

Taking offshore wind global

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GWEC's Mission

1

To act as an **authoritative voice** for the **global industry**, speaking out on policy issues that affect the industry, fostering best practices and technology innovation and ensuring fair market access and fair treatment for its members across global markets.

2

To **develop new markets** for the wind industry and accelerate the global growth of the sector. GWEC has a successful track record in places like China, India, Brazil, South Africa, Mexico, Argentina and Colombia. We are currently helping to develop crucial emerging markets such as Vietnam and the Philippines, while working to accelerate growth in others such as India and Mexico, and enable the expansion of Offshore Wind into global markets.

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CO Members



renewables



Associations



JOIN THE GLOBAL COMMUNITY!

C1, C2, and C3 Members

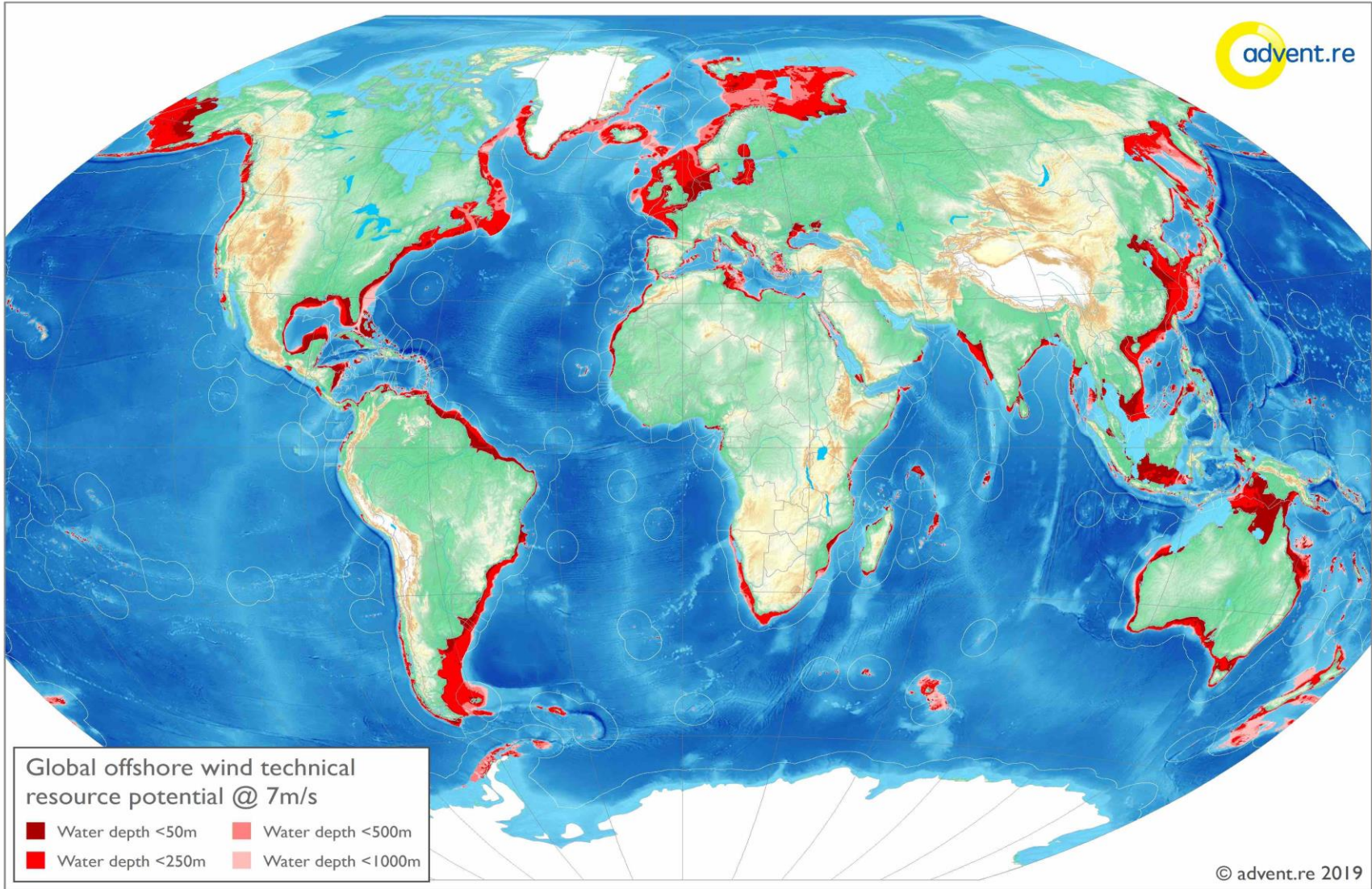


Global Offshore Wind Market

- Potential, Dynamics, Outlook



Global offshore wind potential



- 3.1 terawatts is technically available in selected emerging markets

Characteristics of the offshore wind market

Large, complex projects

Offshore projects have a minimum size of 100MW+, normal project size is now more like **300 MW to 1.2 GW**

Capital-intensive projects

For a 500MW wind farm, it takes **50mn USD to develop** and **2bn USD to build**

Long development time

It takes **7 to 10 years** from gaining the option to the full commissioning of the wind farm, emerging markets take longer

