Wind Power Prediction Model: OSHybrid

- Wind power prediction
- World-wide
- Wind energy feed-in
- Physical-statistical modelling
- High degree of availability
- Prediction even with faulty SCADA data
- Reliability & Quality
- Energy Management
- Direct Marketing

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World-wide Predictions

Today, most branches of the energy economy rely on an exact forecast of the future wind power input. Power plant scheduling, direct marketing, power trading and grid operations can only be carried out when an exact, reliable and permanently available prediction of wind power exists for the coming hours and days. OSHybrid, the forecasting model developed by Overspeed, delivers exact and robust predictions thanks to a combination of physical and statistical modelling.

Forecasts and SCADA data

As a general rule, high forecast accuracy is dependant on an optimal combination of wind farm SCADA data representing current production and forecast data from weather services. In many practical situations, however, the online availability of SCADA data is problematic as it frequently arrives delayed at the forecasting system, does not have the necessary time resolution or needs correcting or other post-processing steps.
In ideal cases, in which SCADA data are both online and of high-quality, statistical prediction models generally produce the greatest degree of forecast accuracy. In all other cases, physical modelling approaches are mostly superior as they are more robust when it comes to problematic measured data.

Forecasts without SCADA

With the development of the wind power prediction model OSHybrid, Overspeed has achieved a new hybrid model which combines the advantages of both physical and statistical modelling. The model's core is the description of a given wind farm and its surroundings with physical parameters such as power curves, terrain roughness and orography. The output of this model is corrected with a statistical model which takes the historic time series of the wind farm power into account. The optimization of the model is adaptive, for example monthly. As soon as the model detects larger deviations between model parameters and past tuning parameters, these changes are no longer integrated into the online forecast, but are rather first assessed

by an expert and corrected if necessary. This allows the model to constantly exploit opportunities for improvement while remaining robust in regards to problems and errors in SCADA data or other online information.

Strengths of OSHybrid

Through the combination of physical and statistical approaches, OSHybrid acquires significant advantages in comparison with other prediction models:

- *OSHybrid delivers good forecasts for newly installed wind farms without historic measured data.*
  Purely statistical models do not work without SCADA data, so predictions for a new farm are only available after several weeks or even months.
- *OSHybrid is robust when it comes to missing or qualitatively poorly measured power data.*
  As its core is based on physical modelling and the manual checking of statistical parameters, the model is not led astray through poor data.
- *OSHybrid is ideal for applications with offline SCADA data.*
  As the statistical model tuning takes place regularly but offline, it is particularly well-suited to applications in which SCADA data is only available offline.
- *OSHybrid is well-suited for SCADA data which contains downregulation.*
  Large wind farms in weak power grids are frequently restricted in power for certain periods of time. These times can be excluded from tuning periods thus avoiding a falsification of the results.
- *OSHybrid produces good results for wind farms under construction.*
  Such wind farms constantly vary in installed power as new turbines are added. Forecasts are optionally optimized dynamically through automatic tuning.

- *OSHybrid is good for application-specific tuning.*
  Optimization occurs according to the applied business model. For example, a forecast used in power trading differs greatly from a forecast of extreme values. OSHybrid offers various optimization criteria which can be implemented according to the situation at hand.

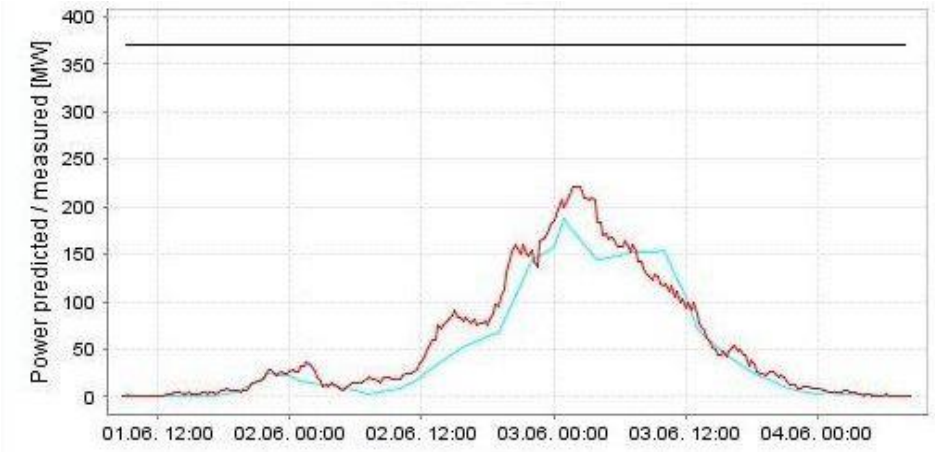
Overall, OSHybrid links high forecast accuracy to robust behaviour relating to measured wind farm power data. As such, OSHybrid is optimally suited for all applications of wind power forecasting.

