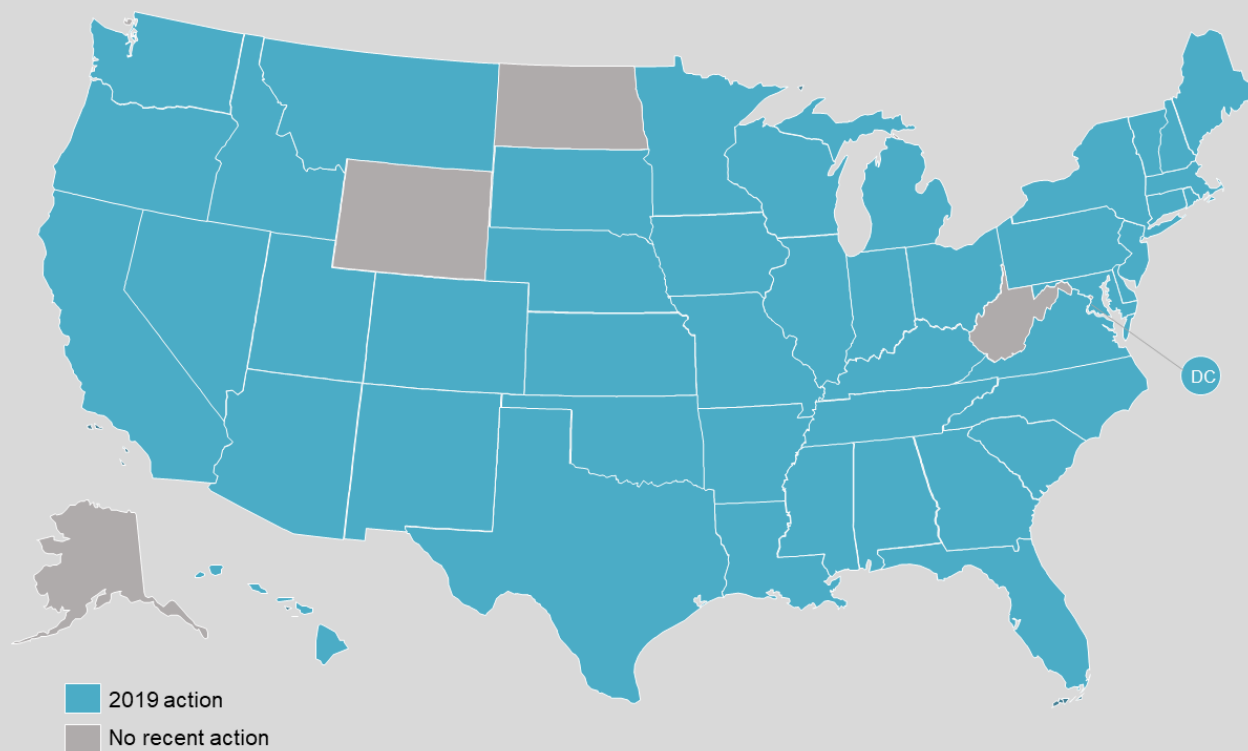
In New Hampshire, the Public Utilities Commission issued its final grid modernization report and recommendations in 2019. Eversource requested approval for microgrid and bring your

own device programs, while regulators approved a utility-owned residential battery program for Liberty Utilities early in the year. State legislators enacted bills extending a property tax exemption to energy storage and requiring the creation of a statewide energy data platform.

## Hawaii

In Hawaii, regulators continued work to develop a performance-based regulation framework, with the Commission Staff filing its proposal. The Commission also opened a new distributed energy resources proceeding, continued work to develop a microgrid services tariff, and approved the HECO utilities' Phase I grid modernization investments. The HECO utilities filed their advanced rate design strategy, the Hawaii Energy Office released a report on utility business models, and lawmakers enacted a data access bill.

**Figure 1. 2019 Legislative and Regulatory Action on Grid Modernization**



## Minnesota

The Minnesota Public Utilities Commission continued work to develop performance-based regulation metrics, while utilities filed their 2019 integrated distribution plans. State lawmakers enacted a bill directing the Department of Commerce to conduct an energy storage study, requiring storage to be considered in integrated resource planning, and authorizing utilities to

