



EUROPEAN TECHNOLOGY & INNOVATION
PLATFORM ON WIND ENERGY

The way forward for offshore wind possible scenarios

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EERA DeepWind 2019

Correction to answer on floaters.

Question:

How much of the installations shown would be floating by 2030?

Correct answer:

If there are sufficient breakthroughs, 10% of installations could be floating by 2030

Agenda

- ETIP
- Offshore market scenarios going forward.
- The technical challenges & the future.

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What are ETIPs?

European Technology and Innovation Platforms are industry-led stakeholder fora recognised by the European Commission

Goals

- Drive innovation, knowledge transfer and European competitiveness and support wind skill excellence.
- Develop research and innovation agendas and roadmaps for action at EU and national levels

Turbine Manufacturers



Universities, research institutes and consultants



Utilities and developers

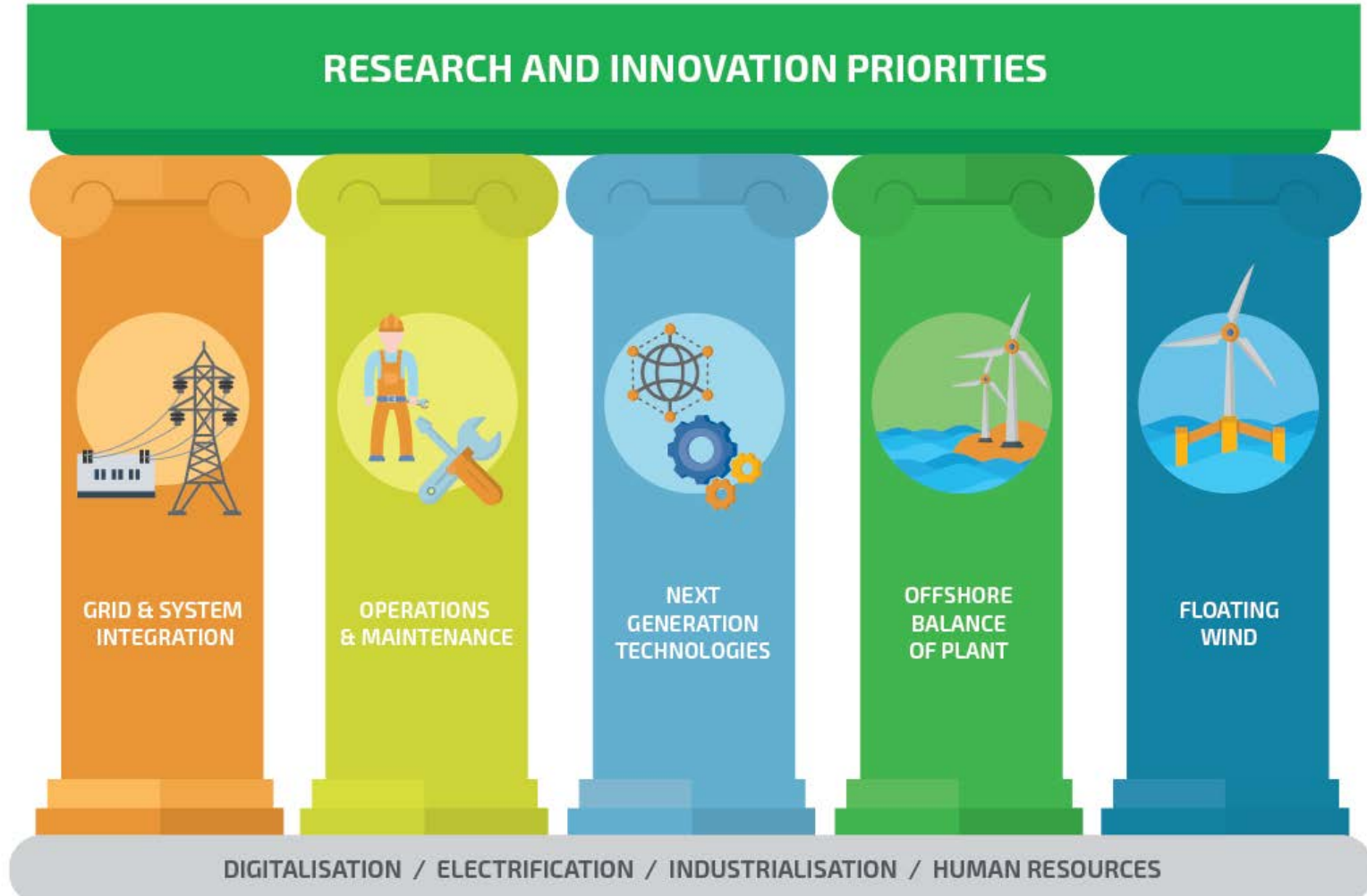


