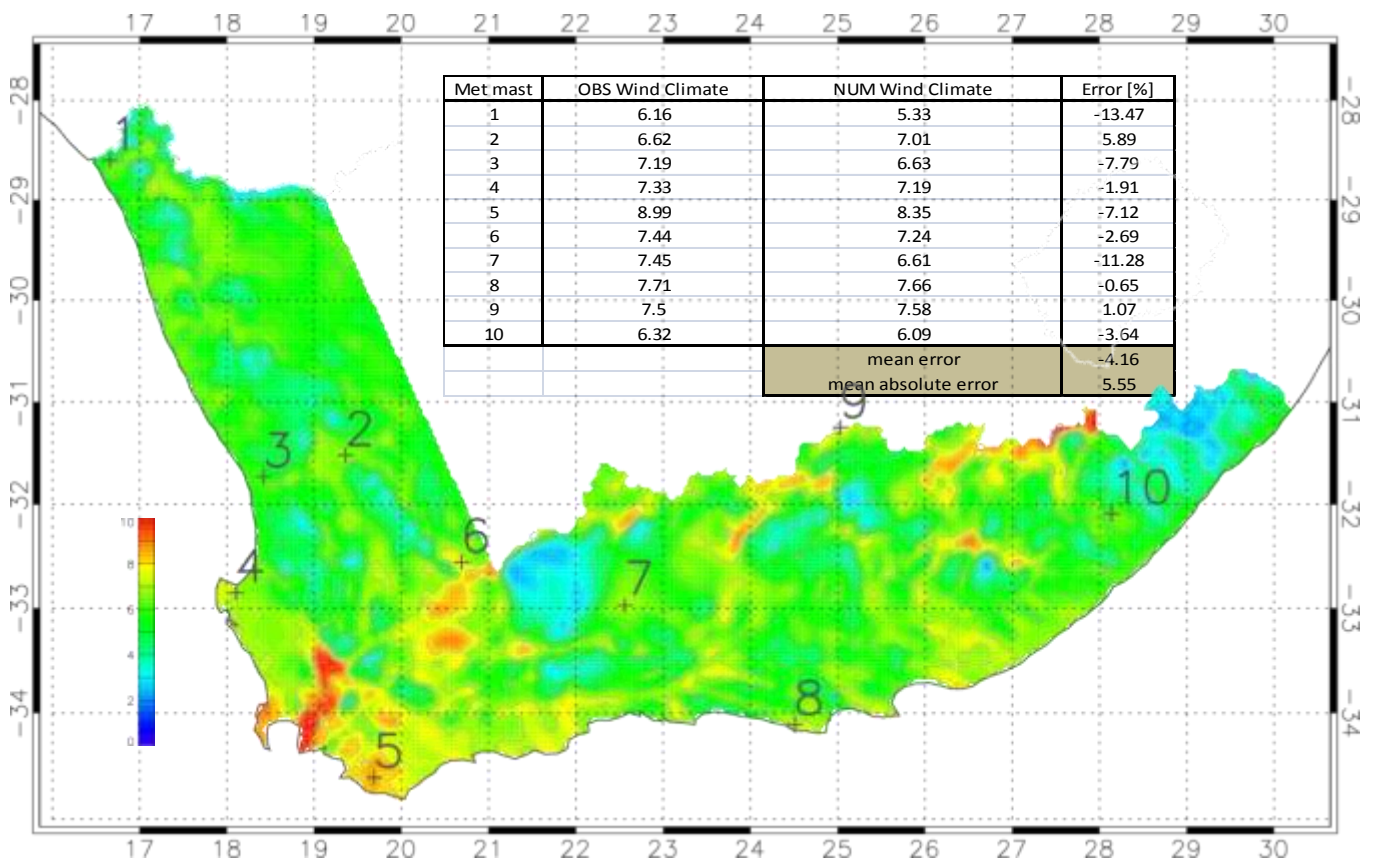


## SOUTH AFRICAN WIND ATLAS (WASA) GUIDE

WASA (2009 to 2014) is an initiative of the South African Government, Department of Energy, and the project is co-funded by the UNDP-GEF through the South African Wind Energy Programme (SAWEP), and the Royal Danish Embassy. South African National Energy Research Institute (SANERI) is the Executing Partner, coordinating and contracting contributions from the implementing partners: CSIR, UCT, SAWS, and Risø, now DTU Wind Energy.