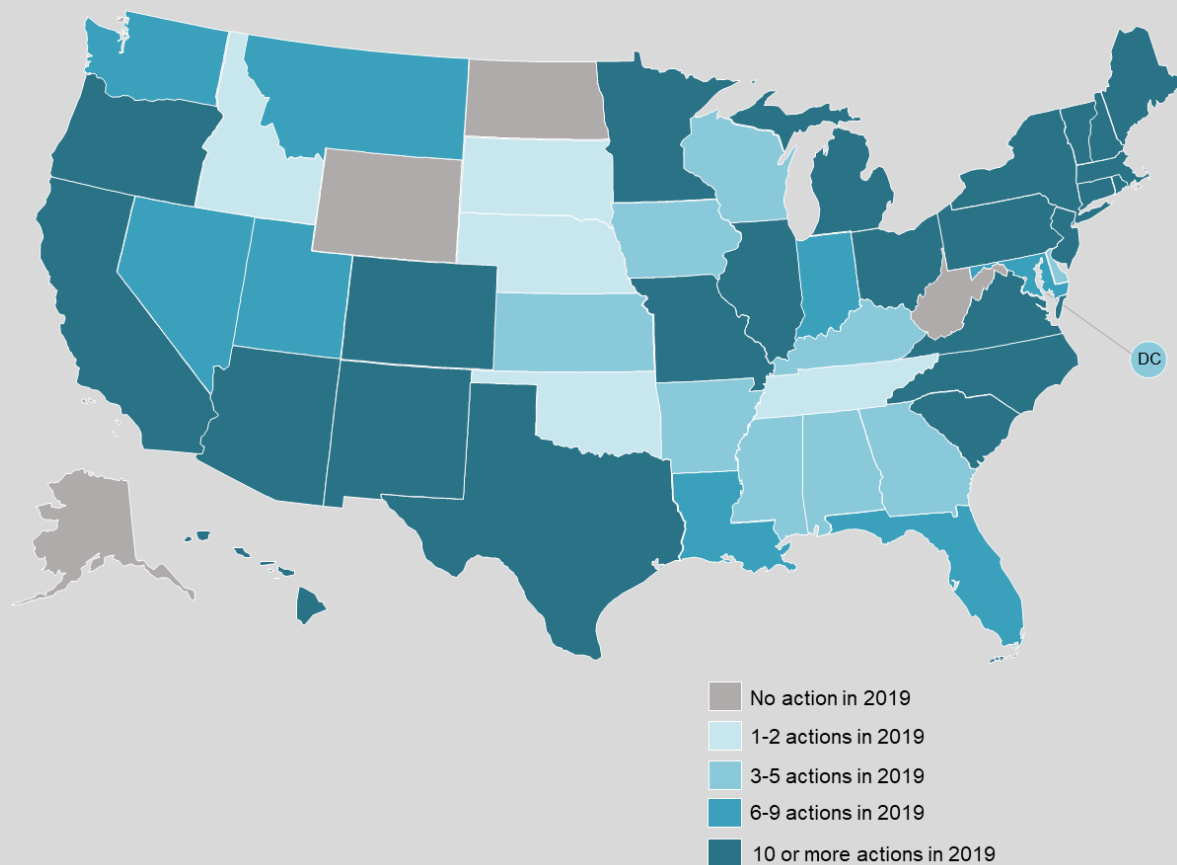


undertake storage pilot projects. Xcel Energy also requested cost recovery for investments in advanced grid intelligence and security.

## New York

The New York Public Service Commission approved modifications to the value of distributed energy resources methodology and considered proposed investments in advanced metering infrastructure and energy storage. The Commission also worked with NYSERDA and a third party to develop a pilot integrated energy data platform, and NYSERDA launched new energy storage incentive programs.

**Figure 2. 2019 Grid Modernization Activity, by Number of Actions**



## Virginia

The Virginia Corporation Commission rejected the majority of Dominion Energy's grid modernization proposal in early 2019, and the utility filed a revised plan later in the year. The Commission also considered Dominion's proposed energy storage pilot. State legislators

enacted bills creating stakeholder efforts on data access and time-varying rates. Dominion filed its associated report and rate design proposal later in the year. The Department of Mines, Minerals, and Energy also released its final energy storage study.

## **California**

In 2019, the California Public Utilities Commission opened a proceeding to reduce microgrid barriers, adopted changes to the Self-Generation Incentive Program, and approved time-of-use rate designs. The Commission also continued work related to distribution system planning and issued decisions on Southern California Edison's grid modernization plan and several battery storage projects.

## **South Carolina**

South Carolina regulators considered Duke Energy's Grid Improvement Plan during 2019 and later opened a proceeding to review the plan outside of the utility's general rate cases. Duke Energy is also developing its integrated system operations planning process. State lawmakers enacted legislation authorizing net metering for facilities paired with storage and requiring the Commission to address the addition of storage to PURPA qualifying facilities.

## **Arizona**

The Arizona Corporation Commission examined retail electric competition during 2019, as well as changes to integrated resource planning. The Commission continued to consider an energy storage target as part of renewable energy standard modifications. Arizona Public Service filed a proposed residential subscription rate pilot and plans for a new customer data platform. The utility also requested cost recovery for new energy storage agreements.

## **Colorado**

Colorado legislators enacted a bill requiring the Public Utilities Commission to conduct an investigation into performance-based regulation and also requiring the Commission to develop distribution system planning rules. Meanwhile, the Commission opened a rulemaking related to electric resource planning and energy storage interconnection, among other topics. Xcel Energy also filed plans for new energy storage projects.

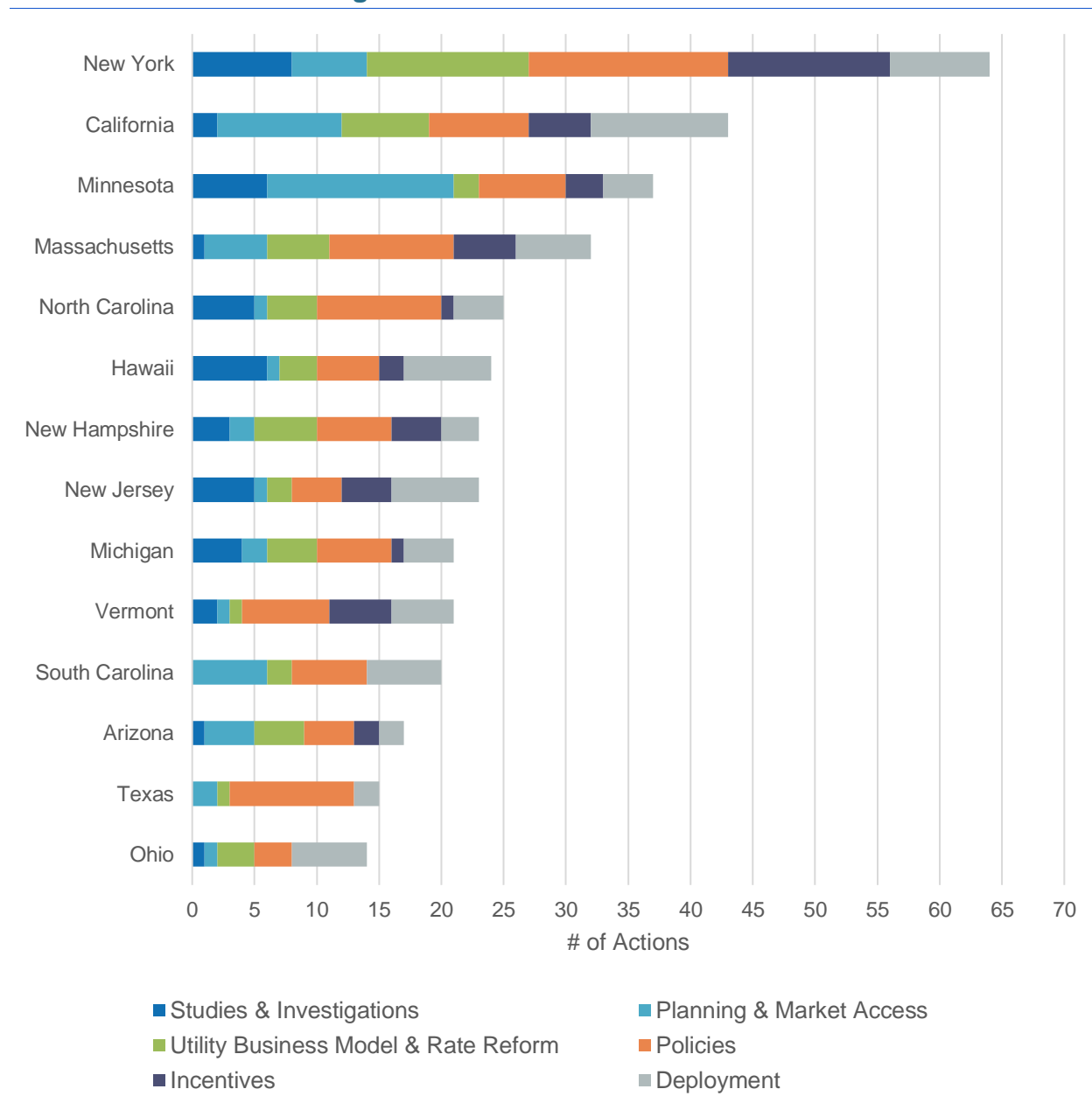
# **TOP GRID MODERNIZATION TRENDS OF 2019**

