State Strategies for Advancing the Use of Energy Storage

Executive Summary

Wide-scale adoption of advanced energy storage technologies could have profound effects on the electric power sector. The technologies offer the potential to shift energy use away from times of peak demand and high prices, improve the reliability and resilience of the electric power grid and support the greater integration of intermittent renewable resources. They are therefore among the technologies expected to be a component of a more modern electric power system. Governors can take actions today that will help determine the extent to which advanced energy storage will be a part of their state's energy future.

This paper defines "advanced energy storage" to include batteries (primarily lithium-ion), compressed air, thermal storage and flywheels; it does not include pumped hydropower storage projects, which make up more than 90 percent of currently installed energy storage capacity in the United States.[1] Recent advances in battery technologies, declines in battery storage costs and state and federal policy incentives have combined to help spur a surge in advanced energy storage installations (with annual deployments of advanced energy storage capacity more than tripling from 2014 to 2015).[2] Because the size and cost of pumped hydropower projects limits deployment opportunities, the number of new pumped hydropower projects is expected to be overshadowed by more advanced energy storage installations—particularly batteries—and states actively promoting storage generally are focused on those advanced energy storage projects.

Although costs are decreasing and economic deployments of advanced energy storage have begun in certain locations, advanced energy storage remains a small part of the overall power market. It faces several barriers to greater adoption and wide-scale deployment including cost, technological and regulatory barriers. For instance, although costs are decreasing, advanced energy storage interconnection and project siting challenges (e.g., to comply with building, fire, zoning and other codes) can increase project costs further and delay project implementation. Compounding those challenges is the fact that electricity markets do not compensate energy storage for the full range of services it can provide.

Recognizing the potential benefits of and barriers to advanced energy storage, some states have begun to use incentives, regulations and other policy approaches to support greater deployment. Based on those examples, governors seeking to stimulate deployment of advanced energy storage in their states may want to consider the following measures:

- Include energy storage in state energy planning efforts and electric utility resource planning;
- Recognize the multiple benefits of storage in state regulations;
- Develop streamlined siting, approval and interconnection processes for energy storage;
- Adopt state utility procurement targets for energy storage capacity;
- Encourage the incorporation of storage into energy assurance efforts;
- Create financial incentive programs for energy storage; and
- Promote research and development efforts for grid operations with energy storage.

Introduction

Often, advanced energy storage is referred to as a game changer for transforming the electric power grid into one that is cleaner, lower cost, more resilient, more reliable and more distributed.[3] Storage enables energy to be generated at one time to be used later, when it is most needed. Energy can be stored in several ways and the main types of storage technologies available are: pumped hydropower, batteries, thermal, compressed air and flywheel storage. Batteries are the most common storage technology being added to the grid today. Storage can be integrated in all parts of the electric system—co-located with generation, connected to the high-voltage transmission system, in the lower-voltage distribution system and behind the customer meter or within a microgrid—so it can be used by utilities, independent providers and customers alike.[4] There are many potential benefits of advanced energy storage, including lowering costs to ratepayers by reducing the amount of electric capacity needed and allowing for the integration of cleaner sources of generation to help to reduce overall emissions from the electric power sector. The following two capabilities are key uses for advanced energy storage technologies:

- **Boosting integration of intermittent renewable resources.** Advanced energy storage can enable intermittent renewable resources both centralized and distributed—to provide a greater share of the resource mix. Storing excess power from intermittent renewables for use during periods when those resources are not available allows them to cover a greater share of the load—thereby also reducing overall emissions from the electric power sector. Similarly, by storing power from intermittent renewables for use during times of peak demand—when spot market prices can be many times higher—advanced energy storage can reduce the costs of providing electricity.[5]

- **Improving grid efficiency, reliability and resilience.** Advanced energy storage can be used to provide frequency regulation, voltage support or other services that improve the operation of the grid. Advanced energy storage also can store power for backup purposes, such as in the event of a power outage.

