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The new IEA Wind Task 36 on Wind Power Forecasting

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The new IEA Wind Task 36 on Wind Power Forecasting

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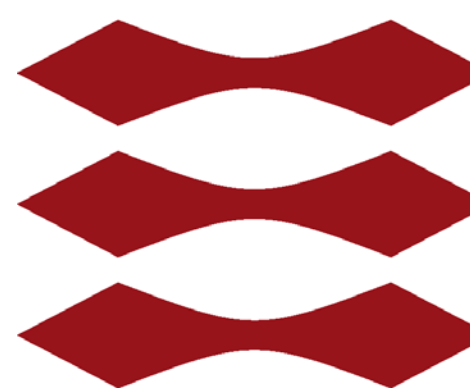**Will Shaw** PNNL
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U.S. DEPARTMENT OF ENERGY | Office of Science

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Abstract

Wind power forecasts have been used operatively for over 20 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 new International Energy Agency (IEA) Task on Forecasting for Wind Energy tries to organise international collaboration, among national weather centres with an interest and/or large projects on wind forecast improvements (NOAA, DWD, …), operational forecaster and forecast users.

The 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 will be aiming at an international pre-standard (an IEA Recommended Practice) on benchmarking and comparing wind power forecasts, including probabilistic forecasts. This WP will also organise benchmarks, in cooperation with the IEA Task WakeBench. Thirdly, we will be engaging end users aiming at dissemination of the best practice in the usage of wind power predictions.

Activities

NWP Improvements

This WP will bring together global leaders in NWP models as applied to the wind industry to exchange information and recommendations regarding most promising areas to improve both the physics of these models and data assimilation methods, and the influence of various data types, such as data from drones, masts, lidars and turbines in data-sparse areas, e.g. offshore for wind energy forecasting. The emphasis will be on improvements of the wind-related forecast performance of these models especially in typical rotor heights. There, the effects of changing stability, complex terrain, the influence of the surface and phenomena such as low-level jets still are only poorly modeled. Forecasting time horizons of 0-3 hours, 3-12 hours, day ahead, 2 weeks ahead, and seasonal are the relevant time scales for the power system, and will be the focus of separate investigations. This can include artificial intelligence techniques or Rapid Update Cycles.

Task 1.1: Compile list of available data sets, especially from tall towers.
Task 1.2: Creation of annual reports documenting and announcing field measurement programs and availability of data.
Task 1.3: Verify and Validate the improvements through a common data set to test model results upon and discuss at IEA Task meetings
Task 1.4: Organization of regular meetings and special sessions at international conferences on wind energy.

Benchmarks

This second work package will review the state-of-the-art for error and uncertainty quantification for wind and wind power forecasting models, with a special emphasis on the underlying NWP forecasts. This activity will further engage both NWP and field measurement researchers to develop guidelines, best practices, and perhaps standards, for evaluating forecast uncertainties. For model evaluation, we would work together with Task 31 in their Model Evaluation Protocol (MEP) implemented in the WindBench platform [10]. This would include trying to use some of their collected datasets while also opening a call for additional datasets for benchmarking.

Task 2.1: Design of benchmark exercises: best practice
Task 2.2: Standard evaluation protocol for both deterministic and probabilistic forecasts: review of existing, best practice, and critical assessment of new proposals
Task 2.3: Uncovering uncertainty origins and development through the whole modelling chain. Parallels with the Windbench platform.
Task 2.4: Set-up and dissemination of benchmark test cases and data sets

Advanced Usage

The third WP will survey the current state of use of forecast uncertainties by the power systems sector, which will be documented in a report. It will then engage 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. Where useful, simple indicators of forecast quality will be developed. This WP will also provide outreach to users of forecasts via webinars or other means to enhance their knowledge and ability to use all available information for operations.

Task 3.1: State of the art of use of forecasts uncertainties in the business practices (operation/management, planning of power systems, markets operation/participation) of actors in the power systems sector (TSOs, DSOs, ESCOs, traders etc).
Task 3.2: State of the art and knowledge sharing from demonstration/pilot projects that deal with the use of forecasts in decision making.
Task 3.3: In several projects, e.g. for projection of the power system evolution by 2030/2050 with high shares of renewables, it is necessary to generate multi annual time series that simulate wind power forecast errors with hourly resolution. State of the art, benchmarking, recommended methodology.
Task 3.4: Review of existing/proposal of best practices on how to measure/quantify the value from the use of probabilistic forecasts
Task 3.5: Communication of wind and wind power forecasts to end-users. Review, recommendations/best practice.
Task 3.6: Set up data sets for benchmarking on the value from the use of forecasts, i.e., for trading.

Call for Collaboration

The operating agent of the task is Gregor Giebel of DTU Wind Energy, co-operating agent is Joel Cline of the US Department of Energy. Collaboration in the task is solicited from everyone interested in the forecasting business. We will collaborate with IEA Task 31 Wakebench, which developed the Windbench benchmarking platform, which this task will use for forecasting benchmarks, and with the task on Solar Forecasting under the PV IEA Annex. The task will run for three years.

Participation is open for all institutions in member states of the IEA Annex on Wind Power, see the map for the current list.

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IEA Wind Participating Member Countries, EWEA, and CWEA

Next steps

There will be a status meeting (not a formal kick-off) at the EWEA Technology Workshop Wind Power Forecasting on October 1/2 in Leuven, Belgium. The formal kick-off is envisaged for the UVIG workshop in Spring 2016.

If you're interested, please contact one of the authors.

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