

Final report

1. Project details

Project title	IEA WIND DK-2021
File no.	64020-2008
Name of the funding scheme	EUDP
Project managing company / institution	DTU Vindenergi
CVR number (central business register)	30060946
Project partners	DTU Vindenergi
Submission date	18 March 2022

2. Summary

Describe the objectives of the project, the obtained results and how they will be utilized in the future.

The short description should be in two versions:

- *English version*
- *Danish version*

Each version should be brief, no more than 2000 characters (including spaces).

Summary

The IEA Wind DK-2021 aimed to increase the impact of IEA Wind EUDP funded activities in 2021, through increased visibility and dissemination within the Danish industry and research community. The project has supported the DEA participation in the IEA Wind TCP Executive Committee (ExCo), as well as the dissemination and networking activities related to IEA Wind. A key objective is to increase industry and research organizations' participation and benefits from IEA Wind research activities. The project has helped Danish companies accelerate time to market of innovative products and secure strategies of Danish research institutions to be in line with international trends as well as to bring Danish priorities into the IEA Wind agenda. The project has collected Danish research needs for DEA to propose new Research Tasks and Topical Expert Meetings within IEA Wind. The work will build on preparation and active engagement as Alternate member at the IEA Wind ExCo and in active IEA Wind Research Tasks with Danish participation during the project period from January 2021 to December 2021. Further with Danish contribution to IEA Wind Annual Report.

The project supports the DEA participation in the IEA Wind TCP Executive Committee (ExCo) in 2021, as well as the dissemination and networking activities related to IEA Wind. A key objective is to increase industry and research organizations participation and benefits from IEA Wind research activities. The project will help Danish companies accelerate time to market of innovative products and secure strategies of Danish research institutions to be in line with international trends as well as to bring Danish priorities into the IEA Wind agenda. The project aims to collect Danish research needs for DEA to propose new Research Tasks and Topical Expert Meetings within IEA Wind. The work will build on active engagement of Peter Hauge Madsen as Alternate member at the IEA Wind ExCo and in active coordination with IEA Wind Research Tasks with Danish participation during the project period January to December 2021, in collaboration with the DEA's Member and Alternate member of IEA Wind ExCo.

Opsummering

Formålet med IEA Wind DK-2021 er at øge effekten af IEA Winds EUDP støttede aktiviteter i Danmark ved styrket synlighed og kommunikation i den danske vindenergisektor. Projektet har understøttet Energistyrelsens deltagelse i IEA Wind TCP Executive Committee (ExCo) og styrket kommunikation og netværksaktiviteter i Danmark relateret til IEA Wind. Aktiviteterne har særligt støtte projektets målsætning om at øge antallet af virksomheder og forskningsinstitutioner, som anvender IEA Winds forskningsaktiviteter. Projektet har bidraget til at accelerere time-to-market for danske virksomheders produkter og sikret, at danske forskningsinstitutioners strategier er i tråd med internationale trends og har bragt danske prioriteringer på IEA Wind dagsordenen. Projektet har indsamlet danske virksomheders og forskningsinstitutioners prioriteter for fremtidige IEA Wind Research Tasks og specialismøder. Arbejdet er sket ved aktiv deltagelse som Alternate i IEA Wind ExCo møder samt i IEA Wind Research Tasks med dansk deltagelse i projektperioden januar til december 2020. Yderligere med dansk bidrag til IEA Wind Annual Report.

Projektet understøtter Energistyrelsens deltagelse i IEA Wind TCP Executive Committee (ExCo) i 2021 og styrker kommunikation og netværksaktiviteter i Danmark relateret til IEA Wind. Aktiviteterne skal særligt støtte projektets målsætning om at øge antallet af virksomheder og forskningsinstitutioner, som anvender IEA Winds forskningsaktiviteter. Projektet vil bidrage til at accelerere time-to-market for danske virksomheders produkter og sikre at danske forskningsinstitutioners strategier er i tråd med internationale trends og bringe danske prioriteringer på IEA Wind dagsordenen. Projektet indsamler virksomheders og forskningsinstitutioners prioriteter for fremtidige IEA Wind Research Tasks og specialismøder. Arbejdet sker ved Peter Hauge Madsens aktive deltagelse som Alternate i IEA Wind ExCo møder samt i dialog med IEA Wind Research Tasks med dansk deltagelse i projektperioden januar til december 2021, i samarbejde med Energistyrelsens medlem og alternate af IEA Wind ExCo et webinar om dansk deltagelse i IEA Wind Tasks.

