

Webinar: Er Danmark med, når nye markedskrav for vindmøller skal formuleres?

Praktisk information

- Webinaret optages
- Spørgsmål samles til sidst og stilles i chatten
- I har ikke mulighed for at anvende jeres mikrofon
- Link til optagelse deles efterfølgende

Dagens program

- 
- 13:00** **Standardisering på vindmølleområdet – status og kommende initiativer**
v/ Asker Juul Aagren og Christine Weibøl Bertelsen,
Dansk Standard
- 13:20** **Hvordan foregår arbejdet med standarder i praksis, og hvilken værdi skaber det for dem, som deltager i arbejdet?**
v/ Søren F. Madsen, Head of Electrical & Mechanical,
Polytech
- 13:40** **Hvilke opmærksomhedspunkter peger Green Power Denmark på?**
v/ Anja Pedersen, chefkonsulent, Green Power
Denmark.
- 14:00** **Opsamling og spørgsmål**
v/ Alle

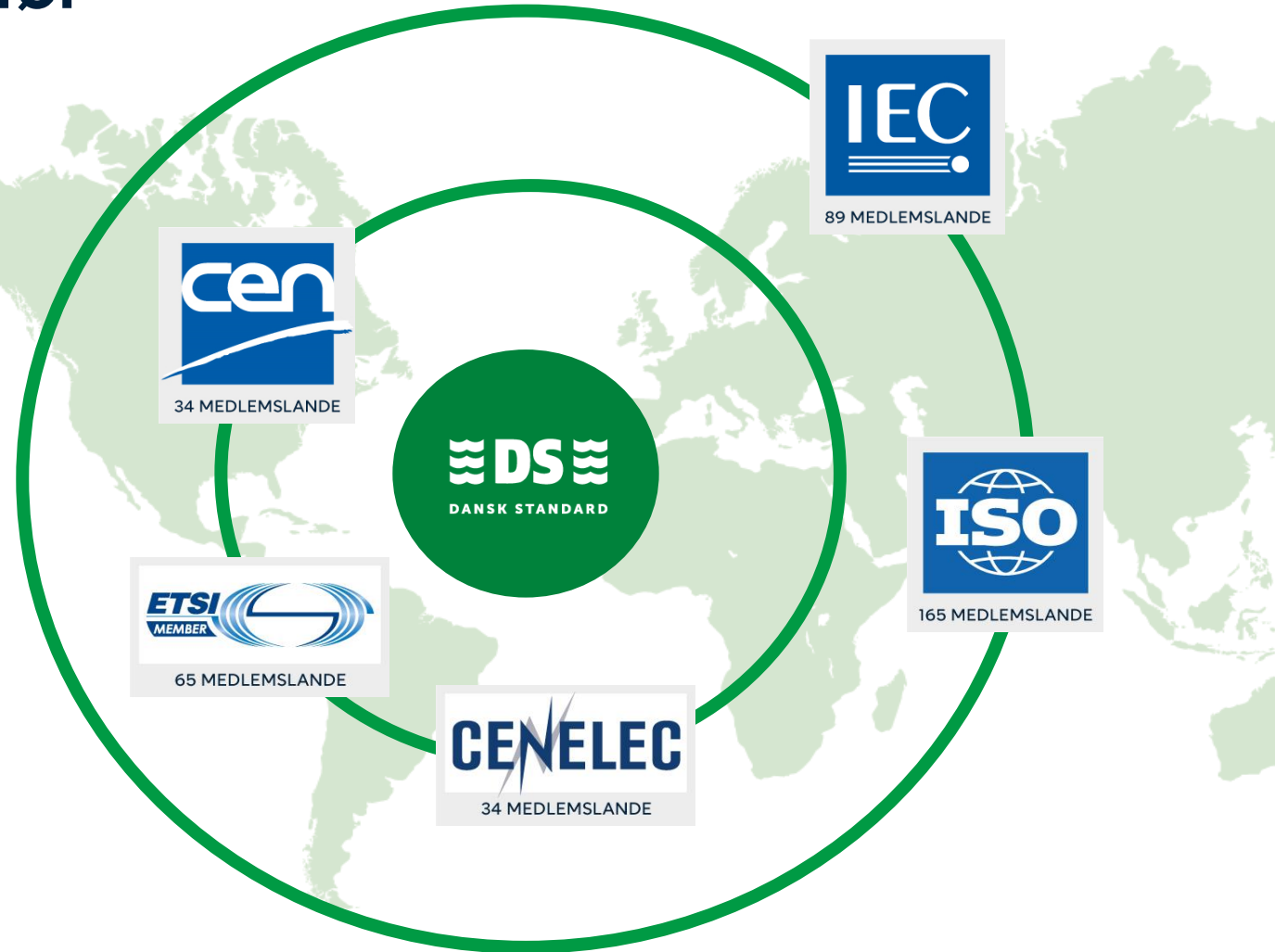
Dansk Standard – en vigtig del af dansk erhvervsliv

- Danmarks officielle standardiseringsorganisation
- Grundlagt i 1926
- Erhvervsdrivende fond
- Ca. 200 medarbejdere
- Erhvervspolitisk partnerskab med Erhvervsministeriet



Dansk Standard – en stærk aktør i et europæisk og globalt standardiseringsnetværk

- 98% af alle standarder i dag er enten europæiske eller internationale
- Dansk Standard er DK's adgang til det europæiske og internationale standardiseringsorganisationer



Om standarder

Hvad er en standard?

Standarder er:

1. Et frivilligt markedsinstrument
2. Konsensusdrevet
3. Vedtaget af anerkendt organ

Standarder kan stille krav til:

Konstruktion

Fx papirformater, gevind, dataformater

Systemer

Fx kvalitetsstyring, risikoanalyse, miljøledelse

Ydeevne

Fx brudstyrke, sikkerhed, ergonomi, støj og stråling

Symboler

Fx piktogrammer for toilet, nødudgang, rygeforbud

Terminologi

Fx korrekt definition af en elektrode eller et statistisk begreb

Metoder

Fx til kemiske analyser eller prøvning og dokumentation af teknologier.



S-udvalget udvikler standarder

CEN og CLC i Europa

I Europæiske standarder under CEN er der lignende arbejde i de Europæiske lande.

DS i Danmark

Der er 220 forskellige udvalg i Dansk Standard.

