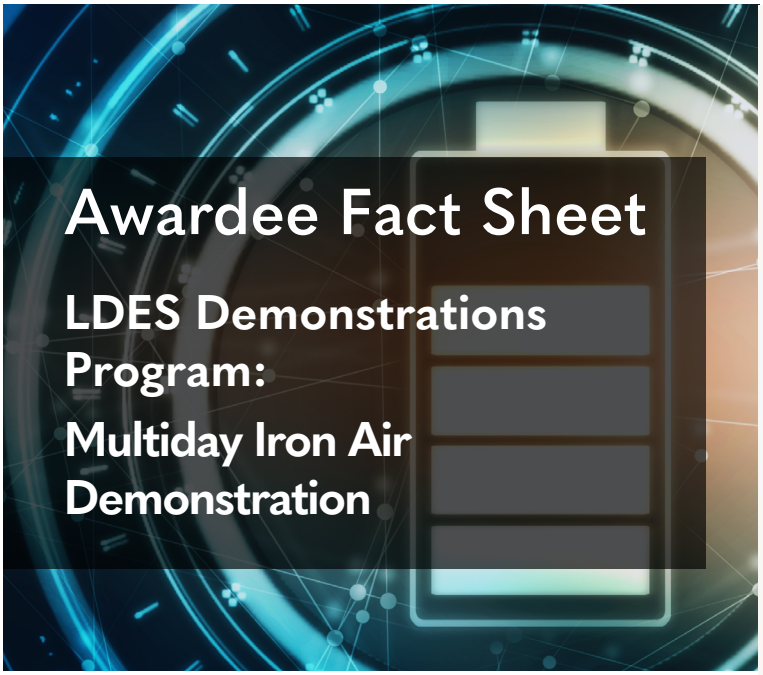
Long-Duration Energy Storage Demonstrations Program – Multiday Iron Air Demonstration

The Long-Duration Energy Storage (LDES) Demonstrations Program, managed by the U.S. Department of Energy's (DOE) Office of Clean Energy Demonstrations (OCED), aims to validate new energy storage technologies and enhance the capabilities of customers and communities to integrate grid storage more effectively. As part of this program, OCED sought applications for LDES projects from a range of different technologies intended to overcome technical and institutional barriers to full-scale deployment of LDES systems in diverse geographies. OCED selected nine projects to begin award negotiations for a total of up to $286 million. Following negotiations, in June 2024, OCED awarded the Multiday Iron Air Demonstration (MIND) project with more than $4.3 million to begin activities in the first two project phases. MIND will be located in both Becker, MN and Pueblo, CO.



Project at a Glance

- **Total OCED Cost Share:** Up to $70 million
- **Phase 1+2 Total Project Amount:** $8,669,783*
- **Phase 1+2 OCED Award Amount:** $4,334,892**
- **Phase 1+2 Scope of Work:** Planning, permitting, design, and other development activities needed to prepare the project for construction in Phase 3
- **Phase 1+2 Timeline:** 7-12 months
- **Recipient:** Xcel Energy is an electric and gas energy provider. Xcel Energy will work in collaboration with Form Energy as the technology provider.
- **Project Locations:** Becker, MN and Pueblo, CO
- **Start Date:** June 2024

*Represents the total project cost for Phases 1+2.

**Represents OCED's cost share for Phases 1+2. Additional funding for this project is subject to future award negotiations at the end of each project phase.

About This Project

Xcel Energy, in collaboration with Form Energy, plans to deploy two 10MW 100-hour LDES systems at two retiring coal plants: Sherburne County (Sherco) Generating Station in Becker, MN and Comanche Generating Station in Pueblo, CO. This project aims to accelerate the commercialization and market development of multiday storage by utilizing the technology at commercial scale in two different settings. Form Energy's battery storage system uses iron-air technology that is optimized to store electricity for 100 hours at costs competitive with legacy power plants. Iron-air battery storage has the potential to enhance grid reliability and help fill the gap in baseload generation many utilities will face as they retire coal plants and integrate variable resources like wind and solar into the electric grid.

In June 2024, OCED awarded the MIND project more than $4.3 million to conduct Phases 1 and 2, which is expected to last 7-12 months. During Phases 1 and 2, Xcel Energy will undergo planning, design, permitting, and other development activities to prepare the project to begin construction in Phase 3.

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.

