

Master thesis position

Assessing alternative operating strategies for wind turbines in cold climate conditions

Introduction to Vasa Vind

Vasa Vind is one of Sweden's leading developers and operators of onshore wind with nearly 500 MW in operation and over 1000 MW in development. We are currently 17 employees, most of us located in our head-office in Solna.

Our portfolio consists of several large onshore wind farms, all of which are situated in cold climate regions, where low temperatures and icing conditions are frequent during the winter period.

Description of the problem

Icing can during the winter accrete on wind turbine blades which change the shape and the aerodynamical profile of the blades. This reduces the power production compared to normal conditions with clean blades. Ice build-up on blades can under the winter therefore result in large production losses and can also be a health and safety issue with the risk for ice throw.

Better understanding of ice build-up and how the turbines are performing during icing conditions are therefore required and investigations into solutions and improvements that can reduce the production losses are of great interest.

Vasa Vind will during the 2022-2023 winter make some tests in one of our wind farms with the aim of finding more optimal strategies for running the turbines during icing conditions and potentially increasing production. The tests consist of both optimised software settings and of alternative operating strategies (start/stop strategies). The tests will generate a lot of data and a lot of data analysis will therefore be needed to assess the benefits of the alternative operating strategies and to better understand turbine behaviour during icing conditions. Analysis will be made by comparing test turbines with nearby reference turbines over the winter using various comparisons techniques.

The thesis work can be summarized in the following research questions:

- How much can alternative turbine software solutions increase power production during icing conditions?
- Can alternative operating strategies during icing conditions increase turbine production?

Qualifications

This thesis is suitable for students at the end of master's programme in Engineering / Mathematics / Physics / Meteorology or similar. Applicants need strong analytical skills with ability to handle and analyse large data sets in MATLAB or PYTHON. Good knowledge in regression analysis and statistical analysis techniques is meriting. Previous knowledge about wind turbines is a plus but not required.

Thesis location

The thesis student is very welcome to write the thesis at Vasa Vind head office in Solna. We recommend spending at least some of the time in our office, especially during the data analysis phase, since this is expected to contribute to deeper analysis and more learning for both parties. At least one trip to one of Vasa Vind's wind farms will be organized during the winter period to also gain some field experience during winter conditions.

Timeline

Indicative timeline for thesis work:

- Start of thesis work: January 2023
- Literature review, preparation for analysis and model development: January-February 2023
- Data analysis, including uncertainty analysis: March/April 2023
- Finalization of thesis: May/June 2023

Application

Applications, including CV and personal letter, shall be sent to erik.holmgren@vasavind.se no later than 21st of November 2022.

Contact

Any questions about the thesis position shall be directed to:

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