

50 States of GRID MODERNIZATION

Q4 2020 Quarterly Report
& 2020 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 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

2020 GRID MODERNIZATION ACTION

In 2020, 48 states plus DC took a total of 658 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 658 actions identified, the most common were related to policies (160), followed by deployment (138), and business model and rate reform (105).

Table 1. 2020 Summary of Grid Modernization Actions

Type of Action	# of Actions	% by Type	# of States
Policies	160	24%	40 + DC
Deployment	138	21%	37
Business Model and Rate Reform	105	16%	37 + DC
Planning and Market Access	94	14%	25 + DC
Financial Incentives	93	14%	29
Studies and Investigations	68	10%	30 + DC
Total	658	100%	48 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 2020

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

Connecticut

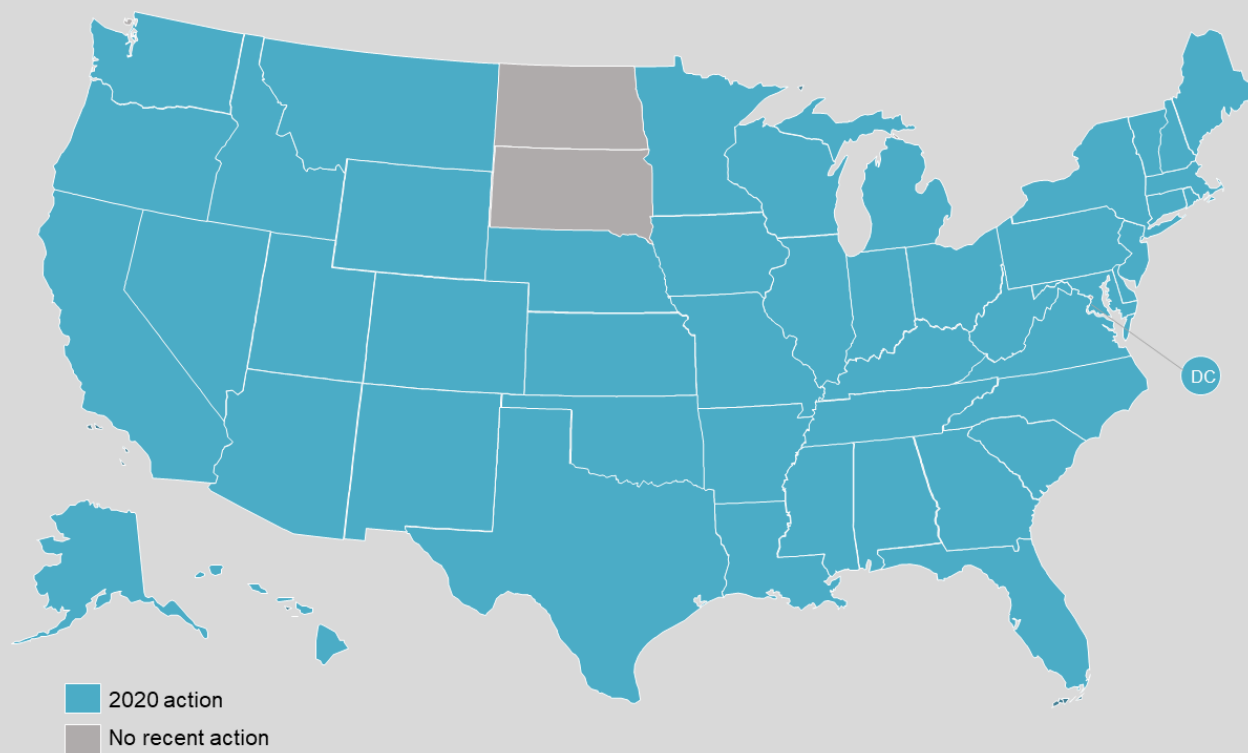
Throughout 2020, the Public Utilities Regulatory Authority had numerous proceedings open to consider different elements of grid modernization, including advanced metering infrastructure, energy storage, resilience and reliability, non-wires alternatives, innovative pilots, and rate design. State lawmakers also enacted legislation directing the Authority to adopt a performance-based regulation framework.

Hawaii

The Hawaii Public Utilities Commission issued a decision establishing a performance-based regulation framework for the HECO utilities, including a multi-year rate period and new performance incentive mechanisms. Hawaii regulators also adopted a customer data access

and privacy policy, considered a draft microgrid services tariff, and reviewed numerous solar-plus-storage power purchase agreements for the state's three investor-owned utilities.

Figure 1. 2020 Legislative and Regulatory Action on Grid Modernization



Virginia

Early in 2020, Virginia regulators issued a decision on Dominion Energy's proposed Grid Transformation Plan, approving parts of the plan and rejecting other elements. The State Corporation Commission also considered time-of-use rate proposals from utilities. Virginia lawmakers enacted legislation establishing an energy storage target of 3,100 MW by 2035, with implementing rules also directing utilities to develop energy storage incentive programs and non-wires alternatives programs.