## **Regulators Establishing Guidelines for Distribution System Plans**

Regulators in a number of states are establishing guidelines for utility distribution system plans. The Minnesota Public Utilities Commission approved integrated distribution plan requirements for each utility, while Delaware and Oregon regulators are in the process of developing rules.

Lawmakers in Colorado and Washington enacted bills directing regulators to establish distribution system planning requirements.

**Figure 3. Most Active States of 2019**



### Utilities Failing to Justify the Costs of Grid Modernization Investments

Regulators in a number of states have rejected utility proposals to invest in grid modernization, finding that the utilities did not sufficiently demonstrate that the benefits of these investments justify the costs. Virginia regulators rejected the majority of Dominion Energy’s initial grid modernization plan for this reason, while the California Public Utilities Commission approved only a portion of Southern California Edison’s proposed investments.

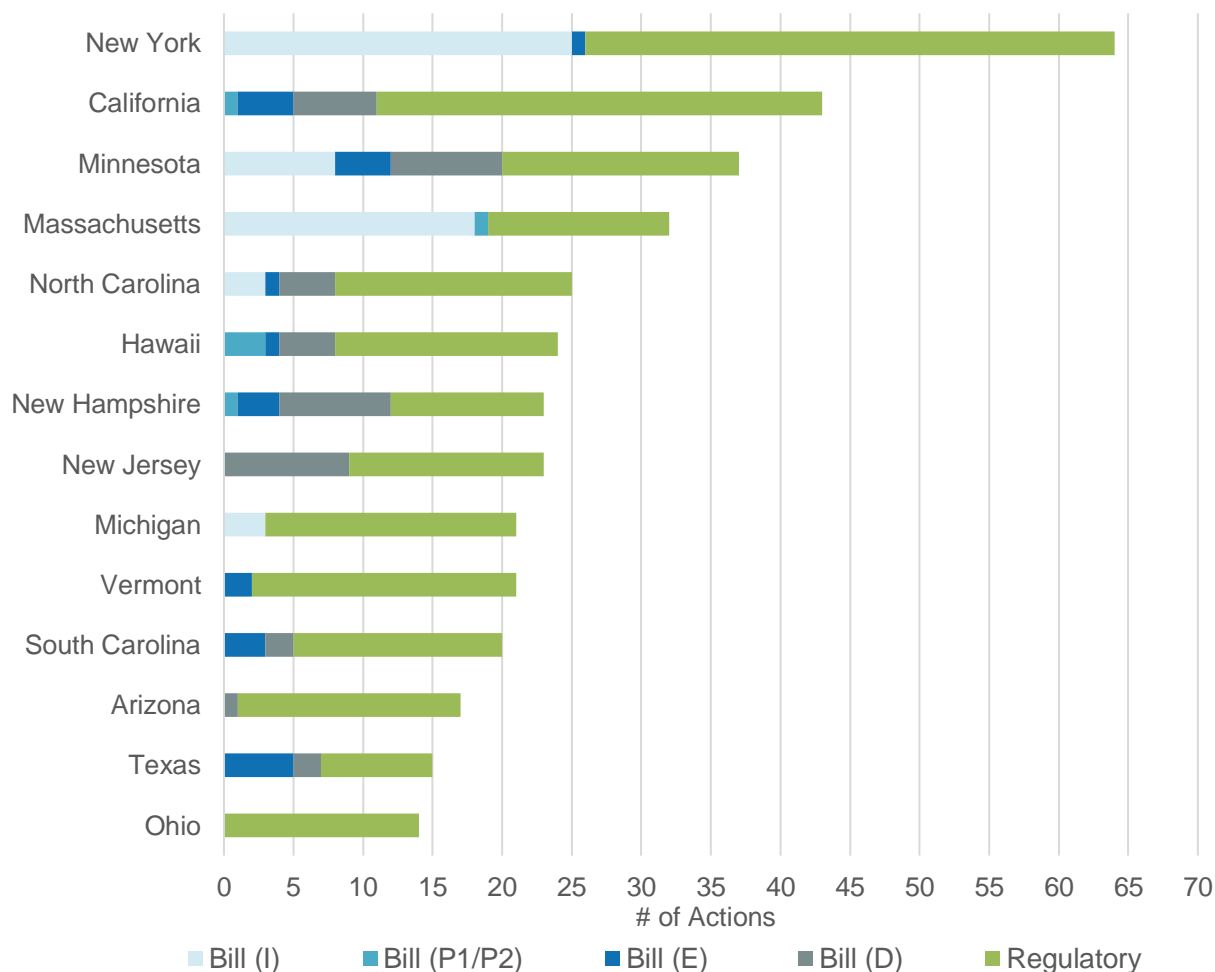
## Utilities Including New Energy Storage Capacity in Integrated Resource Plans

In 2019, utilities filing integrated resource plans increasingly included new energy storage capacity to be added over the planning horizon. Examples of plans filed in 2019 calling for new storage resources include those from Georgia Power (80 MW), Indiana Michigan Power – Michigan (50 MW), and Duke Energy – SC (300 MW). This trend is expected to grow as storage costs continue to decline and states require evaluation of storage options.

## States Considering Performance Incentive Mechanisms

As interest in performance-based ratemaking grows, states are considering the adoption of specific performance incentive mechanisms (PIMs) for utilities. Minnesota’s Xcel Energy filed a proposal to adopt three PIMs based around greenhouse gas reductions and managed charging for electric vehicles, while Massachusetts regulators rejected National Grid’s proposed PIMs related to customer ease, peak reduction, and electric vehicles. Other states considering PIMs in 2019 include Hawaii, New York, Oklahoma, and Rhode Island.

