



Projekteringsværktøj for husstandsmøller: Online WAsP

Et nyt initiativ fra DTU og EMD

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Projekteringsværktøj for husstandsmøller

Online WAsP

Et nyt initiativ fra DTU og EMD

til beregning af energiproduktion, støjemission og økonomiske nøgletal for små og mellemstore vindmøller

Projekteringsværktøj for husstandsmøller

~~Online WAsP~~

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Projekteringsværktøj for husstandsmøller

myWindTurbine

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Agenda:

1. Introduktion [Morten]
2. Anvendelse af myWindTurbine [Andreas]
3. Produktionsopfølgning [Morten]

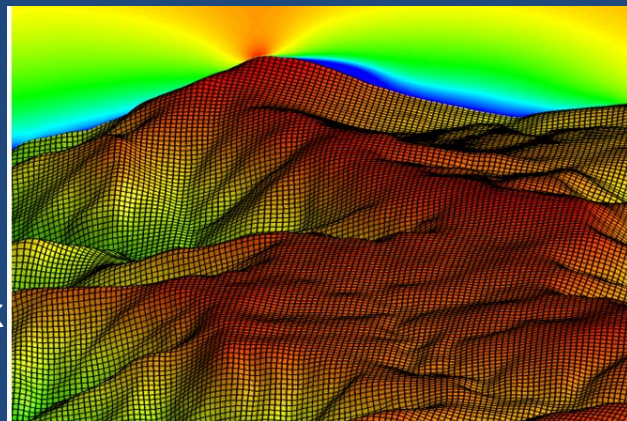


Hvem er vi

Andreas – Projektleder (DTU) - Seniorforsker



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Morten – Projektleder (EMD) – Afdelingsleder



mlt@emd.dk



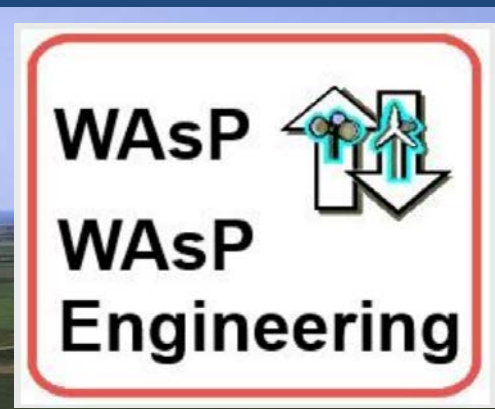
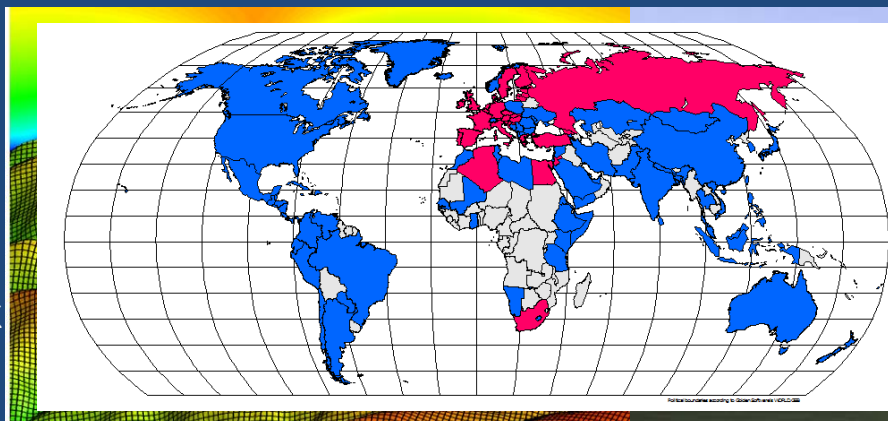


Hvor og med hvad vi arbejder

Andreas – Projektleder (DTU) - Seniorforsker



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Morten – Projektleder (EMD) – Afdelingsleder



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Hvad med Online WAsP?

Visioner og mål

- Dedikeret online værktøj
 - Udviklet i dialog med de potentielle brugere
 - Fokus på enkeltstående små og mellemstore møller
 - Meget kost-effektive beregninger i tid og pris
 - Bygger på nyeste modeller i WAsP og WindPRO (incl validering)
- Global, regional og lokal anvendelighed
- Nøjagtige og uvildigberegninger vha. computer cluster
 - Vindmodel, energiproduktion og evt klimadata med tilknyttede usikkerheder
 - Støjemmissioner
 - Økonomi
- Anvender bedste databaser som input
 - Terræn, vind, vindatlas, vindmøller
- Kan anvendes af forskellige bruger-typer
 - Slutbrugere / potentielle mølleejere
 - Fabrikanter, agenter og sælgere
 - Kommuner