3. Project objectives

- *What was the objective of the project?*
- *Which energy technology has been developed and demonstrated?*

Objectives

- To maximize the dissemination of IEA Wind TCP research results within Denmark to facilitate Danish industry to take the lead in adopting and implementing innovative technology developed within IEA Wind TCP.
- To increase the visibility and awareness of IEA Wind activities in Denmark beyond the participants in the Research Tasks.

- To bring IEA Wind closer to Danish industry - multinational companies, as well as small and medium enterprises (SMEs) - so they can make use of IEA Wind for their innovative products to reach the international market quicker and more effectively.
- At the end of 2021, there were 23 active Research Tasks in the IEA Wind TCP, and Denmark is participating in 16 of them.
- To assist and facilitate meetings and activities, which have included a review of the meeting agenda and meeting material at the ExCo meetings in May and November with focus on Danish views as well as preparation of the Danish contribution to IEA Wind's annual report 2020.

This project focuses on all wind power related technologies that IEA Wind develops during the year 2021. The project will help big and small Danish industry players, as well as the Danish research community to benefit from the opportunities that IEA Wind brings for identifying and incorporating latest research and innovations into their products to achieve TRL9 and to reach the market internationally. IEA Wind TCP Research Tasks cover a wide variety of technologies. At the end of 2021, there were 23 active Research Tasks, and Denmark is participating in 16 of them. The topics include technical research in areas like Lidar, noise, grid integration, modelling of offshore structures and wakes, cold climates, testing, forecasting as well as non-technological Tasks on cost of energy and social acceptance. IEA Wind Research Tasks include the development of recommended practices, guidelines and technical reports as the main tools to communicate the research results within the wind energy sector. The technologies addressed in the Research Tasks are in different stages of maturity, but IEA Wind typically focuses on high TRL levels. Most IEA Wind Recommended practices are pre-standardization work based on mature technology (TRL 7-9), but not fully adopted by the market. Participation in IEA Wind Tasks is consequently an important opportunity to support and influence international consensus about how to use new technology and to update standards accordingly. Market acceptance of the research results depends on the adoption and utilization of the IEA Wind recommended practices and technical documents. This project aims at maximizing the dissemination of IEA Wind research results within Denmark to facilitate Danish industry to take the lead in adopting and implementing innovative technology developed within IEA Wind. With this project, some of the IEA Wind research results will go from TRL 9 to the full implementation in the market by increasing the visibility and awareness of IEA Wind activities in Denmark beyond the participants in the Research Tasks. At the same time, IEA Wind is an excellent framework to help new technologies mature and to have international visibility. Importantly, this project will bring IEA Wind closer to Danish industry - multinational companies, as well as small and medium enterprises (SMEs) - so they can make use of IEA Wind for their innovative products to reach the international market quicker and more effectively. The project process has largely been as planned. The activities have been planning meetings with the Danish IEA TCP ExCo member Karina Remler and Alternate Mette Schultz Jessen as well as Alternate Peter Hauge Madsen and the IEA Wind TCP Secretariat (Ignacio Martí, Kirstine Dahlgaard, Dennis Wettergren and Charlotte Hede Linde). Meetings and activities have included a review of the meeting agenda and meeting material at the ExCo meetings in May and November with focus on Danish views as well as preparation of the Danish contribution to IEA Wind's annual report 2020, which was sent to the Danish Energy Agency for approval in May 2021. The hourly consumption has been more or less as budgeted. Budgeted travel expenses are not deductible due to the Covid-19 situation.

4. Project implementation

- *How did the project evolve?*
- *Describe the risks associated with conducting the project.*
- *Did the project implementation develop as foreseen and according to milestones agreed upon?*

- *Did the project experience problems not expected?*

The planned milestones and deliverables listed below have been achieved. Dissemination of IEA Wind Annual Report 2020 with Danish country part and the two ExCo meetings in 2021 have been on IEA Wind website. In coming years it should be considered to use more channels i.e. the DEA website.

•M1 – DEA approved Danish Annual Report 2020 sent to IEA TCP Wind Secretariat to be included in IEA TCP Wind Annual Report 2020. •M2 – Preparation, DEA advising and participation in IEA Wind ExCo meeting spring 2021 •M3 – Preparation, DEA advising and participation in IEA Wind ExCo meeting fall 2021. •D1.1 Participation in IEA Wind ExCo 87 meeting online 17-20 May 2021 and IEA Wind ExCo 87 meeting online 9-12 November 2021 •D1.2 Danish contribution/country chapter to IEA Wind Annual Report 2020.