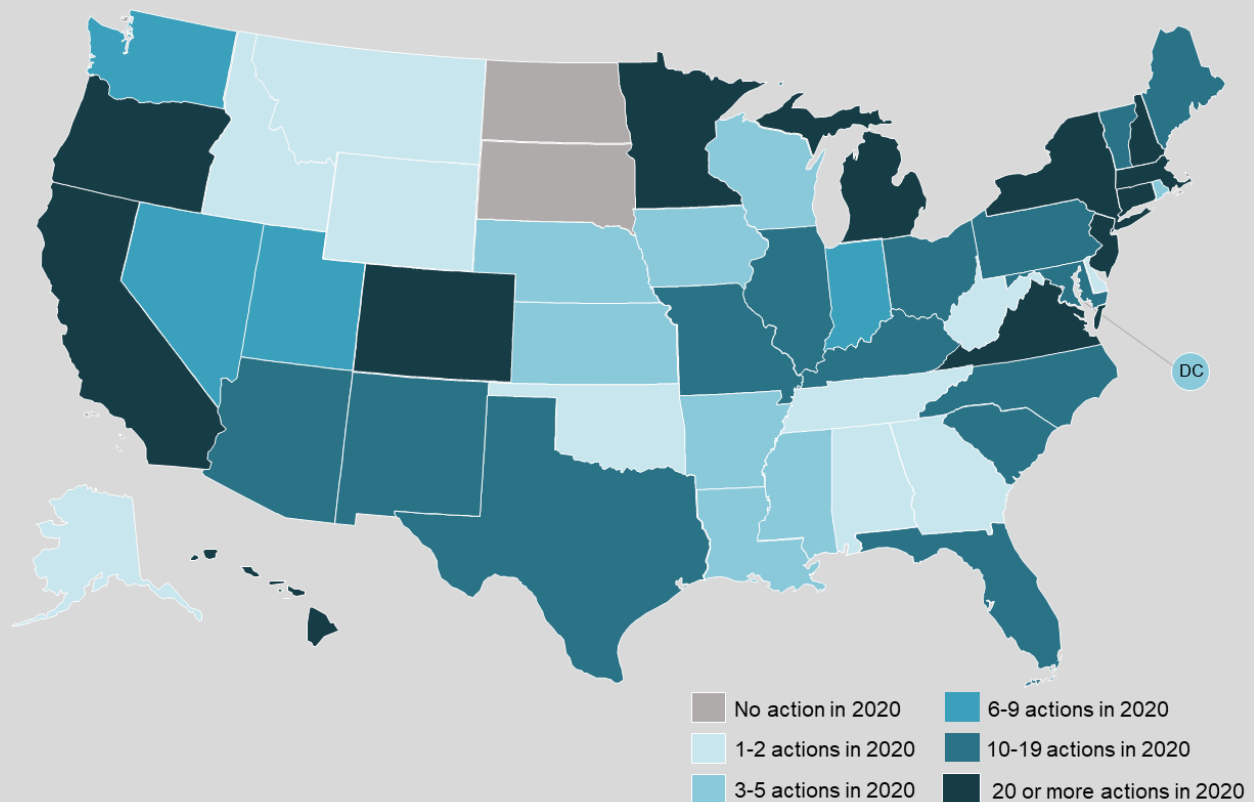
Colorado

The Colorado Public Utilities Commission considered distribution system planning rules, as well as performance-based ratemaking, electric resource planning, and interconnection rules during 2020. The Commission also evaluated time-of-use rate proposals, an advanced grid rider, and a community resiliency initiative incorporating utility-owned energy storage, all proposed by Xcel Energy.

Minnesota

In Minnesota, regulators considered proposals from Xcel Energy to adopt new performance incentive mechanisms and implement new time-of-use rate options, as well as a proposal from Minnesota Power to transition its residential customers to default time-of-day rates. Utilities also filed distribution system plans, and the Public Utilities Commission opened a new proceeding to investigate grid and customer security related to distribution grid data.

Figure 2. 2020 Grid Modernization Activity, by Number of Actions



California

In California, regulators considered a proposed decision adopting rates, tariffs, and rules to facilitate the commercialization of microgrids in the state. The Public Utilities Commission also considered changes to integrated resource planning rules, as well as distributed energy resource tariff frameworks for projects that can defer distribution system investments. Utilities also filed their 2020 energy storage procurement plans, and regulators considered modifications to the Self-Generation Incentive Program.

North Carolina

A state working group released a report examining utility business model reforms during 2020, while Duke Energy and other southeastern utilities announced plans to implement a bilateral energy exchange market. Regulators considered Duke Energy's proposed Grid Improvement Plan, as well as a settlement that would adopt climate resilience planning requirements. Work also continued to develop Duke Energy's Integrated System and Operations Planning process.

New York

During 2020, the New York Public Service Commission approved advanced metering infrastructure deployment proposals put forward by National Grid, New York State Electric & Gas, and Rochester Gas & Electric. Regulators also approved new dynamic load management programs designed to encourage the use of energy storage and help achieve the state's energy storage target.

Arizona

In Arizona, regulators issued a decision revising many of the state's energy rules. The decision includes an energy storage target of 5% of peak demand to be achieved by December 31, 2035, with at least 40% being customer-owned or customer-leased distributed storage. The order also requires utilities to establish energy storage incentives and makes changes to integrated resource planning rules. The Commission also opened a proceeding to investigate performance incentive mechanisms and considered retail competition rules during the year.

Michigan

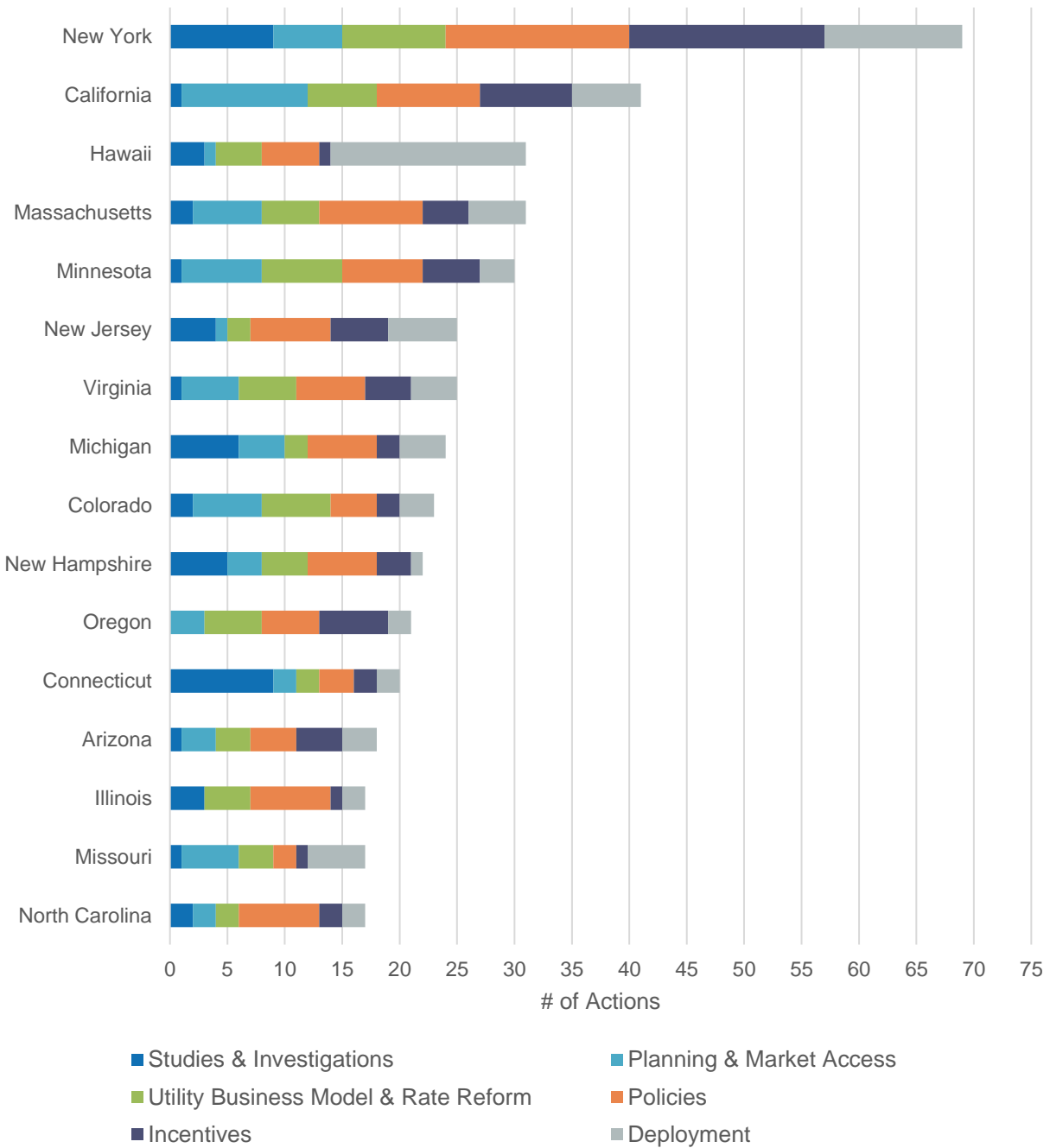
The Michigan Public Service Commission continued its MI Power Grid initiative in 2020, establishing a new workgroup to examine new technologies and business models. The Commission also considered demand response tariffs, releasing a report making several recommendations to improve the performance of demand response resources. Regulators also approved a settlement delaying Indiana Michigan Power's proposed advanced metering infrastructure deployment.

