

A wide-angle photograph of an offshore wind farm at sunset. The sky is filled with dramatic, dark clouds, with the sun low on the horizon, creating a golden glow. Several wind turbines are visible, their towers and nacelles silhouetted against the sky. The water is dark and calm. Two small boats are visible in the distance.

Med havvinden til nye markeder

Historikk og trender innen offshore wind

Jon Dugstad

Director Wind & Solar

Norwegian Energy Partners

Norwegian Energy Partners is an **independent non-profit foundation** established to **strengthen** the long-term basis for **value creation** and employment **in the Norwegian energy industry** through facilitation of the industry's **international** business activities.

We have 270 partners/company members from the Norwegian energy industries!

Norwegian Government

- Ministry of Petroleum and Energy
- Ministry of Trade and Industry
- Ministry of Foreign Affairs

Professional Organisations

- Energy Norway
- Federation of Norwegian Industries
- Norwegian Oil and Gas Association
- Norwegian Shipowners' Association
- The Norwegian Confederation of Trade Unions

Industry

- Equinor
- Statkraft

En stolt industrihistorie







SIEMENS

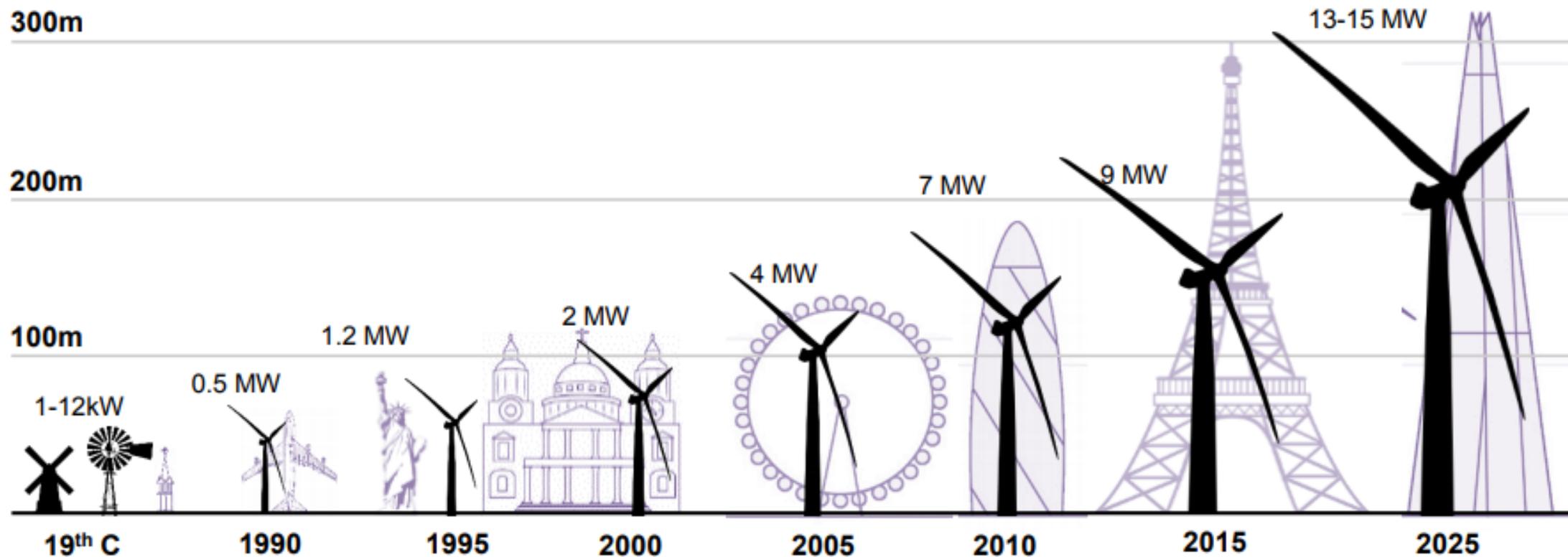
WINDEA

SIEMENS

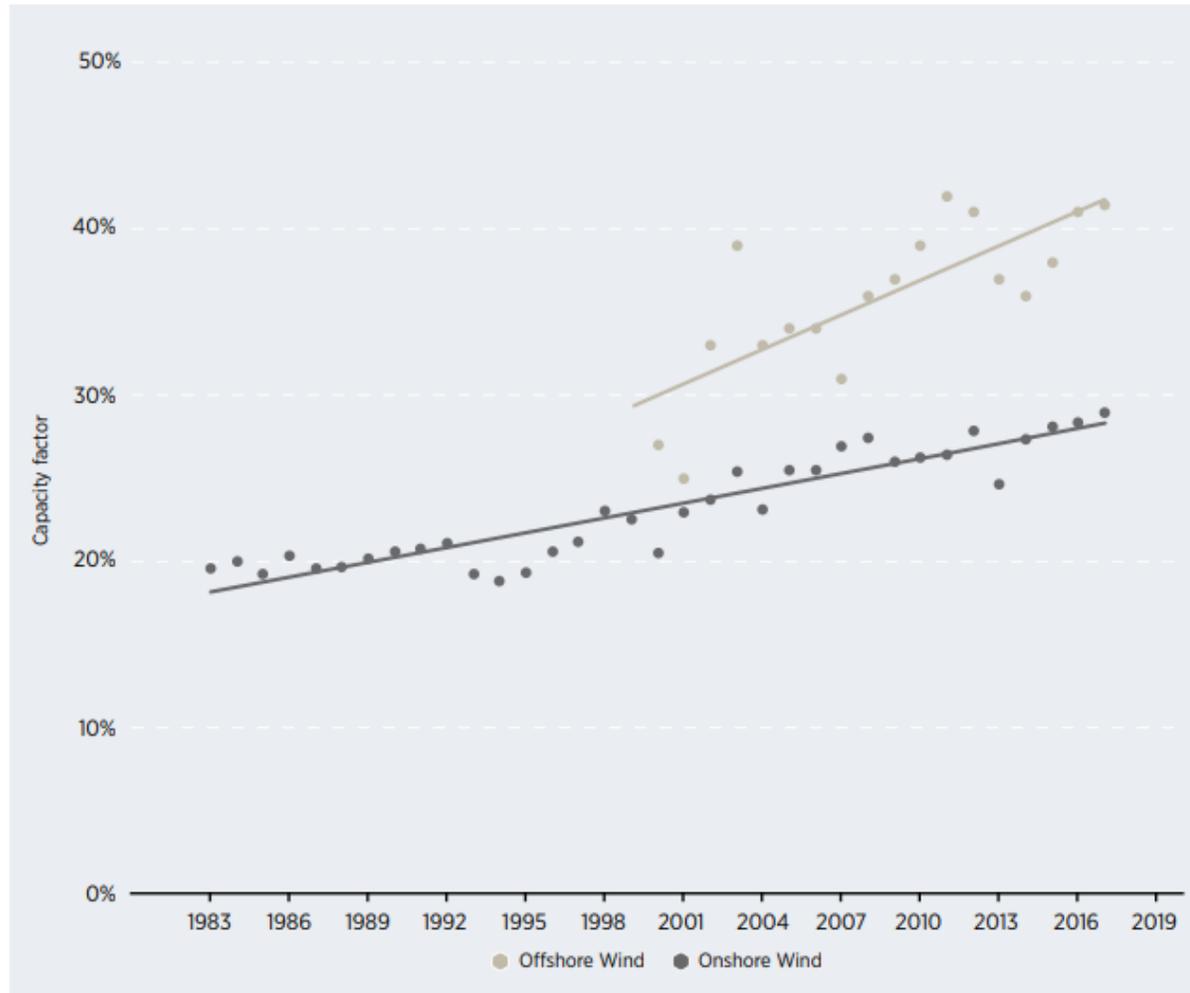
WIND
POWER
SERVICE



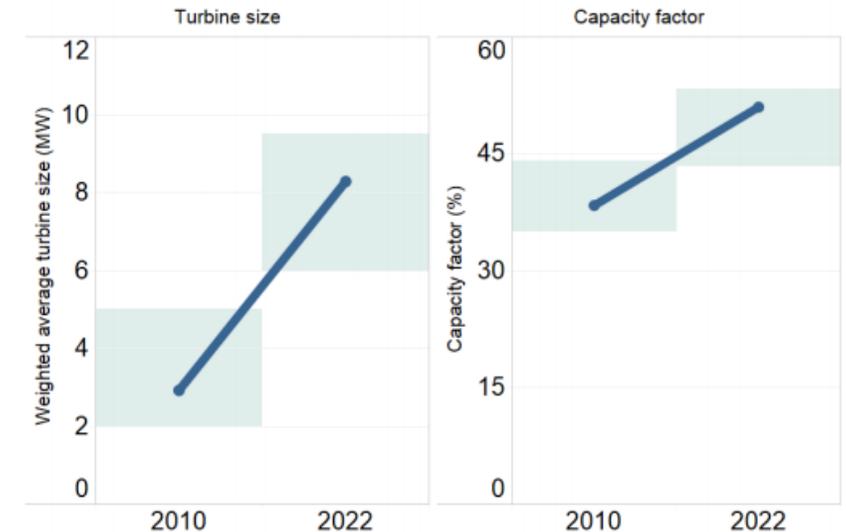
Rivende teknologiutvikling..



.. og økende kapasitetsfaktorer...

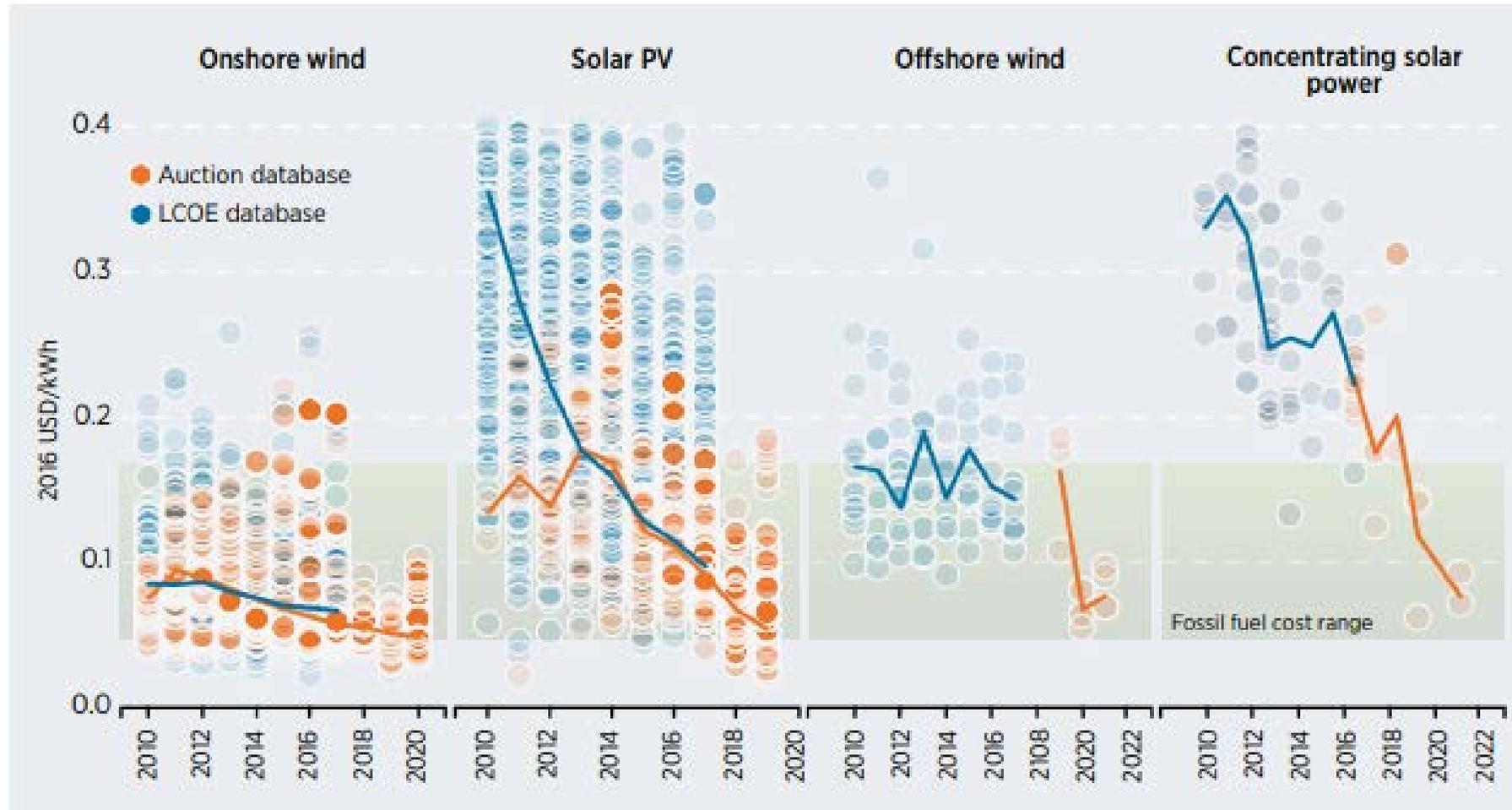


Global weighted average capacity factors for new onshore and offshore wind power capacity additions by year of commissioning, 1983-2017



Source: IRENA Renewable Cost Database; MAKE Consulting, 2018; and Global Data, 2018

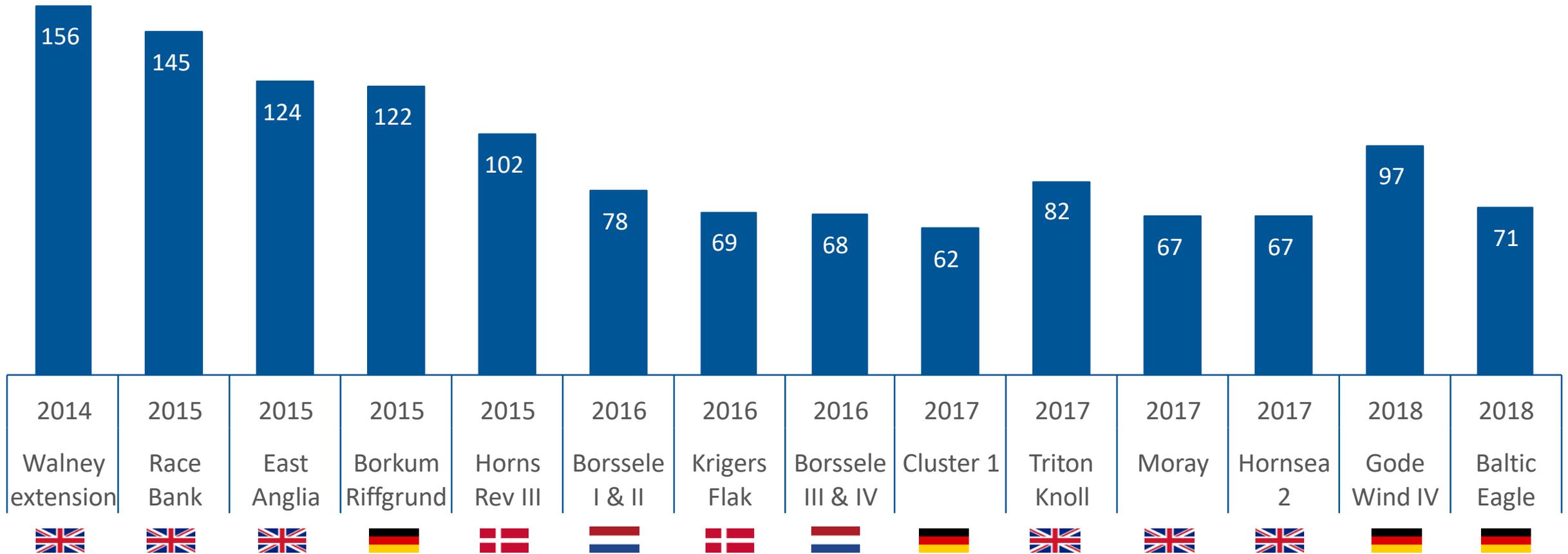
..samt auksjoner.. ..har gjort havvind konkurransedyktig..



