

50

STATES OF

GRID MODERNIZATION

Q4 2024 Report & 2024 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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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*, *The 50 States of Electric Vehicles*, and *The 50 States of Power Decarbonization*. 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

2024 GRID MODERNIZATION ACTION

In 2024, all 50 states plus DC and Puerto Rico took a total of 822 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 822 actions identified, the most common were related to policies (182), followed by deployment (153), and financial incentives (148).

Table 1. 2024 Summary of Grid Modernization Actions

Type of Action	# of Actions	% by Type	# of States
Policies	182	22%	36 + PR
Deployment	153	19%	39 + PR
Financial Incentives	148	18%	40 + PR
Business Model and Rate Reform	134	16%	40 + PR
Studies and Investigations	105	13%	31 + DC, PR
Planning and Market Access	100	12%	28 + DC, PR
Total	822	100%	50 States + DC, PR

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 2024

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

Colorado

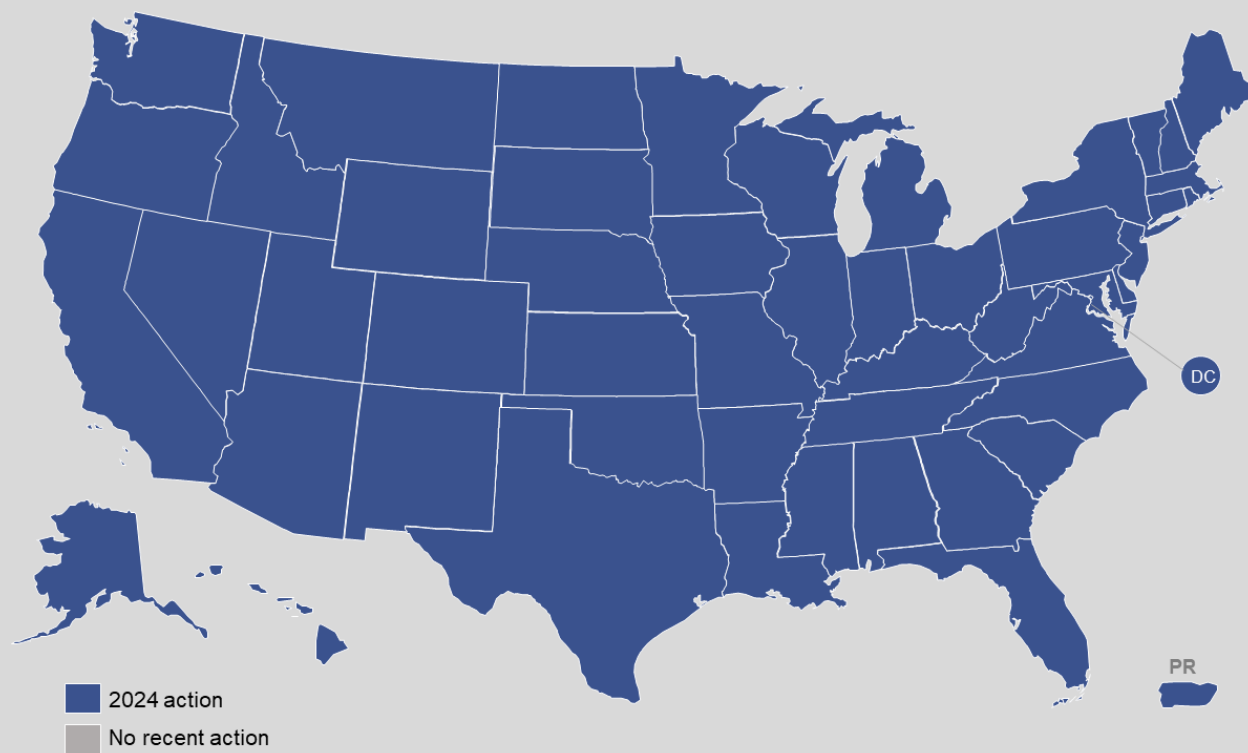
Colorado lawmakers enacted legislation in 2024 directing Xcel Energy to propose virtual power plant (VPP) programs and file a five-year distribution system plan to create sufficient hosting capacity across its system. Xcel Energy filed its distribution system plan later in the year, including a variety of grid modernization investments and plans for a new VPP program. Regulators also considered multiple performance-based regulation measures, while the Colorado Energy Office worked to develop a microgrid roadmap.

New Jersey

The New Jersey Board of Public Utilities opened a new proceeding to investigate virtual power plant opportunities, filed a final straw proposal for a statewide energy storage incentive program, and initiated a workgroup to develop integrated distribution and distributed energy

resource system planning requirements. The Board also released proposed data access standards and approved new utility VPP and demand response programs.

Figure 1. 2024 Legislative and Regulatory Action on Grid Modernization



New York

The New York Public Service Commission opened a new “Grid of the Future” proceeding to increase the deployment and use of flexible resources. Regulators also approved a new roadmap for achieving the state’s energy storage target, and NYSERDA filed an implementation plan for a new bulk energy storage program. Meanwhile, the state’s investor-owned utilities submitted a proposed long-term proactive grid planning framework.

