IEA Wind Task 41 Annual Progress Reports for IEA Wind TCP ExCo Meeting 85

Task 41: Enabling Wind to Contribute to a Distributed Energy Future

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Alice Orrell, Pacific Northwest National Laboratory
Ian Baring-Gould, National Renewable Energy Laboratory

1 Background and Goals

Task Description:

The purpose of IEA Wind TCP Task 41, "Enabling Wind to Contribute to a Distributed Energy Future," is to expand and coordinate international research on wind as a distributed energy resource to lower its costs and deployment barriers. While large-scale wind project costs have decreased over time, the distributed wind system costs have not seen this same decrease. Task 41 was initiated in January 2019 and will be completed in December 2022 to advance wind technology as a cost-effective and reliable distributed energy resource.

This task work plan is divided into five work packages (WPs):

1. **Standards**: Research to support development of design and testing guidelines for small and mid-sized wind turbines
2. **Data Catalog**: Create an information sharing platform for distributed wind research and data
3. **Integration**: Enable efficient and reliable integration of wind technology into evolving electricity systems
4. **Outreach and Collaboration**: Facilitate and coordinate distributed wind research with

other IEA tasks and international organizations

5. **Innovation and Downscaling of Large-Scale Wind Technology**: Apply advances of large-scale wind technology to smaller-scale wind technology

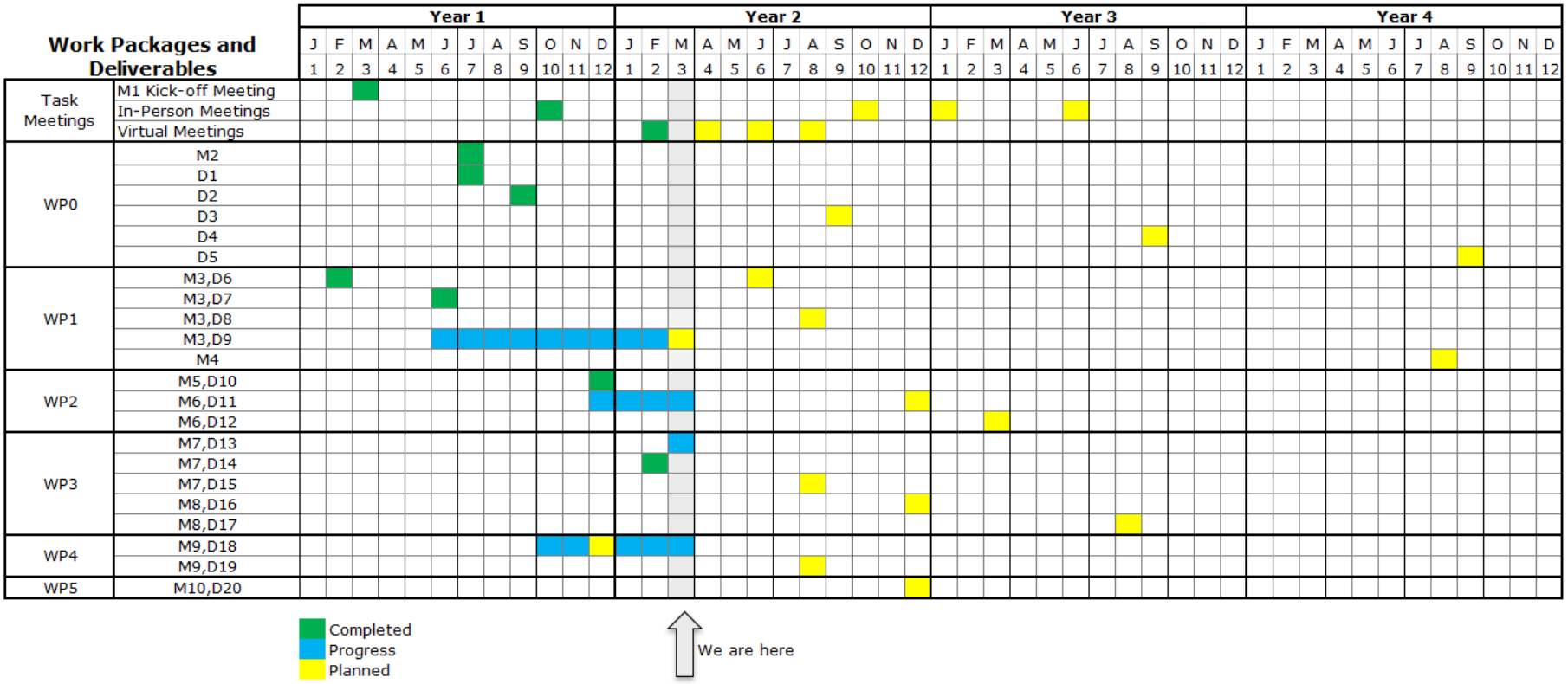
Task Time Plan and Milestones:

The milestones associated with each of these WPs, as well as the lead organizers and contributors, are shown in Table 1. The task schedule for milestones and deliverables is shown in Figure 1.

Table 1: Milestone Table: Work Plan Milestones, Contributors, and Due Dates

No.	Milestone	Milestone Description	Lead Organizations & Contributors	Milestone Due Date	Milestone Completion
WP0	M1	Project kick-off meeting.	Austria, China, Denmark, Ireland, Poland, South Korea, Spain, United States	Winter 2019	✓
	M2	Launch Task 41 web site	NREL, PNNL	Spring 2019	✓
WP1	M3	Wind turbine standards report	NREL	Winter 2020	In Progress Draft Available
	M4	Compendium of standards recommendations	NREL	Summer 2022	
WP2	M5	Specification of data sharing catalog	PNNL, ALL	December 2019	✓
	M6	Completion of initial implementation of DW data catalog	PNNL, ALL	December 2020	
WP3	M7	A review document of control and communication for advanced wind system integration	NREL	Summer 2020	
	M8	State of the industry report on isolated microgrid power systems	NREL	Fall 2021	
WP4	M9	Implementation of IEA Wind TCP task outreach and engagement plan	ALL	Fall 2019	In Progress Draft Available
WP5	M10	Report on downscaling opportunities for mid and small-scale wind turbines	CIEMAT	Fall 2020	

Figure 1 – Task 41 Schedule: Work Packages, Deliverables, Dates



Milestones for past 6 months:

- Milestone 3, Deliverable 9 - Report on recommendations for potential standards changes that will be used to drive additional international research – not achieved, in progress
- Milestone 5, Deliverable 10 – “Data Catalog Specification” – achieved
- Milestone 7, Deliverable 14 – “Distributed Wind Representation in Modeling and Simulation Tools: An Assessment of Existing Tools” – achieved
- Milestone 9, Deliverable 18 - Development of a specific task engagement plan – not achieved, in progress

2 Progress Toward Goals

Progress in WP1

Initial standards meetings in North America (Washington, DC; February 2019) and Europe (Dundalk, Ireland; June 2019) have been held. The China-hosted Asia standards meeting is delayed until August 2020. A second North American meeting is proposed for Summer 2020. A full standards research report (M3 D9) is delayed until after the Asia meeting and the current draft version is available on the task website for participants.

Progress in WP2

An initial data catalog specification report (M5 D10) was published in December 2019 that included a review of needs, catalog hosting options, metadata needs, and next steps. A follow-up meeting to discuss the next steps will be held in April 2020.

Progress in WP3

The summation of relevant international electrical standards (M7 D13) is a ‘living document’ of global distribution system requirements that will be improved and refined over time. The current version available on task website is as of March 2020.

In February 2020, PNNL published its “Distributed Wind Representation in Modeling and Simulation Tools: An Assessment of Existing Tools” report (M7 D14). The report assesses and characterizes how wind is included in modeling & simulation tools compared to how other distributed energy resources are modeled.

Progress in WP4

The task website is regularly updated. A task overview presentation is available on the website for participants' use. A fact sheet about the task was also completed and available on the website for participants and the general public. The in-person October 2019 task meeting was hosted by the Massachusetts Clean Energy Center's Wind Technology Testing Center. The engagement plan (M 9 D18) is in progress and will be discussed at a virtual meeting scheduled for June 2020.

