



OCED
Office of Clean Energy Demonstrations

THE OFFICE OF CLEAN ENERGY DEMONSTRATIONS



Long-Duration Energy Storage National Briefing

09/25/2023

Office of Clean Energy Demonstrations
U.S. Department of Energy

Welcome!



Welcome & Meeting Objectives

- Share information regarding the DOE Office of Clean Energy Demonstrations (OCED) Long-Duration Energy Storage (LDES) demonstration selections and next steps in the process
 - Program Update – LDES project selections announced on 9/22
 - Project Selections – Nine (9) projects with commercial partners
 - Engagement and Next Steps

Introductions



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LDES Program
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OCED



Agenda

- 3:00 – 3:05 | Welcome and Opening Remarks
- 3:05 – 3:15 | OCED Overview
- 3:15 – 3:20 | LDES Overview
- 3:20 – 3:50 | Project-Specific Summaries
- 3:50 – 3:55 | Community Benefits Plan Overview
- 3:55 – 4:00 | Next Steps & Resources



OCED Overview

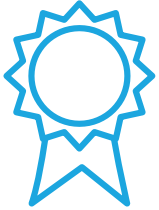


OCED Mission

Deliver clean energy technology **demonstration projects at scale** in partnership with the **private sector** to **accelerate deployment, market adoption**, and the **equitable transition** to a decarbonized energy system.



OCED Mandate



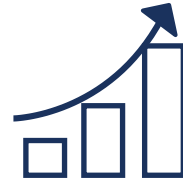
CENTER OF EXCELLENCE

Serve as primary DOE office to deliver full scale clean energy demonstration projects and project management oversight excellence



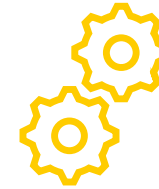
CLEAN ENERGY & EQUITABLE

Help enable 100% clean electricity by 2035 and net zero emissions by 2050 through an equitable energy transition



FOLLOW ON INVESTMENT

Unlock and scale trillion-dollar clean energy follow on investment from the private sector and other sources of capital



DE-RISK TECHNOLOGY

Maintain risk-based, balanced, and defensible portfolio of investments



ENGAGEMENT & OUTREACH

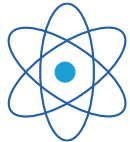
Leverage private sector and broader energy ecosystem to inform OCED and DOE technology commercialization efforts



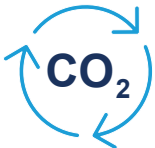
OCED Scope



Regional Clean Hydrogen Hubs (\$8 billion)



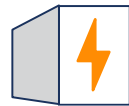
Advanced Reactor Demonstrations (\$2.5 billion)



Carbon Management (\$7 billion)



Industrial Demonstrations (\$6.3 billion)



Long-Duration Energy Storage Demonstrations (\$505 million)



Energy Improvements in Rural or Remote Areas (\$1 billion)

