



Feature list

What's new in windPRO 3.4

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Highlights of windPRO 3.4

This version of windPRO primarily addresses the growing demand for tools to analyze the performance of operating turbines. To support larger datasets, windPRO 3.4 is now a 64-bit application. While overall calculation speeds remain the same, the amount of data which can be stored in memory is significantly increased.

Analyzing the data for operating turbines has become easier than ever with a dedicated Post-Construction track in PERFORMANCE CHECK, along with the new TR10 module.

Solar is gaining a larger footprint for renewable energy. In windPRO 3.4, you can now calculate AEP for solar PV plants with the new module SOLAR PV.

New online datasets are constantly added to windPRO, e.g. access to the German Marktstammdatenregister (MaStR) for easy download of existing WTGs in Germany.



Handle larger datasets with 64-bit windPRO



Determine the Site Yield according to German law



Perform Post-construction analysis in an improved workflow



Calculate AEP for Solar PV considering shading from multiple sources

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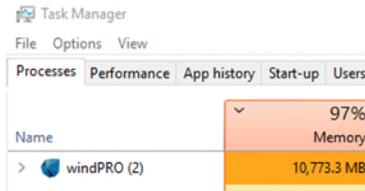
Rev.2 Specified and corrected information concerning TR10 module.

BASIS

64-bit windPRO.

Allows windPRO to utilize as much memory as the computer has available.

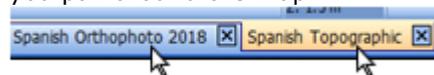
Load bigger amounts of SCADA or METEO data. Setup larger PARK calculations and check against measurements in Performance Check.



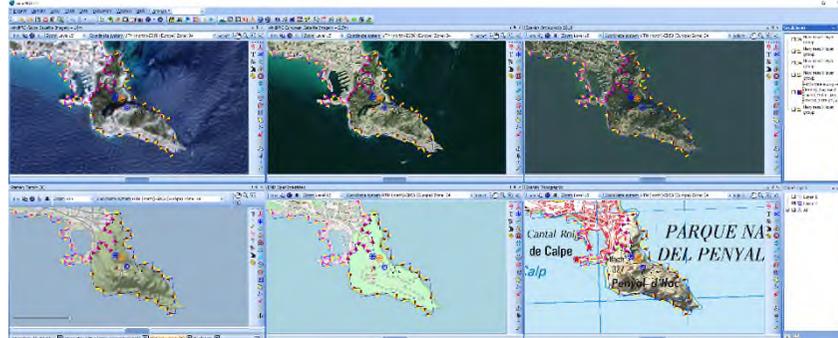
windPRO 3.4 can still open old 32-bit windPRO projects and export files to ver. 3.3 as 32-bit projects.

Synchronization of background maps

Swap between different maps and maintain the same position when you pan around the map.



This makes it easy to compare different map sources:



Turn synchronization on/off with the F8 key.

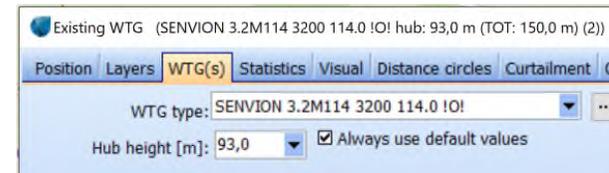
New Vietnamese coordinate system

Support for Vietnam VN2000 coordinate system with different central meridians.

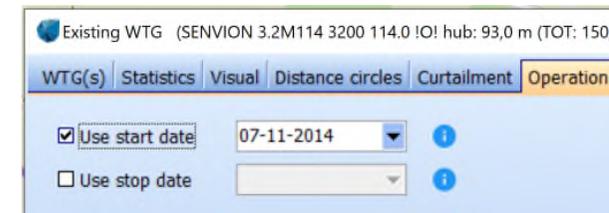
Download existing German WTGs (MaStR database)

Use the "Online WTG Data" tool to download MaStR information about existing turbines near your German project. A similar dataset is also available for projects in the US.

The dataset will be updated over time, as more and more turbines are added to the database. If the data is sufficiently accurate, it is auto-paired to the WTG catalogue in windPRO and ready for a calculation.



Start date (commission date) will be inserted in "Operation" tab, and can be used in calculations, taking Start-Stop dates into account. This will then influence wake-losses in time-varying PARK calculations:



Additional information can be found in the Description tab:

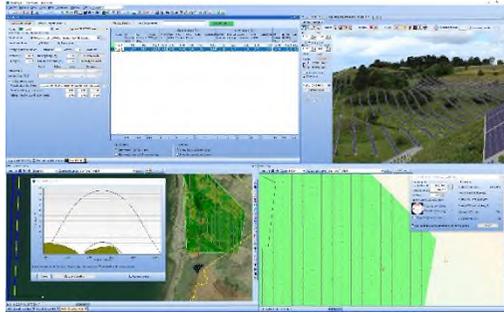


NEW SOLAR PV with AEP

-Quickly design a solar farm layout and calculate the AEP.