Project Site

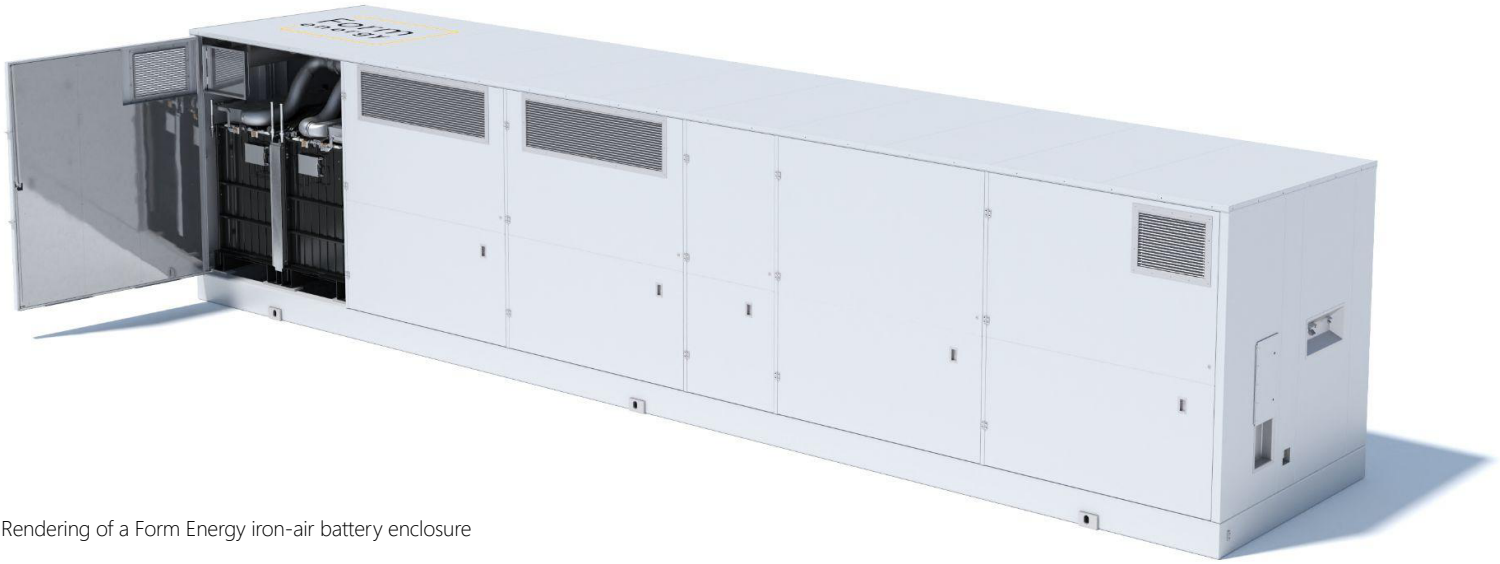
The MIND project will be located at two retiring coal plants: Sherburne County (Sherco) Generating Station in Becker, MN and Comanche Generating Station in Pueblo, CO. Both are in the middle of a major transition as the large coal power plants they host will both be retired by the end of 2030. Demonstrating this technology in two different regions – Minnesota and Colorado – will increase the understanding of system performance under various conditions such as weather, altitude, humidity, and energy supply and demand profiles that will help reduce uncertainties for replicating and deploying the technology at other sites.

Community Benefits Commitments

Community benefits commitments are a key component of the MIND project, informed and developed in consultation with local communities, which aim to mitigate potential adverse impacts of this project and maximize local community benefits. The MIND project will implement these commitments through:

- Creating a **community engagement plan and community advisory bodies** for each of the host communities. Community advisory bodies will provide direct input into community engagement planning, helping ensure engagement meets the needs and priorities of impacted communities and underrepresented groups, and helping identify project impacts, mitigation strategies, and Justice40 metrics.
- Equipping a **clean energy workforce** with experience in solar panels, wind turbines, and stationary battery systems alongside electrified mobility technology.
- Offering **curriculum and hands-on experiences** to educate communities and participants on Xcel Energy and Form Energy technologies through strong collaborations with both government and industry, ultimately advancing the state of clean energy education.
- Developing a **pathway to employment** for communities near LDES sites and from disadvantaged communities, vocational schools, and academic institutions across America.

More details on the MIND project's community benefits commitments can be found in Community Benefits Commitments Fact Sheet.



Rendering of a Form Energy iron-air battery enclosure

The U.S. Department of Energy established OCED to help scale the emerging technologies needed to tackle our most pressing climate challenges and achieve net-zero emissions by 2050. OCED's mission is to deliver clean energy demonstration projects at scale in partnership with the private sector to accelerate deployment, market adoption, and the equitable transition to a decarbonized energy system.

LDES Demonstrations Program Goals

More than 335 million residents in the United States depend on our energy grid to reliably generate an average of 4 trillion kilowatt hours of power annually. During times of high demand, especially during inclement weather when it's more difficult to generate power, it's essential to have energy stored that can be deployed to ease demand, keep prices down, and ensure the lights stay on. Long-duration energy storage is one key option, storing energy that can be discharged over long periods of time that's ready for dispatch when needed. DOE defines LDES as systems capable of delivering electricity for 10 or more hours. The LDES Demonstrations Program features projects with a range of intraday (10 to 36 hours) and multiday (36 to 160+ hours) storage solutions, which can minimize the frequency and length of power interruptions caused by events such as severe weather or cyberattacks on the grid. These projects will help effectively demonstrate the commercial viability of innovative LDES technologies and facilitate wider commercial adoption. Through these projects, OCED envisions the technology eventually being replicated all over the country, providing flexibility and reliability to the power system without creating emissions, supporting a more renewable-heavy future.

Rendering of a 10MW Form Energy iron-air battery system

Two employees conduct a quality check on a battery cell at Form Factory 1 in Weirton, WV

Contact

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More Resources

Website: energy.gov/oced/ldes

Office of Clean Energy Demonstrations: energy.gov/oced