Source: IRENA Renewable Cost Database and Auctions Database

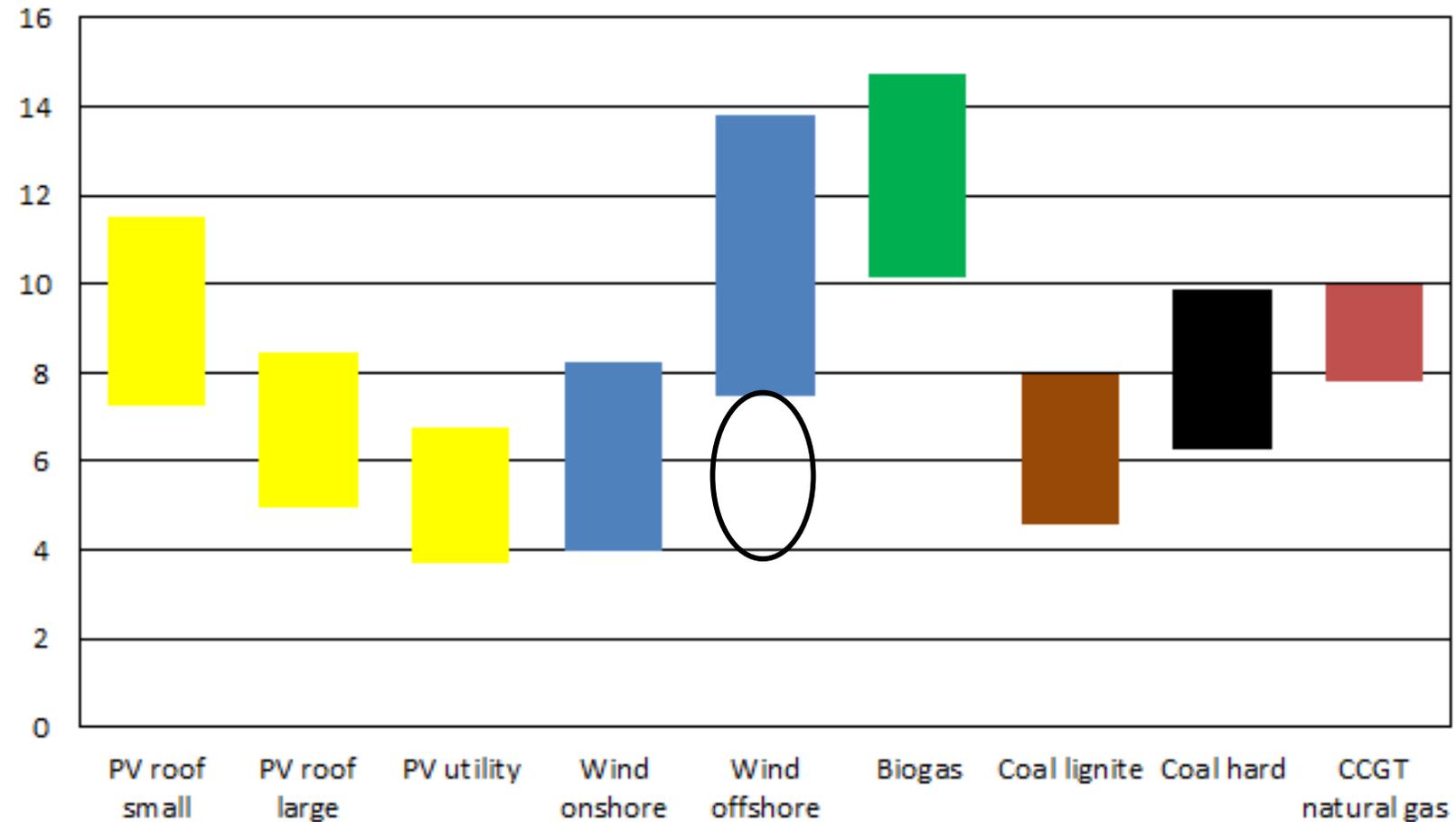
Kostandsreduksjoner i havvind per prosjekt

Levelised revenue of electricity, incl. transmission costs
EUR/MWh¹, 2016-prices



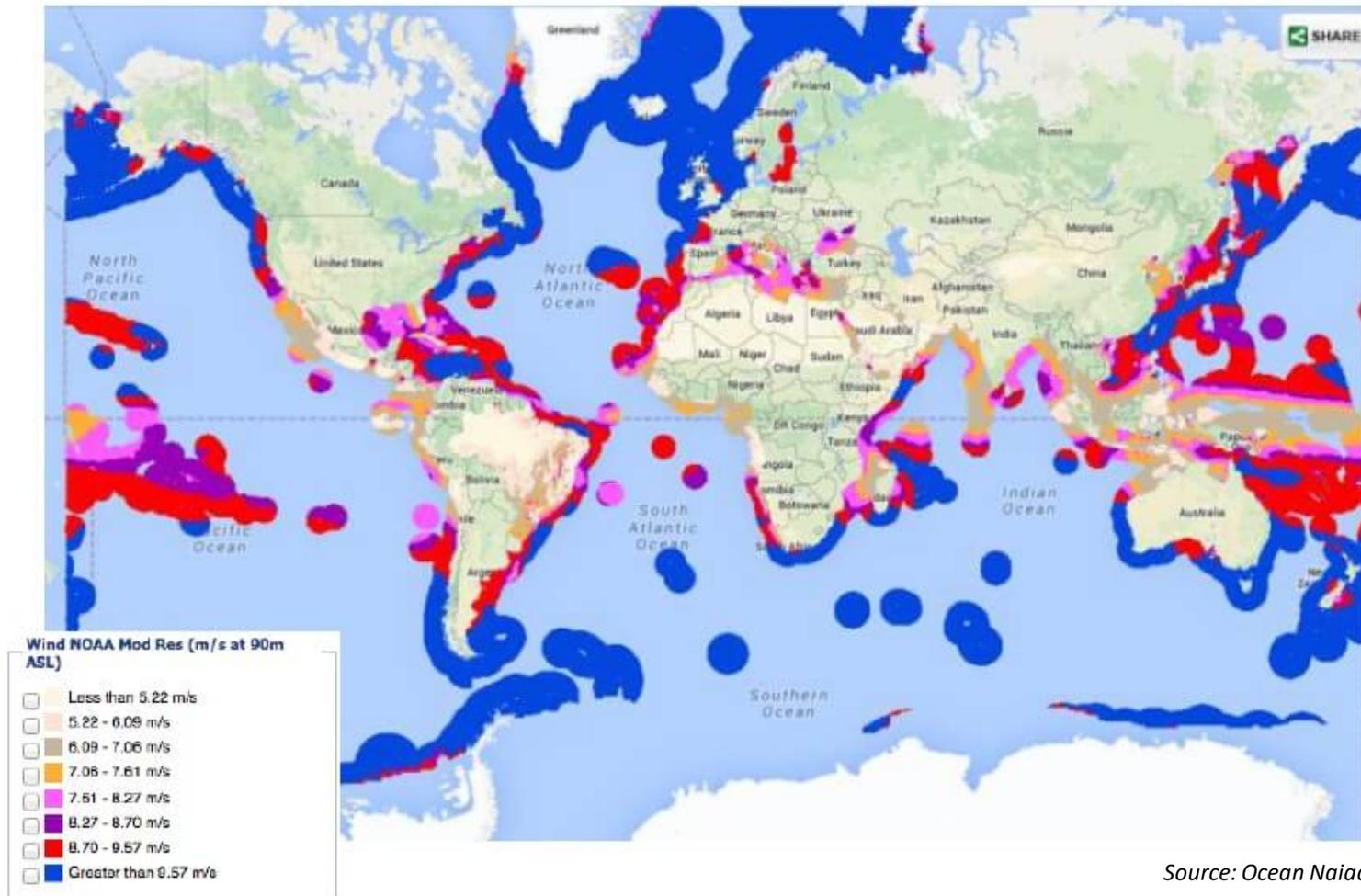
Levelized cost of electricity for Germany