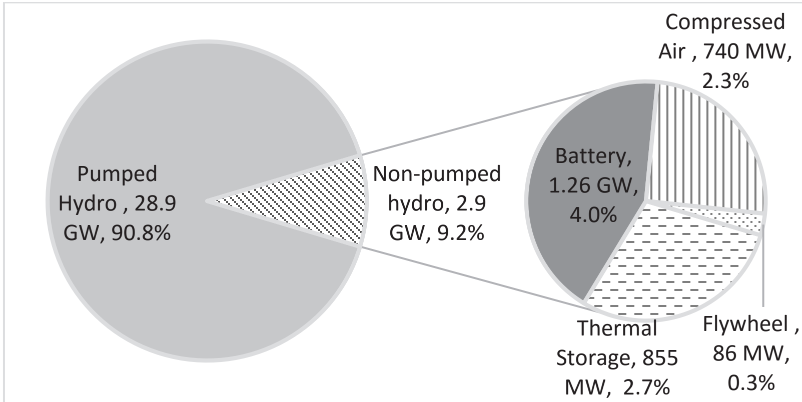
Greater adoption of advanced energy storage is one of the ways that states can help achieve those outcomes when integrated with new generation sources, transmission and distribution upgrades, and other policy choices. Governors have a critical role in determining how and the degree to which advanced energy storage will play a role in their state's electric power grid.

Background and Trends

Energy storage has been a component of the U.S. electricity market for decades, primarily in the form of pumped hydropower storage systems.[6] Currently, of the 32 gigawatts (GW) of installed energy storage capacity in the United States, pumped hydro represents almost 91 percent (see Figure 1 on page 3).[7] The energy storage market is evolving rapidly, however, to include batteries and other non-hydro storage options. Between 2010 and 2014, non-hydro storage capacity in the United States more than doubled—from 160 megawatt (MW) to 350 MW.[8] From 2014 to 2015, the United States saw a further surge, with annual deployed energy storage capacity growing from 65 MW to 221 MW (see Table 1 on page 4).[9] Although energy storage currently represents the equivalent of 2 percent of the total U.S. electricity generation, the market's rapid growth is projected to continue.[10] According to some estimates, another 4 GW of advanced energy storage capacity is expected from 2016 through 2020, and there could be more than 2 GW of new U.S. energy storage installations annually by 2021.[11]

Much of the current growth in storage capacity is due to lower priced, more advanced batteries that can be deployed on the distribution grid or behind the meter;

Figure 1. U.S. Installed Energy Storage Capacity



Source: U.S. DOE 2016 (includes announced projects)

battery prices fell 40 percent to 60 percent in the 18 months prior to March 2016.[12] Analysts are predicting another 50 percent decline in battery costs by 2019.[13] Since 2005, the prices for lithium-ion battery packs—as used in electric vehicles—have dropped from $1,000 to $1,500 per kilowatt hour (kWh) to an industry average of $350 per kWh, resulting in cheaper batteries for use in advanced energy grid storage.[14] That trend is expected to continue, as prices are projected to drop to as low as $100 per kWh by 2020 because of increased battery research and development (R&D), increased production and lower production costs.[15]

Some recent federal actions are expected to drive growth in the storage market even further. The extension of the federal Investment Tax Credit (ITC) for solar in late 2015, for instance, is expected to fuel growth in solar-plus-storage packages, as the ITC applies to storage charged from solar under certain circumstances.[16] A 2016 report from GTM Research estimates the ITC extension will result in an additional 500 MW of renewable-paired storage between 2016 and 2020, a 33 percent increase compared to a scenario with no tax extension.[17]

Energy storage is currently deployed in the United States in four primary ways:

- Larger storage units, sited similarly to central station power plants, that generate or provide electricity during peak hours.[18] Most examples of large energy storage applications are pumped hydropower projects (typically greater than 10 MW in size), although there are some examples of large battery, flywheel, compressed air or thermal storage applications.[19] The first large "peaker" battery storage facility used to provide electricity during times of peak demand, with 100 MW of capacity and a 4-hour duration, is under construction in **California**.[20] Similar energy storage projects can be used as an alternative to traditional gas-fired peaking generation;

- Smaller, distributed storage units that provide a similar function, but their distribution throughout the grid allows them to help meet specific local peaks and help the distribution system function more efficiently. Most storage technologies used for demand shifting and peak reduction are 1 kilowatt (kW) to 1 MW in size;[21]

- Smaller, faster-ramping storage systems that provide frequency regulation, improving the qual-ity of power at a much faster rate than traditional power plants. Lithium-ion batteries are commonly used for fast-ramping capabilities. Storage technologies that provide frequency regulation typically range in size from 1 MW to 2,000 MW;[22] and

