



DANISH TEST AND RESOURCE CENTRE FOR SMALL WIND TURBINE



Tonny Brink

Nordic Folkecenter for Renewable Energy

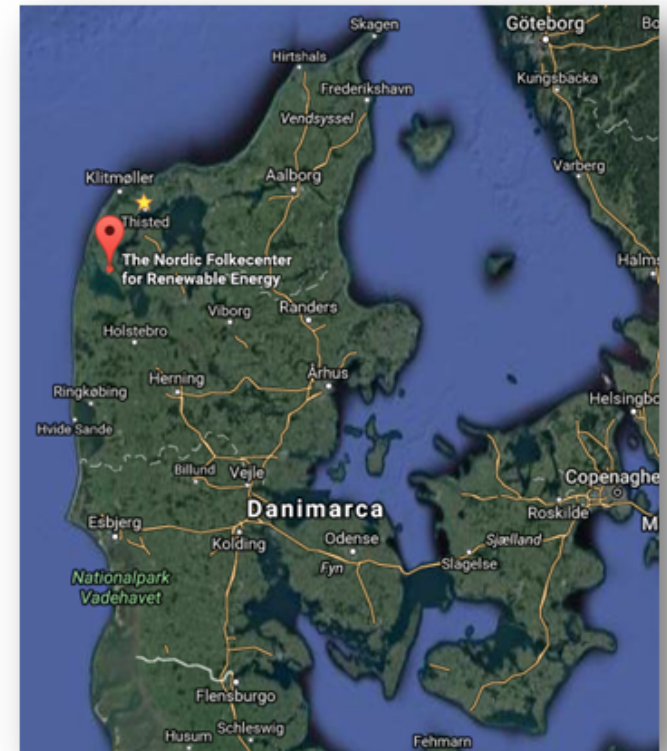
**Workshop DW @ DTU
20. Januar 2023**





The Nordic Folkecenter for Renewable Energy

- NGO founded in 1983
- Focus: Renewable Energy
- Bridge between education and industry
- Well known at international level
- Multi-cultural and multi-disciplinary environment
- Has hosted hundreds of interns, professors, researchers from different fields and from all over the world
- 6000+ visitors/year (1,7 mio. Online)



Goal: Favour the transition towards a 100% renewable energy society



**DANISH TEST AND RESOURCE CENTRE
FOR SMALL WIND TURBINES**

Small Wind Test and Lab



Dansk Standard, S-588, TC88, IEA – Task 41

Strategy for S-588 Vindenergisystemer

Purpose

To ensure that TC 88/S-588 initiates and participates in all standardization projects related to Wind Energy

Active participation in Technical areas

- [IEC TC 88 Wind energy generation systems](#)
- [CLC TC 88 Wind Turbine](#)
- [IECRE – The IEC System for Certification to Standards Relating to Equipment for Use in Renewable Energy Applications](#)
- All Wind energy related projects under [IEC TC 14 Power transformers](#)
- All Wind energy related projects under [ISO TC 60 Gear](#)
- All standardisation projects related to Wind energy in other Technical Committees.

Denmark has since 2013 held the secretariat for IEC TC 88 Wind energy generation systems



Kilde: Dansk Standard



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Small Wind Test and Lab



Danish members of S-588 Vindenergisystemer

Blade Test Centre A/S
Brüel & Kjær Vibro A/S
Codan Forsikring A/S
COWI A/S
Danmarks Vindmølleforening
DIALIGHT A/S
DNV-GL Denmark A/S
DTU Vindenergi
Energinet
Energistyrelsen
Envision Energy (Denmark) ApS
ExxonMobil Nordic
Fonden Lindoe Offshore Renewables
Center
Force Technology
Fredericia Maskinmesterskole
HOFOR A/S
Ingeniørhøjskolen Aarhus Universitet
K 2 Management A/S
LM Wind Power A/S
MHI Vestas Offshore Wind A/S
Nordic Folkecenter for Renewable Energy
PolyTech A/S

Siemens Gamesa Renewable Energy A/S
Suzlon Energy A/S
Svend Ole Hansen ApS
Sweco Danmark A/S
Vattenfall A/S
Vestas Wind Systems A/S
Ørsted Wind Power A/S
Aalborg Universitet

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Roll Call of TC88 MT2 experts and observers

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35 experts

Apologies:

Discussion topics summary

Topic	Priority	Status	Reference
Improvements in Aeroelastic Modeling (including VAWTs)	high	a little on VAWTs in meeting 8, present update in meeting 10	NREL/RRD report: https://www.nrel.gov/docs/fy22osti/81724.pdf
Loads test / validation & verification (2 requires compliance with -13; Simplification desired)	high	tied to scope discussion, tiered approach	
Redefine scope of -2	high	meeting 2, 3, 4, 5, 7, 8, 9 ; awaiting TC88 input	IEA Task 41 report: https://orbit.dtu.dk/en/publications/recommendations-on-potential-standards-changes-for-distributed-wi
Duration test	high	meeting 5	NREL ACP 101-1 report: https://www.nrel.gov/docs/fy21osti/79775.pdf
Material safety factors (characterization)	high	meeting 4, 7; formed SC	J. Spossey document
Improvements in Simplified Loads Methodology	high	meeting 7	NREL/Wood report: https://www.nrel.gov/docs/fy22osti/83708.pdf
Turbulence (including averaging period)	med	meeting 10	IEA Task 27 reports, plans for Task 41
Blade testing (static, fatigue based on tiered sizes)	med	meeting 9	Look at standard, look at ACP 101-1 tier table, etc.
Safety and function testing	med	meeting 9	Look at standard, opportunities to clarify, improve, lessons learned?
Tower dynamics / interactions	med		
Title of MT2 (replace "Safety of Small Wind Turbines")	low	Small Wind Turbines?	
VAWT simplified loads methodology	low	Meeting 8	English version of JSWTA 0001 annex in meeting 7 minutes
Novel designs (e.g. diffuser augmented), or others not defined	low	invite Accelerate Wind, etc.?	
Electrical	added	meeting 6; forming SC.	Summary IEA pres from Trudy F.
Overall 'safety' - however we define that - for me this is a major issue for market acceptance and reputational damage -Alistar Mackinnon	added	Alistair	
Harmonization of the requirements / Time 2 Market / Utilization of the scheme for SWT - Osvald	added	IECRE, MCS guests	
Utilization of IEC 61400-1 loads design methodology for -2 compliance?	added	Tied to scope expansion, tiered approach	
Add uncertainty calculation methods to any measurements	added	TC88 decision	
Risk assessment (annex?)	added	Sharman	
Errata	added		CORRIGENDUM 1 and Wood SLM report

