



Long-Duration Energy Storage Demonstrations Projects Selected and Awarded Projects



 **Xcel Energy's rendering of a 10MW Form Energy iron-air battery system**

Awarded LDES Projects

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Children's Hospital Resilient Grid with Energy Storage (CHARGES)

PROJECT FACT SHEET →

**COMMUNITY BENEFITS
COMMITMENTS SUMMARY →**

Fact sheets currently describe Phase 1.



 **Artist's rendering of aerial view of Valley Children's Hospital solar farm and microgrid (Photo Credit - Goalpost)**

Federal Cost Share: Up to \$30 million

Recipient: Charge Bliss

Location: Madera, CA

Project Summary: During a power outage, hospitals require reliable back-up power to continue to provide essential services. This project plans to install a 3.3 MW behind-the-meter, non-lithium-ion battery energy storage system that would provide power for at least 10 hours to Valley Children's Hospital, a pediatric hospital that serves Justice40 communities around Madera, California. This long-duration energy storage (LDES) project aims to be a key demonstration of critical power backup of an acute care hospital in the U.S. and provide resiliency in a region that is increasingly at-risk for significant power outages due to

fires, storm surges, floods, extreme heat, and earthquakes. This project would also provide a roadmap to facilitate the replacement of diesel generators with cleaner, more cost-effective resources at the hospital facility.

The project team is led by Charge Bliss, who has been working closely with the California Energy Commission to develop and demonstrate the capabilities of renewable energy microgrids as a source of backup power in hospitals. The CHARGES project will be supported by Sandia National Labs for research and analysis, Nhu Energy for microgrid controller integration and development, and Mazzetti for project engineering and design.

As part of its Community Benefits Plan, the CHARGES project plans to establish a Community Engagement Team (CET) that will guide community outreach and engagement, directly engage impacted communities and labor, collect and integrate community and labor input into project decision making, assess community priorities and project impacts, and develop plans for tracking and reporting project data. This groundbreaking LDES project plans to provide significant community benefits through continuity of critical services, community power availability, and cost savings that can be redeployed for health programs.

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Columbia Energy Storage Project

PROJECT FACT SHEET →

**COMMUNITY BENEFITS
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Fact sheets currently describe Phase 1.



 **Rendering of Energy Dome for Wisconsin site**

Federal Cost Share: Up to \$30.7 million

Recipient: Wisconsin Power and Light, doing business as Alliant Energy

Locations: Pacific, WI

Project Summary:

Through the Columbia Energy Storage project, Alliant Energy plans to demonstrate a compressed carbon dioxide (CO₂) long-duration energy storage (LDES) system at the soon-to-be retired coal-fired Columbia Energy Center power station in Pacific, Wisconsin. Designed to discharge 18 MW of power for at least 10 hours, this facility would be the first of its kind in the United States. The project plans to store excess energy from the grid that can be deployed when needed, taking excess energy from the grid and converting the CO₂ gas into a compressed liquid form, which reduces the typical complexity and costs associated with storage. Whenever energy is needed, the liquid CO₂ is heated, vaporized, and expanded back to gas, which turns a turbine and generates electricity.

Alliant Energy has developed community benefits commitments to maximize positive impacts of the Columbia Energy Storage Project and mitigate potential adverse effects. These commitments include creating a Community Stakeholder Working group, holding public meetings and listening sessions to engage with the community, and partnering with local colleges and labor unions to create workforce training and pre-apprenticeship opportunities for local students.

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Communities Accessing Resilient Energy Storage (CARES)

PROJECT FACT SHEET →

**COMMUNITY BENEFITS
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Fact sheets currently describe Phase 1.



 **Internal view of BESS with second-life batteries installed**

Federal Cost Share: Up to \$10 million

Recipients: ReJoule

Locations: Red Lake Nation, MN; Santa Fe, NM; and Petaluma, CA

Project Summary: Through the CARES project, ReJoule plans to build modular energy storage systems made from repurposed batteries for installation at three sites across the Midwest, Southwest, and Western regions of the United States, improving energy resilience at two affordable housing complexes and a Red Lake Nation workforce development campus. ReJoule plans to use second-life lithium-ion batteries from electric vehicles to assemble modular battery energy storage systems (BESS) for behind-the-meter grid installations. ReJoule aims to measure the batteries' State of Health (SOH) using its patented rapid diagnostic testing platform, BattScan, to select batteries for repurposing and estimate their lifespan in the BESS. The behind-the-meter BESS installations will vary in size and use case and have the potential to demonstrate a diverse portfolio of repurposed lithium-ion batteries with 10+ hours of continuous discharge, support larger microgrids and grid storage, and offer a clean-energy alternative to fossil fuel-powered peaker plants.