**Figure 4. Most Active States of 2019, by Action Status**



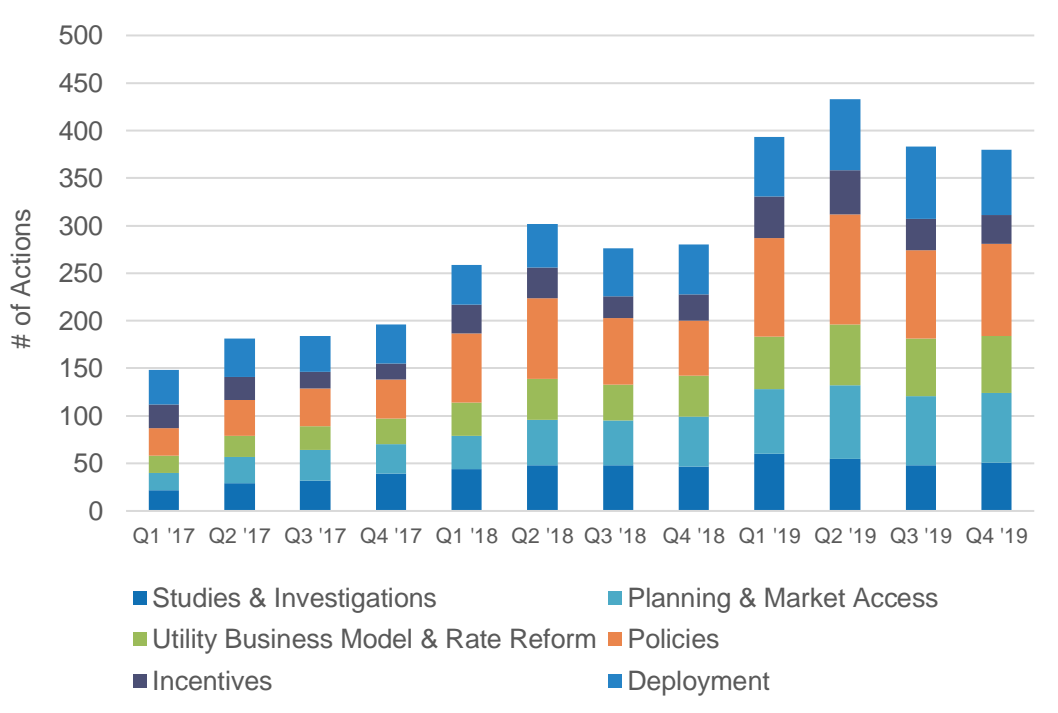
## States Enabling Access to Customer Energy Usage Data

Policymakers and regulators in 25 states considered rules for access to customer energy usage data during 2019, with lawmakers in several states, including Hawaii, Montana, and New Hampshire, enacting legislation that enables greater access to this data. In some states, such as Arizona, North Carolina, and Virginia, utilities also proposed new plans for web-based tools or apps enabling access to customer data.

## Utilities Pursuing Advanced Rate Design Pilots

A number of utilities proposed new rate pilots in 2019 that include features such as dynamic pricing, time-varying rates, demand charges, critical peak pricing, peak time rebates, and subscription pricing. Some utilities are also piloting several rate structures simultaneously. The HECO utilities filed their advanced rate design strategy in 2019, and the North Carolina Utilities Commission approved nine dynamic price pilots for Duke Energy.

**Figure 5. Total Number of Grid Modernization Actions by Quarter**



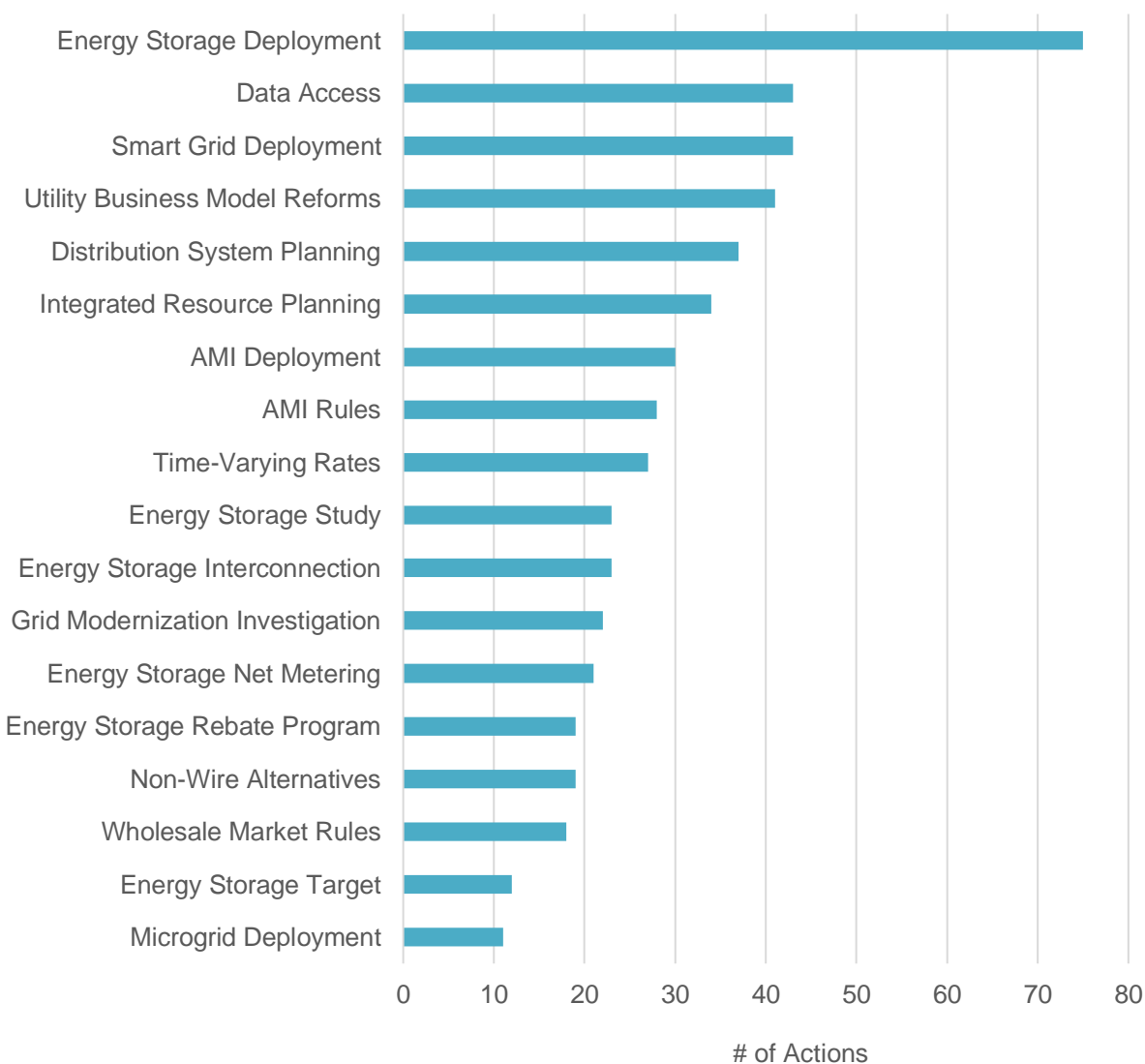
## States Considering Major Utility Business Model Reforms

