Winterwind 2011

IEA Task 19 national overview – Swedish activities in measurements and mapping of icing and de-icing of wind turbines

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Q: Is wind energy in cold climates bigger than offshore?

Q: How can wind energy in cold climate best act as a technological bridge to offshore?

Modeling of icing
A local updraft

The challenges
Icing of wind turbine rotor blades and wind sensors will, in ice-infested areas, lead to low or no energy production during extended periods of time. The main reasons for the concern over icing are:

* personal safety,
* loss of production and
* influence on the expected life of components.

De-icing
There's currently no commercially available anti-icing system that is able to cope efficiently with medium to severe icing conditions. Only two manufacturers, Enercon and WinWind, have so far, shown an official intention to address this issue.

Modeling - A local updraft may increase the risk of icing
For site assessments, topographically induced vertical velocities can't be seen if the weather model's spatial resolution, i.e. the orography, is too low. Here, an analogy with wind speed estimations can be useful: The rich wind resource on the isolated mountain of Uljabuouda in the Municipality of Arjeplog (SE), holding 10 large 3MW WT, can't even be seen in the 1 km grid used in the most current national wind resource atlas. As a comparison, the operational icing forecast currently in use by the National Weather Service (SMHI) uses a 5 km grid.

Measurements - What's in the air?
It is virtually impossible to estimate the rate of icing on an object without being abl e to sufficiently well estimate droplet size distribution and liquid water content in the air. Such measurements are critical in order to move research forward. Icing measurements in tall towers and at nearby wind farm sites can be used to verify and develop general purpose weather forecast and icing models.

What's being done?
The Swedish Energy Agency is currently spending some **30 MEuro** during a five-year period on the development of wind energy technologies adapted for icing climates. The activities include synoptic icing measurements, mapping of icing, de-icing of wind turbines and the evaluation of performance and loads with respect to icing.

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