TOP GRID MODERNIZATION TRENDS OF 2020

Utilities Pursuing Innovative Pilot Programs

Many utilities are proposing innovative pilot programs to test new technologies and program designs. In Wisconsin, Xcel Energy requested approval for a new pilot to provide resiliency as a service, deploying battery storage at customer locations. Tampa Electric in Florida proposed a DC microgrid pilot program that would supply power to homes with utility-owned nanogrids, and in Vermont, Green Mountain Power proposed a frequency regulation pilot that will aggregate battery storage systems to participate in the ISO-New England market.

Figure 3. Most Active States of 2020



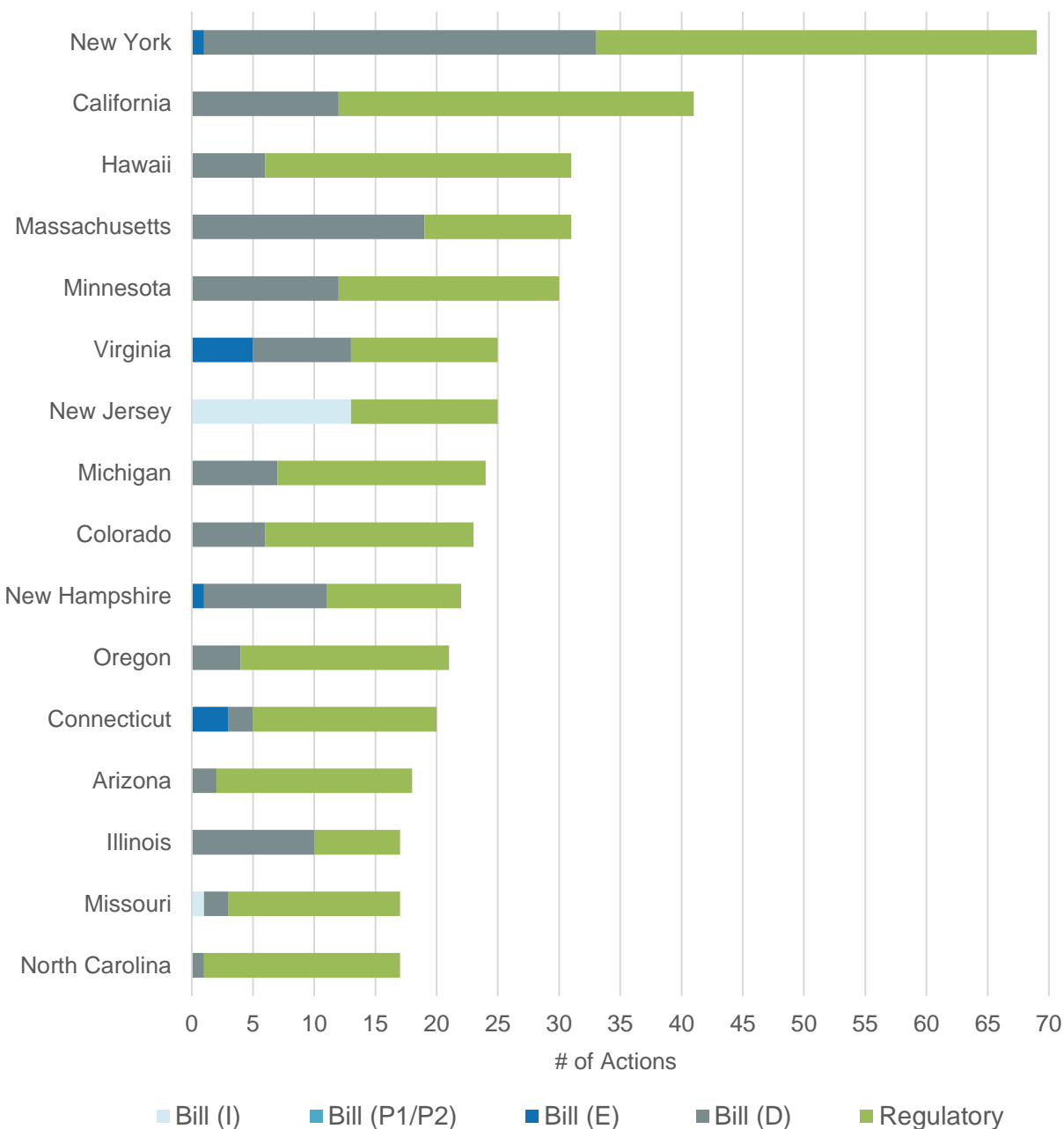
States Considering Utility Business Model Reforms

Actions related to utility business model reforms were the second most common type of action taken during 2020. States considered many different types of reforms, including decoupling, performance-based regulation, and energy market reform. Hawaii regulators adopted a performance-based regulation framework during the year, while utilities in the Southeast announced plans for a Southeast Energy Exchange Market.

