

50 States of GRID MODERNIZATION

Q1 2017 Quarterly Report

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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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OTHER 50 STATES REPORTS

In addition to *The 50 States of Grid Modernization*, the NC Clean Energy Technology Center publishes a quarterly report called *The 50 States of Solar*. Previous editions of *The 50 States of Solar* are available for download at www.nccleantech.ncsu.edu or by clicking here:

- [Q1 2017 Executive Summary](#)
- [Q4 2016 and 2016 Policy Review – Executive Summary](#)
- [Q3 2016 Executive Summary](#)
- [Q2 2016 Executive Summary](#)
- [Q1 2016](#)
- [Q4 2015 and 2015 Policy Review](#)
- [Q3 2015](#)
- [Q2 2015](#)
- [Q1 2015](#)
- [Q4 2014](#)

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GLOSSARY OF ABBREVIATIONS

ALJ	Administrative Law Judge
d/b/a	Doing Business As
DER	Distributed Energy Resource
DG	Distributed Generation
IOU	Investor-Owned Utility
IRP	Integrated Resource Plan
GW	Gigawatt
kW	Kilowatt
kWh	Kilowatt-Hour
MW	Megawatt
NEM	Net Energy Metering
PACE	Property Assessed Clean Energy
PPA	Power Purchase Agreement
PV	Photovoltaics
REC	Renewable Energy Credit
RPS	Renewable Portfolio Standard
TOU	Time-of-Use

OVERVIEW

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 is intended to be inclusive of the following topics: (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 on 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 provides regular quarterly updates 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 communication with stakeholders and regulators in the industry.

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 are states and utilities proposing deployment of advanced grid technologies, energy storage, microgrids, and demand response programs?

Actions Included

This report focuses on cataloguing and describing important proposed and adopted policy changes related to grid modernization and distributed energy resources, *excluding 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* and are generally not included in this report.

In general, this report considers an “action” to be a relevant (1) legislative bill that has been introduced or (2) a regulatory docket, utility rate case, or rulemaking proceeding. Only statewide actions and those related to investor-owned utilities are included in this report. Specifically, actions tracked in this issue include:

Studies and Investigations

Legislative or regulatory-led efforts to study energy storage, grid modernization, utility business model reform, or alternative rate designs, e.g., through a regulatory docket or a cost-benefit analysis.

Planning and Market Access

Changes to utility planning processes, including integrated resource planning, distribution system planning, and evaluation of non-wires alternatives, as well as changes to state and wholesale market regulations enabling market access.

Utility Business Model and Rate Reform

Proposed or adopted changes to utility regulation and rate design, including performance-based ratemaking, decoupling, time-varying rates, and residential demand charges.

Time-varying rate and residential demand charge proposals are only documented if they are being implemented statewide, the default option for all residential customers of an investor-owned utility, or a notable pilot program intended to soon become a default option. Actions related to inclining or declining block rates are not included in this report.

Grid Modernization Policies

New state policy proposals or changes to existing policies related to grid modernization, including energy storage targets, clean peak standards, and energy storage compensation policies.

Financial Incentives for Energy Storage and Advanced Grid Technologies

New statewide incentives or changes to existing incentives for energy storage, microgrids, and other advanced grid technologies.

Deployment of Advanced Grid Technologies

Utility-initiated requests, as well as proposed legislation, to implement demand response programs or to deploy advanced metering infrastructure, smart grid technologies, microgrids, or energy storage.

Actions Excluded

This report excludes utility proposals for grid investments without a modernization component, as outlined above, as well as projects that have already received legislative or regulatory approval. Actions related exclusively to pumped hydroelectric storage or electric vehicles are not covered by this report. While actions taken by municipal utilities and electric cooperatives are not comprehensively tracked in this report, particularly noteworthy or high-impact actions will be covered. The report also excludes changes to policies and rate design for distributed generation customers; these changes are covered in the 50 States of Solar quarterly report.

THE U.S. ELECTRICITY SYSTEM IN TRANSITION

The U.S. electricity grid is in a state of transition. The system has traditionally been a “one-way street”, with power flowing from utility-owned centralized generation, via utility-owned transmission and distribution lines, toward end-use customers. However, the electric system is increasingly becoming more of an interconnected web, with small but growing numbers of end-use customers also generating electricity with small-scale, distributed systems that are capable of providing various services to the grid.

Technology is making rapid advancements, continuing to offer new benefits to the electric system. Policy, however, has not kept pace with the speed of technical energy advancements, with most U.S. electricity policy still focused primarily on the traditional one-way, centralized system model and its institutions. This is changing, though, with more and more states initiating investigations into advanced grid technologies and proposing policy and regulatory changes intended to enable the development of a modern electric system.

Grid Modernization

Grid modernization is an expansive topic, capturing the many individual pieces of the transition occurring in our nation’s energy system. A major element of this transition is the deployment of new technologies, such as advanced metering infrastructure and smart grid technologies, including communications and control technologies for managing distributed energy resources of all kinds. These technologies offer the opportunity to bring new benefits to both utilities and consumers, including economic, environmental, reliability, security, and consumer experience benefits.

The deployment of advanced grid technologies is already underway. The market for distributed generation, namely solar photovoltaics, is already scaling rapidly, while the energy storage market is expected to grow from an expected 6 GW of annual installed capacity in 2017 to over 40 GW in 2022.¹ Utilities had already deployed nearly 65 million smart meters by the end of 2015, covering over 50% of U.S. households, and more installations are underway.²

But before advanced grid technologies can be utilized to their fullest extent, regulatory structures must be reformed in order to remove existing barriers to deployment. By reexamining regulatory frameworks, business models, and rate designs, an energy system that allows for fair evaluation of technological options, greater market participation, and full and open compensation may be created.

Over half of U.S. states are currently examining these regulatory frameworks or actively working to deploy advanced grid technologies. This activity is expected to continue, much like the ongoing evaluation of state solar policies, as states and utilities conduct studies, try new approaches, and learn from each other to achieve a more modern grid.

OVERVIEW OF Q1 2017 POLICY CHANGES

Table 1 provides a summary of state actions related to grid modernization occurring during Q1 2017. Of the 148 actions catalogued, the most common were those related to deployment of advanced grid technologies (36), followed by policies (29), and financial incentives (25). The actions occurred across 37 states plus DC in Q1 2017 (Figure 1). Box 1 highlights some of the key actions of Q1 2017, described in greater detail in the following sections.

Table 1. Summary of Grid Modernization Actions (Q1 2017)

Type of Action	# of Actions	% by Type	# of States
Deployment	36	24%	19
Policies	29	20%	16
Financial Incentives	25	17%	11
Studies and Investigations	22	15%	16 + DC
Business Model and Rate Reform	18	12%	13
Planning and Market Access	18	12%	12
Total	148	100%	37 States + DC

Note: The “# of States/ Districts” total is not the sum of the rows because some states have multiple actions. Percentages are rounded and may not add up to 100%.

Figure 1. Legislative and Regulatory Action on Grid Modernization (Q1 2017)

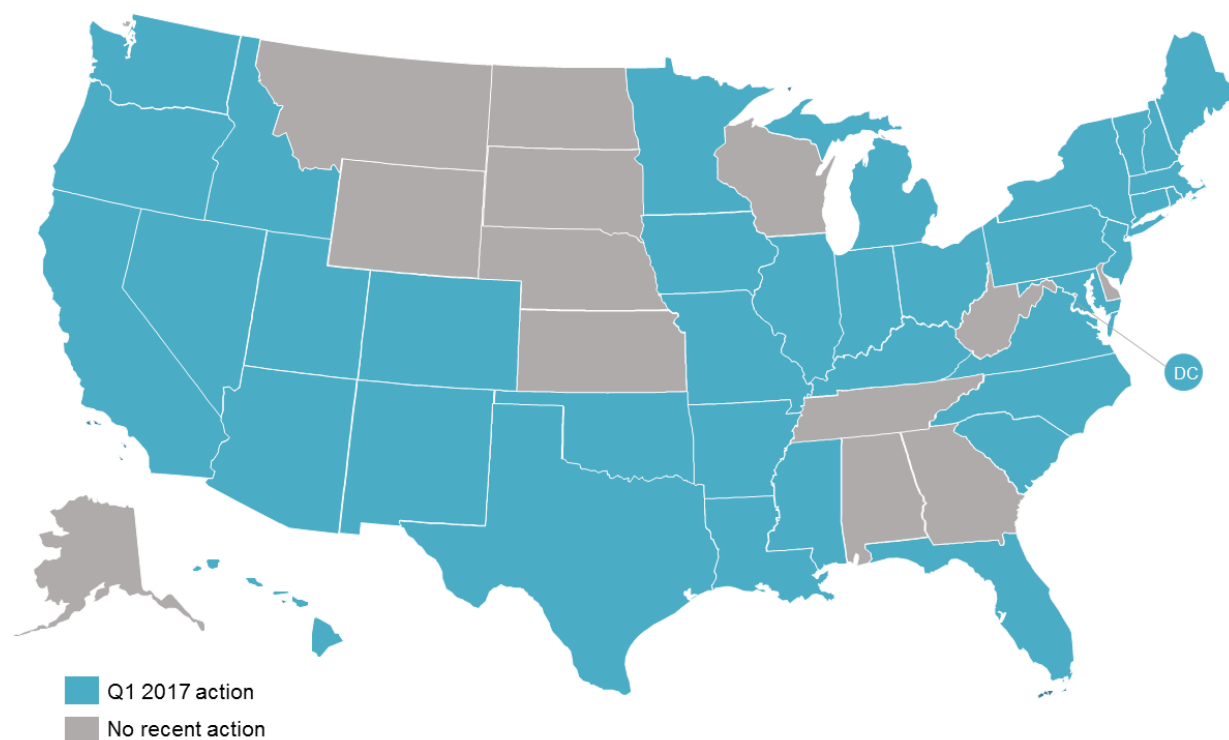


Figure 2. Top Ten Most Active States of Q1 2017

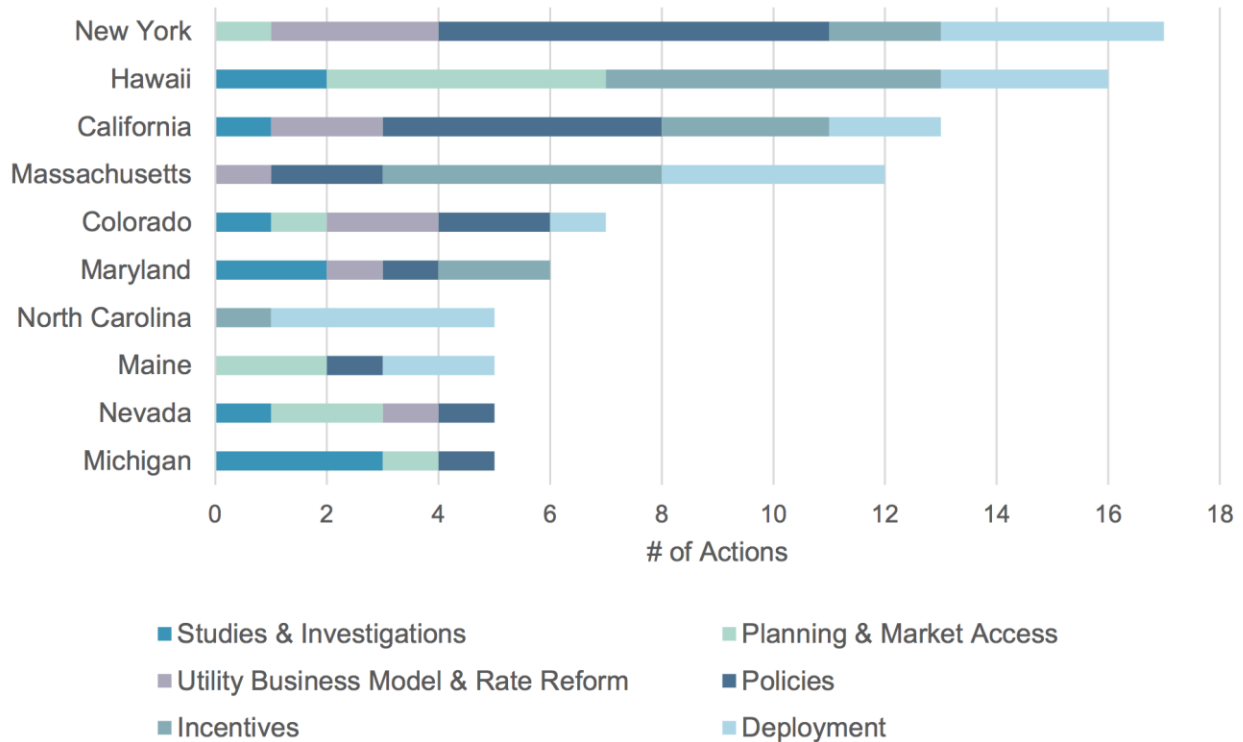
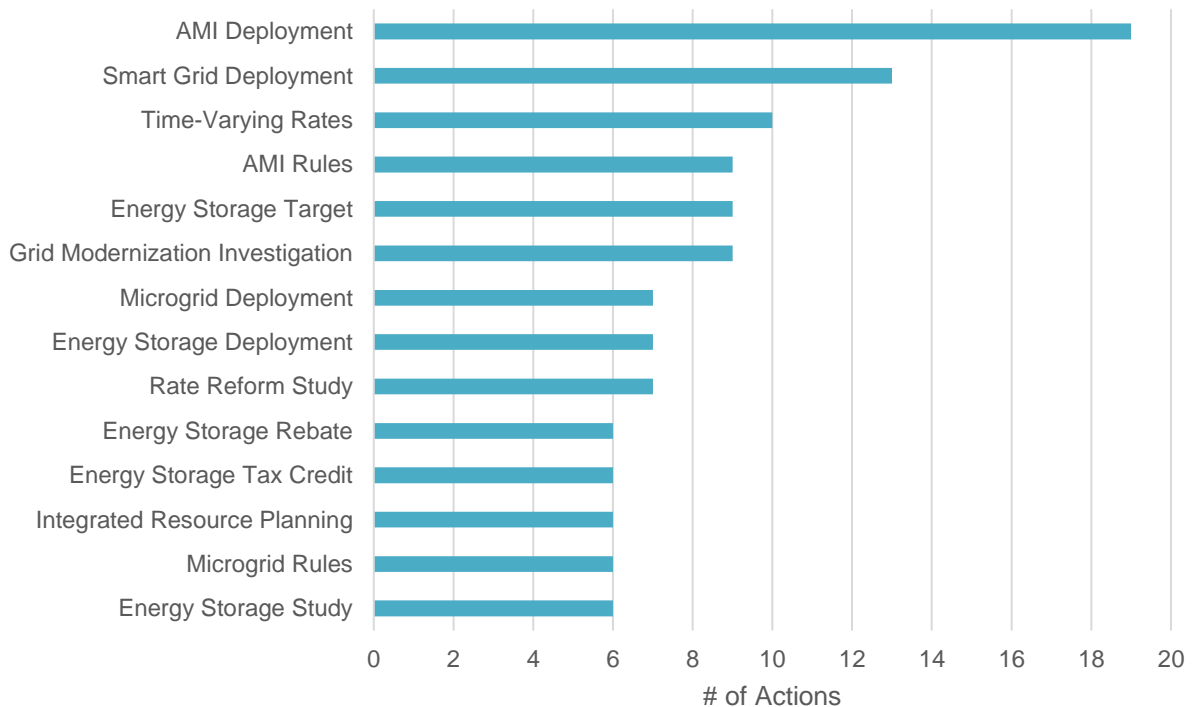


Figure 3. Most Common Types of Actions Taken in Q1 2017



Box 1. Top Five State Grid Modernization Developments of Q1 2017

Maryland Legislature Advances State Tax Credit for Energy Storage

The Maryland State Senate [passed a bill](#) adopting a state tax credit for energy storage systems in March 2017, which the State House later passed in early April and the Governor signed into law in May. The credit would be equal to 25% of installed costs, up to \$5,000 for residential systems and \$500,000 for commercial systems.

