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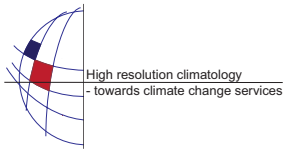

Wind Power predictability a risk factor in the design, construction and operation of Wind Generation Turbines

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Summit:
The wind power predictability is often a forgotten decision and planning factor for most major wind parks, both onshore and offshore. The results of the predictability are presented after having examined a number of European offshore and offshore parks power predictability by using three(3) mesoscale model IRIE_GFS and IRIE_EC and WRF.

Full description:
It is well known that the potential wind production is changing with latitude and complexity in terrain, but how big are the changes in the predictability and the economic impacts on a project?
The concept of meteorological predictability has hitherto to some degree been neglected as a risk factor in the design, construction and operation of wind power plants. Wind power plants are generally built in places where the wind resources are high, but these are often also sites where the predictability of the wind and other weather parameters is comparatively low. This presentation addresses the question of whether higher predictability can outweigh lower average wind speeds with regard to the overall economy of a wind power project.
Low predictability also tends to reduce the value of the energy produced. If it is difficult to forecast the wind on a site, it will also be difficult to predict the power production. This, in turn, leads to increased balance costs and a less reduced carbon emission from the renewable source.
By investigating the output from three(3) mesoscale models IRIE and WRF, using ECMWF and GFS as boundary data over a forecasting period of 3 months for 25 offshore and onshore wind parks in Europe, the predictability are mapped. Three operational mesoscale models with two different boundary data have been chosen in order to eliminate the uncertainty with one mesoscale model. All mesoscale models are running in a 10 km horizontal resolution. The model output are converted into “day a head” wind turbine generation forecasts by using a well proven advanced physical wind power model. The power models are using a number of weather parameters like wind speed in different heights, friction velocity and DTHV.
The 25 wind sites are scattered around in Europe and contains 4 offshore parks and 21 onshore parks in various terrain complexity. The “day a head” forecasts are compared with production data and predictability for the period February 2010-April 2010 are given in Mean Absolute Errors (MAE) and Root Mean Squared Errors (RMSE). The power predictability results are mapped for each turbine giving a clear picture of the predictability in Europe.
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Finally a economic analysis are shown for each wind parks in different regimes of predictability will be compared with regard to the balance costs that result from errors in the wind power prediction. Analysis shows that it may very well be profitable to place wind parks in regions of lower, but more predictable wind ressource.

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