### Introduction

The Numerical Wind Atlas (NWA) shows the generalised<sup>1</sup>, climatological (30-year) annual mean wind speed [m/s] 100 m above ground level, for the Northern Cape, Western Cape and Eastern Cape.

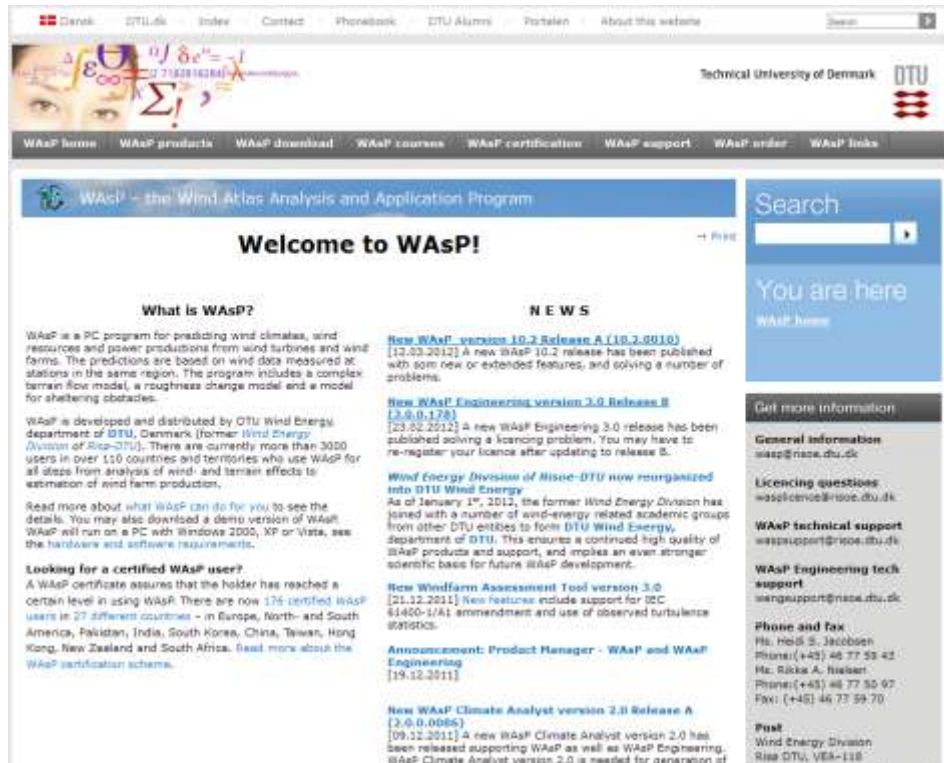


The Numerical Wind Atlas Database contains the generalised<sup>1</sup> wind climate data sets (.lib files) for every 5 km x 5 km, corresponding to approximately 15000 data points (“virtual masts”) that can be employed directly with WAsP (licensed version) for wind farm planning and wind resource assessment.

<sup>1</sup> flat, uniform terrain, no obstacles and with 3 cm roughness (e.g. farmland with open appearances) over the entire area

## How to access the Numerical Wind Atlas Database

1. Download WAsP 10.2 from the WAsP website. [www.wasp.dk](http://www.wasp.dk). Install the WAsP software on the hard disc drive (HDD). The unlicensed WAsP will allow you view the Generalised Wind Climate .lib files, but will not allow any calculations to be done.



2. Register for data downloads on the WASA website [www.wasa.csr.co.za](http://www.wasa.csr.co.za)

### i. Go to the downloads page



ii. Complete all the required fields



Message Board:

- Please note: All the date/times are in SAST (UTC +2)
- 2012/02/15: January 2012 now available.
- 2012/02/15: December 2011 updates for WMO2, WMO5 and WMO7 now available.
- 2012/01/17: December 2011 now available.
- 2011/12/05: November 2011 now available.
- 2011/01/06: The directions of all the stations have been corrected. Please download the new versions.
- 2011/01/06: (Magnetic declination had been added instead of subtracted)

Welcome to the WASA download site

If you are already registered, and want to download data, OR if you want to check whether you are registered fill in your e-mail address, and press the 'Send Password' button. It will be sent to you by e-mail.