Illinois and Ohio Launch Grid Modernization Proceedings

In March 2017, the Illinois Commerce Commission initiated a grid modernization proceeding – called [NextGrid](#) – aimed at creating a 21st century regulatory model that supports innovation, empowers customers and communities, drives economic development, and optimizes the electric utility industry. The Public Utilities Commission of Ohio also launched a grid modernization proceeding, called [PowerForward](#), in March 2017. PowerForward is aimed at charting a path forward for grid modernization projects and innovative regulations to improve the consumer experience.

New Hampshire Completes Multi-Year Grid Modernization Investigation

In March 2017, New Hampshire's [Grid Modernization Working Group](#) submitted its [final report](#) to the Public Utilities Commission. The report includes many areas of consensus among stakeholders, as well as distinct stakeholder viewpoints on areas of non-consensus. The proceeding covered distribution system planning, advanced metering functionality, rate design, customer data and education, and utility cost recovery and financial incentives.

Washington Commission Issues Draft Policy Statement on Energy Storage in Integrated Resource Planning

Washington's Utilities and Transportation Commission issued a [draft policy statement](#) on the role of energy storage in the integrated resource planning process in March 2017. In the statement, the Commission noted that utilities will be required to fully evaluate the costs and benefits of energy storage as an alternative to new resource investments, and the state will move forward with a transition to sub-hourly modeling.

New York Public Service Commission Issues Monumental Order on DER Compensation

The New York Public Service Commission [issued an order](#) in its [Value of Distributed Energy Resources \(VDER\) proceeding](#) in March 2017, which includes examination of compensation for behind-the-meter energy storage systems that are paired with renewable generation. While these systems will not be compensated through the VDER tariff yet, the intent is for new installations at some point to be compensated with a value-based approach.

Delivery System for Increased Sustainability (MEDSIS) report in January 2017. A working group in New Hampshire released a report, which recommends that each utility develop grid modernization plans with a stakeholder engagement process. The report also lays out specific considerations that should be made in the development of the plans. And a working group in Rhode Island released a detailed Benefit-Cost Framework that may be used to evaluate DG programs, alternative rate designs, and grid modernization projects.

Box 2. Categorizing Studies and Investigations

Actions included within Studies and Investigations do not include a defined policy proposal or a directive to make a policy or regulatory change. Once a specific proposal is introduced, the action will be included in the category pertaining to change, such as Grid Modernization Policies or Utility Business Model and Rate Reform.

In Q1 2017, legislation was introduced in four states that would initiate energy storage or grid modernization studies. Legislators in Colorado, Maryland, and New Jersey proposed bills that would require energy storage investigations to be completed, while a bill in Hawaii would require an independent third party to establish initial grid modernization plans.

Figure 5. Action on Studies and Investigations by Topic (Q1 2017)

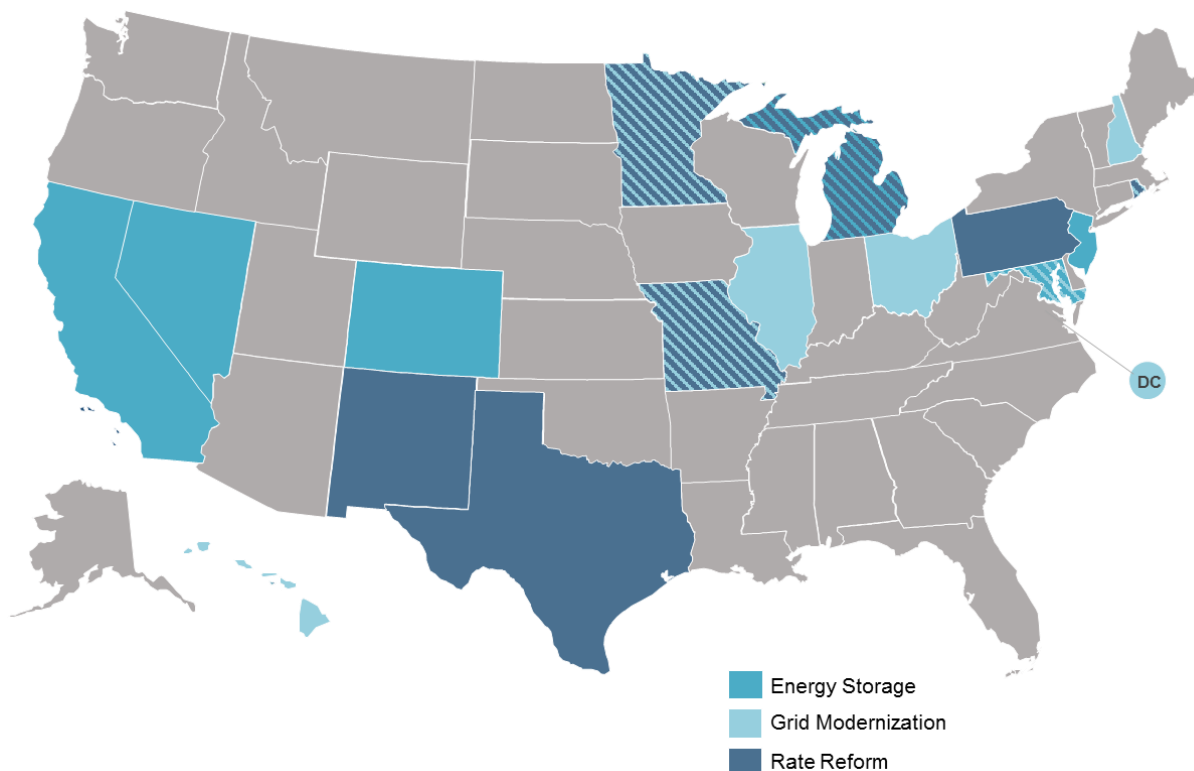


Table 2. Updates on Grid Modernization Studies & Investigations (Q1 2017)

State	Type of Study	Description	Source
CA	Energy Storage	California has an ongoing proceeding examining the value of DERs to the distribution system. Utilities have proposed a range of demonstration projects to examine various scenarios related to the location on the grid and technology options, some of which include storage. In a February 2017 decision, the California Public Utilities Commission granted approval to some demonstration projects, rejected others, and approved only some elements of other projects.	Docket No. R. 14-08-013 Decision No. 17-02-007
CO	Energy Storage	H.B. 1299 would have directed the Transportation Legislative Review Committee to conduct a hearing during 2017 on the benefits and costs of energy storage systems that utilities may incorporate into their electric resource acquisition plans. The bill passed the House, but was defeated in the Senate.	H.B. 1299 (D)
DC	Grid Modernization	In June 2015, the DC Public Service Commission initiated a proceeding to identify technologies and policies that can modernize its energy delivery system for increased sustainability, reliability, efficiency, cost-effectiveness, and interactivity. In January 2017, the staff presented the Modernizing the Distribution Energy Delivery System for Increased Sustainability (MEDSIS) report. The Commission is currently accepting comments on the report.	Formal Case No. 1130 MEDSIS Staff Report
HI	Grid Modernization	H.B. 1569 would require the Public Utilities Commission, when considering certain types of grid modernization plans, to direct an independent third party to establish an initial grid modernization plan. It would also require the Commission to allow public comments and subjects the plan to further modification by the Commission. The bill failed to make crossover.	H.B. 1569 (D)
	Utility Business Model	H.B. 1700 of 2016 appropriated funds for the Hawaii Energy Office to commission a study of alternative utility and regulatory models to enable the state to (1) meet its energy goals; (2) maximize consumer savings; (3) enable a competitive distribution system; and (4) eliminate or reduce conflicts of interest in energy resource planning, delivery, and regulation. The Energy Office released an RFP in September 2016, and expects the selected firm to begin the project in Q2 2017.	H.B. 1700 (2016) RFP
IL	Grid Modernization	In March 2017, the Illinois Commerce Commission opened the "NextGrid" proceeding following the passage in December 2016 of legislation making	Docket No. 17-0142

		comprehensive changes to various aspects of Illinois energy policy. This will be a collaborative process between stakeholders and will involve a broad array of topics, some related to grid modernization (one of the four main subject areas mentioned is "grid design, digital networks and markets." Comments on the initial resolution were due at the end of April 2017.	NextGrid
MD	Energy Storage	H.B. 773 directs the Power Plant Research Program to conduct a study to determine what regulatory reforms and market incentives are necessary or beneficial to increase energy storage deployment in the state in a way that is fair and open to all stakeholders. The bill was signed by the governor in early May 2017.	H.B. 773 (E) S.B. 715 (P1)
	Grid Modernization	In September 2016, the Maryland Public Service Commission (PSC), as part of the Exelon-PHI merger condition, initiated a grid modernization proceeding to make sure that the electric distribution system in Maryland is customer-centric, affordable, reliable, and environmentally sustainable. The proceeding is addressing rate design, electric vehicles, competitive markets and customer choice, the interconnection process, energy storage, and distribution system planning. The PSC held an initial public hearing in December 2016 and issued a detailed schedule in January 2017. Proposed pilot programs for general time-varying rates are to be developed between February and June 2017, with pilot programs occurring between July 2017 and June 2018. Regarding competitive markets and customer choice, a statewide standard data sharing format and changes to retail choice will be considered. A rulemaking to define residential energy storage and how it is interconnected and classified in PSC rules, as well as criteria for utility evaluation of energy storage as a distribution grid investment will be considered. The PSC also intends to hold a technical conference on distribution system planning.	Public Conference No. 44
MI	Demand Response	Legislation enacted in December 2016 directs the Public Service Commission (PSC) to assess the use of demand response (DR) in Michigan. In March 2017, the PSC released a draft plan for the scope of the study. The study will assess DR potential for the 20-year period beginning in 2018. Regulatory proceedings on DR implementation are expected to begin in summer 2017.	S.B. 437 (2016) S.B. 438 (2016) Michigan Demand Response Potential Study
	Energy Storage	Legislation enacted in December 2016 directs the Public Service Commission (PSC) to conduct a study on an appropriate DG tariff that reflects an equitable cost of service for utility revenue requirements. At the initial DG working group meeting in March 2017, the	S.B. 437 (2016) S.B. 438 (2016)

		PSC staff provided details on their plan to implement the legislation. The PSC staff proposed limiting the scope of the study to solar and solar plus battery storage. The PSC will conduct a cost of service study, and PSC staff will aim to prepare a report on the study by January or February 2018, with a final report being published in March or April 2018. Parties will also be able to file their own studies and tariff filings for the PSC to consider. The study and tariff development must be completed by April 20, 2018. A second working group meeting was held on April 19th, a third on May 10th, and a fourth is scheduled for June 28th.	Distributed Generation Study
	Rate Reform	Legislation enacted in December 2016 directs the Public Service Commission (PSC) to conduct a study on performance-based regulation, under which a utility's authorized rate of return is dependent on achievement of targeted policy outcomes. The study is due by April 20, 2018. The PSC began research on the topic in April 2017.	S.B. 437 (2016) S.B. 438 (2016) Performance-Based Regulation Report
MN	Grid Modernization	The Public Utilities Commission opened a docket in May 2015 to consider the development of policies related to grid modernization. The proceeding features broad stakeholder engagement and numerous workshops. No significant actions occurred in Q1 2017, but the proceeding is ongoing with workshops planned throughout the rest of 2017.	Docket No. 15-558
	Rate Reform	The Public Utilities Commission (PUC) initiated a stakeholder proceeding in July 2015 to consider alternative rate designs for Xcel Energy. The proceeding has held workshops and heard from various speakers about alternative rate design implementation across the country. During Q1 2017, the PUC received comments on four topics presented in its February Notice of Comment Period. The topics include whether or not the PUC should direct Xcel to develop an alternative rate design pilot.	Docket No. 15-662
MO	Grid Modernization, Rate Reform	In March 2017, the Missouri Public Service Commission opened a proceeding to gather information on issues including AMI installation, PACE financing programs, and alternative rate design proposals. Comments were due by May 1 st .	Docket No. EW-2017-0245
NH	Grid Modernization	In July 2015, the New Hampshire Public Utilities Commission (PUC) opened a docket on grid modernization, pursuant to H.B. 614 of 2015. The PUC convened a formal working group to develop recommendations on several issues, including distribution system planning, advanced metering functionality, rate design, customer data and	Docket No. IR 15-296 NH Grid Modernization Working Group