Regulators Requiring Utilities to File Distribution System Plans

Regulators in a number of states are adopting distribution system planning rules and requiring utilities to file plans that include specific elements. The Oregon Public Utility Commission adopted a requirement for utilities to file distribution system plans including a hosting capacity analysis, while Colorado regulators initiated a rulemaking to develop distribution system planning rules with requirements related to non-wires alternatives.

Figure 4. Most Active States of 2020, by Action Status



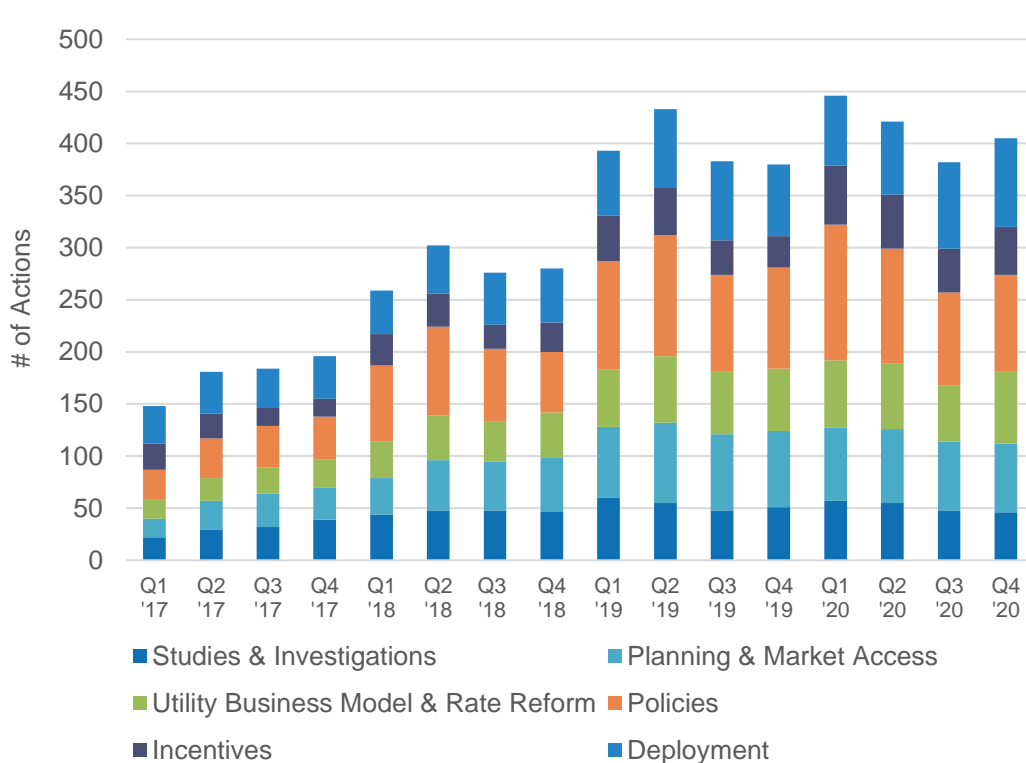
States Requiring the Use of All-Source Competitive Procurement

A growing number of states are requiring utilities to use all-source competitive procurement mechanisms to meet needs for energy and capacity. Arizona and Washington regulators both approved new rules requiring utilities to issue all-source requests for proposals based on needs identified in utilities' integrated resource plans. These solicitations will allow supply-side and demand-side resources to compete on an equal basis.

States Adopting Energy Storage Targets

A growing number of states are adopting targets requiring utilities to procure a certain amount of energy storage capacity by a particular date. Virginia lawmakers enacted a bill in 2020 adopting a state target of 3,100 MW of energy storage by 2035. In Nevada, following a study considering the costs and benefits of a storage target, regulators approved a target of 1,000 MW of energy storage by 2030. Arizona regulators also adopted an energy storage target, with 40% of the target to be met with distributed storage systems.

Figure 5. Total Number of Grid Modernization Actions by Quarter



Utilities Proposing Advanced Rate Design Pilots

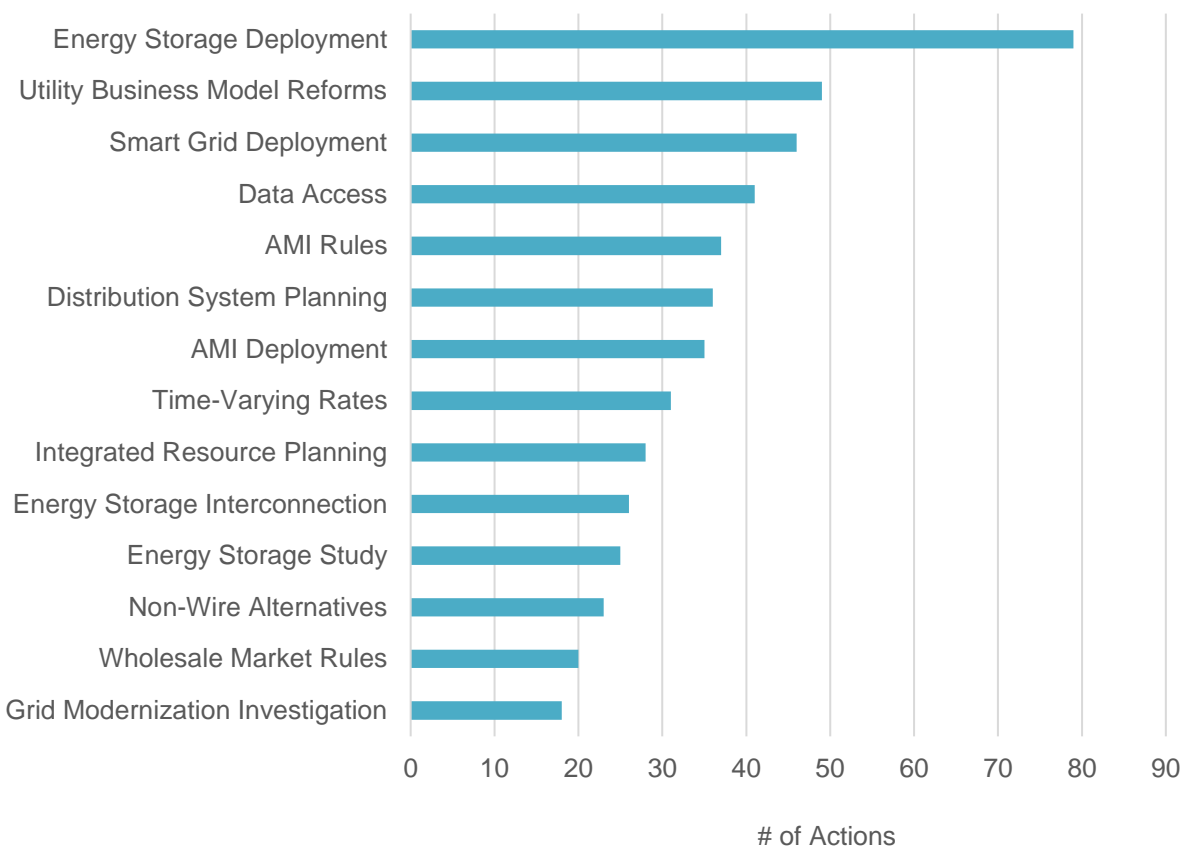
A growing number of utilities proposed advanced rate design pilots during 2020, including elements such as time-varying rates, critical peak pricing, and peak time rebates. Residential