While some states are pursuing more modest utility business model reforms, such as decoupling, others are considering more dramatic reforms, such as joining a wholesale market or introducing retail competition. Legislation introduced in North Carolina requires large utilities to file applications to establish or join a regional transmission organization, while a proceeding underway in Arizona is evaluating retail competition and other reforms.

## Utilities Including Energy Storage Offerings within Energy Efficiency and Demand-Side Management Plans

Utilities are increasingly including energy storage programs and incentives within their energy efficiency and demand-side management plans. In early 2019, the Massachusetts Department of Public Utilities approved an incentive for storage dispatching during call events as part of the utilities' joint energy efficiency plan. Utilities in New Hampshire and Rhode Island also proposed storage incentives as part of efficiency plans.

**Figure 6. Top Grid Modernization Actions of 2019**



## Regulators Emphasizing Programs and Rates to Make Full Use of Smart Meters

When considering proposals to deploy advanced metering infrastructure (AMI), state regulators are placing a significant emphasis on programs and rates that will help realize the

full benefits of these meters. The Virginia Corporation Commission rejected Dominion Energy’s AMI proposal, which the utility later refiled, incorporating the Commission’s guidance. Hawaii regulators approved the HECO utilities’ AMI plan, but required the utility to file an advanced rate design strategy and data access and privacy policy.

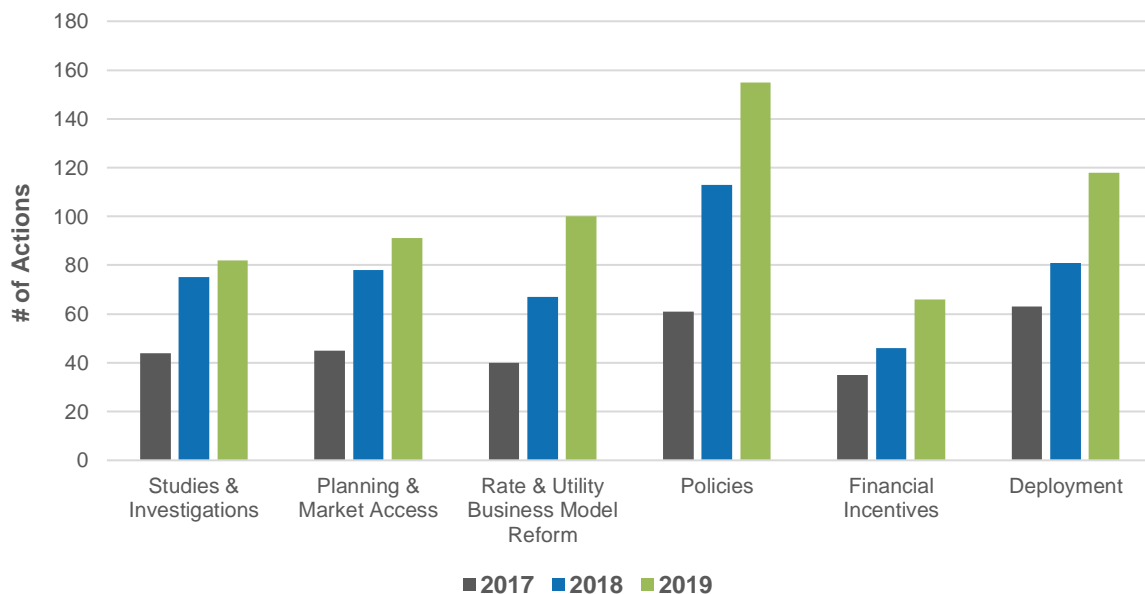
### States Examining Interconnection and Compensation Rules for Battery Storage

Several states addressed interconnection rules for battery storage systems during 2019, as well as how these systems are treated under net metering policies and state implementation of the Public Utility Regulatory Policies Act (PURPA). Arizona regulators adopted storage interconnection standards, while Arkansas, Massachusetts, Montana, and other states authorized net metering for facilities paired with storage. North Carolina and South Carolina are also considering the addition of storage at PURPA qualifying facilities.

## LOOKING BACK: 2017 to 2019

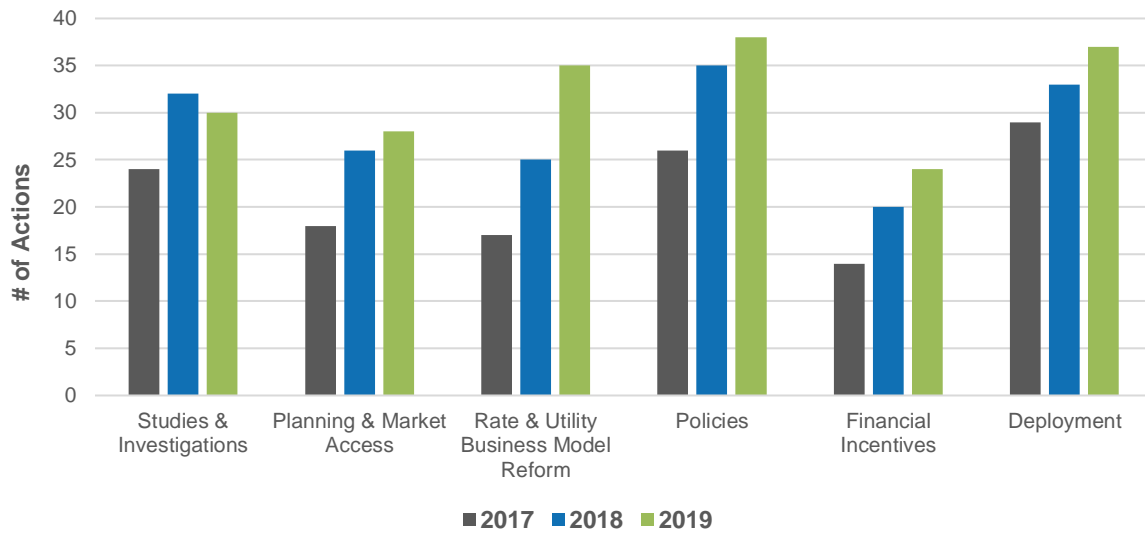
Total grid modernization action increased by 33% over the past year, with states and utilities taking approximately 612 actions in 2019, compared to 460 actions in 2018 and 288 actions in 2017. In 2019, activity increased in every category tracked by this report by the following amounts: Studies & Investigations: 9%, Planning & Market Access: 17%, Utility Business Model & Rate Reform: 49%, Policies: 37%, Incentives: 43%, and Deployment: 46%. The number of states taking actions increased in each category except studies and investigations from 2018 to 2019.