EEG Direct Marketing

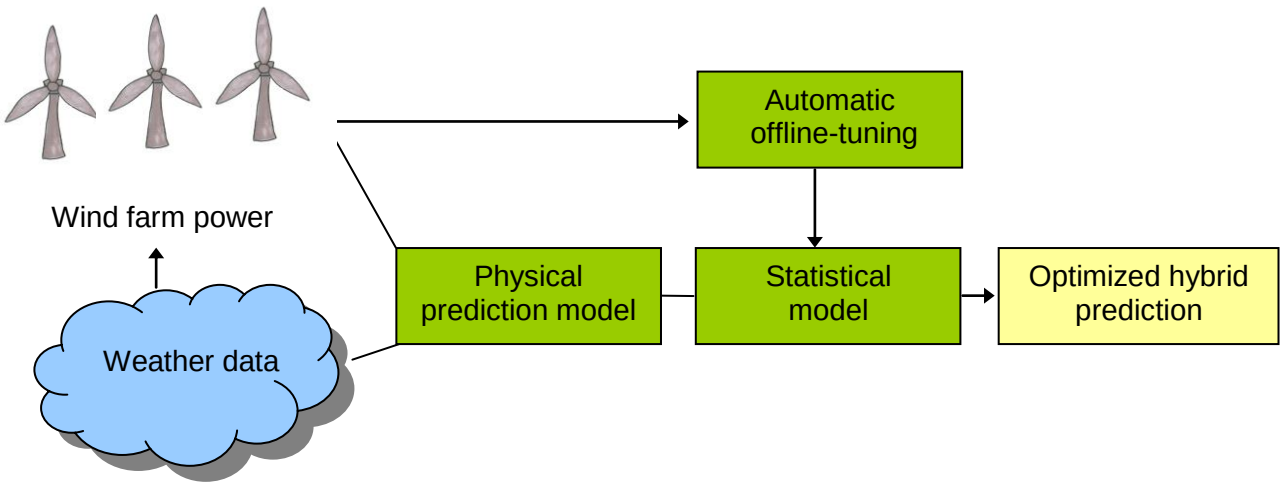
Through the passing of the Renewable Energy Law Amendment (Erneuerbare-Energien-Gesetzes, EEG) in 2012 it became possible to bring significant amounts of wind energy to the energy market via direct marketing. This application also makes a high quality wind power forecast indispensable. Accurate predictions are necessary because increasing uncertainty generally leads to significant balancing power costs which can considerably narrow the profit margins achieved through direct marketing or even render them entirely unprofitable. Moreover, the risk of having to provide balancing power is further minimized through very-short term forecasts and intraday trading.

Quality and Reliability

As these predictions are essential components in the business processes of our customers, we do everything to guarantee high system availability. With our years of experience, mirrored server systems, quality management and a support team available 24/7, we achieved 100% availability in the last 5 years. This applies to server solutions operated by us for our customers as well as to systems integrated on-site into the IT infrastructure of our clients. In recent years, our prediction system has been intensively tested by customers both for stability and the maintaining of No-Single-Point-of-Failure criteria.



Time series of wind power predicted by OSHybrid (blue) and actually measured wind power (red), Northern Ireland



Schematic representation of OSHybrid functionality