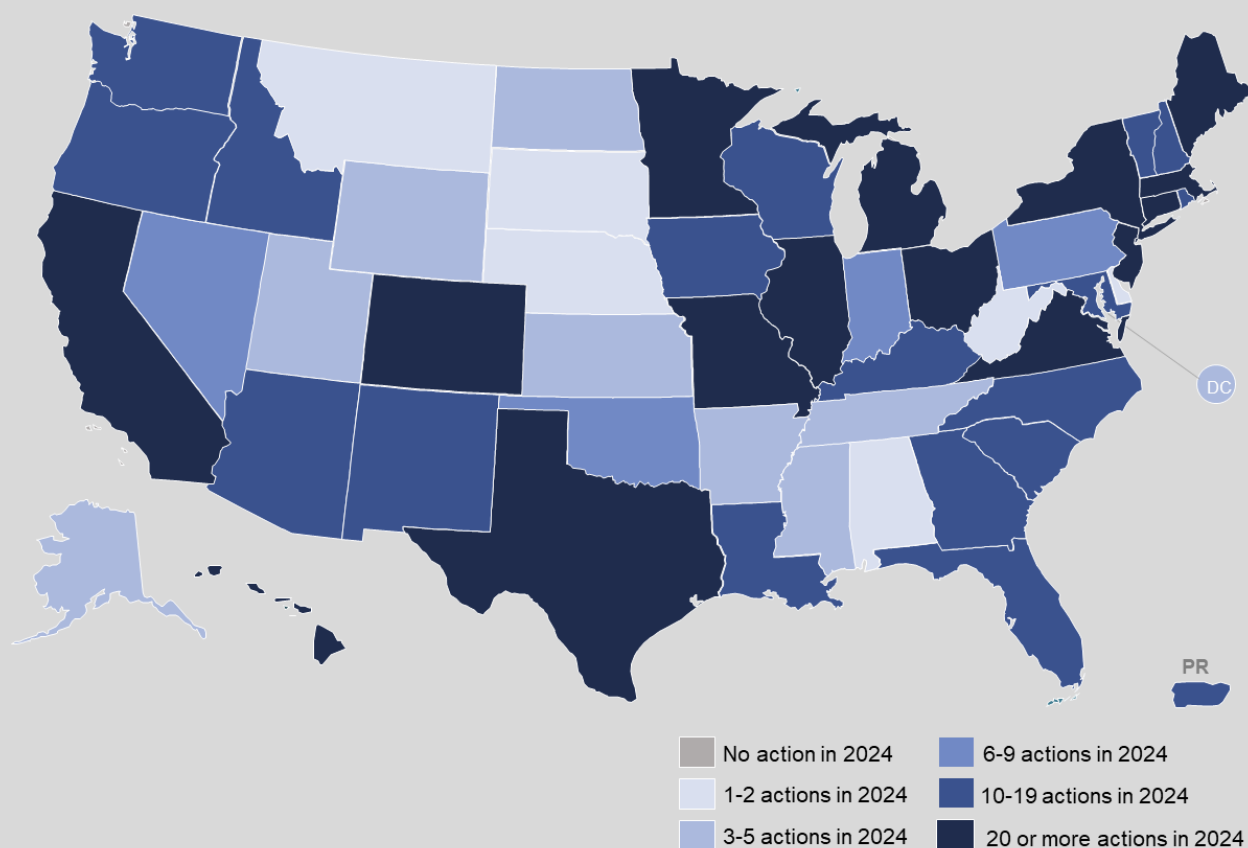
Massachusetts

Massachusetts regulators approved the three electric distribution companies’ final electric sector modernization plans, encompassing a significant amount of grid modernization investment. Regulators also considered performance-based regulation proposals from Unital and National Grid, while lawmakers enacted an expansive bill increasing the state’s energy storage target and advancing the use of grid-enhancing technologies.

Connecticut

In Connecticut, the Public Utilities Regulatory Authority (PURA) released a straw proposal on performance incentive mechanisms, as well as a decision on the evaluation of non-wires solutions. PURA also made changes to the state's energy storage incentive program and considered a number of interconnection rule modifications. PURA Staff filed a concept paper on integrated distribution system planning, while Unitil completed a report on time-varying rates.

Figure 2. 2024 Grid Modernization Activity, by Number of Actions



Minnesota

As part of an integrated resource plan filed in Minnesota, Xcel Energy detailed plans for a new distributed capacity procurement. The Public Utilities Commission issued an order refining data access standards and also opened new proceedings on integrated distribution planning rules, distribution system cost sharing for interconnection in constrained areas, advanced rate design for load management, and a framework for proactive grid upgrades and cost allocation.

California

The California Energy Commission considered modifications to the Demand Side Grid Support program, while state lawmakers enacted a bill advancing the use of grid-enhancing technologies. The Public Utilities Commission adopted improvements to the distribution system planning process, as well as implementation rules for multi-property microgrid tariffs. Regulators also initiated a rulemaking on the safety, reliability, and resiliency of the electric distribution system, and CAISO filed a final proposal for energy storage bid cost recovery.

Maryland

Maryland lawmakers enacted legislation requiring the development of a VPP program and opt-in time-varying rates for investor-owned utilities. A workgroup focused on distribution system planning (DSP) filed proposed recommendations for the state's DSP process, and the Public Service Commission initiated a rulemaking to facilitate the launch of the Maryland Energy Storage Initiative programs.

Illinois

Illinois regulators approved integrated grid plans filed by Ameren Illinois and Commonwealth Edison, which include significant investment in grid modernization. The orders also direct the utilities to develop VPP programs. The Illinois Power Agency completed an energy storage policy study and a report assessing Ameren's continued participation in MISO.

Michigan

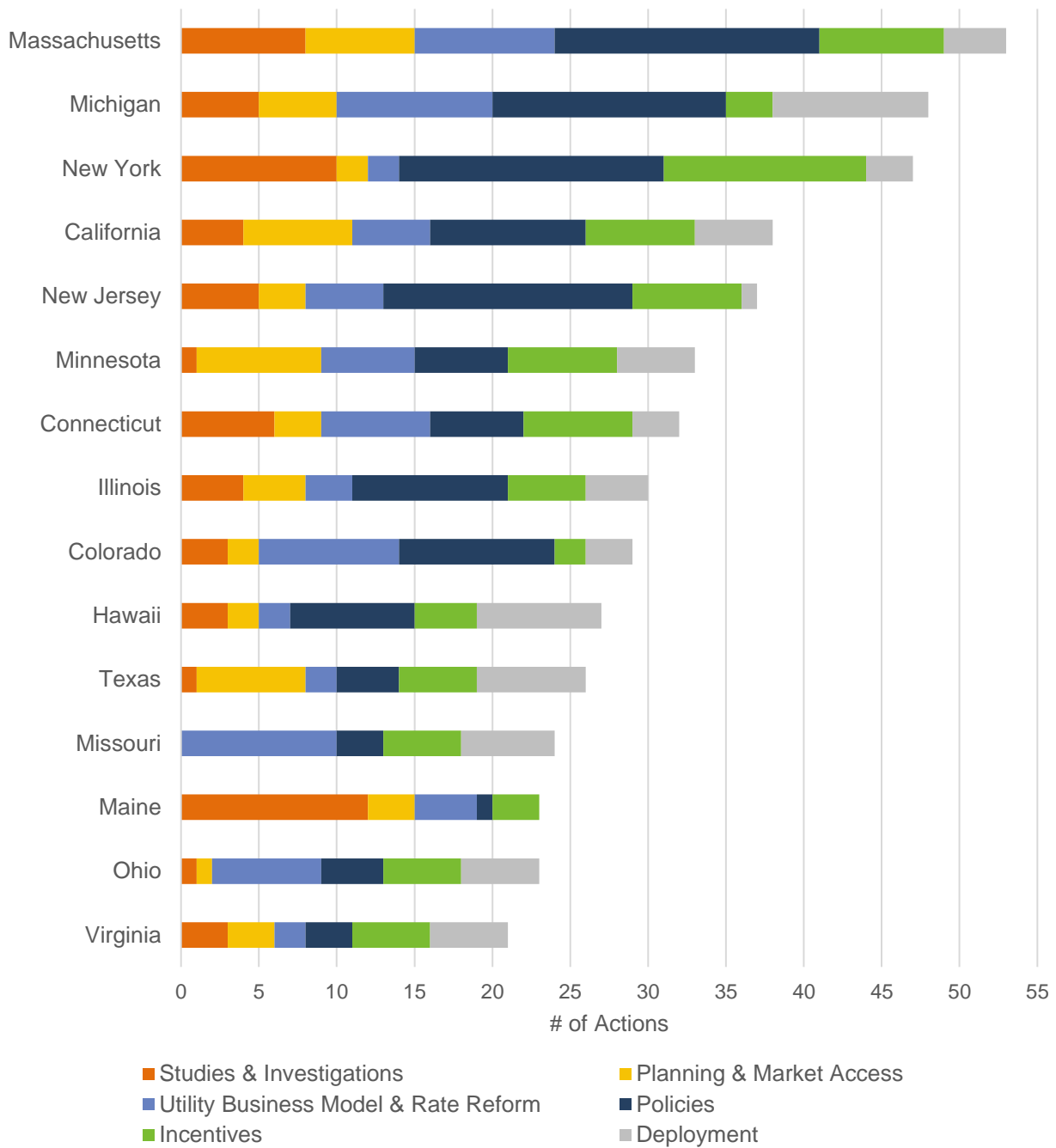
The Michigan Public Service Commission Staff released a straw proposal on improvements to the distribution system planning process. Meanwhile, the Commission worked to implement 2023 legislation adopting an energy storage target and considered distribution system plans filed by utilities. The state's demand response aggregation workgroup and financial incentives and disincentives workgroups continued their work.

