

INTEGRATING WIND ENERGY INTO PUBLIC POWER SUPPLY SYSTEMS – GERMAN STATE OF THE ART

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ABSTRACT

In Germany, more than 18 GW wind power generating capacity were installed till 2005. The four German transmission system operators (TSO) are obliged to take care of grid operation and safety and to provide balancing power. Knowledge about the instantaneous wind power generation is a prerequisite for any successful integration of wind power into the electricity supply system. Additionally wind power forecasts are essential. The “Institut für Solare Energieversorgungstechnik” (ISET) has successfully developed the Wind Power Management System (WPMS), a software tool which supports the German TSO to identify problems of grid operation and to provide balancing power. The main functionality of the WPMS is to forecast the expected power feed-in of wind energy. The WPMS includes a number of prediction modules, being optimised for different targets. Each module consists of a set of artificial neural networks (ANN). The inputs of the networks are predicted meteorological parameters like wind speed and direction, air pressure, temperature etc. provided by different weather services. The result is the wind farm power output for a specific time period up to 72 hours for day ahead- and up to 8 hours for short term forecasts in the resolution of the incoming weather data. Since 2001, the forecast error of the day ahead forecast has approximately halved. The precision is validated continuously by comparing power forecasts with measured data. To calculate the error of the forecasts the root mean square error (RMSE) is used.