Table 1. U.S. Energy Storage Installations (2014 and 2015)

	2014	2015	Change
Total Deployments (MW)	65	221	Up 243 percent
Total Deployments (MWh)	86	161	Up 88 percent
Front-of-Meter Deployments[23] (MW)	58	187	Up 223 percent
Behind-the-Meter Deployments[24] (MW)	6.9	35	Up 405 percent
Utility-Scale System Price ($/kWh)	$800-$1,300	$700-$1,200	Down 8 percent to 13 percent
Utility-Scale Pipeline (MW)	3,630	6,638	Up 83 percent
Number of Markets with Policy Developments	10 state markets, 1 regional market and federal	20 state markets, 4 regional markets and federal	13 additional markets
Cumulative Five-Year Forecast (MW)	2,294 (2015-2019)	4,030 (2016-2020)	Up 76 percent

Source: GTM Research and the Energy Storage Association

- Energy storage that is sited alongside distributed energy resources at critical infrastructure or industries, allowing for uninterrupted, low-emissions power during emergencies. Most off-grid storage technologies are 1 kW to 100 kW in size.[25]

Most U.S. energy storage development is concentrated in particular states or regions. In 2015, for instance, the mid-Atlantic PJM region—a regional transmission organization that operates in all or parts of **Delaware**, **Illinois**, **Indiana**, **Kentucky**, **Maryland**, **Michigan**, **New Jersey**, **North Carolina**, **Ohio**, **Pennsylvania**, **Tennessee**, **Virginia**, **West Virginia** and the District of Columbia—was the largest bulk-scale storage market, Hawaii was the largest customer-sited residential market, and California was the largest customer-sited non-residential market (mainly commercial and industrial installations).[26] The high penetration of renewables in Hawaii and California drives demand for energy storage in those states.

Challenges to Greater Adoption of Energy Storage

Although deployment of energy storage has boomed and is expected to continue to accelerate, challenges at the state, regional and national levels could limit energy storage's growth. It is also important to note that some types of advanced energy storage technologies are only suitable for certain purposes, meaning that they can only store a certain amount of electricity to meet future needs. For example, battery storage systems are typically small and a much greater storage capacity other than from batteries alone, such as from non-battery technologies that include hydrogen, methane and compressed air energy storage along with other utility scale storage options will need to be part of the solution to meet grid modernization efforts. Other electric grid efficiency gains can also be realized through options other than energy storage, such as through microgrid projects, combined heat and power applications, demand response programs and improvements in grid operation and planning.

Cost, Siting and Interconnection Constraints

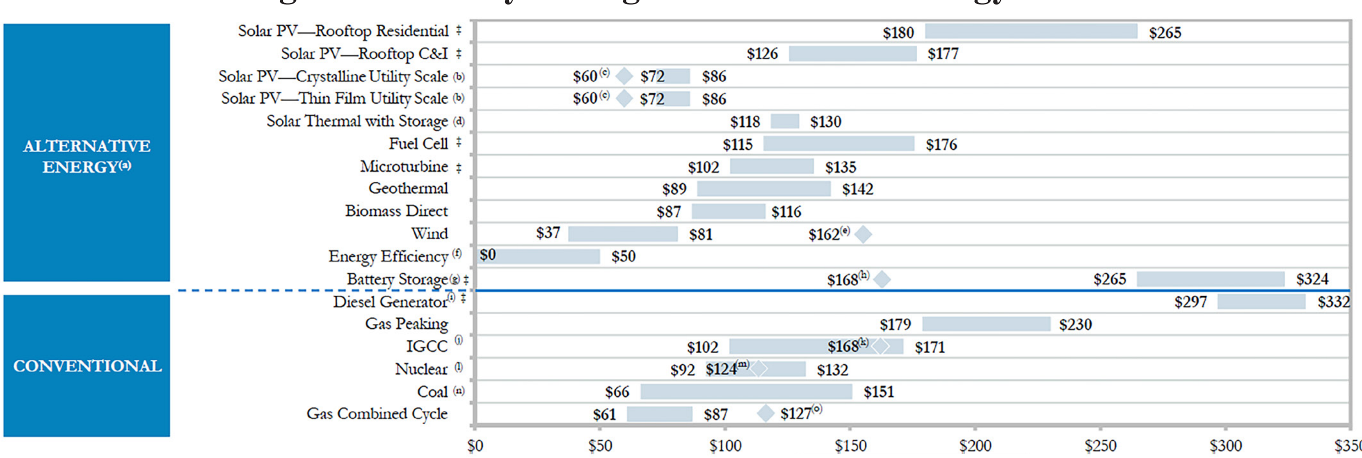
The cost of advanced energy storage is decreasing, but many advanced energy storage technologies compete with a variety of technologies to provide multiple services. If storage is compared to any traditional generation at scale (e.g., gas combined cycle, coal-fired plants or other conventional technologies shown in Figure 2 below), advanced energy storage is not cost competitive. However, since advanced energy storage is a uniquely flexible asset and can do multiple services (e.g., peaker + ancillary services), combining services makes it more cost effective than the sum of traditional resources required to do both.[27] Battery technology advances are relatively new, and only a handful of states have financial incentives in place for battery storage. Most financial incentives for clean technologies do not list storage explicitly as eligible, only allow for limited types of storage projects to qualify or do not address this technology. Without this explicit inclusion of energy storage in state incentive programs, cost could remain a key barrier to deployment.

