

# Blackout prevention by advanced information

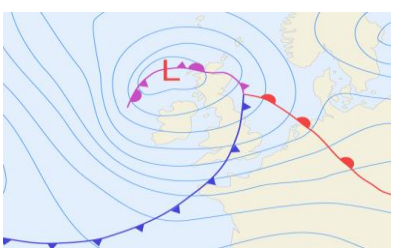
- Ramp event predictions
- Cut-off event predictions
- Spatio-temporal correction
- Prediction risk index
- ECMWF's deterministic and ensemble predictions
- Export of Warnings and alerts in XML and RSS
- Set up for Irish TSO SONI with 370 MW inst. Power

## Ramps and extreme events

When the weather forecast is off and a thunderstorm ruins the barbeque, that's quite annoying but one can cope. If the wind energy weather forecast is wrong, then in a worst case scenario our lights go out.

In order to master such situations, the Oldenburg prediction experts, Overspeed, have launched a new software system to predict and alarm extreme changes in power from wind energy. The Anemos-SafeWind-System – Anemos.eXtreme – calculates special forecasts for extreme events such as storm fronts and warns the user of resulting events such as the shutting off of wind parks. This is done with the help of innovative and flexible algorithms, Anemos.rulez. The Northern Ireland grid operator, SONI, is serving as a test customer.

## Prediction of storm fronts



If weather fronts with high wind speeds resulting in large amounts of power from wind energy are to be expected, then the prediction system sends a warning to the grid operator which can then initiate the necessary counter-measures to prevent a black-out. This may include making use of additional resources from conventional power plants or throttling of other power generators. Even turning off larger consumers in some situations is an option. This is because at every moment in time, the production and consumption of electric power should be the same; otherwise the power grid becomes unstable.



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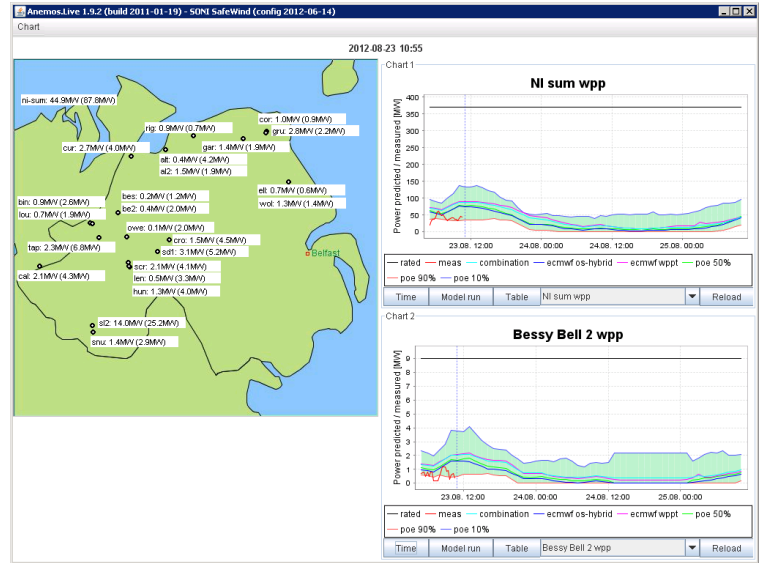


Figure 1: Graphical user interface of Anemos.live for SONI set-up. Left: map showing current measurements of wind farms and aggregations. Right: 2 Charts with latest wind power predictions including uncertainties for total region and a single wind farm.