Strong reliance on political support

Long-term political support including targets and to drive legislative and administrative change

“No easy way to enter the offshore wind industry”



Experience gained in mature markets over the past 15 to 20 years



Projects are now on time and on budget, providing stable revenue stream



Offshore wind has become attractive for institutional investors, now even entering at pre-construction stage

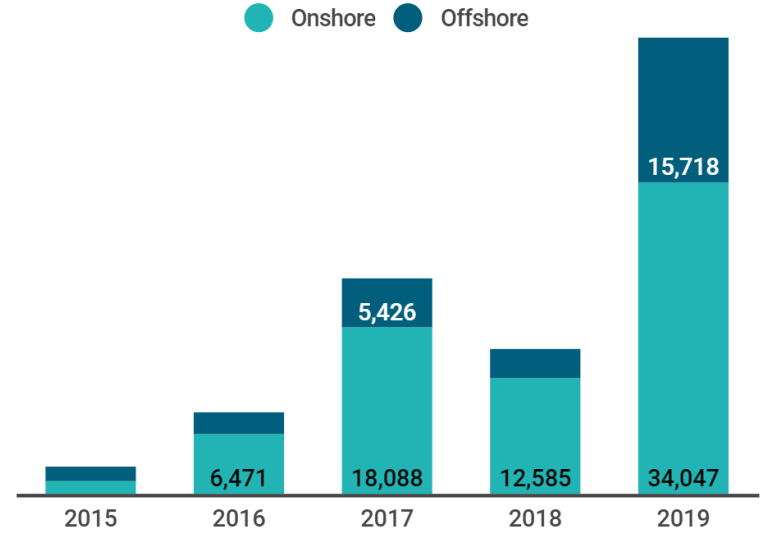
Market-based mechanisms dominate the global wind market

Support scheme and capacity allocation mechanism

Status Jan 2020



Global wind auction results 2015-2019



• Technology-specific auctions and tenders (“Wind only”) dominate to allocate offshore capacity



Source: GWEC Intelligence, National sources, January 2020

LCOE and bid levels

Mature offshore wind markets

Developing offshore wind markets

USA
 LCOE - 62-121 USD/MWh
 Bid - 100USD/MWh PPA

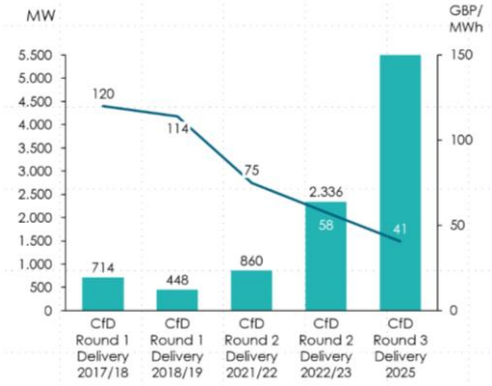
Germany
 LCOE - 78-138 USD/MWh
 Bid - 50 USD/ MWh (2018)

UK
 LCOE - 69 -93 USD/MWh
 Bid - 50 USD/MWh (2019)

Developing offshore wind markets

China
 LCOE - 82 -115 USD/MWh
 FIT - 110-125 USD/MWh
 Bid – 102 USD/ MWh (2019)

Vietnam
 •n. a.
 •98 USD/MWh (FIT)



In 2017, 1.38 GW of offshore wind out of its first German competitive auction totalling 1.49 GW won the tender with a **zero-subsidy**, then followed by the Netherlands in 2018. Zero- subsidy bids mean the projects will only receive the wholesale electricity price, which introduces merchant risk.