Procedural barriers to greater energy storage deployment exist as well.[28] For instance, the interconnection process enabling energy storage projects to connect to the grid is frequently poorly defined, lengthy or expensive. For example, the first battery storage project to interconnect to the Midcontinent Independent System Operators (MISO) grid faced many hurdles and ultimately resulted in a contested interconnection process before the Federal Energy Regulatory Commission (FERC). FERC recently took up a review of the main barriers to battery storage interconnection for this reason.[29] Siting processes also can be hurdles, particularly for technologies such as pumped hydro or compressed air. For example, most pumped hydro storage projects must be licensed by the FERC, in addition to navigating separate state licensing and siting processes.[30] In California in February 2016, the Sacramento Municipal Utility District cancelled plans to develop a pumped storage project because of cost and siting issues; the project was to be placed inside a mountain to minimize noise and visual impacts, but boring the required tunnels would have created new groundwater monitoring costs.[31] Customer-sited battery storage applications also have come up against local codes and siting processes because of fire concerns.[32]

Regulatory Valuation and Compensation Barriers for Energy Storage

For energy storage projects to be economically viable in many areas, they must be able to be compensated for multiple services. Although states and utilities are beginning to recognize the multiple benefits and

Figure 2. Battery Storage vs. Other Technology Costs



Source: Lazard's Levelized Cost of Energy Analysis – Version 8.0, Unsubsidized Levelized Cost of Energy September 2014.

services that storage can provide, state regulations do not yet properly compensate energy storage for the full value it provides to the grid. Properly valuing energy storage is complicated, and states and utilities may have difficulty quantifying the value of services that energy storage provide apart from the avoided cost of generation.[33]

Regulatory hurdles to full valuation and compensation for storage also exist, particularly in terms of how and whether energy storage services can participate in different electricity markets. For example, one key potential value stream is storage's ability to provide ancillary services,[34] but energy storage projects usually cannot bid into ancillary services markets operated by Regional Transmission Organizations (RTOs) and Independent System Operators (ISOs). Some states, for instance, have regulations that limit utilities' participation in wholesale electricity generation markets if they are providing electricity distribution services, which prevents utilities from both investing in energy storage for transmission services—and recovering those costs in electricity rates—and bidding that storage into ancillary services markets or selling electricity during periods of peak demand. (Providing all of these services would require approval by FERC and state regulators.) In 2016, the White House Council of Economic Advisers released a study recommending that energy storage should be able to bid into various grid management markets in a way that captures the full value of energy storage, and FERC is currently seeking public input on ways to address those kinds of barriers to energy storage.[35]

Utility Resistance

Because energy storage plays a key role in helping integrate the greater use of distributed energy resources (DERs), some utilities may perceive energy storage as a threat to utility earnings. Distributed energy resources are expected to displace 320 GW of centralized generation from 2014 to 2023, and DERs could outpace centralized generation in annual capacity additions as early as 2018.[36] Some distribution utilities thus worry that DER proliferation combined with stagnant load growth could significantly hurt utility revenues. Some municipal utilities are particularly concerned given their small size and structure, which can make it more difficult to raise rates to recover expenses. On the other hand, there are several demonstration projects in which some utilities are piloting customer-sited advanced energy storage programs such as providing software-managed energy storage capabilities to optimize DER, delivering benefits to both customers—in the form of lower electricity bills and backup power—and utilities and system operators (in the form of demand response, frequency regulation and deferred system upgrades).[37]

Governor and State Actions to Facilitate Deployment of Energy Storage

Governors seeking to support advanced energy storage technologies can work with state agencies, legislatures and others to create financial incentive programs for distributed energy resource; establish requirements for utility procurement of storage; integrate storage into current utility regulatory practices; incorporate storage into energy assurance efforts; include storage in state energy planning; and promote research, development and demonstration of storage technologies.