E-mail:

Password:

If you have not yet registered, and want to download data, please complete the registration form below.

First name: \*

Surname: \*

Company name / Affiliation / Personal user: \*

Affiliation type: \*

If 'Other' above, please enter:

Intended usage: \*

If 'Other' above, please enter:

Address: \*

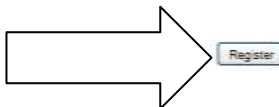
Country: \*

Telephone: \*

E-mail: \*

Password: \*

Confirm Password: \*



iii. Click on the <Register> button

3. Log in to the data download website using your e-mail address and password provided.

Welcome to the WASA download site

If you are already registered, and want to download data, OR if you want to check whether you are registered, please complete the log in form below, and press the 'Log in' button. If you have forgotten your password, please fill in your e-mail address, and press the 'Send Password' button. It will be sent to you by e-mail

E-mail:

Password:

4. Click on the wind atlas link on the data download page.

Other links: [WASA Online Graphs](#) [WASA FAQ](#) [Arrangement Drawing](#) [Instrumentation Summary](#) [Meet Site Information](#) [Station and Site Descriptions](#)

Logout

Welcome to the WASA download site, Eugene

You are logged in as [emahille@csir.co.za](#)

**WASA Wind Atlas downloads NEW**

**WASA Met. data downloads**

Please choose the sites from which you wish to download data.

- W001 (28°08'36.7"S, 16°00'51.5"E - since 2010-06-25)
- W002 (31°21'23.7"S, 19°21'32.7"E - since 2010-06-25)
- W003 (31°43'49.4"S, 19°25'10.15"E - since 2010-06-24)
- W004 (32°30'41.2"S, 19°08'34.8"E - since 2010-05-18)
- W005 (34°38'41.6"S, 19°41'30.3"E - since 2010-05-20)
- W006 (32°28'24.4"S, 20°41'23.7"E - since 2010-05-17)
- W007 (32°38'08.2"S, 23°32'23.8"E - since 2010-05-28)
- W008 (34°08'02"S, 24°10'49"E - since 2010-05-24)
- W009 (31°13'01.76"S, 18°01'50.18"E - since 2010-08-01)
- W010 (32°08'26.5"S, 28°08'09.8"E - since 2010-08-08)

Go

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5. Scroll down to the Tadpole link on the Wind Atlas web page and click on the link.

Other links: [WASA Online Graphs](#) [WASA FAQ](#) [Arrangement Drawing](#) [Instrumentation Summary](#) [Meet Site Information](#) [Station and Site Descriptions](#)

Welcome to the WASA Wind Atlas download site

This is the download site for the First verified numerical atlas for South Africa

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- [Reports and Guidelines](#)
- [Map data and tools](#)
- [Software](#)

To provide feedback to the WASA team, you can optionally download and fill in the [questionnaire](#), and e-mail to the [Webmaster](#)

**First Numerical Wind Atlas**

The WASA numerical wind atlas contains generalised wind atlas data sets for tens of thousands of model grid points in the WASA region.

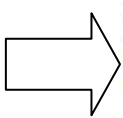
The mesoscale model used for the first verified atlas is the Karlsruhe Atmospheric Mesoscale Model (KAMM) and the spacing between grid points can be viewed in the [Tadpole web interface](#).

6. The Tadpole page with the Google Earth plug-in will open.



7. Select the domain on the left side of the Google Earth plug-in that covers your area of interest.

i Measurement masts.



ii South Africa (all domains)