**Figure 7. Number of Grid Modernization Actions 2017-2019**

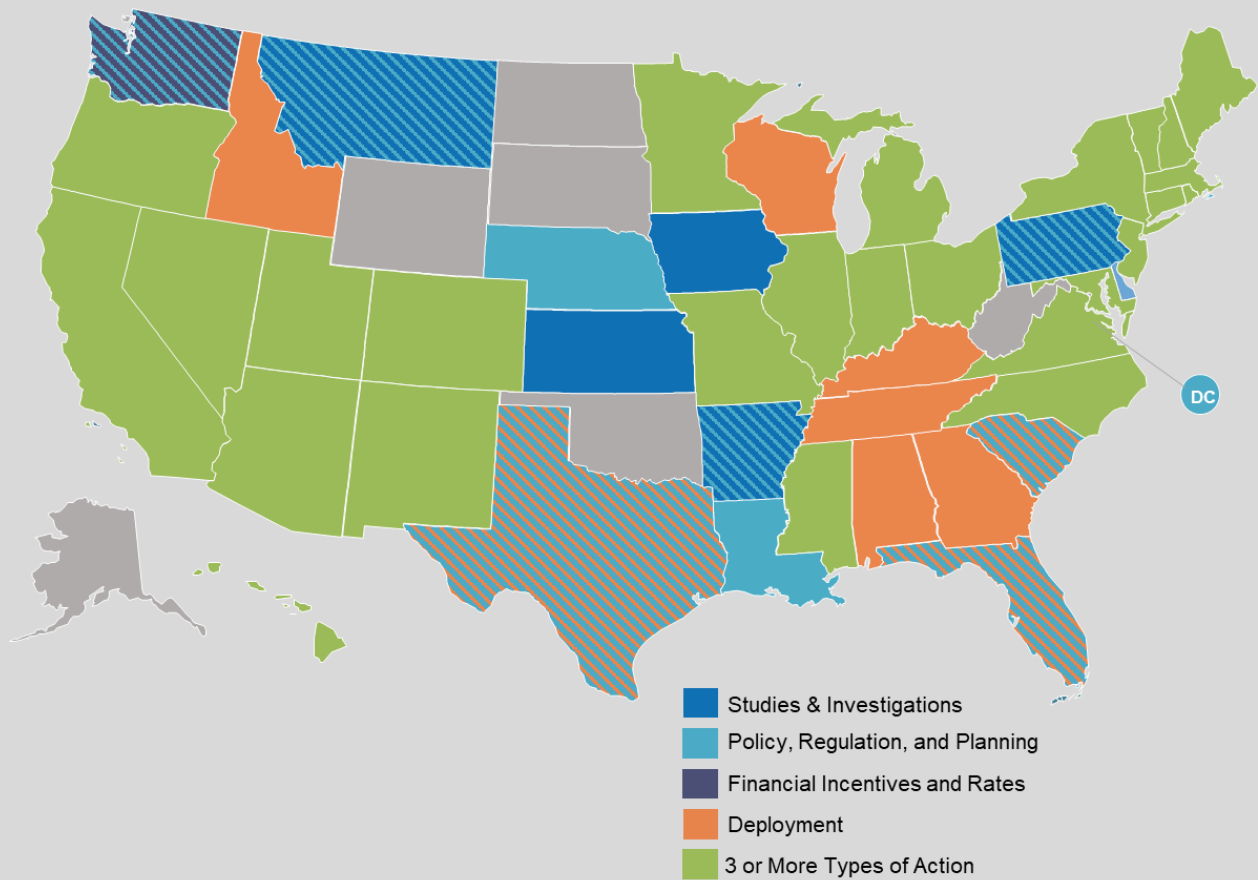




**Figure 8. Number of States Taking Grid Modernization Actions 2017-2019**



**Figure 9. 2019 Energy Storage Action, by Type of Action**



## Q4 2019 GRID MODERNIZATION ACTION

In the fourth quarter of 2019, 43 states plus DC took a total of 380 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 380 actions catalogued, the most common were related to policies (97), followed by planning and market access (73), and deployment (69).

**Table 2. Q4 2019 Summary of Grid Modernization Actions**

Type of Action	# of Actions	% by Type	# of States
Policies	97	26%	33
Planning and Market Access	73	19%	23 + DC
Deployment	69	18%	28
Business Model and Rate Reform	60	16%	27 + DC
Studies and Investigations	51	13%	25 + DC
Financial Incentives	30	8%	11
<b>Total</b>	<b>380</b>	<b>100%</b>	<b>43 States + DC</b>

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 2019

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

### **Connecticut Regulators Open an Array of New Grid Modernization Proceedings**

The Connecticut Public Utilities Regulatory Authority issued an interim order in its grid modernization investigatory proceeding in October 2019, deciding to open new dockets on 11 specific topics. The Authority opened six of these proceedings in Q4 2019, which focus on energy affordability, advanced metering infrastructure, electric storage, zero-emission vehicles, innovation pilots, and interconnection.