TOP GRID MODERNIZATION TRENDS OF 2024

Establishing Distribution System Planning Guidelines

Several states took steps to establish formal rules or guidelines for utility distribution system planning (DSP). Michigan Public Service Commission Staff released a straw proposal on DSP process improvements, while a Maryland DSP work group released its recommendations. California regulators approved modifications to the state's DSP rules, and the DC Public Service Commission opened a new proceeding to implement an integrated DSP process. New Mexico regulators also filed draft integrated DSP rules.

Figure 3. Most Active States of 2024



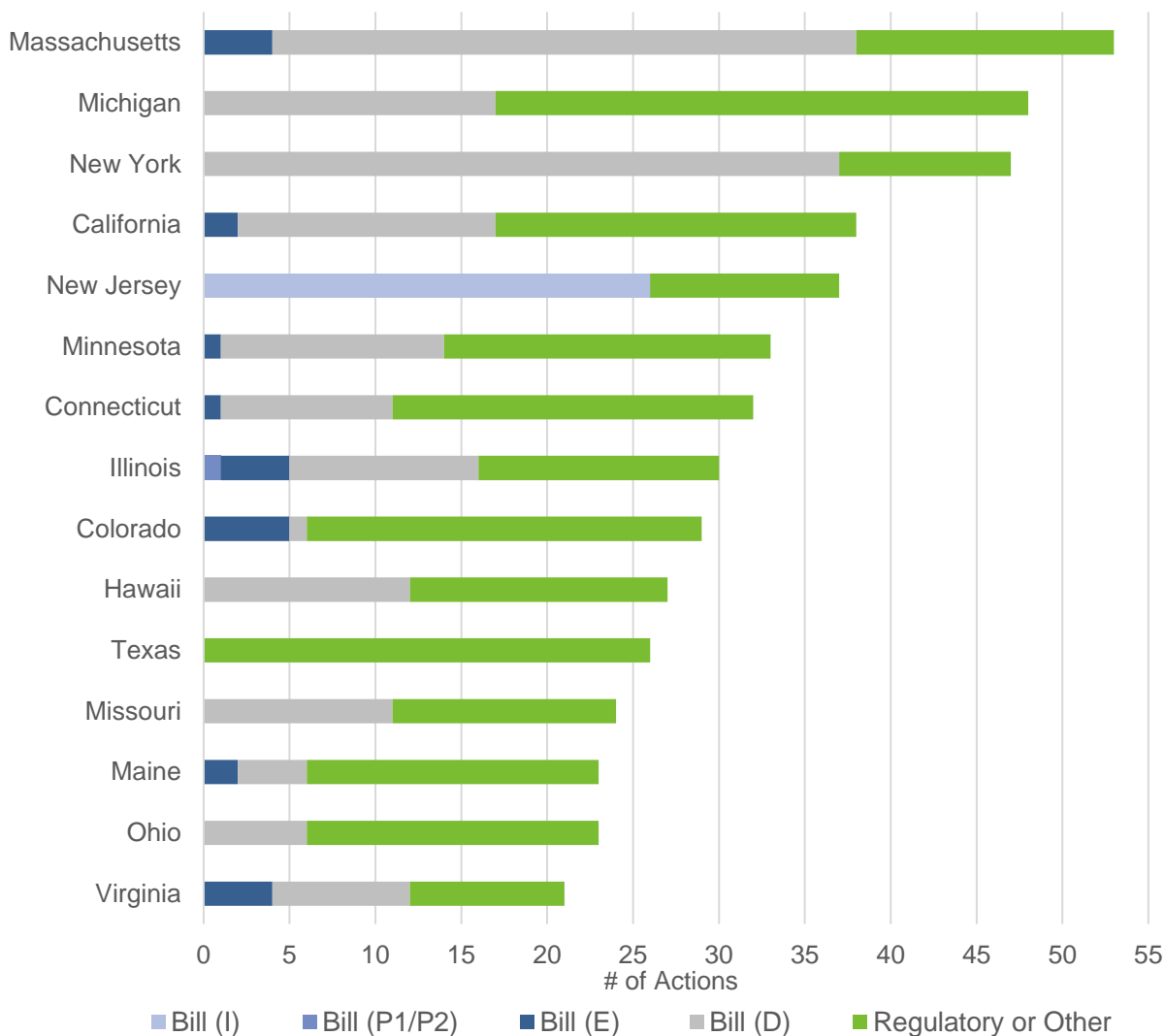
Evaluating Opportunities for Grid-Enhancing Technologies

A number of states advanced the use of grid-enhancing technologies by evaluating opportunities to deploy them and incorporating this technology into existing grid planning processes. California lawmakers enacted legislation requiring a study of grid-enhancing technologies. Legislators in Maine, Massachusetts, Minnesota, and Virginia also enacted bills initiating examinations of grid-enhancing technology opportunities.

