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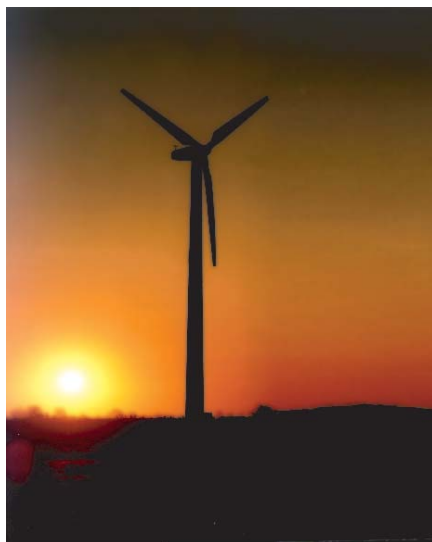
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# Wind 2 PRO



**WindPRO**  
Training courses 2010

**EMD**  
www.emd.dk

**Wind  
PRO**

Software for wind energy project and planning

# WindPRO 3-Day Training Course

## Day 1: BASIC and Analysing Wind Data

*The purpose of the first course day is for beginners to obtain a basic understanding of WindPRO and for the more experienced users to refresh their skills and an overview of the latest improvements in WindPRO. For all participants this day is a unique opportunity to explore the "state of the art" in wind projects design.*

*The BASIS module is the platform on which all WindPRO modules operate. No matter which modules of WindPRO you are using or intent to use, you will need to get familiar with the BASIS facilities.*

Basic Information and Exercises:

- **Installation of software**
- **Course introduction** – Best practice for wind energy project design.
- **Project development with WindPRO** - The basic ingredients for a WTG project and a demonstration of how WindPRO can be used throughout the process to calculate and document the project.
- **Introduction to WindPRO** – System overview, possibilities and limitations.
- **Coordinate systems and maps**
- **Printing and reports**
- **The WTG Catalogue (WindCat)** - With detailed technical data provided by the manufacturers for over 700 types of turbines, including the latest on the market.
- **Practice exercises using the WindPRO Basis module, including:**
  - Creation of a new project
  - Attachment of scanned maps
  - Import of digital height contour lines
  - Working with layer structure and different layout support features
  - Establishment of a wind farm, get familiar with the many design auxiliary tools
  - Obtain Z-coordinates from Digital Height Model (DHM)
  - Calculation/setup
  - Preview/print of reports
  - Export/import facilities (on more levels)

Analysing Wind Data:

- **Wind energy** – A theoretical introduction to the field of wind energy calculation.
- **Measuring the wind** – Import and

analysis of wind measurements in the METEO object. Here measured wind data can be validated (screened), analysed and prepared for use in energy calculations. Methods for validation of the measurements will be presented and best practices for measuring campaigns discussed.

- **Practical exercise in importing and analysing measured wind data (logger data).**
- **Simple energy calculation** - We will demonstrate how you can make energy yield calculations for a single turbine based directly on the measurements (and shear). Presentation of the report features or how to make extensive documentation of any calculation.

## Day 2: Energy Calculations

*On day 2 we start with the presentation of the park effect generated by wind turbines in a wind farm and see how to include it in the e energy yield calculation of a wind farm. Later, we will introduce the use of WAsP, which is currently the best-documented and most used calculation engine for wind energy calculations. We will prepare the background data to be used in the WindPRO/WAsP calculation, like roughness, obstacles and a height model and we will look into advantages and pitfalls of using WAsP. Finally, we will look at more advanced facilities like wind resource maps, layout optimizations and long term correction of wind data.*

Park Calculations on measured Wind Data:

- **PARK calculation 1** – We will demonstrate how you can make energy yield calculations for a wind farm including the calculation of the wake losses on each turbines, based directly on the measurements.

- **Exercise**

Using the WAsP Flow and Roughness Model (Wind Atlas model) in combination with WindPRO:

- **The wind atlas model** – A presentation of the theory behind the WAsP model. What kind of input data is necessary and how well does it operate
- **The site assessment** – How to describe the site so that WAsP handles it correctly. Tools exists in WindPRO to make the description of roughness and height contours manually, but also a

number of digital formats are supported so that roughness and the height model can be read from e.g. GIS files

- **Wind statistics and PARK calculation 2** – We apply WASP to our site description and show how we first calculate a wind statistic (a Wind Atlas) for the region based on terrain and wind data, then perform a more precise energy calculation based on the wind statistic that takes into account the terrain around each wind turbine.
- **Exercise**
- **WASP pitfalls** – A brief introduction to the pitfalls in the wind atlas model. The difference between a good and a poor calculation.
- **Wind resource maps and Optimisation** – Wind resource maps are very useful to identify areas with high wind energy and therefore an excellent help to make site layouts. Based on such wind resource maps WindPRO can create optimised high-yield layouts taking into account array losses, spacing demands and distance to protected areas.
- **Exercise**
- **Correlation and long term correction** – Most measurements are made only for a limited amount of time. It may therefore be necessary to include other long-term data in the analysis. We present some of the most common and usable ways to correlate wind measurements including the MCP module in order to perform long-term corrections (MCP).

