furow

Powered by solute

Wind data analysis, wind resource assessment, and wind farm layout and optimization design software in one interface

Furow

Furow is a complete and exhaustive software, which possesses features directly involved with a wind farm development project at any given stage. Furthermore, its compatibility is flexible while working with other software, therefore, allowing users easy access to share and compare information.

The most important stages in wind farm development projects are included won Furow.

Data Analysis

Wind resource assessment

Micrositing

Furow has wind data analysis, wind resource assessment, and wind farm layout and optimization design modules in one interface

Data Analysis

Data Analysis

Furow allows to inspect the data uploaded from any wind measurement device (meteorological masts, LIDAR, SODAR, reanalysis, mesoscale,...).

Furow offers automatic rules and manual flags to select the data that must be avoided or erased by the user in the future analysis. Moreover, it is interesting to analyze the data coverage, to observe the data quantity stored by the sensors of the mast or remove the influence of the mast over somewind sensors, due to the direction of the wind flow registered.

Once the inspection is finished, a user can complete the information with different MCP techniques, which will result in obtaining complete time series of meteorological variables to be analyzed. These MCP techniques can be applied with sensors of the same meteorological mast or with sensors of different masts, close to the one which is being analyzed.

Data Analysis

Then, Furow offers a wide range of statistics developed to get maximum knowledge of the meteorological variables at the measured point. Once the data is analyzed, at the measured heights, a user can calculate vertical extrapolations to obtain data at different heights, which then becomes the inputs to perform a wind resource assessment in a further stage.

The methodology (upload, inspect, complete and analyze) is supported by several graphics, which allow the user to select the best representation, depending on the step of the methodology or the statistical analysis where it is involved.

Furow is a software ready to work with a geographical position and the data that the client can have access. One of the analysis made by Furow without measurements is the estimation of extreme wind speeds at a place affected by hurricanes.

Features within the data analysis module:

Data inspection
- Data coverage
- Apply time shift
- Apply slope offset
- Flag editing
- Tower distortion

Generate data
- Derive new variable
- Atmospheric parameter extrapolation
- Wind vertical extrapolation
- Rotor equivalent wind speed
- Air density and wind power calculation
- MCP (single and multiple)

Data analysis
- Availability
- Weibull fit
- Scatter plot and fitting
- Turbulence
- Wind shear
- Long term
- Extreme winds
- Atmospheric Stability