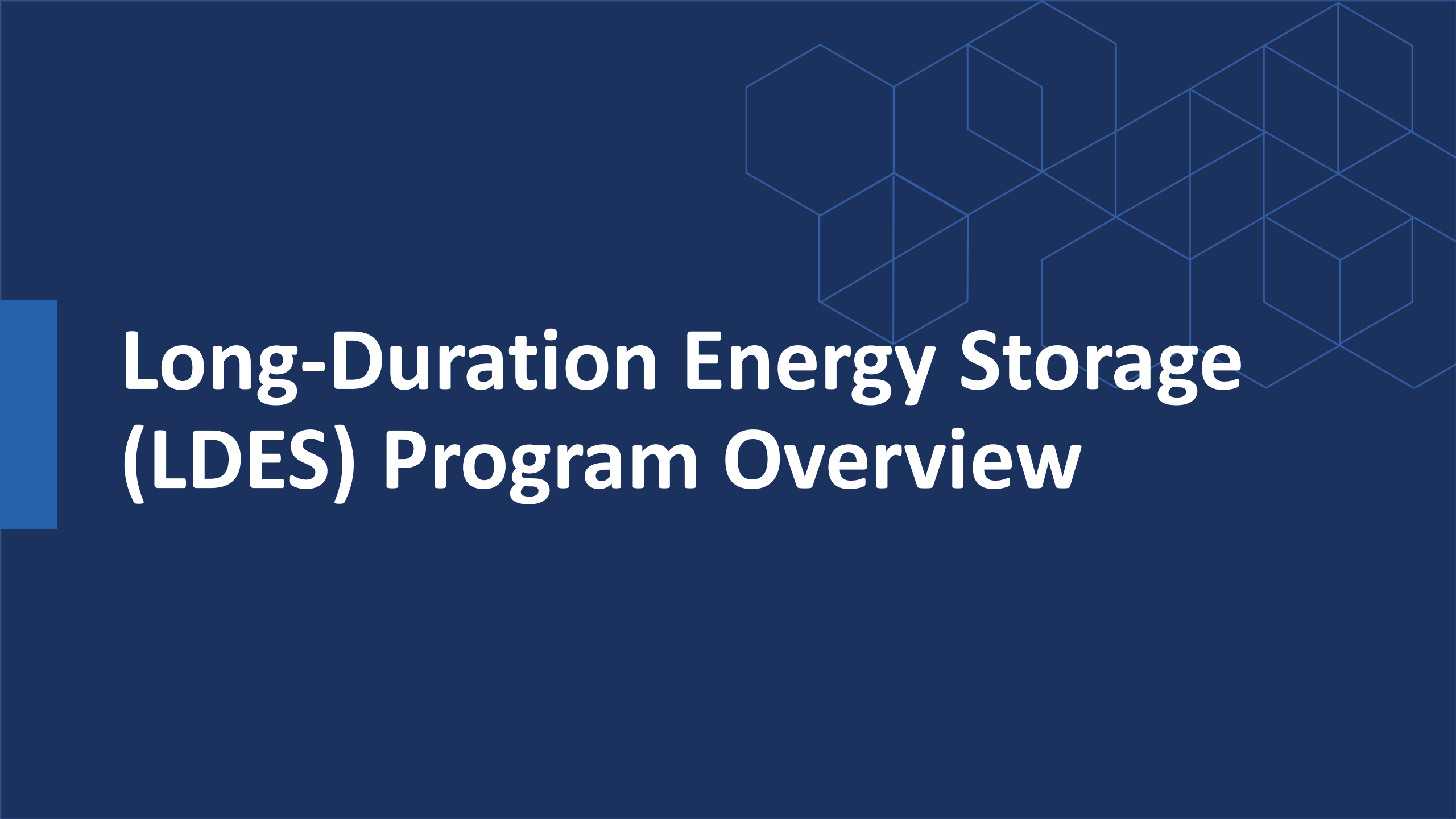


Clean Energy Demonstrations on Mine Land (\$500 million)



Other Initiatives (\$133 million)





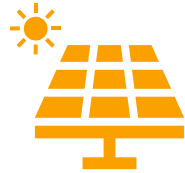
Long-Duration Energy Storage (LDES) Program Overview

Why Long Duration Energy Storage

Cheaper, longer energy storage can:



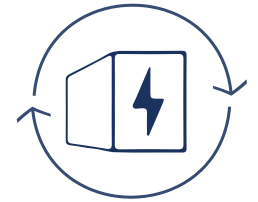
Support the **expansion of renewables** like solar and wind by providing stability, flexibility, and optionality to the grid



Reduce the need for new fossil fuel capacity by **firming renewables**



Enhance **resiliency of the grid** and at critical facilities (e.g., hospitals, affordable housing) **during extreme weather** and other disruptive events



Diversify the domestic energy storage **supply chain**

Overview

- As we move towards a power grid that relies on more variable energy, **the need for LDES is critically important.**
 - Of the 1,325 current energy storage projects in North America, only 25 (or 2%) have duration of over 10 hours.
- The projects announced last week will help increase the **availability and market viability of LDES** and facilitate the deployment of clean, reliable energy across the nation.
 - The nine (9) projects selected for award negotiation include collaborations among communities and businesses, tribal nations, utility providers, hospitals, clean tech entrepreneurs, labor unions and retirement communities.





Long-Duration Energy Storage

Energy Storage: The capture of energy produced at one time for use later to reduce imbalances between energy demand and energy production.

LDES: Energy storage systems capable of delivering electricity for 10 hours or longer.

OCED's LDES Demonstrations:

Aims to fund projects that will overcome the technical and institutional barriers that exist for full-scale deployment with a focus on a range of different technology types for a diverse set of regions.