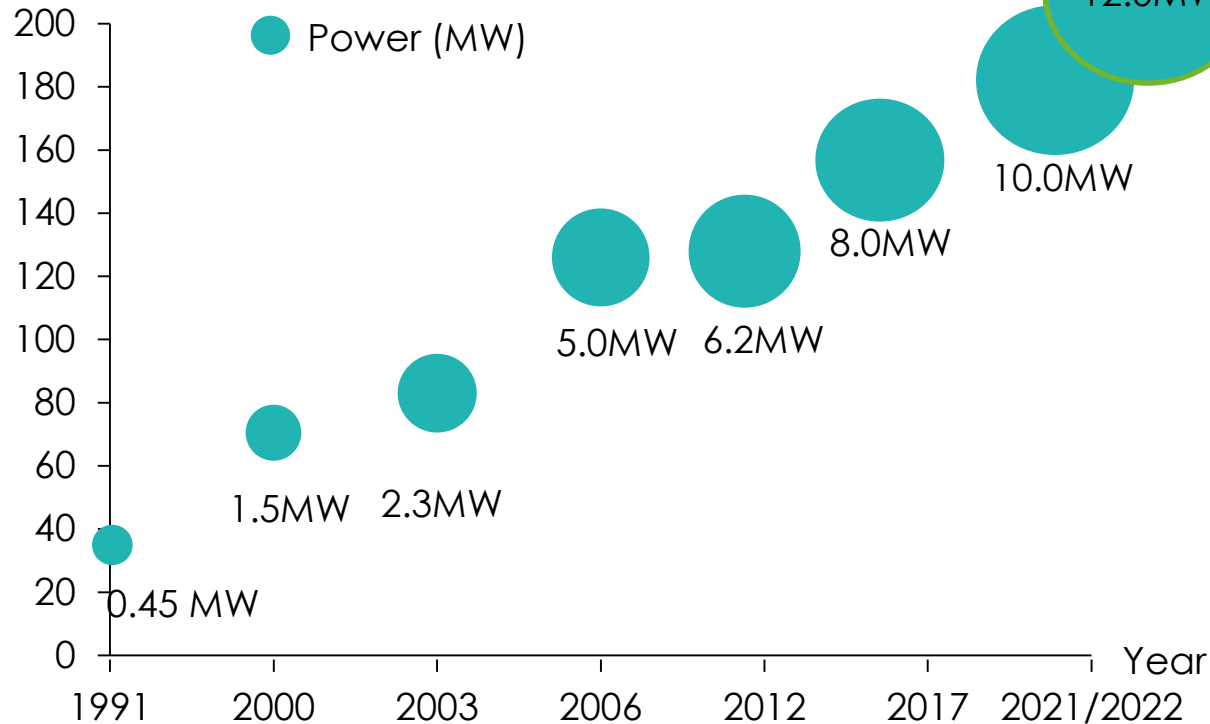
Different LCOE and bid levels in mature and developing offshore markets underline different risk profiles

Innovation and efficiency are key growth drivers (Turbine)

Rotor sizes and power rating to increase

Commercial offshore wind turbine development

Rotor size (m)



- **Capacity factors continue to improve**

FX. GE Haliade-X 12 MW DD turbine claims **63%** capacity factor, 5-7 points above the industry standard.