		<p>education, and utility cost recovery and financial incentives. In March 2017, the working group submitted its final report to the Commission. The report recommends that each utility develop grid modernization plans with a stakeholder engagement process. Stakeholders agreed that fixed customer charges should recover customer-related charges based on a cost of service study, demand charges should not be assessed on residential customers for now, and that location-based pricing be limited to DERs. Utilities suggested that time-varying rates for transmission and distribution (T&D) are not practical to implement at this time, while non-utility stakeholders suggested time-varying T&D rates should be implemented in the near future. Utilities concluded that AMI should be installed only to achieve the level of rate complexity proposed by the utility to avoid excess cost, while non-utility stakeholders concluded AMI be installed to enable the full range of competitive energy products and services alternatives. The group also determined that opt-in time-varying generation rates should include critical peak pricing if implemented, and that these rates can also be offered as the default rate with many different design options. The group agreed that sharing data with third-party providers is favorable to encourage market competition for advanced energy technologies and that data security must be addressed. The group noted that an individual customer should always be free to share their own data with third parties, provided the utility and third parties make customers aware of the risks involved. The group recommends allowing time for public comment, holding one or more technical sessions, and that the PUC then open a docket to fully adjudicate the non-consensus items and move forward on guidance and a schedule for grid modernization plans.</p>	Document Repository Final Report
NJ	Energy Storage	<p>Companion bills A.B. 4728 and S.B. 3064 would require the Board of Public Utilities to conduct a study on energy storage, identifying needs and opportunities for the state. The study would consider implementation of storage technologies, benefits and costs to ratepayers, and an optimum target.</p>	A.B. 4728 (I) S.B. 3064 (I)
NM	Rate Reform	<p>In March 2017, the New Mexico Public Regulation Commission initiated an investigation to determine whether it should standardize or change its ratemaking policies. Specifically, the Commission is requesting information related to developing a standardized method for determining return on equity (ROE), whether ROE should be adjusted under an incentive/disincentive mechanism, providing access to proprietary software used by utilities to support</p>	Docket No. 17-00046-UT

		positions in rate cases to all intervenors and staff, defining regulatory assets, and recovery of certain regulatory case expenses. A public workshop will be held on August 9th.	
NV	Energy Storage	The Public Utilities Commission of Nevada (PUCN) opened an investigatory docket in January 2016 to explore energy storage technologies. The PUCN convened a series of meetings and workshops throughout 2016, and in Q1 2017 held a stakeholder meeting and a workshop to discuss interconnection issues related to energy storage.	Docket No. 16-01013
OH	Grid Modernization	The Public Utilities Commission of Ohio (PUCO) announced the launch of its PowerForward grid modernization investigation in March 2017. The PUCO intends to use the study to chart a path forward for future grid modernization projects and innovative regulations that can improve the consumer experience. PowerForward is scheduled to occur in three phases, with Phase 1 beginning in April 2017 with a three-day “Glimpse of the Future” speaker series.	PowerForward Website
PA	Rate Reform	In December 2015, the Pennsylvania Public Utility Commission (PUC) opened a proceeding to investigate alternative ratemaking methodologies. A hearing was held in March 2016, and the PUC issued an order in March 2017 requesting further input from stakeholders on their experiences with different types of alternative rate methodologies, including decoupling, lost revenue adjustment mechanisms, straight fixed/variable pricing, surcharges and riders, choice of test years, multi-year rate plans, demand charges, standby and backup charges, and demand-side management performance incentives. The PUC is also requesting comments regarding whether the Commission should adopt policy statements identifying preferred alternative rate methodologies or initiate rulemakings to require specific methodologies.	Docket No. M-2015-2518883
RI	Grid Modernization, Rate Reform	In January 2016, the Public Utilities Commission (PUC) approved National Grid’s request to withdraw its proposed alternative rate design. However, the PUC determined that it was important to continue to review the issues raised in the proceeding. In March 2016, the PUC opened a docket to identify and measure the costs and benefits of net metering and DERs. The stakeholder group’s was managed by a third-party consultant, and the group met nine times between May 2016 and March 2017. The group released a final draft of the report in late March, and submitted a complete final version in early April. The working group developed a detailed Benefit-Cost Framework that may be used to evaluate DG	Docket No. 4600 Stakeholder Process Document Repository Final Working Group Report

		programs, alternative rate designs, and grid modernization projects. The group proposed holding technical meetings on many of the topics addressed in the proceeding.	
TX	Rate Reform	The Texas Public Utilities Commission (PUC) opened this proceeding in June 2016 to investigate alternative ratemaking mechanisms. The PUC issued a final report in January 2017, recommending several changes, including the automation of rate updating, stabilization of utility fixed cost recovery, and adoption of earnings sharing mechanisms. The PUC recommended changes be phased in over a three to five year period.	Docket No. 46046

Legislative Status Key: I = Introduced, P1 = Passed One Chamber, P2 = Passed Both Chambers, E = Enacted, D = Dead. Bill statuses are up to date as of early May 2017.

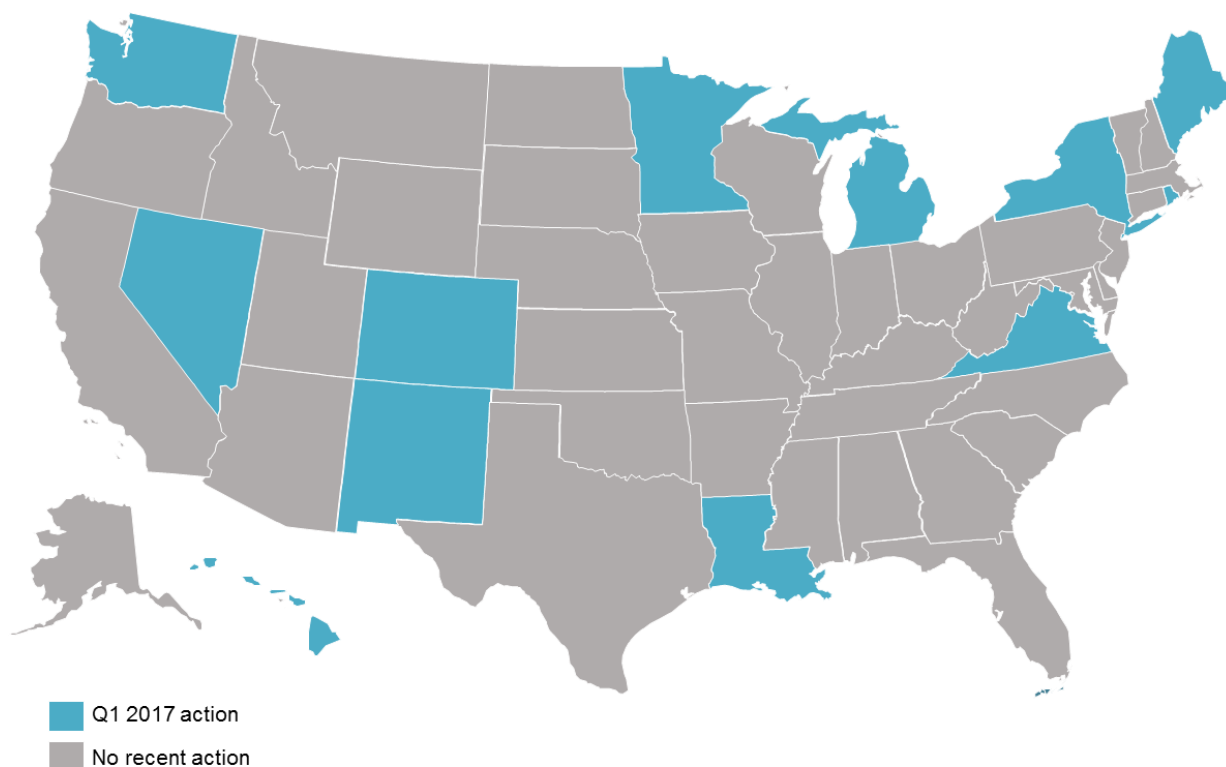
PLANNING AND MARKET ACCESS

Key Takeaways:

- In Q1 2017, 12 states considered changes to utility planning processes and state regulations enabling market access.
- Six states considered changes to the integrated resource planning process, while three states took action on distribution system planning.
- The Washington Utilities and Transportation Commission issued a draft policy statement on the role of energy storage in integrated resource planning.

As the role of energy storage and other distributed energy resources increases within our energy system, many are realizing that current utility planning methods do not adequately capture the full costs and benefits of these resources. For example, many of the benefits of energy storage systems occur on a sub-hourly basis, while traditional integrated resource planning is completed at an hourly level.

Figure 6. Action on Planning and Market Access (Q1 2017)



In Q1 2017, six states considered changes to the integrated resource planning (IRP) process. In Washington, regulators issued a draft policy statement on energy storage's role within the IRP process. The statement notes that utilities seeking approval for new resource acquisitions will have to demonstrate that they have fully considered energy storage as an alternative,

including a reasonably complete consideration of all costs and benefits. The Commission also indicated that the state will begin to transition to sub-hourly modeling in the IRP process, and that new rate options may be developed in order to encourage behind-the-meter storage installations. A formal rulemaking is also underway at the Commission.

New Mexico initiated a rulemaking in Q1 2017 to amend IRP rules, particularly to ensure energy storage is evaluated on a comparable and consistent basis. Michigan is also evaluating IRP rules, and a bill in Nevada would require the Commission to give preference to resources with the greatest economic and environmental benefits to the state.

Distribution system planning is another area beginning to receive greater attention, as distribution-level resources increase. Three states took action related to distribution system planning, with the New York Public Service Commission issuing an order regarding distribution system implementation plans.

Another area of importance to the goal of grid modernization is market access for advanced grid technologies and different types of market participants. One technology in particular that tends to run into regulatory barriers is the microgrid. Oftentimes, microgrids conflict with utility franchise rules, where the microgrid risks categorization as a public utility and may not sell power within another utility's state-granted jurisdiction.

Hawaii and Maine both took action regarding microgrid rules in Q1 2017. A Maine bill would allow municipalities to work with utilities to develop microgrid projects, and a number of proposed bills in Hawaii would exempt microgrids to varying extents from regulation as a public utility.

Wholesale power markets are also addressing rules regarding participation of energy storage resources. As storage systems may act as both supply-side and demand-side resources and provide multiple types of services, establishing appropriate market access and compensation can be a complex task. Developments related to wholesale power market rules will be covered in future issues of the 50 States of Grid Modernization.

Table 3. Updates on Planning and Market Access (Q1 2017)

State	Sub-Topic	Description	Source
CO	Energy Storage Rules	S.B. 89 declares that customers have the right to install and use energy storage systems with a discharge rate up to 25 kW on their property. The bill also directs the Public Utilities Commission to develop a streamlined interconnection process and does not allow customers with energy storage systems to be charged additional fees.	S.B. 89 (D)
HI	Microgrid Rules	H.B. 1163 would clarify that a microgrid serving a public university are exempt from regulation as a public utility. The bill failed to make crossover.	H.B. 1163 (D)
	Microgrid Rules	H.B. 128, as originally written, would have exempted any microgrid demonstration project (authorized by the legislature or the Public Utilities Commission) from regulation as a public utility. As amended, the provisions only apply to a microgrid demonstration project at the Natural Energy Laboratory of Hawaii. The bill, in its amended form, passed the House in March 2017.	H.B. 1248 (P1)
	Microgrid Rules	H.B. 1280 would require the Public Utilities Commission to (1) study and determine a reasonable microgrid rate schedule to be charged by the Department of Education (DOE) to its users; (2) study and determine a fair and reasonable amount for the fees charged by the utility to the DOE for use of its infrastructure; and (3) establish oversight procedures for DOE microgrid projects. The bill failed to make crossover.	H.B. 1280 (D)
	Microgrid Rules	S.B. 143 would clarify that microgrids serving public university are exempt from regulation as a public utility. The bill failed to make crossover.	S.B. 143 (D)
	Microgrid Rules	S.B. 1029 would clarify that microgrids serving a public university are exempt from regulation as a public utility. The bill failed to make crossover.	S.B. 1029 (D)
LA	Integrated Resource Planning	In January 2017, the New Orleans City Council opened a docket to consider proposed changes to the Council's integrated resource planning (IRP) process and requirements. Proposed changes were filed by late February 2017, and the Advisors filed a report in late April. The proceeding was not initiated explicitly or exclusively to consider changes related to DERs, but several comments propose making changes to ensure fair treatment and consideration of DERs and demand-side management.	City Council Docket No. UD-17-01 (<i>docket not publicly accessible</i>)
ME	Microgrid Rules	H.B. 190 would establish rules to allow municipalities working together with electric utilities to create microgrids. The bill is currently a concept draft, and will address the following topics: (1) renewable generators	H.B. 190 (I)

		within the microgrid, (2) methods for adding storage and enabling the utility to manage charging and use of stored energy, (3) rates for generation and stored power usage, (4) credits for municipal utilization, and (5) compensation for scheduling or shedding of electrical load to reduce peak demand.	
	Non-Wires Alternatives	In April 2016, the Public Utilities Commission (PUC) opened an investigation into the designation of a Non-Transmission Alternative (NTA) Coordinator. The Smart Grid Policy Act authorized the PUC to designate a smart grid coordinator, and previous proceedings examined this possibility. The purpose of this proceeding is to develop a framework for selecting an NTA Coordinator, determine the scope of the NTA Coordinator's functions and duties, and determine whether a third party entity or transmission and distribution utilities should perform the NTA Coordinator functions. The end goal is to have the framework for an RFP or rate incentive, depending on whether a third party or utilities should hold the NTA Coordinator role. The PUC filed a strawman proposal when it opened the docket, leaving many aspects open for discussion. A revised process chart and preliminary issues list was filed in November 2016. Testimony was filed through Q1 2017.	Docket No. 2016-00049
MI	Integrated Resource Planning	Legislation passed in December 2016 requires the Public Service Commission (PSC) to set modeling parameters and assumptions for utilities to use in submitting integrated resource plans (which are required under the legislation). The PSC held stakeholder meetings in March and April 2017, and will initiate a formal proceeding by August 18, 2017.	S.B. 437 (2016) S.B. 438 (2016) Integrated Resource Plan Updates
MN	Integrated Resource Planning	A pair of bills introduced in February 2017 would require the economy, job growth, and job retention to be analyzed in the integrated resource planning process.	H.B. 1309 (I) S.B. 1177 (I)
NM	Integrated Resource Planning	In February 2017, the New Mexico Public Regulation Commission initiated a rulemaking to amend the state's integrated resource planning (IRP) rules. The Commission is considering requiring utilities to consider energy storage resources on a comparable and consistent basis in IRP alongside supply-side and demand-side resources. The Commission is holding a series of workshops, the first of which took place in April 2017. A public hearing will begin on May 31st.	Docket No. 17-00022-UT
NV	Grid Modernization Planning	S.B. 145 would require utilities to submit grid modernization plans to the Public Utilities Commission as part of their integrated resource plans. The bill also authorizes the Commission to approve these plans if the benefits exceed costs. The bill passed the Senate in April 2017.	S.B. 145 (P1)

	Integrated Resource Planning	S.B. 65 would require utilities to provide the Public Utilities Commission with an overview of their integrated resource plans (IRP) four months before officially filing it. The bill would also require the Commission to give preference in IRPs to sources of supply that provide the greatest economic and environmental benefits to the state. The bill was introduced and sent to committee in February 2017.	S.B. 65 (I)
NY	Distribution System Planning	In March 2017, the Public Service Commission (PSC) published its order on the Distributed System Implementation Plans. In the order, the PSC provided guidance on hosting capacity, interconnection portals, non-wire alternatives, data privacy, and energy storage as being implemented as a part of REV.	Docket No. 14-M-0101 Docket No. 16-M-0411
RI	Distribution System Planning	In March 2017, the Governor of Rhode Island directed the Public Utilities Commission, Office of Energy Resources, and Division of Public Utilities and Carriers to design a new regulatory framework for Rhode Island's electric system. Distribution system planning is being considered as part of this effort. A meeting on distribution system planning is scheduled for May 26th.	Power Sector Transformation Initiative
VA	State Planning & Support	S.B. 1258, enacted in early April 2017, converted the Virginia Solar Energy Development Authority to the Virginia Solar Energy Development and Energy Storage Authority. The Authority's purpose is to facilitate, coordinate, and support the development of the state's solar and energy storage industries.	S.B. 1258 (E)
WA	Distribution System Planning, Integrated Resource Planning	In May 2015, the Washington Utilities and Transportation Commission staff initiated a proceeding to investigate the role of energy storage in utility planning and procurement. The Commission later initiated a rulemaking proceeding in September 2016 consider changes to the integrated resource planning (IRP) process. The Commission specifically sought to evaluate how recent advances in the energy industry, such as the growth of DG and development of energy storage technologies, showed be treated in the IRP. In March 2017, the Commission released a draft policy statement for comment, and parties submitted comments until early April. The Commission's policy statement cites energy storage as a key enabling technology for utilities to comply with state energy policies, and that utilities should be diligently working to identify and pursue cost-effective energy storage opportunities. Other key items include: <ul style="list-style-type: none"> Utilities seeking a prudence determination for new resource acquisitions must demonstrate that their analysis of resource options included a storage alternative, and that they have reasonably considered all of the costs and benefits. 	Docket No. UE-151069 Docket No. U-161024 Draft Policy Statement

- A timeline for transitioning to sub-hourly IRP modeling will be discussed in the rulemaking proceeding (Docket No. U-161024). In the meantime, a “net cost” method will be used within traditional hourly modeling, whereby utilities will use an external model to calculate sub-hourly benefits of energy storage and subtract these from costs in the IRP model.
- Utilities are to rely on energy storage cost data from reliable, independent third parties.
- The Commission is willing to consider rate design proposals that reflect the cost of serving customers during high-demand periods, in order to provide tariffs with price signals to encourage behind-the-meter storage projects.