The planned milestone and deliverable listed below have not been achieved. An online IEA Wind TCP webinar for IEA Wind TCP Research Tasks run by Danish project managers was planned for November/December, 2021, but was cancelled due to other conflicting wind energy events, i.e. Electric City 2021. In coming years, it should be considered to plan an online webinar earlier in the year, rather than at the end of the year.

•M4 - IEA Wind event 2021 – online webinar. •D2.1 Webinar about Danish participation in IEA Wind Tasks.

Documentation is added as appendices.

5. Project results

- *Was the original objective of the project obtained? If not, explain which obstacles that caused it and which changes that were made to project plan to mitigate the obstacles.*
- *Describe the obtained technological results. Did the project produce results not expected?*
- *Describe the obtained commercial results. Did the project produce results not expected?*
- *Target group and added value for users: Who should the solutions/technologies be sold to (target group)? Describe for each solutions/technology if several.*
- *Where and how have the project results been disseminated? Specify which conferences, journals, etc. where the project has been disseminated.*

6. Utilisation of project results

- *Describe how the obtained technological results will be utilised in the future and by whom.*
- *Describe how the obtained commercial results will be utilised in the future and by whom the results will be commercialised.*
 - *Did the project so far lead to increased turnover, exports, employment and additional private investments? Do the project partners expect that the project results in increased turnover, exports, employment and additional private investments?*
- *Describe the competitive situation in the market you expect to enter.*
 - *Are there competing solutions on the market? Specify who the main competitors are and describe their solutions.*
- *Describe entry or sales barriers and how these are expected to be overcome.*
- *How does the project results contribute to realise energy policy objectives?*

- *If Ph.D.'s have been part of the project, it must be described how the results from the project are used in teaching and other dissemination activities.*

Results

The project has supported the Danish work in IEA Wind and the project results will indirectly be utilized by Danish companies and research institutions. The project will help to accelerate time to market of new products and services for wind energy, which will contribute to make wind energy more cost effective, as well as to remove barriers for large-scale deployment of wind energy. By connecting more Danish stakeholders with IEA Wind, more Danish innovations and new wind energy products will reach the market sooner. This will facilitate and accelerate Denmark's transition to green energy, contributing to the objective of making Denmark independent of fossil fuels by 2050. In the same context, the project has contributed to a faster development of wind energy technology leading to a larger deployment of wind energy. This leads to further reductions of CO₂ emissions, contributing to the policies on climate change mitigation. IEA Wind includes in its Strategic Plan cost reduction as a key driver for the research activities. In this context, increasing the impact of IEA Wind research outcomes in Denmark will contribute to reduce cost of wind energy. On the other hand, this project will also help Danish research focused on cost reductions for wind energy to utilize IEA Wind opportunities to accelerate time to market, which will create further possibilities for cost of energy reductions. This project has indirectly supported Danish companies to adopt quickly and effectively to recommendations from IEA Wind (i.e. using effectively new technology like LIDAR's for offshore wind, measuring reliability, how to plan wind farms in cold climate etc., which will create a competitive advantage that can help the Danish sector to stay ahead of competitors. Maintaining technological leadership of the Danish wind energy sector will help to maintain and create employment in Denmark across the wind energy value chain. Since IEA Wind impact is international, a better use of IEA Wind potential will also help Danish companies to export innovative solutions internationally.

7. Project conclusion and perspective

- *State the conclusions made in the project.*
- *What are the next steps for the developed technology?*
- *Put into perspective how the project results may influence future development*

Perspective

Alternate member to the ExCo, Peter Hauge Madsen, and DTU staff from the IEA Wind Secretariat have been in close cooperation with the DEA/EUDP ExCo members Karina Remler and Mette Schultz Jessen during 2021. The planned and agreed tasks and milestones are fulfilled. A new application as Alternate for the year 2022-2023 was submitted and granted in December 2021. The maximizing and consolidating of the Danish work in IEA Wind can continue for the benefit of companies and research institutions.

8. Appendices

- Add link to relevant documents, publications, home pages etc.

- 1) Minutes ExCo 87 (attached pdf)
- 2) Danish presentation ExCo 87 (attached pdf)
- 3) Minutes ExCo 88 (attached pdf)
- 4) IEA Wind TCP 2020 Annual Report (attached as pdf)
- 5) Danish Country Chapter 2020 Annual Report (also attached as pdf)
- 6) Electric City 2021 agenda (<https://windeurope.org/ElectricCity2021/conference/programme/>)