time-of-use rate pilots were the most common, with utilities increasingly incorporating three or four time-of-use periods plus seasonal variation. Some utilities are also requesting approval to make pilot time-of-use rates permanent options, or even the default rate for residential customers.

Growing Focus on Electric Grid Resilience

States and utilities are increasingly focusing on electric grid resilience in the context of planning and investments. A proposed settlement in North Carolina would require Duke Energy to undertake climate resilience planning, and California regulators are developing rules to ensure reliable electric service in the event of extreme weather events. Colorado regulators approved Xcel Energy’s community resilience initiative, and Xcel proposed a similar pilot program in Wisconsin that would deploy resiliency service assets at customer locations.

Figure 6. Top Grid Modernization Actions of 2020



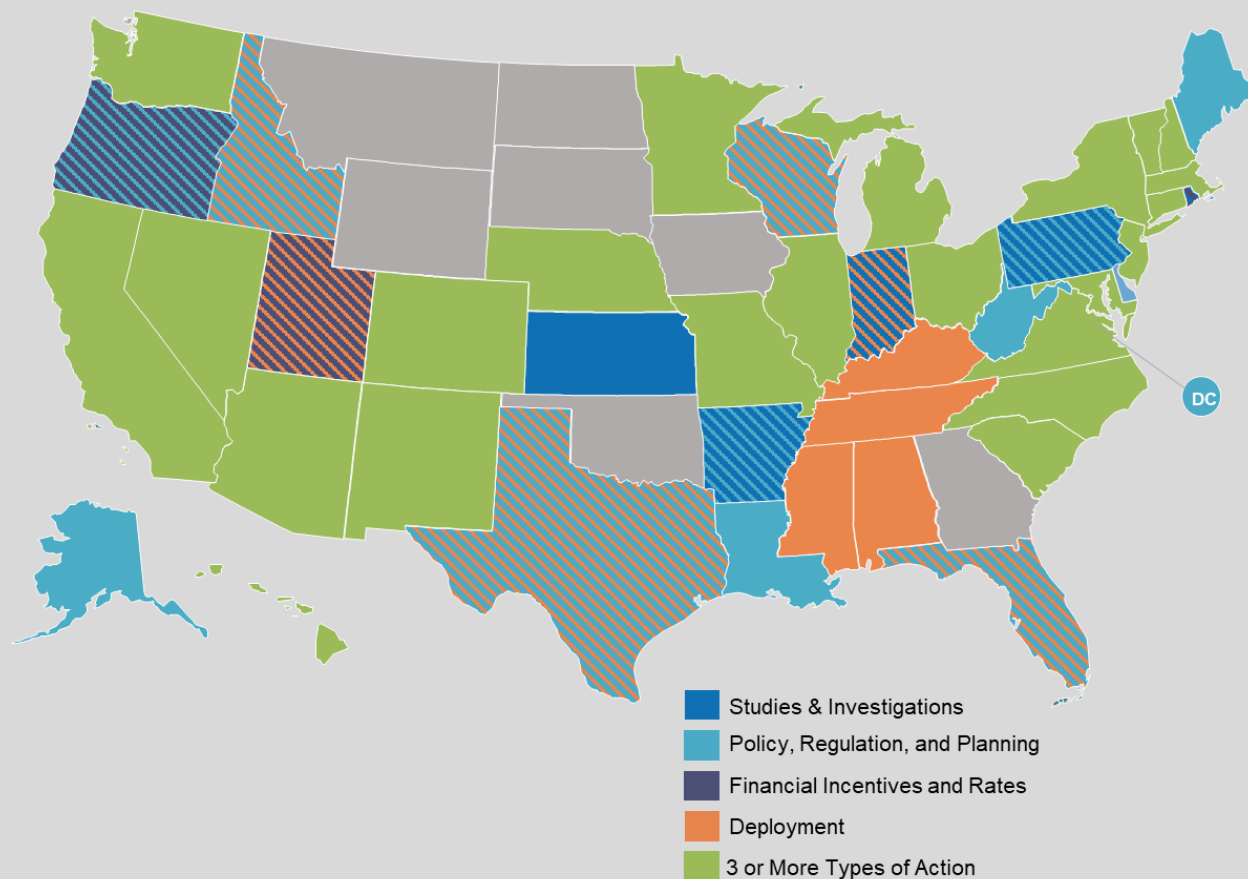
Utilities Planning Extensive Battery Storage Deployment

Energy storage deployment led grid modernization actions for the fourth year in a row, with utilities planning numerous pilot projects, as well as more extensive deployment resulting from competitive procurements or efforts to comply with state storage targets. Many utilities are also planning to add new storage capacity in their integrated resource plans, and some utilities are even planning customer-sited storage deployment.

Policymakers Considering AMI Opt-Out and Data Access Policies

As more and more utilities deploy advanced metering infrastructure (AMI), policymakers and regulators are tasked with establishing rules for opting out of AMI and obtaining access to the interval data generated by AMI. Several states considered legislation concerning AMI opt-out, while regulators evaluated at least 14 utility opt-out fee proposals. Regulators in South Carolina adopted rules governing access to customer AMI interval data, while the New Hampshire Public Utilities Commission worked to develop a statewide energy data platform.

