



Competitiveness Improvement Project funding is helping Sonsight Wind continue development of its Sonsight 3.5-kilowatt wind turbine. A prototype of the turbine installed at Beech Mountain, North Carolina, is shown here. *Photo from D. R. McIntosh, Sonsight Wind*

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

2021 Prototype Testing Awardee: Sonsight Wind

Project Dates: Nov. 18, 2021–Aug. 17, 2023

Project Overview

Small Wind Turbines Can Contribute to the Distributed Energy Revolution

For small wind turbines—those under 10 kilowatts (kW) in generating capacity—the combined costs for turbines, towers, foundations, power electronics, installation, and maintenance can result in a high levelized cost of energy (LCOE). This makes it difficult for small wind turbines to gain a foothold in the distributed energy revolution currently being led by solar power. Sites with high average wind speeds generally allow lower LCOE, but the vast majority of Americans live and work within more moderate-wind-speed areas, so small turbines should be cost effective to buy and use within such areas.

Sonsight Wind's 3.5-kW horizontal-axis wind turbine (HAWT) is being developed to address these challenges.



Devon Rocky McIntosh, Sonsight president and CEO, and Brent Summerville, NREL technical monitor, enjoy a moment with the newly installed Sonsight prototype wind turbine. *Photo from Brent Summerville, NREL*

“Rooftop solar will play a critical role in combating climate change, and small wind turbines or wind-solar hybrid systems can be just as cost effective—or better—than rooftop solar alone while expanding energy generation diversity. Competitiveness Improvement Project funding has been critical in facilitating testing and system optimization for continued development of the Sonsight 3.5-kW prototype wind turbine.”

Devon Rocky McIntosh, president and CEO, Sonsight Wind

Project Outcomes and Deliverables

This CIP award will result in a prototype wind turbine that is ready for certification testing and permitting, with detailed manufacturing and commercialization plans.

- Specific deliverables include:
- Verifying power performance and design data
- Confirming turbine stability
- Performing safety and function tests
- Preparing the generator for Underwriters' Laboratories (UL) listing
- Preparing the controller for UL listing.

Project Approach

To demonstrate that a wind turbine smaller than 10-kW can be both viable and profitable, Sonsight Wind designed its 3.5-kW HAWT with a focus on reducing costs—in manufacturing as well as infrastructure and maintenance.

Design features include:

- **Lower-cost tower and foundation installations**—with the turbine using long blades (5-meter diameter rotor) with a patented high-torque permanent magnet generator for low rotations per minute (RPM) and thrust
- **Rotor blades and inverters sourced from high-volume manufacturers**—with a commercially produced solar power inverter adapted for wind energy
- **Low specific power (175 W per square-meters)**—for cost-effective use over a wide range of wind speeds
- Greater dependability—a low-RPM rotor with fully stall-regulated overspeed (generator-torque-induced) control and precise speed regulation
- **Low maintenance and a long turbine life**—a combination of a low-RPM rotor, low operating temperatures, and only two moving parts (a rotor shaft and yaw shaft)
- **Low noise**—thanks to a combination of inherently low-noise blades and a low-RPM rotor.

Project Collaborators

Current and future project partners include:

REInnovations—for field testing and UL-listing consulting

Project Financial Information

Award Amount: \$250,000

Awardee Share: \$63,538

Total: \$313,538

“Through the Competitiveness Improvement Project, Sonsight can move closer to its goal of manufacturing a certified and cost-competitive small-scale distributed wind turbine.”

Brent Summerville, NREL technical monitor

Prototype Testing Award

One of eight types of Competitiveness Improvement Project awards, Prototype Testing projects validate a prototype turbine to determine the commercial readiness of the turbine system. These results are intended to confirm that turbine designs are ready for certification testing.

About the Competitiveness Improvement Project

The U.S. Department of Energy's (DOE's) Competitiveness Improvement Project supports U.S. leadership in distributed wind technologies. Managed by NREL on behalf of DOE's Wind Energy Technologies Office, the Competitiveness Improvement Project 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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