ReJoule has developed community benefits commitments to maximize positive impacts of the CARES project and mitigate potential adverse effects. These commitments include creating community advisory bodies, developing labor and workforce development plans, and pursuing workforce and labor agreements for all project sites.

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Front-of-the-meter Utilization of Zinc Bromide Energy Storage (FUZES)

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Fact sheets currently describe Phase 1.



NextEra Energy Resources operational North Dakota Wind Energy Center, located in Edgely, ND

Federal Cost Share: Up to \$49.1 million

Recipient: NextEra Energy Resources Development, LLC

Locations: Morrow County, OR; Manitowoc County, WI; LaMoure County, ND

Project Summary: NextEra Energy Resources Development, LLC proposes development of zinc-bromide battery energy storage systems for a front-of-the-meter application at existing renewable energy sites in Morrow County, OR; Manitowoc County, WI; and LaMoure County, ND. Each of these energy storage systems aim to provide 5–10 MW of power for at least 10 hours. The expected benefits of this development include increased capacity at the point of interconnection, reductions in greenhouse gas emissions, improved utilization of renewable energy

generation facilities, lower future energy costs, and high replication potential across future NextEra Energy Resources projects.

The project team plans to implement community benefits commitments by driving economic development, creating a unique community engagement plan for each host community, and collaborating with local technical and community colleges to provide education and training for workers.

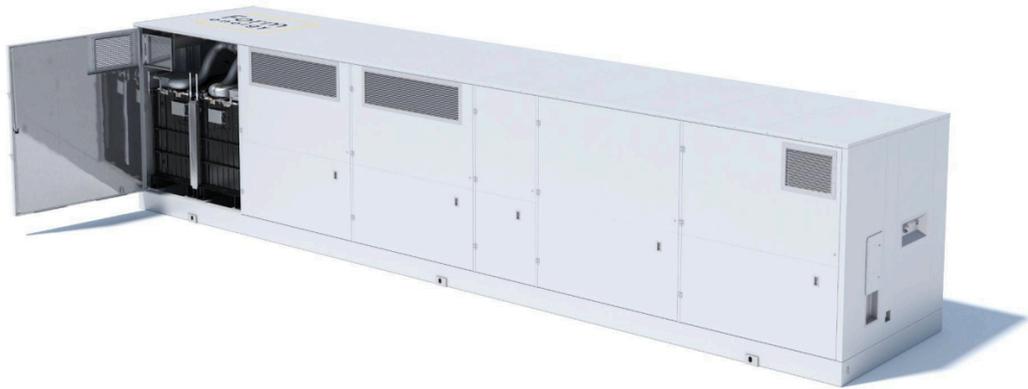
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Multiday Iron air Demonstration (MIND)

PROJECT FACT SHEET →

**COMMUNITY BENEFITS
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Fact sheets currently describe Phases 1 and 2.



 **Rendering of Form Energy iron-air battery enclosure**

Federal Cost Share: Up to \$70 million

Recipients: Xcel Energy

Locations: Becker, MN and Pueblo, CO

Project Summary: Multiday energy storage is essential for the reliability of renewable electricity generation required to achieve our clean energy goals and provides resiliency against multiday weather events of low wind or solar resources. Xcel Energy, in collaboration with Form Energy, will deploy two 10MW 100-hour long-duration energy storage (LDES) systems at retiring coal plants in Minnesota and Colorado. This project aims to accelerate the commercialization and market development of multiday storage through strategic collaboration, technology, and scale.

Form Energy, the technology provider, produces iron-air batteries, which use some of the safest, cheapest, and most abundant materials—low-cost iron, water, and air. Xcel Energy and Form Energy will be joined by Argonne National Laboratory (ANL) to measure, assess, and validate the technical and social impacts of the project. ANL will collaborate with Xcel Energy on workforce development to educate communities on the battery energy storage technology and develop pathways to employment for communities near the LDES sites, vocational schools, and academic institutions across America. The team is also working with labor unions, including the International Brotherhood of Electrical Workers (IBEW), to shape project-generated jobs and build a career pipeline.

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Pumped thermal energy stOrage in ALaska Railbelt (POLAR)

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COMMUNITY BENEFITS COMMITMENTS SUMMARY →

Fact sheets currently describe Phase 1.



Federal Cost Share: Up to \$50 million

Recipient: Westinghouse Electric Company, LLC

Location: Healy, AK

Project Summary: Supplying reliable electricity to residents and businesses in Healy, Alaska presents challenges due to its remote location and extreme weather. Westinghouse Electric Company, LLC together with technology provider Echogen Power Systems will develop and deploy a Pumped Thermal Energy Storage (PTES) system with a 1200 MWh capacity, capable of a minimum continuous output of 50 MW for 24 hours at Healy Power Plant. The power plant in Healy, Alaska relies on two coal-fired generation units, one of which is slated for retirement.