A workshop was held on transmission and distribution system planning in March 2017 as part of the rulemaking proceeding.

Legislative Status Key: I = Introduced, P1 = Passed One Chamber, P2 = Passed Both Chambers, E = Enacted, D = Dead. Bill statuses are up to date as of early May 2017.

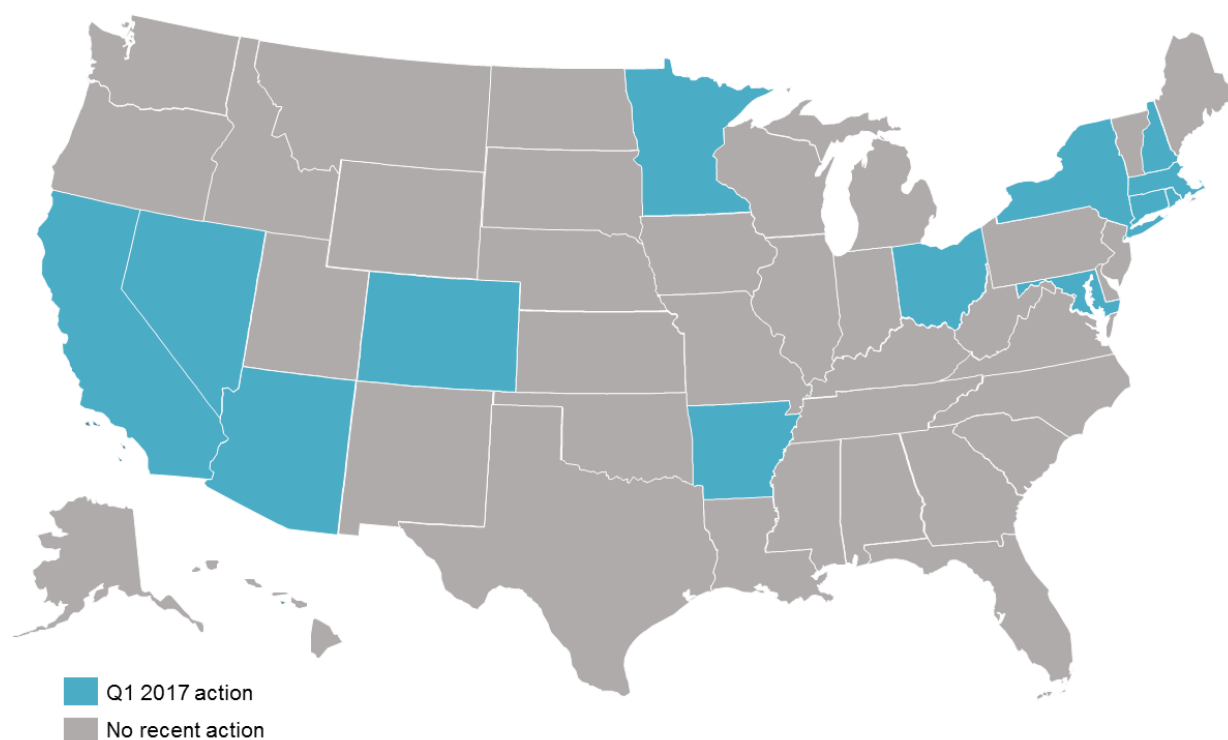
UTILITY BUSINESS MODEL AND RATE REFORM

Key Takeaways:

- In Q1 2017, 13 states took 18 actions to reform rate design, regulatory structures, or utility business models.
- Nine states took action on time-varying rates, while utilities in two states have proposed mandatory demand charges for all residential customers.
- Many states are conducting studies and investigations related to rate reform before proposing specific changes (see these actions in Studies and Investigations).

U.S. utilities have traditionally operated under cost of service regulation, whereby a utility's rates are based on its revenue requirement – its costs, including both capital and operating costs, plus a reasonable return. Utility rate design, particularly for residential customers has typically consisted of a fixed customer charge, plus a flat per-kWh rate for energy consumed during the billing period. Many commercial and industrial rates also include a demand charge, based on the customer's maximum kW demand during the billing period; however these charges have been rarely mandatory for residential customers.

Figure 7. Action on Utility Business Model and Rate Reform (Q1 2017)



As technological advancements are made, traditional utility business models, regulatory frameworks, and rate designs are being reformed in many parts of the country. In Q1 2017, 13 states considered these types of changes. The most common type of reform currently being

pursued is a transition to time-varying rates, particularly for residential customers, with nine states taking action on time-varying rates.

California has already begun the process of shifting all residential customers of investor-owned utilities to default time-varying rates. The state is currently examining the appropriate time periods for these rates, which will ultimately have a significant impact on both general residential customer bills and distributed generation customer bills and savings potential.

A settlement agreement in Arizona Public Service's (APS) general rate case would not make time-varying rates and demand charges mandatory for residential customers, as originally proposed. However, all APS customers would be moved to time-varying rates beginning in May 2018. Xcel Energy in Colorado is also moving toward default time-varying rates as a result of a settlement agreement, and one other investor-owned utility – Oklahoma Gas & Electric in Arkansas – has a pending request to implement mandatory demand charges for all residential customers.

Proposed legislation in both Nevada and Rhode Island would remove legal barriers to implementing time-varying rates, and a bill in New Hampshire would direct the Public Utilities Commission to implement time-varying rates. While a few additional states are taking regulatory and rate reform action aside from time-varying rates, most states looking at these changes are in a study or investigation phase, and have not yet proposed specific changes.

Table 4. Updates on Utility Business Model and Rate Reform (Q1 2017)

State	Sub-Topic	Description	Source
AR	Demand Charges	As part of its general rate case filed in August 2016, Oklahoma Gas & Electric proposed a mandatory demand charge for all residential customers. A public comment hearing is scheduled for May 2017.	Docket No. 16-052-U
AZ	Demand Charges, Time-Varying Rates	In Arizona Public Service's (APS) June 2016 general rate case, the utility proposed mandatory time-varying rates and demand charges for all residential customers. In March 2017, a settlement agreement among 30 parties was filed, which includes several rate options for residential customers and residential DG customers, but does not make time-varying rates and demand charges mandatory. However, in May 2018, time-varying rates will become default for all APS customers. The agreement is pending Commission approval.	Docket No. E-01345A-16-0036 Settlement Agreement
CA	Time-Varying Rates	California is in the process of shifting to default TOU rates for residential customers of investor-owned utilities. The Assigned Commissioner and ALJ issued a ruling in January 2017, establishing the scope and procedural schedule for the rest of 2017. The schedule includes testimony, hearings, and workshops if necessary throughout Q2 2017.	Docket No. R-12-06-013
	Time-Varying Rates	This proceeding, separate from the proceeding examining the transition to default TOU rates, is examining the appropriate time periods for future TOU rates. In a January 2017 decision, the California Public Utilities Commission identified relevant principles and related data requirements at a broad level to assess TOU time periods.	Docket No. R-15-12-012 Decision No. 17-01-006
CO	Decoupling	In July 2016, Public Service Company of Colorado d/b/a Xcel Energy filed a request to implement a revenue decoupling plan for residential and small commercial customers. Evidentiary hearings were held in February 2017, and position statements were filed by March 10 th . In early May 2017, the Public Utilities Commission issued a recommended decision, which would approve the decoupling pilot program for residential customers, but not for commercial customers.	Docket No. 16A-0546E
	Time-Varying Rates	The settlement agreement in the recent rate case of Public Service Company of Colorado d/b/a Xcel Energy, approved in November 2016, calls for the introduction of two TOU rate pilot programs, with the aim of moving toward a default TOU rate for residential customers by 2020.	Docket No. 16AL-0048E

CT	Rate Reform	In February 2016, the Public Utilities Regulatory Authority (PURA) opened a docket to conduct a full Cost of Service Study (COSS) and rate design review to establish a standardized methodology for electric distribution companies to use. The review will be conducted in two phases – Phase I addressing the COSS and Phase II addressing rate design. In early April 2017, PURA determined that questions regarding the cost of serving DG customers should be explored in a new, separate docket. This docket is temporarily suspended until completion of the new docket pertaining to DG rate issues.	Docket No. 16-02-30
MA	Performance-Based Ratemaking	In Eversource's pending general rate case, filed in January 2017, the utility requested approval of a performance-based ratemaking mechanism, whereby rates would adjusted annually in accordance with a revenue-cap formula. This mechanism would replace the utility's current capital cost recovery mechanism, and Eversource suggests that it will help the utility pursue its clean energy goals and greater cost efficiency. Public hearings were held in April 2017, and evidentiary hearings will be held in June.	Docket No. 17-05
MD	Time-Varying Rates	As part of Maryland's grid modernization proceeding (Public Conference No. 44), utilities will develop pilot programs for time-varying rates. These are set to be developed between February and June 2017, with the pilot programs taking place between July 2017 and June 2018.	Public Conference No. 44
MN	Rate Reform	A pair of bills introduced in February 2017 would require the Public Utilities Commission to consider economic growth and job retention when establishing rates.	H.B. 1309 (I) S.B. 1177 (I)
NH	Time-Varying Rates	H.B. 401 directs the Public Utilities Commission to develop a process to implement time-varying rates as part of the active grid modernization proceeding. The bill was retained in committee in February 2017.	H.B. 401 (I)
NV	Time-Varying Rates	Existing law prohibits utilities from adopting time-of-use rates. S.B. 145 would remove that prohibition and allows utilities to adopt time-of-use rates if the Commission deems them just and reasonable.	S.B. 145 (I)
NY	Rate Reform	As a part of the Reforming the Energy Vision Track Two order, the Public Service Commission (PSC) required the utilities to provide in detail the cost allocation methodologies being used to calculate standby rates. The PSC also directed the utilities to file revisions to their standby service rates to implement offset tariff and reliability credit provisions for standby customers who are able to demonstrate that they are able to reduce their load below contract	Case No. 16-M-0430

		demand over consecutive summer periods. The utilities filed their tariff amendments in August 2016, which became effective on January 1, 2017 after including revisions ordered by the PSC.	
	Time-Varying Rates	S.B. 3093 would create a Real Time Smart Meter program to provide residential customers with greater ability to control and manage electricity usage. Customer electing to participate in the program would be charged based on electricity usage and time of usage and a flat fee incorporating a generation bid cost and service size cost. Utilities, subject to Public Service Commission agreement, may delay participation in the program for at least ten years. During this time, other providers would have the opportunity to provide meters. The bill also provides authority to the Commission to establish real time smart meter pilot programs.	S.B. 3093 (I)
	Utility Business Model Reform	In May 2016, as part of Track Two of New York's Reforming the Energy Vision proceeding, the Public Service Commission (PSC) directed the utilities to propose a DG interconnection survey process and Earning Adjustment Mechanism (EAM) metrics. The EAM will provide utilities with diverse, balanced financial incentives to implement REV outcomes. In September 2017, the utilities proposed EAM metrics, as well as specific targets and incentives to be developed. In March 2017, the PSC ordered the utilities to file a revised proposal with modifications provided by the PSC.	Case No.16-01575/16-M-0429
OH	Time-Varying Rates	In February 2017, the Public Utilities Commission of Ohio (PUCO) approved a stipulation for AEP to implement Phase 2 of its gridSMART Project. The gridSMART Project includes a deployment of smart meters to 894,000 additional customers, a transition to time-differentiated pricing, and other smart grid investments and studies.	Docket No. 13-1939-EL-RDR
RI	Utility Business Model Reform	In March 2017, the Governor of Rhode Island directed the Public Utilities Commission, Office of Energy Resources, and Division of Public Utilities and Carriers to design a new regulatory framework for Rhode Island's electric system. An introductory session was held on April 6th, and a technical meeting on utility business models was held on April 24th. A meeting on grid connectivity is scheduled for May 9th, a meeting on distribution system planning is scheduled for May 26th, and a meeting on beneficial electrification of transportation is set for May 31st.	Power Sector Transformation Initiative
	Time-Varying Rates	Companion bills H.B. 5642 and S.B. 553 would allow utilities to implement time-of-use rates for all residential customers. Currently, Rhode Island law	H.B. 5642 (I) S.B. 553 (I)

does not allow time-of-use rates to be applied to residential customers, with the exception of pilot programs.

Legislative Status Key: I = Introduced, P1 = Passed One Chamber, P2 = Passed Both Chambers, E = Enacted, D = Dead. Bill statuses are up to date as of early May 2017.

