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PRESS RELEASE

**Successful completion of »EWeLiNE« project:
probability forecasts, higher temporal and spatial resolution:**

Fraunhofer IWES and the German Meteorological Service with new models for more accurate weather and energy forecasts

Storm or calm, dark clouds or blue skies - wind turbines and photovoltaic systems supply more or less energy to the grid depending on weather conditions. A big challenge for transmission grid operators is having to forecast the amount of supplied energy as accurately as possible in order to maintain a stable grid. Fraunhofer IWES in Kassel, together with the German Meteorological Service (DWD) in Offenbach, has thus developed mathematical models as part of the EWeLiNE project, which enables significantly improved predictions than the traditional procedure. The partners have now completed the BMWi sponsored project which started at the end 2012.

»In order to guarantee a reliable supply, transmission grid operators are required to maintain a constant balance between power supply and demand within the grid. They must therefore know how much energy will be supplied in the next few hours and days and in which regions,« explains Dr Jan Dobschinski, head of the energy systems forecasts research group at the Fraunhofer Institute for Wind Energy and Energy Systems Technology IWES in Kassel. To do this they rely on weather and energy forecasts which, however, are not always correct: »Forecast errors are a real problem for transmission grid operators with regards to grid security,« says EWeLiNE project manager and Fraunhofer researcher, Dr Malte Siefert.

As practice tests show, the new forecast models developed by IWES and DWD have a very high forecast accuracy as well as weather warnings that are adapted to grid operation. This makes them superior to the previously used procedures, especially in the event of extreme weather conditions such as strong winds. The new models also provide the data in a higher temporal and spatial resolution. »With our models, transmission grid operators are able to forecast the supply for each and every one of the several hundred transformer stations in Germany. This makes grid management easier and safer. Even electricity traders can benefit from the reliable forecasts,« says Siefert.

Emission data every 15 minutes

One of the central starting points for the EWeLiNE project was adapting weather models to the specific requirements and conditions of renewable energy. This allows the models

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now, for example, to give accurate predictions for wind conditions at the height of the wind turbine hub. In particular, scientists were able to significantly improve the diurnal cycle.

For the photovoltaic system, the low stratus concentration can now be predicted more accurately which is a huge help for grid operators as even small changes in fog density can have a huge effect on the system performance. In addition, the models also provide a risk map for the occurrence of low stratus. There is also a higher temporal forecast resolution: radiation data is now calculated at 15 minute intervals so that the forecasts take into account any quick changes in cloud conditions.

Forecasts show probabilities

As well as the weather models, researchers have also enhanced energy forecasts for wind energy and solar power systems, including a higher spatial resolution for photovoltaic systems. The new models use self-learning algorithms that combine both old and real-time data to improve forecasts. By using graphically prepared weather forecasts in combination with power forecasts, grid operators gain valuable information for managing the grid and energy trading.

With the new weather and energy models users are also able to make probabilistic forecasts. Instead of predicting an energy supply for a certain period, users are able to calculate probabilities - for example, they can calculate with 80% probability that the supply will be under 500 megawatts wind energy and with 15% probability that it will be under 200 megawatts. »This is truly added value for grid operators as probabilistic forecasts can represent uncertainties. The company can therefore better estimate whether they will need a buffer to maintain a stable grid. Probability is even a plus for the marketing of energy,« says Siefert.

Using a demo-platform with an interactive, high spatial resolution map, grid operators can test the new forecast models. The transition to a permanent online operation should be carried out gradually in the next few months.

Follow-up projects with more partners

After completing the EWeLiNE project, which was sponsored by the Federal Ministry of Economic Affairs and Energy (BMWi), the partners will now continue their development in the »Gridcast« follow-up project. »Here we are aiming to work on improving the forecasts for individual transformer stations,« Siefert explains. They aim to integrate further information such as satellite images for solar forecasts alongside weather data.

Moreover, with Gridcast, researchers will examine how to integrate the deviation between potential generation and actual generation into the forecasts. »Wind turbines are becoming increasingly restricted, in part down to grid congestion or nature conservation and sound insulation regulations. For photovoltaic systems, both internal consumption and the installed storage capacity are growing. These developments must be taken into account for supply forecasts,« Dobschinski explains.

As well as IWES, DWD and the transmission grid operators, wind energy system manufacturer Enercon and two distribution network operators are also involved in the Gridcast project. »Distribution network operators are really important for securing grid stability as renewable energy is fed in at this network level,« says Dobschinski.

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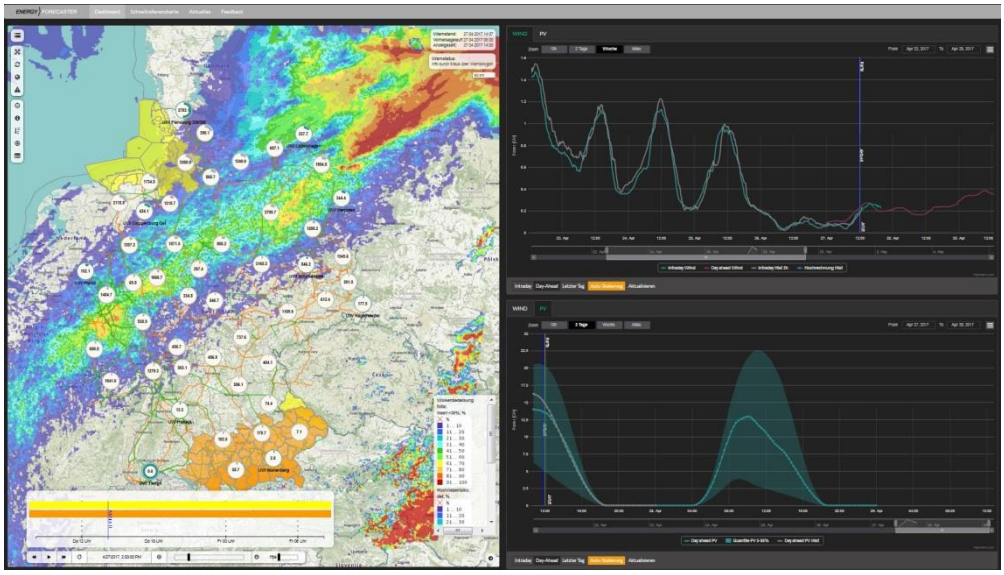

»EnergyForecaster«: Using a demo-platform with an interactive, high spatial resolution map, grid operators can test the new forecast models. The transition to a permanent online operation should be carried out gradually in the next few months. [©Fraunhofer IWES]