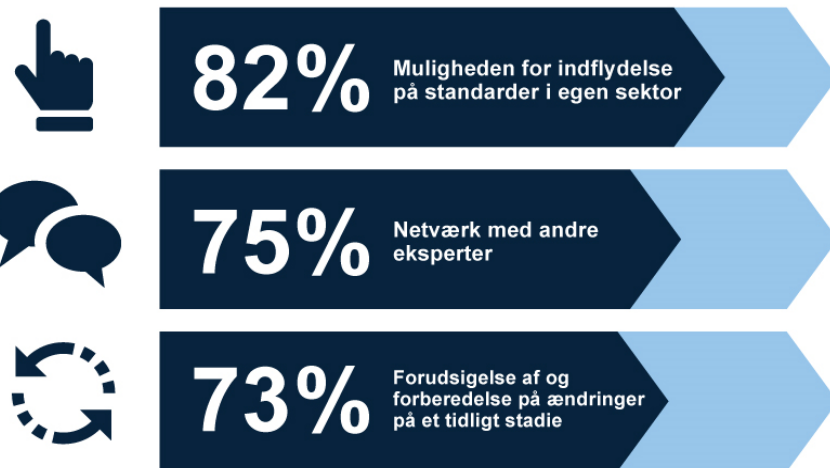
ISO og IEC internationalt

I Internationale standarder under ISO er der lignende arbejde i medlemslandene.



I et udvalg udvikles standarder af deltagerne. DS er facilitator. Et udvalg har i gennemsnit 10 medlemmer fra forskellige brancher. Udvalget arbejder med en portefølje af standarder der passer til udvalgets fagområde. Nogle standarder er under revision andre er nye standarder under udvikling.

Nordiske virksomheder forbereder sig på fremtiden gennem standardisering



69%

mener, at standarder forenkler eksporten af varer og ydelser



84%

mener, at standarder hjælper med at overholde regulering



85%

mener, at standarder skaber tillid og tryghed hos kunderne



87%

betragter standardisering som en vigtig del af fremtidige forretningsplaner











FRONT

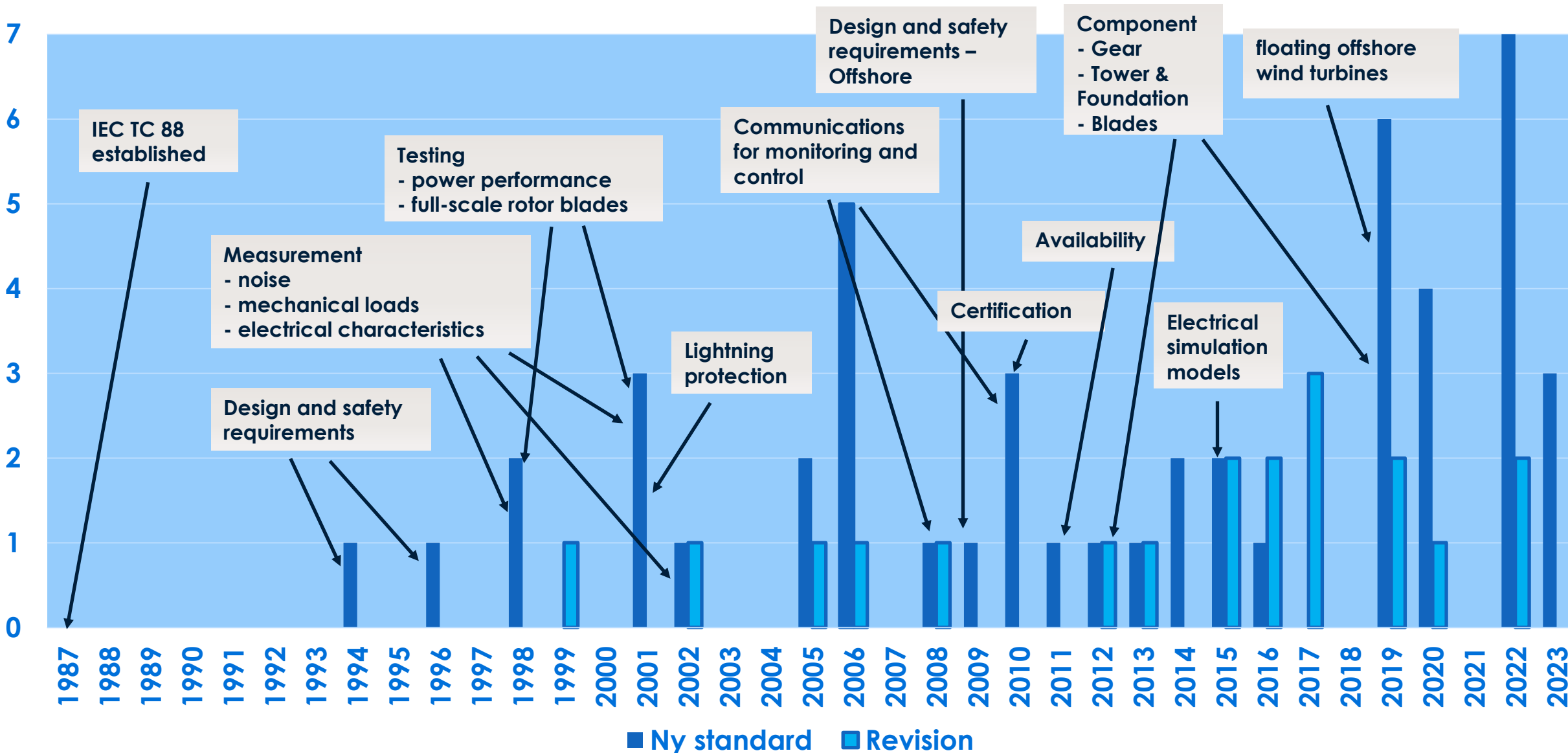
FRONT

AX038T

FRONT

FRONT

Publicerede internationale standarder de seneste 35 år





Fremtidige fokusområder

- Horisontalt fokus – Energisystemer
- Identificering af “Gaps”
- Leverandørkæden
- Bæredygtighed
- Brintproducerende vindmøller

Nye aktive standardiserings projekter

- Probabilistic design measures for wind turbines
- Through life management and life extension
- Decommissioning and preparation for recycling
-
- Certificering

Nuværende medlemmer i Vindenergisystemer (S-588)

Blade Test Centre

COWI

DEIF

DNV Denmark

DTU Vindenergi

Energinet

Energistyrelsen

Envision Energy (Denmark)