In the PTES system, a heat pump draws electricity from the power grid and converts the electricity into heat stored in inexpensive concrete blocks. This stored energy is then converted back into electricity using a heat engine. The PTES system also utilizes a low-cost ice-based low temperature reservoir.

The POLAR project's PTES system will pair with planned wind power development from Golden Valley Electric Association (GVEA) at the plant to fill the gap in power generation from the retiring coal-fired unit, improve electricity reliability in Alaska's Railbelt region, and improve air quality in the region, while demonstrating the viability of high-temperature long-duration energy storage in a cold climate. Project benefits would flow indirectly to Alaskan Native villagers in underserved communities, such as the North Slope Borough.

Construction will be led by ASRC Energy Services - Houston Contracting Company, Inc. GVEA has created a strategic generation plan for achieving decarbonization objectives while reducing electricity costs and maintaining the stability and security of the electrical grid in Alaska. This project also includes the Electric Power Research Institute (EPRI) and Shell Global Solutions, US, Inc.

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Rural Energy Viability for Integrated Vital Energy (REVIVE)

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[COMMUNITY BENEFITS COMMITMENTS SUMMARY →](#)



Federal Cost Share: Up to \$29.7 million

Recipient: Dairyland Power Cooperative

Locations: Frentress Lake, IL; Waukon, IA; Wyeville, WI

Project Summary: Rural areas are often the last to benefit from innovation, have lower household incomes, and limited resources to invest in emerging technologies. Power outages are increasingly common in these areas, leaving communities and critical infrastructure more vulnerable. To address these challenges, Dairyland Power Cooperative (DPC) plans to develop and build three battery energy storage systems utilizing vanadium flow batteries (VFBs). Each system would be installed at DPC-owned distribution centers and provide up to 700 kW of power for up to 10 hours for rural communities in Illinois, Iowa, and Wisconsin. The aim is to bring high-benefit, low-risk energy solutions to vulnerable and underserved rural areas. For co-ops that may

not have experience with long-duration energy storage (LDES), this demonstration would showcase the value and the implementation path for LDES and give the co-ops experience working with the technology, spurring replication opportunities with co-ops across the country. The proposed technology provider, Invinity Energy Systems, is a global leader in the production of vanadium flow batteries. The safe, durable, and proven VFB poses no fire risk, does not degrade, and has an operational life of 25 years.

DPC plans to collaborate with the distribution cooperative at each location, including Allamakee Clayton Electric Cooperative, Jo-Carroll Electric Cooperative, and Oakdale Electric Cooperative. Pacific Northwest National Laboratory will carry out the techno-economic analyses and data collection for the project, which will inform decision-making and provide valuable insights into the potential benefits of VFBs. The REVIVE project plans to implement community benefits commitments through identifying community liaisons and ambassadors at each project site to support local outreach and education and serve as a channel for community feedback. DPC also plans to engage in workforce training to support workforce opportunities for local workers at each project site.

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Second Life Smart Systems (SMART)

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Fact sheets currently describe Phase 1.



 **Smartville engineers conduct a quality control check on a Smartville 360 energy storage system**

Federal Cost Share: Up to \$10 million

Recipients: Smartville, Inc.

Location: Los Angeles County, CA; Orangeburg, SC; Denmark, SC; Atlanta, GA; and New Orleans, LA

Project Summary: The retired electric vehicle (EV) lithium-ion battery stockpile is growing, and there is great debate over how these batteries should be disposed of. They are made from cobalt, lithium, and nickel, which are scarce and nonrenewable resources. Smartville, Inc. plans to help solve this issue by demonstrating the viability of repurposed lithium-ion electric EV batteries in LDES systems across a range of use cases, environments, and sizes—from smaller scale (50kW x 10 hour) to larger scale (200kW x 10 hour). Smartville aims to install small-scale systems at two Historically Black Colleges and Universities (HBCUs) for education and training purposes; two large-scale systems for grid resilience, load balancing, and peak shaving in Los Angeles County; one large-scale system to support a town renovation project and promote green technologies; and two large-scale systems to support EV charging.

The Smartville second-life battery solution – Smartville 360 BESS – is one of the first second-life energy storage systems to integrate and control repurposed electric battery packs from different manufacturers at varying levels of states of health in one unified system. It uses the highest-quality tier-1 automotive lithium-ion batteries, and proprietary controls providing superior performance, safety, and longevity.

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Stored Rechargeable Energy Demonstration (STORED)

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Fact sheets currently describe Phase 1.



Rendering of Urban Electric Power's Outdoor Pod, a Modular Design for Dense Urban Areas

Federal Cost Share: Up to \$6.5 million

Recipient: Urban Electric Power, Inc.