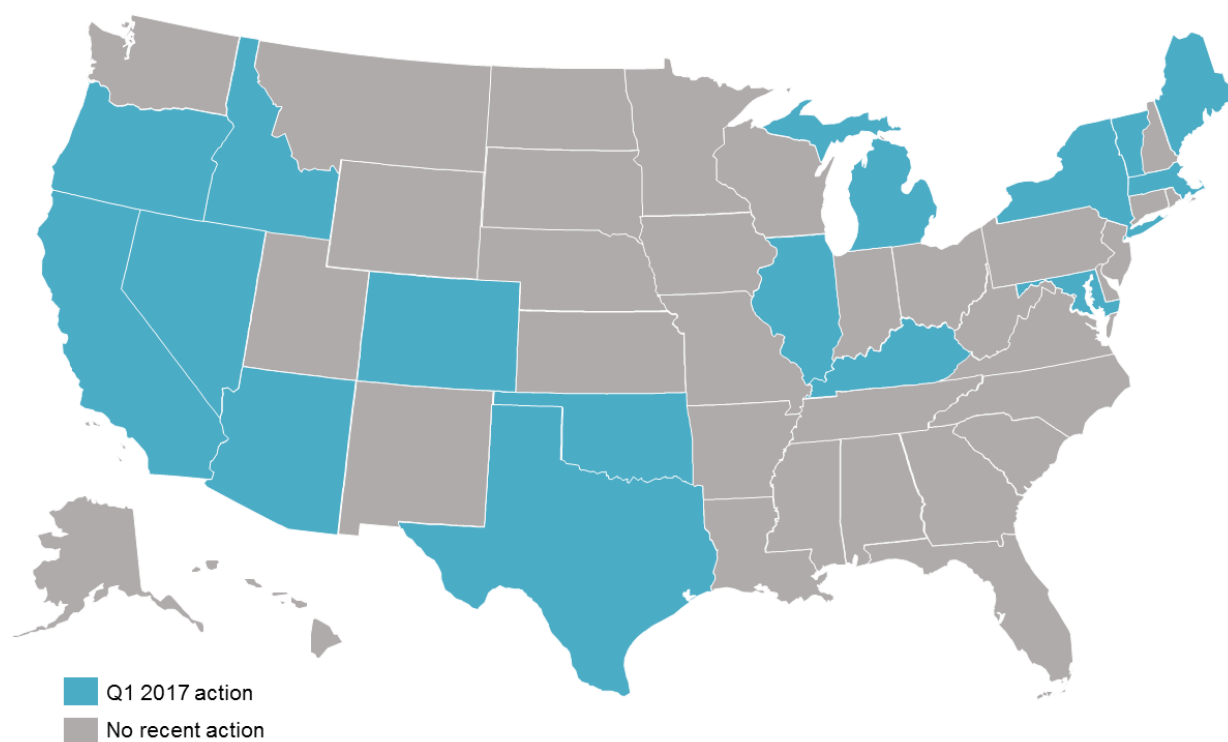
GRID MODERNIZATION POLICIES

Key Takeaways:

- In Q1 2017, 16 states took 29 actions on grid modernization policies, including energy storage targets, clean peak standards, and state rules regarding advanced metering infrastructure.
- Eight states considered changes related to cost recovery, opt-out provisions, and cybersecurity of advanced metering infrastructure.
- Six states took action related to energy storage targets, while two states examined clean peak standards as potential new components to add to existing renewable portfolio standards.

There are many different ways in which states may regulate and promote advanced grid technologies. Several states are currently considering changes to existing policies to clarify their impact on energy storage and other technologies. States are also considering the adoption of new policies, such as energy storage mandates and clean peak standards, aimed specifically at these new technologies. This category is intended to capture both types of changes, and allow for new proposed policy designs to also be captured.

Figure 8. Action on Grid Modernization Policies (Q1 2017)



During Q1 2017, 16 states considered changes to existing policies or proposed the adoption of new policies related to grid modernization. Legislation proposed in three states – New York,

Nevada, and Vermont – would create new energy storage mandates, while a pair of California bills would create “clean peak standards” as part of the state’s existing renewable portfolio standard. These clean peak standards would require that a certain percentage of energy used to meet peak load hours be derived from clean sources. This provides an opportunity for energy storage to be used in place of other peaking generators.

Box 3. A Note About Policies

Grid Modernization Policies is intended to be a broad category, capturing state-level policy actions related to grid modernization and the deployment of distributed energy resources (excluding solar-specific actions) that do not neatly fit into other categories in this report. The actions in this category are largely centered on market development policies, such as energy storage mandates, regulatory procedures, and customer options.

Another policy area seeing action in multiple states was advanced metering infrastructure (AMI) rules, specifically provisions on cost recovery, opt-out ability, and cybersecurity. Bills in six states – Kentucky, Maine, Maryland, Michigan, New York, and Oklahoma – would allow for AMI opt-out, while a pair of Texas bills would adopt ERCOT’s data privacy and cost recovery provisions for Entergy Texas. Vermont is addressing cybersecurity issues associated with AMI within a Public Service Board proceeding.

Table 5. Updates on Grid Modernization Policies (Q1 2017)

State	Policy Type	Description	Source
AZ	Renewable Portfolio Standard	In August 2016, Arizona Corporation Commission Chairman Little opened a docket to review, modernize, and expand Arizona's renewable portfolio standard (RPS). At the end of November, the Residential Utility Consumer Office filed a proposal to add a Clean Peak Standard to Arizona's RPS. The Clean Peak Standard would require a certain percentage of energy used to meet peak load hours to be derived from clean sources. A workshop was held on April 27, 2017.	Docket No. E-00000Q-16-0289 RUCO Comments
CA	Demand Response	The California Public Utilities Commission (CPUC) is working to integrate demand response into the CAISO market, and is investigating whether a competitive procurement mechanism for supply-side resources outside of traditional utility programs is viable. An initial pilot auction was conducted in 2015 with delivery in 2016, and a second auction took place in 2016 with delivery expected in 2017. The CPUC later approved a third pilot auction in 2017. OhmConnect filed a request for the evaluation of the pilot programs to be expedited so the demand response auction mechanism could be made permanent by summer 2018. In March 2017, the CPUC issued a proposed decision denying OhmConnect's request.	Docket No. R-13-09-011
	Energy Storage Target	Guided by Assembly Bill 2514 of 2010, the California Public Utilities Commission (CPUC) adopted an energy storage mandate in 2013, which requires the IOUs to collectively procure 1,325 MW of energy storage by 2020. The CPUC has an ongoing proceeding, split into two tracks, examining this mandate and other issues surrounding the deployment of energy storage. Track 1 dealt with more near-term issues and was resolved through a CPUC Decision in January 2016. The CPUC issued a Proposed Decision in February 2017 related to various Track 2 issues, including revisions to the energy storage procurement targets, station power, and community storage. Various parties filed comments on the Proposed Decision.	Docket No R. 15-03-011 Proposed Decision
	Permitting	A.B. 546 in California would require local governments with at least 200,000 residents to make all documents and forms associated advanced energy storage permitting public accessible online by September 30, 2018. Local governments with fewer than 200,000 residents would have to meet this requirement by January	A.B. 546 (I)

		31, 2019. This bill further states that permitting and inspection fees should be based only on the cost to issue the permit and complete the inspection, and not on the value of the installation. The bill also directs the Governor's Office of Planning and Research to create a California Energy Storage Permitting Guidebook by January 2020.	
	Renewable Portfolio Standard	A.B. 1405, introduced in February 2017 would require an unspecified percentage of peak-load electricity to come from clean peak resources, such as energy storage. The bill would require the California Public Utilities Commission to determine the actual percentage of kilowatt-hours delivered by each load-serving entity during peak hours. The bill was in committee at the end of Q1 2017.	A.B. 1405 (I)
	Renewable Portfolio Standard	S.B. 338, introduced in February 2017 and amended in March, would require the California Public Utilities Commission to consider establishing policies and procedures to ensure each load-serving entity meets its net-load peak energy needs while reducing the need for new electricity generation and new transmission. Options to consider could include clean energy technologies, demand response, and efficiency.	S.B. 338 (I)
CO	Demand Response	H.B. 1227, introduced in March 2017, would extend demand-side management goals for IOUs to 2028. It would require the Public Utilities Commission to set goals of at least 5% peak demand reduction and 5% energy savings relative to 2018 numbers. As of early May 2017, the bill has passed the House and was under consideration in the Senate.	H.B. 1227 (P2)
	Interconnection	In March 2017, several solar groups filed a petition to modify current DG interconnection rules. The groups have requested that energy storage be added to the interconnection rules, and to investigate metering needs for solar-plus-storage systems.	Docket No. 17M-0131E
ID	PURPA	In February 2017, Idaho Power filed a petition with the Public Utilities Commission for a declaratory order determining the appropriate contract terms, conditions, and avoided cost rates for PURPA contracts requested by battery storage facilities. Idaho Power suggested that facilities up to 100 kW should be entitled to published avoided cost rates and a 20-year term, while facilities larger than 100 kW may receive negotiated avoided cost rates and a two-year term.	Docket No. IPC-E-17-01

		Developer comments were due by April 5th, other comments were due by April 27th, and reply comments were due by May 11th.	
IL	Demand Response	Legislation introduced in Illinois would extend the requirement for utilities to reduce peak demand by 0.1% over the prior year through cost-effective demand response measures. This requirement would be effective through December 31, 2026.	H.B. 2825 (I) H.B. 3687 (I) S.B. 1601 (I)
KY	AMI Rules	S.B. 121 would allow customers of retail electric suppliers and municipal electric utilities to opt out of AMI installation. The bills also notes that customers will not be charged for electricity consumption attributable to the smart meter.	S.B. 121 (I)
MA	Energy Storage Target	In August 2016, Massachusetts enacted legislation directing the Department of Energy Resources (DOER) to determine if it is prudent to adopt an energy storage requirement. In December 2016, DOER determined that establishing a target is prudent and requested stakeholder input by January 27th. DOER will adopt a specific target by July 2017.	DOER Letter to Conferees
	Energy Storage Target	Companion bills introduced in Massachusetts would direct the Department of Energy Resources (DOER) to establish a statewide deployment target of 1,766 MW of cost-effective energy storage to be developed by January 1, 2025. The proposed legislation would also directs DOER to set a subsequent deployment target on or before December 31, 2020 to be achieved by January 1, 2030. The targets are to include both minimum and maximum limits on the amount of storage that may be owned by load-serving entities and are to be reevaluated every three years. The legislation also permits DOER to consider policies to encourage storage deployment.	H.B. 1746 (I) S.B. 1874 (I)
MD	AMI Rules	H.B. 1406 would allow customers to opt out of AMI installation at no additional cost. The bill also directs the Department of Health and Mental Hygiene and the Public Service Commission to jointly report on the public health impact of smart meters in the state. The bill was reported unfavorably from committee.	H.B. 1406 (I)
ME	AMI Rules	S.B. 75, introduced in January 2017, would allow customers to opt out of AMI installation without being charged a fee, monthly charge, or higher rate. The bill also allows utilities to decrease the number of times traditional meters are read and utilize a billing method based on average	S.B. 75 (I)

		electricity consumption, subject to Public Utilities Commission approval.	
MI	AMI Rules	H.B. 4220, introduced in February 2017, would allow utility customers to opt out of having an advanced meter installed; utilities would only be able to install advanced meters if the customer did not opt out and choose to retain a traditional meter. This bill would apply to both IOUs and municipal utilities. This bill has not yet passed the House.	H.B. 4220 (I)
NV	Energy Storage Target	S.B. 204 would require the Public Utilities Commission to determine whether it is in the public interest to adopt annual requirements for the procurement of energy storage by utilities. The bill was introduced in February 2017 and passed the Senate in late April.	S.B. 204 (P1)
NY	AMI Rules	A.B. 3066 and A.B. 6464 would require AMI devices to meet certain performance and safety standards, and would allow customers the ability to opt-out of AMI installation at no penalty, fee, or service charge.	A.B. 3066 (I) A.B. 6464 (I)
	AMI Rules	S.B. 3093 would create a Real Time Smart Meter program, in which customers would have the option of continuing with their current metering system, as well as purchasing or renting a real time smart meter from a third party certified by the Public Service Commission.	S.B. 3093 (I)
	DER Compensation	<p>As part of New York's Reforming the Energy Vision (REV) proceeding, the Public Service Commission (PSC) is developing a methodology for DER valuation that provides a more precise and complete accounting of the values and costs of DERs, including energy storage, than traditional net metering. While the PSC recognized that the development of an appropriate value and compensation for DERs will be an ongoing process progressing in tandem with technical and market capabilities, it directed the public staff to develop recommendations on the value of DERs that could potentially lead to an alternative to net metering.</p> <p>In March 2017, as part of the net metering transition order (Docket No. 15-E-0751), the PSC provided direction on how DERs should transition from net metering to a Value of Distributed Energy Resources (VDER) tariff that reflects the cost and benefits of DERs on the grid. The transition is to occur in phases. In Phase One, mass market projects will be interconnected under existing net</p>	Docket No. 15-02703/15-E-0751

		<p>metering rules with a 20-year contract term. Any on-site energy storage systems paired with renewable energy generation facilities will retain traditional net metering, and all projects interconnected before the order will be grandfathered. Projects that don't qualify for the Phase One net metering will be compensated based on Phase One Value Stack tariff.</p> <p>The Value Stack tariff will be based on monetary crediting for net hourly electricity exported to the grid. Excess credit will be eligible for carry over to subsequent billing and annual periods. Projects eligible for the Value Stack will have a contract term of 25 years from their in-service date. The Value Stack for net hourly electricity exported to the grid will be calculated based on the value of – (1) an energy value based on day-ahead hourly zonal locational-based marginal price (LBMP), (2) capacity value, (3) environmental value, and (4) demand reduction value and locational system relief value. The PSC will commence discussion on Phase Two of the transition in 2017.</p>	
	Energy Storage Target	S.B. 2699 would require the Public Service Commission to initiate a proceeding to determine energy storage targets that can be achieved by 2021. The procurements targets would be established by December 2018.	S.B. 2699 (I)
	Energy Storage Target	Legislation introduced in 2017 would require the Public Service Commission to commence a proceeding to establish energy storage programs. The bills require the Commission by 2018 to set an energy storage target to be achieved by 2030.	A.B. 6571 (I) S.B. 5190 (I)
	Energy Storage Target	In March 2017, the Public Service Commission (PSC), as a part of its Order on Distributed System Implementation Plans (DSIP), directed the utilities to deploy at least two energy storage projects at separate distribution substations or feeders that can perform at least two types of grid functions, such as increasing the hosting capacity of the substation or help in managing peak load.	Docket No. 16-M-0411
	Self-Directed Program	Legislation introduced in January 2017 requires the New York Public Service Commission to create a self-directed program for promoting renewable energy, microgrids, fuel cells, and energy storage technologies.	S.B. 1225 (P1) A.B. 1705 (I)
OK	AMI Rules	S.B. 601 would allow residential and commercial customers of public utilities regulated by the Corporation Commission to opt out of AMI installation. The bill would allow the utility to	S.B. 601 (I)

		charge a one-time \$5.00 fee to customers opting out.	
OR	Energy Storage Target	H.B. 2193 of 2015 directed utilities serving 25,000 or more residential customers to procure one or more energy storage systems with the capacity to store at least 5 MWh of electricity. The bill also directed the Public Utility Commission (PUC) to adopt guidelines for utilities to use in submitting an energy storage proposal. The PUC initiated a proceeding in September 2015, and issued an order adopting guidelines in December 2016. The guidelines cover various topic areas, including how utilities can design and select projects to propose, how utilities should submit their formal proposals, storage evaluation requirements, and competitive bidding requirements. The PUC order also directed the Public Staff to convene workshops to develop a framework for the utilities to use in conducting storage potential evaluations. The Public Staff submitted their recommendations in March 2017, which the PUC later approved.	H.B. 2193 (2015) Docket No. UM 1751
TX	AMI Rules	S.B. 1145 and H.B. 2572 are companion bills which would apply to Entergy Texas, a fully integrated utility which is not part of ERCOT. These bills would apply ERCOT-applicable advanced metering rules to Entergy Texas. The relevant rules deal with cost recovery for AMI and data privacy. S.B. 1145 has passed the Senate and is under consideration in the House.	S.B. 1145 (P2) H.B. 2572 (I)
VT	AMI Rules	In February 2017, the Vermont Department of Public Service filed a letter requesting that the Public Service Board hold a status conference on cybersecurity issues relating to smart metering. These issues were investigated several years ago and left open. A conference was held in April 2017, and the Department was to file proposed cybersecurity principles by April 28th. Recommendations by stakeholders on these principles are due by June 2nd.	Docket No. 7307
	Energy Storage Target	H.B. 501 directs the Department of Public Service to develop policy recommendations and targets for energy storage capacity in the state, particularly for systems storing electricity from intermittent sources. The full text of the bill is not yet available.	H.B. 501 (I)

Legislative Status Key: I = Introduced, P1 = Passed One Chamber, P2 = Passed Both Chambers, E = Enacted, D = Dead. Bill statuses are up to date as of early May 2017.