Figure 7. 2020 Energy Storage Action, by Type of Action



Utilities Offering Smart Thermostat Incentive Programs

Several utilities requested approval for smart thermostat incentive programs during 2020, including Dominion Energy, Portland General Electric, Duke Energy, Madison Gas & Electric, and Dayton Power & Light. These programs typically offer a bill credit for participation and allowing the utility to control the thermostat during peak events. Some programs also offer rebates for the thermostats themselves.

LOOKING BACK: 2017 to 2020

Total grid modernization action increased by about 8% over the past year, with states and utilities taking approximately 658 actions in 2020, compared to 612 actions in 2019, 460 actions in 2018, and 288 actions in 2017. In 2020, activity increased in every category tracked by this report except studies and investigations. The two categories that saw the greatest increase in activity were financial incentives (41%) and deployment (17%). The number of states taking actions increased or held steady in each category except planning and market access from 2019 to 2020.

Figure 8. Number of Grid Modernization Actions 2017-2020

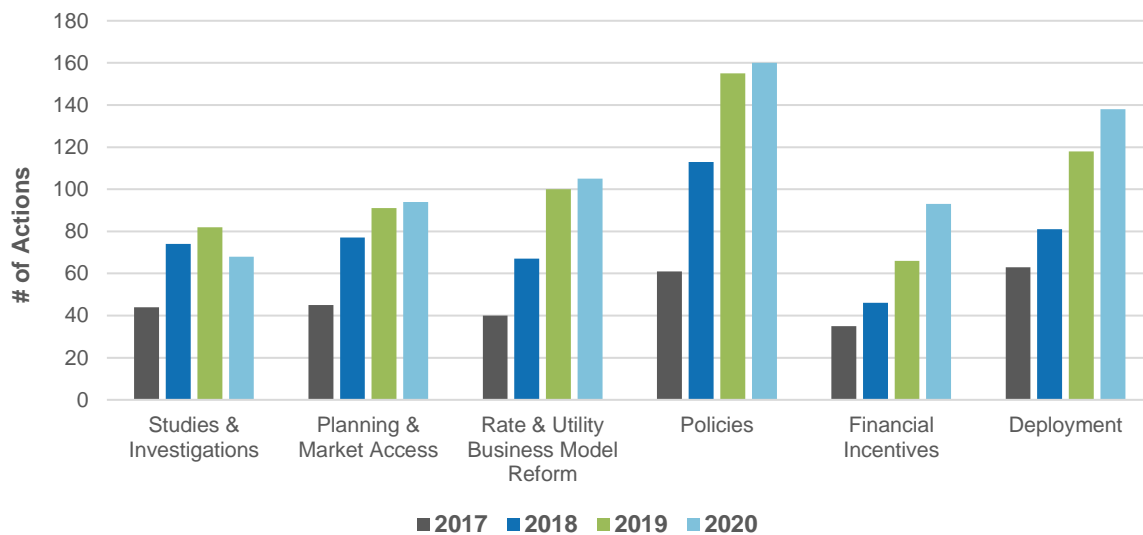
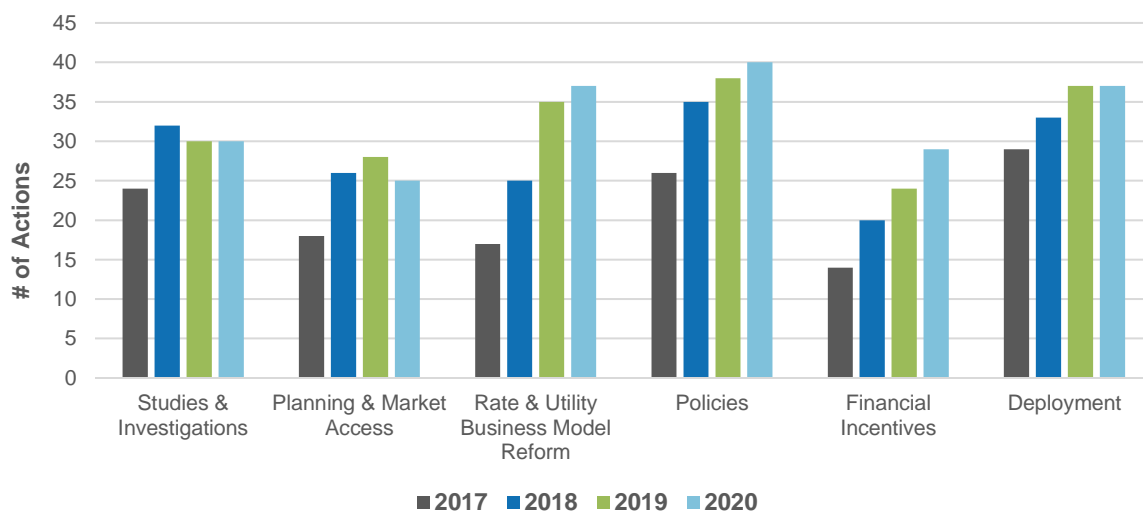


Figure 9. Number of States Taking Grid Modernization Actions 2017-2020



Q4 2020 GRID MODERNIZATION ACTION

In the fourth quarter of 2020, 46 states plus DC took a total of 405 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 405 actions identified, the most common were related to policies (93), followed by deployment (85), and utility business model and rate reform (69).

Table 2. Q4 2020 Summary of Grid Modernization Actions

Type of Action	# of Actions	% by Type	# of States
Policies	93	23%	33 + DC
Deployment	85	21%	32
Business Model and Rate Reform	69	17%	34 + DC
Planning and Market Access	66	16%	22 + DC
Studies and Investigations	46	11%	18 + DC
Financial Incentives	46	11%	15
Total	405	100%	46 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 2020

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

Hawaii Regulators Adopt Performance-Based Regulation Framework

The Hawaii Public Utilities Commission adopted a performance-based regulation framework in December 2020, establishing a five-year multi-year rate period and approving five new performance incentive mechanisms based on streamlining interconnection, utilization of distributed energy resources for grid services, accelerating renewable portfolio standard compliance, improving energy efficiency for low to moderate income customers, and utilization of AMI interval data.