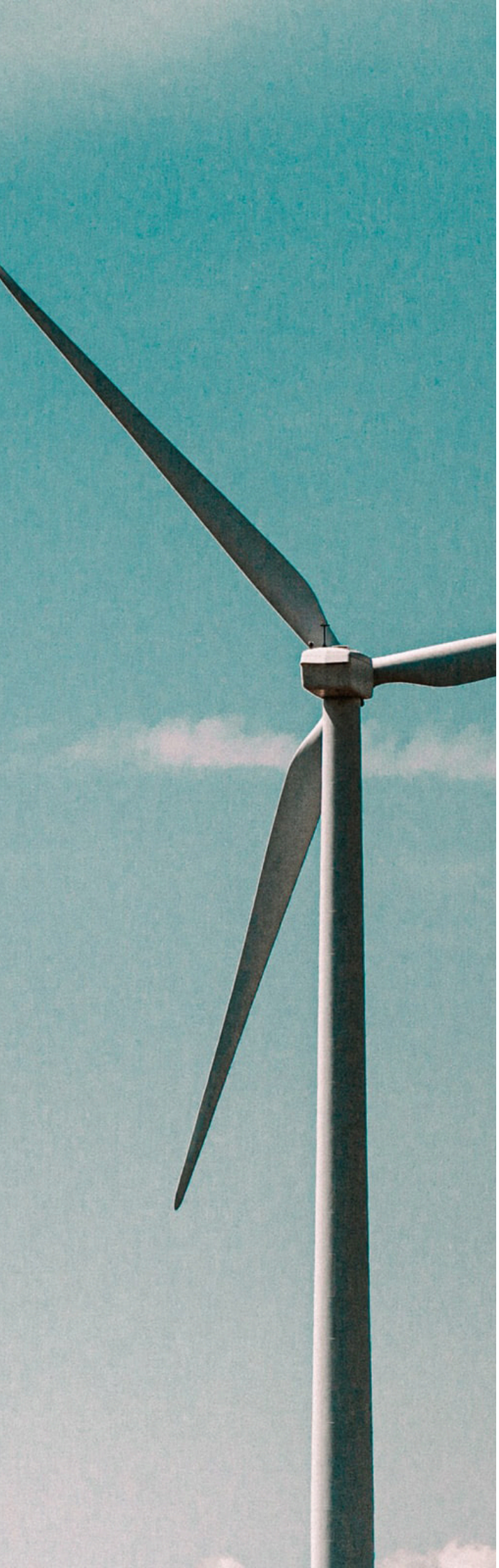
Wind resource assessment

Once a user has full knowledge of the meteorological behavior, at the point of the mast or at the points of the masts, it is ready to begin the area calculations through Furow´s second module, wind resource.

Furow considers the analysis of atmospheric stability, which is essential to perform wind resource assessment. All the calculations are supported on the Monin-Obukhov length and that is the reason why, although the wind resource engine is based in a linear model, it works better doing wind resource assessment in areas with small hills than other standard software of the market, compared with wind measurements.

Moreover, as the most complete wind software on the market, if the area´s orography is considered complex or high roughness, a user can choose to run the CFD model.

This CFD model has been built including the atmospheric stability in their code. Therefore, the calculations will be different depending on the atmospheric stability: stable, neutral or unstable.



Wind Resource Assessment

Furow is built up to work with several masts to calculate wind resource assessment, to import and export wind resource files in any format, allowing to communicate with the rest of the software of the market, and to calculate any map with the meteorological variables uploaded in the previous module.

Once the wind resource map is calculated, a user can relocate the meteorological mast or the time series of wind parameters (speed, direction, standard deviation, temperature and pressure) at any point of the map increasing considerably the knowledge of the analyzed area.

Features within the wind resource assessment module:

- Calculate wind resource (map and discrete)
- Correct wind resource with multiple Clima Objects.
- Calculate extreme winds
- Calculate wind validation map
- Inspect profile
- Get A & K Weibull map
- Export wind resource grid
- Combine WRGs to create a wind resource object
- Combine RSF y WRG to create wind resource object