iii Individual modeling domain

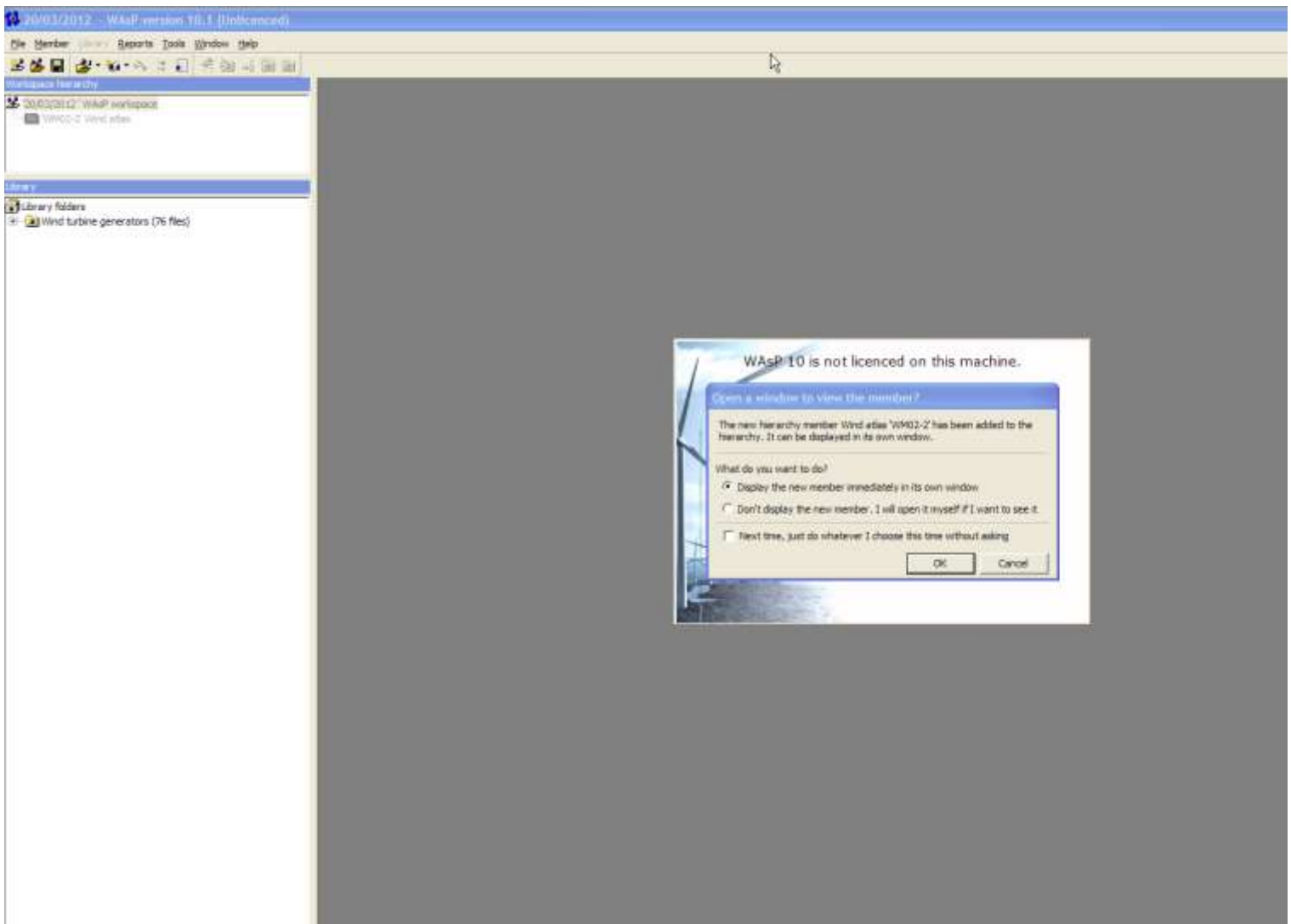


8. Locate your area of interest using the standard Google Earth controls.
9. Click on the wind atlas grid point closest to your area/point of interest.