- **Increase of AEP**

FX. SGRE SG10.0-193 DD turbine will have up to **30%** AEP increase compared with SG8.0-167DD. GE Haliade-X 12 MW DD turbine AEP is likely to be **twice** as much as the Haliade 150-6MW

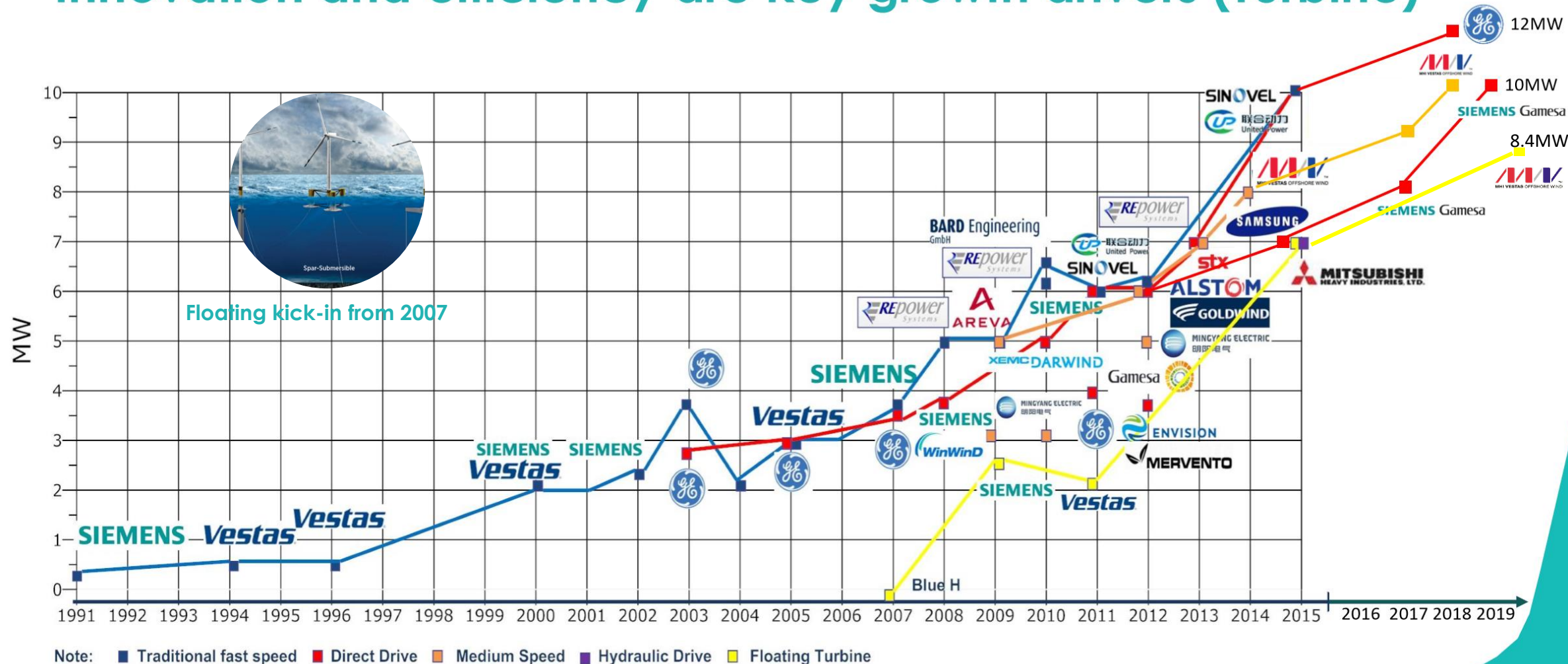
- **Cost reduction of BOP**

FX. Less unit means **saving** for foundations, inter-array cable, installation for foundation, turbine and cable.

- **Reduction of OPEX**

O&M costs account for approximately 25-30% of total project life-cycle costs. Less unit also means saving in Project OPEX

Innovation and efficiency are key growth drivers (Turbine)