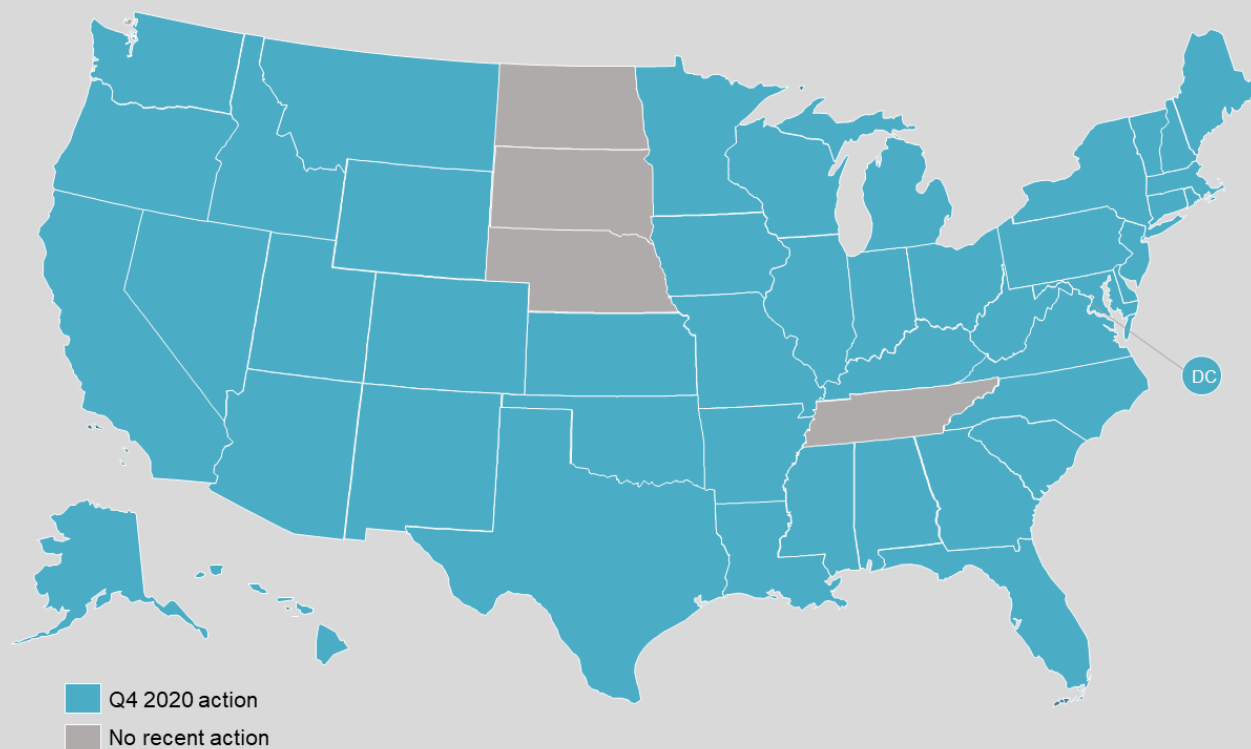
Utilities File Proposal for Southeast Energy Exchange Market

In December 2020, several southeastern utilities announced plans to file for approval from the Federal Energy Regulatory Commission for a centralized, automated, 15-minute energy exchange, called the Southeast Energy Exchange Market (SEEM). The SEEM would allow for bilateral trading among participants, and the utilities estimate that the exchange will provide up to \$50 million in benefits each year, potentially increasing to \$150 million.

Arizona Corporation Commission Adopts Energy Storage Target

The Arizona Corporation Commission adopted an array of energy rule changes in November 2020, including an energy storage target of 5% of peak demand by December 31, 2035. Of this target, 40% is to be met with customer-owned or customer-leased distributed storage. The rules also direct utilities to establish energy storage incentive programs and include changes to integrated resource planning and resource procurement rules.

Figure 10. Q4 2020 Legislative and Regulatory Action on Grid Modernization



Colorado and Oregon Regulators Consider Distribution System Planning Rules

In December 2020, the Colorado Public Utilities Commission opened a rulemaking proceeding to develop distribution system planning rules. The proposed rules would require utilities to file distribution system plans every two years, as well as grid innovation plans and non-wires alternatives cost-benefit methodologies. Oregon regulators approved distribution system planning guidelines during the quarter, which also require utilities to file distribution system plans every two years, including hosting capacity analyses.

Rhode Island Office of Energy Resources Launches New Energy Storage Incentive

The Rhode Island Office of Energy Resources launched a new \$1.5 million energy storage incentive pilot program in October 2020. The program provides an incentive adder based on maximum continuous power rating for commercial-scale energy storage systems that are paired with new renewable energy facilities. For small-scale projects, the adder is a flat \$2,000 per project with a storage component.

MOST ACTIVE STATES AND SUBTOPICS OF Q4 2020

The most common types of actions across the country related to energy storage deployment (52), followed by utility business model reforms (33), distribution system planning (30), smart grid deployment (28), and advanced metering infrastructure rules (26). The states taking the greatest number of actions related to grid modernization in Q4 2020 can be seen in Figure 12. New York, California, and New Jersey took the greatest number of actions during the quarter, followed by Massachusetts, Hawaii, Connecticut, and Michigan.