Micrositing

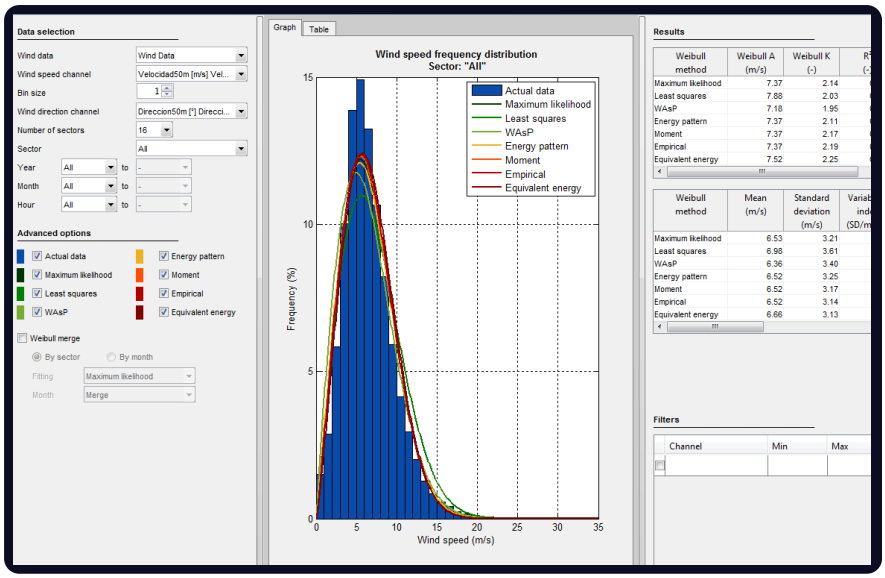
Micrositing

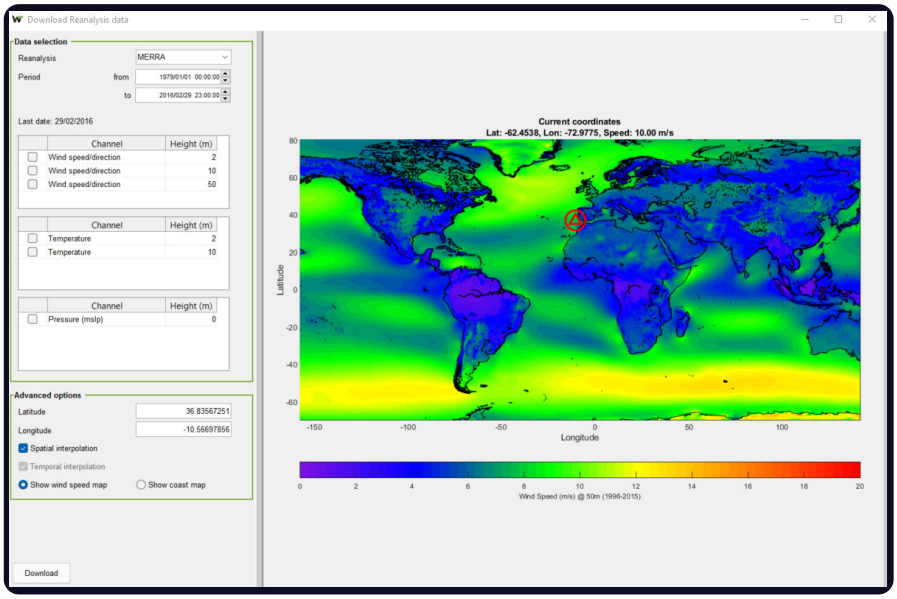
Within the micrositing module, users will find all necessary features to design the wind farm design in the site previously calculated.

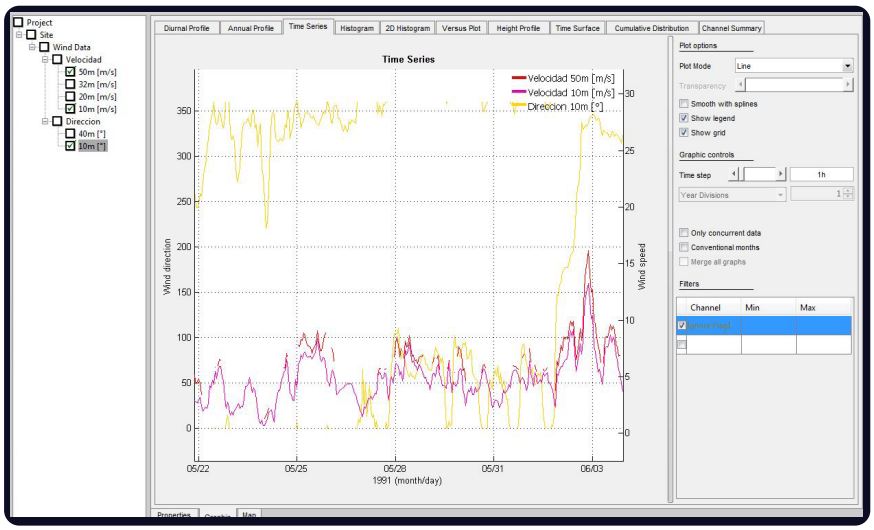
Features within the micrositing module:

- Wakes effect
- Optimizer
- Energy production estimation
- Energy losses estimation
- Wind sector management
- Wind farm power curve calculator
- Environmental analysis (Noise and shadow flicker)
- Site compliance
- Financial analysis
- Final reports
- Financial results report
- Class and subclass verification.