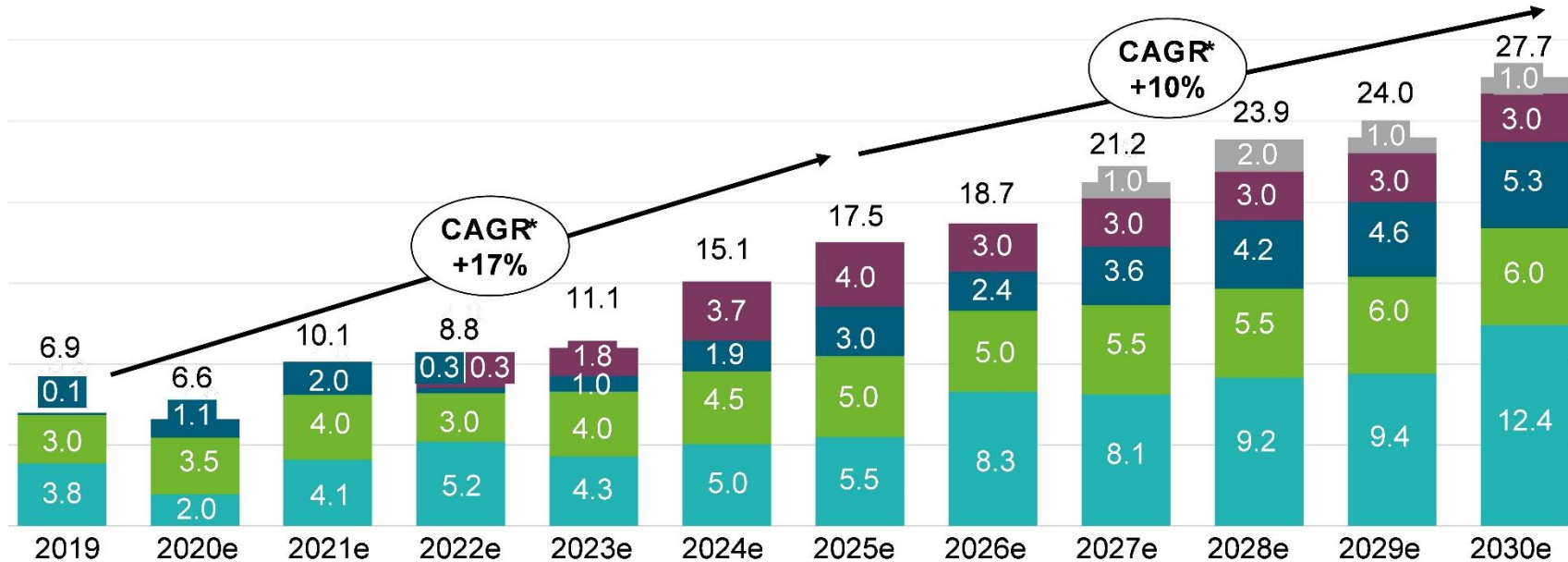


- Where the offshore turbines is headed: rated capacity of 20 MW (with rotor larger than 260m) by 2030;
- Floating challenge: too many designer (15+), needs consolidation and needs to be modularized.

