U.S. DEPARTMENT OF ENERGY

Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

2021 PROJECT PEER REVIEW

U.S. DEPARTMENT OF ENERGY
WIND ENERGY TECHNOLOGIES OFFICE

NREL Transforming ENERGY

T40 - WETO.1.2.5.401 - Distributed Wind Strategic and Technical Engagement

Technology RD&T and Resource Characterization – Distributed Wind

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FY21 Peer Review - Project Overview

Project Summary:
This project supports key efforts to lower the cost, support the appropriate deployment and address improved the certification process for distributed wind, including:

- Providing actionable analysis and information on distributed wind technology and the market
- Ensuring that current standards balance reliability for consumers while allowing needed market innovation
- Expanding international collaboration on research and development
- Developing and providing information on distributed wind to key, primarily federal, energy stakeholders.

Project Start Year: FY 2019
Expected Completion Year: FY 2022
Total expected duration: 4 years

FY19 - FY20 Budget: $1,785,000

Key Project Personnel: Ian Baring-Gould (PI), Eric Lantz, Ben Sigrin, Kevin McCabe, Tyler Stehly, Robert Preus, Jeroen van Dam, Brent Summerville

Key DOE Personnel: Patrick Gilman and Bret Barker

Project Objectives 2019-2020:

- Complete several state-based market analyses, building on updates to the dWind analysis tool and the 2018 Futures document.
- Baseline and draft updated standards for turbines below 150kW peak.
- Implement a new International Energy Agency (IEA) Wind Technical Collaboration Program (TCP) Task aimed at enabling wind energy to compete in future distributed energy systems

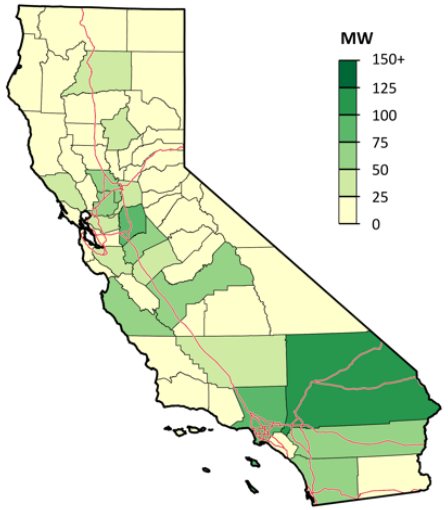
Overall Project Objectives (life of project):

- Provide distributed wind market research, data, and analysis to support WETO's and distributed wind goals.
- Reduce barriers through strategic and technical engagement.
- Update and align technical standards for distributed wind.

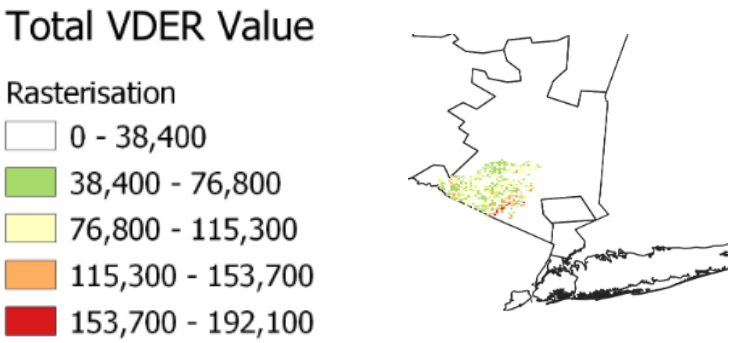
Project Impact – Analytical Modeling

Building on the dWind analysis tool that supported the 2016 Distributed Wind Futures Report, NREL has worked to expand analysis capabilities, leading to an improved articulation of market potential and location.

- Assessments of distributed wind market for Colorado, Minnesota, and New York identifying key market conditions in which the deployment of distributed wind should be the most successful.
- Assessment of the impact of time-of-use energy rates (upper right) provide expanded insight on market availability.
- Understanding the specific locational value of distributed energy resources provide even greater granularity for distributed wind siting (lower right)
- Making the dWind model publicly available supports external market research.