Fonden Lindoe Offshore
Renewables Center

Force Technology

Ingeniørhøjskolen Aarhus
Universitet

LM Wind Power

Nordvestjysk Folkecenter For
Vedvarende Energi

Peak Wind

PolyTech

Riskpoint

SEWPG European Innovation
Center

Siemens Gamesa Renewable Energy

Svend Ole Hansen

Sweco Danmark

Teknologisk Institut

Vattenfall Vindkraft

Vestas Wind Systems

Wind Power Lab

Ørsted

Aalborg Universitet

**.....Der er et stort
potentiale for flere
myndigheder og
virksomheder, som
ønsker at få indflydelse
eller indsigt i fremtidige
markedskrav**



Motivation for standardisation in Polytech

Søren Find Madsen
Head of Electrical & Mechanical, R&D

2023-10-31

Speaker

- Søren Find Madsen
Head of Electrical & Mechanical, R&D
Polytech A/S
- MSc.E.E. (2001)
PhD in Lightning Protection of blades (2006)
- Industrial experience
 - Highvoltage.dk ApS (2006-2012)
 - Testinglab Denmark ApS (2007-2012)
 - Global Lightning Protection Services A/S (2012-2018)
 - Polytech A/S (2018 -)
- Member of DS/S-588 – Wind Energy Generation Systems
 - Chair of DS/S-588/U-08 – Lightning Protection
- Member of TC-88 – Wind Energy Generation Systems
 - Secretary of IEC TC88/MT24: Lightning protection of wind turbines
 - Member of TC88/PT61400-32: Operations and maintenance of blades



Polytech at a glance

Established

1994



People

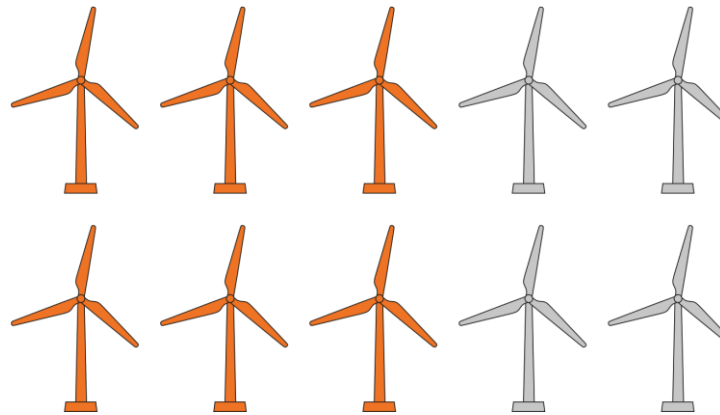
~500



+30 PhDs specialized in wind, lightning and fiber optics
+ 25 nationalities

Global presence

Facilities and offices in Denmark, China, Germany, and Mexico



Parts installed in ~60% of all blades manufactured

Certified

In the United Nations Sustainable Goals by Bureau Veritas



Test centers

Material and lightning testing.