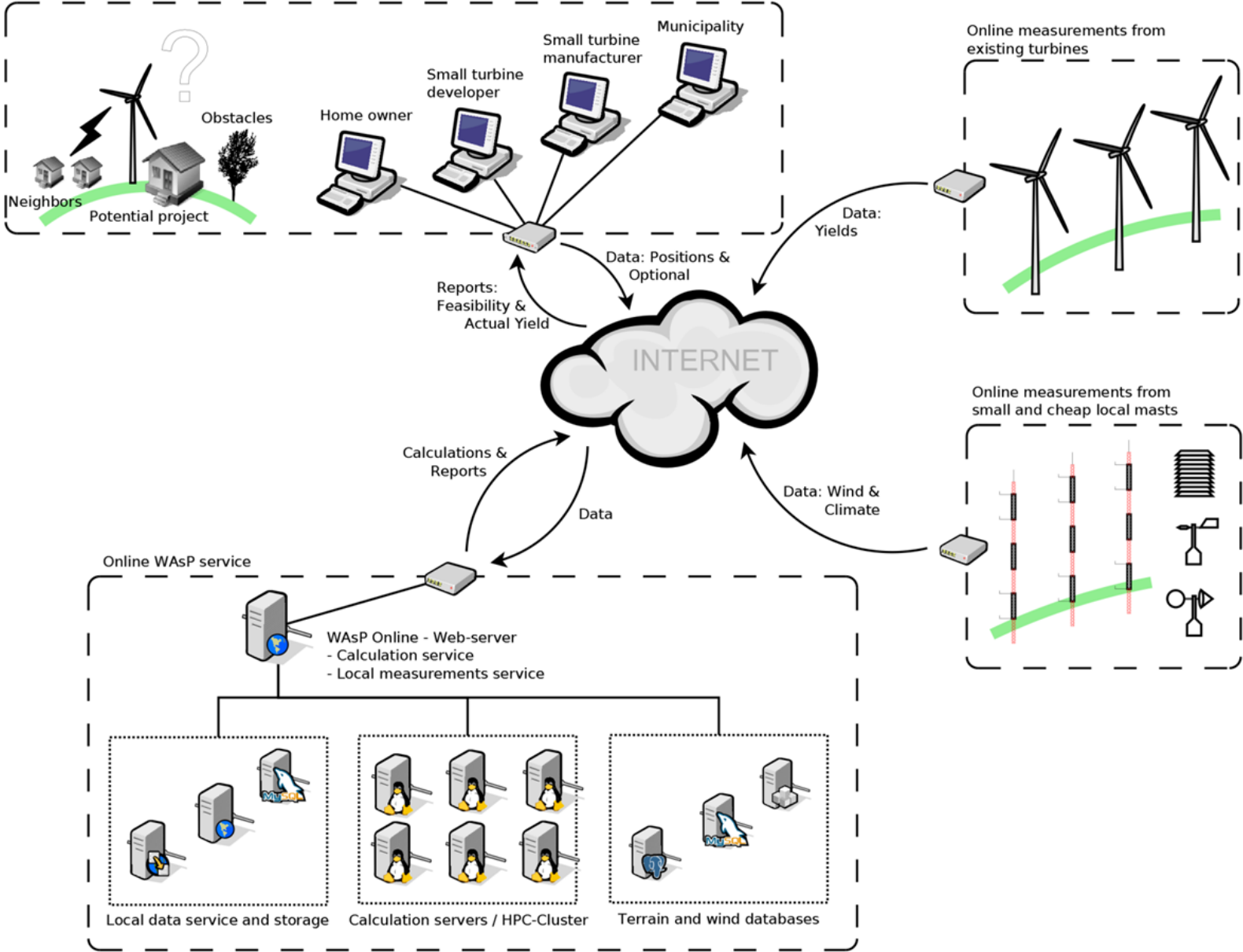
Hvad med Online WAsP?

Visjoner og mål

- Dedikeret til alle brugere
 - Uafhængige og professionelle møller
 - Nøjagtige beregninger (Primo November 2015)
 - Bygge og drift (Primo November 2015)
- Global, regional og lokal tilgængelighed (Primo November 2015)
- Nøjagtige beregninger
 - Energiproduktion og evt. nettilslutning
 - Støjemissioner
 - Økonomi
- Anvender bedste databaser som input
 - Terræn, vind, vindatlas, vindmøller
- Kan anvendes af forskellige bruger-typer
 - Slutbrugere / potentielle mølleejere
 - Fabrikanter, agenter og sælgere
 - Kommuner

NÆSTEN KLAR TIL BETA-TEST
(Primo November 2015)
Vil du med, læg en besked på
www.mywindturbine.com/support

Users, projects and sites



www.myWindTurbine.com

Opera MyWindTurbine 0.1.214 x +
www.mywindturbine.com

Help ▾ [Flags]

MyWindTurbine
Small wind turbines - wind resources and much more.

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www.myWindTurbine.com

www.mywindturbine.com

Help Messe Brugger Logout

Dashboard Resource Map Installed Turbines

myWindTurbine

Dedicated software for wind related assessments of small and medium sized turbines. The MyWindTurbine software enables the user to create wind energy projects for individual installations. MyWindTurbine is also designed for turbine owners, being able to monitor and calculate the performance of the turbine. The software is intuitive, contains almost 90% of data needed for any calculation process and comes at an affordable price.

Statistics

Users	66
Projects	179
Resource calculations	579
Calculations	827

Calculation Engine

Dedicated feature for suitability analysis and economic calculations of a turbine project. The region's best available terrain description and wind statistics are used to calculate the wind resource at turbine's position. Each project can incorporate an unlimited number of calculations for different turbine types and locations within a 500m radius of the project location. More at [wiki](#)

New Project **Demo Project**

My Projects

Bonus 150kW ved Flauenskjold

Project	Bonus 150kW ved Flauenskjold
Calculation	SWP25kW
AEP	71747.7 kWh

Turbine Monitoring

Designed for turbine owners in order to monitor and analyze the performance of their installed turbine. This feature is using the monthly production and down-time data to calculate the performance of the turbine. More at [wiki](#)

