

Testimony of  
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on behalf of the  
**U.S. ENERGY STORAGE ASSOCIATION**

before the  
**United States House of Representatives**  
**Committee on Science, Space, and Technology**  
**Subcommittee on Energy**

Hearing entitled  
**“The Future of Electricity Delivery: Modernizing and Securing our  
Nation’s Electricity Grid”**

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Chairman Lamb, Ranking Member Weber, and Members of the Subcommittee—

On behalf of the U.S. Energy Storage Association (ESA), thank you for the invitation to speak today on the role that energy storage plays in modernizing and securing our electric power infrastructure.

ESA is the national trade association working toward a more resilient, efficient, sustainable and affordable electricity grid enabled by energy storage technologies. With more than 180 member companies, ESA represents a diverse group of power sector stakeholders, including independent power producers, electric utilities, energy service companies, financiers, insurers, law firms, installers, manufacturers, component suppliers and integrators involved in deploying energy storage systems throughout the United States on the electric grid, in homes and businesses, integrated into critical infrastructure and in military installations. We represent a broad technology base that includes electrochemical, thermal, mechanical, process, and pumped hydro storage.

#### *About Energy Storage*

Our electric system is bound to a simple reality of physics—supply must precisely match demand at every moment, everywhere. Energy storage technologies are transformative for the electric system because they enable electricity supplied from any source to be saved for use at a later time, precisely when, where, and in whatever form it is most needed. That simple concept enables an enormous amount of capabilities for the electric grid—be it supplying back-up power, reducing peak system demands, relieving stressed grid infrastructure, firming the supply of variable generation sources such as solar and wind, or maintaining optimal function of inflexible generation sources such as nuclear. These capabilities more efficiently ensure that supply and demand reliably match, which in turn optimizes the use of all grid infrastructure and resources. Energy storage is a critical hub of a resilient, efficient, sustainable and affordable energy system.

Energy storage is central to integrating higher levels of variable wind and solar resources. Storage can take excess generation from renewables and store it for later use, avoiding waste and filling gaps in supply; this is increasingly important as renewable penetrations increase and constraints in transmission or distribution systems impede full delivery of wind and solar. Moreover, storage is increasingly being procured in portfolios with renewable power to backfill from power plant retirements. Utilities as diverse as Xcel Energy in Colorado, Nevada Energy, Arizona Public Service, and Hawaiian Electric Company have each planned to procure hundreds of megawatts (MW) of battery storage paired with solar power over the next several years, often to replace retiring fuel-based power plants. And it's not just battery storage—there are over 2,000 MW of pumped hydroelectric storage projects currently pending a license before

FERC, as well as utilities testing and procuring flywheels, thermal storage, and other storage technologies.

Moreover, storage is increasingly critical for reliability and resilience of customer supply, especially in rural areas, island systems and remote communities without a grid connection. Co-ops and public power utilities are deploying storage systems on their grids and microgrids, particularly in remote communities with fuel supply risks such as those served by Cordova Electric Cooperative in Alaska and Kawaii Island Utility Company in Hawaii.

Storage is also increasingly being deployed, often in more rural communities, to increase the capabilities and extend the life of existing grid infrastructure. In using storage this way, grid operators can avoid far more expensive transmission or distribution upgrades, thereby suppressing cost increases otherwise borne by their customers. Utilities like Duke Energy, Eversource, and National Grid are finding innovative ways to extend the life of their wires infrastructure by installing storage, with innovative projects in some cases that integrate both utility- and customer-sited storage assets into “non-wires alternative” investments. At the same time, installing storage at the distribution level increases their hosting capacity, allowing more rooftop solar and electric vehicles to be used on the existing wires.

Most people think of a battery when they hear “energy storage” —and for good reason. Batteries are everywhere—in our phones, computers, appliances, our cars, and increasingly throughout our electric grid. There are a variety of energy storage technologies—not only different kinds of batteries, such as flow batteries, but also mechanical storage technologies (like pumped hydro and flywheels), thermal storage technologies (like ice storage and molten salt), and power-to-gas storage technologies (like hydrogen and ammonia). Each has its own performance characteristics and best-suited applications, but all do the same job of storing energy for use when it is most needed, be that across seconds, hours, or days. In effect, it decouples the element of time from supply and demand.