10. Download the .lib file and save on your hard disk

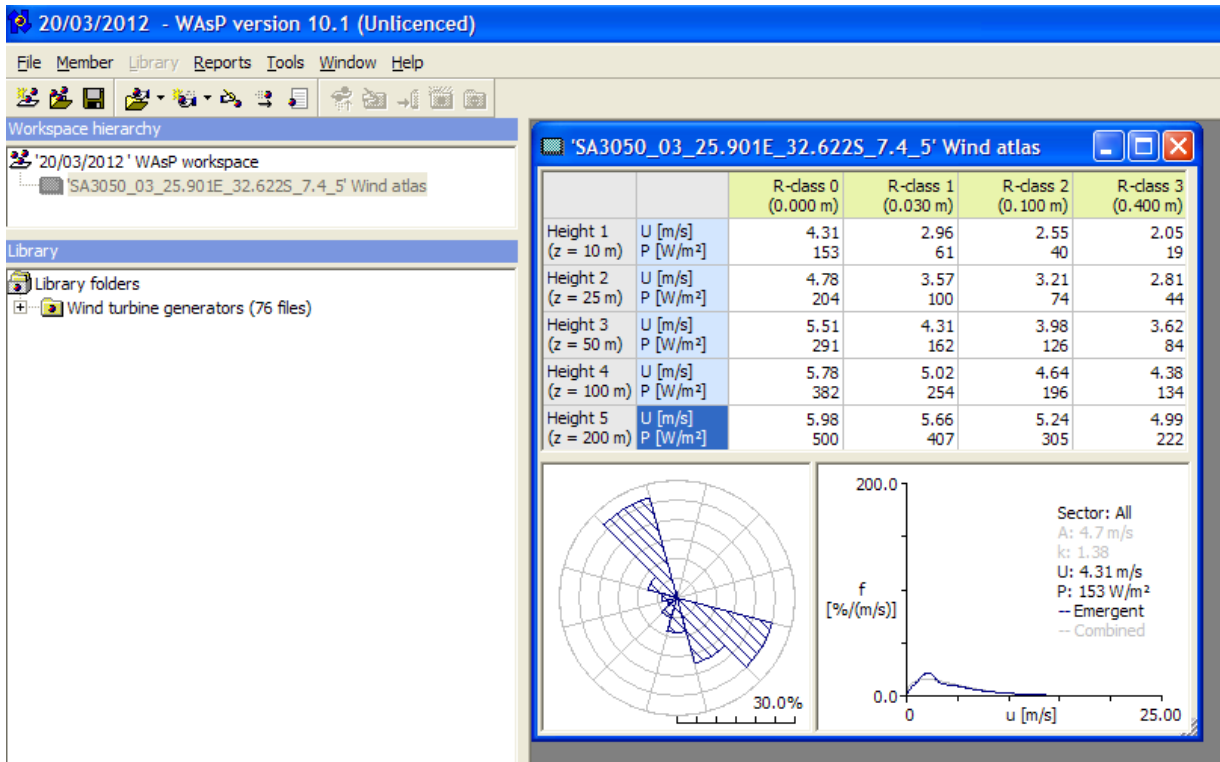


**11. View the .lib file by:****i. Double clicking on the saved .lib file or**

- ii. Run the WAsP 10.2 program. Open the .lib file by using the File|New Workspace  
Right click on Project 1  
Insert from File  
Select Wind Atlas, locate the file you downloaded and Open.**



- iii **Generalised wind climate at the selected point. Left click on the wind rose sectors to display the sectorised wind speed distribution curve.**



12. The .lib file is the Generalised<sup>1</sup> or Geostrophic wind climate for the selected grid point. The .lib file contains the wind direction distribution as well as the sectorised and all wind speed distribution for the selected grid point. The table contains the mean wind speed and power density at five standard heights above ground level (0m, 10m, 25m, 50m, 100m, 200m) and five roughness classes. The roughness classes correspond to ground cover types:

R class 0 (0.000m) water areas, R class 1 (0.030m) farmland with open appearances, very few buildings, trees, airport area with some buildings and trees, R class 2 (0.100m) farmland with closed appearance, R class 3 (0.400m) low forest, suburbs, shelter belts, many trees and/or bushes and R class 4 (1.500m) tall forest

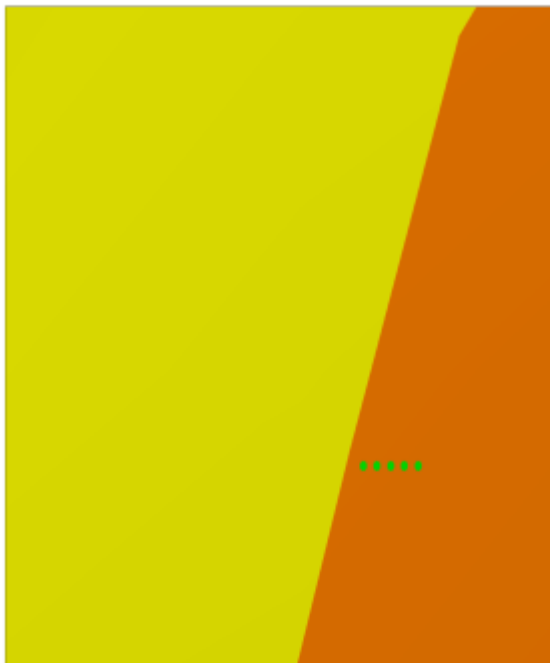
It also shows the Weibull graph and parameters A and k (lower right corner) which is a mathematical fit to the generalised wind data. The Weibull parameters A and k are used in combination with the wind turbine power curve, to calculate e.g. the estimated Annual Energy Production (AEP) etc. of a wind turbine(s) at the site.