in EuroCent/kWh, source: Fraunhofer ISE; March 2018



Møter etterspørsel langs kysten

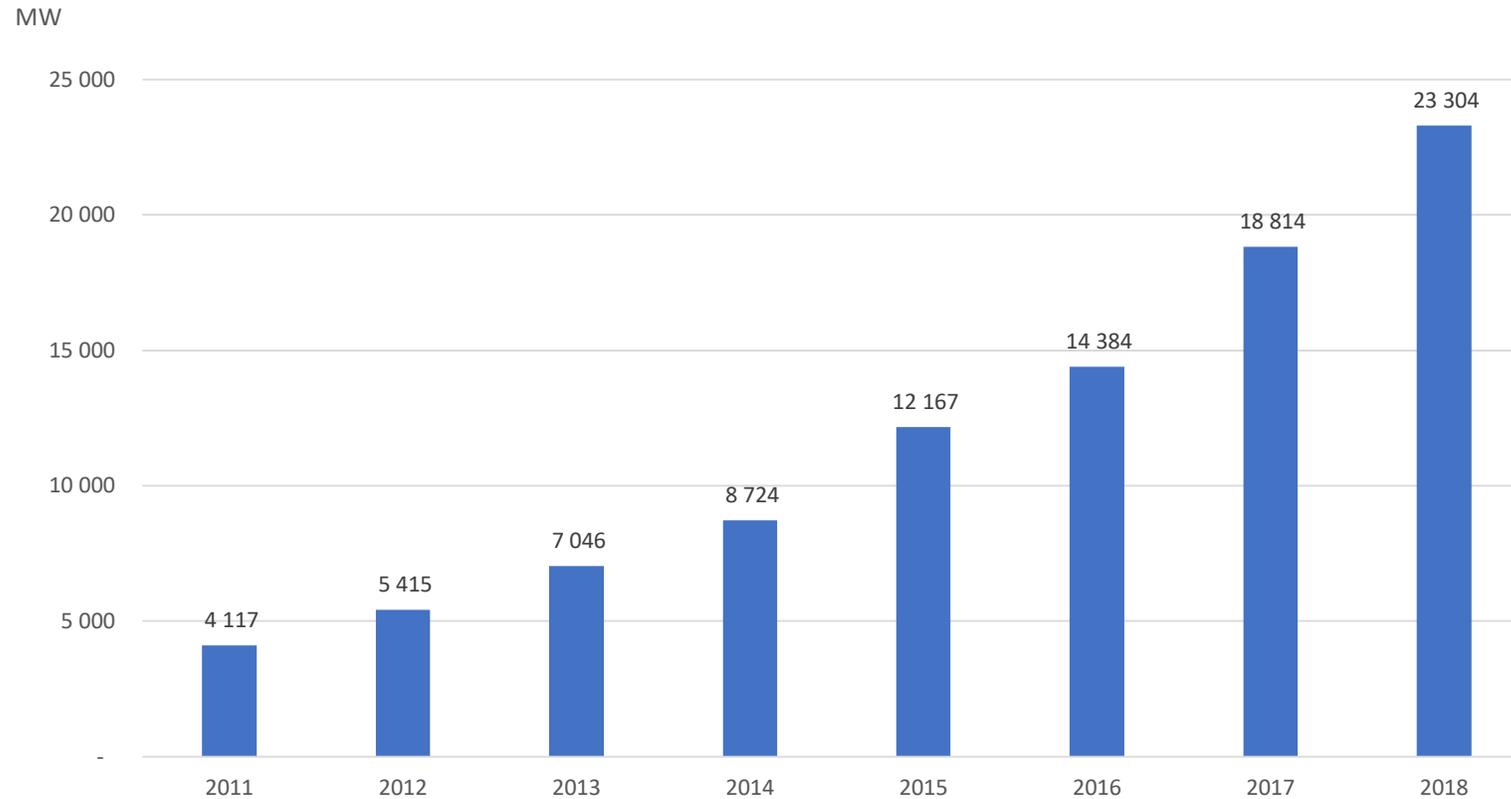
Vindhastigheter ved 90 m



Source: Ocean Naiad

Ca. 40% av verdens befolkning lever nærmere enn 100 kilometer fra kysten!

...og skapt en raskt voksende global industri!



120 GW i 2030



Global Offshore Wind Market Set to Grow Sixfold by 2030

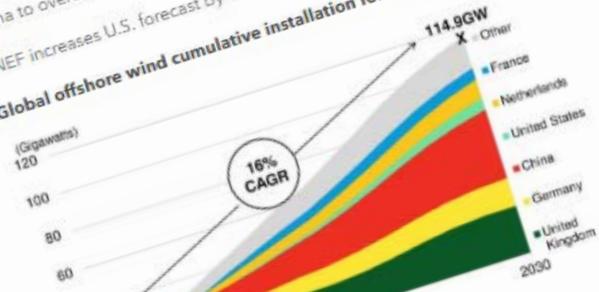


January 8, 2018

This article first appeared on the [BNEF mobile app](#) and the [Bloomberg Terminal](#).

- China to overtake U.K. and lead installations by 2022
- BNEF increases U.S. forecast by 85% on new state targets

Global offshore wind cumulative installation forecast



Search
Enter keywords

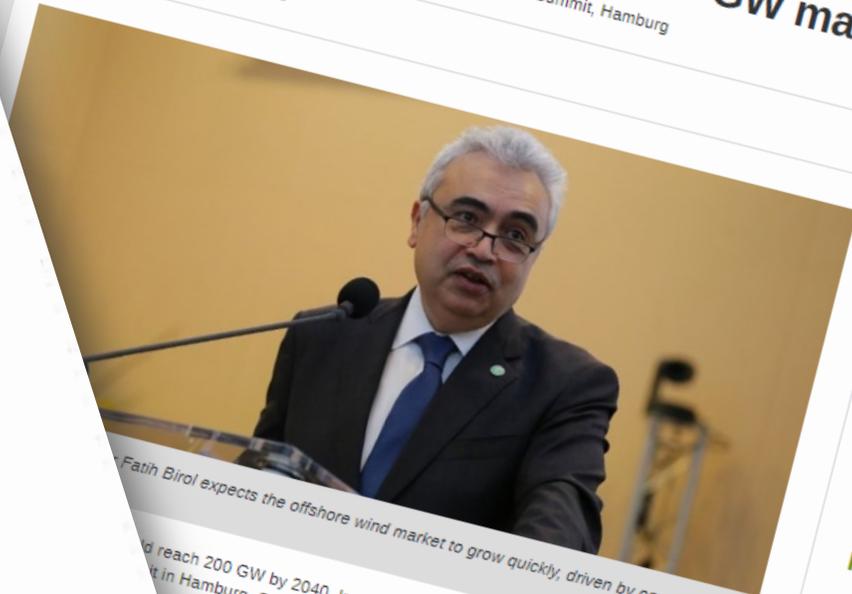
IEA chief predicts potential 350-GW market for offshore wind

Tue 25 Sep 2018 by David Foxwell reporting from Global Wind Summit, Hamburg

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Fatih Birol expects the offshore wind market to grow quickly, driven by ongoing...