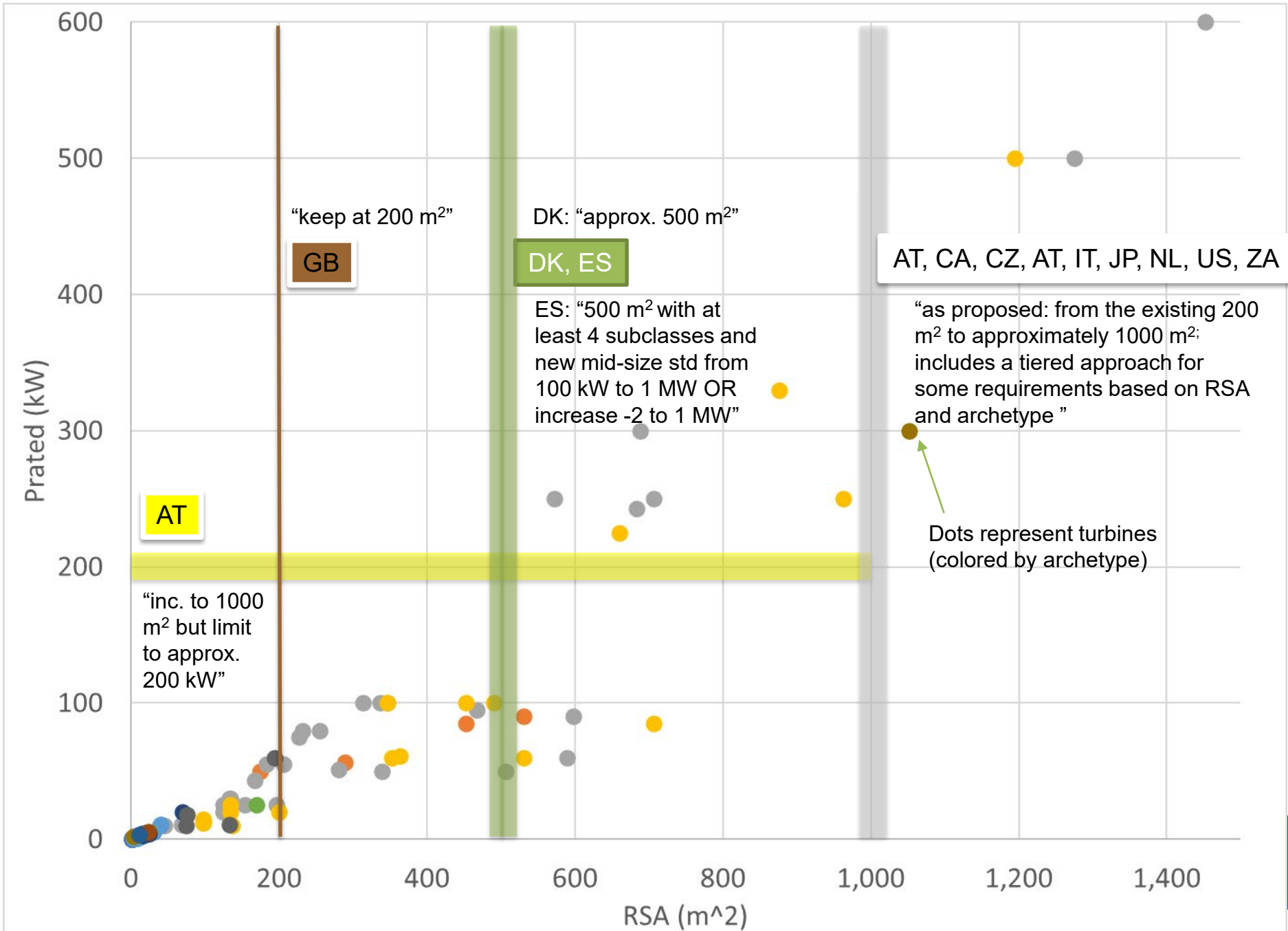
Scope of Work update

Report of Comments on [88/919/Q](#) (posted on TC88 dashboard)

- Proposal for scope of revision of IEC 61400-2:2013, Wind turbines - Part 2: Small wind turbines
- Circulation Date: 2022-10-21, Closing Date: 2022-12-02

Ctry	Comment
AT	We agree with an increasing of the rotor area to max. 1000 m ² for small wind turbines, but the maximum power shall then also be limited to approximately 200 kW.
CA	CA approves the proposed scope of work for the 4th revision with no comments.
CZ	The Czech NC approves the proposed scope of work for the 4th revision.
DK	DK support the proposed scope of work for the 4th revision and an increase of the rotor swept area to approximately 500 m ² .
ES	Spain is in favour to increase the scope of the 61400-2 standard from 200 m ² to 500 m ² rotor swept area, defining at least four different subclasses for different wind turbines sizes ranges. Spain proposes to start a new mid-size standard from 100 kW to 1 MW rated power wind turbines. If this proposal is nor viable, one option would be to extend IEC-61400-2 scope up to 1 MW including at least one more subclass
GB	To date, no valid justification has been put forwards by MT 2 to support a scope increase to 61400-2 on technical and/or safety grounds. Therefore, the UK votes no to an increase in scope above the existing 200m ² swept area limit. Furthermore, the UK is very concerned regarding the longer-term reputational risks to the wider wind energy sector that might potentially arise if the scope is increased.
IT	The Italian National Committee agrees to start now the revision of the current Third Edition of Standard 61400-2 and approves the related scope and timetable. Particularly, the Italian NC is in favour of extending the range of applicable rotor swept areas up to 1000 m ² , given the steady trend towards larger rotors for the same rated powers and the fact that wind turbines up to 200 kW capacity have often been included among small units by supporting legislation, e.g. in Italy. In doing that, harmonisation with 61400-1 as far as medium wind turbines are dealt with in that Standard (now from 200 to 1000 m ² swept areas) should also be borne in mind
JP	We agree with the expansion of the rotor swept area up to 1000 m ² . However, we propose not to specify the upper limit on rated output (e.g. 100 kW). We cannot understand why there is a great gap between the upper limit of rotor swept area and that of rated output [kW]. Specifically, we do not understand the reason for setting an upper limit on the rated output. “Swept area 1000 m ² or less” and “1000VAC/1500VDC or less” would be more appropriate.
NL	The NL NC supports the proposal for scope of revision of IEC 61400-2:2013
US	Approved; no comment
ZA	The scope of amendment is approved

Graphical summary of comments received.