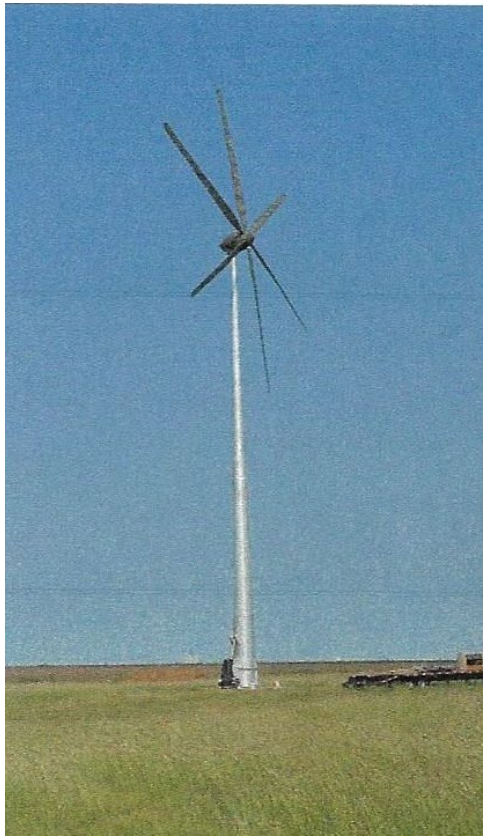
Economic Potential of distributed wind in 2030 as detailed in the California time-of-use dWind analysis.



More explicit locational analysis provides greatly expanded insight into the Value of Distributed Energy Resources (VDER) down to very high resolution, here focused on lower New York state and Long Island.

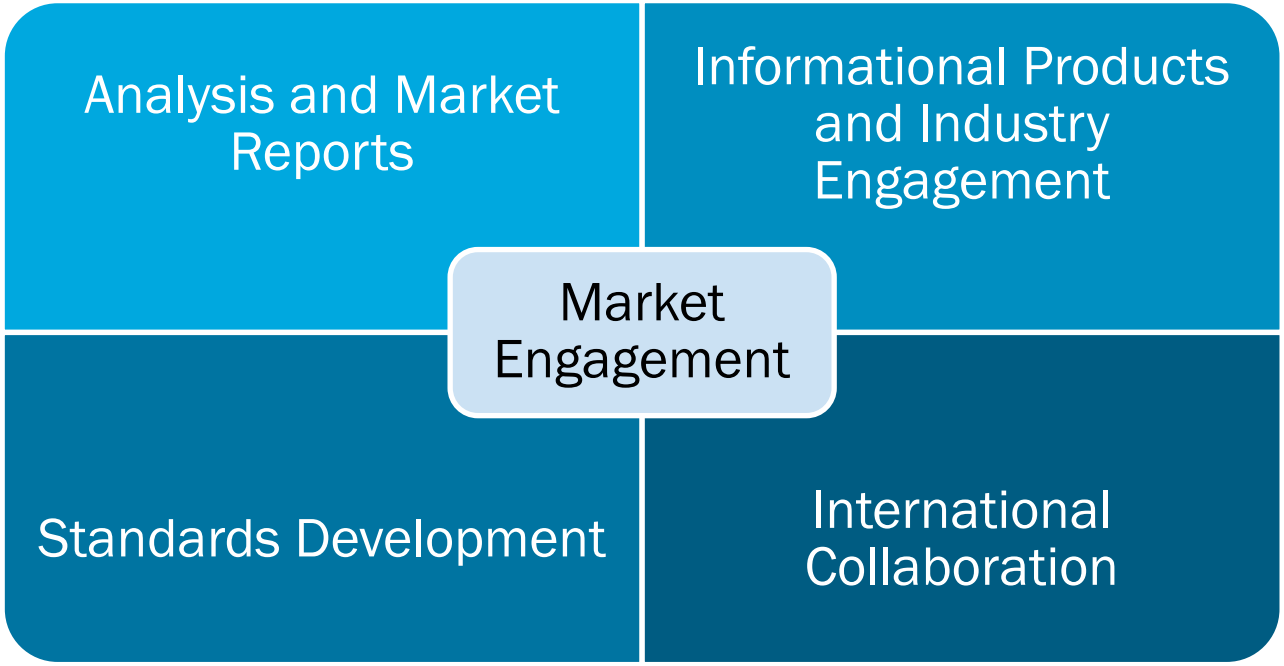
Project Impact – Update to US Standards

- The 2009 small wind standard (AWEA 9.1) was identified as a key barrier to wind turbine innovation and was forcing smaller turbines to certify to the IEC 61400-1 standard, a process with a cost in excess of $1M.
- To initiate the needed revision of the 2009 small turbine standard, NREL, working in conjunction with the Distributed Wind Energy Association, hosted a series of domestic standards forums, supported a systematic assessment of certification experience since 2009, and sponsored the development of a proposed draft which is expected to be accepted in 2021.
- Building international collaboration through the IEA Wind TCP Task 41, NREL is developing international research consensus of needed changes to the international small wind turbine standard, IEC 61400-2
- Concurrent with these efforts, NREL has provided active engagement with other international and national standards, such as IEEE, that impact distributed wind, providing important insight for the distributed wind industry.



