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IEA Wind Task 36 Forecasting

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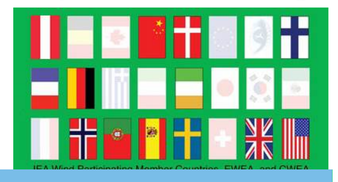
Summary

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.

The main deliverables are an up-to-date list of current projects and main project results, including datasets which can be used by researchers around the world to improve their own models, and an IEA Recommended Practice on the forecast solution selection process, a position paper regarding the use of probabilistic forecasts. Additionally, spreading of relevant information in both the forecasters and the users community is paramount, e.g. through common workshops or webinars.

Participation is open for all institutions in member states of the IEA Annex on Wind Power, see ieawind.org for the up-to-date list.



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 rotor heights.

Two lists of up-to-date data are mentioned below (tall met masts and experiments). Additionally, this WP verifies and validates the improvements through a common data set to test model results upon and discuss at IEA Task meetings.

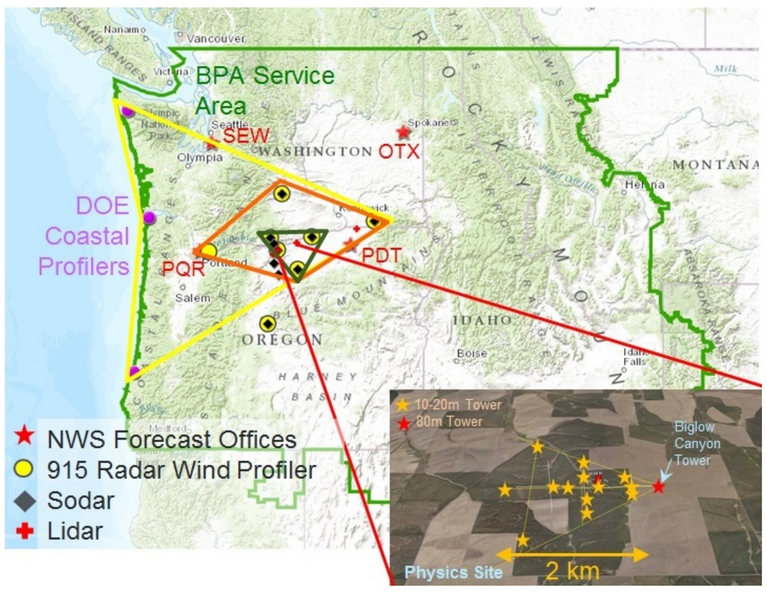


Figure 1: The instrumentation of WFIP2, in the Northwest of the USA. Source: Joel Cline.

A list with masts useful for validation of the forecasts is underway, measuring at least 100m. 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 Perdigao 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.

See

IEAwindforecasting.dk.

Forecast Selection Process

In the second WP we currently work on a triple series of recommended practices guides (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.

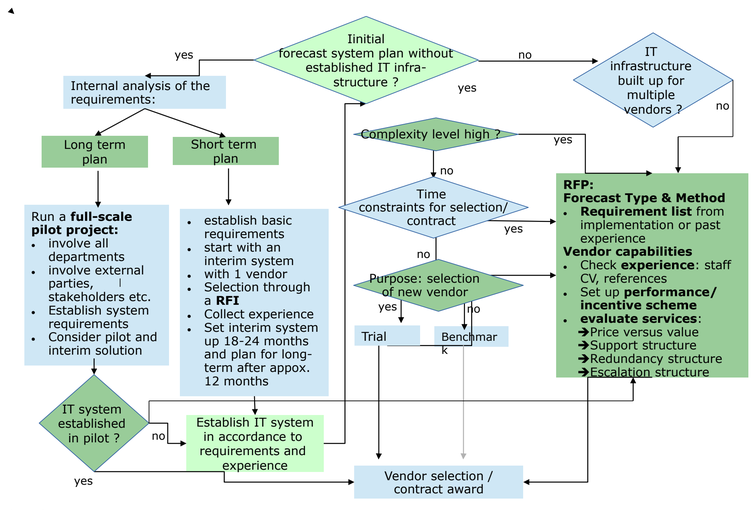


Figure 2:
Overview of a simple decision support scheme illustrating common difficulties when deciding for or against trials or common procurements. Cost, validity and output of trials are often over estimated In their usefulness, because fair evaluation requires a lot of resources, and complex problem solving can often not be verified by simple tests. A guideline for decision making is therefore under preparation by the task.

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 trustworthy results, fail to answer the questions end-user seek to answer and are often wasting resources for all involved parties (typically the client and 3-8 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.

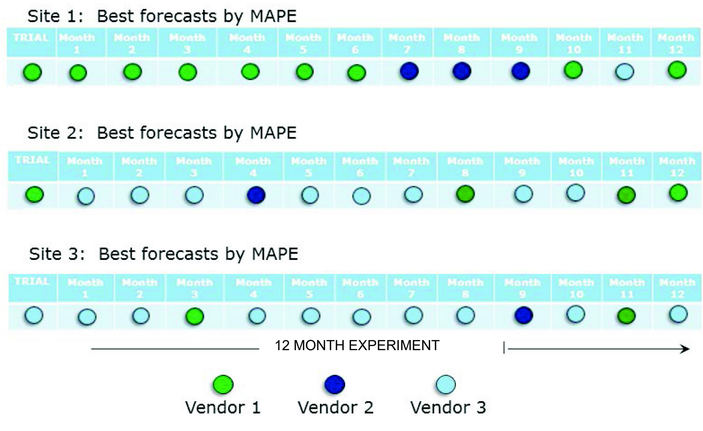


Figure 3: Experiment run over 1 year to demonstrate the difficulty of fair and reliable evaluation of forecasts and why forecast trials often fail to provide answers to the end-users questions/requirements. Looking over a 1-year period, there is no vendor that outperforms on all sites in all months and the differences for winning may be rather small, which means the results have no significance. See the full experiment outline and results by visiting the ieawindforecasting.dk web page → Publications → C. Collier: Why Do Forecast Trials Often Fail to Answer the Questions for which End-Users Need Answers: A Forecaster's Point of View

Results

Information Portal

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Workshop Minute Scale Forecasts

In June 2018, IEA Wind Task 32 Lidars and 36 Forecasting held a combined workshop on Very Short Term Forecasting of Wind Power. The main tools employed were lidars, radars and SCADA data. Main results were:

- Forecasts on the minute time scale are getting more important in high-wind-penetration power systems.
- A combination of weather models and instrumentation provide important information when persistence fails, namely at fast changing weather conditions, ramping and high speed wind events.
- Data quality is a major issue, including sensor availability (e.g., Lidars 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 uncertainties by the power systems sector and documents and publishes results in a report and publications. It engages both actors 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:

48 pages on the use of uncertainty forecasts in the power industry.

Source: http://www.mdpi.com/1996-1073/10/9/1402/

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