Investigating and Creating State Frameworks for Virtual Power Plants

Distributed energy resource (DER) aggregations, or virtual power plants (VPPs), have become a topic of interest across the country, with several states opening new investigatory proceedings or working to develop statewide frameworks for VPP programs. Regulators in New Jersey, Pennsylvania, and Wisconsin opened new VPP proceedings this year, while lawmakers in Colorado and Maryland enacted bills establishing state VPP guidance.

Figure 4. Most Active States of 2024, by Action Status



Developing Expansive Grid Investment Plans

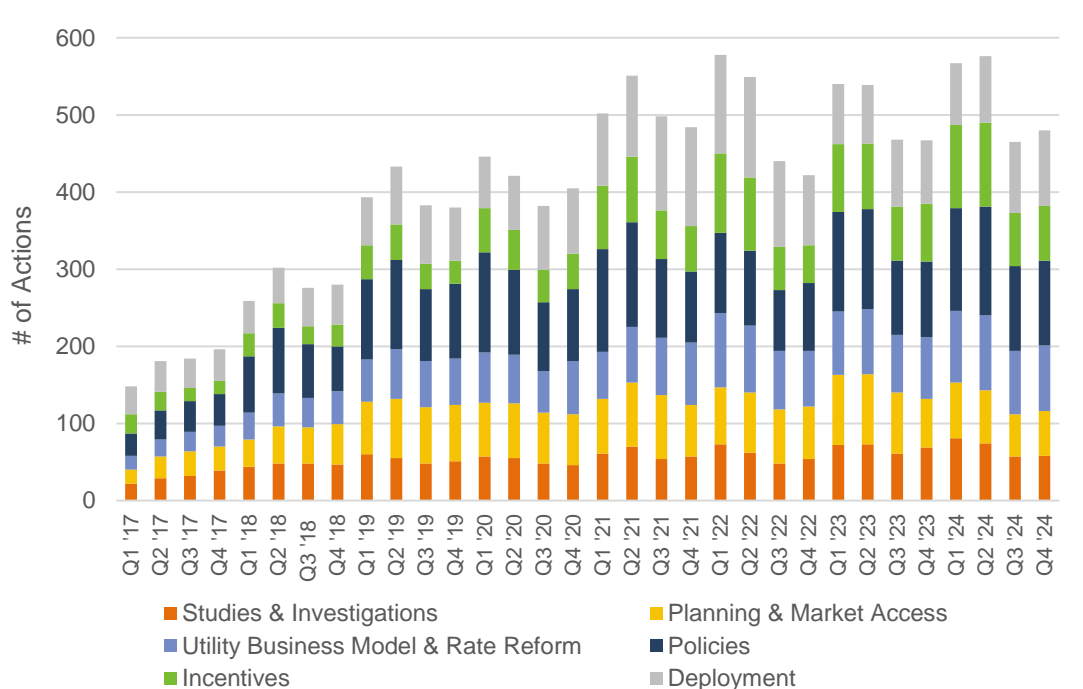
As more states adopt formal grid planning processes, utilities are filing plans that include proposed investments in a variety of grid modernization technologies, as well as new customer-facing programs. Regulators in Illinois and Massachusetts approved expansive utility plans including extensive grid investment and VPP program development. Regulators in

Michigan, Minnesota, Ohio, and Oregon also considered utility distribution plans, while Texas regulators evaluated grid resilience plans filed by utilities.

Examining Performance-Based Regulation Tools

While some states are currently implementing performance-based regulation (PBR) mechanisms, other states are at an earlier stage and examining the potential for PBR tools. Virginia legislators passed a resolution initiating a study of PBR tools, while the Oklahoma Corporation Commission released a report on alternative ratemaking methodologies. Michigan’s financial incentives and disincentives workgroup submitted a final report and straw proposal, and Washington regulators issued an initial policy statement on PBR.

Figure 5. Total Number of Grid Modernization Actions by Quarter



Moving Toward Incentive Programs with Active Control or Performance Incentives

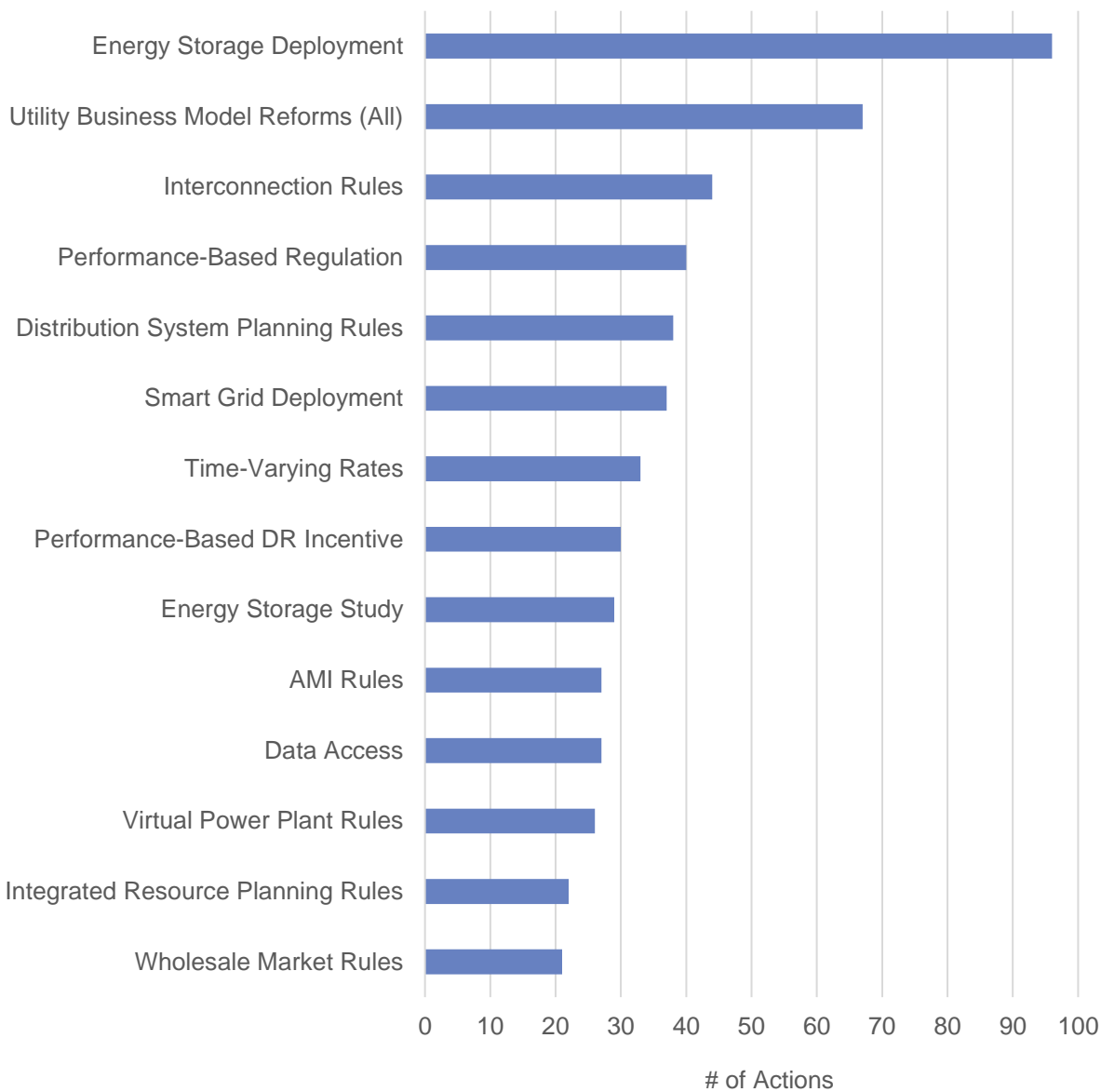
Increasingly, utilities are designing customer incentive programs that incorporate performance incentives or active control for DERs and demand management. Many of these programs involve utility control of smart thermostats or air conditioning, including programs proposed by utilities in New Jersey and Ohio. Other programs are focusing on battery storage systems, such as programs under consideration in Maine, New Hampshire, Oregon, and Virginia.