For the purpose of today’s hearing, I will focus my remarks on the role of battery storage, the fastest growing grid storage technology. Today approximately 2,500 megawatts (MW) of battery storage are installed or under development nationwide, with megawatt-scale installations planned or operating in 29 states. Battery storage technologies—primarily lithium-ion batteries—are declining rapidly in cost, dropping by 50% every 3 to 4 years and projected to continue in the near- to medium-term at 10-15% year over year. Driven by these cost declines, U.S. deployments doubled in 2018, are on track to double again in 2019, and are forecast to triple in 2020, representing over \$3 billion in annual sales in the U.S. by 2021. That sharp cost decline is driving greater performance of battery storage more cost-effectively, increasing their range of applications. The largest battery in the world is currently under development in the

U.S. and will be capable of providing 100 MW of power for four hours—enough to power 50,000 homes through the peak demands of the day. At the same time, aggregations of distributed storage installed in homes and businesses are being operated as virtual power plants, with the largest aggregations currently about 20 MW in size—effectively mimicking a small generator.

Storage is uniquely flexible among all grid resources. *First*, storage is the only resource promoting reliability in every part of the grid: co-located with generation, connected to the high-voltage transmission system, placed on the lower-voltage distribution grid, and located in buildings, as well as in microgrids. It is modular and can be scaled to any size, from a home system of a few kilowatts (kW) to a central facility 10,000 times larger. *Second*, storage provides value to all power sector participants: utilities, independent providers, and consumers can all own and operate storage for a variety of reliability services and other cost-saving applications. *Third*, storage is the only grid resource that operates as both supply and demand in a single resource: supply when discharging and demand when charging, giving it the unique flexibility to mitigate oversupply as well as undersupply conditions. *Fourth*, storage is capable of near-instantaneous response and precise control, able to ramp its output to charge or discharge at full power in milliseconds. It is that precise control that allows storage to efficiently provide essential reliability services of frequency response, voltage control and ramping, as well as enhance resilience during sudden disruptions. *Fifth*, storage can provide a diversity of functions for the bulk power system, the distribution grid, and end-users, even providing multiple services interchangeably over time to meet the greatest need in any given moment. *Sixth*, storage can be deployed quickly, with build times for MW-scale installations in less than 6 months. Importantly, storage is agnostic to the supply of electricity, and its flexibility can be used to optimize grid functions for any supply mix, as it changes over time. That's why we call storage the "bacon of the electric grid"—it makes everything a little bit better. Nuclear, coal, gas, wind, solar, hydro, demand response, wires infrastructure and system efficiency: you name it, storage enhances its utilization.

#### *About the Grid Modernization Research and Development Act of 2019*

ESA applauds the Subcommittee for incorporating energy storage into its proposed draft legislation to modernize and secure the electric grid. Indeed, storage is being used to enhance electric service reliability & resilience and to increase the capabilities of the existing electric infrastructure.

In Section 3, "Enhancing grid resilience and emergency response," the proposed program to enhance grid resilience is important, particularly in light of the terrible impact of increasingly frequent and severe weather events limiting access to electricity. Distributed energy resources (DERs), including storage, have been critical to the resilience of communities in Puerto Rico,

California, Massachusetts, Florida, and others hit by hurricanes, fires and ice storms. Grants for projects that increase the resilience of electric service with DERs will speed the ability of communities and local governments to prepare for the next disaster. It's also important that, in undertaking this effort, the federal government use the information it gathers to help prove the economic case for resilience investment so that State Commissions can measure the cost effectiveness value when considering rate requests by regulated utilities, and so that the private sector can step in when the proposed grant money is spent. To that end, ESA asks the subcommittee to consider directing the Department of Energy to work with relevant stakeholders in government and industry to develop a method for quantifying the value of resilience. Without a well-defined and broadly accepted valuation method, resilience will remain challenging to fit into the cost-benefit analyses and program designs that ultimately determine whether an energy storage project makes financial sense for a grid operator, a state or local government, a utility or a community.

In Section 6, "Grid-scale energy storage," there are a number of commendable provisions that appear to reflect bipartisan ideas from H.R. 2909, the Promoting Grid Storage Act, introduced by Representative Casten and Representative Bacon, and H.R. 2986, the Better Energy Storage Technology Act introduced by Representative Foster and Representative Herrera Beutler. ESA endorses both bills, and I will try to briefly summarize the key contributions that have garnered our association's and our members' support.