Current Status:

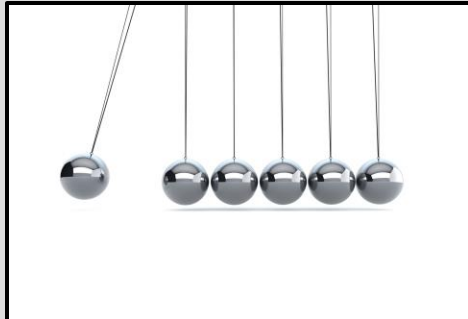
- **September 22, 2023: DOE announced nine projects selected for award negotiations.**

Types of LDES Technology Selected

Mechanical

Compressed carbon dioxide (CO₂) energy storage

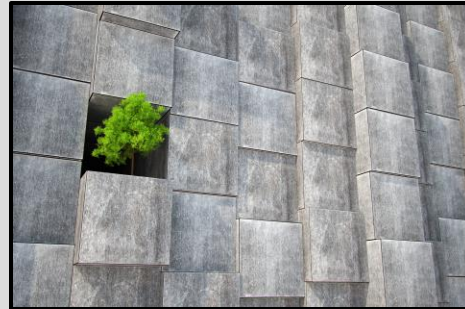
- Stores electric energy in the form of potential energy (compressed CO₂).



Thermal

Sensible heat storage

- Turns grid electricity into heat using large-scale heat pumps. Heat is stored and used to generate power when needed.



Electrochemical

Flow batteries

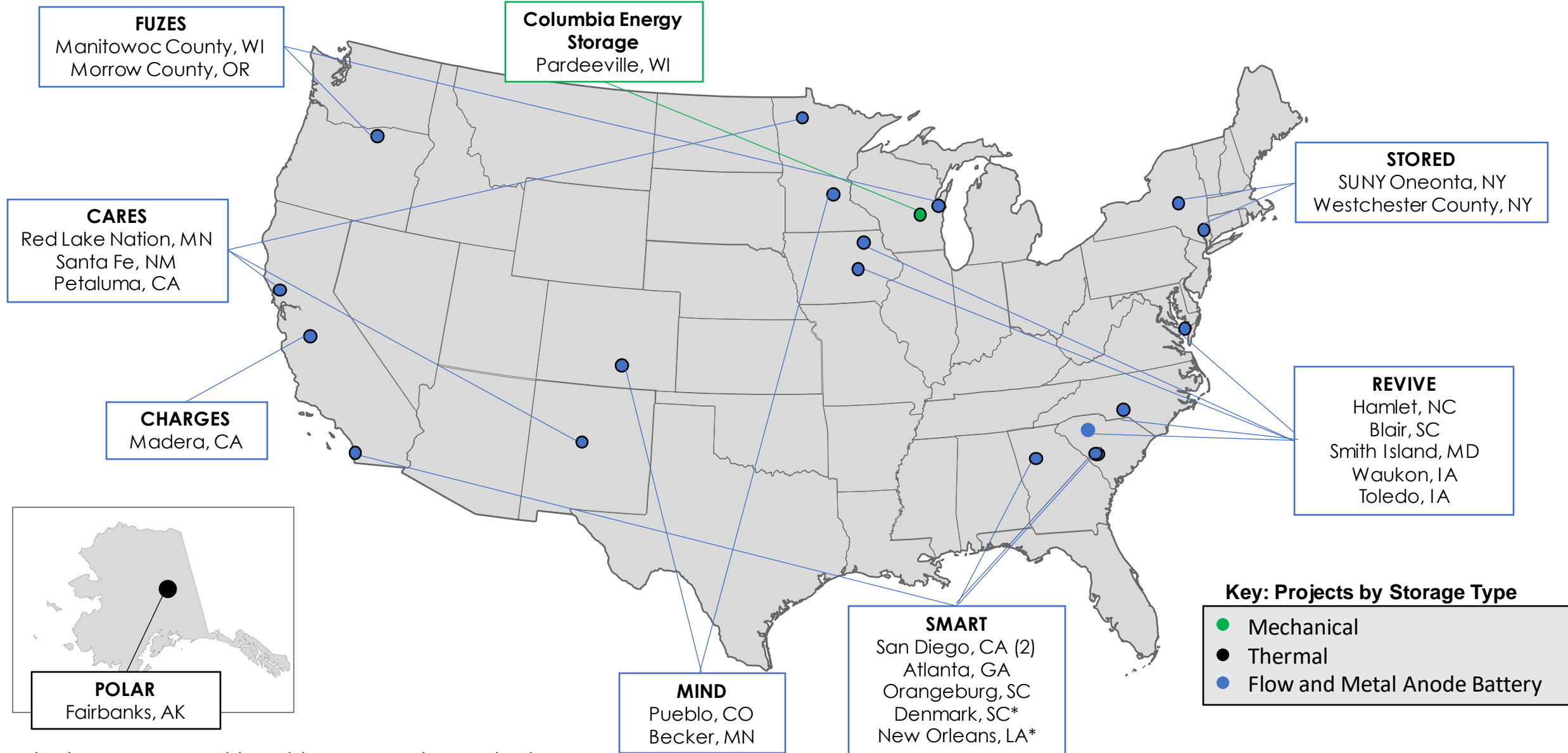
- Uses liquid positive and negative electrode material stored in tanks. Fluids flow past reaction site to produce power. Effectively decouples energy and power.