New Turbine **Demo Turbine**

My Installed Turbines

Bonus 150 kW at Voer

Name	Bonus 150 kW at Voer
Type	Bonus 150 kW
AEP	247000 kWh

Month	Production (kWh)
Mar 2015	~10000
Apr 2015	~20000
May 2015	~10000
Jun 2015	~20000
Jul 2015	~20000
Aug 2015	~20000

Wind Resource

Turbine Catalog **Coordinates System**

- No Wind Resources
- Global Wind Atlas @ 50m
- EMD ConWx Resource Map @ 25m
- Danish Wind Resource Map @ 25m

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OpenStreetMap contributors

56.71323, 8.96581

Nu til Andreas

Flauenskjold | Voer

150 kW Bonus



Lægivere

Geodatastyrelsen

Sample – Flauenskjold, Northern Jutland



Geodatastyrelsen

Sample – Strandby, Northern Jutland



Geodatastyrelsen

Sample – Aalborg University, Northern Jutland

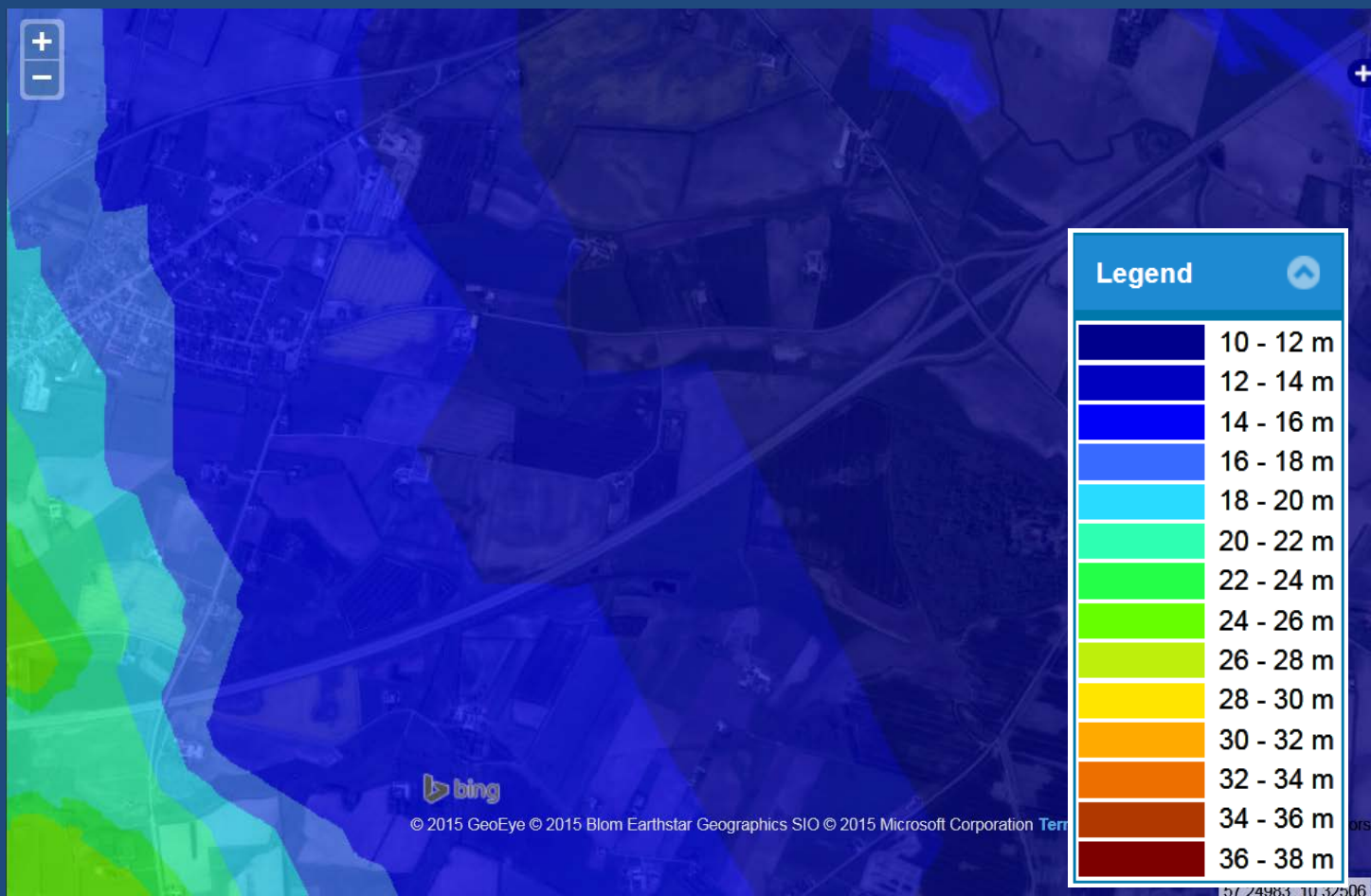


Produktionsberegning

Ruhedskort



Højdekonturer



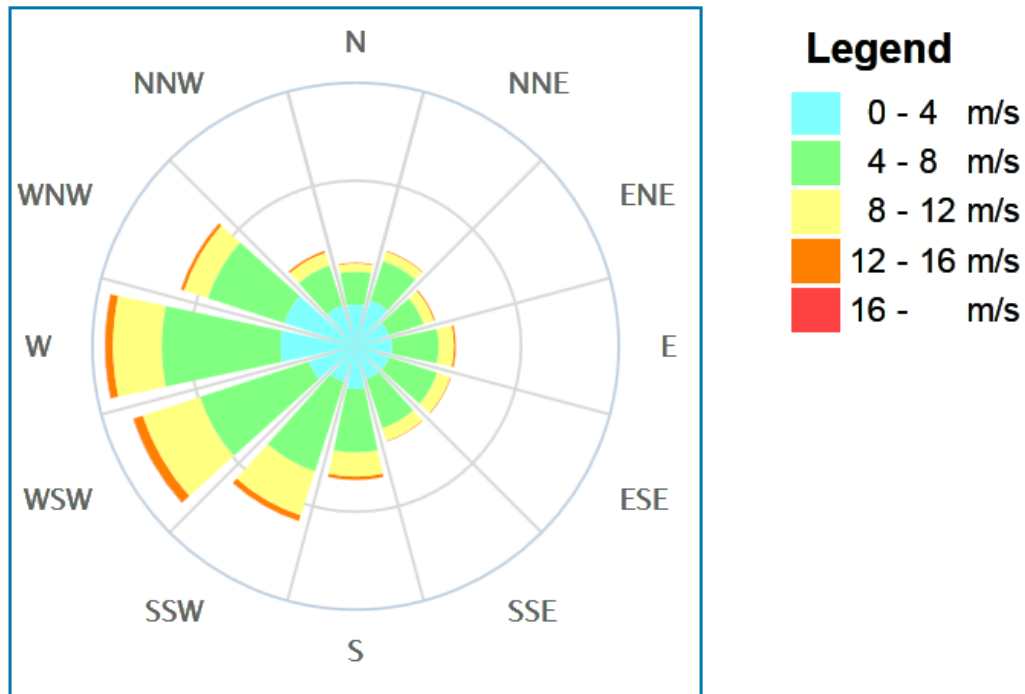
Lægivere

Sample – Flauenskjold, Northern Jutland



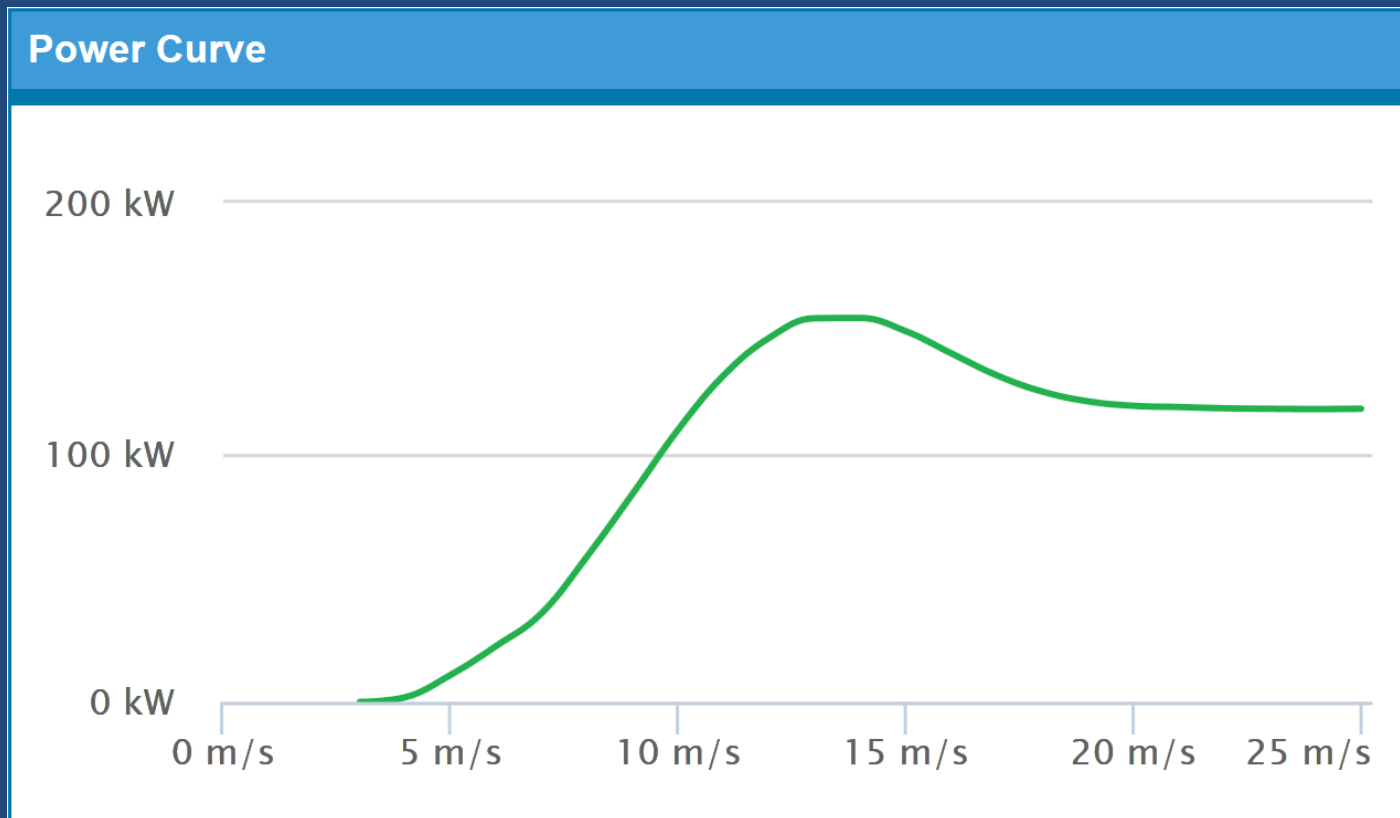
Lokalt Vindklima

Frequency rose (%)