Growth of the global offshore wind market- 2030

New installations
Business-as-usual scenario
GW, offshore

Other China Europe
North America Asia ex China

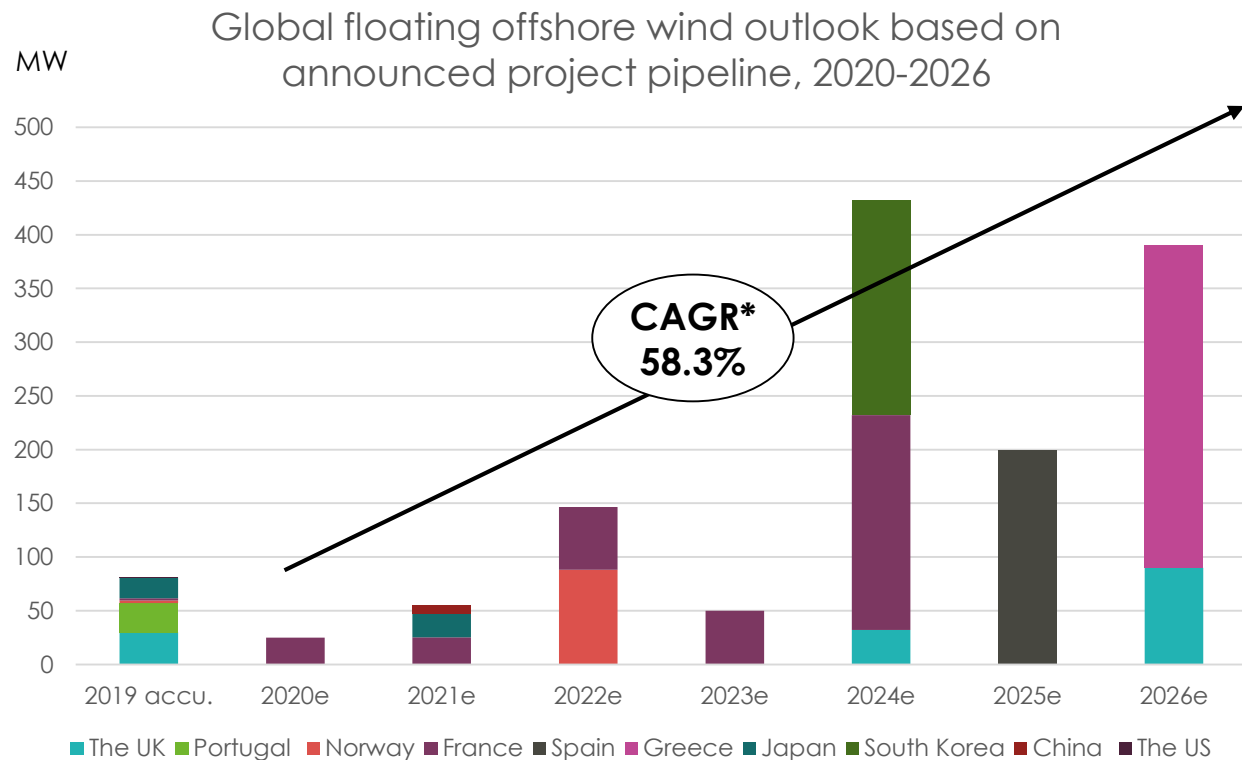


- According to GWEC Market Intelligence's forecast, **185 GW** of offshore wind is likely to be built **between 2020 and 2030**, bringing the global total to about **215 GW**, of which 96 GW (45%) located in Europe, 89 GW (42%) in Asia, 25 GW (12%) in North America.
- **China** is expected to install **52 GW** new offshore wind in 2020-2030, making it the **largest** offshore wind market in the world in both new and accumulative installation

* CAGR = Compound Annual Growth Rate

Source: GWEC Market Intelligence Offshore Wind Outlook 2030 (April 2019)

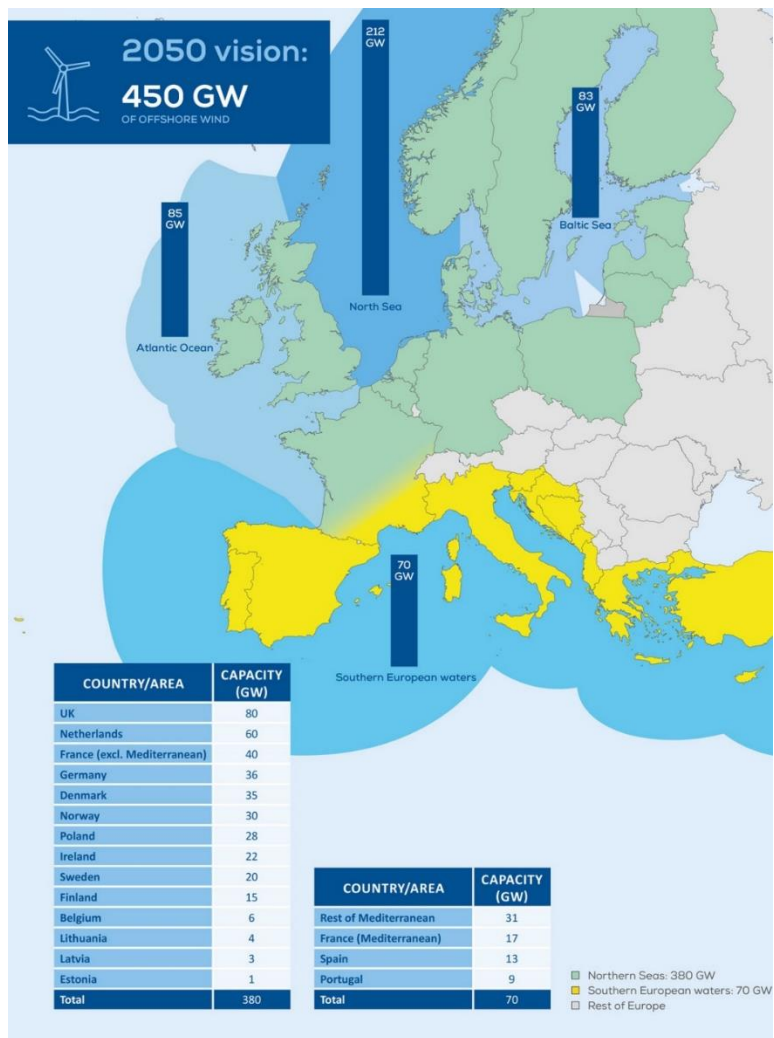
Floating offshore wind outlook 2030 - up to 19GW



