

U.S. Department of Energy Competitiveness Improvement Project (CIP)

2022 Component Innovation Awardee: Windurance

Project dates: June 21, 2023–March 31, 2025

Project Overview

Energy Storage Integrated With Distributed Wind Resources Can Provide Affordable Electricity in Remote Operations

Combining battery energy storage with distributed wind energy systems can increase production, ability to meet local electricity demands, interconnection capacity, and potential sales of surplus energy back to the grid, while reducing demand charges and the overall levelized cost of energy (LCOE). Energy storage options for distributed wind energy systems can vary widely in terms of power level and energy storage capacity, and their potential benefits depend on factors including wind resource, turbine design, connection requirements, use patterns, utility rates, and regulations.

Windurance received a 2022 Competitiveness Improvement Project (CIP) funding award to add battery energy storage capabilities to the company's bidirectional DC converter. The energy storage component will complete a comprehensive portfolio of power conversion and control electronics that can be seamlessly integrated with distributed wind systems. The company received earlier CIP awards to fund prototype design and construction of wind turbine pitch actuators, inverters, and controllers.

Project Outcomes and Deliverable

The modular and scalable battery energy storage chassis will be certified according to UL 1741 Interconnection System Equipment safety and reliability standards and integrated with a comprehensive power conversion components data network. It will offer wind turbine original equipment manufacturers (OEMs), developers, installers, and end users a range of potential benefits in settings that include agricultural, commercial, industrial, educational, and military facilities.

"This 2022 CIP award makes it possible for Windurance to make the informed business decisions needed to develop certified products and drive growth in the distributed wind sector."

— Paul Rowan, director of engineering, Windurance

Project Approach

Numerous existing and emerging battery technologies based on a variety of stationary lead acid, hybridized ultracapacitor lead acid, lithium ion, and other chemistries could provide viable storage solutions for distributed wind energy systems. Windurance plans to incorporate modular, scalable, and battery-technology-agnostic storage in a UL-certified distributed wind energy resource power conversion and controls platform.

The project team will work with OEMs to determine the best economic configuration for battery management power conversion in terms of power rating per module, available battery technology elements, practical range of storage, and electrical connection methods.

"Combined with its distributed wind conversion and control technologies, the addition of Windurance's new energy storage component will make it viable for remote operations that rely on clean energy systems to meet electricity needs."

— Lee Jay Fingersh, technical monitor, National Renewable Energy Laboratory (NREL)





Windurance's modular and scalable battery energy storage system will work with a variety of distributed wind turbine systems, such as Pecos Wind Power's new PW85 turbine, shown here. *Photo from Pecos Wind Power*

Project Collaborators

The following four wind turbine OEMs will partner on the project to provide advice and feedback on market goals and application requirements:

- [Pecos Wind Power](#)
- [Wind Harvest International](#)
- [Northern Power Systems](#)
- [XFlow Energy Company](#).

Some of these partners are recipients of other CIP awards and all have partnered with Windurance on previous projects.

Project Financial Information

Award Amount: \$122,213

Awardee Share: \$378,900

Total: \$501,114

Component Innovation Award

One of nine types of CIP awards, Component Innovation Awards support innovation in existing wind energy generator designs to improve components, leading to a reduced levelized cost of energy.

About the Competitiveness Improvement Project

The U.S. Department of Energy's (DOE's) CIP supports U.S. leadership in distributed wind technologies. Managed by NREL on behalf of DOE's Wind Energy Technologies Office, the CIP supports innovation to advance wind energy as a low-cost, distributed generation technology option.

More Information

Visit NREL's website at www.nrel.gov/wind/competitiveness-improvement-project.html

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