

IEA Wind Task 36 Forecasting for Wind Power



FORECASTING FOR YOU

Setup

Wind power forecasts have been used operatively for over 25 years. Despite this fact, there are still several possibilities to improve the forecasts, both from the weather prediction side and from the usage of the forecasts.

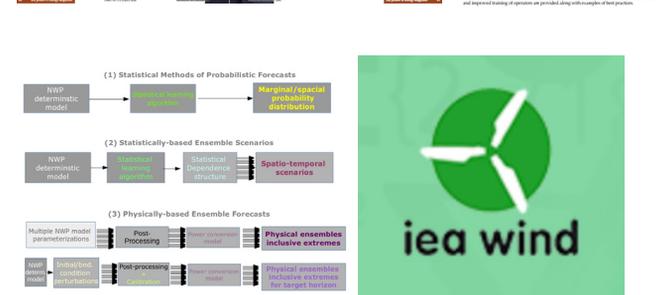
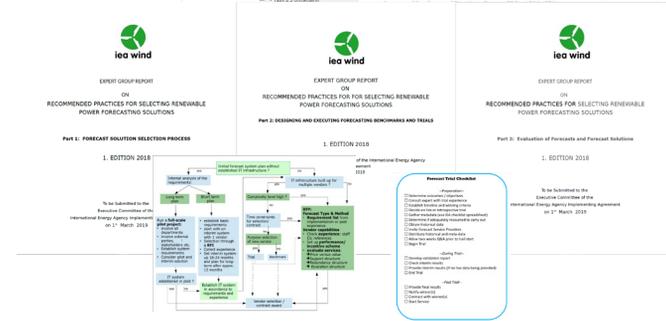
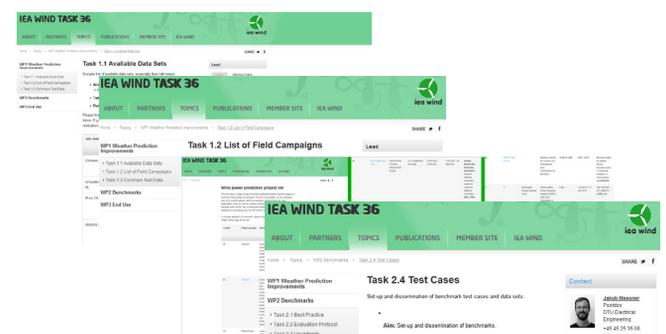
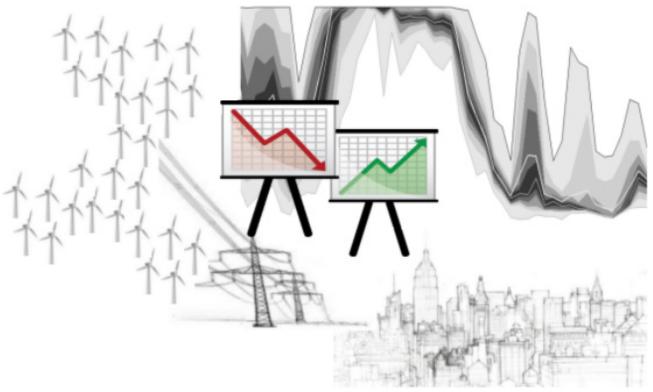
The IEA Wind Task is divided in three work packages: Firstly, a collaboration on the improvement of the scientific basis for the **wind predictions** themselves. This includes numerical weather prediction model physics, but also widely distributed information on accessible datasets. Secondly, we deal with the **conversion to power** and issues affecting the forecast vendors. Thirdly, we will be engaging end users aiming at dissemination of the best practice in the usage of wind power predictions. The Task is currently in its second phase, 2019-2021.

Results of phase I (2016-2018)

We developed an **information portal**, with links to data, projects and knowledge useful for wind power forecasting. This could be a list of tall masts useful for online validation of NWP models, a list of field campaigns with open data for model verification, or a selection of benchmarks for forecasts with established data sources and existing reference frameworks.

A major result was the IEA Wind Recommended Practice (RP) on **Forecast Solution Selection**, detailing out the necessary steps to get the best adapted forecasts for the individual use case. The RP starts with the initial deliberations which might or might not end up with the decision to do a forecast trial. The second document shows how to conduct such a trial in order to yield acceptable and usable results for both the end user and the participating vendor. The last part shows how to evaluate the trial to get 1) significant, 2) representative and 3) reliable results.

For **probabilistic forecasts**, we published two papers with an overview (for a broader readership) and one with a long list of specific use cases (more technically oriented). We also classified methods for uncertainty forecasting, and tried to establish a common vocabulary. We also mapped the current use of probabilistic forecasts through a questionnaire.