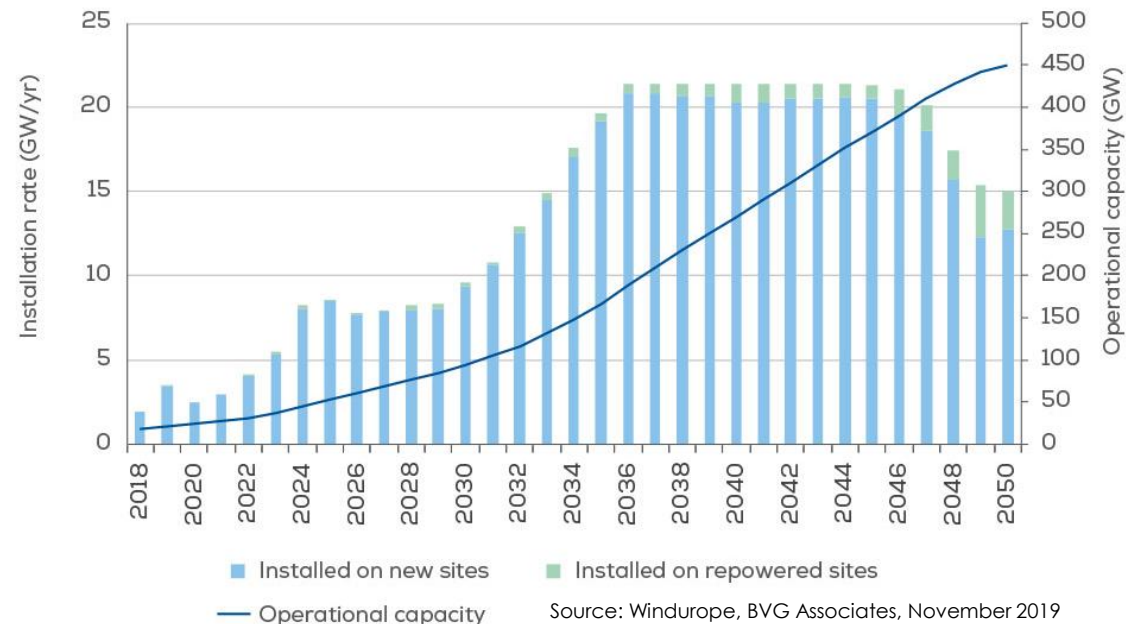
- The next large scale floating project, Hywind Tampen, will be installed **140 km** off the coast in the water depth of **260-300m**.

- The world's **first floating turbine**, SWT-2.3MW, was installed by Equinor in **Norway** in **2009**.
- As the end of 2019, **80.5 MW** of floating wind were installed in **ten countries** with **the UK** taking the lead followed by **Portugal** and **Japan**.
- **1,308 MW** planned to be built **by 2026**, of which 82% is located in **Europe** and the rest in **APAC**.
- **2030 floating forecasts** spread from **6GW** up to almost **19GW**, all influenced by how quickly levelised cost of energy numbers can be brought down to below €50/MWh (\$55/MWh).
- Floating wind will be considered as simply another choice of foundation solution rather than as a separated offshore wind sector, **100-150 GW** is projected to be built **in EU** by **2050**.

