July 2019

IEA Wind TCP Task 41

Distributed Wind
Task Overview

iea wind

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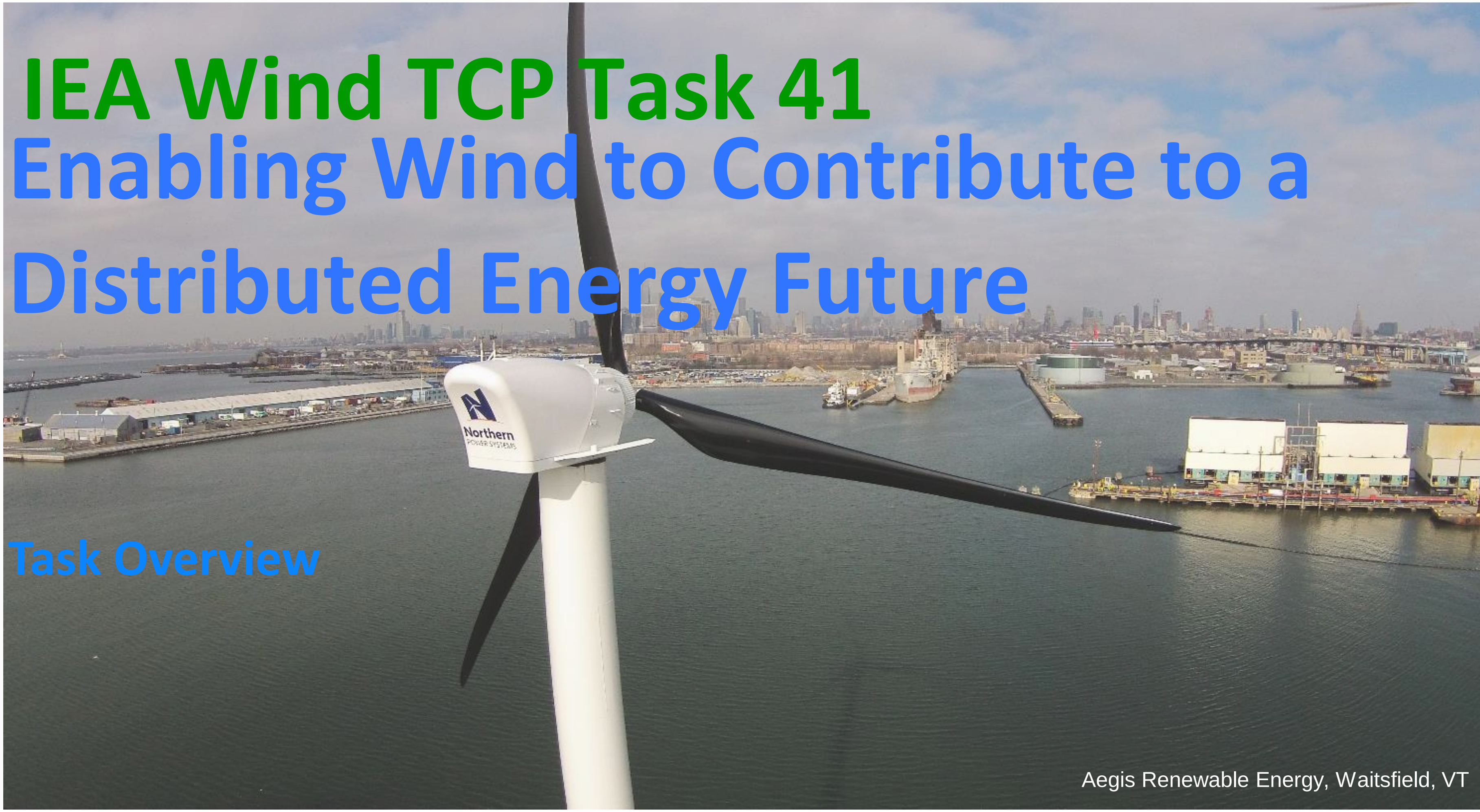
Enabling Wind to Contribute to a Distributed Energy Future

