



# Department of Energy

Washington, DC 20585

May 18, 2023

## MEMORANDUM TO THE DEPARTMENT OF ENERGY ELECTRICITY ADVISORY COMMITTEE

FROM: Gene Rodrigues  
Assistant Secretary  
Office of Electricity

SUBJECT: DOE Response to Recommendations made in the  
2022 Biennial Energy Storage Review

I want to thank all the members of the DOE Electricity Advisory Committee (EAC) for your efforts in evaluating the portfolio of Energy Storage activities across the Department of Energy (DOE) and your thoughtful recommendations in the *2022 Biennial Energy Storage Review* that were submitted to me on February 16, 2023. Regarding the specific recommendations that you made; DOE has the following responses.

### 1. Conduct macro-energy storage analysis.

- DOE agrees with the EAC and will continue to holistically examine the evolution of the energy system and its impact on the value, quantity, and location of energy storage needs. DOE has done work in the past and will continue to do work in the future that incorporates improved energy cost and performance, new technologies including energy storage, and additional policy considerations into system-level/macro-market analyses. Examples include:
  - The National Renewable Energy Laboratory's (NREL) [Storage Future Studies](#) is a series of analyses that: (1) developed energy storage cost and performance projections, (2) assessed the economic potential of diurnal storage out to 2050, (3) examined distributed solar and storage adoption, and (4) the operational impacts of widespread energy storage on the grid.
  - NREL's [Standard Scenarios](#) is an annual product that examines 50+ scenarios of power sector evolution. All the underlying data and model is publicly available.
  - NREL's [100% Clean Electricity by 2035 report](#) examined five pathways to achieve the Administration's 100% clean electricity goal and found the U.S. could need as much as 120-350 GW of diurnal storage and 100-650GW of long-duration/seasonal storage by 2035 in order to meet resource adequacy and reliability needs.
  - NREL's [Evaluating the Impacts of the Inflation Reduction Act and Bipartisan Infrastructure Bill on the U.S. Power System](#) report assesses the impact of new tax credits including the new investment tax credit for standalone storage systems and estimates the law will spur 50-100 GW of storage by 2030.
  - DOE's [Pathways to Commercial Liftoff: Long-Duration Energy Storage](#), conducts techno-economic analysis of existing Long-Duration Energy Storage (LDES) technologies, identifies cost reduction and compensation improvements

for LDES technologies to be commercially viable, and proposes solutions to existing market barriers.

## **2. Coordinate with industry to promote efficient markets for energy storage.**

- DOE welcomes the recommendation and agrees that the Department should continue to support work that promotes strong energy storage markets. Examples of previous work now being used by the storage industry include the [ESGC Market Report](#) and the [ESGC Cost and Performance Assessment](#).
- DOE is also facilitating bankable and replicable storage solutions by creating new performance prediction capabilities through the performance data collection and data science efforts of the Rapid Operational Validation Initiative (ROVI).
- Finally, DOE is supporting deployment projects that target unique use cases and unlock new market opportunities through activities such as the Office of Clean Energy Demonstration's (OCED) LDES Funding Opportunity Announcement (FOA) and the Office of Electricity's (OE) Storage Demonstration Program.

## **3. Support local efforts by states and regulators to remove barriers to facilitate markets and remove disincentives for energy storage.**

- DOE agrees with the EAC. DOE has an existing portfolio of work to boost capacity in state energy offices and regulatory commissions which will continue to be supported and augmented into the future. DOE will continue to work with decision-makers to help them understand how grid evolution will drive diurnal, long-duration, and seasonal storage needs to maintain resource adequacy, reliability, resilience, and affordability.
- OE's activities that augment institutional capabilities around storage analysis include:
  - [Energy Storage Technical Assistance](#)
  - [Energy Storage for Social Equity](#)
- In addition to storage-specific activities, DOE funds activities that generally support decision-makers (without being specific to storage), such as:
  - [Grid Modernization Lab Consortium Technical Assistance for Public Utility Commissions](#)
  - [Grid Modernization Lab Consortium Technical Assistance for ISO/RTOs](#)
  - [EERE & OE Grid Solutions Program](#)
  - Water Power Technologies Office – [Hydrowires Technical Assistance](#)

## **4. Improve the resilience of critical services by supporting the deployment of energy storage at critical services and interdependent network infrastructure.**

- DOE welcomes the recommendation and agrees that the Department should continue to support work to deploy energy storage that supports resiliency for critical services and infrastructure.
- DOE is increasing its interagency coordination with Department of Defense and Department of Homeland Security to leverage energy storage to support critical infrastructure such as military installations and community lifeline facilities.
- Ongoing activities, such as Energy Storage for Social Equity, provides technical assistance and project development support for communities to implement storage that serves resilience needs such as supporting community shelter operations during power outages.