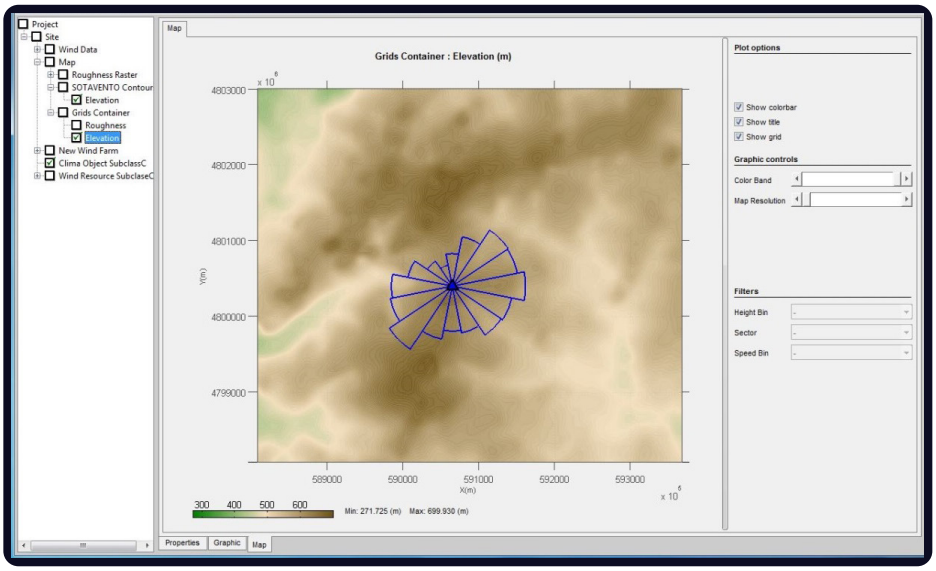
Data Analysis

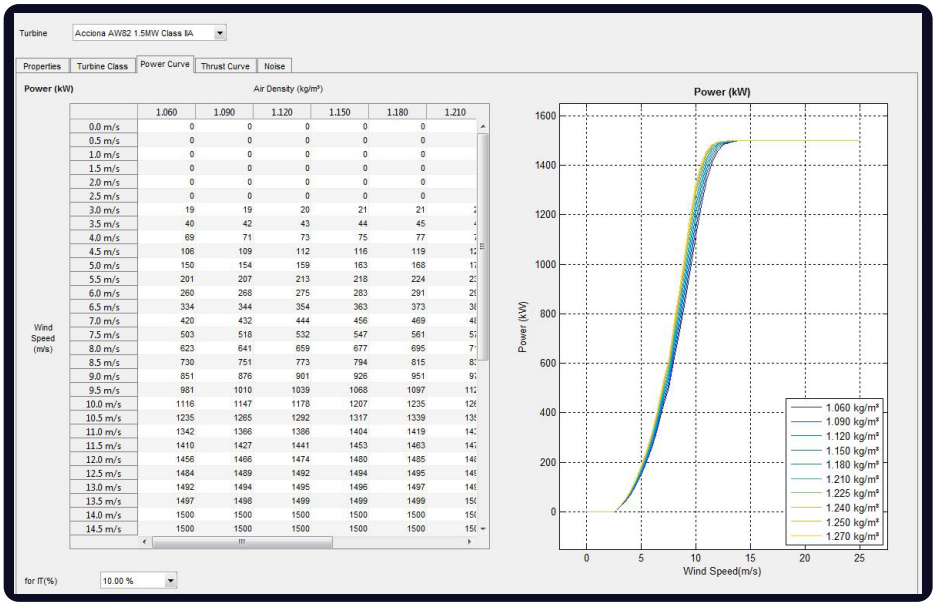


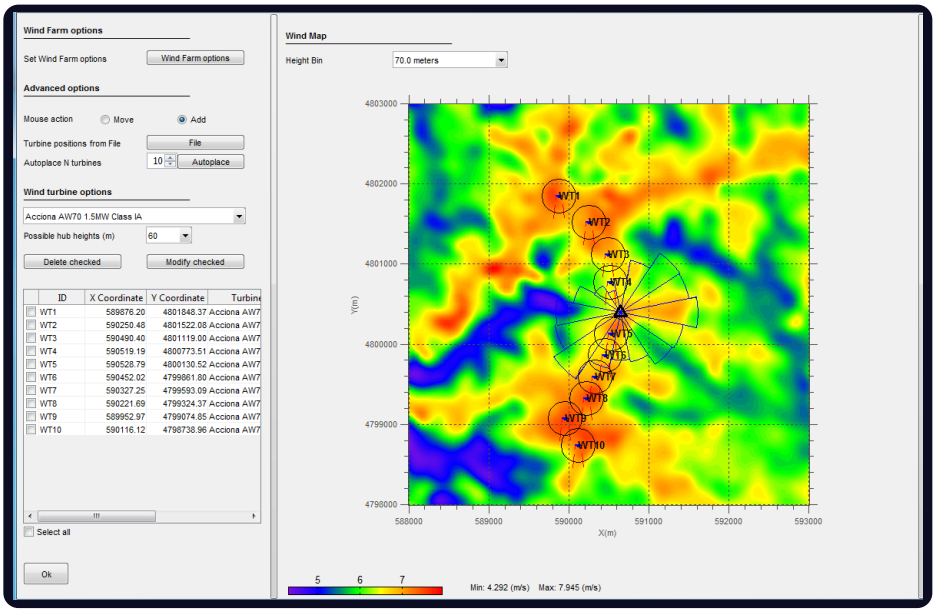