All centers are accredited by DANAK, the Danish Accreditation Fund



Polytech Solution Portfolio



**Lightning
Protection Systems**



**Leading Edge
Protection**



**Blade Monitoring
& Optimization**



**Transport Equipment
& Solutions**



Subsea

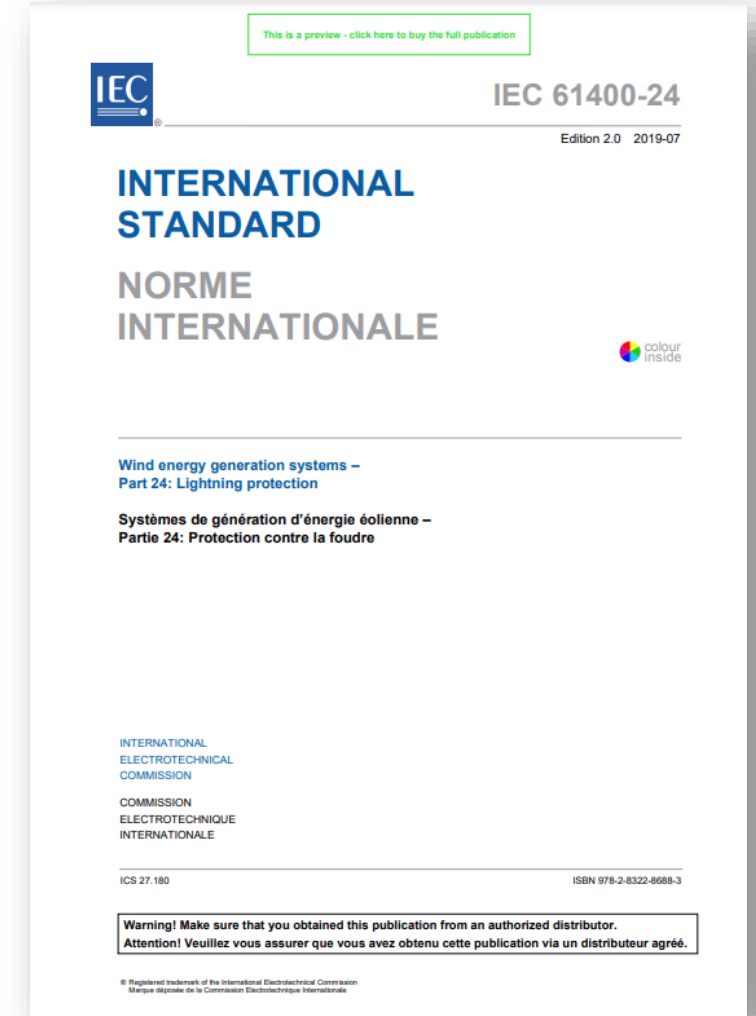


**Performance &
Structural Components**

All solutions aims to enhance the durability and productivity of wind turbines

Definition of a Standard

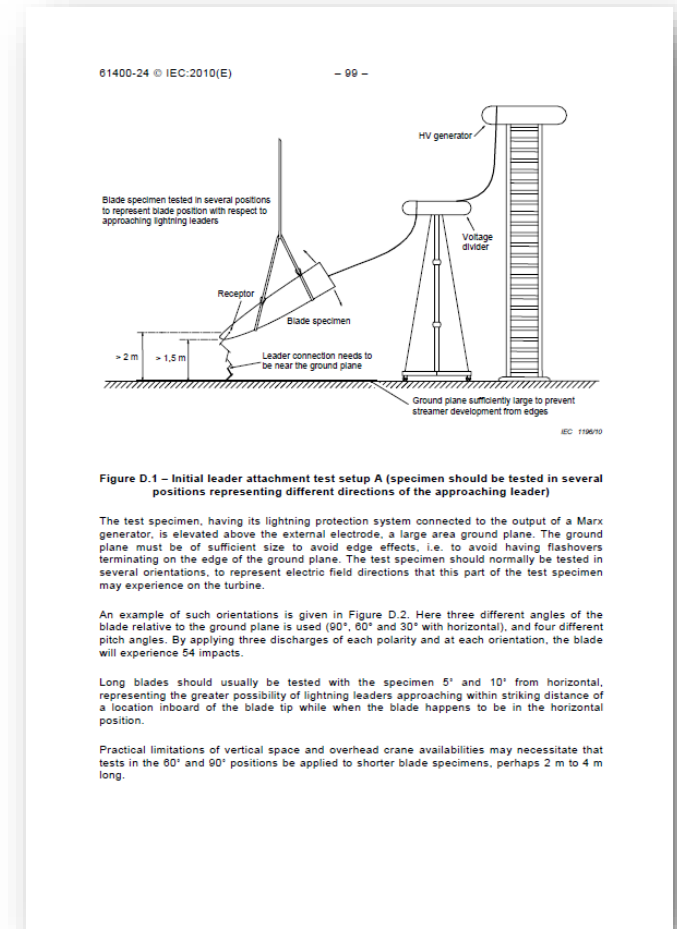
- **Trade document** to assist Seller/buyer relationship
- Written by industry experts (or those who realize the power it brings)
 - Authors pay to participate, and secondly IEC or DS sell the documents
- Strict functional and/or verification **requirements** and guidelines/recommendations
- Enable 3rd party **certification**



My role in international standardisation

IEC 61400-24 Ed1 (2005-2010)

- Invited to TC88-MT24 meetings in late 2005
 - Automatically member of DS/S-588 and DS/S-588/U-08
- Responsible for **Test Annex D** (informative)
- Input on blades with Carbon, **LPS coordination**
- Input on **modelling tools** and processes
- **Initiation of a long term technical relationship** with industrial and academic stakeholders world wide
- IEC61400-24 Ed1 published in 2010

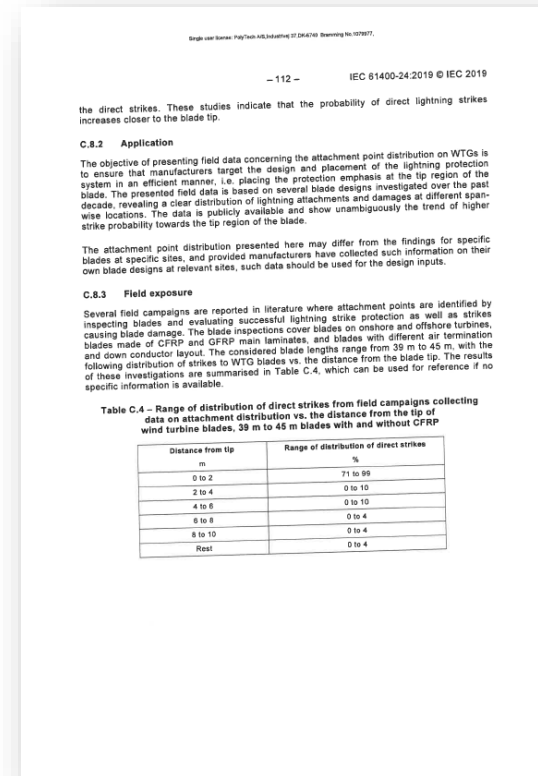


IEC61400-24 Ed1 Annex D.2.
Initial Leader Attachment Test

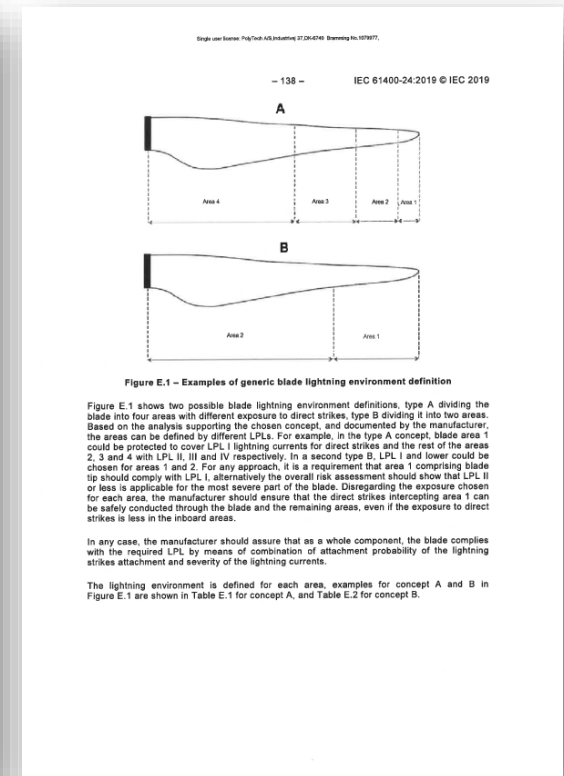
My role in international standardisation

IEC 61400-24 Ed2 (2014-2019)

- **Served as secretary**, with a convenor from Denmark (Ørsted)
- General improvements to main document
 - Requirement for OEM to describe lightning environment
- **Annex C** with field insight from blade damages
- **Annex D** became normative
- **Annex E** including zoning concept
- International meetings, research collaboration, friendships world wide
- IEC61400-24 Ed2 Published in 2019



IEC61400-24 Ed2 Annex C.8
Damage distribution



IEC61400-24 Ed2 Annex E
Zoning concept

My role in international standardisation

IEC 61400-24 Ed3 (2021-)

- **Serving as secretary**, with a convenor from Japan
- Improvement of Annex L: Lightning monitoring systems
- General improvements to main document
- Reformulation of **lightning environment** for wind turbines
 - Utilize Polytech's database of +3000 lightning recordings in actual turbines
- Industrialise the document
 - Potential split in three parts *Design, Verification, and Maintenance*

MT24-23-3-5

88/965/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER:
IEC 61400-24/AMD1 ED2

DATE OF CIRCULATION:
2023-08-11

CLOSING DATE FOR VOTING:
2023-11-03

SUPERSEDES DOCUMENTS:
88/928/CD, 88/948/AC

IEC TC 88 : WIND ENERGY GENERATION SYSTEMS

SECRETARIAT:
Denmark

SECRETARY:
Mrs Christine Weibel Bertelsen

OF INTEREST TO THE FOLLOWING COMMITTEES:
TC 81

PROPOSED HORIZONTAL STANDARD:

OTHER TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.