Progress in WP5

An initial discussion about WP5 was held at the in-person October 2019 task meeting. A follow-up virtual meeting will be held in summer or fall 2020.

Recent Results

Non-proprietary technical information and results are as described above in the progress for each work package discussions.

3 List of Participants

Table 2 gives a list of Task 41 participants and their organizations.

Table 2 – Task 41 Participants

Country	Contacts	Organization
Austria	Mauro Peppoloni	University of Applied Sciences Technikum Wien
	Kurt Leonhartsberger	University of Applied Sciences Technikum Wien
Belgium	Mark Runacres	Vrije Universiteit Brussel
Canada	David Wood	University of Calgary
	Sergio Gualteros	Nergica
China	Jia Yan	Inner Mongolia University of Technology
	Charlie Dou	CWEA
	Li Yan	Goldwind China
	Bian Qiying	Chinese General Certification Center
Denmark	Tonny Brink	Nordic Folkecenter for Renewable Energy
	Anca Hansen	Technical University of Denmark
	Kaushik Das	Technical University of Denmark
	Tom Cronin	Technical University of Denmark
	Anna Maria Sempreviva	Technical University of Denmark
Germany	Immanuel Dorn	Enbreeze

	Sudheesh Sureshkumar	Enbreeze
Ireland	Raymond Byrne	Dundalk Institute of Technology
	Paul Mac Artain	Dundalk Institute of Technology
Italy	Francesco Castellani	University of Perugia
Poland	Maciej Karczewski	Windtak
	Piotr Domalgaski	Windtak
South Korea	Seokwoo Kim	Korea Institute of Energy Technology Evaluation and Planning
Spain	Ignacio Cruz	CIEMAT
	Luis Cano	CIEMAT
Taiwan	Chung-Chun (Wallace) Hsu	Taiwan SMWA, Advisor to TIER
United States	Robert Preus	NREL
	Jeroen van Dam	NREL
	Danielle Preziuso	PNNL
	Alice Orrell	PNNL
	Ian Baring-Gould	NREL
	Trudy Forsyth	Wind Advisors Team
	Bret Barker	DOE
	Sarah Barrows	Pacific Northwest National Laboratory

4 Statement of Accounts and Value of Contributions

Status of accounts

Operating Agent costs for PNNL and NREL are paid by the U.S. Department of Energy, therefore there are no revenues and cost of participating to report. The U.S. DOE operates on a fiscal year cycle.

Expenses:

Costs	Budget (Oct 2018-Sept 2020)	Actual to Date (Oct 2018-March 2020)
Labour		US$99,455
Travel		US$10,272
Other costs		US$641
TOTAL	US$150,000	US$110,368

Value of in-kind activities

Table 3 presents the estimated national in-kind labour person months per country. Individual labour hour estimates were provided by task participants. Assuming a labour hour value of US$200 per hour, 8 hours per day, 30 days per month, and a combined total of 17.4 person-months, the value of the in-kind labour is US$835,200 through March 2020.

Table 3: Estimated National In-Kind Labour Person Months

Country	In-Kind Labour Person-Months
Austria	1.0
Belgium	0.2
Canada	0.5
China	1.1
Denmark	1.3
Germany	0.5
Ireland	1.1
Italy	0.1
Poland	1.0
South Korea	0.4
Spain	0.9
Taiwan	0.4
United States	8.9

5 New Developments Since Last Report

Task 41 presented a progress report at ExCo 84 in September 2019. New developments since then (Year 1 Month 9) are tracked in Figure 1.

6 Future Milestones

Plans and Deliverables for the Coming Year

Table 4 lists all deliverables, showing their status and planned completion.

