



# USER MEETING 2011

INTRODUCTION TO WINDSIM 5.1

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windsim

# CONTENT

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- **New features in WindSim 5.1**

- Losses & Uncertainties module
- Scaled turbulence in the wind resource module
- Forecasting module
- Frandsen model for IEC classification
- K-omega Wilcox model

- **Updated tools**

- Power curve creation tool
- LIDAR Correction Tool
- Terrain editor

- **Release date for WindSim 5.1**

- **Development**

# NEW FEATURES

## Losses and Uncertainties

- New feature under Tools
- Userdefined parameters

The screenshot displays the 'Losses And Uncertainties' window, which is divided into two main sections: 'Losses' and 'Uncertainties'.

**Losses Section:**

- AEP GROSS:** 111,42 GWh/y
- AEP (inc. wake effects):** 107,15 GWh/y
- AEP NET:** 99,81 GWh/y

**Other losses (6,85%)**

Description	%	
Availability	3	✕
Grid	3	✕
Icing	1	✕

**Uncertainties Section:**

- P50:** 50 % → **99,81 GWh/y**
- P75:** 75 % → **90,44 GWh/y**
- P90:** 90 % → **82,00 GWh/y**
- Uncertainties:** **13,92%**

**Uncertainties wind (6,78%)**

Description	%	
Wind variability	3	✕
Wind measuremnts	1	✕
WindSim	6	✕

**Uncertainties energy (6,71%)**

Description	%	
Power curve	6	✕
Losses	3	✕

(Sensitivity factor 1,80%)

Export Need Help?

# NEW FEATURES

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## Scaled ambient turbulent intensity

- Time series in the objects module
- Annual scaled turbulent intensity

# NEW FEATURES

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## Forecasting

- Manual and automatic forecasting via the GUI
- First version has to be requested from [support@windsim.com](mailto:support@windsim.com)
- First version free of charge

# NEW FEATURES

## Forecasting

The screenshot displays the 'Forecasting' application window. The interface includes a menu bar (File, Refresh, Filter, About), a 'Log' section with a table of events, an 'Action' panel with 'Start', 'Stop', and 'Test' buttons, a 'Properties' panel with expandable sections for Project, Calculation, and Server, and a 'Schedule' panel. At the bottom, there are tabs for 'Result', 'Object', and 'Message', and a results table for 'Energy Production'.

Item	TimeStamp	Message	Host
5099	6/10/2011 11:56:27 AM	Results generated OK	Nil
5098	6/10/2011 11:56:25 AM	Starting windsim core	Nil
5097	6/10/2011 11:56:24 AM	Checking server...	Nil
5096	6/10/2011 11:55:24 AM	Results generated OK	Nil
5095	6/10/2011 11:55:22 AM	Starting windsim core	Nil
5094	6/10/2011 11:55:21 AM	Checking server...	Nil
5093	6/10/2011 11:54:21 AM	Results generated OK	Nil
5092	6/10/2011 11:54:19 AM	Starting windsim core	Nil
5091	6/10/2011 11:54:18 AM	Checking server...	Nil
5090	6/10/2011 11:53:18 AM	Results generated OK	Nil
5089	6/10/2011 11:53:16 AM	Starting windsim core	Nil

Version: 502  
Date: 10.06.11 08:20

Energy Production	
Turbine 1.txt	22.11.2010 11:26
Turbine 2.txt	22.11.2010 11:26

# NEW FEATURES

## Forecasting

The screenshot shows the 'Forecasting' application window. The top menu bar includes 'File', 'Refresh', 'Filter', and 'About'. The main area is divided into several sections:

- Log:** A table of messages with columns for Item, TimeStamp, Message, and Host. The messages are as follows:

Item	TimeStamp	Message	Host
S114	6/10/2011 12:00:37 PM	Stop forecasting	Nil
S113	6/10/2011 12:00:11 PM	Results generated OK	Nil
S112	6/10/2011 12:00:09 PM	Starting windsim core	Nil
S111	6/10/2011 12:00:08 PM	Checking server...	Nil
S110	6/10/2011 12:00:08 PM	Start forecasting	Nil
S109	6/10/2011 12:00:07 PM	Stop forecasting	Nil
S108	6/10/2011 11:59:36 AM	Results generated OK	Nil
S107	6/10/2011 11:59:35 AM	Starting windsim core	Nil
S106	6/10/2011 11:59:33 AM	Checking server...	Nil
S105	6/10/2011 11:58:33 AM	Results generated OK	Nil
S104	6/10/2011 11:58:32 AM	Starting windsim core	Nil
- Action:** A dropdown menu currently showing 'Start Stop Test'.
- Properties:** A tree view showing project settings:
  - Project:** Name: Hundhammer, Layout: Forecasting
  - Calculation:** AirDensityCorrection: No correction, WakeModel: Model 3
  - Server:** ServerName: ftp2.windsim.com
- Schedule:** An empty section for scheduling.

Below the log is a 'Result' section with tabs for 'Object', 'Message', and 'Animation'. The 'Object representation' tab is active, showing a 3D topographic map. A vertical color scale on the left indicates values from 20 to 82. The map features a central brown area with a white circle and triangle, surrounded by yellow and green terrain. The status bar at the bottom left shows 'Ready'.

# NEW FEATURES

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## Frandsen model in the IEC classification

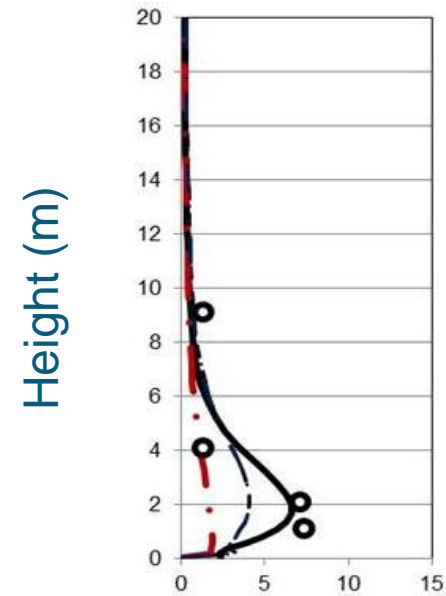
- IEC classification after the Amendment for the 3rd edition
- Wake induced turbulence calculated by Frandsen model
- New table in energy module

# NEW FEATURES

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## K-omega Wilcox model

- Option under the wind field module
- Better simulation of TKE profiles



Turbulent Kinetic Energy ( $\text{m}^2/\text{s}^2$ )

# UPDATED TOOLS

## Power curve tool

Create New Power Curve

Turbine manufacturer :

Type specification :