FUNCTIONS CONCERNED:
 EMC ENVIRONMENT QUALITY ASSURANCE SAFETY

SUBMITTED FOR CENELEC PARALLEL VOTING NOT SUBMITTED FOR CENELEC PARALLEL VOTING

Attention IEC-CENELEC parallel voting
The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting.

The CENELEC members are invited to vote through the CENELEC online voting system.

This document is still under study and subject to change. It should not be used for reference purposes.
Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.
Recipients of this document are invited to submit, with their comments, notification of any relevant "in Some Countries" clauses to be included should this proposal proceed. Recipients are reminded that the CDV stage is the final stage for submitting IEC clauses. (See AC/22/2007 or NEW GUIDANCE DOC).

TITLE:
Amendment 1 – Wind energy generation systems – Part 24: Lightning protection

PROPOSED STABILITY DATE: 2028

NOTE FROM TC/SC OFFICERS:
In order to assist MT 24 when sorting and compiling the given comments on the CDV document, it is of great importance that all comments given in the comments form refer to both clause and line numbers in the CDV document.

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IEC CDV 61400-24:2019/
AMD1 © IEC 2023

- 7 -

This type of sensors might not be suitable for detecting continuing currents.
The manufacturer should provide the frequency response of the sensitivity and its uncertainty.

80
81 Users should be careful interpreting the information provided by the manufacturers of these types of devices.
82
83

84 **L.3.2.2 Local lightning current measurement systems**
85 Special systems, e.g. with sensors mounted on the tower and/or in the blades of a wind turbine
86 to trigger a lightning alarm based on electromagnetic or optical criteria are called local lightning
87 current measurement systems. The sensor measures what actually strikes the turbines, and
88 prevents remote lightning flashes from triggering a false alarm. Such systems can be connected
89 to a SCADA system giving a useful indication of lightning strikes in real-time. The systems may
90 give an indication of current waveform and strike severity, and can hence be used by operators
91 to evaluate the degree of wear and damage, and to prepare maintenance for the relevant
92 turbines after a lightning storm.

93 The lightning parameters which individually or in combination are closely related to the wear of
94 the lightning protection system and/or damages of the wind turbine are the current magnitude,
95 total charge transfer, specific energy and front time of the lightning current, etc. Whether these
96 parameters can be measured accurately depends largely on the frequency response and
97 resolution of the system.

98 The sections below highlight important features of local lightning current measurement system
99 to effectively capture the desired outcome of the lightning strikes.

100 **L.3.2.3 Classifications**
101 The characteristics of lightning current such as the current magnitude, charge, specific energy and
102 front time etc. vary and may depend on the installation areas. Therefore, it is recommended
103 to investigate available information about characteristics of lightning currents for the installation
104 area when selecting the lightning measurement system to actually meet the specified
105 performance. To aid the selection, local lightning current measurement systems are classified
106 into four types according to the measurement performance, and hence the adequacy of
107 measuring the different lightning characteristics. The classification is shown in Table L.6.

108

Table L.6 – Class of lightning measurement systems

Category	Range	Class I	Class II-FC	Class II-EC	Class III
Frequency bandwidth*	0.1 Hz to 1 MHz or wider	x			
	1 Hz to 1 MHz or wider		x		
	0.1 Hz to 100 kHz or wider			x	
	1 Hz to 100 kHz or wider				x
Maximum measurable current value*	200 kA or higher	x	x		
	100 kA or higher			x	x
Maximum measurable electric charge value*	1000 C or higher	x		x	
	600 C or higher		x		x
Minimum detectable current value*	1 kA or lower	x	x	x	
	2 kA or lower		x		x
Digital resolution*	16 bit or higher	x			










IEC61400-24 Ed2: Amendment 1: Annex L on lightning monitoring systems

My role in international standardisation

IEC 61400-24 Ed3 (2021-)

Short and Long-term Plans

 As of July 2021

	2021	2022	2023	2024	2025	2026
NP1 by JP (or CN+JP)		 NP submit → approval  Meetings in MT24 → CD  CDV → FDIS  IS publish (Ed.2.1 amendment)				
NP2 by CN (and other countries)		 (PWI if needed)	 NP submit → approval  Meetings → CD  CDV → FDIS  IS publish (Ed.3.0)			

4

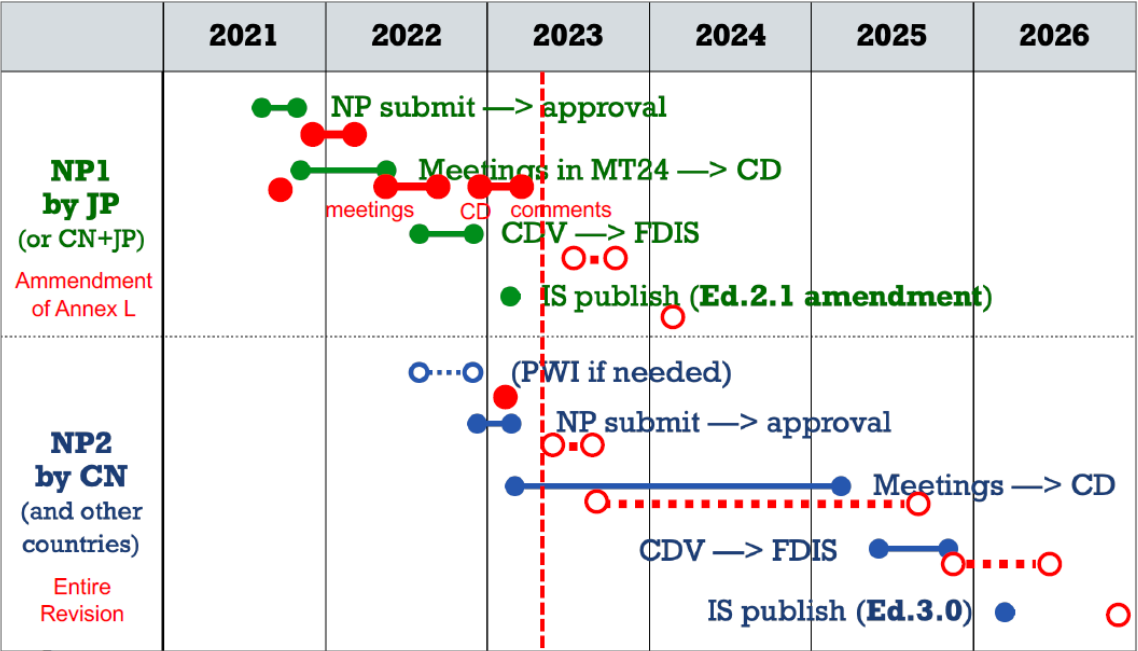


My role in international standardisation

IEC 61400-24 Ed3 (2021-)