Non-flow batteries

- Similar to a car, phone, or rechargeable AA batteries.



Selected Project Locations



*These locations support career training and do not represent demonstration sites.

Phased Approach to Project Management

- ☆ Initial Application
- ◇ Go/No-Go Decisions





Project-Specific Summaries

Communities Accessing Resilient Energy Storage (CARES)

- **Prime:** ReJoule
- **Location(s):** Red Lake Nation (Minnesota), New Mexico, California
- **LDES Technology:** Second Life EV Batteries
- **Highlights:**
 - Makes use of retired batteries from electric vehicles
 - Provides demand reduction, load shifting, and resilience at two affordable housing complexes and a Red Lake Tribal Nation tribal workforce development campus
 - Engages a nonprofit to build career pathways in clean energy technology for youth, women, and individuals



Second life sMARt sysTems (SMART)

- **Prime:** Smartville, Inc.
- **Location(s):** Georgia, California, and South Carolina
- **LDES Technology:** Second Life EV Batteries
- **Highlights:**
 - One of the first projects to use existing “second life” batteries, reducing the need to mine new minerals and reducing associated carbon emissions of producing new batteries
 - Will serve critical facilities including affordable housing complexes and senior centers
 - Aims to install more than 7 MWh of lithium-ion battery systems to provide grid resiliency, lower future energy costs and backup power
 - Historically Black Colleges and Universities (HBCUs) will support career training at key sites through Denmark Technical College in Denmark, SC and Dillard University in New Orleans, LA



STOred Rechargeable Energy Demonstration (STORED)

- **Prime:** Urban Electric Power
- **Location(s):** New York
- **LDES Technology:** Zinc Manganese Dioxide Battery
- **Highlights:**
 - Employs batteries that utilize earth-abundant raw materials that are readily available through supply chains
 - Will increase resilience, decrease installation costs, and "firm" solar generation, with batteries expected to provide up to 24 hours of continuous power
 - Will be located at two sites in New York that are supported by the New York Power Authority, a publicly owned utility, and separate community advisory committees



Rural Energy Viability for Integrated Vital Energy (REVIVE)

- **Prime:** National Renewables Cooperative Organization (NRCO)
- **Location(s):** Iowa, South Carolina, North Carolina, Maryland
- **LDES Technology:** Vanadium Redox Flow Batteries (VRFBs)
- **Highlights:**
 - Will develop a Rural Behind-the-Meter LDES Cooperative Network, comprised of vanadium redox flow batteries with discharge capabilities of up to 20 hours
 - Batteries will be located at three to five sites across the Midwest, Southeast, and Mid-Atlantic regions of the United States
 - Aims to deliver high-benefit, low-risk energy solutions to vulnerable and disadvantaged rural areas with associated workforce training



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

- **Prime:** California Energy Commission (CEC)
- **Location(s):** California
- **LDES Technology:** Zinc Bromide Flow Battery
- **Highlights:**
 - Will provide backup power to a children's hospital in California increasingly at risk of power outages and that serves a community with a 30% childhood poverty rate
 - Expected to produce a roadmap for the replacement of diesel generators with cleaner, more cost-effective resources at the hospital facility
 - The project is a collaboration between the California Energy Commission, labor unions, and local community and industry partners