Include Energy Storage in State Energy Planning Efforts and Utility Resource Planning

Incorporating energy storage into the state energy planning process can help states promote energy storage and address regulatory barriers, and several states have done so. States should ensure the energy storage is considered as an alternative to traditional gas-fired peaking generation in future resource planning analysis. State utility commissions already have the authority to ask their utilities to include storage in resource planning. No new legislation or regulation is required, although it often helps to have a legislative directive. In 2015, **New Mexico** Governor Susana Martinez released a new state energy policy and implementation plan that includes several recommendations to support energy storage (including energy storage technology development and testing), support for industry partnerships to pursue a large-scale demonstration projects and to minimize regulatory and permitting costs.[38] California Assembly Bill 327, enacted in 2013, requires investor-owned utilities (IOUs) to develop distribution resource plans that will identify the best locations for distributed energy resources, including energy storage, on the distribution system.[39] California recently enacted legislation, SB 350, requiring utilities to assess energy storage in their integrated resource plans.[40] **Utah** Governor Gary Herbert's 10-year energy strat-egy recommends that the state coordinate with utilities on broadening baseload electricity supply, including by evaluating energy storage strategies and capabilities for use in conjunction with renewable energy sources.[41]

Recognize the Benefits of Storage in State Regulations

To break regulatory silos that prevent greater adoption of energy storage and proper valuation of storage's multiple benefits, governors can clearly define the role and treatment of energy storage in state regulations. For instance, since energy storage can provide stored power instantaneously when needed, one option is to clarify that energy storage can be treated the same as traditional forms of generation. **Texas**, for instance, enacted SB 943 in 2011, which clarified that energy storage technologies, when used as generation assets, are afforded all the same rights as other generation assets.[42] The Hawaii Public Utilities Commission provided for the interconnection of distributed storage through revisions to applicable interconnection standards and existing distributed energy policies and programs as part of its Phase 1 orders in the distributed energy resources docket.[43] Similarly, **Washington** considered HB 1296, in 2013, that would have required electric utilities to include energy storage in all integrated resource plans; however, that bill did not pass the legislature.[44] Governors also can encourage RTOs and ISOs to support energy storage's participation in ancillary services markets and in transmission planning. For example, the California ISO and PJM Interconnection both explicitly enable storage to participate fully in the general marketplace and do not limit storage resources to certain configurations or services.[45] (The ancillary services market and the need for frequency regulation helped cause the PJM Interconnection to experience the largest growth in energy storage installations in 2015.)[46] MISO, meanwhile, acknowledges—somewhat ambiguously—that there are several types of resources for which storage resources, in principle, are eligible to qualify.[47] Other ISOs and states have no tariff language on advanced energy storage and provide no guidance on how it should be compensated.[48]

Develop Streamlined Siting, Approval and Interconnection Processes for Energy Storage

A long and expensive siting and approval process can hinder the deployment of energy storage. Where possible and advisable, governors can work with state agencies to streamline siting and permitting processes for storage projects, while still thoroughly reviewing the projects. For example, the California state legislature is considering a bill, AB 2713, that will streamline the permitting process for advanced energy storage installations.[49]

Streamlining the interconnection process also can accelerate energy storage deployment. In 2014, California exempted small storage added to certain solar systems or other generators from some interconnection requirements and fees, and in June 2016, the state capped interconnection upgrade fees at 125 percent of the utility's estimated cost.[50] In March 2016, the **New York** Public Service Commission released an order approving some incremental changes to streamline the state's existing interconnection requirements.[51]