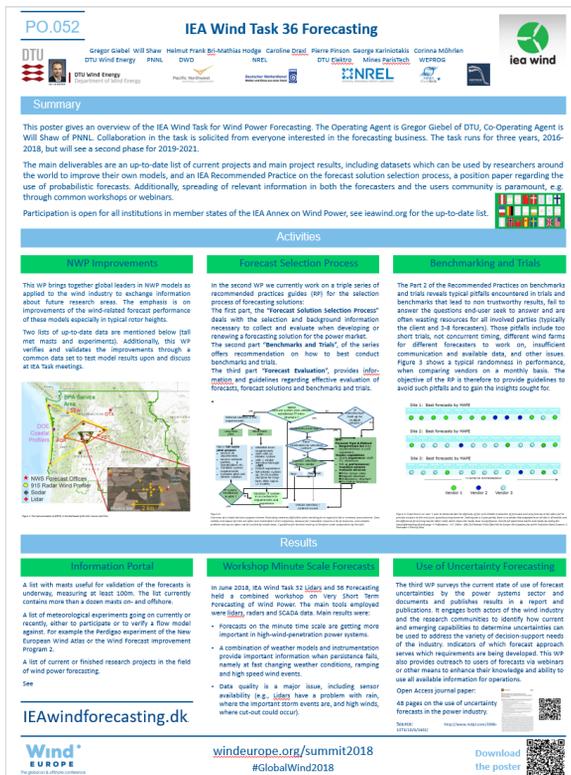


Impact

The Task sends out **news** a few times a year, is present on conferences and meetings, and has its own **YouTube** channel. There, alongside video transmissions of the public workshops, we also had 4 **webinars** of half an hour talks plus audience questions on the major results of phase I. The fourth one was an additional one on forecast use in Denmark.

The Task members also try to get a enhance **collaboration** between weather prediction providers and vendors, and between vendors and end users. One activity for the current phase of the Task (2019-2021) is a look into **standardization** of data, to make data exchange more fluent across the industry. Another activity is to estimate the **value** of better forecasting.

We also collaborate with other Wind Tasks, e.g. in the common workshop on minute scale forecasting we had together with Task 32 **Lidar**. In the future, we will also collaborate with IEA PV Task 16 **Solar** resource, which also deals with forecasting and has some of the same issues.

PO.052 IEA Wind Task 36 Forecasting

Summary

This poster gives an overview of the IEA Wind Task for Wind Power Forecasting. The Operating Agent is Gregor Giebel of DTU. Co-Operating Agent is Will Shaw of PNNL. Collaboration in the task is solicited from everyone interested in the forecasting business. The task runs for three years, 2016-2018, but will see a second phase for 2019-2021.

Activities

- NWP Improvements:** This WP brings together global leaders in NWP models as applied to the wind industry to exchange information about future research areas. The emphasis is on improvements of the wind-related forecast performance of these models especially in typical error regimes. Two lists of up-to-date data are mentioned below (all net mast and experiments). Additionally, this WP verifies and validates the improvements through a common data set to test model results upon and discuss at task meetings.
- Forecast Selection Process:** In the second WP we currently work on a triple series of recommended practices guide (RP) for the selection process of forecasting solutions. The first part, the "Forecast Solution Selection Process" deals with the selection and background information necessary to collect and evaluate when developing or renewing a forecasting solution for the power market. The second part "Benchmarks and Trials" of the series offers recommendation on how to best conduct benchmarks and trials. The third part "Forecast Evaluation" provides information and guidelines regarding effective evaluation of forecasts, forecast solutions and benchmarks and trials.
- Benchmarking and Trials:** The Part 2 of the Recommended Practices on benchmarks and trials reveals typical pitfalls encountered in trials and benchmarks that lead to non-transparent results, fail to answer the questions end-user seek to answer and are often wasting resources for all involved parties. Specifically the client and 3-4 forecasters. Those pitfalls include too short trials, not concurrent timing, different wind farms for different forecasters to work on, insufficient communication and available data, and other issues. Figure 3 shows a typical randomness in performance, when comparing vendors on a monthly basis. The objective of the RP is therefore to provide guidelines to avoid such pitfalls and to gain the insights sought for.

Results

- Information Portal:** A list with mast useful for validation of the forecasts is underway, measuring at least 200m. The list currently contains more than a dozen masts on- and offshore. A list of meteorological experiments going on currently or recently, either to participate or to verify a flow model against. For example the Herlega experiment of the new European wind atlas or the wind forecast improvement program 2. A list of current or finished research projects in the field of wind power forecasting.
- Workshop Minute Scale Forecasting:** In June 2018, IEA Wind Task 32 Lidar and 36 Forecasting held a combined workshop on Very Short Term Forecasting of Wind Power. The main topics employed were Lidar, reflow and SCADA data. Main results were:
 - Forecast on the minute time scale are getting more important in high-wind-generation power systems.
 - A combination of weather models and instrumentation provide important information when persistence fails, namely at fast changing weather conditions, ranging and high speed wind events.
 - Data quality is a major issue, including sensor availability (e.g., Lidar have a problem with rain, where the important storm events are), and high winds, where cut-out could occur.
- Use of Uncertainty Forecasting:** The third WP surveys the current state of use of forecast uncertainty by the power systems sector and documents and publishes results in a report and publications. It engages both sectors of the wind industry and the research communities to identify how current and emerging capabilities to determine uncertainties can be used to address the variety of decision support needs of the industry. Indicators of which forecast approach serves which requirements are being developed. This WP also provides outreach to users of forecasts via webinars or other means to enhance their knowledge and ability to use all available information for operations. Open access journal paper: 45 pages on the use of uncertainty forecasts in the power industry.

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Collaboration



Currently, some 250 people from 12 countries are collaborating on forecasts. There are meetings every half year, often in conjunction with relevant conferences. We also have special sessions at conferences for outreach, and usually an overview poster. If you are **interested** to collaborate, or just to be informed about new results, please contact Gregor Giebel.

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The **International Energy Agency** is an autonomous organisation which works to ensure reliable, affordable and clean energy for its 30 member countries and beyond.
The **IEA Wind Technology Collaboration Programme** supports the work of 38 independent, international groups of experts that enable governments and industries from around the world to lead programmes and projects on a wide range of energy technologies and related issues.
IEA Wind Task 36 connects 250 experts from academia, forecast vendors and end users to improve the accuracy and value of wind power forecasts.