Piloting Advanced Time-Varying Rate Designs

While time-varying rates have become relatively common rate options across the country, many utilities are now piloting more advanced time-varying rate structures, including those

incorporating critical peak pricing. El Paso Electric filed new pilot rates incorporating critical peak pricing in New Mexico and Texas, and Minnesota regulators opened a new proceeding on Xcel Energy’s advanced rate design for load management.

Figure 6. Top Grid Modernization Actions of 2024



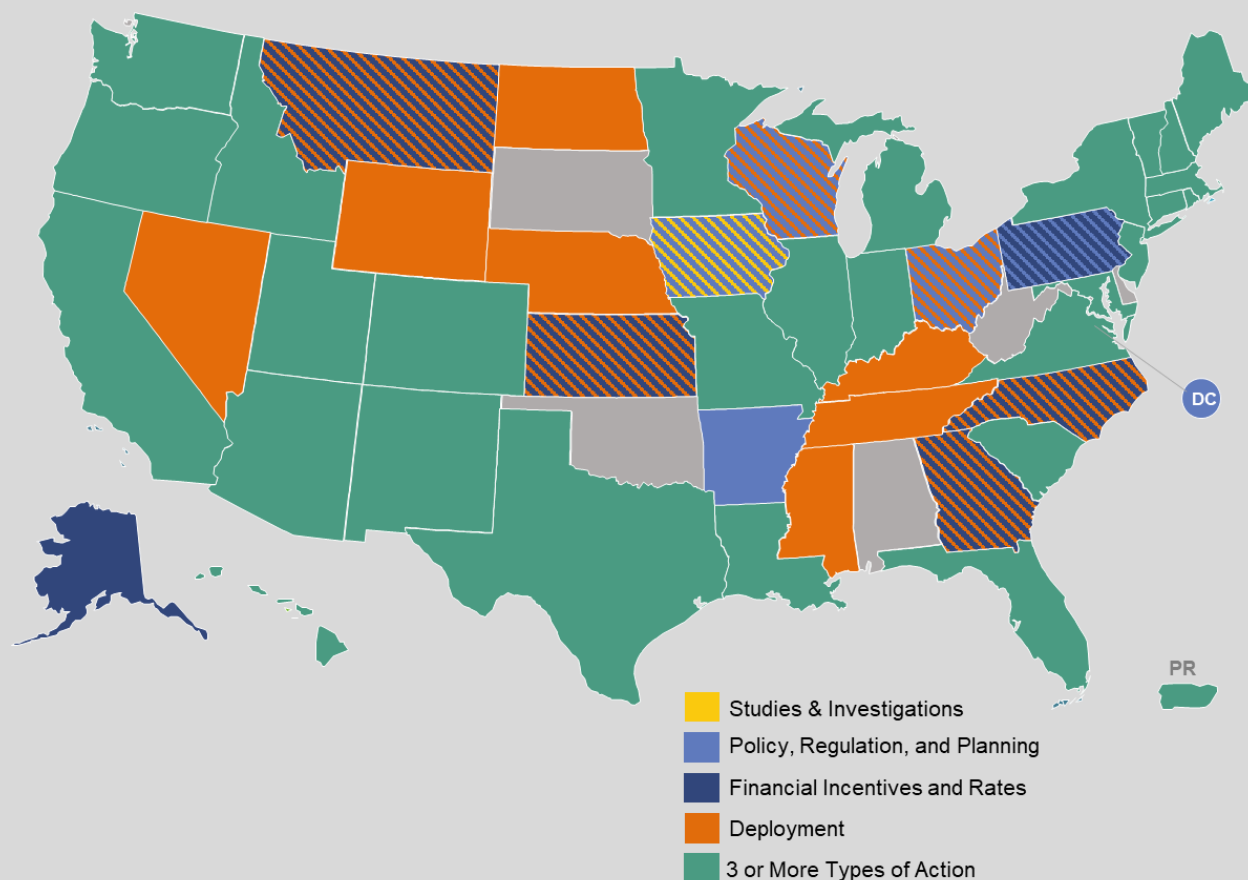
Planning for Long-Duration Battery Storage Deployment

Although the vast majority of battery storage deployment to date has focused on systems with durations of two to four hours, a growing number of utilities are incorporating medium- and long-duration storage into their resource plans. Avista Utilities, Idaho Power, PacifiCorp are among the utilities with long-duration storage in their latest resource plans. Meanwhile, Massachusetts legislators adopted a new energy storage target with specific carve-outs for medium- and long-duration storage.

