



The AWPPS System

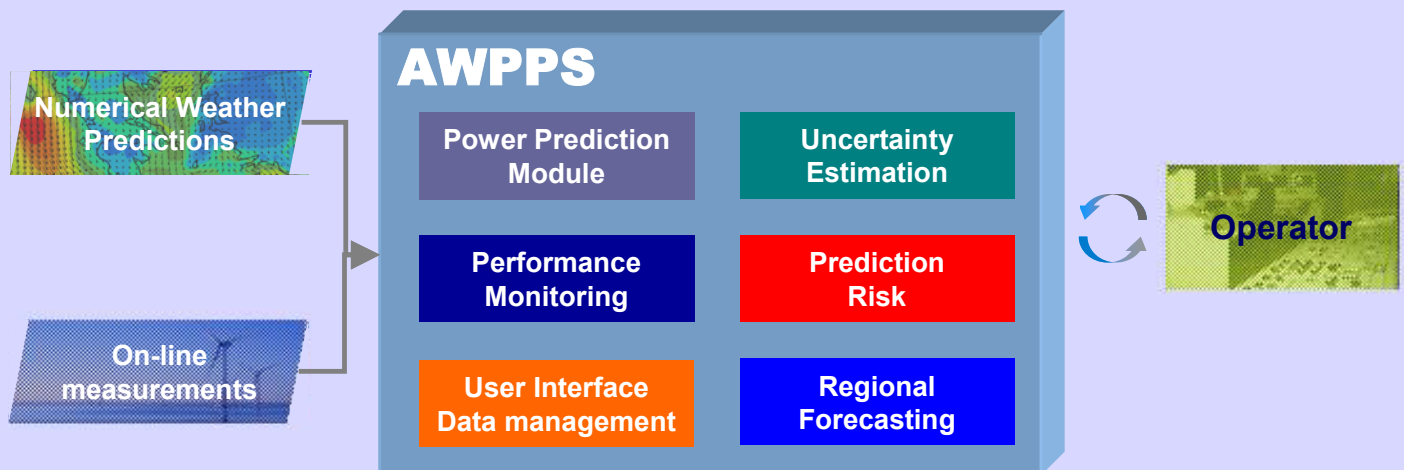
The AWPPS provides short-term forecasts for the power output of **onshore** and **offshore** wind farms :

- ✓ for the next 24/72 hours with a time step of 1 hour (updates every hour),
- ✓ for the next 4/6 hours with a time step of 10-15 min (updates every 10/15 min),
- ✓ on-line uncertainty assessment for these forecasts.

Why wind power forecasts ?

Accurate short-term wind power forecasts permit to operate wind farms, maximise wind power penetration, plan reserves & storage, maximise revenues when participating in the electricity market, plan maintenance etc. For all these purposes, the AWPPS can be used by end-users such as Transmission or Distribution System Operators, Independent Power Producers, Energy Service providers, wind farm operators, energy traders, etc.

The Software



Power Prediction

The Power Prediction Module provides forecasts for the output of each considered wind farm. The core Module is based on state-of-the-art **adaptive fuzzy neural networks**. This approach provides strong advantages compared to classical neural networks or other statistical or physical techniques. The module is enhanced with on-line adaptation capabilities for optimal performance.

Uncertainty Estimation

The AWPPS is the only available tool that provides confidence intervals for wind power forecasts with a **predefined level of confidence** (i.e. 85, 90, 95%). The intervals are produced based on an advanced approach appropriate to the wind prediction problem.

Prediction Risk

The Prediction Risk Module permits to «forecast» the uncertainty based on the expected weather stability for the next 24 hours. The on-line use of this module permits to develop appropriate strategies for maximising the value from the use of power forecasts.