Rose shows the frequency of the energy flux from the particular directions over one year

Effektkurve



Produktion

Faktisk produktion (index-korrigeret)	247 MWh / yr	100%
Med myWindTurbine (ikke korrigeret)	271 MWh / yr	+ 9.7%
Beregning med DK07 vind statistik (+landsdelskorrektion)	233 MWh / yr	- 5.7%
EMD konsulent beregning (kalibreret med nabomøller)	245 MWh / yr	- 0.8%

Nu til Morten

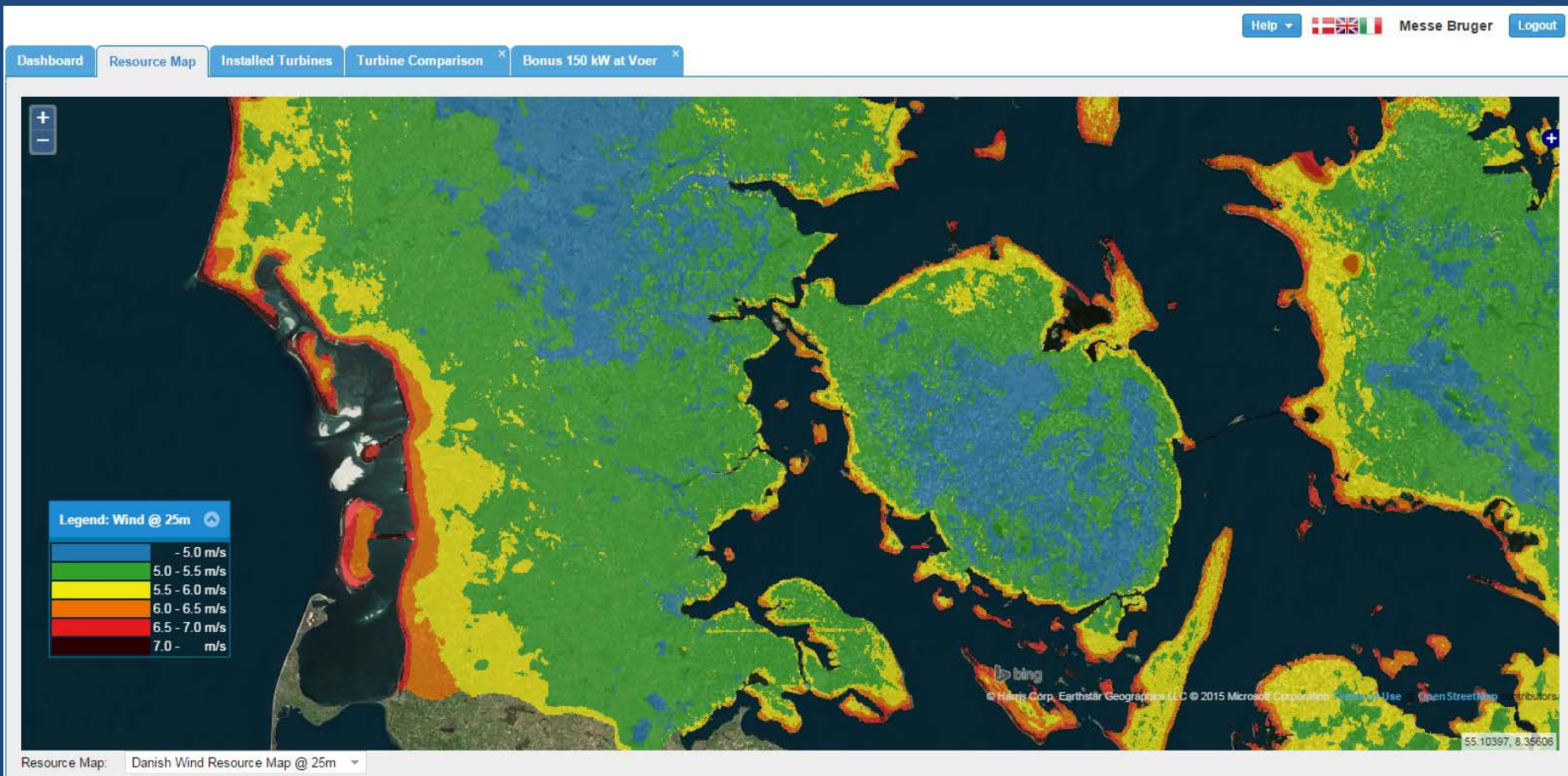
Flauenskjold | Voer

Produktions-opfølgning på 150 kW

Bonus – 30 meter navhøjde



Hvorfor produktions-opfølgning?




”Det blæser mindre end du tror”

Hvorfor produktions-opfølgning?