Implementing Cost Sharing for Interconnection-Related Grid Upgrades

Interconnection rules and cost allocation procedures were a significant topic of interest in 2024, with a number of states allowing cost sharing for grid upgrades triggered by interconnection applications. Minnesota regulators opened a proceeding to establish tariffs for distribution system cost sharing for interconnection in constrained areas. Cost sharing rules were also considered in Colorado, Connecticut, and Maryland.

Figure 7. 2024 Energy Storage Action, by Type of Action



Undertaking Resilience-Focused Grid Planning

A number of states are undertaking planning efforts focused on grid resilience, in large part to address threats such as wildfires and hurricanes. The California Public Utilities Commission began a new rulemaking to update rules for the safety, reliability, and resiliency of the distribution system, while Puerto Rico regulators opened a proceeding to develop a priority plan to address major outages. Utilities in Texas filed transmission and distribution system resiliency plans throughout the year.

LOOKING BACK: 2017 to 2024

Total grid modernization action increased substantially over last year, nearly reaching its previous peak level. States and utilities took approximately 822 actions in 2024, compared to 774 actions in 2023, 778 actions in 2022, 823 actions in 2021, 658 actions in 2020, 612 actions in 2019, 460 actions in 2018, and 288 actions in 2017. In 2024, activity increased in the areas of rate and utility business model reform, policies, financial incentives, and deployment. All 50 states, plus DC and Puerto Rico, took grid modernization actions in 2024.

Figure 8. Number of Grid Modernization Actions 2017-2024

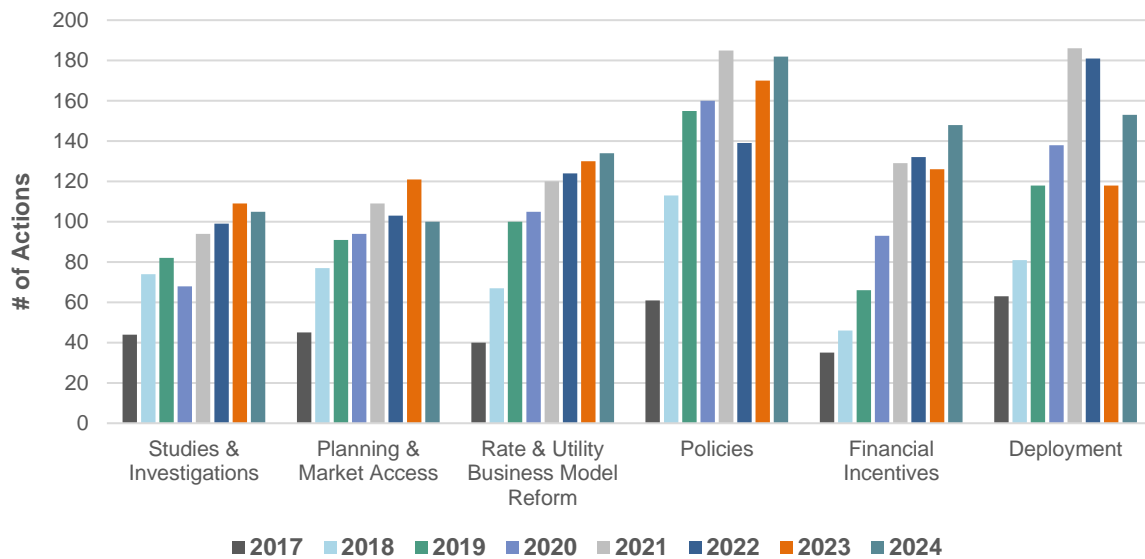
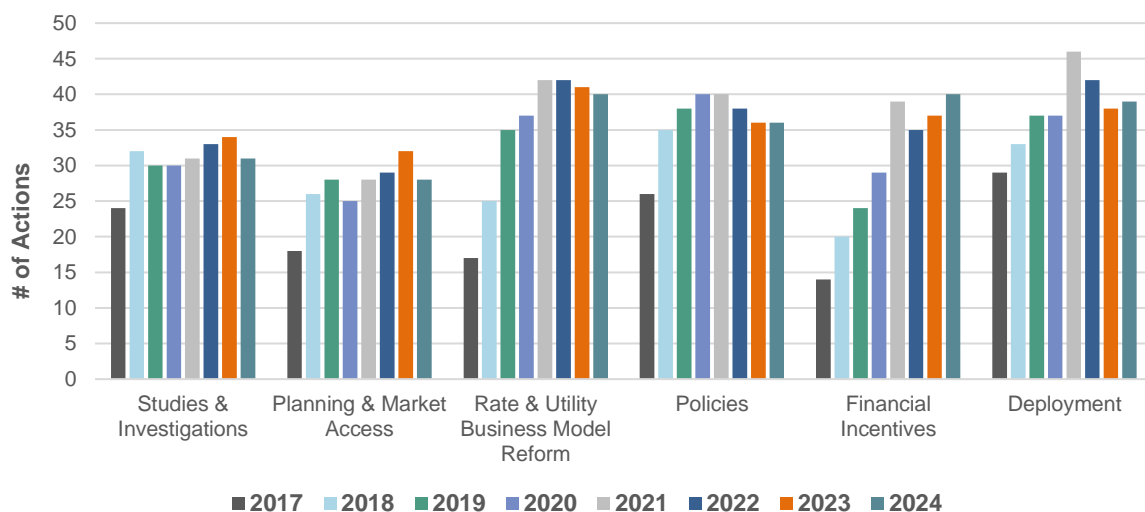


Figure 9. Number of States Taking Grid Modernization Actions 2017-2024



Q4 2024 GRID MODERNIZATION ACTION

In the fourth quarter of 2024, 47 states plus DC and Puerto Rico took a total of 502 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 502 actions catalogued, the most common were related to policies (110), deployment (98), and utility business model and rate reform (85).

Table 2. Q4 2024 Summary of Grid Modernization Actions

Type of Action	# of Actions	% by Type	# of States
Policies	110	22%	26 + PR
Deployment	98	20%	38
Business Model and Rate Reform	85	17%	37 + PR
Financial Incentives	71	14%	27 + PR
Planning and Market Access	69	14%	21 + DC, PR
Studies and Investigations	69	14%	19 + DC, PR
Total	502	100%	47 States + DC, PR

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 2024

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

Illinois Commerce Commission Approves Utility Grid Plans

The Illinois Commerce Commission approved multi-year integrated grid plans filed by Ameren Illinois and Commonwealth Edison. The plans include investments in distributed energy resource management systems and advanced distribution management systems, among other technologies. The Commission’s orders also directed the utilities to engage with stakeholders to develop new virtual power plant programs.