Adopt State Utility Procurement Targets for Energy Storage Capacity

Some states have established explicit targets for energy storage development to help remove utility barriers and to help energy storage better compete. For example, California Governor Jerry Brown signed legislation in 2010 that requires IOUs to procure 1.325 GW of energy storage by the end of 2020.[52] (California's net generation is 22.7 GW annually, so energy storage will comprise almost 6 percent of California's generation mix by 2020.[53]) Each major IOU is required to meet a series of biannual procurement targets based on where the storage technologies are located on the grid (transmission, distribution or customer-level). Some IOUs are going beyond the targets; one California investor owned utility, Southern California Edison, announced contracts for 261 MW of new energy storage, which is five times higher than the amount it is required to procure under the California law.[54]

California is not alone. **Oregon** Governor Kate Brown signed a law in 2015 requiring each electric company in the state—with 25,000 or more retail customers—to procure one or more storage systems with capacity to store at least five megawatt hour of energy, with the total capacity procured by each company limited to 1 percent of that company's 2014 peak load.[55] In March 2016, the **Connecticut** Department of Energy & Environmental Protection issued a request for proposal for 2 MW to 20 MW of renewable, passive demand response and energy storage procurement.[56] **Massachusetts** Governor Charlie Baker signed H.4568 into law in August 2016. The bill allows the Massachusetts Department of Energy Resources until the end of 2016 to decide whether to adopt an energy storage procurement target for electric companies.[57]

Encourage the Incorporation of Storage into Energy Assurance Efforts

Prioritizing energy storage for its reliability and resiliency services is another way to increase deployment and capture more of the value of energy storage within a state. Multiple states have integrated storage into research or pilot programs aimed at promoting energy assurance, such as microgrid projects. To help provide power at critical infrastructure facilities during power outages, the **Florida** Department of Agriculture and Consumer Services created the SunSmart Schools and Emergency Shelters program in 2009, which has helped 115 emergency shelters install solar PV systems with battery storage.[58] Connecticut Governor Dannel Malloy signed legislation in 2012 that established a state grant and loan program for technologies that support microgrids at private or institutional facilities.[59] In 2016, Governor Malloy signed legislation that expanded the program, so state funds could support energy storage installations as part of the microgrid.[60] A state task force on resilience established in Maryland recommended in 2014 creating a grant program to support public purpose microgrids and energy storage.[61] The New Jersey Board of Public Utilities issued a series of grants for behind-the-meter storage facilities to improve grid resilience in 2015 and will offer additional funding in 2017.[62]

Create Financial Incentive Programs for Energy Storage

Access to capital and other cost barriers limit storage's deployment. State financial incentive programs may directly include energy storage as an eligible technology for funding, or state financial programs that focus on renewable resources and other forms of distributed energy resources can lead indirectly to substantial energy storage deployment. The California Self Generation Incentive Program (SGIP) provides upfront and performance-based incentives to a variety of technologies, including customer-side energy storage; the program's combination of incentives is calculated to return up to 60 percent of the cost of a storage system.[63] In June 2016, California made revisions to the SGIP, allocating 75 percent of program funds to energy storage, with 15 percent of that amount directed towards residential projects. The total funding for the SGIP program currently is set at $83 million per year through 2019.[64]

Some states have included energy storage as an eligible resource in their renewable energy or energy efficiency procurement requirements. In Massachusetts, flywheel storage qualifies under the state's alternative energy portfolio standard, which requires that 5 percent of the state's electric load be met with alternative energy by 2020—although most of the standard has been met to date with combined heat and power technologies.[65] Washington considered a bill, HB 1289, in 2013 that would have allowed qualifying utilities to credit energy storage output from renewable resources at 2.5 times the normal rate to help meet the state's energy efficiency resource standard.[66] States that do allow energy storage to qualify under a renewable portfolio standard should be sure to avoid double counting, so renewable resources and the storage that receives and later discharges some of their power do not both get credit for the same energy. For example, Kansas made that distinction for energy storage paired with renewable generation.[67]

Promote Energy Storage Research and Development

Governors' can promote increased storage R&D, including the creation of pilot or demonstration projects. States have limited experience with some energy storage technologies, as well as with the integration of these technologies with the grid. Although most R&D related to energy storage is conducted or funded on the federal level (see *Federal Role in R&D* text box below), some states have begun to focus their own research on energy storage and vehicle-to-grid integration (see *Vehicle-to-Grid Technology* text box on page 10). For instance, the New York State Energy Research and Development Authority partnered

FEDERAL ROLE IN R&D

The U.S. Department of Energy (DOE) funds research in a variety of energy storage technologies, along with power electronics. Most funding for energy storage is from the DOE Office of Electricity Delivery and Energy Reliability (OE). Currently OE is collaborating with the Advanced Research Projects Agency – Energy (ARPA-E) on storage initiatives. Specific areas of research by ARPA-E and OE include research on flywheel energy storage, planar sodium metal halide batteries, zinc halide flow batteries, and wide-bandgap semiconductor power electronics.

