

Finding better wind energy potential with the new European Wind Atlas

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Over the last 25 years, the world has seen an increased dependency on wind energy that promises to continue growing. This has created an everevolving process to develop a method that can accurately assess a region's wind energy potential. The most-used assessment methods today are based on the European Wind Atlas through the use of the Wind Atlas Analysis and Application Program (WAsP).

Recently, the Global Wind Atlas has been published and brought into use for assessment methods. But these, along with those associated with the European Wind Atlas, are still faulty in certain situations.

These limitations caused the European Union and other countries to begin development of the New European Wind Atlas that will be more accurate and can be used for all types of terrain.

Erik Lundtang Petersen, a Danish researcher of the Technical University of Denmark Department of Wind Energy, discusses the details of the New European Wind Atlas aimed at improving <u>wind</u> energy assessment and how it will address limitations of prior methodologies in this week's *Journal of Renewable and Sustainable Energy*.

The EU has been involved in developing a wind atlas methodology since 1981, with its establishment of the European Wind Atlas. The goal was to produce a comprehensive set of models for the horizontal and vertical extrapolation of meteorological data as well as estimation of wind resources. The atlas proved influential on European decision makers by



making it possible to find a location with good wind resources in most places, as long as the correct topographical settings are chosen. However, they have since found that, though it worked well for simple land regions with flat terrain, it had shortcomings when it came to mountains and hills.

It became commonplace to include a combination of mesoscale and microscale models into the European Wind Atlas. "The idea is to let the mesoscale models create the statistics for resolutions of 10 kilometers or so, and then use the microscale models to continue from there and do the exact prediction of the production of a wind turbine at a specific location," Petersen said.

The Global Wind Atlas uses a downscaling process, excluding a mesoscale model, to pinpoint sufficient potential locations within areas that have an overall low wind energy potential according to the European Wind Atlas. This model, however, was not made with the intention of identifying prime wind farm locations.

In fact, the Global Wind Atlas states this directly: "The correct use of the Global Wind Atlas dataset and tools is for aggregations, upscaling analysis and energy integration modelling for energy planners and policy makers. It is not correct to use the data and tools for wind farm siting."

The European Wind Atlas and the Global Wind Atlas have opened up a world of possibilities for the utilization of wind energy, but still experiences issues. The <u>wind energy</u> community is hampered by a collection of projects having large, negative discrepancies between calculated and actual resources and design conditions.

Petersen highlights one devastating case in which a wind farm, after 10 years of operation, has generated only half of the predicted amount of <u>energy</u>. And to make matters worse, there currently exists no well-



established method that aims to correct these discrepancies. But now the EU, with their launch of the New European Wind Atlas, is working to avoid similar instances in the future.

The New European Wind Atlas, which will be ready by 2020, is aimed to serve as a standard for site assessment by reducing overall uncertainties in determining wind conditions.

"There are many things the new <u>model</u> should be able to handle, in order to be able to predict everywhere with high accuracy," Petersen said. "In reasonably uncomplicated conditions, it should be better than three percent [uncertainty], and in the complicated regions it should be better than 10 percent."

Improved competencies on atmospheric flow, together with the guidelines and best practices for the use of data, promises to become a key tool with reduced overall uncertainties for determining wind conditions.

More information: Erik Lundtang Petersen, In search of the wind energy potential, *Journal of Renewable and Sustainable Energy* (2017). DOI: 10.1063/1.4999514

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