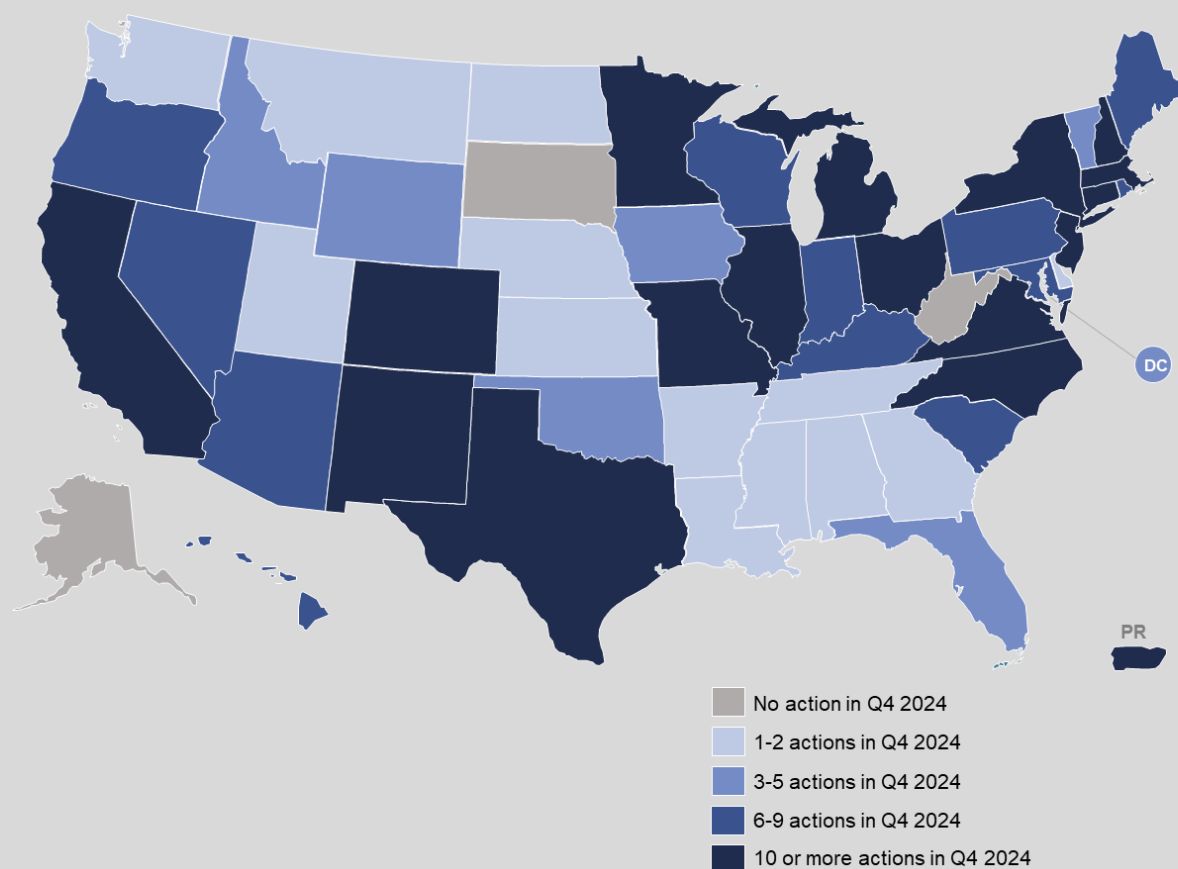
Battery Demand Response Programs Proposed in Maine and Virginia

Efficiency Maine included plans for a new aggregated battery storage incentive program as part of its Triennial Plan for 2026-2028. Efficiency Maine would pay storage aggregators for capacity made available during targeted peak hours. In Virginia, Dominion Energy also proposed a new battery storage program as part of its 2024 demand-side management update. The program will provide participants with an upfront incentive and performance-based incentives for participating in demand response events.

Massachusetts Lawmakers Adopt New Energy Storage Target

The Massachusetts General Court enacted legislation in November 2024 that establishes a new energy storage target. The bill calls for utilities to enter into long-term contracts for up to 5 GW of energy storage by July 31, 2030, of which 3.5 MW must be mid-duration energy storage, 750 MW must be long-duration storage, and 750 MW must be multi-day storage.

Figure 9. Q4 2024 State and Utility Action on Grid Modernization



New Jersey Regulators File Energy Storage Incentive Straw Proposal

In November 2024, the New Jersey Board of Public Utilities Staff filed a final straw proposal for a new energy storage incentive program. The straw proposal includes incentives for both front-of-the-meter and behind-the-meter projects, as well as an adder for projects in overburdened communities. Initial target incentive amounts range from \$150 per kWh to \$300 per kWh, depending on project size.

New Orleans City Council Opens Distributed Energy Resources Proceeding

The New Orleans City Council, which regulates Entergy New Orleans, opened a new proceeding in November 2024 focused on evaluating ways to increase the availability of distributed energy resources in light of the frequency and intensity of severe weather events, rapidly changing climate conditions, and increased demand on the grid. Participating parties are currently considering battery storage programs that could support resilience.

MOST ACTIVE STATES AND SUBTOPICS OF Q4 2024

The most common types of actions across the country related to energy storage deployment (59), utility business model reforms (45), smart grid deployment (33), interconnection rules (32), and performance-based regulation (28).

The states taking the greatest number of actions related to grid modernization in Q4 2024 can be seen in Figure 11. New York, Massachusetts, Michigan, and New Jersey saw the most action during the quarter, followed by California, Ohio, and Texas. Overall, 47 states, plus DC and Puerto Rico, took actions related to grid modernization in Q4 2024.