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

- **Prime:** NextEra Energy Resources
- **Location(s):** Oregon, Wisconsin
- **LDES Technology:** Zinc Bromide
- **Highlights:**
 - Aims to demonstrate a 10-hour duration zinc bromide battery that is non-flammable, low-cost, and uses domestically available components
 - Expected project impacts include increased renewable capacity at a grid interconnection and reduced curtailment of renewables
 - Partnerships will be the Tribal Historic Preservation Offices to support both tribal energy development and career opportunities through partnerships with community colleges



Columbia Energy Storage Project

- **Prime:** Wisconsin Power and Light Company
- **Location(s):** Wisconsin
- **LDES Technology:** Compressed Air Energy Storage (CAES)
- **Highlights:**
 - Will demonstrate compressed CO₂ energy storage at commercial scale
 - Outputs will include a roadmap to inform deployment nationwide
 - Collaborating with state and local governments, labor unions, and surrounding Tribal Nations via the Midwest Tribal Resources Association to ensure the engagement of energy-burdened communities



Pumped thermal energy stOrage in ALaska Railbelt (POLAR)

- **Prime:** Westinghouse Electric Corp.
- **Location(s):** Alaska
- **LDES Technology:** Thermal Energy Storage
- **Highlights:**
 - Aims to demonstrate high-temperature thermal storage in cold climates through an integrated heat battery with turbomachinery to store energy at large scale
 - Located at a coal facility slated for retirement, the project will provide local jobs and bolster regional grid resiliency
 - Project partnerships will benefit Alaskan natives through collaborations with the Arctic Slope Regional Corporation, communities, and schools



Multiday Iron air Demonstration (MIND)

- **Prime:** Northern States Power Co.
- **Location(s):** Minnesota, Colorado
- **LDES Technology:** Iron Air Battery
- **Highlights:**
 - The project will demonstrate multi-day iron-air batteries that utilize safe, inexpensive and abundant materials
 - Aims to provide energy storage through 10-megawatt, 100-hour-long LDES systems at retiring coal plants in Minnesota and Colorado, accelerating the commercialization of multi-day storage
 - Project partners will collaborate on workforce pipelines for retraining and job creation





Community Benefits Plans (CBPs)

Prioritizing Community Benefits in OCED Projects

OCED **requires** applicants to include a Community Benefits Plan (CBP) to help ensure broadly shared prosperity in the clean energy transition.

By **prioritizing community benefits**, we can ensure the next chapter in America's energy story is marked by greater justice, equity, security, and resilience.

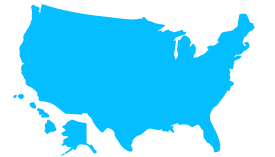
Community & Labor Engagement



Diversity, Equity, Inclusion, & Accessibility



Investing in the American Workforce



Justice40 Initiative



Community Benefit Plans - Implementation Requirements per Phase



*CBPs are considered alongside assessments of engineering, procurement, and construction; business development and management; permitting and safety; and technical data and analysis.

◇ Go/No-Go Decisions



Next Steps & Resources

Next Steps

- **Regional Briefings:** DOE OCED will hold three regional briefings (East, West, and Midwest) in October to share information with the communities located near project sites
- **Award Negotiations:** DOE OCED will commence negotiations with project selectees
- **After Award: *IF the projects receive an award (successful negotiations)***
 - Selectees enter into cooperative agreement with DOE OCED for Phase One
 - Phase One includes Detailed Project Plans (phase anticipated to last up to a year and half)
 - Future phases subject to Go/No Go Decisions
 - OCED will work with selectees to comply with the National Environmental Policy Act (NEPA) where relevant

*Subject to change based on negotiations. Negotiations may take several months.



OCED Contact Information

- To reach DOE OCED about the LDES projects:
 - Email: **oced_Ids@hq.doe.gov**
- Subscribe to receive OCED news and updates, including new funding opportunities – visit <https://www.energy.gov/oced/> and scroll to the bottom to sign up.

Sign Up for OCED News & Alerts

Subscribe and stay up-to-date on all upcoming funding opportunities, news announcements, upcoming events, and more.

Resources

- [OCED_LDES.pdf \(energy.gov\)](#)
- [LDES Selections for Award Negotiations | Department of Energy](#)
- [Project-Specific Information](#)
- [Long Duration Energy Storage - Pathways to Commercial Liftoff](#)





Thank you!



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For more information, please visit energy.gov/OCED