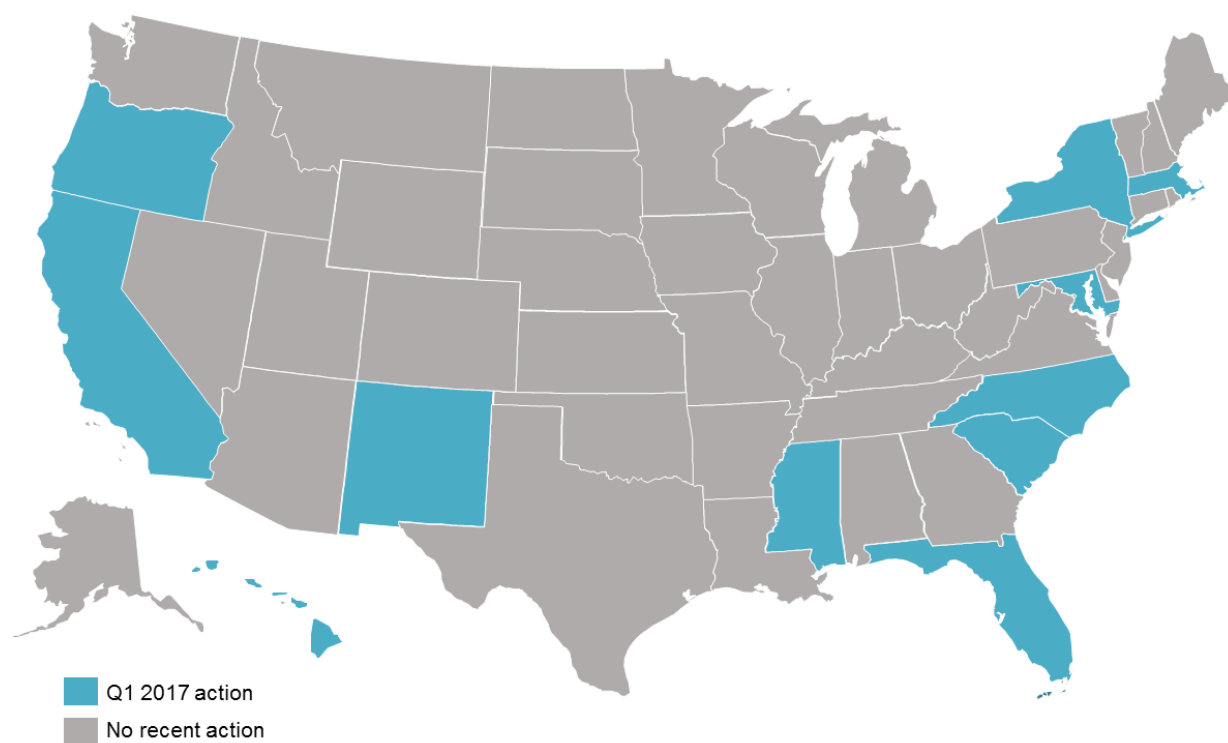
FINANCIAL INCENTIVES

Key Takeaways:

- In Q1 2017, there were 25 actions ongoing or under consideration in 11 states related to incentives for advanced grid technologies.
- While relatively few states considered implementing new incentive programs or making changes to existing programs, multiple states took several actions on incentives.
- Maryland recently became the first state to enact a state tax credit for energy storage.

In Q1 2017, there were 25 actions ongoing or under consideration in 11 states related to incentives for grid modernization. These actions include tax credits, property and sales tax exemptions, grant programs, rebate programs, loan programs, and property assessed clean energy (PACE) financing programs. Most notably, Maryland became the first state to pass a tax credit for energy storage systems in early April 2017, which the governor signed into law in May.

Figure 9. Action on Financial Incentives (Q1 2017)



While less than a quarter of states took action on incentives during Q1 2017, a few of these states took several incentive-related actions. Several bills in Hawaii seek to provide incentives for energy storage as well; a few have failed to advanced, but two active bills would offer a rebate program (H.B. 1593) and a tax credit (S.B. 660) for energy storage systems.

Massachusetts also took several actions on incentives this past quarter. H.B. 2600 would create a sales tax exemption, a local option for a property tax exemption, and a rebate program for

energy storage. Massachusetts has also launched a grant program for energy storage as part of its Energy Storage Initiative, with applications due by June 9, 2017.

Box 4. Tax Incentives, Grants, Rebates, and Financing Programs

The term **tax incentives** covers a broad spectrum of incentives, including income **tax credits** and **deductions**; **property tax exemptions**, exclusions, abatements, and credits; and **sales tax exemptions** and refunds. **Performance-based incentives** are based on the energy production of a system. **Grant programs** are one-time monetary payments, typically awarded through a competitive process, while **rebate programs** provide cash incentives for equipment installations meeting program specifications. Finally, **loan programs** provide financing for the purchase of advanced grid technologies and **Property Assessed Clean Energy (PACE) financing** programs allow property owners to borrow money to pay for certain clean energy improvements and repay the amount via a special assessment on the property. Find incentives for renewable energy and energy efficiency with the [Database of State Incentives for Renewables and Efficiency](#).

Multiple bills are also under consideration in California and New York. Two California bills would introduce new energy storage rebate programs, while proposed legislation in New York would provide tax credits for energy storage systems and a grant program for microgrid projects.

Figure 10. Action on Incentives by Incentive Type

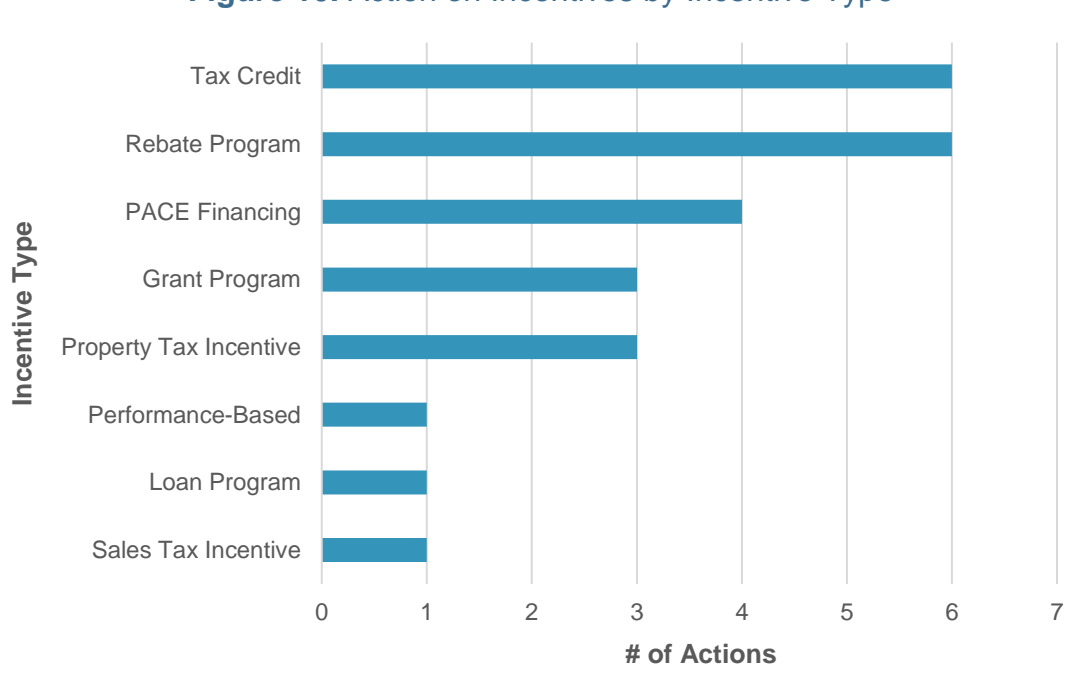


Table 6. Updates on Financial Incentives (Q1 2017)

State	Incentive Type	Description	Source
CA	Rebate Program	The Self-Generation Incentive Program (SGIP) provides rebates for energy storage systems. The California Public Utilities Commission, as required by 2016 legislation, approved a decision in April 2017 effectively doubling the budget for the program. The decision also sets aside 85% of the additional funding for energy storage, splitting it 90/10 between projects larger than 10 kW and residential projects equal to or less than 10 kW.	Docket No. R-12-11-005 Decision No. 17-04-017
	Rebate Program	A.B. 1030, introduced in February 2017, would require the Public Utilities Commission and governing boards of local publicly owned utilities to create an energy storage rebate program that sets aside a portion of funding for low-income customers and disadvantaged communities. The bill was defeated in April.	A.B. 1030 (D)
	Rebate Program	S.B. 700 would require the California Public Utilities Commission to create an Energy Storage Initiative, through which utilities would be required to offer rebates to customers who install certain energy storage equipment. As currently amended, the bill does not specify a required funding level; utilities would have individual proceedings to determine an appropriate funding amount for the rebates.	S.B. 700 (I)
FL	Property Tax Incentive	S.B. 90 implements a ballot initiative passed in August 2016, adopting a property tax exemption for solar plus storage systems for commercial and industrial customers. The bill passed both legislative chambers unanimously.	S.B. 90 (P2) H.B. 1351 (D)
HI	Loan Program	S.B. 1310 would redirect the Green Infrastructure Loan Program and would require green infrastructure loans to be issued for utility-scale energy storage projects. The bill failed to make crossover.	S.B. 1310 (D)
	Rebate Program	H.B. 1593 would create the Energy Savings Jump Start Program within the Hawaii Green Infrastructure Authority. Among other things, the Energy Savings Jump Start Program would include a rebate program for residential, commercial, and utility-scale energy storage systems. The bill was passed by the House in March 2017.	H.B. 1593 (P1)
	Rebate Program	S.B. 660 would create the energy storage market acceleration program and the energy storage rebate program, to be paid out through the public benefits fund. The bill failed to make crossover.	S.B. 660 (D)

	Tax Credit	S.B. 361 would create a state tax credit for residential, commercial, multifamily, and utility-scale energy storage systems. The bill failed to make crossover.	S.B. 361 (D)
	Tax Credit	S.B. 365 would create a state tax credit for residential, commercial, multifamily, and utility-scale energy storage systems. The bill failed to make crossover.	S.B. 365 (D)
	Tax Credit	S.B. 665 would create a state tax credit for energy storage systems starting in 2018. The tax credit would be equal to 25% of costs, up to \$5,000 for residential and \$500,000 for commercial projects. The bill passed the Senate in March 2017, and is currently in conference committee.	S.B. 665 (P1)
MA	Grant Program	In March 2017, the Massachusetts Clean Energy Center launched a grant program providing a total of \$10 million to energy storage demonstration projects with innovative, replicable business models and multiple value streams. This grant program is part of the state's Energy Storage Initiative. Applications are due June 9, 2017.	Advancing Commonwealth Energy Storage Program
	Performance-Based Incentive	As part of legislation enacted in April 2016, the Department of Energy Resources was directed to develop a new solar incentive program to succeed the Solar Renewable Energy Credit II (SREC II) Program. DOER released its final program design at a stakeholder meeting on January 31, 2017. The new program takes the form of a performance-based incentive and includes an adder for solar + storage systems. The base adder is \$0.045/kWh and will decrease by 4% with each block of installed solar capacity (amount of capacity per block will vary by utility territory.) This adder will vary based on the ratio of storage capacity to solar capacity, as well as the duration of the storage system.	Development of the Next Solar Incentive Final Program Design
	Property Tax Incentive	H.B. 2600 would allow municipalities to exempt energy storage systems from property taxation.	H.B. 2600 (I)
	Rebate Program	H.B. 2600 directs the Department of Energy Resources to establish a rebate for Massachusetts-based companies installing and manufacturing energy storage systems.	H.B. 2600 (I)
	Sales Tax Incentive	H.B. 2600 would adopt a sales tax exemption for energy storage systems through 12/31/2025.	H.B. 2600 (I)
MD	Grant Program	H.B. 1395 would add grants for energy storage systems to the state's existing Solar Energy Grant Program. Eligible storage equipment would include batteries and other electrochemical storage,	H.B. 1395 (I)

		capacitors, compressed air, pumped hydropower, hydrogen storage, thermal energy storage, regenerative fuel cells, flywheels, and superconducting magnets. Grants would be available for 30% of the installed cost, up to \$3,000.	
	Tax Credit	S.B. 758 would create a state tax credit for energy storage systems. Energy storage systems are defined as systems used to store electrical energy, or mechanical, chemical, or thermal energy that was once electrical energy, for use as electrical energy at a later time or in a process that offsets electricity use at peak times. The credit would be equal to 30% of installed costs up to \$5,000 for a residential property and \$150,000 for a commercial property. The aggregate amount of tax credits provided in a taxable year would be \$750,000, and the credit would expire on 12/31/2022. The bill passed the Senate in March 2017, the House in early April, and was signed into law in May 2017.	S.B. 758 (E) H.B. 490 (P1)
MS	Tax Credit	Legislation introduced in Mississippi in January 2017 would have created a state tax credit for residential solar energy systems, including solar systems with associated battery storage. The proposed credit for the energy storage component was \$0.20 per watt-hour of the first 20 kWh of battery capacity installed. The bill died in committee in February.	S.B. 2077 (D)
NC	PACE Financing	S.B. 493 would make significant changes to North Carolina's commercial PACE financing enabling legislation, including explicitly allowing energy storage systems to be financed through the program. Current PACE language allows distributed generation renewable energy and energy efficiency improvements to qualify.	S.B. 493 (I)
NM	PACE Financing	S.B. 215 would expand the state's Renewable Energy Financing District program to allow energy storage, energy efficiency, and water conservation projects to be eligible. Energy storage improvements would include any modification that is capable of absorbing energy or storing it for a period of time and thereafter delivering the energy. New Mexico ended its 2017 legislative session without passing the bill.	S.B. 215 (D)
NY	Grant Program	S.B. 4490 requires the New York State Energy Research and Development Authority to create a grant program to provide incentives up to \$150,000 per applicant to promote microgrids in the state.	S.B. 4490 (I)
	Tax Credit	A.B. 6235 would create a state tax credit for residential energy storage systems equal to 25% of costs, up to \$7,000.	A.B. 6235 (I)

OR	PACE Financing	H.B. 2132 would add energy storage and smart electric vehicle charging stations to the list of improvements eligible for PACE financing. The bill passed the House in April 2017.	H.B. 2132 (P1)
SC	PACE Financing	S.B. 261 would establish a commercial PACE financing program in the state. Battery and thermal storage systems would be eligible under this program.	S.B. 261 (P1)
	Property Tax Incentive	S.B. 44 would adopt an 80% property tax exemption for distributed energy resources, including energy storage systems.	S.B. 44 (P1) H.B. 3079 (I)

Legislative Status Key: I = Introduced, P1 = Passed One Chamber, P2 = Passed Both Chambers, E = Enacted, D = Dead. Bill statuses are up to date as of early May 2017.