Short and Long-term Plans

As of July 2021
 Now



5



General experience with standardisation

- **International work** – TC88-MT24
 - Requires patience – consensus seeking!
 - **Initiative pays off**
 - Strong relationships across borders, industrial and academic
- **Danish Committee** – DS/S-588/U-08
 - Meetings when specific documents from S-588 are to be discussed
 - Limited participation in national meetings, 10-20% of the 25 members
 - Those who participate, have a saying!
- **Industrial impact**
 - As soon as a CD or CDV is submitted for national commenting, it becomes a defacto standard
 - Certifiers and customers are aware of the content
 - Single words and phrases are super important!!
 - **It gives Polytech an upper hand** in developing products and services

Polytech benefits

- Polytech operates a large lightning **test facility**...
 - Test requirements for wind turbine blades have become mandatory in IEC61400-24 Ed2!
- Polytech conduct **lightning micro siting** for Wind Farm developers...
 - Higher demands on lightning risk assessment, the OEM must specify the environment and how they handle that in the design in IEC61400-24 Ed2!
- Polytech engineer and **manufacture lightning protection systems** for blades...
 - Specific requirements for design documentation in IEC61400-24 Ed2!
 - Our parts are pre-tested and verified, even before the standard is published!
- Polytech produce **lightning measurement systems** for wind turbines...
 - Amendment 1 for IEC 61400-24 Ed2 now defines four classes of LMS, we provide a Class 1 instrument!

Personal benefits

- **Strong international network** of experts, industrial and academic
 - The "consensus requirement" means that we get along well 😊
- **Traveling activities**, meetings are scheduled together with international events like conferences, trade fares, etc.
- Standardisation and 'being aware' is **a sales parameter**, for the company and for you as an employee
- **Initiative pays off!** – those who volunteer to write the text, also get to phrase the requirement.

Thank you!

Any questions?

31 OKTOBER 2023

Opmærksomhedspunkter fra Green Power Denmark

Indhold

1. Introduktion til Green Power Denmark
2. Industrien i overskrifter
3. Seneste udspil fra Green Power Denmark, regeringen og EU
4. Standardisering og samarbejde i vindsektoren

Danmarks grønne erhvervs- og interesseorganisation

- ↳ Etableret i marts 2022 ved en fusion af tre organisationer: Dansk Energi, Wind Denmark og Dansk Solkraft.



Om Green Power Denmark

Repræsenterer 1.500 medlemmer, 800 lavsmedlemmer og 200 medlemmer af associerede foreninger.

Etableret den 23. marts 2022

Ca. 125 ansatte

Kontorer i København, Aarhus og Bruxelles

Vores medlemmer dækker hele værdikæden fra producenter af møtrikken i vindmøllen til små og store VE-producenter samt operatørerne af elnettet og elhandelselskaberne, der sælger strømmen til forbrugeren.

Green Power Denmark har tre branchefællesskaber

↳ Dansk e-Mobilitet er branchefællesskab for danske virksomheder med direkte kommerciel interesse i elbiler, elektriske varebiler og lastbiler samt elbussers introduktion i Danmark.

↳ Fiberalliancen er branchefællesskab for selskaber som ejer, driver og anvender samfundskritiske fibernet og højhastigheds-teleinfrastruktur.

↳ Intelligent Energi er et branchefællesskab for aktører, som arbejder for en konkret udrulning af et integreret og fleksibelt energisystem, der giver danskerne sikker og grøn energi til konkurrencedygtige priser

 **DANSK
E-MOBILITET**

 **FIBERALLIANCEN**

 **INTELLIGENT
ENERGI**

Vindindustrien i overskrifter

80 procent af hele verdens nye havvindmøller sidste år blev opført i Kina

Offshore vindkraft | 14. juli 2022 kl. 14:43 | 8

ENERGI I EUROPA 15. august 2023

Europas vindmøller risikerer at blive klemmt mellem Kina og USA



13.07.2023 | kl. 07.03 RENEWABLES

Tysk energinetværk tjener 94 milliarder på bud om havmølleparker

Det er første gang, at tyske BnetzA benytter sig af en budrunde.



 **REUTERS®** World ▾ Business ▾ Markets ▾ Sustainability ▾ Legal ▾ Breakingviews Technology ▾ Invest

Energy

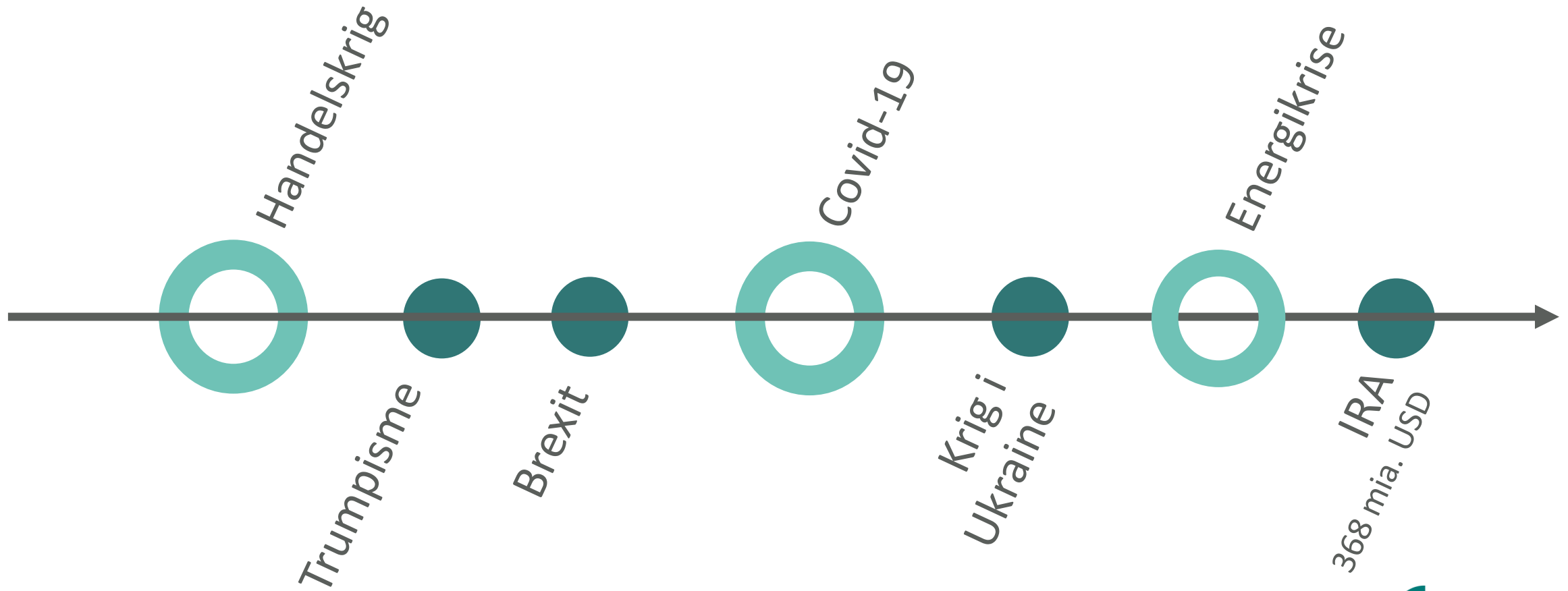
U.S. offshore wind auction draws record \$4.37 billion in bids