- Producerer møllen det som du forventede?
- Kører møllen som den skal – set over tid?
- Lær af andre møller:
 - Sammenlign i samme område
 - Sammenlign af samme type
- Beregn års-middelproduktionen vha. vind index
- Få advarsel ved høj vind
- Hjælp andre mølle-købere
 - Vindmodel kan valideres/kalibreres med produktion fra nabomøller
- Gør miljøgevinsten synligt – del fx på facebook

Skridt 1: Opret møllen på www.myWindTurbine.com

Help ▾  Messe Brugger [Logout](#)

Dashboard Resource Map Installed Turbines **Turbine Comparison** × Bonus 150 kW at Voer

Turbine Specification

- Production Data
- Wind Index
- Turbine Performance
- Report

Thursday	Wind Speed	Icon
12-18	9.7 m/s	↑
18-24	8.4 m/s	↶
Friday		
00-06	10.9 m/s	↶
06-12	11.4 m/s	↶
12-18	8.9 m/s	↶
18-24	8.0 m/s	↶
Saturday		
00-06	5.8 m/s	↶
06-12	6.3 m/s	↶
12-18	6.4 m/s	↶
18-24	4.2 m/s	↶
Sunday		
00-06	2.4 m/s	↶
06-12	1.7 m/s	↶
12-18	3.8 m/s	↶
18-24	1.9 m/s	↓
Monday		
00-06	2.1 m/s	↶
06-12	4.7 m/s	↶

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[Delete Turbine](#)

Name: Bonus 150 kW at Voer

Location: 57.248260 10.320980

Wind Index: DK Wind Index

Turbine: Bonus 150 kW

Hub Height: 30



Installation Date: November 1989

Installation Cost: 0 DKK

Yearly expected production: 247000 kWh

Private data:

Description:
Demo turbine at Voer / Flauenskjold.
Turbine calculated using WindPRO 3.0 as well as follow up by data from 'stamdata-registeret' from the danish energy agency.



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57.25847, 10.25283

Skridt 2: Hver måned – indtast produktionstal

Turbine Specification ⓘ

Production Data ⓘ

Wind Index ⓘ

Turbine Performance ⓘ

Report ⓘ

Thursday

12-18 9.7 m/s ↑

18-24 8.4 m/s ↗

Friday

00-06 10.9 m/s ↗

06-12 11.4 m/s ↗

12-18 8.9 m/s ↗

18-24 8.0 m/s ↗

Saturday

00-06 5.8 m/s ↗

06-12 6.3 m/s ↗

12-18 6.4 m/s →

18-24 4.2 m/s ↗

Sunday

00-06 2.4 m/s →

06-12 1.7 m/s ↘

12-18 3.8 m/s ↗

18-24 1.9 m/s ↓

Monday

00-06 2.1 m/s ↘

06-12 4.7 m/s ↗

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[Delete Turbine](#)