European offshore wind vision for 2050



Installation rate required to achieve 450 GW by 2050



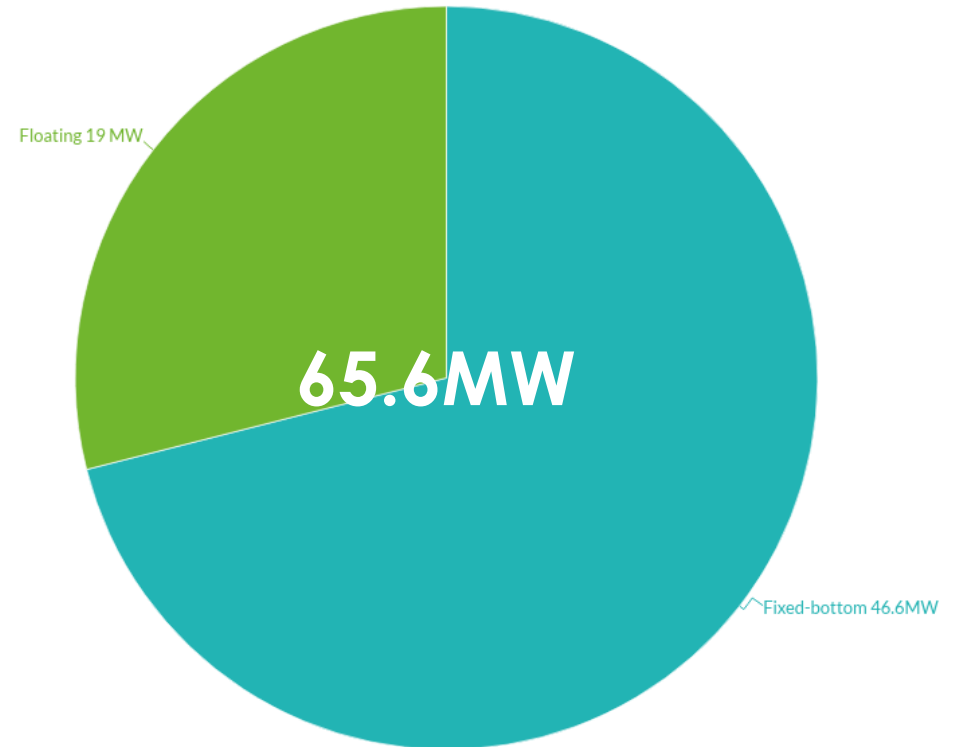
- **450 GW by 2050 vision:** 380 GW in the North Seas and 70 GW in Southern European waters;
- The 2050 vision is not only to help Europe **go carbon-neutral** and **keep the technology leadership**, but also to bring huge opportunities for **economic growth, industrial restructuring** (O&G) and **job creation** (local industry and supply chain);
- To reach the 450 GW target, **annual installation rates** need to increase from **today's 3 GW** per year to over **20 GW** per year in **2030**;

Japan's offshore wind potential

Japan's offshore wind potential

- ✓ As of December 2019, Japan has 65.6MW of offshore wind power, including five floating turbines totaling 19MW, with another 13 GW of projects under EIA process.
- ✓ GWEC Market Intelligence forecasts that the country could boast 10GW of offshore wind capacity by 2030 if effective industry development is achieved.

Japan's offshore wind capacity in 2019



Accelerating Japan's offshore wind market

- Europe took over 20 years to establish its offshore wind market
 - 1991, first offshore wind farm, 450kW turbines
 - Early 2000's, 2MW marinised onshore turbines
 - Now, 12MW turbines, designed specifically for offshore wind with high performance and reliability
 - A similar evolution for foundations, transmission, construction vessels, project management, health and safety, de-risked financing, etc.
- Japan can harness this global momentum to rapidly create its own offshore wind market
 - Learning from experience from other markets
 - Adapting it to Japan's political and fiscal backdrop



Japan Offshore Wind Task Force

- ✔ Launched by GWEC and JWPA on 27 February 2020 with key local and global industry players to accelerate Japan's offshore wind market.
- ✔ The Task Force will address key bottlenecks to the growth of Japan's offshore wind industry such as providing input to streamline the regulatory process for project development and building a local supply chain.
- ✔ The first deliverable of the Task Force will be a cost reduction study to explore the long-term cost reduction potential of the industry in Japan. The study will be released in October 2020 at the Global Offshore Wind Summit – Japan, organised jointly by GWEC and JWPA.



Thank you!

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