By Valerie Volcovici

February 28, 2022 4:18 PM GMT+1 · Updated a year ago

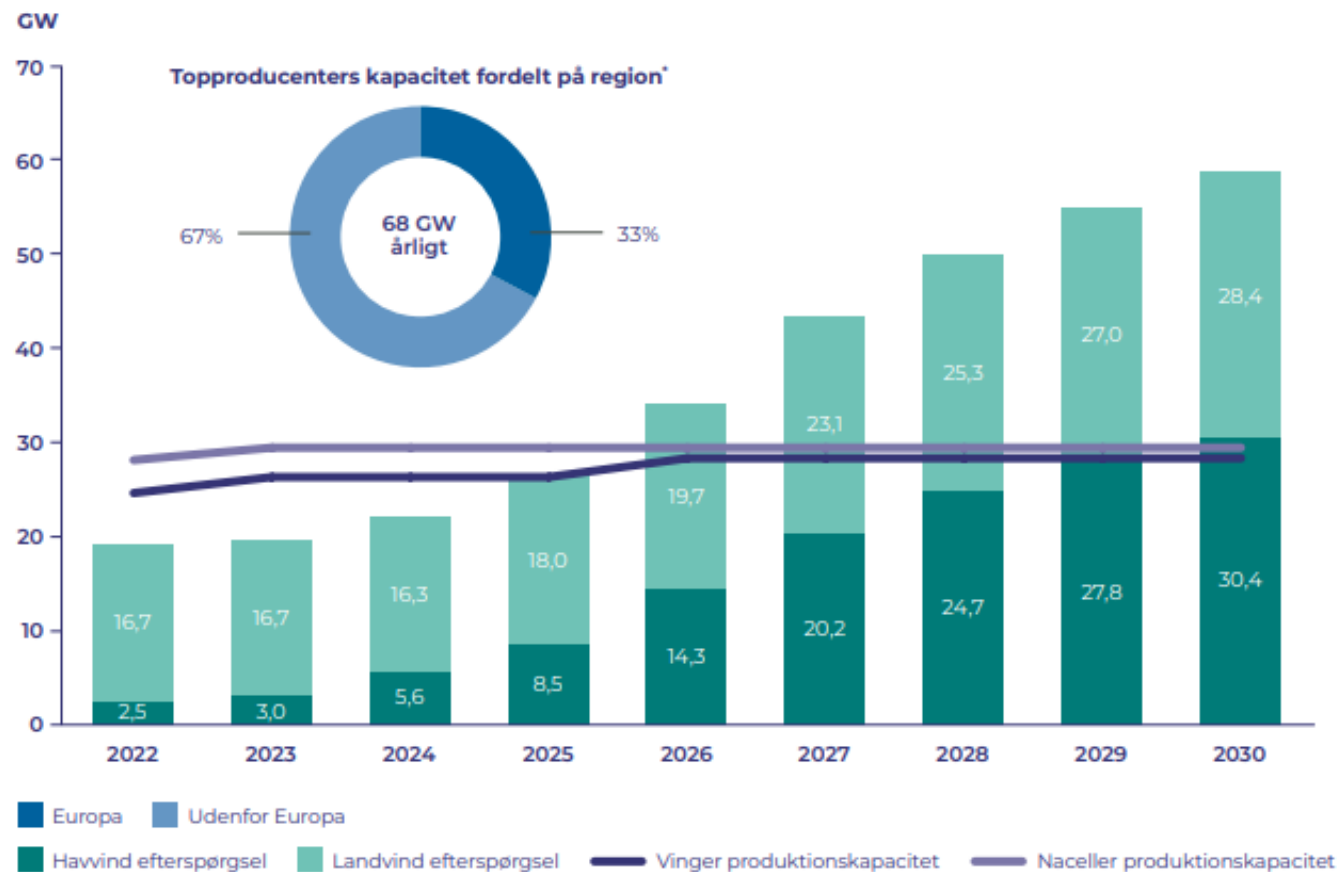


Fra globalisering til regionalisering



Målsætninger og kapacitetsudbygning

Figur 1: Produktionskapacitet og efterspørgsel efter vindmøller i Europa (GW)



* Topproducenter inkluderer: Vestas, Siemens Gamesa, GE, Nordex og Enercon. Kilder: Rystad Energy research og analyse; Virksomheders årsrapporter og hjemmesider.

Kilde: Rystad Energy – The State of the European Wind Energy Supply Chain (april 2023).

Seneste udspil fra Green Power Denmark, regeringen og EU

Eksempler på udspil

EU:

- ↪ Net Zero Industry Act – Rammer for grøn omstilling i Europa (foråret 2023)
- ↪ Wind Power Action Plan (i sidste uge)

Danmark:

- ↪ 9-12 GW havvind, herunder en Energi-ø.
- ↪ Regeringsudspil på vedvarende energi på land: 32 områder i kommunerne

Green Power Denmark (efterår 2023):

- ↪ Forslag til finansloven i 2024
- ↪ Industripolitisk udspil : Fra Modgang til Medvind
- ↪ Arbejdskraftpanels anbefalinger

Mette Frederiksen: "Statsstøtte er tilbage på bordet"

"Statsstøtte er kommet tilbage på bordet. Det er ikke et dansk forslag, at det skulle det. Men det er en ny virkelighed, vi også på vegne af jer er nødt til at forholde os til,"

"...i erhvervspolitikken har vi kun ét ønske i virkeligheden. I hvert fald et ønske, der er større end noget andet. Det er, at vores danske produktionsvirksomheder bliver i Danmark. At I vækster i Danmark. At I skaber jeres arbejdspladser i Danmark".