The Promoting Grid Storage Act, which was also endorsed by the American Public Power Association and the National Rural Electric Cooperative Association, would create a competitive grant program at the Department of Energy (DOE) for state & local governments, utilities, public power authorities, and rural co-ops seeking support for incorporating storage into long-term planning and grid operations. This approach is new in that, rather than wait for the federal government to identify desired projects, these local entities would be empowered to identify the kinds of modeling support and grid deployments that will best accelerate their learning through experience, share the investment responsibility and construct a competitive proposal to cost-share those activities.

ESA requests that the subcommittee include in Section 6 the competitive grant program envisioned in the Promoting Grid Storage Act. The current section 6(a)(8) describes a technical assistance program that we believe DOE already has the authority to pursue. To empower local stakeholders to bring projects forward that best overcome informational barriers and lower risks, ESA recommends the subcommittee to incorporate Sections 4 and 6 of the Promoting Grid Storage Act directly into the legislation under consideration.

The Better Energy Storage Technology (BEST) Act, which was also endorsed by the Bipartisan Policy Center, the U.S. Chamber of Commerce Global Energy Institute, ClearPath Action, Citizens for Responsible Energy Solutions, the National Audubon Society, the National Hydropower Association, the Union of Concerned Scientists, and the Information Technology and Innovation Foundation, would emphasize DOE investments in demonstration projects of storage technologies providing flexibility to the electric system on an intra-day, inter-day, and seasonal basis—all of which are increasingly needed in an electric system adapting to higher levels of renewable energy and the demands on the grid of an increasingly electrified economy. Moreover, those demonstrations are intended to put such technologies on a path toward cost and performance targets, which is critical to commercialization. However, it should be noted that legislating the parameters of technology goals can pose a risk to innovation, potentially limiting technology development pathways that will become clearer only after some years of research and development.

ESA requests that the subcommittee therefore give greater discretion to DOE to identify the specific performance targets associated with the energy storage systems in Section 6. In particular, ESA recommends that the legislation specify only a desired service life of storage projects, recognizing that the number of cycles needed will vary according to the duration and application for the storage. Particularly for longer-duration storage, which may cycle less over its total lifetime, prescribing the needed cycle life in statute could eliminate possible technology solutions.

Finally in Section 6, ESA asks that the committee strike the term “*grid-scale*,” storage, as it can be confusing. Some large commercial and industrial facilities utilize energy storage at multiple-megawatt scale on-site, and their customer-sited *location* does not make them any less important in *scale*. Moreover, energy storage can provide service to the electric grid as a larger, single system or as an aggregation of smaller, distributed systems. For example, New England’s wholesale electric market operator has recently awarded a forward-capacity contract to an aggregation of 20 MW of storage paired with solar power—effectively competing right alongside larger, single systems. To the extent that the subcommittee seeks to use a term of art, “grid energy storage” should suffice without inadvertently confusing the intent of the section.

In Section 7, “Hybrid energy systems,” we commend the subcommittee for efforts to drive research & development on storage systems paired with generation and identify barriers to their use. Many of those barriers remain at the level of the bulk power system, which is in many places under the governance of a Regional Transmission Organization (RTO) or Independent System Operator (ISO). As hybrid energy systems with storage are relatively new, RTOs and ISOs have not yet presented clear rules for how they would operate in the electric system.

Therefore, in addition to the objectives presently in the bill, ESA respectfully requests the subcommittee to consider directing the Federal Energy Regulatory Commission (FERC) to seek a report from RTOs and ISOs on the present rules and processes regarding the interconnection, market participation, and capacity accreditation of hybrid energy systems.

In Section 8, “Grid integration,” there are a number of useful research, development, and demonstration (RD&D) programs on the next frontier particularly for integrating an electrified transportation system with the grid. To these ideas ESA recommends adding complementary RD&D efforts on the re-use of electric vehicle (EV) batteries for “second life” applications in charging infrastructure and electric grid service. EV battery capacity equivalent to 100 times that installed on the U.S. grid will be removed from vehicle service globally by the mid-2020s, and a great number of these batteries may still have a power storage capability that is useful for service to the grid—representing a potential low-cost grid integration resource and an environmentally responsible method to divert still-useful assets from recycling or disposal.

#### *In Conclusion*

We are at an historic moment where the U.S. can harness energy storage technologies to cost-effectively modernize and secure our electric system. I thank the subcommittee for the opportunity to speak to these critical issues, and I welcome your questions.