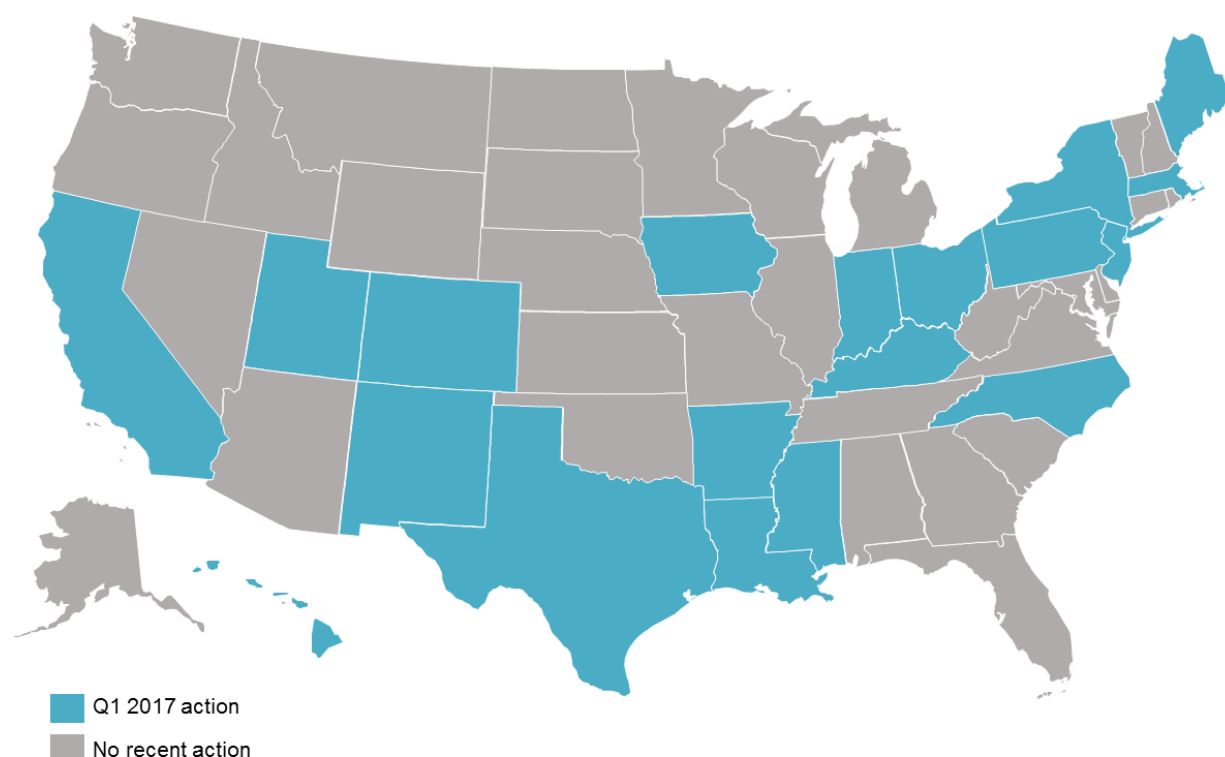
DEPLOYMENT OF ADVANCED GRID TECHNOLOGIES

Key Takeaways:

- In Q1 2017, there were 36 pending or decided proposals from state legislators or utilities in 19 states to deploy advanced grid technologies, such as advanced metering infrastructure (AMI), smart grid components, microgrids, and energy storage projects.
- Nineteen requests included deployment of AMI, while six requests included energy storage projects.
- Utility requests were typically filed as standalone requests, as part of general rate cases, or as part of grid modernization plans.

While most states are still investigating or proposing policy and regulatory changes to better enable the use of advanced grid technologies, many utilities are already deploying these technologies. Advanced metering infrastructure (AMI) is the technology that has seen the most deployment so far; AMI installations tend to provide significant financial savings and are necessary for the implementation of many new rate structures, such as time-varying rates.

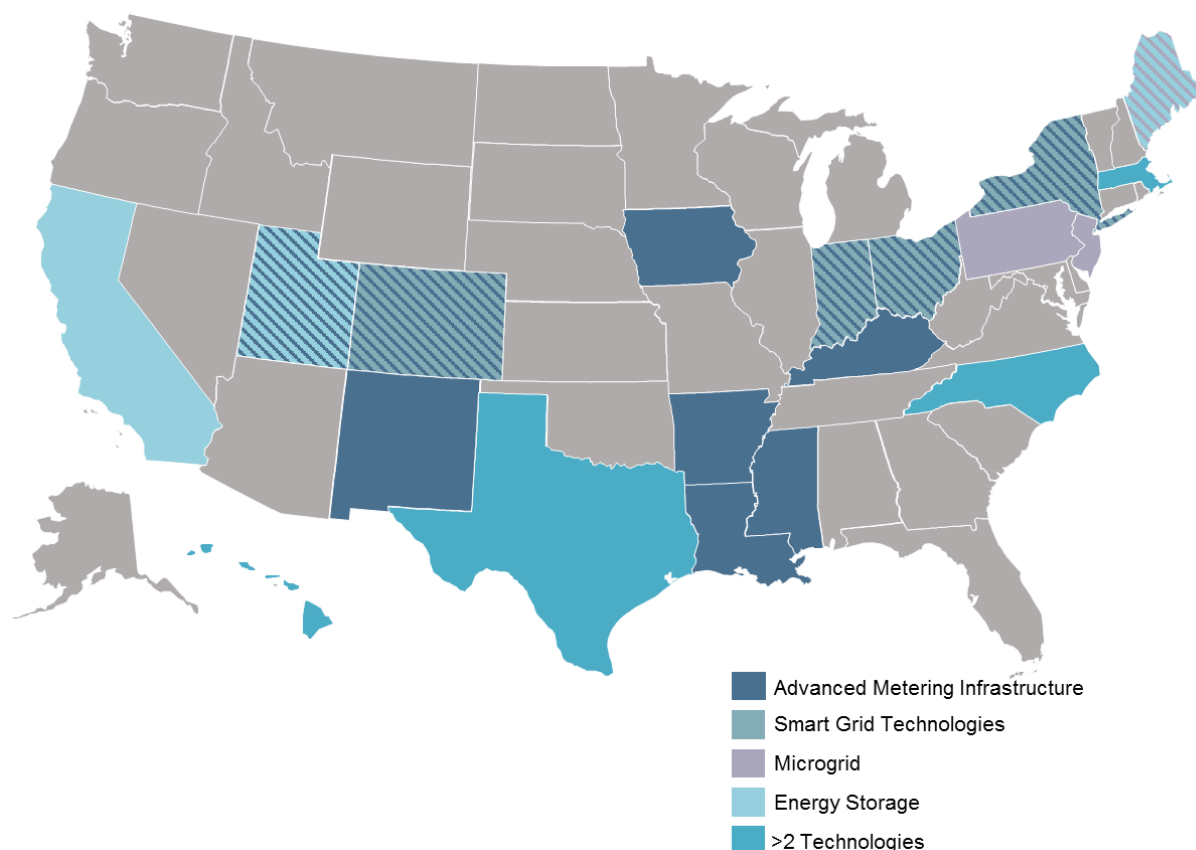
Figure 11. Action on Advanced Grid Technology Deployment (Q1 2017)



Entergy has filed proposals to fully implement AMI in four of its service territories: Arkansas, Louisiana, Mississippi, and New Orleans. These requests are all currently pending. Utilities in Indiana, Iowa, Kentucky, Massachusetts, New Mexico, New York, North Carolina, Ohio and Utah have also filed requests to deploy AMI.

Many utilities are also pursuing pilot projects, especially for energy storage and microgrid technologies. In North Carolina, the Utilities Commission approved Duke Energy Progress' proposed microgrid project in early April 2017. Hawaii, Maine, and New Jersey all have pending legislation related to microgrid deployments.

Figure 12. Proposed Deployments by Technology Type (Q1 2017)



Utilities in Maine, Massachusetts, North Carolina, Texas, and Utah have pending proposals to deploy energy storage facilities. Utah's proposal is part of Rocky Mountain Power's implementation of the 2016 Sustainable Transportation and Energy Program Act, while Eversource in Massachusetts has proposed energy storage deployment in both its grid modernization plan and January 2017 general rate case application.

Table 7. Updates on Advanced Grid Technology Deployment (Q1 2017)

State	Utility	Technology	Description	Source
AR	Entergy Arkansas	AMI	In September 2016, Entergy Arkansas submitted a proposal to replace existing meters with advanced meters. Entergy expects the deployment to provide a nominal net benefit of \$431 million to customers. If approved, Entergy would begin deployment of the communications network in 2018 and meters in 2019. Entergy proposed recovering the AMI deployment costs through its Formula Rate Plan Rider. A hearing is scheduled to begin on August 31, 2017.	Docket No. 16-060-U
CA	Los Angeles Department of Water & Power (LADWP)	Energy Storage	S.B. 801, introduced in February 2017, would require LADWP to deploy at least 100 MW of cost-effective energy storage by December 31, 2017. Cost-effective energy storage is defined as any transmission-connected, distribution-connected, or behind-the-meter storage facility providing a four-hour duration resource adequacy service. This directive is intended to mitigate the impact of a gas leak at the Aliso Canyon natural gas storage facility.	S.B. 801 (I)
	Southern California Edison	Smart Grid	In its latest rate case, Southern California Edison proposed an investment of \$1,875 million in capital expenditures from 2016 - 2020 for its Grid Modernization plan, which includes automation, planning, communications, and information technology improvements. The case is ongoing.	Docket No. A-16-09-001 Southern California Edison Proposal
CO	Public Service Co. of Colorado d/b/a Xcel Energy	AMI, Smart Grid	In August 2016, Xcel Energy submitted an Advanced Grid Intelligence and Security proposal. This plan includes AMI deployment, as well as a Volt-VAR optimization program and components of an advanced communications network. Settlement agreements were due by May 8, 2017.	Docket No. 16A-0588E
HI	Maui Electric Company (MECO)	Demand Response	In September 2016, Maui Electric filed an application for an expansion of its Fast Demand Response program from its current 0.2 MW total load to 5 MW. In March 2017, the Consumer Advocate recommended approving an expansion of just 1 MW for 2017. Maui Electric replied in March, asserting that the load total of 5	Docket No. 2016-0232

			MW is necessary to meet an anticipated reserve capacity shortfall.	
	N/A	Microgrid	H.B. 848 would require the University of Hawaii to develop a plan for a microgrid project on its campus and to submit the plan to the legislature prior to convening the regular session of 2019. The bill passed the House in March 2017.	H.B. 848 (P1)
	Hawaiian Electric Company (HECO), Hawaii Electric Light Company (HELCO), Maui Electric Company (MECO)	Smart Grid	In March 2016, Hawaii's IOUs submitted a proposal for a \$340 million Smart Grid Foundation Project. In January 2017, the Public Utilities Commission denied the utilities' request, noting that the project may not be cost-effective, it fails to address how customer-sited assets will be integrated, and it does not address the risk of obsolescence due to technological advancement. The Commission also directed each of the utilities to submit a comprehensive Grid Modernization Strategy by June 30, 2017, which will be vetted through a stakeholder process. The utilities later requested a change in the due date for its Grid Modernization Strategy, which the Commission approved. The utilities must submit their initial drafts by June 30, 2017, and after stakeholder input, their final documents by August 29, 2017.	Docket No. 2016-0087
IA	Interstate Power & Light d/b/a Alliant Energy	AMI	In January 2017, Interstate Power & Light filed a request for a waiver from electric meter testing requirements while it installs AMI for residential and small commercial customers.	Docket No. WRU-2017-0004-0150
IN	Southern Indiana Gas & Electric d/b/a Vectren	AMI, Smart Grid	In February 2017, Southern Indiana Gas & Electric filed a \$500 million, seven-year transmission and distribution modernization plan. The plan includes deployment of AMI. An evidentiary hearing is scheduled for June 26, 2017.	Docket No. 44910
KY	Kentucky Utilities	AMI	In November 2016, Kentucky Utilities filed for a general rate increase as well as deployment of AMI throughout its service territory. A hearing was held in early May 2017.	Docket No. 2016-00370
	Louisville Gas & Electric	AMI	In November 2016, Louisville Gas & Electric filed for a general rate increase. The proposal also includes full deployment of AMI in the utility's service territory. A hearing was held in early May 2017.	Docket No. 2016-00371