Fra Modgang til Medvind

Anbefalinger til en national strategi for den grønne energiindustri

- Omdøb Erhvervsministeriet til Industri- og Erhvervsministeriet
- Danske målsætninger for industriel produktionskapacitet
- Danmark skal udnytte de lempede statsstøtteregler fra EU
- Målrettet finansieringsstøtte til en robust grøn energiteknologiindustri
- Infrastruktur der understøtter grøn omstilling og danske virksomheders konkurrenceevne
- Danmark skal have testfaciliteter i verdensklasse
- Sikker adgang til råvarer og materialer
- Partnerskab om arbejdskraft til den grønne omstilling
- Danmarks eksport af grøn energiteknologi og -services skal øges



Wind Power Action Plan

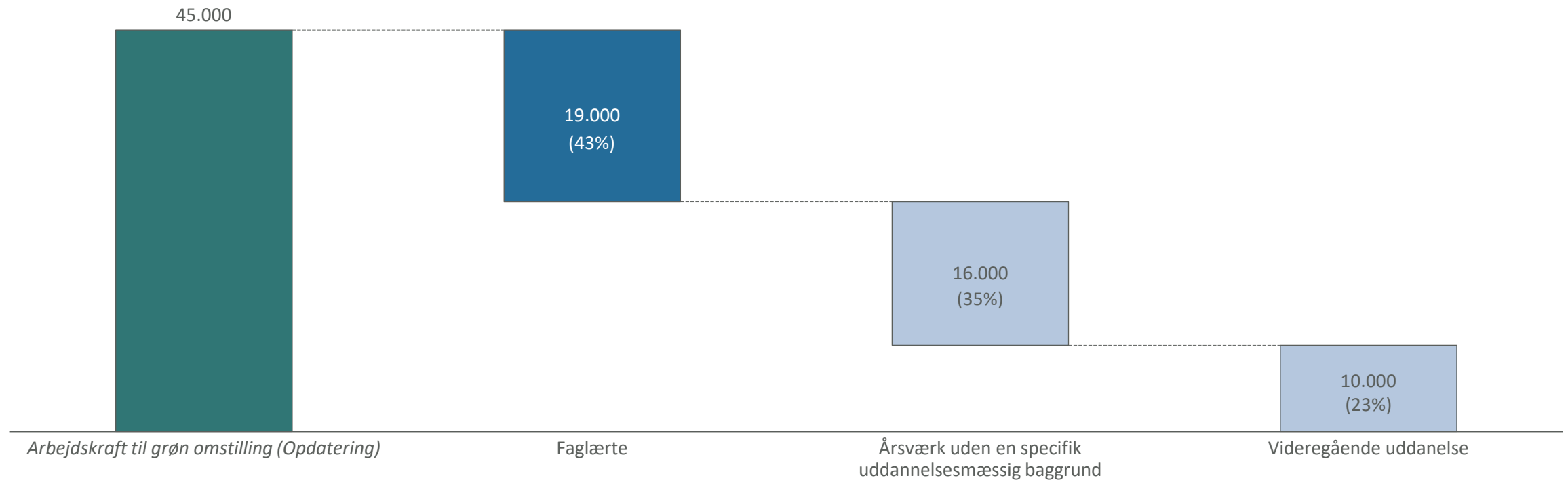
Offentliggjort 24. oktober og indeholder bl.a.:

- ↪ Mere tempo på tilladelser til vedvarende energi
- ↪ Nye udbudsbetingelser for udbud af havvindmøller med prækvalifikationskriterier der ikke kun kigger på pris.
- ↪ EIB stiller risikobegrænsende garantier for investeringer i vindenergi og finansiering af produktionsfaciliteter.
- ↪ Forventet fordobling af budgettet for EU's Innovationsfond til grønne teknologier - til 35 mia. kr.



Der er brug for 45.000 årsværk ekstra om året til grøn omstilling i perioden 2023-2030

Behov for arbejdskraft fordelt efter uddannelsesmæssig baggrund
Antal fuldtidsbeskæftigede (årligt gennemsnit fra 2023-2030)



Note: Tal er afrundet til nærmeste hele 1000. *Faglærte* dækker personer med en erhvervsuddannelse såsom elektriker, VVS'er, smed og murer, men også kontor- og handelsuddannede. *Årsværk uden specifik uddannelsesmæssig baggrund* dækker over personer, der skal tilvejebringe og udføre opgaver, der ikke kræver en specifik uddannelsesmæssige baggrund. *Videregående uddannelse* dækker over personer med en kort-, mellem- og langvarig videregående uddannelse samt Ph.d. niveau.

Kilde: Opdatering og egne beregninger på baggrund af Beskæftigelseseffekter af investeringerne i den grønne omstilling (2020), Power-to-X muligheder og erhvervspotentialer (Rambøll,2021) og Grøn Strøm til Tiden (2022).

Standardisering og samarbejder

Standardisering og samarbejde

Tværgående samarbejder :

- ↪ IEC vindsekretariat hos Dansk Standard
- ↪ IEA Wind Technology Collaboration Programme (TCP) Sekretariat DTU Wind and Energy Systems
- ↪ Megavind

Green Power Denmark deltagelse i standardiseringsarbejde

IEA Technology Collaboration Programme

The Technology Collaboration Programme supports the work of independent, international groups of experts that enable governments and industries from around the world to lead programmes and projects on a wide range of energy technologies and related issues.

The experts in these collaborations work to advance the research, development and commercialisation of energy technologies.

Examples:

Task 19: Wind Energy in Cold Climate

Task 26: Cost of Wind Energy

Task 36: Forecasting for Wind Energy

Megavind

Scope: To create a virtual and physical platform via which the wind energy community can communicate, coordinate and collaborate its work and activities related to research, innovation, and technology.

Ambition: To define and agree on concrete research and innovation (R&I) priorities

Megavind is working on research, development and demonstration (R,D&D) recommendations within:

Power-to-X

Sector integration / sector coupling

Balance of plant

Sustainability

Partnerships in the wind industry supply chain

Tests, validation, and verification of components, technology and/or processes

Spørgsmål

Opsamling og spørgsmål

- Hvilke styrker har de danske vindmølle-aktører?
- Hvilke udfordringer/muligheder ser I på kort og lang sigt ift. øget efterspørgsel på vindmøller i DK/internationalt?
- Hvor meget fylder bæredygtighed i jeres forretningsudvikling?
- **Næste skridt...**

Kontakt

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