
***DOE's Role in Assisting State-Level
Implementation, Valuation, and Policy
Treatment of Energy Storage***

*Recommendations for the
U.S. Department of Energy*

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EAC
ELECTRICITY ADVISORY COMMITTEE 

1 Introduction

Energy storage is a versatile resource that is capable of providing multiple power system services. It is able to support generation, transmission, and distribution operations, as well as act as a load. However, it is still a relatively expensive resource in many cases and regulators and utilities have limited experience integrating and operating the technology at scale. Thus, for energy storage to become more cost-effective and continue to expand adoption, it is important that the technology is able to capture the value from all services that it is capable of providing. Moreover, for sustained growth, the value of those services must be directly translated into savings or added value to consumers.

There are two critical elements for achieving this goal. The first is updated rates, tariffs, and market designs that can monetize and capture these value streams. The second is good information about the technical performance, value of services, and use cases of energy storage installations currently in operation.

The Department of Energy (DOE) has a role in both of those areas and is already providing significant assistance in various ways including, the development of valuation models, participation in storage demonstration projects with cost effective business models, collaboration with state regulatory commissions and state energy agencies, dissemination of information through webinars, and establishment of a storage policy database. However, information and direct technical assistance is not reaching much of the country at a time when policymakers are increasingly facing decisions relating to energy storage deployment. Thus, the ultimate intent of these recommendations is to encourage DOE to increase its visibility, to broaden its geographic reach, and to round out its established panoply of energy-storage products and programs. These recommendations aim to provide critical information and assistance so state-level stakeholders can address energy storage-related issues in regulatory and policymaking decisions.

2 Approach

This work product represents the compilation and analysis of expert input gathered from an Electricity Advisory Committee (EAC) panel discussion, DOE and National Laboratories experts, interviews with state regulatory and legislative representatives, and EAC subcommittee and working group meetings.

Initial conversations with DOE and National Laboratories helped define the current state-of-the-art technologies and their efforts to address energy-storage issues. The EAC Energy Storage Subcommittee organized the “Rate, Tariff, and Market Design for Energy Storage” Panel for the February 2018 EAC Meeting. Panelists representing regulators, analysts, and market designers provided a variety of stakeholder perspectives on the treatment of energy storage from a regulatory and market-design perspective. In June 2018, DOE hosted a webinar with presentations from the Pacific Northwest National Laboratory, Sandia National Laboratories, and the Lawrence Berkeley National Laboratory on research related to energy storage.

From October 2018 to January 2019, working group members conducted a series of interviews with commissioners and staff of state regulatory commissions and state legislators representing Montana, Kansas, Maryland, Indiana, Utah, Illinois, and California. The key question asked whether DOE efforts and platforms—such as research, dissemination of knowledge, or outreach—can help the states address energy storage-related issues better in regulatory and policymaking decisions.

These efforts were instrumental to identify the state-level priorities and information gaps to develop and evaluate energy storage regulatory cases and legislation. These findings helped identify DOE efforts that are best suited to support a sustainable growth path for energy storage at the state level, while helping the Office of Electricity (OE) meet its policy priorities.

3 Key Findings

3.1 Updated Rates, Tariffs, and Market Designs

Energy storage does not fit discretely within one asset classification (i.e., generation, transmission, distribution, or load). Instead, storage can act as one or more of them, and sometimes more than one simultaneously. Since each type of asset has different regulatory treatments at the federal and state levels, energy storage resources transcend the boundary between market- and rate-based services. This can include services that do not have explicit values (e.g., reliability and resilience). Therefore, traditional regulatory and market designs may not be an appropriate framework to regulate the provision and compensation of energy storage services.

In many parts of the country, federal, regional, and state regulators are already addressing these issues and updating rules and regulations to account for the particularities of energy storage. Updated approaches address questions regarding the appropriate way to classify energy storage and its regulatory treatment as well as ways markets operate. However, work remains to address these questions by federal, regional, and state policymakers to ensure consistent and mutually supportive policies at the state, RTO, and federal levels.

3.2 Information Sharing

There is a growing body of knowledge and information about the performance of energy storage devices. This includes the different services that they are able to provide and the value of those applications. There has also been an accumulation of analytical tools to help value the services that energy storage provides, including those developed by DOE. Nevertheless, there is a clear need for greater sharing of this accumulated knowledge and new information about energy-storage applications, value, and cost-effectiveness. The sharing of this information can accelerate the industry's advancement along the learning curve, which could significantly contribute to improving the economics of deploying energy storage and its regulatory acceptance.

At the state level, legislators and regulators recognize information gaps on the technical capabilities, value streams, and limitations of energy storage and the regulatory perspectives stated above. In particular, they need the most up-to-date data and information on technology advancements, security requirements and risks, system reliability, and rate impacts. A better understanding of cost and rate structures and storage-related business models is needed to maximize the value of storage and its benefits to ratepayers.

DOE, with its national reach and widespread credibility, is in a unique position to help disseminate this type of information.

4 Recommendations

DOE can effectively assist state policy-makers and regulators by serving as a source of information on energy storage’s capabilities, impacts, costs, and benefits. DOE could provide credible market information, input, and options based on current and past regulatory decisions, and the evolving science, applications, and research related to energy storage. While significant research exists in this space, DOE can help streamline the dissemination of this information through direct outreach and engagement with national organizations in a way that fills knowledge gaps and adequately reaches the necessary stakeholders involved in state-level proceedings. Moreover, this information needs to be “translated” so it is understandable across a spectrum of different stakeholders (e.g., energy-storage developers, utilities, legislators, regulators, and ratepayers).