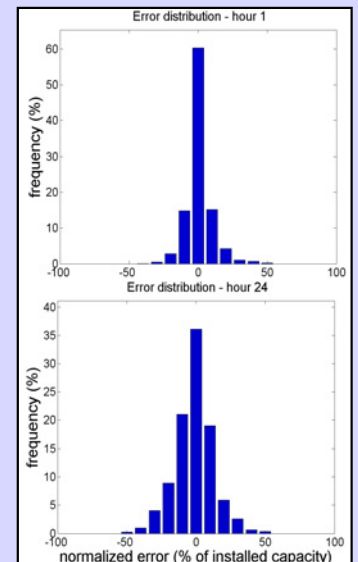
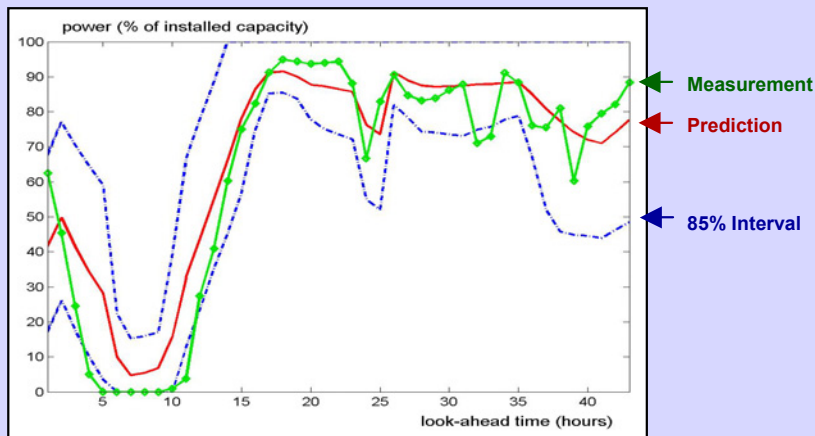
Regional forecasting

The AWPPS includes a module for forecasting regional or national wind power based on a sample of reference wind farms.



Performance

The AWPPS was successfully adapted and validated for more than 35 onshore and offshore wind farms in Denmark, Germany, Greece, Ireland, Portugal, Spain and UK situated in different terrain types (flat, semi-, complex). The performance for single wind farm forecasting ranges between 2-5% (of the nominal wind farm power) for one-hour ahead predictions and 10-15% for 48 hours ahead. The performance for regional forecasting is 8-10% for 24 hours ahead.

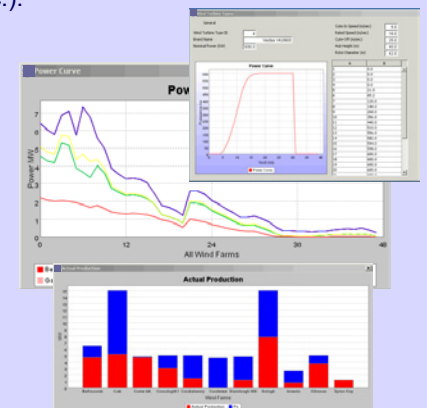


Input

- Numerical Weather Predictions by meteorological services (i.e. Aladin, Hirlam, Skiron etc.).
 - If available: on-line measurements of power and meteorological variables.
 - The user may insert information on **scheduled maintenance** of the wind farms.
- Advanced processes are used for automatic selection of the most relevant input.

Implementations

The AWPPS is provided as an independent software able to run locally at the end-user or via internet (via secured access). It can be also provided through the More-Care Energy Management System (EMS) or finally through the e-terra SCADA system of AREVA T&D.



References

The development of AWPPS started in 1995. The prediction modules of AWPPS have been installed for on-line operation in Ireland for the prediction of 11 wind farms, in Crete for 6 wind farms and in Madeira for 2 farms. An installation at Azores is under development (4/2004).

<http://www-cenerg.cma.fr/prediction>

Developed by :



For more information :

Dr. George Kariniotakis,
Project Manager,
Ecole des Mines de Paris,
Centre d'Energétique,
B. P. No 207, 6904 Sophia Antipolis,
France.
Tel: +33-(0)493957501, (~99)
Fax: +33-(0)493957535
georges.kariniotakis@cenerg.cma.fr