Task Overview



Aegis Renewable Energy, Waitsfield, VT

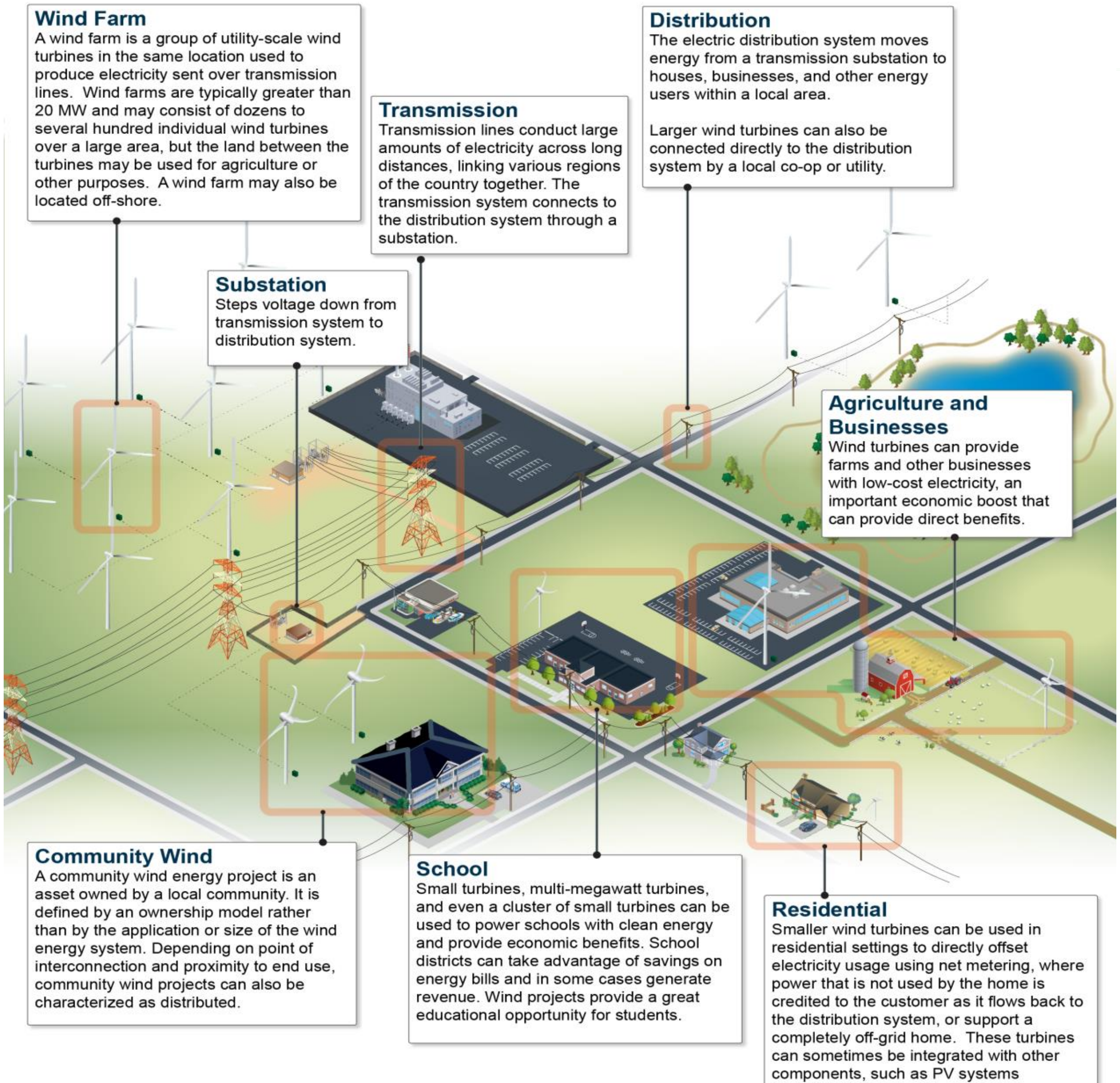
July 2019

The International Energy Agency
Cooperation in the Research, Development, and
Deployment of Wind Energy Systems

iea wind

PNNL-SA-144866

How Does Task 41 Define Distributed Wind?



Graphic: NREL / U.S. DOE

- Wind turbines connected at a distribution voltage (nominally 70 kV or lower) in a behind-the-meter, in-front-of-the-meter, or off-grid application.
- Distributed wind is inclusive of all sizes of wind turbines and is agnostic to business model.

Typical Distributed Wind Applications

Off Grid
Courtesy of NREL

Residential
Courtesy of Pika Energy

Wind energy technologies (of all size classes) are used as distributed energy resources on the distribution grid, on the customer side of the meter, or at an isolated off-grid location to support local loads or grid operations. Distributed wind systems are often used to self-generate power in remote communities or offset a portion of energy costs for grid-connected retail power customers.