Others



2018 Strategic Research & Innovation Agenda

Driving market development with targeted R&I



ETIP

- Would like to thank EERA, SINTEF and NTNU for allowing us to plan our ETIP workshop in conjunction with EERA Deepwind and Equinor for hosting us .
- Applaud the NOWRIC initiative that will clearly create a needed technology powerhouse for offshore wind in the Nordics
- Will support the SETWIND offshore initiative in every way we can to ease its success.
- Will continue to promote EERA DeepWind as an event of excellence that is, international, open and also helps redress the gender imbalance in our industry.

Blatent promotion



UCC
University College Cork, Ireland
Coláiste na hOllscoile Corcaigh



Wind Energy Science
Conference 2019

17 - 20 JUNE
CORK, IRELAND



eawe
european academy of wind energy



WIND ENERGY
SCIENCE CONFERENCE

CORK, IRELAND
17-20 JUNE 2019



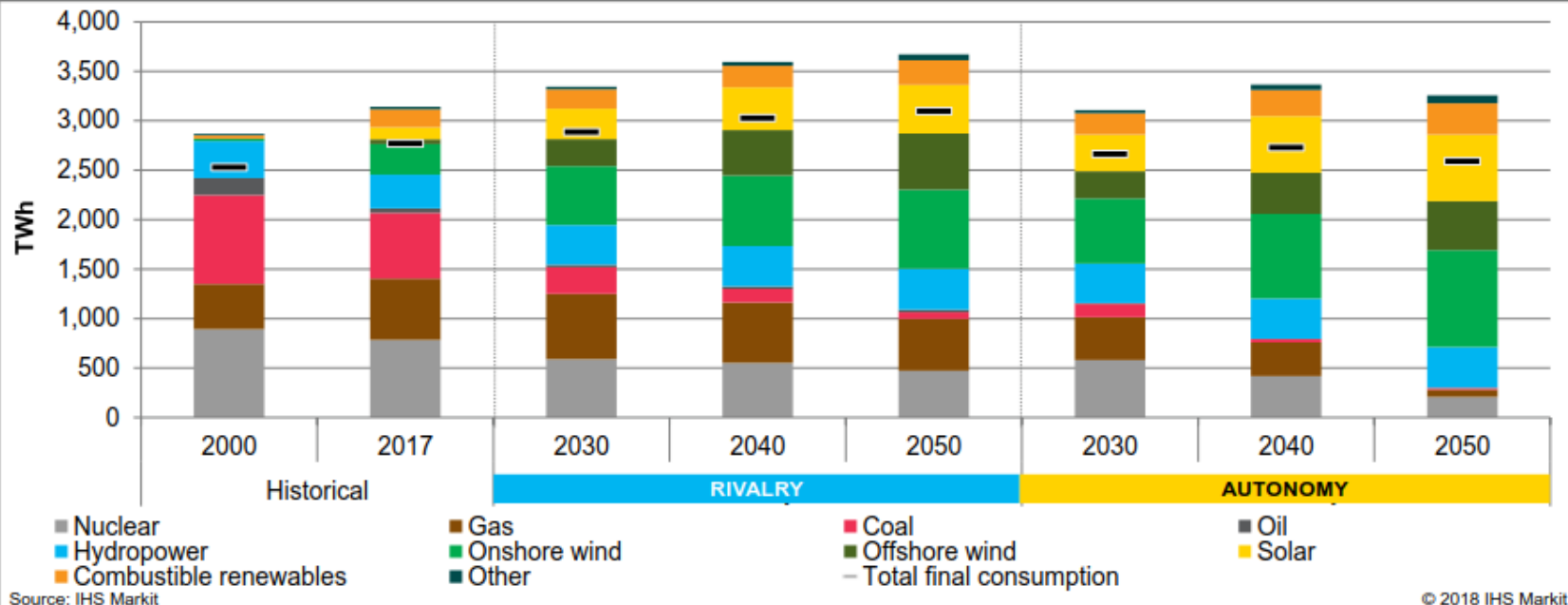
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The economists view of offshore IHSMarkit and BNEF

