IceWind

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www.icewind.dk

Havsnäs wind farm, Sweden

The IceWind project, with partners from Denmark, Iceland, Finland, Norway and Sweden, focuses on wind engineering in cold climates. The work includes novel aspects such as the development of an Icing Atlas for Iceland and Sweden as ice may impact on wind power generation in many aspects. The integration of the Nordic countries' electricity grid with high shares of wind power will be addressed as will problems caused by icing and scheduling offshore operations, maintenance and accessibility. Forecasting and analysis of the interplay between hydropower and wind is another topic. A common denominator of the project is the reliance on high-resolution meteorological modelling. State-of-the-art modelling tools will be used and further developed to resource allocation in the form of wind and icing atlases for forecasting, planning of offshore operations, and to create input data for estimating energy system and balancing impacts of wind power to the grid. High-level education will involve four new interdisciplinary Ph.D. students on the topics icing, forecasting and wind resources in different countries, sharing common knowledge and developing icing atlases including production loss due to icing. Key aspects related to the large-scale integration of wind power will also be addressed.

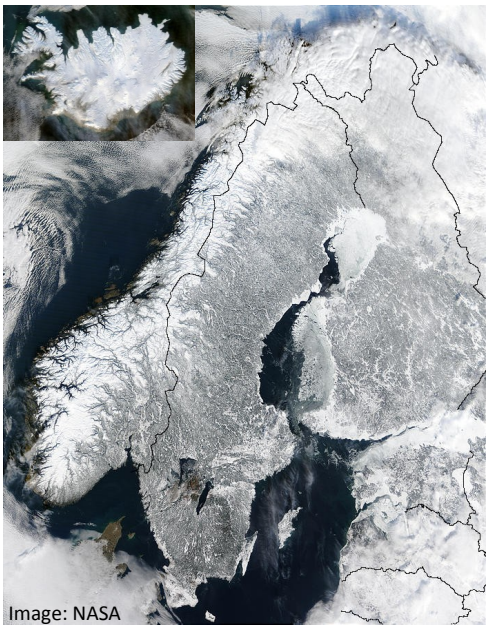

Image: NASA

The objectives of the IceWind project further aim to support the European targets for the high amount of renewable integration of the power systems in 2020, with the inevitable move towards offshore waters. The project outcomes are expected to be relevant for other cold climate areas of the world.

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Top-level Research Initiative

Integration of large-scale wind power

IceWind

Work Package 1: Wind turbine icing

A detailed icing atlas will be produced for parts of Sweden and Iceland that are affected by icing. This will serve as a basis for estimating icing risk and production losses due to icing and is a prerequisite for a market study of wind energy in cold climates as well as for deciding on the use of anti– or de-icing equipment. Tools for the short term forecasting of icing and associated production losses will also be developed for use with the icing atlas.

Image: Kent Larsson, Risuddens El AB (SE)

Image: Sigfús Már Pétursson

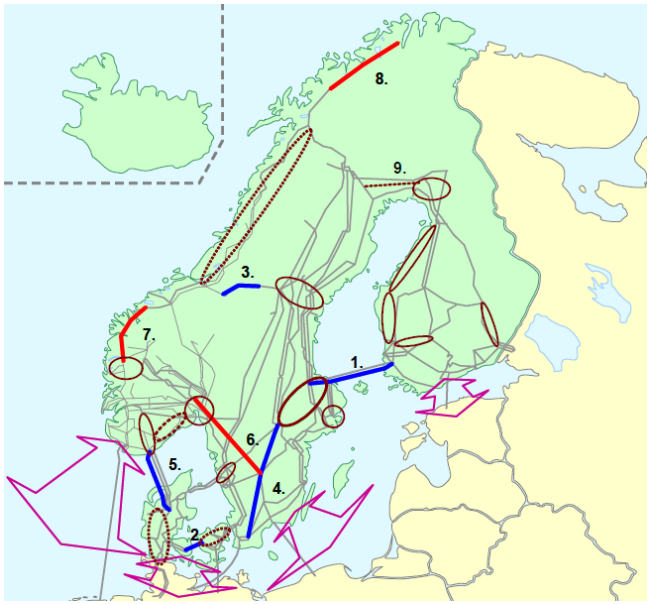
Work Package 2: Wind energy in Iceland

A wind atlas (both onshore and offshore) will be created for Iceland which, along with the icing atlas from WP1 and land use registries will be used to determine 5-10 sites suitable for wind farms in Iceland. A comparison will be made of the cost between wind power and other renewable energy options including integrated wind and hydropower. An analysis of wind power integration in Iceland's transmission network will also be conducted with respect to the possibility of large scale wind power development.

Work Package 3: Offshore forecasts and O&M

Better tools for the forecasting of wind and waves will enable improved planning of offshore operations and lower the costs of operation and maintenance. Models for calculating ship movements given a specific wind and wave climate will be developed and validated. Impact of stability and icing on wake losses in large offshore wind farms will be investigated using meso-scale models and CFD.

FOB Swath by Offshore WindService



Work Package 4: Power and energy aspects

The spatial and temporal variability in the wind resources (including icing losses) in the Nordic region will be analysed along with variability in forecasts and forecast errors. This will be done in order to determine the implications for wind power integration into the balancing and power markets, and for electrical grid development.

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The Top-level Research Initiative aims to involve the very best agencies and institutions in the Nordic region, and promote research and innovation of the highest level, in order to make a Nordic contribution towards solving the global climate crisis. It is operated by Nordic Energy Research, an independent institution under the Nordic Council of Ministers.
http://www.toppforskningsinitiativet.org