The Star Wind 45kW, 6 bladed ultra low specific power wind turbine is the first to initiate testing to the new small wind turbine standard, saving significant certification costs.

Program Performance – Scope, Schedule, Execution



- Strategic Technical Engagement includes four primary organizational tracks, with most of them including work that is coordinated across the NREL work portfolios.
- Each project is implemented with a quarterly outline of efforts, publications, and outputs that were built around a four-year project plan.
- All substantial deliverables, milestones, and go/no-go decisions were completed on time and within budget.
- All publications undergo a peer review and typically have strong industry engagement.

Program Performance – Accomplishments & Progress

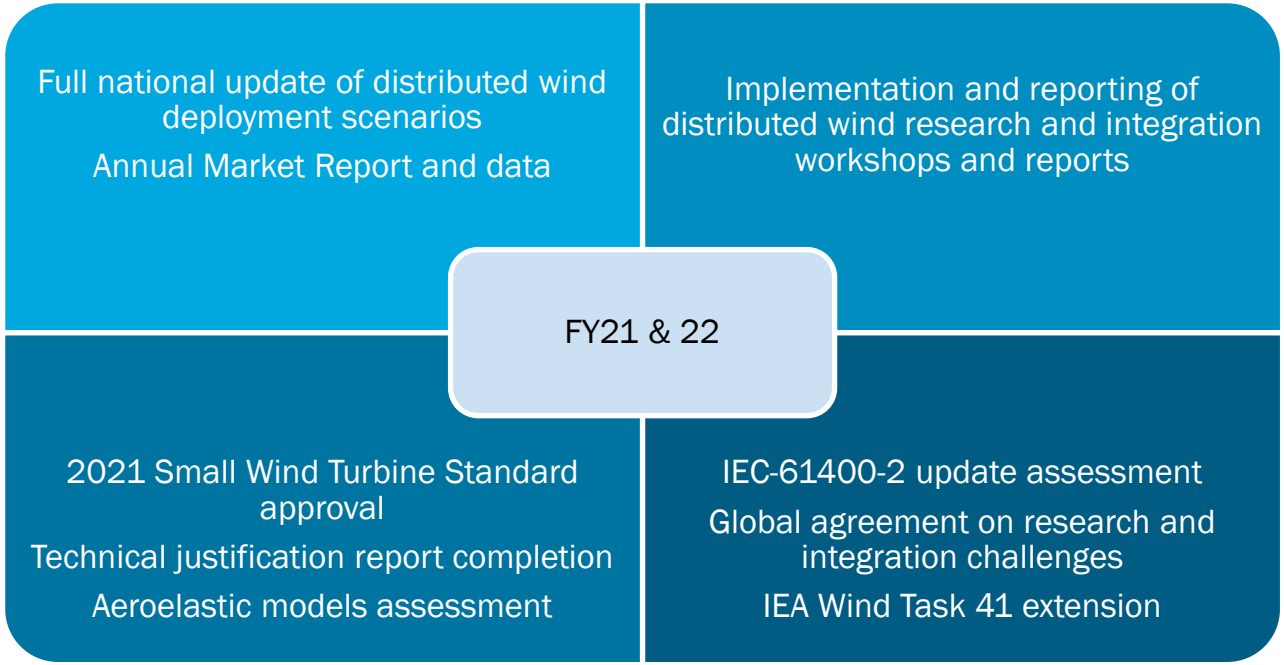
During 2019 and 2020, this project has made significant stakeholder engagement accomplishments, including:

- Published four significant technical or market reports.
- Hosted seven industry workshops, several virtually.
- Completed the work to update the decade-old Small Wind Turbine Standard, only the first of which could be done in person.
- Organized and chaired two distributed wind sessions at the North American Wind Energy Academy/WindTech conference.
- Formally initiated and co-lead the new international collaboration on distributed wind, IEA Task 41 with 11 participating nations
- Improved web, graphical, and print content to broaden the understanding of distributed wind.