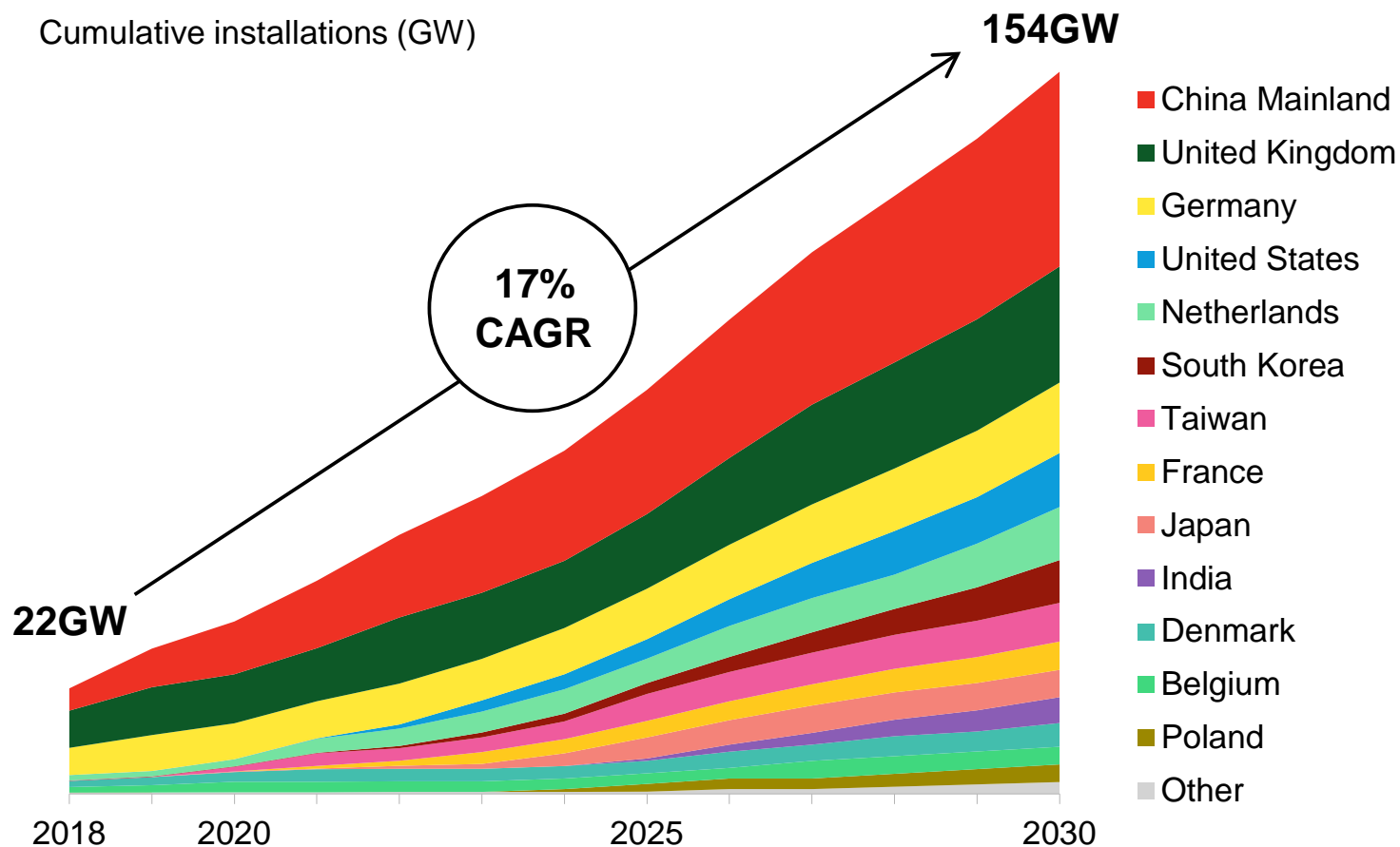
View from a major fossil analyst house

Renewables will dominate the power mix in the Rivalry and Autonomy IHS Markit long-term power scenarios