<sup>1</sup> flat, uniform terrain, no obstacles and with 3 cm roughness (e.g. farmland with open appearances) over the entire area

13. Any further analysis to estimate the actual wind climate, wind farm planning, layout and wind resource assessment at the area/point of interest (e.g. microscale modeling) will require a licensed version of WAsP, see 15. If you are unfamiliar with WAsP or microscale modelling you are urged to contact a reputable wind energy specialist or consultant to help in assessing your needs.
14. Note, that although the WAsP software has been used in this guideline it should be possible to use any similar software (WindPro, GH WindFarmer etc.) to view the .lib file.
15. **Microscale Modeling**

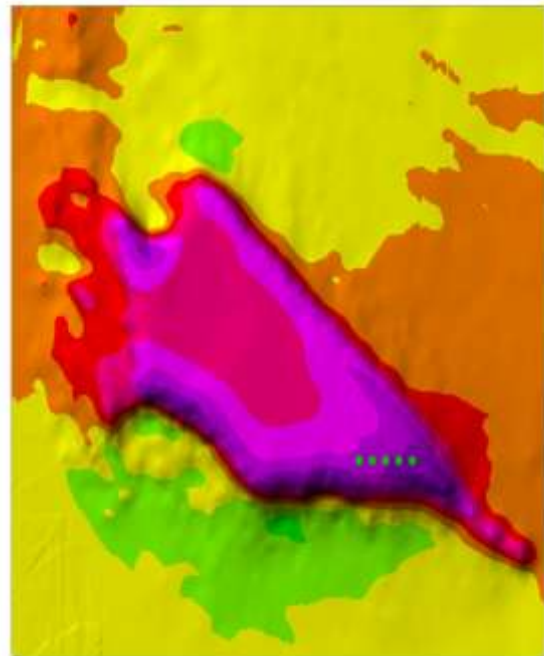
**The Numerical Wind Atlas and database assume a flat, uniform terrain, with no obstacles and with 3 cm roughness (e.g. farmland with open appearances) everywhere. I.e. it ignores surface effects such as elevation (e.g. hill that can speed up the wind), roughness (e.g. forest that can slow down the wind), obstacles etc. It is then very likely that the Numerical Wind Atlas will over- or under-predict the mean local wind speed and power density.**

**Numerical Wind Atlas**



Grid cell size 5120 m  
 Wind farm of five 2 MW turbines  
 Estimated AEP = 39 GWh

**Microscale Modeling**



Grid cell size 20 m  
 Wind farm of five 2 MW turbines  
 Estimated AEP = 55 GWh

Microscale modeling of the surface effects such as elevation, roughness, obstacles etc. that results in a more accurate prediction of the local wind climate and therefore wind farm planning, layout and wind resource assessment is called downscaling and requires a fully licensed version of WAsP or similar software and professional assistance to set up and run the software. [See Planning and Development of Wind Farms \(Risø-I-3272\)\(ed.2\)](#)

16 Please complete the questionnaire and provide feedback on your experience.



Other links: [WASA Online Graphs](#) [WASA FAQ](#)  
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The mesoscale model used for the first verified atlas is the Karlsruhe Atmospheric Mesoscale Model (KAMM) and the spacing between database; the grid point locations can be viewed in the [Tadpole web interface](#).

**PLEASE NOTE.** While the application of the Numerical Wind Atlas NWA assists anyone, for free, to explore the generalised wind climate for every 5km x 5km ( about 15000 data points on the NWA), it does not substitute the need for proper wind measurements which is a usual requirement for funding.

### **DISCLAIMER**

**By using this Guide, you agree that the exclusions and limitations of liability set out in this disclaimer are reasonable. If you do not think they are reasonable, you must not use this Guide.**

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