Wind Resource Assessment







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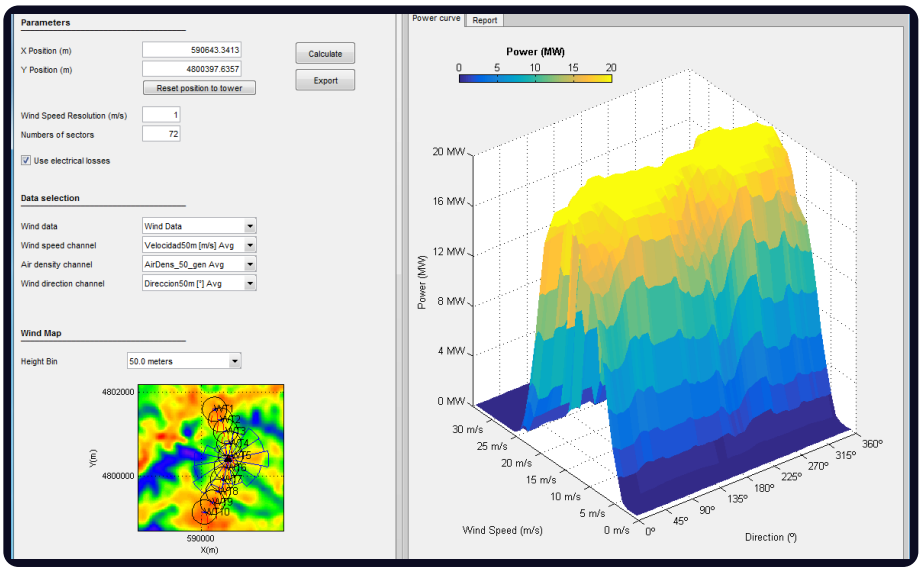