-Take into account the shading losses from nearby wind turbines, including tower, nacelle and blade shading, along with the shading effect from topography and other obstacles.

-The interactive layout design tool allows you to work on multiple solar farm areas, each with different panel types, spacing and orientation.



-Use measured and/or modelled climate data accessible through the meteo object.

-Gain free and easy access to 20y Heliosat Solar irradiance data (1999-2020) covering ~2/3 of the globe.

-Save time planning a solar farm by using the same tools as for wind projects, utilizing the same elevation data, maps, turbines, obstacles, photomontages etc.

-Generate topographical shading maps to guide the placement of new solar panels.

-Generate reports, result to file timeseries and export to shape file



*Go hybrid!
Take the solar and wind production timeseries calculated by windPRO and combine it with storage, electricity prices, and consumer demand in energyPRO*

PERFORMANCE CHECK

Performance Check has been divided into three tracks:

-Post-construction:

Quantify lost production based on nacelle wind speeds and error codes. Use this to calculate the future yield with a 50% lower uncertainty compared to traditional pre-construction estimates.

-Model validation and calibration:

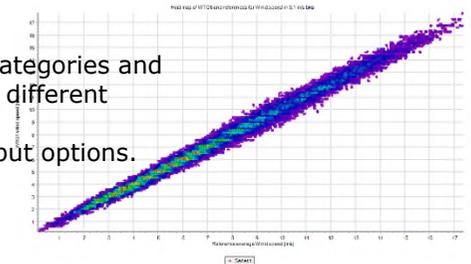
Compare measured production with model calculated. Calibrate the model and use the calibrated model together with meso-scale long term data to predict future yield with high accuracy.

-Quality factor (TR10):

Evaluate the site quality according to German Law EEG2017, TR10 guidelines. Certification by TÜV-SÜD in progress.

New in Post-construction:

- Streamlined workflow.
- New tool for nacelle wind speed consistency check and correction.
- Improved error code handling.
- Automatically load error code categories and generate new error codes from different descriptions.
- Improved report and more output options.



TR10

New sub-module for PERFORMANCE CHECK.

Evaluate how a wind farm's remuneration will be affected at the 5,10,15-year mark according to the German TR10(Rev.0) guideline. windPRO is capable of calculating the site yield with either the detailed or the simplified methodology depending on the availability of the SCADA data.

The correct implementation of the category allocation and the simplified method according to TR10(Rev.0) is certified by TÜV SÜD.

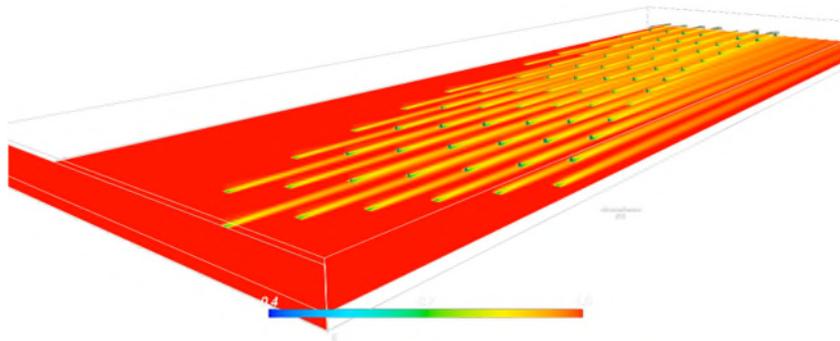
PARK

WakeBlaster

Integration of WakeBlaster, a new cloud-based RANS solver-based wake calculation engine from ProPlanEn.

Many wake models are based on modelling the development of the wake of single turbines independent of the presence of other wind turbines. WakeBlaster in contrast models the detailed structure of the 3D wind field for a complete wind farm. The numerical model reduces the wake loss uncertainties, not least by eliminating the need for many empirical corrections like wake superposition, large wind farm, deep array, close spacing, atmospheric stability (aka blockage) and stubby towers (aka blockage).

EMD is appointed as global reseller of WakeBlaster subscriptions and credits. Contact sales@emd.dk for more information.



EWTS II (G.C. Larsen) : 2008 wake model updated

The Larsen:2008 wake combination model has been updated with options for linear and RSS weighting. This is although not a general recommended model, but it was pointed out that this model should use linear, not RSS weighted combination model. Now both can be used, also in combination.

Curtailement import

Curtailements can now be imported to a single WTG object, the same way as importing curtailements in multi-edit.

Bat-curtailement with rain

Time-varying PARK calculation can now use the Precipitation signal for bat curtailement rules.

Edit rule

Type:

Name:

	Condition for curtailement	Unit	From	To
	Precipitation	mm/h	0	30

LOSS & UNCERTAINTY

Per-turbine-losses

Losses can now be entered for individual turbines or as losses for the park as a whole.