February 2020. *SWT-1 Initial drafting* meeting. Denver, Colorado

Project Performance - Upcoming Activities

Important work will continue through 2022, building on work completed in the first two years of this technical effort in all four primary project areas.

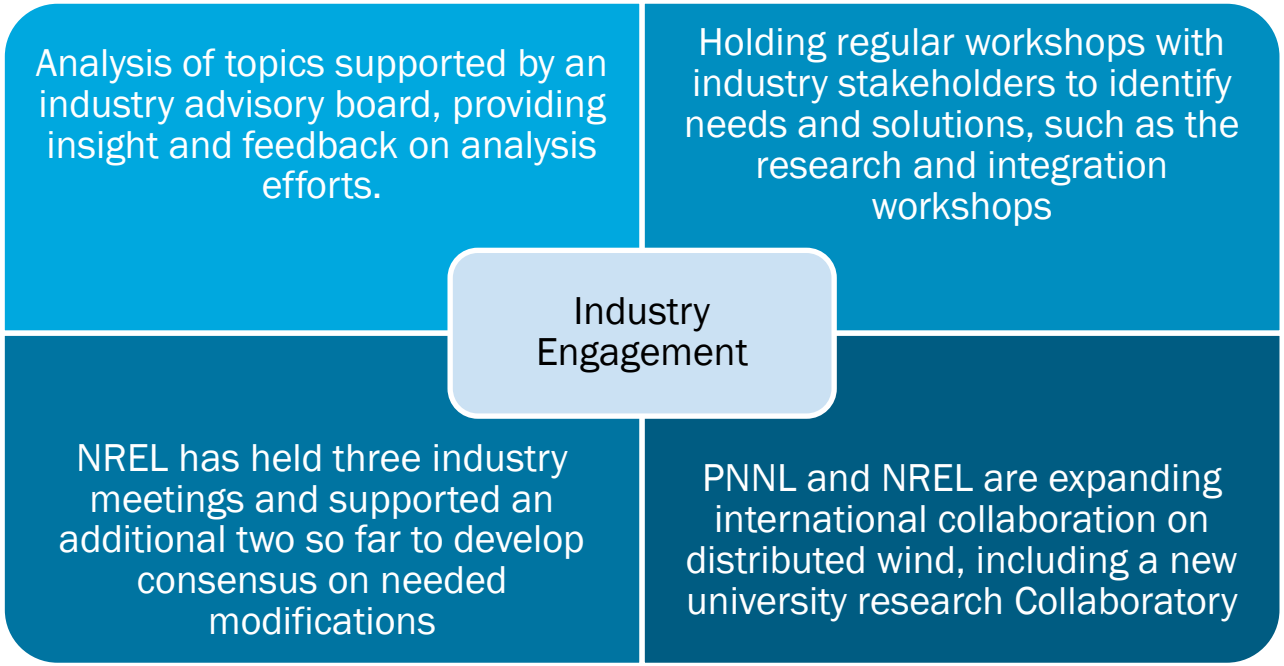


Noted significant planned publications:

- Distributed Wind Futures study update.
- The American Clean Power 2021 Small Wind Turbine Standard
- Assessment of existing distributed wind system topologies and aeroelastic capabilities to allow technology innovation and certification.

Stakeholder Engagement & Information Sharing

This project focuses extensively on industry and wider stakeholder engagement, building on a strategy that includes in-person and virtual workshops, annual forums at national conferences, international research collaborations through IEA Wind, and the engagment of industry advisory panels for significant research projects. Some specific efforts for each project area include:



Key Takeaways and Closing Remarks

Project Impact: Although the future role of distributed wind is not as well accepted as distributed solar, **distributed wind is currently cost competitive except at very small scales** and provides many additional benefits that this project works to articulate.

Project Performance: This project is responsible for producing many of the reports that **industry relies on to both understand and articulate current and future market potential.** This work is critical to the eventual success of the distributed wind industry.

Stakeholder Engagement: The project **works closely with the wider distributed wind community**, engaging actively with manufacturers, developers, researchers, and academia, both domestically and abroad.