Locations: Oneonta, NY and Valhalla, NY

Project Summary: Energy storage is critical to New York's clean energy future. As renewable power sources like wind and solar provide a growing portion of New York State's electricity, storage will allow clean energy to be available when it is most needed. New York aims to deploy 3,000MW of storage by 2030 and has convened an Inter-Agency Fire Safety Working Group to address battery safety issues. This project utilizes a fire-safe battery using low-cost and largely domestically

available materials. Urban Electric Power aims to demonstrate the viability of its zinc manganese dioxide (ZnMnO₂) batteries in large scale and long-duration energy storage systems. This project will provide load management and power resilience to the selected sites. Between the two proposed sites, it will provide up to 600kW of power for up to 12 hours per discharge, yielding a total stored energy capacity of 7.2MWh. A successful demonstration could enable market adoption of Urban Electric Power's LDES system by proving decreased technology risk, reducing demand on grid infrastructure through reduced peak demand load, and reducing total costs of installation and operation as compared to a Lithium-Ion system.

Urban Electric Power's solvent-free rechargeable ZnMnO₂ batteries utilize earth-abundant raw materials that are readily available through supply chains established by the non-rechargeable alkaline battery industry, and more than 75 percent of Urban Electric Power's raw material vendors are based in the U.S. The batteries have been successfully piloted at several energy storage installations.

Community benefits commitments are a key component of the STORED project, which will be implemented by engaging local communities, pursuing workforce and community agreements, and promoting local hiring and workforce development to provide access to high-quality jobs. Urban Electric Power is teaming up with the New York Power Authority, a public utility with expertise in clean energy technologies, which has an established environmental justice program and will be leading outreach to members of these communities. EPRI will provide technical and industry expertise and guidance.

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FAQs

1. What is long-duration energy storage (LDES)?

DOE defines [long-duration energy storage](#) (LDES) as storage systems capable of delivering electricity for 10 or more hours, multi-day (36+ hours), and seasonal storage. As we move towards a carbon-free electric grid that relies more on variable renewable energy generation, the need for reliable LDES technologies that can supply energy over long periods of time becomes increasingly important.

Storage plays a huge role in allowing utilities and grid operators to effectively use renewable energy resources, like solar and wind, available on demand. Cheaper, longer, and more efficient storage is needed to meet energy demand that fluctuates throughout the day and night and particularly during extreme weather events.

2. Why is DOE investing in LDES?

LDES is a critical component of our strategy to decarbonize the nation's power system by boosting the integration of renewable energy and enhancing grid reliability. Through this funding, OCED aims to revolutionize energy storage by supporting projects that provide extended storage durations, ensuring a stable and consistent energy supply, even during periods of high demand or in extreme weather conditions.

OCED's [LDES Demonstrations Program](#) is focused on a range of technologies with regional diversity to demonstrate promising

technologies at different scales and help innovative LDES technologies become commercially viable.

These projects will also provide a pathway to achieve the Department's [Energy Storage Grand Challenge](#) goal of reducing storage cost by 90 percent within the decade and demonstrate the potential for creation of long-term, high-quality jobs in clean energy manufacturing, installation, and maintenance.

3. How many projects have been selected and how much funding is DOE providing?

In September 2023, [OCED announced](#) up to \$286 million for nine projects that have been selected for award negotiations under the [LDES Funding Opportunity](#). The projects will develop LDES systems in 17 states and one Tribal nation.

DOE also announced up to \$39 million for six projects selected under the [LDES Lab Call](#) funding opportunity to demonstrate technology innovations and resiliency advantages in national labs at a range of scales. For more information on the six selected lab call projects, [visit here](#).

Funding amounts for the selected projects are being finalized and will be announced after the award negotiations process is complete.

4. What are the anticipated benefits of LDES projects?

Improving LDES technologies is vital to efficiently and economically integrating renewable energy at scale into our nation's electric grid. The projects selected for award negotiations aim to achieve a scale that would be the first of its kind – and not just with renewable

energy, but also with our increasingly diverse mix of energy resources.

Cheaper, longer energy storage can build resilience for communities, increase local control of the power system, and minimize power grid disruptions, particularly during severe weather events.

This investment into LDES technology will reap benefits across the country, from providing a reliable source of electricity for a children's hospital in a disadvantaged community to expanding workforce development programs at technical and community colleges, HBCUs, and other minority-serving institutions. The selected projects will not only catalyze new technologies but will also foster the kind of novel collaborations that are critical to building an equitable clean energy system.

5. How were the LDES projects selected?

Selectees for the LDES Demonstrations Program were evaluated through a rigorous technical and merit review process following criteria set forth in the [Funding Opportunity Announcement](#). These criteria included an evaluation of each proposal's technical merit and impact, financial and market viability, project workplan, and community benefits plan.

Subscribe to [OCED Alerts](#) to stay updated on the Long-Duration Energy Storage Demonstrations Program. For additional information on long-duration energy storage, please visit the [OCED's website](#) and [download this fact sheet](#).

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