

# WINDFOR™

## Wind Power Forecasting

**ENFOR**  
DELIVERING THE FUTURE

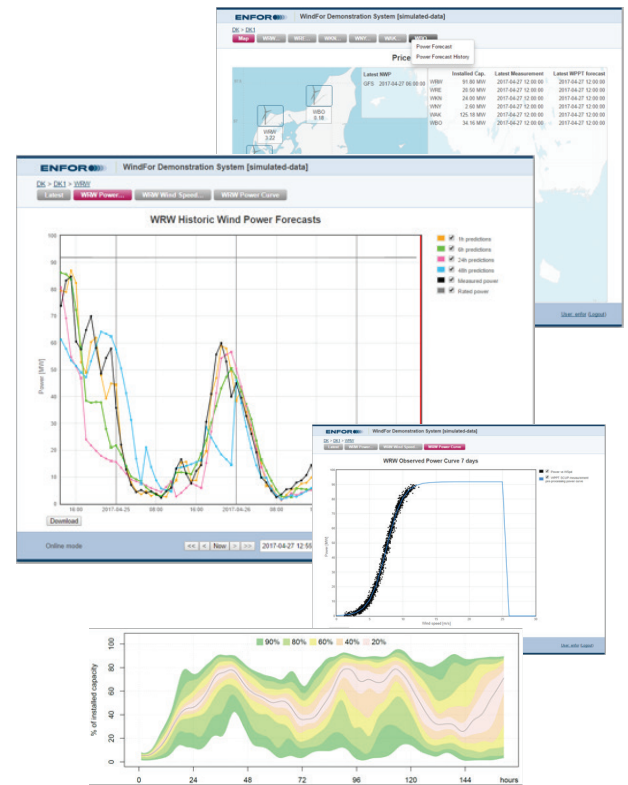
WindFor™ (formerly known as WPPT) is a software solution for wind power forecasting. WindFor™ delivers highly accurate predictions of wind power production for the operational horizon. WindFor™ is very flexible and has a long track record of producing accurate forecasts in almost any condition.

## Why do you need WINDFOR™?

Wind power forecasting is a necessity in order to plan and operate power system with a large number of wind farms. This applies to both commercial players in liberalized power markets and to system operators who need to understand the impact of renewable energy production.

Accurate wind power forecasting is needed by asset owners and electricity traders in order to nominate and trade the power production efficiently. By increasing forecast accuracy, asset owners and traders can reduce costs of imbalance fees and penalties.

Transmission system operators need accurate wind power forecasts to maintain system stability as intermittent power production from wind power can cause system instability and increase the cost of balancing the electricity system (e.g. from standby capacity).



## Key benefits:

- ✓ Market leading wind power forecast accuracy
- ✓ Proven operational track record of more than 15 years
- ✓ Highly flexible and configurable to almost any condition
- ✓ Reduce costs for traders, asset owners and TSOs
- ✓ Low maintenance system with minimal interference for the customer
- ✓ Many tailor-made modules which can handle complex requirements

Comparisons between wind power forecasting services have shown that WindFor™ delivers very accurate predictions, making it the preferred choice for customers all over the world.

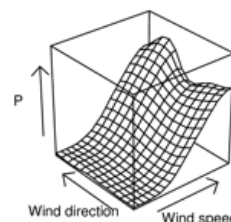
## How does WINDFOR™ work?

WindFor™ is a self-learning and self-calibrating software system based on a combination of physical models and advanced machine learning. This combines the best of artificial intelligence with wind power domain knowledge in order to produce the most accurate wind power forecasts available.

Forecasts are produced every time the system receives new data. WindFor™ runs in either online mode and continuously receives real-time production data or in off-line mode with historical data. By integrating WindFor™ directly with the SCADA system and thereby providing real-time production data, very accurate short term forecasts can be achieved.

WindFor™ can use one or more weather forecast providers as input and automatically detect the optimal prioritization for each wind farm and for different forecast horizons.

The self-learning and self-calibrating algorithms will continuously learn about the wind farm characteristics and will adapt to changing



conditions, seasonal variations and as the wind turbines ages such that forecasts stay accurate at all times.

WindFor™ can deliver power forecasts in almost any file format and can be integrated directly into the operational IT-platform of the client, such that data are retrieved and delivered seamlessly to and from relevant systems.

WindFor™ is available as a software package installed locally on the client's servers or as a service hosted on servers operated and maintained by ENFOR. WindFor™ is supplied with various support, maintenance and license packages, which can be tailor-made to client specifications to provide a cost/performance ratio which fits the needs of the individual client.

## Key features:

- Integrates with all major weather forecast providers
- Runs in both on-line or off-line mode
- Configurable forecast horizons, update frequency and time resolution
- Configurable browser based graphical user interface and reporting tool
- Data integration interfaces supporting numerous formats, file types and protocols
- Forecasting of uncertainty bands
- Scenario generation
- Estimation of probability/risk of cut-out at high wind speeds
- Estimation of the probability of a ramp occurrence
- Ice detection and forecasting of ice decay
- Combines and weights multiple internal forecasts or external forecasts
- Downscaling module for complex and mountainous regions
- Upscaling module for improving forecast of off-line wind farms with on-line measurements from other wind farms
- Ensemble weather forecast module for improved forecast accuracy
- Estimation of "lost production" during curtailment

## About ENFOR

ENFOR provides forecasting and optimization solutions for the energy sector. Utilities, energy traders, transmission and distribution system operators use ENFOR solutions for forecasting of wind power, solar power, hydro power, electricity and heat demand as well as optimization of district heating systems. Based in Denmark, and established in 2006 as a spin-off from the Technical University of Denmark, the company has a solid operational track record and successfully serve customers all over the world.

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*"The future is an unknown, but a somewhat predictable unknown.  
To look to the future we must first look back upon the past."*

- Albert Einstein