Table 4: Deliverables Table

No.	Deliverable	Deliverable Description	Lead Organizations & Contributors	Deliverable Due Date	Deliverable Completion
WP0	D1	Development of general IEA Task 41 and distributed wind PowerPoint presentation for use by members	NREL/PNNL	Spring 2019	✓
	D2	First annual progress report		Fall 2019	✓
	D3	Second annual progress report		Fall 2020	
	D4	Third annual progress report		Fall 2021	
	D5	Final Report		Fall 2022	
WP1	D6	Stakeholder forum to engage wind industry around the effectiveness or modifications of current standards for small and mid-sized turbines in the U.S.	NREL	Winter 2019	✓
	D7	Stakeholder forum to engage wind industry around the effectiveness or modifications of current standards for small and mid-sized turbines in the Europe	Austria, Denmark, Ireland, South Korea, Spain, Taiwan, United States, Germany	Summer 2019	✓
	D8	Stakeholder forum to engage wind industry around the effectiveness or modifications of current standards for small and mid-sized turbines in the Asia	NREL, China	Fall 2019	Delayed
	D9	Report on recommendations for potential standards changes that will be used to drive additional national and international research	NREL	Winter 2020	In Progress Draft Available
WP2	D10	Specification of a data sharing catalog; including a review of needs, what meta data should be collected, and potential options for hosting the catalog	PNNL, ALL	Fall 2019	✓
	D11	Development of data sharing, storage and if needed security protocols for meta data to be stored on the platform. Specification of a potential data sharing portal that expands on the catalog		Fall 2020	
	D12	Development of a data instruction guide for the DW data catalog		Spring 2021	
WP3	D13	Summation of relevant international and defined national electrical standards, operational practices that would be applicable to DW looking from the grid or microgrid perspective with a specific consideration of turbine size and complexity	China, Denmark, Germany, Ireland, Spain, United States	Fall 2019	In Progress
	D14	Based on initial work completed in the U.S., review how DW is modelled in distributed grid and microgrid systems, the availability of design tools and models and an assessment of the modeling methods used for wind energy	PNNL	Fall 2019	✓

	D15	Assessment of different levels of DW system control, including a classification for DW control strategies for high contribution distributed grids, including different capabilities of grid support and likely data needs for future wind systems	NREL	Summer 2020	
	D16	Design or best practice guide for the design of high renewable contribution isolated power systems	NREL	Fall 2020	
	D17	State of the industry report for isolated microgrid power systems	NREL	Fall 2021	
WP4	D18	Development of a specific IEA Wind TCP task engagement plan to be reviewed by Task. This will include DW focused research efforts that could be incorporated into future task proposals, allowing the specific consideration of DW topics within other IEA Wind TPC efforts	ALL	Fall 2019	In Progress Draft Available
	D19	Identification of specific, high priority non-IEA Wind TCP stakeholders that could be a source for additional targeted engagement		Summer 2020	In Progress
WP5	D20	Report on the potential opportunities for cost reductions in mid and small scale wind technology based on current LCOE lowering technology innovations being applied to large and offshore turbine technologies	CIEMAT	Fall 2020	

7 Detailed work plan for coming year

WP 1

- Delayed Asia International Standards Assessment Forum is planned for August 2020
- A second North American International Standards Assessment Forum is planned for Summer 2020
- The initial draft of distributed wind standards challenges will be finalized and research plans for high priority research topics, identifying and coordinating with potential national research programs, will be developed

WP 2

- The task will identify the appropriate online platform to host the distributed wind research and data catalog
- Virtual meeting scheduled for 14 April 2020.

WP 4

- Task participants will review and discuss the draft engagement plan
- The task will implement the engagement plan
- Virtual meeting scheduled for 9 June 2020
- Joint in-person meeting with Wind TCP Tasks 19 and 32 scheduled for October 2020 in Vienna

WP 5

- Develop list of initial downscaling concepts and circulate to universities as potential research projects

8 Publications, presentations, dissemination

Publications, presentations, dissemination

All publications and presentations are available to task participants on the task website, including a task overview presentation and fact sheet.

Participation in the Task meetings

In-person and virtual meeting participation has been strong.

Industry participation

Small wind turbine manufacturers, Eocycle Technologies Inc. (Canada) and Pecos Wind Power (USA), participated in October 2019 task meeting in Boston and the task will look for more ways to facilitate industry participation.