- Anticipated at scale LDES deployments may support resiliency objectives through OE/OCED demonstration programs, with technologies that can provide 24 hours or more of duration.

**5. Increase the resilience of the grid and support customer, critical services, and grid-level resilience by facilitating the bidirectional storage capacity of electrified mobility.**

- DOE agrees with the EAC and has a variety of programs focused on accelerating the deployment, integration, and utilization of electric vehicles for grid reliability. Examples include:
  - [EV@Scale Consortium](#) - brings together National Laboratories and key stakeholders to conduct infrastructure research and development to address challenges and barriers for high-power EV charging infrastructure that enable greater safety, grid operation reliability, and consumer confidence.
  - V2X [MOU](#) - brings together cutting-edge resources from DOE, DOE national labs, state and local governments, utilities, and private entities to evaluate technical and economic feasibility as we integrate bidirectional charging into energy infrastructure. The MOU will also advance cybersecurity as a core component of V2X charging infrastructure.
  - [EVGrid Assist](#) - provide technical assistance and inform research and development on vehicle-grid integration (VGI) to facilitate the rapid deployment of electric vehicles and the associated charging infrastructure by minimizing the impacts to the electric grid and helping electric utilities and regulators make planning and policy decisions.

**6. Facilitate the cost-effective deployment and interoperability of fixed and mobile storage assets by promoting standards that support consistent best practices among the industry and user groups.**

- DOE appreciates the recommendation and agrees that developing standards is a critical piece of expanding storage deployment.
- DOE will continue its ongoing energy storage R&D work on codes and standards and leverage this recommendation to continue and expand upon this important work. Examples of standards development work include:
  - [Energy Storage Reliability Codes and Standards Activities Update](#)
  - [IEEE Std 1547.9-2022](#)
  - [Battery Management System Standards](#)
  - [Energy Storage Safety Collaborative Codes and Standards Report](#)

**7. Address barriers and develop use cases for the industry and end users to facilitate timely and efficient interconnection and accelerate the integration of storage assets to maintain stability and promote resilience as the grid transitions.**

- DOE appreciates the EAC's recommendation has ongoing work to catalyze the development of future storage use cases and develop solutions for interconnection challenges in order to ensure a timely energy transition that ensures reliability and resilience.

- Activities to demonstrate emerging use cases include:
  - [Pathways to Commercial Liftoff: Long-Duration Energy Storage](#),
  - PNNL's [Embedded Storage](#) research - Improving grid infrastructure with embedded storage will improve transmission-level and distribution-level resilience, support critical lifeline capabilities for emergencies such as critical load outage ride-through and generator black-start, and improve joint operating characteristics of natural gas/electric generation systems
  - [Long-Duration Storage Shot](#)
  - [Energy Storage Grand Challenge Roadmap](#)
  - [Puerto Rico Grid Resilience and Transitions to 100% Renewable Energy Study](#)
- Activities that help states better understand use cases and reduce barriers include:
  - [Interconnection Innovation e-Xchange \(i2x\)](#) - enables a simpler, faster, and fairer interconnection of clean energy resources all while enhancing the reliability, resiliency, and security of our electric grid.
  - Rapid Operational Validation Initiative (ROVI) will facilitate bankable and replicable storage solutions by creating new performance prediction capabilities.

Thank you again for your thoughtful recommendations and your efforts in reviewing DOE's energy storage activities. We welcome opportunities for additional feedback on how these or future activities could fulfill the recommendations outlined in the most recent Assessment. If you wish to discuss this matter further, my staff is available to meet with the Committee, as needed.