Commercial
Courtesy of Patsy McEnroe

Industrial
Courtesy of Aegis Renewables

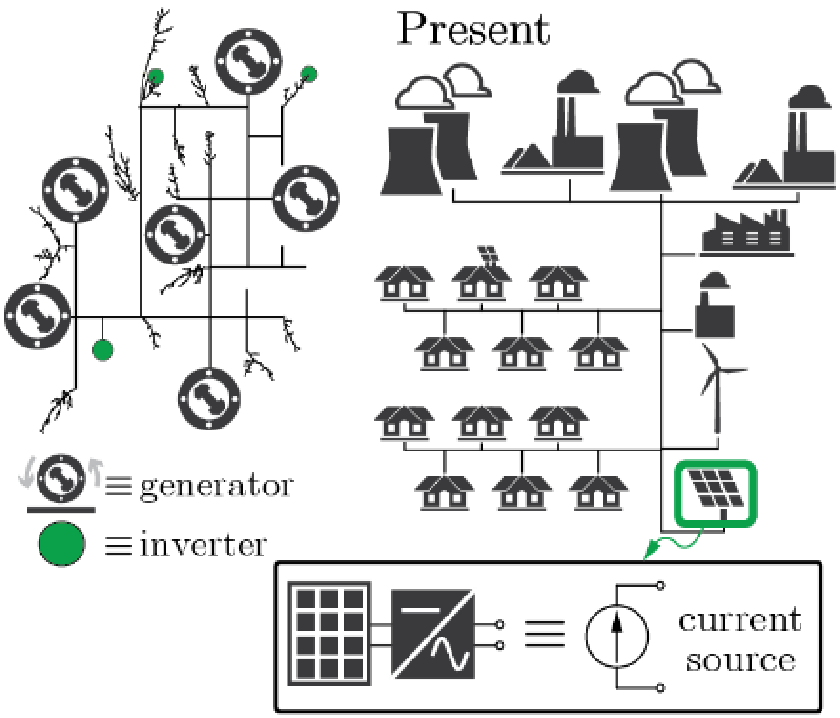
Task Motivation: Costs

- There have been large cost reductions in distributed energy resources, such as solar PV and energy storage, but limited cost reductions in turbine technologies less than 1 MW in size used in distributed and remote applications.

Task Motivation: Evolution of the Grid

- There are large potential distributed energy resource markets across the globe, particularly as grids evolve and the need for low-cost clean energy expands.
  - Distributed energy resources provide expanded grid diversity and resiliency.
  - There is expanded potential for distributed energy resources in areas of the world with weak transmission networks.
  - There is huge potential in energy access markets in developing nations (US$113 billion through 2030) and for isolated energy systems (micro-grids), both of which are currently dominated by solar PV.

Task Motivation: Evolution of the Grid



From grid-following controls

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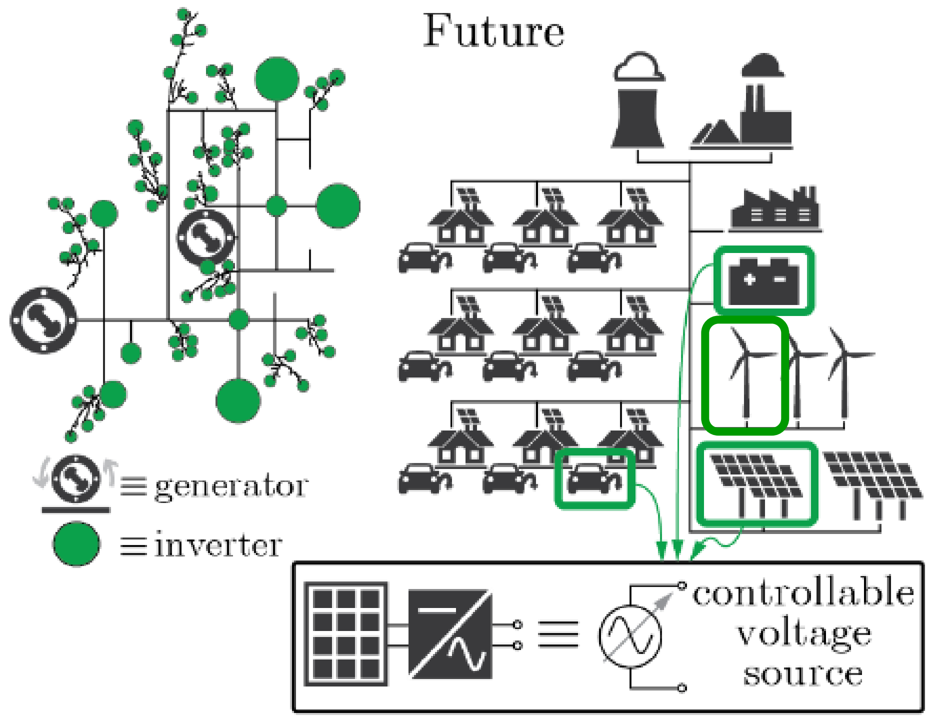


To next-generation grid-forming controls

The idea of what constitutes a grid is changing, especially in places with limited existing transmission infrastructure.