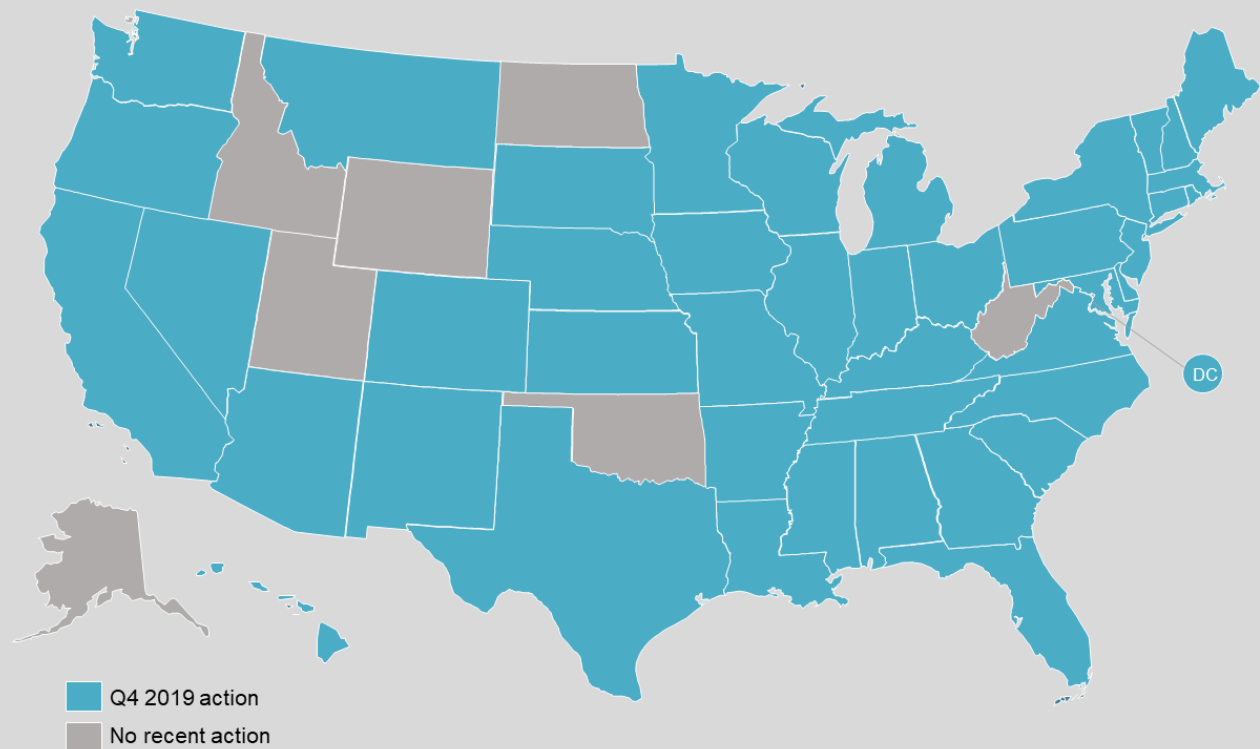
### **Michigan Public Service Commission Launches MI Power Grid**

The Michigan Public Service Commission launched its MI Power Grid initiative in October 2019. MI Power Grid is a multi-stakeholder effort aiming to help integrate new clean energy technologies and optimize grid investments. Topics to be addressed include innovative rate offerings, demand response, technology pilot programs, data access and privacy, performance-based ratemaking, and advanced planning processes. A final report is expected by middle to late 2021.

## Arizona Corporation Commission Adopts Energy Storage Interconnection Rules

In November 2019, the Arizona Corporation Commission issued an order adopting distributed generation interconnection rules. The rules include specific provisions for energy storage systems, including an expedited process for non-exporting or inadvertent export facilities up to 20 kW. The Commission Staff filed a Notice of Final Rulemaking with the Office of the Attorney General.

**Figure 10.** Q4 2019 Legislative and Regulatory Action on Grid Modernization



## Final Energy Storage Studies Released in Maine and Minnesota

Final energy storage studies were published in both Maine and Minnesota during December 2019, pursuant to legislation enacted in each state earlier in the year. Maine's study includes several policy recommendations, including establishing deployment targets. Minnesota's study finds that solar-plus-storage is cost-effective today and standalone storage could become cost-effective in 2025. Minnesota's study also includes policy recommendations, such as making storage a standard part of the integrated resource planning process.

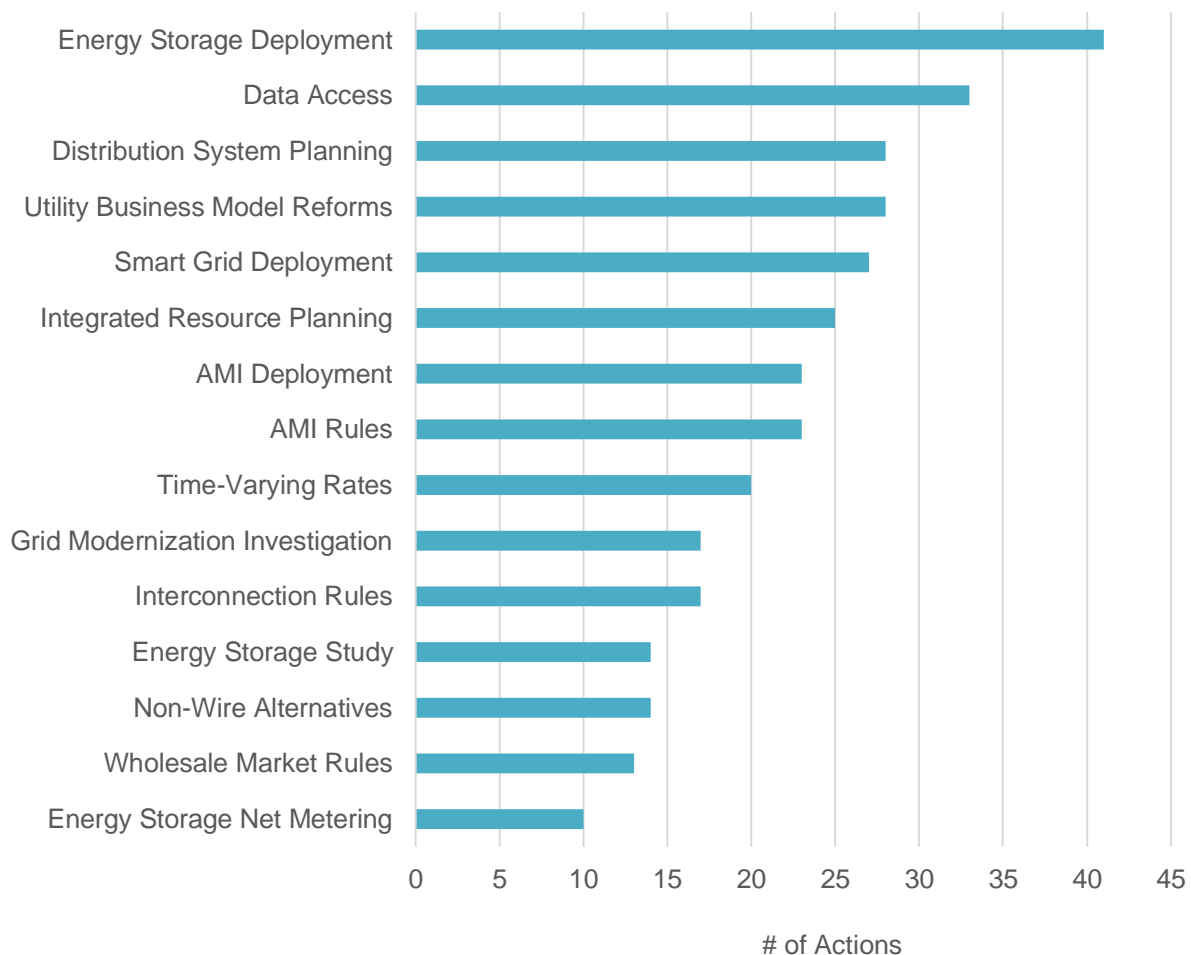
## FERC Approves Tariffs for Energy Storage Participation in Wholesale Markets