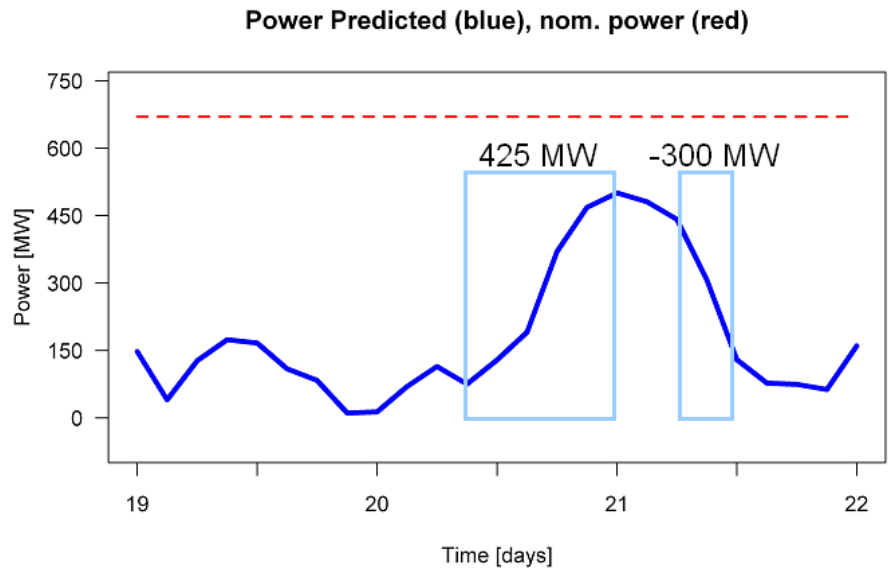
## Ireland as a test-case

"The higher the percentage of wind energy in a power grid, the more important extreme weather predictions become for the power industry", says Dr. Hans-Peter Waldl, Managing Director of Overspeed and responsible for the practical implementation of research results. "Ireland is an ideal test-case scenario for us because the portion of wind energy is significantly higher than in Germany. There we learn the challenges to be faced at home due to the surge in renewable energies."

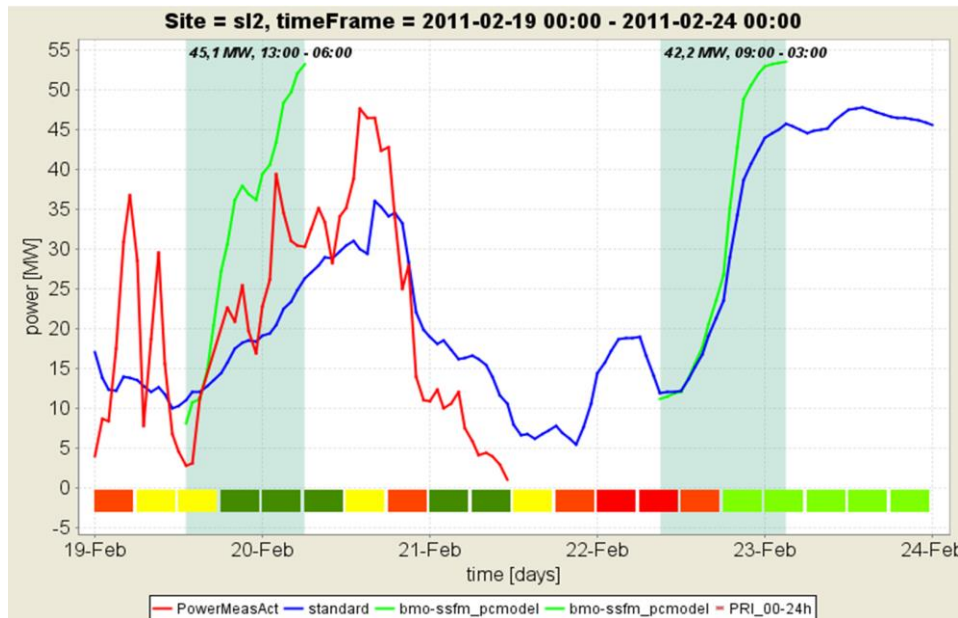
**EU research projects**

The extreme event forecasts are operated on the well-established Anemos platform, a commercial spin-off from several research projects developed by Overspeed within an international collaboration. Further prediction models come from European partners in Germany, Denmark, France and Spain.

The development of the warning system is within the framework of the EU-Project SafeWind, which is dedicated to the modeling of extreme weather events in the area of wind energy.



*Figure 2: Prediction of two upcoming ramps by Anemos.Rulez with an expected power increase of 425 MW and decrease of 300 MW*



*Figure 3: Extension of user interface with new predictions: power predicted (blue), power measured (red), ramp prediction (green), prediction risk index (boxes at bottom)*