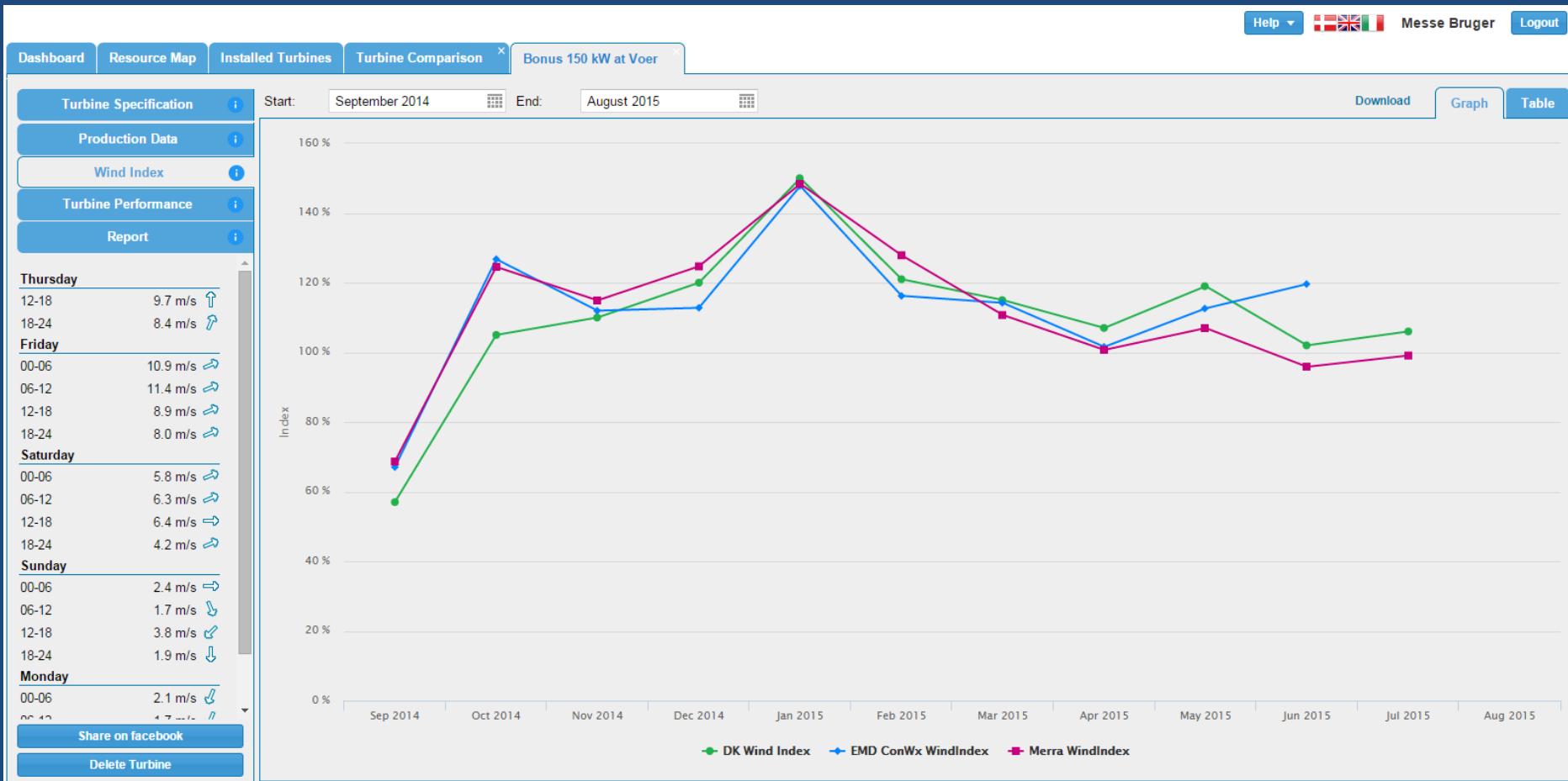
Production Bulk upload ⓘ Year

Disabled	Month	Production [kWh]	Down Days	Availability [%]	Performance	Expected Production
<input type="checkbox"/>	January	27311.0	0.00	100.00	94%	29022.5
<input type="checkbox"/>	February	24947.0	0.00	100.00	100%	24905.8
<input type="checkbox"/>	March	31935.0	0.00	100.00	103%	30875.0
<input type="checkbox"/>	April	18333.0	0.00	100.00	99%	18525.0
<input type="checkbox"/>	May	19707.0	0.00	100.00	105%	18730.8
<input type="checkbox"/>	June	12211.0	0.00	100.00	65%	18730.8
<input type="checkbox"/>	Juli	12829.0	0.00	100.00	96%	13379.2
<input type="checkbox"/>	August	9634.0	0.00	100.00	85%	11320.8
<input type="checkbox"/>	September	16974.0	0.00	100.00	79%	21612.5
<input checked="" type="checkbox"/>	October	8505.0	0.00	100.00	43%	19554.2
<input type="checkbox"/>	November	13874.0	0.00	100.00	69%	19965.8
<input type="checkbox"/>	December	24338.0	0.00	100.00	95%	25523.3

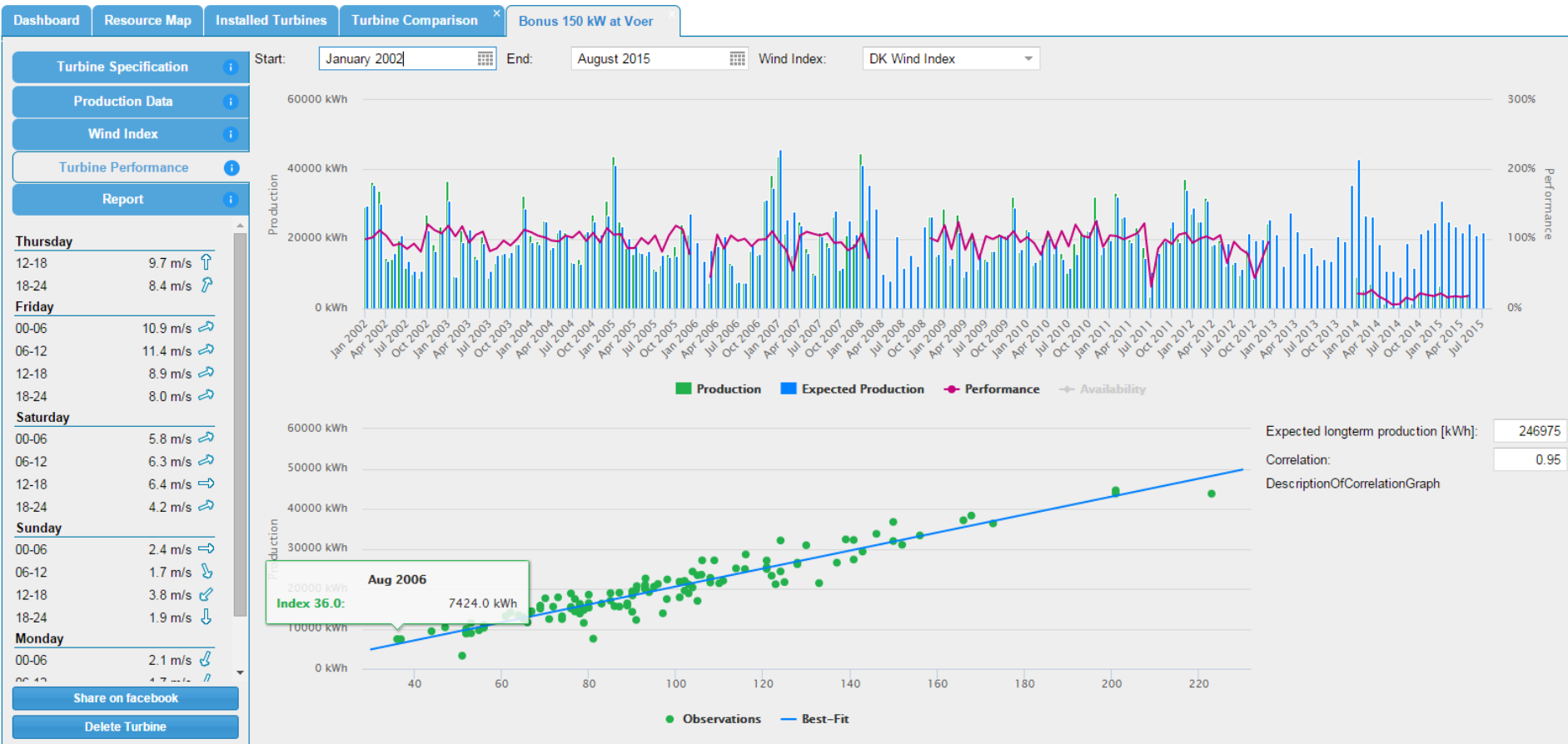
Table contains monitoring data of the turbine for each month.