### Day 3: Environmental Impact Assessment

*The third day is aimed at getting familiar with the kind of environmental documentation the local authorities usually request in order to give the needed permissions. This day's programme will alternate between theoretical explanations of the various environmental impacts and practical exercises in how to calculate and document them with WindPRO.*

Environmental Calculations:

- **Noise impact** – How to make noise impact calculations with the DECIBEL module. Establishment of noise sensitive areas. Noise regulations and different methods of calculating the noise from WTGs are presented.
- **Shadow flickering impact** – Assess-

ment of the flickering impact using the SHADOW module. Calculations for both individual neighbours and the surrounding area in general are demonstrated

- **Zones of Visual Influence (ZVI)** –How to make maps showing how many WTGs are visible from each individual calculation point, or how to calculate the cumulative impact of several wind farms Possibility to present the radar ZVI calculation.

- **Exercises**

Visualisations:

- **Photomontage** – which will cover aspects like:
  - How to take the photos and import them to the software in a proper way.
  - How to calibrate the camera model to make sure that the WTGs are rendered at the correct positions and in the right proportions on the background photo – how to use as well control marks as digital height model for calibration is demonstrated.
  - It will also be shown how the visualisation tool can be used to give a presentation of the WTG project, where several options are available, like rubber tool for removing rendered WTG parts that should be behind e.g. trees, and how to include other elements than WTGs in rendering, e.g. transformer stations.
- **Exercise**
- **Animations** - We will use the photomontages to create simple 2D-animations for use for animated presentation on computers, web pages etc.
- **The 3D ANIMATOR** – we will demonstrate how to use our virtual reality module, where you can drive or fly through an artificial rendered landscape with animated WTGs. This can be used at presentations for investors or for local authorities and neighbours to give a very impressive presentation of the project. It also offers a unique inspection of the whole data set the energy calculation is based on, especially the digital height information.



# REGISTRATION



In order to register, please either make a copy of this page, fill-in the form and fax the copy to: +45 9635 4446 or use our on-line registration form at: [www.emd.dk](http://www.emd.dk)

- Buenos Aires, Argentina, September 7-9, 2010
- Kassel, Germany, October 19-21, 2010
- Rome, Italy, October 20-22, 2010
- Seoul, Korea, October 26-28, 2010
- Barcelona, Spain, October 26-28, 2010
- Montreal, Canada, November 3-5, 2010
- Aalborg, Denmark, November 9-11, 2010
- Boston, MA, USA, November 16-18, 2010
- Peterborough, UK, November 16-18, 2010
- Rio de Janeiro, Brazil, November 23-25, 2010
- Kassel, Germany, Nov. 30 - Dec. 2, 2010

*Additional training courses may be arranged - Visit [www.emd.dk](http://www.emd.dk) to see updated list of scheduled courses. Final date for registration is 14 days before the course start (for courses abroad).*

## Company Details

Company
Participant
Address
Tel:
Fax:
Email:
VAT. No. (only necessary for EU companies)

*A possible cancellation has to be in writing no later than 5 days before the course start.*

*We reserve the right to cancel the course presuming the case that there are not sufficient participants.*

## Practical Information

### Prices

1 participant	1 day	Euro	400	US Dollars	600
1 participant	2 days	Euro	780	US Dollars	1.170
1 participant	3 days	Euro	1.140	US Dollars	1.710

*Prices in US Dollars may be changed without notice according to the prevailing exchange rate between Euro and US Dollars.*

### Place

Exact location will be published at [www.emd.dk](http://www.emd.dk) no later than four weeks before the course start.

### Payment

Invoice will be sent before the course and payment is due before the course.

### Important

Danish VAT will be added to the above prices if no VAT number is provided (only applies to EU-based companies).

### Other WindPRO Courses

Please visit [www.emd.dk](http://www.emd.dk) for details of courses held in German, Spanish, Italian and French language.

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