In October and November 2019, the Federal Energy Regulatory Commission (FERC) approved tariffs filed by six wholesale market operators for the participation of energy storage resources. The tariffs were developed in response to FERC Order 841 of February 2018, requiring tariffs to allow battery storage to participate in energy, capacity, and ancillary services markets.

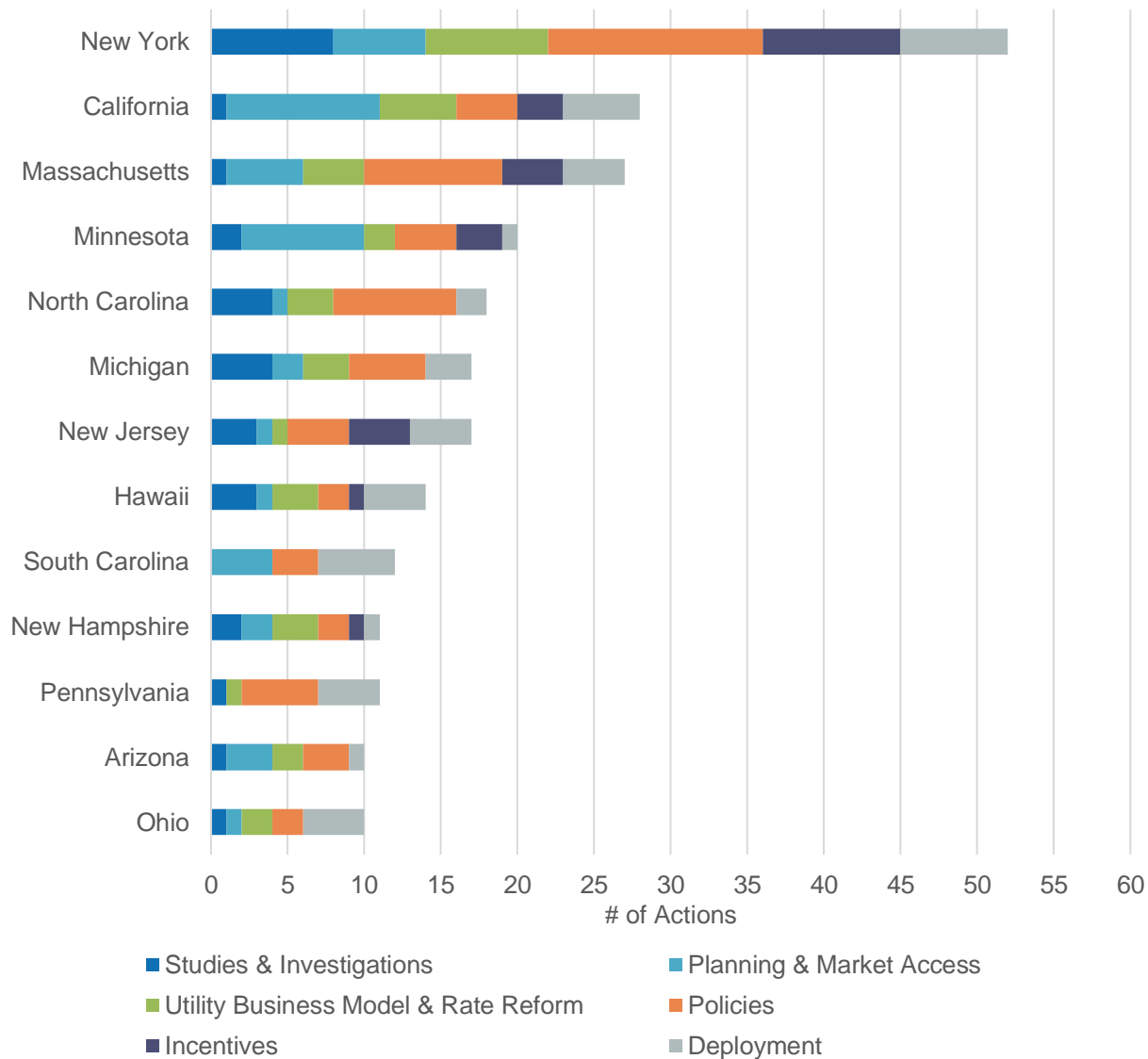
## MOST ACTIVE STATES AND SUBTOPICS OF Q4 2019

The most common types of actions across the country related to energy storage deployment (41), followed by data access policies (33), distribution system planning (28), utility business model reforms (28), and smart grid deployment (27). The states taking the greatest number of actions related to grid modernization in Q4 2019 can be seen in Figure 12. New York, California, and Massachusetts took the greatest number of actions during the quarter, followed by Minnesota, North Carolina, Michigan, and New Jersey.

**Figure 11. Most Common Types of Actions Taken in Q4 2019**



**Figure 12. Most Active States of Q4 2019**



# 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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- 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

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<b>Single-Tech Subscription (Grid Modernization &amp; Energy Storage)</b> <i>(Includes 50 States of Grid Modernization report, plus biweekly legislative &amp; regulatory grid modernization/energy storage tracking, policy data sheets, &amp; quarterly webinars)</i>	\$4,500	N/A
<b>All-Tech Subscription</b> <i>(Includes 50 States of Grid Modernization report, 50 States of Solar report, &amp; 50 States of Electric Vehicles report; plus biweekly legislative &amp; regulatory tracking; policy data sheets, &amp; quarterly webinars for solar, grid modernization/energy storage, &amp; electric vehicles)</i>	\$10,500	N/A



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