Manually enter losses per turbine

A new loss category called "Other curtailement" has been added:

Birds	<input type="checkbox"/>	
Bats	<input type="checkbox"/>	
Other curtailement	<input checked="" type="checkbox"/>	Edit

New uncertainty categories have been added

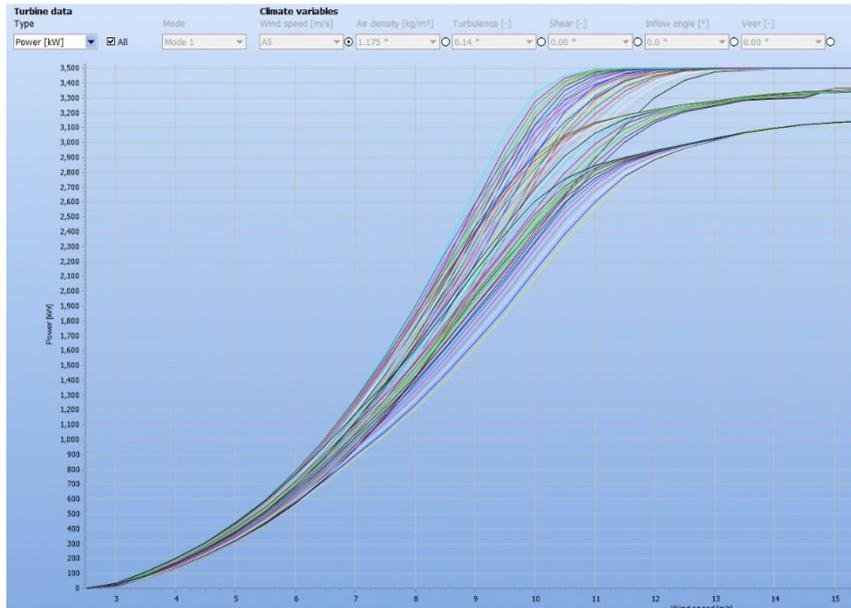
- Category A (Wind data): "Reference WTGs"
- Category B (Modelling of Wind Data): "Uncertainty of Terrain data"
- Category C (Conversion of Energy): "Site-specific impacts on power curve"
- Category C (Conversion of Energy): "Differing technical operating behavior"

Technical:

PowerMatrix files can now be read directly from windCAT without using a .wtg file. This enables manufactures to generate multi-dimensional turbine datasets on in-house servers and use them directly in windPRO.

PowerMatrix files can currently be generated by the following manufactures:

- Enercon
- GE
- Nordex
- Siemens-Gamesa
- Vestas



For more information on the PowerMatrix format visit: help.emd.dk/knowledgebase/content/PowerMatrixFormat_v1.5.pdf

The free and reduced wind speeds are now included in the "**Park result to XML file**".

```
- <WTG_result>
  <Total>10,219.40</Total>
  <Efficiency>97.92</Efficiency>
  <Regional_correction_factor>1.000</Regional_correcti
  <Free_wind_speed>9.08</Free_wind_speed>
  <Reduced_wind_speed>9.08</Reduced_wind_speed>
```

Result to file exports no longer include thousands-separators.

UTM (south)-WGS84		
Name	Easting	Southing
West mas	597254	6816041
West mas	597254	6816041

Grid-curtailment can be activated as an experimental feature in PARK by requesting support@emd.dk

The 3DA object is not compatible with 64-bit and is hidden in all 3.4 projects. The underlying data structure is still preserved, so saving old projects in 3.4 as w33p/w33p files, will still work.

Antivirus: A new application (wpcalc32.exe) is now being used to run WAsP and WEng calculations.

Deinstallation leaves fewer traces on the machine

Online data

Since the introduction of windPRO 3.3 the following online datasets have been made available:

Elevation models

- [Australia](#)
- [Belgium Walloon](#)
- [Estonia](#)
- [Global AW3D30 \(ALOS\)](#)
- [Germany](#)
 - [Saxony](#)
 - [Hamburg](#)
 - [Berlin](#)
- [Latvia](#)
- [Wales](#)

Roughness models

- [Copernicus Global Land Service - 100m](#)

Orhophoto maps

- [Denmark](#)
- [Latvia](#)
- [France](#)
- [Spain](#)

Topographic maps

- [Estonia](#)
- [Spain](#)

Bathymetry models

- [EMODnet \(Europe\)](#)
- [GEBCO \(Global\)](#)

Forest height models

- [Danish KU](#)
- [Estonia](#)
- [Latvia](#)
- [Norway](#)

Climate data

- [EMD-WRF Europe+](#)
- [ERA5](#)
- [ERA5\(T\)](#)

Turbine data:

- [Marktstammdatenregister \(MaStR\)](#)