...reach 200 GW by 2040, International Energy Agency executive director Fatih Birol said at a ministerial session in Hamburg, Germany, but with support from governments it has even...



Recent whitepapers

MAN Dual-Fuel GenSets
By MAN Diesel and Turbo

Alignment and Measurement Services
By Wartsila

521 til 2050

Cumulative installed capacity (GW)

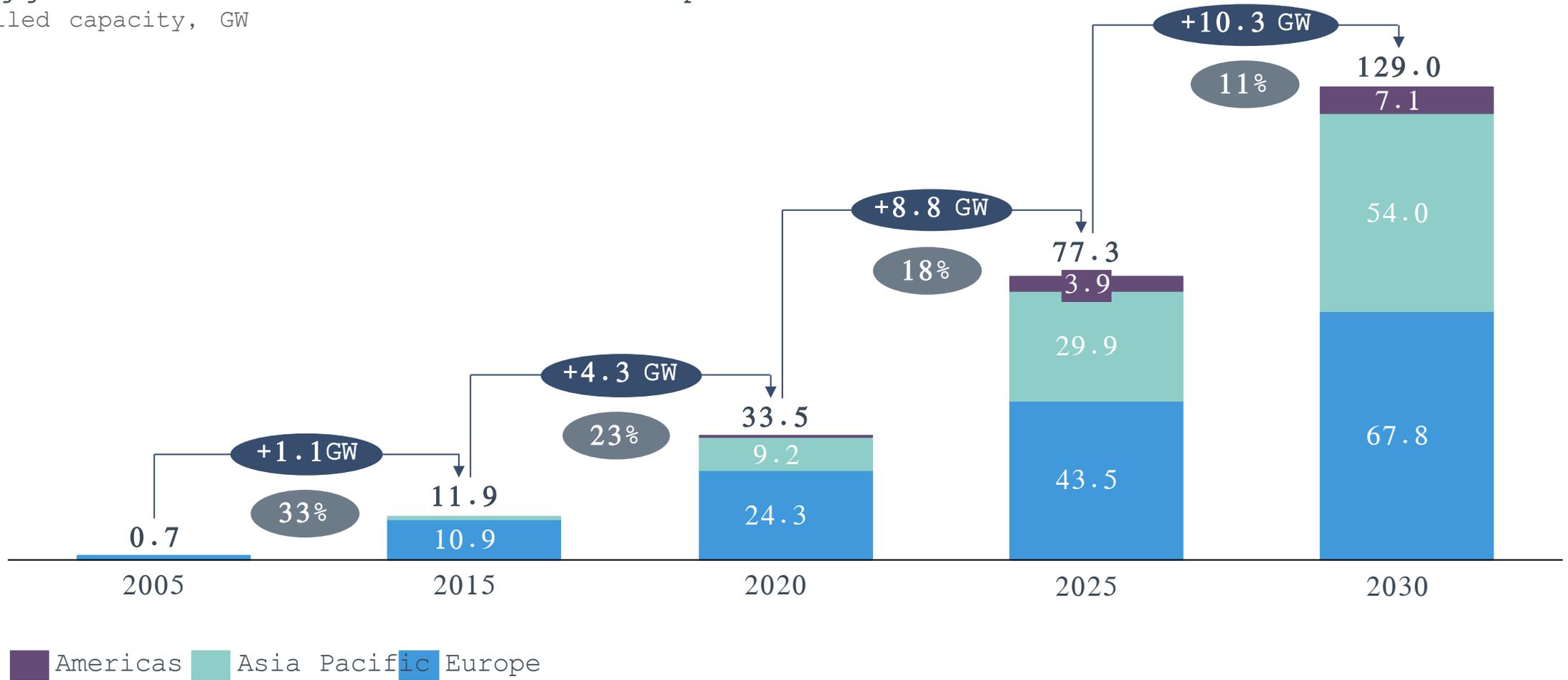
Global offshore wind- REmap Case



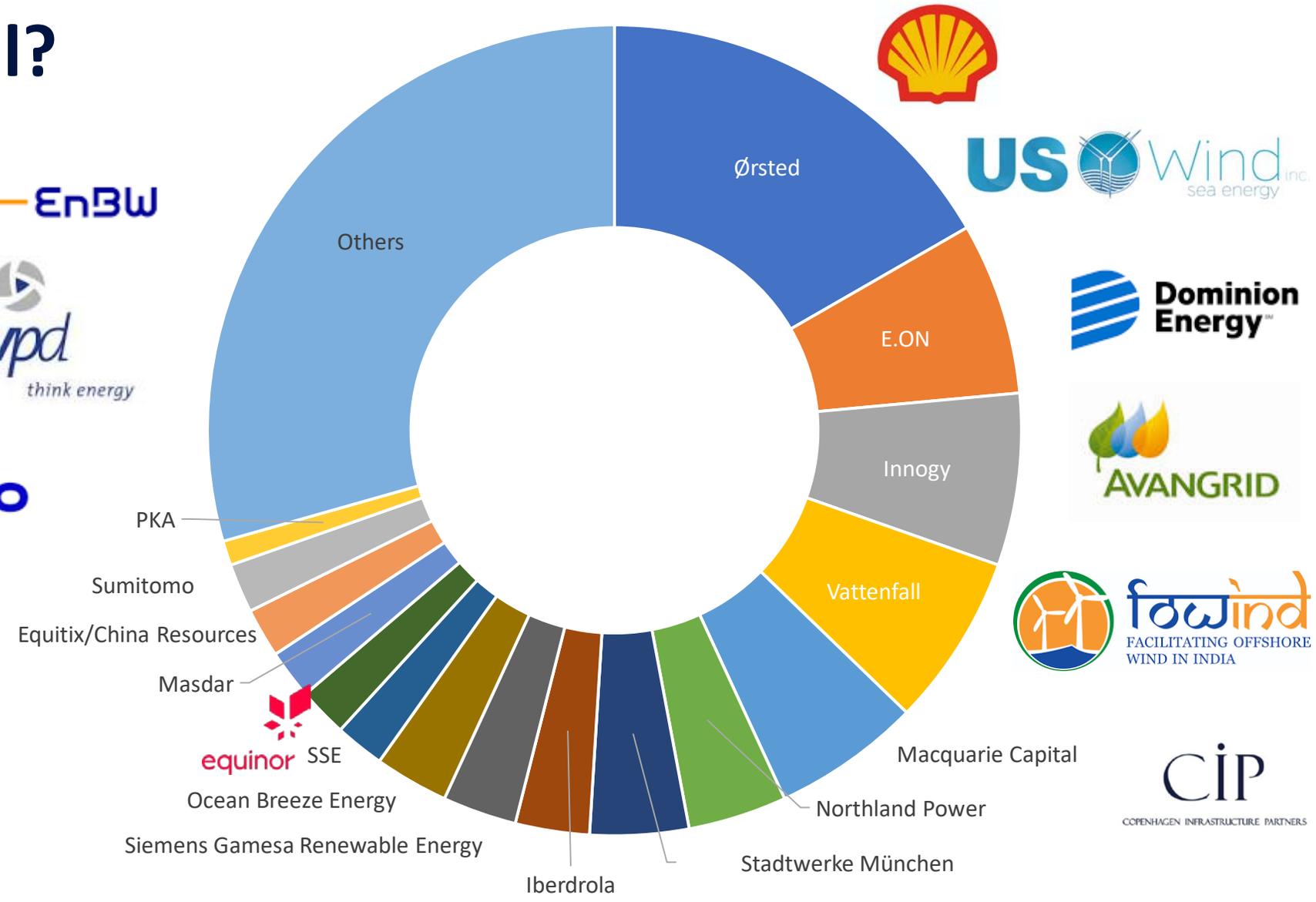
Source: IRENA, 2018b, 2018c

Et globalt marked!