- Disabled (editable field) - Gives the option to disable the outliers from any future calculations, such as the long term expected production.
- Production (editable field) - Registered production data, which is inserted monthly by the user.
- Down days (editable field) - Number of days in a month when the turbine was stopped.
- Availability (calculated field) - Monthly percentage when the turbine was running.
- Performance (calculated field) - It gives the division between the measured production and expected production. The result should be around 100% (in worst cases +- 20% error range)
- Expected production (calculated field) - It gives an indication of the expected production, based on the rated power of the turbine, the selected wind index and the estimated capacity factor.

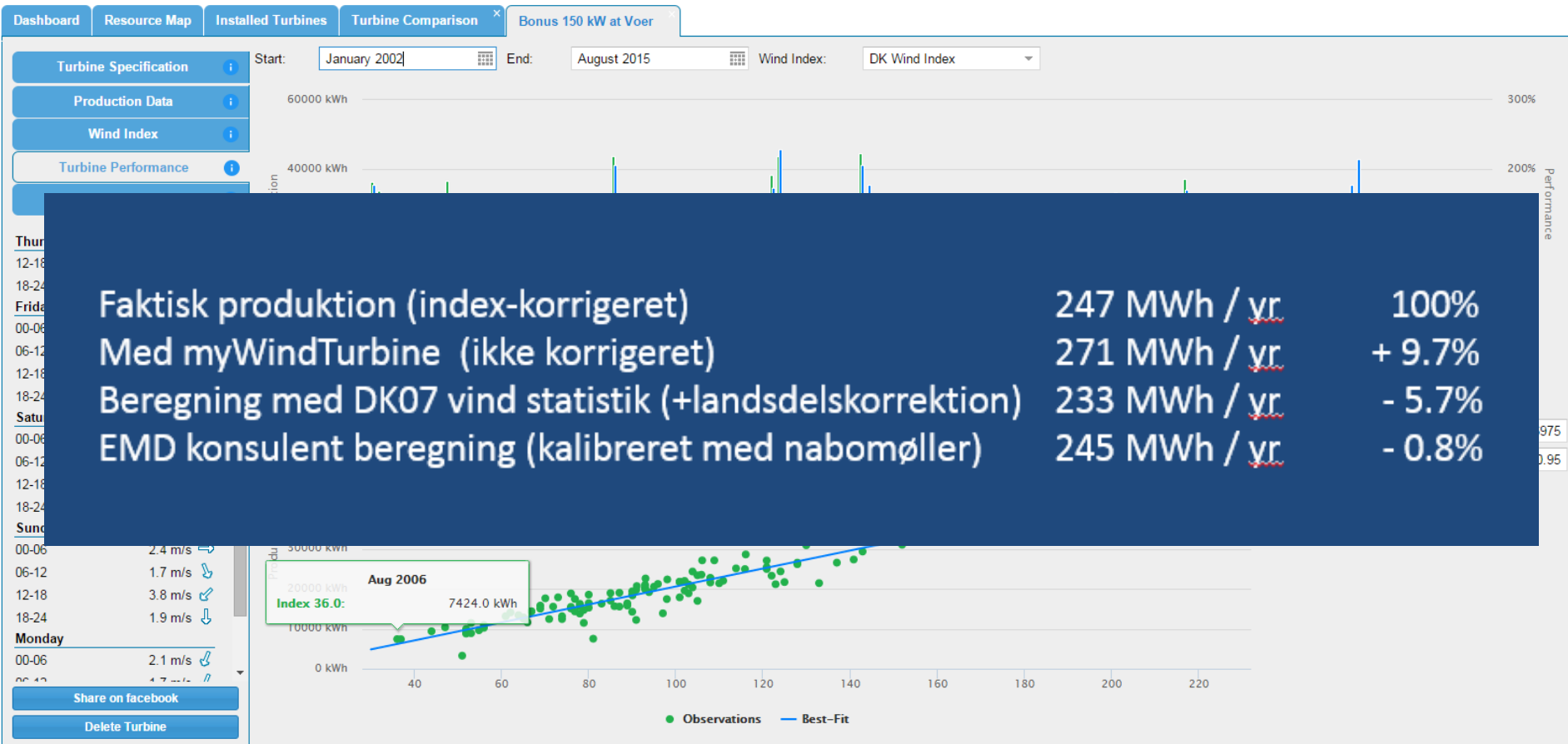
Skridt 3: Hver måned – afvent vindindex (vi giver besked)



Skridt 4: Hver måned – check performance - og langtidsproduktion



Skridt 4: Hver måned – check performance - og langtidsproduktion



Nå –

så møllen producerede mindre end det du forventede?

- (Alt) for optimistisk forventning til vindforholdene
 - Ingen vind-vurdering
 - Forkert vindvurdering
 - Indflydelse af lægvere, størrelse, placering, porøsitet, model
- Tilgængelighedsproblemer (mekanik)
- Fejlagtig effektkurve i forhold til idealet
 - For optimistiske målinger (fx baseret på dårlig datakilder)
 - Påvirkning fra turbulens, shear (lægvere)
 - Ingen effektkurve

MØLLE-EJER?

Registrer din mølleproduktion (allerede nu) på www.myWindTurbine.com - det koster gratis

MØLLE-PRODUCENT?

Vi kan aftale upload fra direkte fra SCADA.
Snak med Morten fra EMD eller Andreas fra DTU.

SUPPORT / KONTAKT?

<http://www.mywindturbine.com/support/>