Figure 11. Most Common Types of Actions Taken in Q4 2020

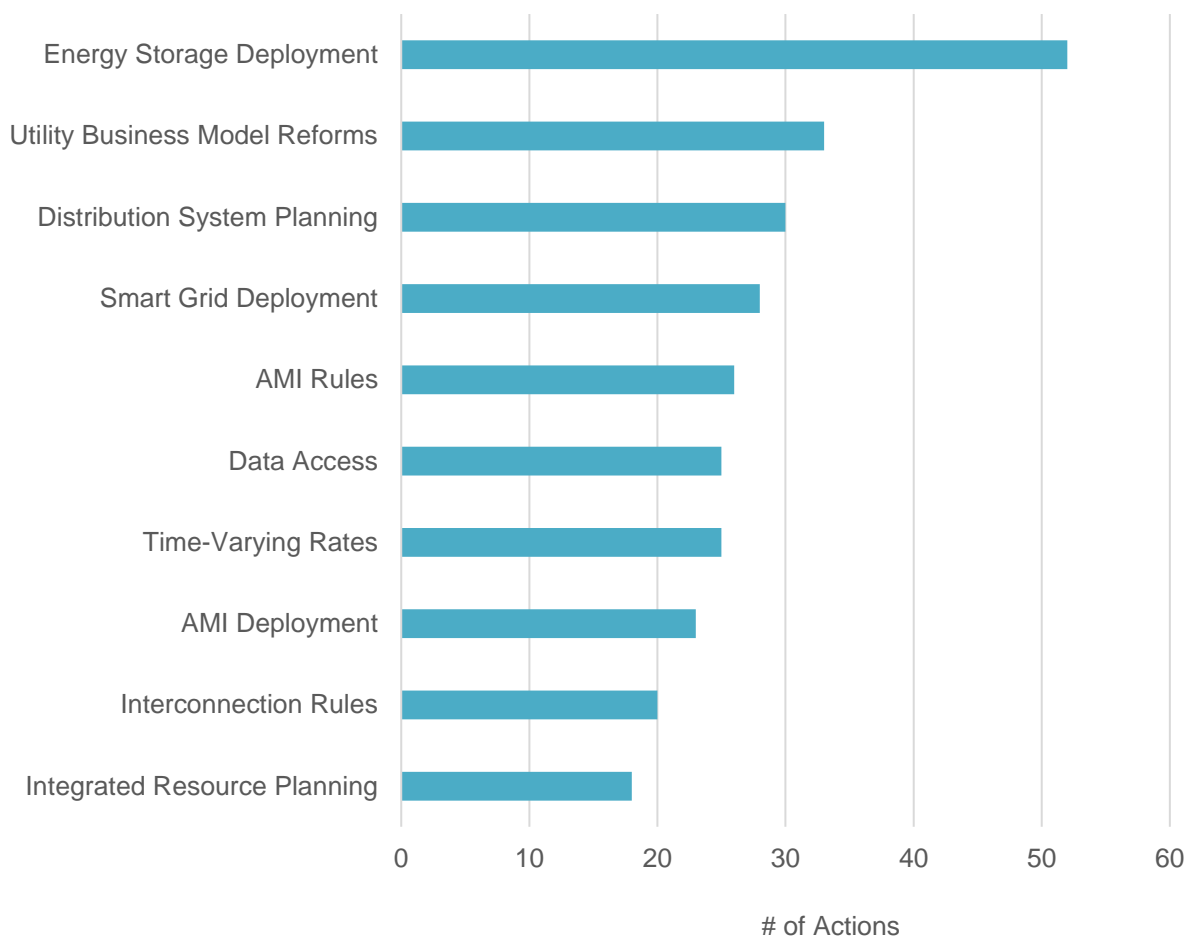
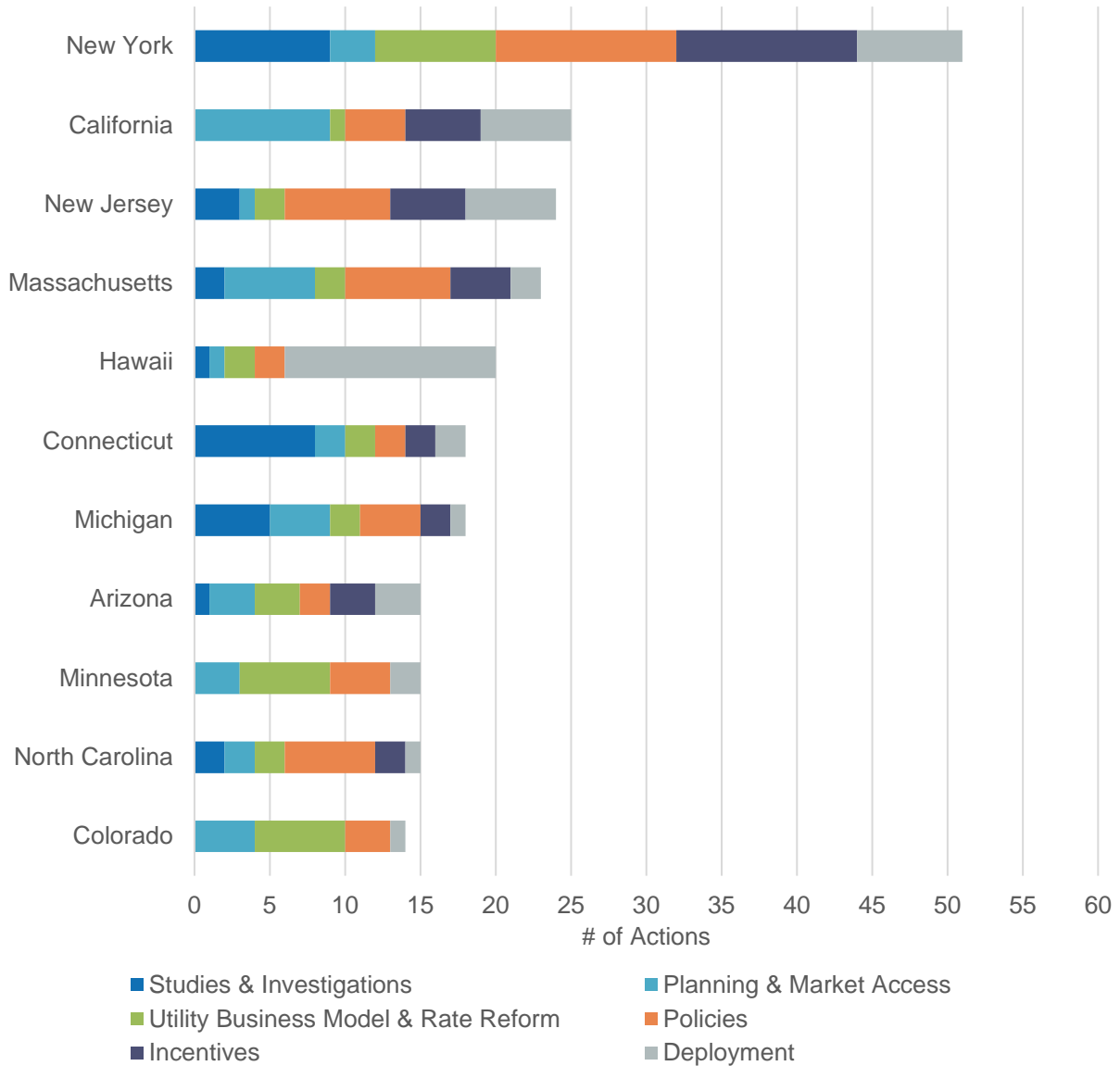


Figure 12. Most Active States of Q4 2020



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 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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