Strong growth in established and new offshore wind power markets
 Installed capacity, GW



Hvem selger vi til?



Source: WindEurope



..og deres største leverandører...

**Seaway
Heavy Lifting**



A Subsea 7 company

ATKINS

Member of the SNC-Lavalin Group

ABB



GeoSea

Geotechnical Offshore Contractor



MHI VESTAS OFFSHORE WIND

SIEMENS Gamesa
RENEWABLE ENERGY



aibel

 **Fred. Olsen Windcarrier**

 **Boskalis**

RAMBOLL

**Prysmian
Group**

**BLADT
INDUSTRIES**

 **Jan De Nul
GROUP**



HITACHI
Inspire the Next

DOOSAN

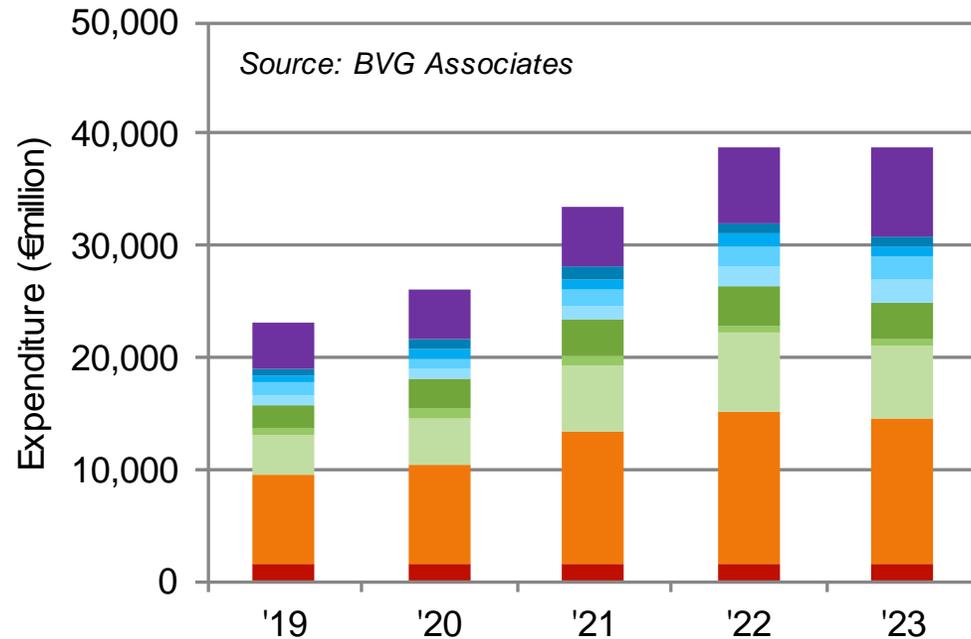
 **GOLDWIND**

Nexans

 **LAFARGE**

 **Norwegian
Energy Partners**

Et marked på NOK 1600 milliarder over de neste 5 årene til 2023



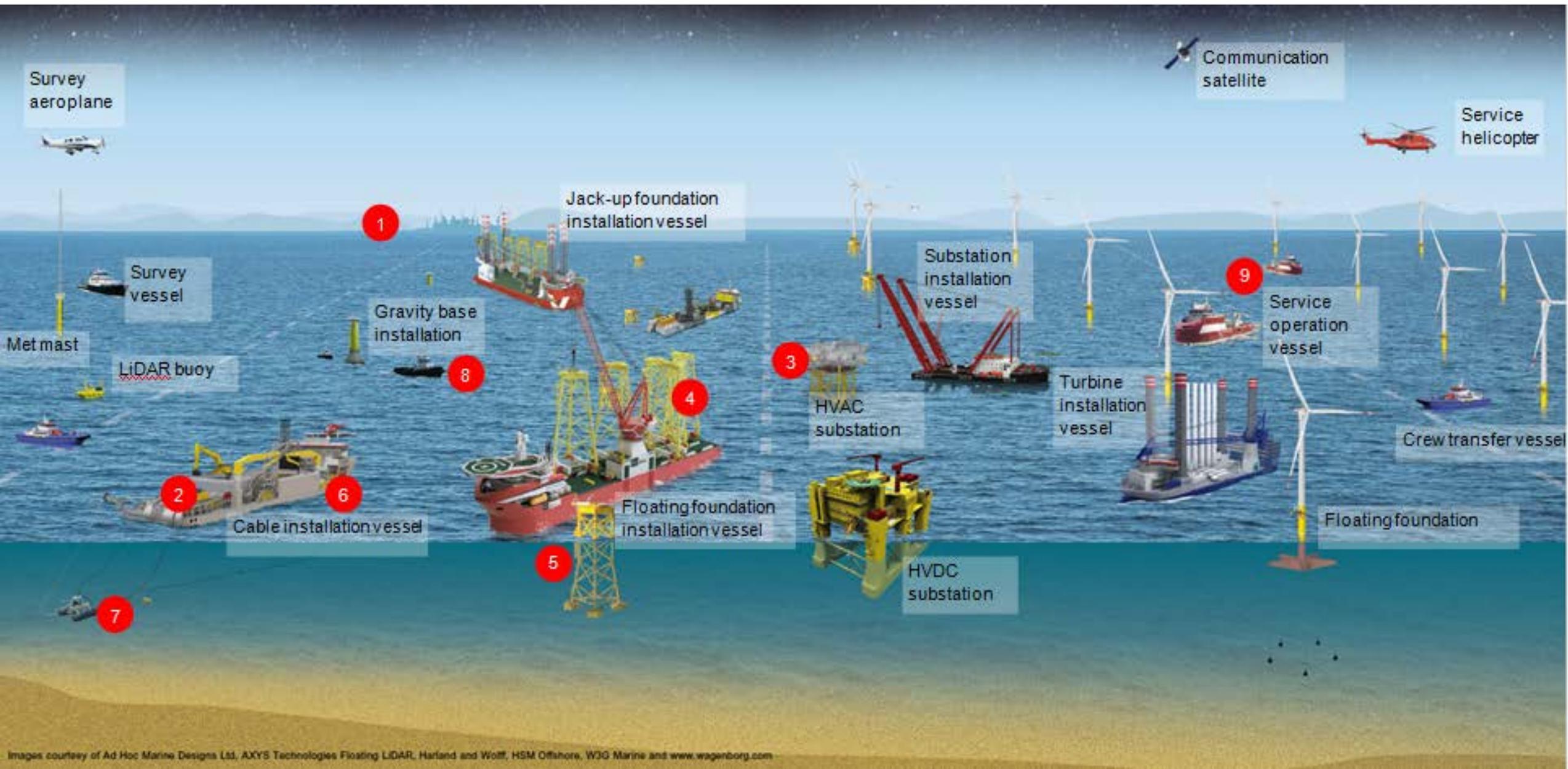
- Project development
- Turbine
- Foundation
- Array cable
- Transmission
- Turbine installation
- Foundation installation
- Array cable installation
- Transmission installation
- OMS

Forventninger økt fra 1080 milliarder for 5 års-perioden frem til 2022 som i 2017 rapporten

Årlig ca. NOK 300 milliarder – til 380 i 2023

- Europa : NOK 680 mrd.
- Asia : NOK 720 mrd.
- USA/Canada: NOK 200 mrd.