Nominal power :  kW

Air density :  kg/m<sup>3</sup>

Cut-in speed :  m/s

Cut-out speed :  m/s

Rated wind speed :  m/s

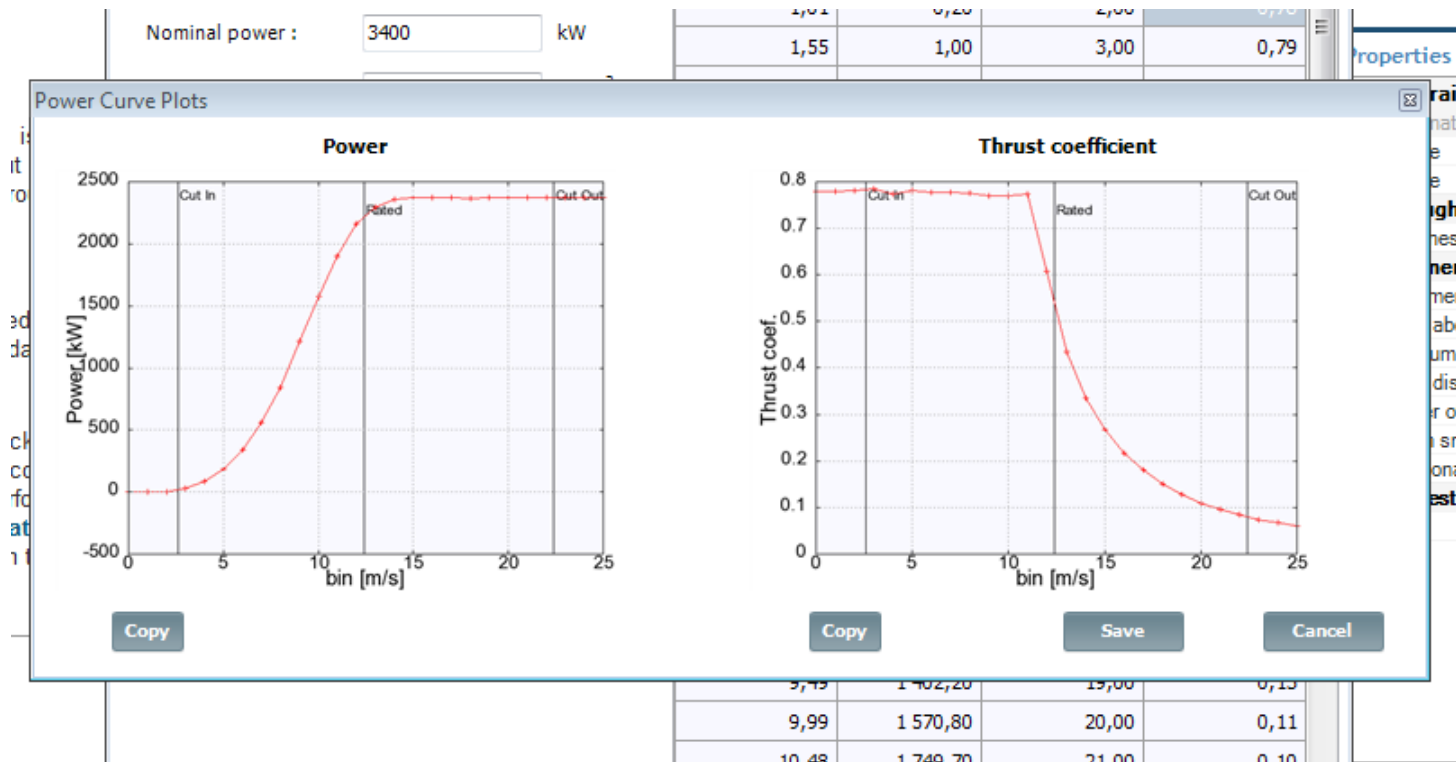
Define noise broadband data

Power curve data:

Speed (m/s)	Power (kW)	Speed (m/s)	Thrust Coef.
0,58	-0,30	1,00	0,78
1,01	-0,20	2,00	0,78
1,55	1,00	3,00	0,79
2,04	5,80	4,00	0,77
2,55	17,70	5,00	0,78
2,99	30,80	6,00	0,78
3,44	53,00	7,00	0,78
3,97	85,80	8,00	0,78
4,52	129,20	9,00	0,77
4,99	183,70	10,00	0,77
5,53	259,90	11,00	0,77
6,00	339,90	12,00	0,61
6,49	444,10	13,00	0,44
7,02	566,60	14,00	0,34
7,51	715,00	15,00	0,27
8,00	844,40	16,00	0,22
8,50	1 035,10	17,00	0,18
9,01	1 222,40	18,00	0,15
9,49	1 402,20	19,00	0,13
9,99	1 570,80	20,00	0,11
10,48	1 749,70	21,00	0,10
10,97	1 889,40	22,00	0,08
11,47	2 063,00	23,00	0,07

# UPDATED TOOLS

## Power curve tool



# UPDATED TOOLS

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## LIDAR correction tool

- Support of Windcube V1 and V2
- Writing directly into tws files
- Providing standard deviation in tws files
- No need for the 10 minutes data anymore. Only raw data used

# UPDATED TOOLS

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## Terrain editor

- GlobalMapper API included
- More formats can be included on request
- Free GlobalMapper licence for WindSim users
- GWS export from GlobalMapper possible

# Release Date

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## Release date for WindSim 5.1

- Beta version shortly after the user meeting
- Final version in August/September 2011
- Beta testers welcome!!!

# Development

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## Short term

- Automatic gridding procedure based on given park layout
- Reading of ows and tws files from excell
- Improved preprocessing tool
- Big Model Version with
  - temperature
  - parallel version
  - increased number of nodes for terrain
- Better convergence for difficult cases

# Development

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## Long term

- WindSim 6.0
  - New GUI
  - Unstructured grid
  - Automatic cross correlation
  - Weighting of exported profiles
  - Reporting into Word/PDF
  - Multiple models in one project
  - Queuing up of jobs in wind fields