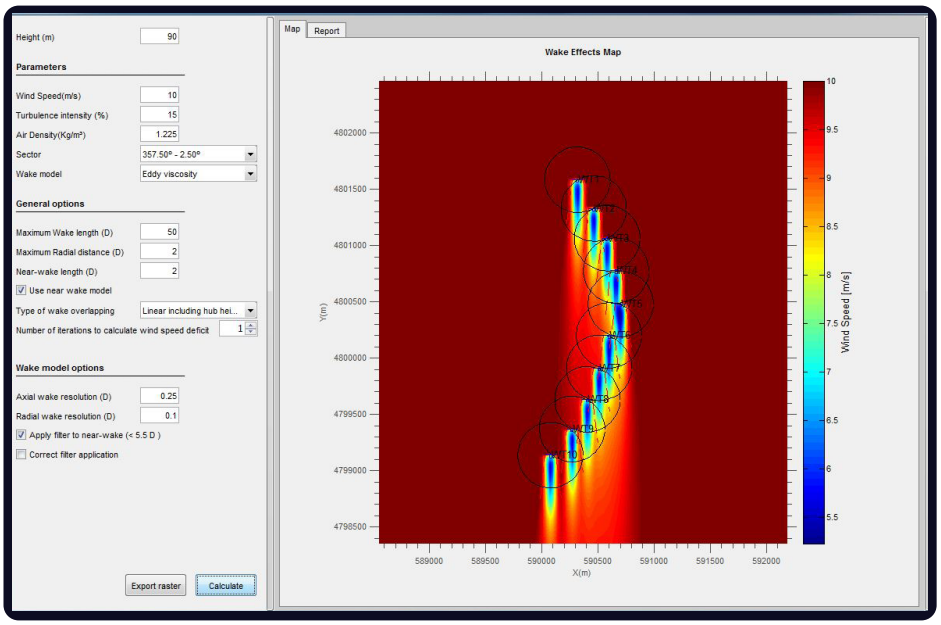

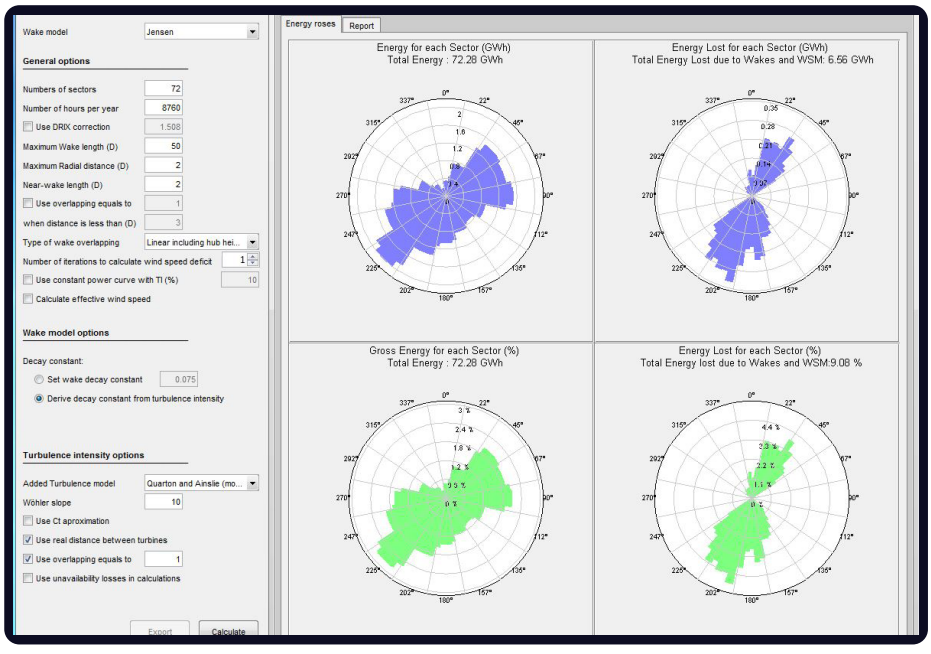

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