Offshore ekspertise etterspurt!



Store komplekse prosjekter med mange kontrakter

Marine operasjoner er sentrale

Forståelse for hav og material

Kunnskap om offshore drift og vedlikehold

Forståelse av teknologirisiko og -anvendelse

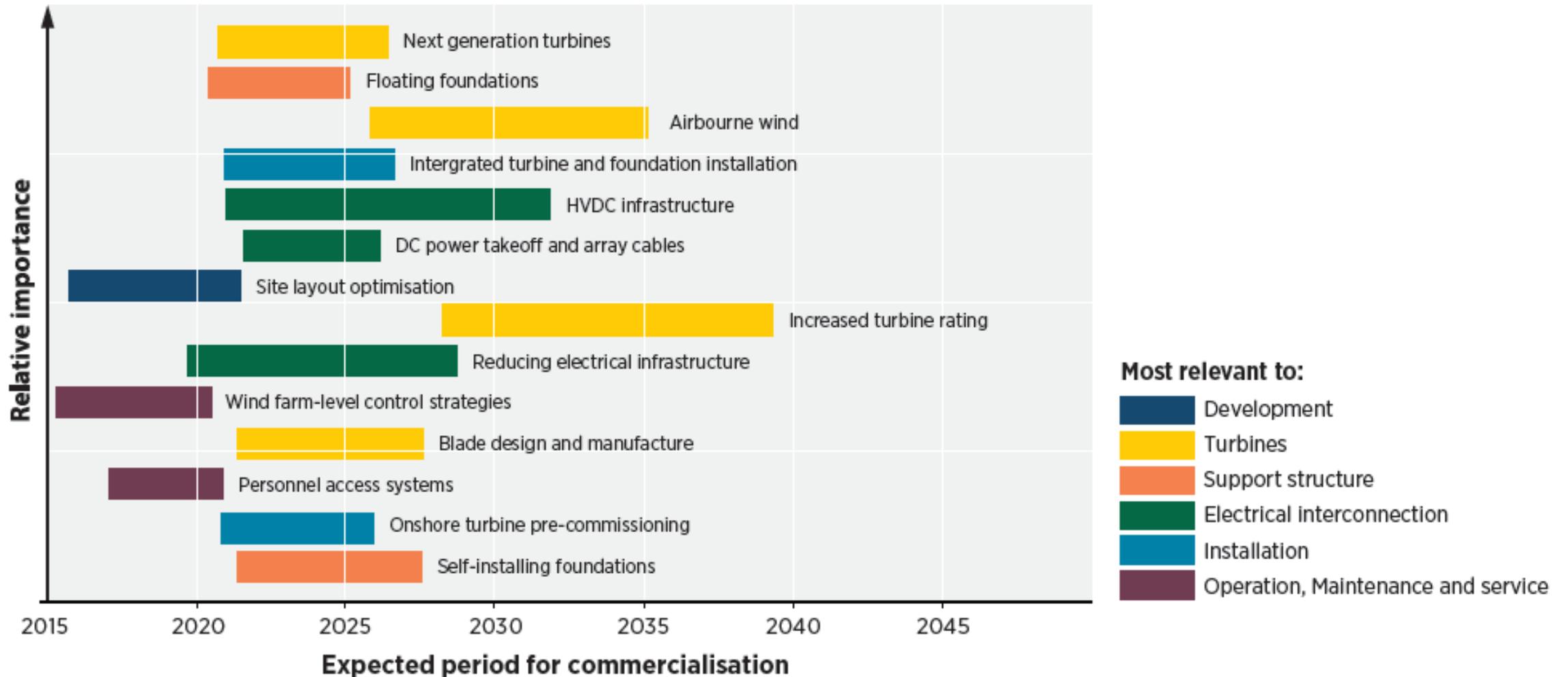
HMS



“There will be huge demand for new innovative offshore solutions and expertise with a global reach as offshore wind is expanding into new markets.”

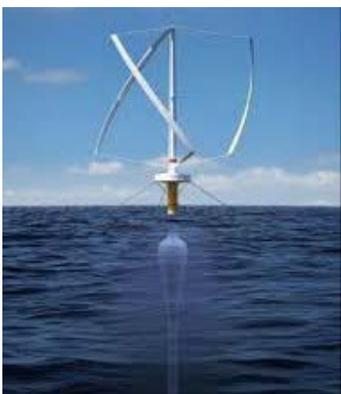
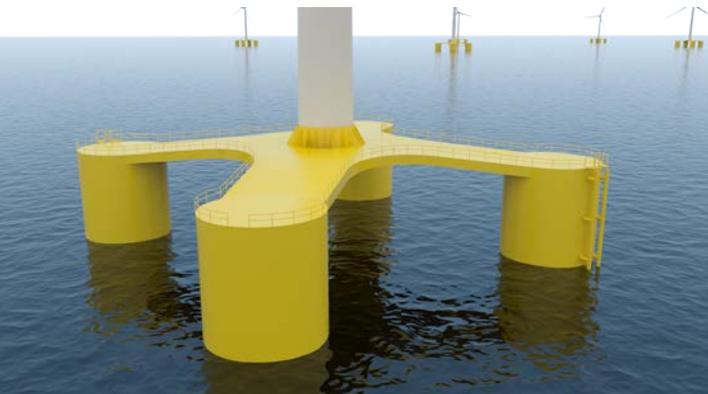
Large developer

Innovasjon (og standardisering) ...



Source: IRENA Innovation Outlook; Offshore Wind

Flytende vind kommer...