Figure 10. Most Common Types of Actions Taken in Q4 2024

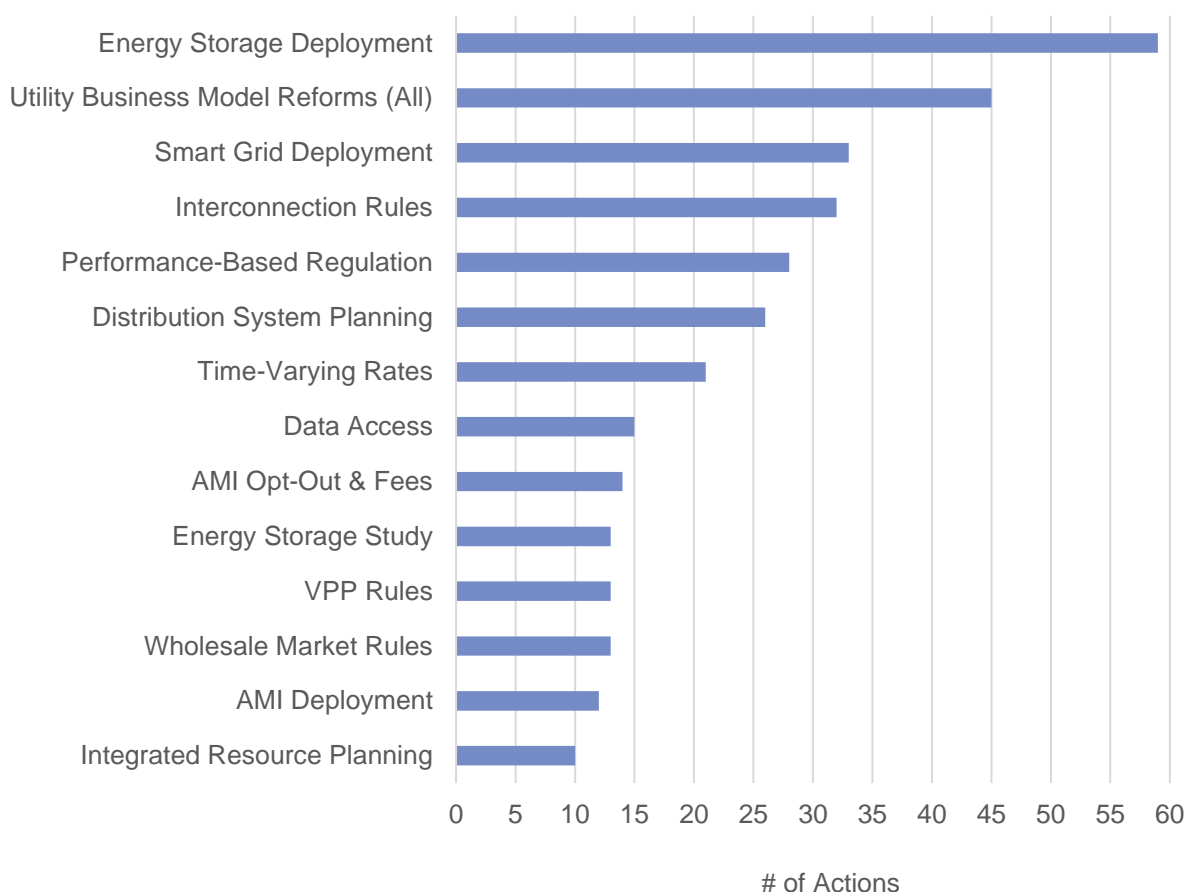
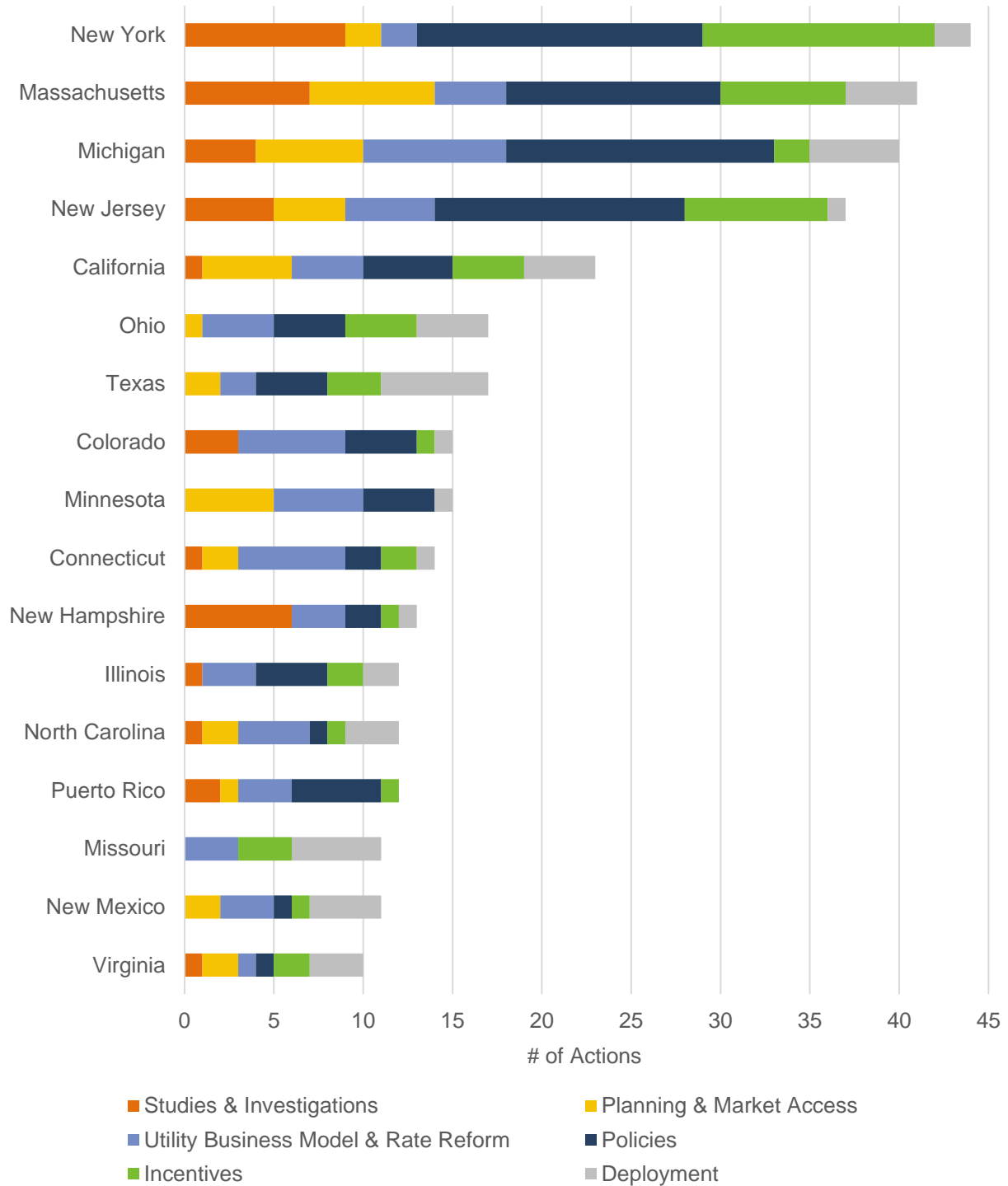


Figure 11. Most Active States of Q4 2024



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

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- Cite an objective source in your own research and analysis

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