LA	Entergy Louisiana	AMI	<p>In November 2016, Entergy Louisiana submitted a proposal to deploy an advanced metering system, including advanced electric and gas meters and a communications network supporting two-way data communications. Entergy's plan would deploy AMI in phases, resulting in full implementation by 2022.</p> <p>Communications network deployment would begin in 2018, with meter deployment beginning in 2019. Entergy estimates the nominal net benefit to customers to be \$607 million (\$190 million NPV). Entergy is also proposing an Advanced Metering System (AMS) Customer Charge be implemented to recover costs beginning in April 2019. The per-customer AMS charge is estimated to be \$2.22 in Year 1, \$2.74 in Year 2, \$3.08 in Year 3, and \$2.88 as the final charge. A hearing is scheduled to begin on September 26, 2017.</p>	Docket No. U-34320
	Entergy New Orleans	AMI	<p>In October 2016, Entergy New Orleans filed a proposal to deploy AMI throughout its service territory, as well as an advanced communications network, a distribution management system, meter data management system, outage management system, and supporting infrastructure.</p>	City Council Docket No. UD-16-04 (<i>docket not publicly accessible</i>)
MA	Eversource	AMI, Energy Storage, Smart Grid	<p>In accordance with the Department of Public Utilities' June 2014 order on grid modernization plans, Eversource filed its grid modernization plan in August 2015. Eversource has proposed investments in advanced sensing technology, next generation remote faulted circuit indication, a distribution management system, network load flow, predictive outage detection, automated feeder reconfiguration, voltage optimization, integrated planning tracking for DERs, energy storage, adaptive protection/two-way power flow, resiliency improvements, opt-in time-varying rates and related infrastructure, cybersecurity, communications, and a customer education and outreach plan. Evidentiary hearings are scheduled for late May 2017.</p>	Docket No. 15-122
	Eversource	Energy Storage, Smart Grid	<p>As part of its general rate case filed in January 2017, Eversource has proposed a Grid Modernization Base Commitment, which includes several investments to</p>	Docket No. 17-05

			modernize the grid. These investments include creation of a distribution system network operator (\$44 million), distribution system automation (\$84 million), foundational technology for demand-side management (\$111 million), energy storage research and demonstration projects (\$100 million), customer tools for DER integration (\$15 million), and electric vehicle infrastructure and vehicle conversions (\$45 million).	
	Fitchburg Gas and Electric Light Company d/b/a Unitil	Smart Grid	In accordance with the Department of Public Utilities' June 2014 order on grid modernization plans, Unitil filed its grid modernization plan in August 2015. Unitil's proposed plan includes five programs: (1) DER enablement, (2) grid reliability, (3) distribution automation, (4) customer empowerment, and (5) workforce and asset management encompassing 16 capital investment projects. Evidentiary hearings are scheduled for mid-May 2017.	Docket No. 15-121
	Massachusetts Electric Company and Nantucket Electric Company d/b/a National Grid	AMI, Smart Grid	In accordance with the Department of Public Utilities' June 2014 order on grid modernization plans, National Grid filed its grid modernization plan in August 2015. National Grid proposed four different scenarios (Balanced Plan Scenario, AMI-Focused Scenario, Grid-Focused Scenario, and Opt-In Scenario) which provide a different portfolio of investments. The plans include investments in the following: AMI, customer load management devices, voltage optimization and conservation voltage reduction technologies, advanced distribution automation, feeder monitors, an advanced communications network, an advanced distribution management system and distribution supervisory control and data acquisition system, information and operational technologies, cybersecurity infrastructure and protocol development, training and asset management, and marketing outreach and education surrounding these technologies and new proposed offerings. Evidentiary hearings are scheduled for the second part of May 2017.	Docket No. 15-120
ME	Emera Maine	Energy Storage, Microgrid	In February 2017, Emera Maine filed a petition for approval of a microgrid project at its Hampden Operations Center. The	Docket No. 2017-00027

			project is intended to provide electric supply, storm back-up, and reduction of energy operating cost at the Center. The proposed microgrid would consist of a 600 kW solar PV system, a 500 kW/950 kWh Tesla Powerpack battery, an existing diesel generator, and an electric vehicle charger. Briefs and reply briefs were due in April 2017.	
	N/A	Microgrid	S.B. 378 directs the Public Utilities Commission to establish a limited microgrid program for industrial customers in northern Maine. The Commission is to establish the capacity limit for generators in a microgrid, the kilovolt limit for transmission or distribution systems in a microgrid, the maximum distance between a generator and an industrial customer in a microgrid, and the maximum number of industrial customers that may be in a microgrid. Anyone constructing and operating a microgrid, pursuant to this legislation, would not be regulated as a public utility. The bill died in early May 2017.	S.B. 378 (D)
MS	Entergy Mississippi	AMI	In November 2016, Entergy Mississippi submitted a proposal to deploy advanced metering infrastructure throughout its service territory. Entergy estimates the nominal net benefit of this deployment to customers to be \$183 million (\$53 million net present value). If approved, Entergy would begin communications network deployment by late 2018 and meter deployment in early 2019. The total implementation cost would be \$136 million. Entergy proposed an opt-out option be made available, but limited to residential customers.	Docket No. 2016-UA-261
NC	Duke Energy Carolinas	AMI	Duke Energy Carolinas has deployed smart meters to about 25% of its customers in North Carolina and South Carolina and plans to deploy more. Some customers eligible to receive smart meters have asked to keep their traditional meters. Duke Energy Carolinas has proposed charging these opt-out customers an initial \$150 set-up fee and a monthly fee of \$11.75 to cover expenses related to sending out meter readers. During Q1 2017, the Utilities Commission	Docket No. E-7 Sub 1115

			received public comments on Duke's proposal.	
	Dominion NC Power, Duke Energy Carolinas, Duke Energy Progress	AMI, Microgrid, Smart Grid	As part of the 2016 Biennial IRP and REPS Compliance proceeding, the IOUs were required to submit their 5-year Smart Grid Technology Plans. The plans vary and include a wide mix of smart grid technologies, including AMI deployment and, in Dominion's case, a microgrid project. The Utilities Commission approved the utilities' plans in March 2017, but also requested that the utilities, the Public Staff, and all interested parties continue discussing potential rule changes for customer data access.	Docket No. E-100 Sub 147
	Duke Energy Progress	Energy Storage	In January 2016, Duke Energy Progress filed an application for its Western Carolinas Modernization Project. The project involves the construction of new natural gas units and a 5 MW utility-scale energy storage pilot. In March 2017, Duke Energy Progress filed its annual progress report on the project in which it proposed deployment of up to 10 batteries with a total capacity over 5 MW to be deployed starting in 2018.	Docket No. E-2 Sub 1089
	Duke Energy Progress	Microgrid	In November 2016, Duke Energy Progress applied for a certificate of public convenience and necessity for a microgrid project. The small project would serve a communications tower operated by the National Park Service in the Great Smoky Mountains. The project would consist of a 10 kW PV system and an approximately 95 kWh zinc-air battery. The proposed project received two statements of public support and no objections, and in March 2017 Duke Energy Progress and the Public Staff submitted their proposed order. The Utilities Commission is expected to issue a decision in early Q2 2017.	Docket No. E-2 Sub 1127
NJ	N/A	Microgrid	S.B. 881 and A.B. 2756 would require the Board of Public Utilities to establish a microgrid pilot project for municipalities to equip their critical facilities.	S.B. 881 (I) A.B. 2756 (I)
NM	Public Service Company of New Mexico (PNM)	AMI	In February 2016, Public Service Company of New Mexico (PNM) submitted a proposal to deploy advanced metering infrastructure throughout its service	Docket No. 15-00312-UT

			territory. The cost of the project would be \$87.2 million, and PNM expects installation to be completed by June 2019. PNM estimates the net benefit of the project to customers to be \$20.9 (net present value). PNM also proposes an opt-out option with a surcharge. Hearings were held in February and March 2017.	
NY	New York State Electric & Gas, Rochester Gas & Electric	AMI	In December 2016, New York State Electric & Gas and Rochester Gas & Electric filed a petition seeking authorization for full deployment of AMI and to establish surcharge for recovery of the costs. In March 2017, the Public Service Commission held a procedural conference where procedural issues were discussed, including party status, litigation schedule, and other topics.	Docket No. 17-E-0058
	Orange and Rockland Utilities	AMI	In February 2017, Orange and Rockland Utilities filed a petition for full deployment of AMI, an AMI rate pilot program, and implementation of Non-Wires Alternative (NWA) projects and cost recovery of these programs. The Public Service Commission previously authorized the first phase of the AMI rollout program; this is the second phase of the program completing full deployment of AMI in the utility's service area.	Docket No. 17-M-0178
	PSEG Long Island	AMI	As a part of the Long Range Utility 2.0 plan, PSEG Long Island proposed roll-out of AMI to all of its customers, installing over 50,000 AMI meters in 2017. In 2016, PSEG Long Island began to install targeted AMI to large commercial users and to all new meter installations that required net metering.	Docket No. 14-01299
	N/A	Smart Grid	A.B. 4223 requires utilities to develop and adopt smart grid system deployment plans by July 2018 and issue RFPs by October 2018. The smart grid would allow for a two-way communications system with real time monitoring, diagnostics, and control. Utilities would be allowed recovery of their costs.	A.B. 4223 (I)
OH	Ohio Edison d/b/a First Energy	Smart Grid	In October 2016, PUCO ordered First Energy to file a Distribution Modernization Rider (DMR), which would collect \$600 million over three years to fund modernization of the distribution grid. First	Docket No. 14-1297-EL-SSO

			Energy filed its tariff in November 2016, and in December the Public Staff recommended its approval. The Ohio Consumers' Counsel (OCC) and the Ohio Manufacturers' Association Energy Group (OMAEG) then filed a joint motion to reject the DMR tariff. PUCO denied the consumer groups' motion and approved the DMR tariff in December 2016. The OCC filed an additional application for rehearing in January 2017, which PUCO denied in February 2017.	
	Ohio Power Company d/b/a AEP	AMI, Smart Grid	In February 2017, the Public Utilities Commission of Ohio (PUCO) approved a stipulation for AEP to implement Phase 2 of its gridSMART Project. The gridSMART Project includes a deployment of smart meters to 894,000 additional customers, a transition to time-differentiated pricing, and other smart grid investments and studies.	Docket No. 13-1939-EL-RDR
PA	PECO Energy	Microgrid	In May 2016, PECO filed an application for approval of a microgrid pilot plan. PECO later withdraw its application so that a collaborative proceeding on microgrid deployment may take place. The ALJ granted PECO's request to withdraw its application in November 2016, and in January 2017, the Public Utility Commission adopted the ALJ's decision.	Docket No. P-2016-2546452
TX	El Paso Electric	Demand Response	In March 2017, El Paso Electric submitted a plan for a three-year residential and small commercial demand response pilot program. Smart thermostats would be used to control customers' air conditioning load during summer.	Docket. No. 46967
	American Electric Power Texas North Company	Energy Storage	In September 2016, AEP Texas North Company filed a proposal to install two utility-scale lithium-ion batteries in its distribution system with the aim of increasing system reliability and avoiding the need to perform alternate infrastructure upgrades. Distribution utilities in Texas are normally prohibited from owning energy storage systems used to sell electricity at wholesale, but the utility in this case has requested relief from these rules and requested that the batteries be considered distribution assets. A hearing is scheduled for June 20, 2017.	Docket No. 46368

UT	Rocky Mountain Power	AMI, Energy Storage	In September 2016, Rocky Mountain Power submitted a proposal, pursuant to the 2016 Sustainable Transportation and Energy Program (STEP) Act, to implement an advanced substation metering project and a solar plus storage project. An order on Phase I issues, including the solar plus storage project, was issued in December 2016, approving the project on the condition that Utah customers are credited for the program's generation. The advanced substation metering project is being addressed in Phase II of the proceeding. A hearing was held in April 2017.	Docket No. 16-035-36
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Q2 2017 OUTLOOK

With only four states scheduled to still be in session during Q3 2017, most decisions on proposed legislation will be made during Q2.³ At least 82 bills related to grid modernization, energy storage, microgrid, and demand response were introduced in Q1 2017; most of these remained pending at the end of the quarter.

In early May, **Maryland**'s governor signed a bill creating the first energy storage state tax credit in the country. Another bill creating a state energy storage tax credit is active in **Hawaii** and currently in conference committee. **New York** also took action on incentives in early Q2 2017, allocating \$15.5 million for an energy storage grant program.

In **California**, the state's Self-Generation Incentive Program reopened to energy storage applicants on May 1st, with most of the program's Step 1 allocation for energy storage incentives being subscribed in the first 24 hours.⁴ Also in **California**, a bill creating a new energy storage rebate program was passed by the Senate in Q2 2017.

A bill directing the Public Utilities Commission of **Nevada** to consider establishing an energy storage target was passed in April 2017, and similar bills remain active in **Massachusetts**, **New York**, and **Vermont**. **Massachusetts** is expected to formally establish an energy storage target by July 2017.

Bills to conduct a grid modernization study and an energy storage study were filed in **North Carolina** in early Q2 2017, and Q2 amendments to an **Oregon** bill call for a study related to grid modernization and regulatory structures. **Maryland**'s governor signed a bill initiating an energy storage study in early May. Major grid modernization investigations are ongoing in several states, including **Illinois**, **Ohio**, and **Rhode Island**.

In late April, the **New York** Grid Modernization Act was introduced, which would initiate a smart grid feasibility study and create a smart grid advisory council and a transmission and distribution coordinating council. Should the study indicate it is in the public interest to deploy smart grid technology, the Public Service Commission would approve a ten-year grid modernization program.

A hearing on a settlement agreement filed in **Arizona** Public Service's general rate case is scheduled for Q2 2017, in which optional rate schedules with time-varying rate and demand charges are likely to be approved. Pilot programs for time-varying rates in **Maryland** are to be developed during Q2 2017.

A microgrid project proposed by Duke Energy Progress in **North Carolina** was approved in April 2017. Hearings on **Massachusetts** utilities' grid modernization investment plans are being held in Q2 2017.

ENDNOTES

¹ Energy Storage Association, *Facts and Figures*, 2017, <http://energystorage.org/energy-storage/facts-figures>

² Adam Cooper, *Electric Company Smart Meter Deployments: Foundation for a Smart Grid*, The Edison Foundation Institute for Electric Innovation, October 2016, <http://www.edisonfoundation.net/iei/publications/Documents/Final%20Electric%20Company%20Smart%20Meter%20Deployments-%20Foundation%20for%20A%20Smart%20Energy%20Grid.pdf>

³ National Conference of State Legislatures, 2017 State Legislative Session Calendar, April 2017, <http://www.ncsl.org/documents/ncsl/2017sessioncalendar.pdf>.

⁴ Peter Maloney, *California's SGIP opens to strong demand for storage incentives*, Utility Dive, 5 May 2017, <http://www.utilitydive.com/news/californias-sgip-opens-to-strong-demand-for-storage-incentives/442022/>; Christian Roselund, *SGIP Step 1 (mostly) sells out in 24 hours*, PV Magazine, 3 May 2017, <https://pv-magazine-usa.com/2017/05/03/sgip-step-1-mostly-sells-out-in-24-hours/>