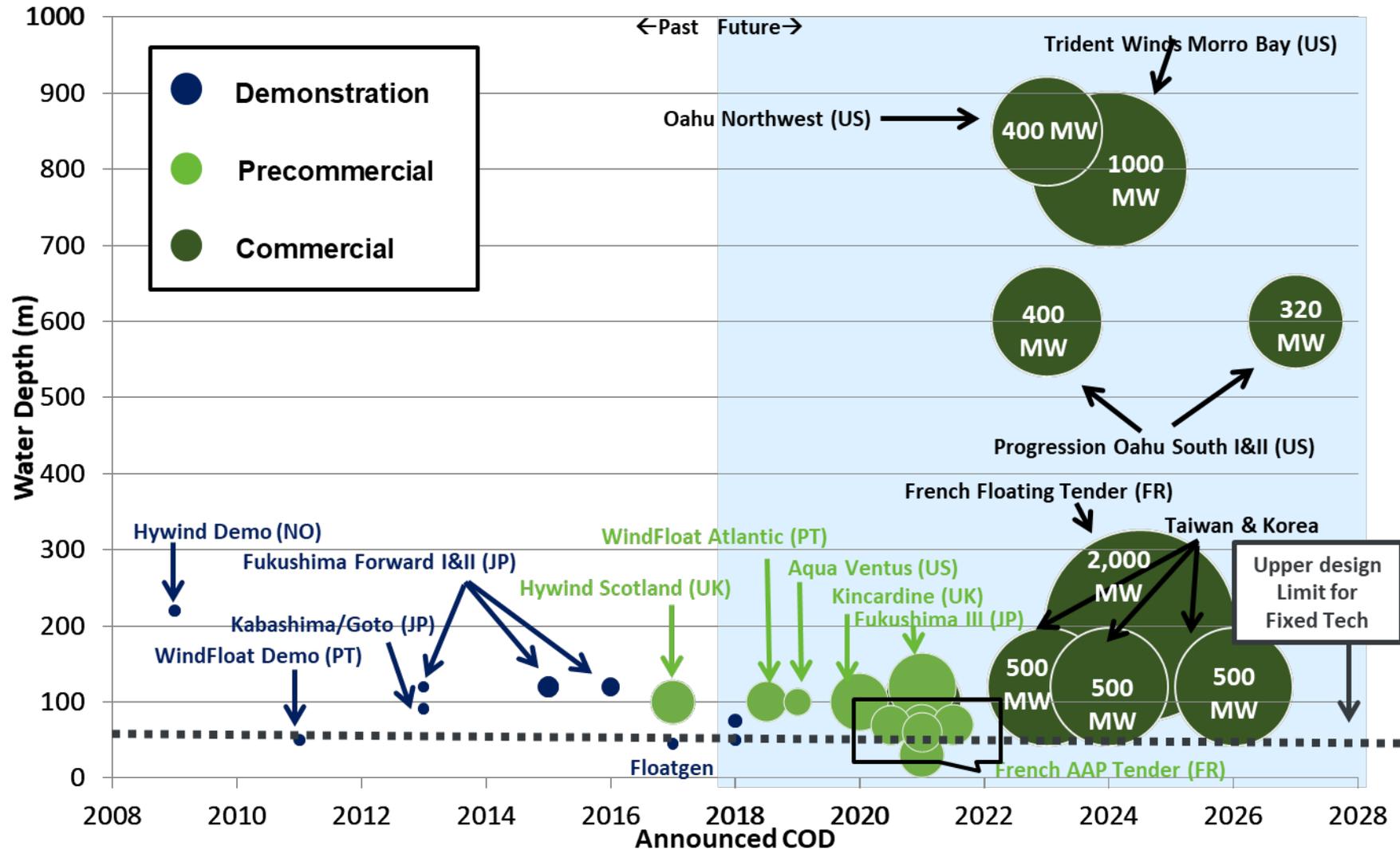


...og vi er ikke alene...

Wind Farm Name	Country	Capacity (MW)	Commissioning date
Hywind Scotland	United Kingdom	30	2017 (in operation)
Windfloat Atlantic	Portugal	25	2019
Flocan 5 Canary	Spain	25	2020
Nautilus	Spain	5	2020
SeaTwirl S2	Sweden	1	2020
Kincardine	United Kingdom	49	2020
Forthwind Project	United Kingdom	12	2020
EFGL	France	24	2021
Groix-Belle-Ile	France	24	2021
PGL Wind Farm	France	24	2021
EolMed	France	25	2021
Katanes Floating Energy Park -Array	United Kingdom	32	2022
Hywind Tampen	Norway	88	2022

Wind Farm Name-	Country	Capacity (MW)	Commissioning date
SeaTwirl S1	Sweden	0.03	2015 (in operation)
EOLINK	France	0.1	2018 (in operation)
Floatgen	France	2	2018 (in operation)
TetraSpar	Norway	3.6	2019
FLOWocean Demonstrator	Norway		2019
DemoSATH	Spain	2	2020





Flytende - first mover – 50% av BOP Hywind Scotland!

- Engineering of substructures and towers, system engineering
- Procurement services
- Transportation of substructures
- Preparations for the installation of top sections and generators
- Towing, mooring operations and connecting
- Static and dynamic cabling and associated accessories
- Platform technology; safety; marine verification; and warranty surveys







GOLD TERN

Fred. Olsen Windcarrier

1027



Hva skal til?

Konkurransedyktig på kvalitet og pris

Endringsvilje og- evne

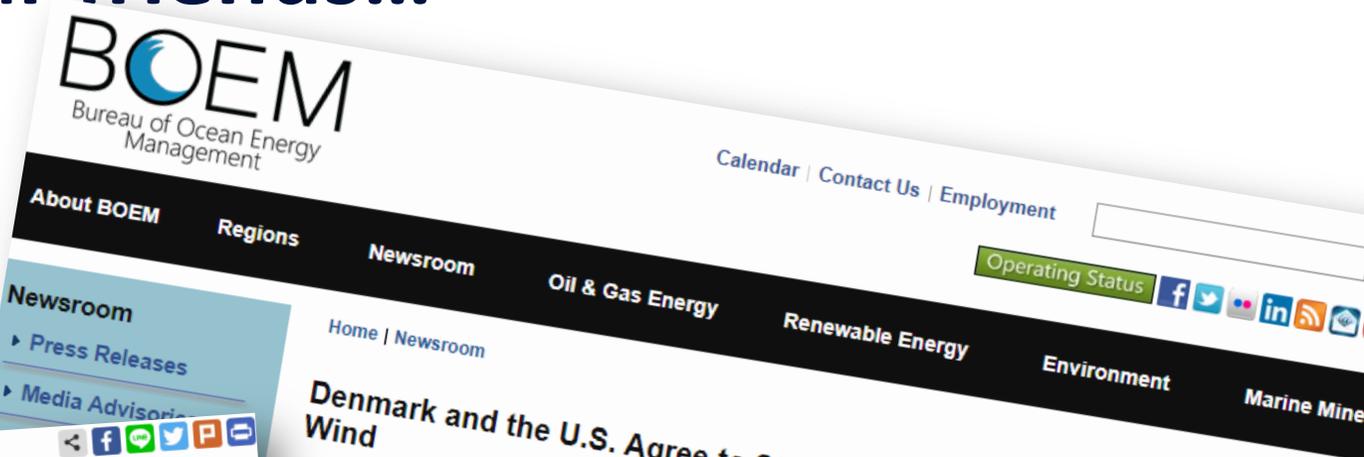
Innovativ

Industrialiseringsevne

Kremmerinnstilling

Tilstedeværelse

With a little help from your friends...



What's New

MOEA welcomes Taiwan-U.K. offshore wind power cooperation

Organization: Department of International Cooperation

Publish Date: 2018-04-10 15:53



MOEA welcomes Taiwan-U.K. offshore wind power cooperation

Minister of Economic Affairs Jong-Chin Shen and U.K. Minister for Investment at the Department for International Trade Graham Stuart witnessed the signing of a memorandum of understanding on cooperation in the field of offshore wind farm development.

Off
Fol
Mar
2011

Earlie
enga

exchanging views on bilateral offshore wind power cooperation.

Denmark and the U.S. Agree to Strengthen Cooperation on Offshore Wind

05-13-2016

BOEM is pleased to announce that Denmark and the United States have signed a memorandum of understanding on offshore wind energy projects.

On May 4, 2016 at the Embassy of Denmark in Washington, D.C., Danish Ambassador and BOEM Director Abigail Ross Hopper signed a Memorandum of Understanding on Offshore Wind Energy Projects, which expresses mutual interests in developing offshore wind as a clean and sustainable energy source.

OFFSHORE VIND

Norske leverandører vil hjelpe Taiwan å bygge ut havvind

Før helgen ble det skrevet samarbeidsavtale mellom Taiwan og norske industripartnere. Nå går turen til Kina og Sør-Korea.





En enorm mulighet for Norge,
bare begrenset av vår egen evne
til å forstå og utnytte den!

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Takk for oppmerksomheten!

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