Task 41 Goals

- Enable wind technology as an economically competitive and reliable distributed energy resource option.
- Expand collaboration around and understanding of wind technologies as a distributed energy resource.

IEA Wind TCP Task 41 Work Packages

- WP1: Progressing Distributed Wind Technology Design Standards for Small and Mid-Size Wind Turbines
- WP2: Data Information Catalog
- WP3: Expand Learning and Support of the Integration of Distributed Wind into Evolving Electricity Systems
- WP4: Outreach and Collaboration with Other R&D Activities
- WP5: Innovation and Downscaling of Utility-Scale Technology

Work Package 1: Standards

Support distributed wind technology design standards for small and mid-size wind turbines to allow for accelerated innovation and improved consumer confidence

- Convene industry stakeholders to identify issues with current standards as they relate to small and mid-size turbines in distributed wind installations through forums in the United States, Europe, and Asia.
- Report on recommendations for potential changes to the existing standard IEC 61400-2.

Work Package 2: Data Catalog

Develop an information-sharing catalog for distributed wind research and data

- Identify potential data contributors and users; what shared resources are needed; what data are available on key topics; and recommended practices for data collection, reporting, accessing, and storage.
- Catalog and make available metadata about distributed wind data sets so researchers can contact data owners directly about using the data.
- Consider including a catalog of data processing tools and decision support tools.

Work Package 3: Integration

Work with distributed wind and distributed energy resources industry players to expand integration of wind into grid and off-grid power systems for expanded controllability, cybersecurity, and advanced grid services

- Develop a best practice guide for the design of isolated power systems.
- Report on state of the industry for isolated microgrid power systems.
- Research the value wind can provide in supporting high variable renewable grids.
- Review how wind is represented in distributed grid and microgrid systems tools and models.
- Summarize national and international electrical standards to support external standards development.

Work Package 4: Outreach and Collaboration

Support expanded collaboration with ongoing research efforts and with the wider distributed energy resources community

- Identify and engage with industry and government research efforts.
- Expand engagement with other distributed energy resources industries (PV, storage, grid) to expand understanding of wind, including in areas such as energy access, energy system resiliency, and community power.
- Help define and coordinate larger distributed wind research and encourage opportunities for research collaboration.
- Engage with other IEA tasks that can inform Task 41.

Work Package 5: Down-scaling

Expand collaboration and research on utility-scale technology innovation for applicability to reduce lifecycle costs of energy (LCOE) for small and mid-sized turbines

- Assess advances in cost reductions and performance enhancements at utility scale for application to small and mid-size wind turbine technology
- Summarize international LCOE cost reduction roadmaps
- Share LCOE reduction best practices and experiences

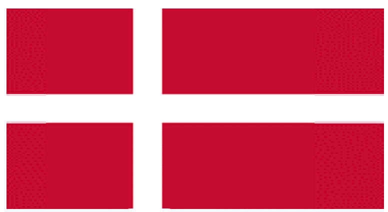
Participants

U.S. Department of Energy; National Renewable Energy Laboratory; Pacific Northwest National Laboratory

CIEMAT

Chinese Wind Energy Association, China General Certification; Goldwind; Inner Mongolia University of Technology

Natural Resources Canada



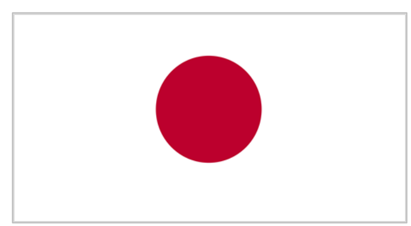
Denmark Technical University; Nordic Folkecenter for Renewable Energy

Dundalk Institute of Technology

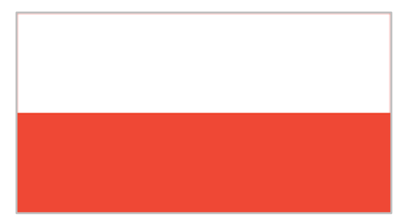
Korea Institute of Energy Research

Fachhochschule Technikum Wien

Vrije Universiteit Brussel



New Energy and Industrial Technology Development



Windtak

Thank You!

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