Scope cont'

TC88 Guidance

Conclusion from TC88 from 88/931/RQ

- On basis of the replies the conclusion is that:
 - the revision of IEC 61400-2:2013, will be initiated
 - as there is no clear majority directly approving the proposed scope, MT 2 will have to further discuss and decide on the scope for revision, taking the comments received into consideration.

Next meetings and topic(s)

Meeting	Date	Format	Topics
1	24-May-22	Virtual	Kickoff meeting, set schedule, overview of scope of work for this revision
2	23-Jun-22	Virtual	Scope of work prioritization, started scope increase discussion
3	28-Jul-22	Virtual	Scope increase discussion, IECRE overview
4	25-Aug-22	Virtual	Scope increase discussion, material safety factors
5	22-Sep-22	Virtual	Scope discussion tabled, MCS guests, duration test
6	27-Oct-22	Virtual	Electrical requirements
7	22-Nov-22	Virtual	Scope increase update, MSF SC update, Simplified loads methodology
8	20-Dec-22	Virtual	TC88 update, VAWT SLM
9	24-Jan-23	Virtual	Scope of work, Blade testing, Safety & function testing
10	2&3-Mar-23	Hybrid; Arlington, VA, USA; with DWEA	VAWT design....TBD
11	Apr-23	Virtual	TBD
12	May-23	Tentative F2F opportunity: Wind Energy Science Conference 2023, 23-26 May in Glasgow	In person or virtual? Abstract prepared for small wind mini-symposium - SWT the next 10 years. (Paddy, Mark, Brent, Joe).

Meeting 10 DWEA conference info, agenda, and hotel info here:

<https://distributedwind.org/>

	Kickoff	SOW Approved	CD	CDV	FDIS	IS
Current estimate	2022-05-24	*2023-xx-xx	2023-xx-xx	2024-xx-xx	2025-xx-xx	2025-12-12 (stability date)
Actual	2022-05-24					

**to update once SOW is accepted; IEC timing recommendations next slide*



Initiating of Revision Process (RR)

When scope of work is agreed upon, RR submitted, clock starts running.

Target dates **recommended** by IEC:

Committee Draft (CD):	12 months;
Committee Draft for Vote (CDV):	24 months;
Final Draft International Standard (FDIS):	33 months;
Published International Standard (IS):	36 months.

Per TC88:

When you have agreed on the scope for the revision in MT 2, it shall be sent to TC 88 via an RR (Review Report). Then the clock starts running.

So, you will have time now to discuss the received comments with MT 2 and decide on the final scope for revision. (The scope shall of course still be inside the limits of the proposed scope in the Questionnaire)



Nordic Folkecenter
for Renewable Energy

WIND ENERGY AS A LEVER FOR LOCAL DEVELOPMENT IN PERIPHERAL REGIONS



There are no longer technological or economic barriers for the quantum leap to 100% renewable energy

COMMUNITY WIND POWER for the World

*Energy Democracy
Local Acceptance
Community Development
Lower Electricity Prices*

Leire Gorroño Albizu | Preben Maegaard | Jane Kruse

**MissionGreenFuels partnerskab* (eller IM2 Partnerskabet)
AAU - <https://vbn.aau.dk/da/organisations/institut-for-kommunikation-og-psykologi>



Problems

- Few and expensive turbine to fit the market (standards)
- Joint ownership on small wind turbines
- No Danish Manufactures onboard in working with standards
- Still No Market???



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Educated as a Marine Engineer, he is Folkecenter’s Chief Technical Director. He has got 35 years of experience in the international wind industry, working for Vestas Wind Systems A/S and Folkecenter. This has provided him with broad knowledge in service and maintenance site management and construction and operational project management. Hold positions and responsibilities: Travel Technician, Site Manager, Logistics Coordination, Area Service Manager, Technical Support Dept., People Manager, Technical After Sales/Customer Reporting, WTG Performance and Diagnostic analysis, Communication, Planning, Controlling, Technology Transfer, Project Management and Execution Leader.

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