The DOE also distributed American Recovery and Reinvestment Act of 2009 funds to several states to implement energy storage pilot projects. For example, DOE provided funding to the **Vermont** Department of Public Service for their Clean Energy Development Fund, Electrical Energy Storage Demonstration program. The DOE contributed $250,00 to this program with the state contributing an additional $50,000. The state issued the solicitation, awarding funding to a photovoltaic-powered microgrid project paired with battery storage developed by the utility Green Mountain Power.

In early 2016, DOE's Grid Modernization Initiative announced $18 million in funding for six new solar-plus-storage projects across the United States. DOE also funds research at the national laboratories (led by Sandia National Lab and the National Renewable Energy Laboratory) and in states that have their own energy research agencies, such as **California** and **New York**, both of which are often cost-shared with industry partners.

Vehicle-to-Grid Technology

The storage capacity of electric vehicles' batteries may allow them to serve as sources of distributed energy storage that have value to the electric grid. Technology to support managed charging and two-way power flow is still in the research and development phase. The U.S. Department of Energy's National Renewable Energy Laboratory is leading some of the research related to Vehicle-to-Grid (V2G) integration, such as exploring strategies to allow for the export of vehicle power to assist in grid outages.

As with other energy storage technologies, states and utilities will need to determine an appropriate model for dispatching V2G electricity and pricing it based on the value it provides to the grid. **California** has started developing a model to dispatch V2G electricity and released a Vehicle-Grid Integration road map in 2014. The Electric Power Research Institute (EPRI) is also researching V2G. In October 2014, EPRI conducted an advanced software platform demonstration for integrating plug-in vehicles with smart grid technologies at the Sacramento Municipal Utility District's customer service center.

with nine companies to build a battery testing and commercialization center in 2014.[68] The California Energy Commission funds energy storage research through the Electric Program Investment Charge.[69] The renewable energy portfolio standard in North Carolina allows up to $1 million annually in cost recovery by an electric power supplier to fund R&D to encourage renewable energy, energy efficiency and air quality improvements (including energy storage research).[70] The Washington Clean Energy Fund funded four major utility-scale battery R&D projects that include detailed economic value analysis by the DOE and Pacific Northwest National Labs.[71]

Broader Initiatives

State policy actions not directly tied to energy storage can have an effect on the rate at which energy storage is deployed in the near term, and states should explore energy storage as one of several technologies and policy areas that are part of their future energy system. For example, approval of utility rate structures such as time-varying pricing for electricity—also known as time of use pricing—and net metering revisions that increase compensation for distributed resources could increase the value of self-generation, which in turn increases the value of electricity stored for use when prices are higher. Broader state policy initiatives, such as those focusing on DER like the CEC Public Utilities Commission's distributed resource plan and the New York Public Service Commission's Reforming the Energy Vision and also in front of the meter policy initiatives such as ISO market coordination or discussing utility integration of storage into their infrastructure, also will influence other state policies and are expected to heavily affect the outlook for energy storage in the United States.[72] Because of the potential emissions that can be offset through the ability to store electricity from cleaner sources of generation, deploying energy storage to offset other generation (e.g., during peak periods) can also yield environmental benefits that can help states meet their environmental policy objectives.

Conclusion

Over time, energy storage is expected to play a more essential role in state, federal and utility efforts to modernize the electric power grid. Robust deployment of energy storage could help keep energy costs low, improve grid efficiency and enhance grid resilience and is one of the technologies that states can consider when modernizing their electric power system. Regardless of their overall goals, governors can play a key role in breaking down barriers and incentivizing growth in the storage market.

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[23] "Front-of-Meter" deployments include energy storage installations that are connected to the grid and use distribution or transmission services.
[24] "Behind-the-Meter" deployments include storage systems installed at an end-user's property that provides load without using the transmission or distribution system. Such systems are commonly referred to as distributed generation or customer-sited generation.
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