Recommendation Title	Detailed Recommendations
<p>1. DOE should support research and pilot projects that address market and regulatory design</p>	<p>DOE’s and OE’s focus on storage valuation and the examination of multi-use applications is a very positive development. Nevertheless, state policymakers do not always have a clear understanding of how to design market and regulatory structures that can allow these full value streams to be monetized.</p> <p>Recommendations include:</p> <ul style="list-style-type: none"> • Examine value-stream monetization, and identify which streams have successfully been monetized by which type of deployers under what types of market and regulatory designs • Focus DOE programs on market and regulatory-design issues from a research, rather than policy-prescription, perspective <p>Examination can be done as a theoretical analysis, <i>ex post</i> synthesis of real-world experience, or through pilot programs.</p> <p>The primary stakeholders that would be impacted include state regulatory commissions, state legislatures, energy-storage developers, independent system operators, and regional transmission organizations.</p>
<p>2. DOE should facilitate sharing of lessons learned and storage-deployment experiences</p>	<p>Energy-storage deployers can have difficulty demonstrating value of an energy-storage project, especially to regulators, customers, and other external stakeholders. Some projects are developed with expectation of value, which may or may not be realized until the project is complete. Other projects can reveal values that are not anticipated <i>a priori</i>. Thus, sharing lessons learned and experiences from actual projects would be beneficial. Recommendations include:</p> <ul style="list-style-type: none"> • Work with industry to develop an open-source, free industry-standard valuation tool that accurately characterizes energy storage performance, evaluates value at multiple points in the grid, and co-optimizes benefits subject to the technical limitations of an energy storage system • Develop a platform for sharing information, experiences, and lessons learned from pilot and demonstration projects with input from states, utilities, and other market participants. This work could be incorporated in the DOE Global Energy Storage Database. DOE should take a tiered approach to

	<p>information delivery by providing executive summaries of technical information on top of deeper, more detailed reports. Information can include:</p> <ul style="list-style-type: none">○ Technical characteristics of projects and performance data (although, the latter can be difficult to obtain)○ Financial information of the projects (although, cost terms in a supplier contract may be proprietary, cost accounting may differ, and avoided costs may be difficult to obtain)○ Real-world case studies on benefits and value of energy-storage deployments○ Information on models and decision-support tools that were used to analyze a potential energy-storage project <i>a priori</i> and experiences with them (i.e., how actual and modeled performance compare) <ul style="list-style-type: none">● Consider funding the Database of State Incentives for Renewables & Efficiency® (DSIRE), which is hosted and maintained by North Carolina State University and consider tracking energy storage along with renewable energy policy and regulatory developments—consistent and combined tracking of both sets of technologies will be beneficial to the understanding of state policy trends.● Organize regional workshops, educational fora, or small-group discussions to provide information to states and market participants and gather information about their needs regarding the evaluation of energy storage costs and benefits so DOE can better assist them<ul style="list-style-type: none">○ DOE should continue to leverage national organizations, such as the National Association of Regulatory Utility Commissioners, National Conference of State Legislatures, National Association of State Energy Officials, National Association of State Utility Consumer Advocates, and National Governors Association, as a platform for outreach and as a way to gather information about their specific information needs that can later inform DOE's educational projects and activities○ This should be supplemented with regional training fora for state-level regulators and legislators○ Educate legislators and regulatory commissions on how energy storage functions in the electric system, including:<ul style="list-style-type: none">▪ State of technology▪ Reliability improvements▪ Value of facilitating more renewable energy sources, and the need for long-duration energy storage for such▪ Costs savings versus cost of energy storage for ratepayers, overall valuation, and rate impacts▪ Ownership models, how benefits are realized, by whom, and how to incentivize maximizing ratepayer benefits▪ Safety issues▪ Security concerns and mitigation▪ Rate structures, business models, and timing to ramp down subsidies▪ Benefits of energy storage in avoiding other capacity additions or allowing retirement of other assets
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	<ul style="list-style-type: none">▪ Federal and state interfaces and jurisdiction▪ Challenges associated with aggregated distributed systems participating in wholesale markets <p>The primary stakeholders that would be impacted include state regulatory commissions, state energy offices, state utility-consumer advocates, state legislatures, and energy-storage developers.</p>
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5 Conclusion

There is significant variation of energy-storage adoption amongst states. While many of the states interviewed are just beginning to understand the capabilities and impacts of energy storage, others are exploring changing their utilities' resource-planning processes or beginning to explore long-duration energy-storage resources. The recommendations in this document lay out a pathway through which DOE can help states that are in all stages of energy-storage deployment address important issues in regulatory and policymaking decisions. These include supporting research on market and regulatory designs to monetize value streams that are traditionally market-contingent or fall under rate-based regulation, direct outreach to state-level regulators and legislators through workshops and discussions, and streamlining the sharing of information in the form of an efficient platform and executive summaries. Some of these recommendations may require resources that go beyond what DOE and OE currently have available. Requests for additional resources to address these vital needs may be necessary and prudent.

Appendix: List of Interviews

Interviewee(s)	Affiliation	Interview Date
Brad Johnson Will Rosquist	Montana Public Service Commission	October 29, 2018
Jay Emler Jeff McClanahan	Kansas Corporation Commission	November 1, 2018
Andrew Johnston	Maryland Public Service Commission	November 9, 2018
Eric Koch	Indiana State Senate	December 12, 2018
Steve Handy	Utah State House of Representatives	December 12, 2018
Sue Rezin	Illinois State Senate	December 14, 2018
Forest Kaser	California Public Utilities Commission	January 15, 2019