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Track: GRIDS Topic: GRI02 Electricity system operation

OPTIMAL MANAGEMENT OF WIND GENERATION IN POWER SYSTEMS & MARKETS – THE ANEMOS.PLUS PROJECT

Nowadays, wind power has an increasing share in the electricity generation mix in several European countries. Due to the variable nature of wind, the large-scale integration of wind power causes several difficulties in the management of a power system. Today it is widely recognized by end-users such as Transmission System Operators, utilities a.o. that forecasts of the power output of wind farms up to 48/72 hours ahead contribute to a secure and economic power system operation.

The past ANEMOS project has successfully addressed research in the field of wind power forecasting for a wide range of end-user requirements. It has identified new research priorities and challenges for the future. One of them concerns the necessity to integrate efficiently wind power forecasts and their uncertainty into the daily practice of power system management. This paper presents the EU project ANEMOS.plus, which develops research towards this direction and namely on intelligent management tools for addressing the variability of wind power.

At a first stage wind forecasting tools are enhanced with new functionalities. The modular ANEMOS forecasting software permits to integrate easily new advanced functionalities. The paper presents such functionalities developed in the frame of this project (i.e. advanced probabilistic models) or in complementary projects such as SafeWind (i.e. Anemos.rulez approach for alarming in case of extreme events such as ramps). At a second stage new operational tools for managing wind generation and for trading in electricity markets are developed following stochastic approaches. The project then focus on demonstrations identified as key challenges for large-scale integration of wind power into the electricity supply, including:

i) Reliable provision of advanced wind power forecasts through alternative technologies and at different scales ranging from single wind farm to regional/national scale. Focus is given on :

- The accuracy of forecasts provided by different modelling approaches.
- The online estimation of uncertainty in the forecasts.
- The ergonomomy of the prediction tools.

ii) Optimal integration of wind energy into power systems and electricity markets. The aim is to demonstrate the benefits from the use of advanced tools for :

- Allocation of balancing power and definition of reserves.
- Optimal scheduling of power systems with high wind penetration.
- Bottleneck management in large power systems as well as local grids.
- Management of storage associated to wind energy.
- Trading of wind power in markets using advanced strategies.

The various demonstration projects are set-up at end-users from 8 countries participating in the project. The results demonstrate the applicability of such tools at an operational level and compare their benefits to classical deterministic approaches for both for managing wind penetration and for trading wind generation in electricity markets.