EU28: Evolution of net power generation by technology



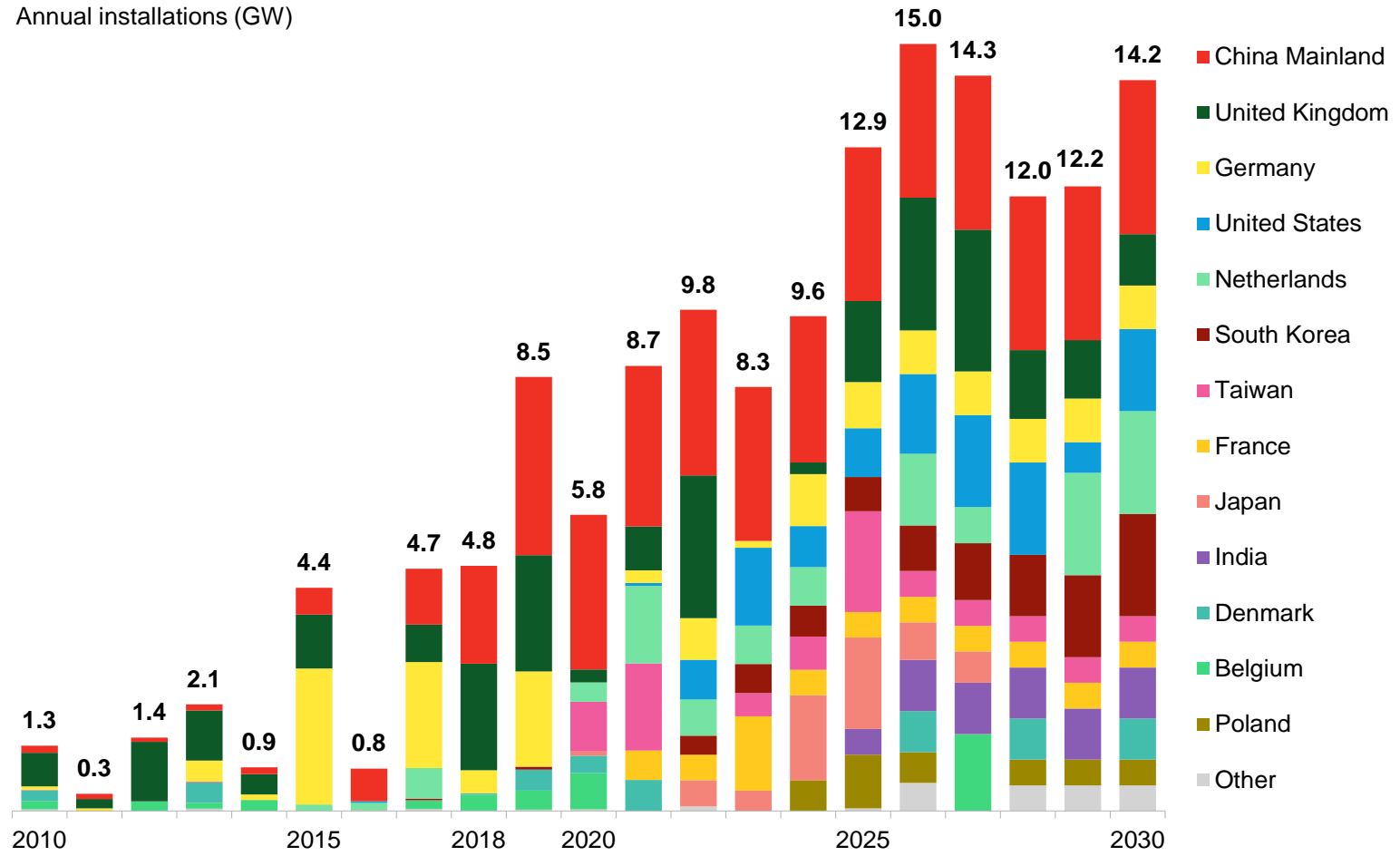
Global cumulative Offshore installation forecast



Source: BloombergNEF. Note: 'Other' -- Sweden, Ireland, Norway, Finland, Portugal, Spain, Italy.

Global offshore wind installations, by country

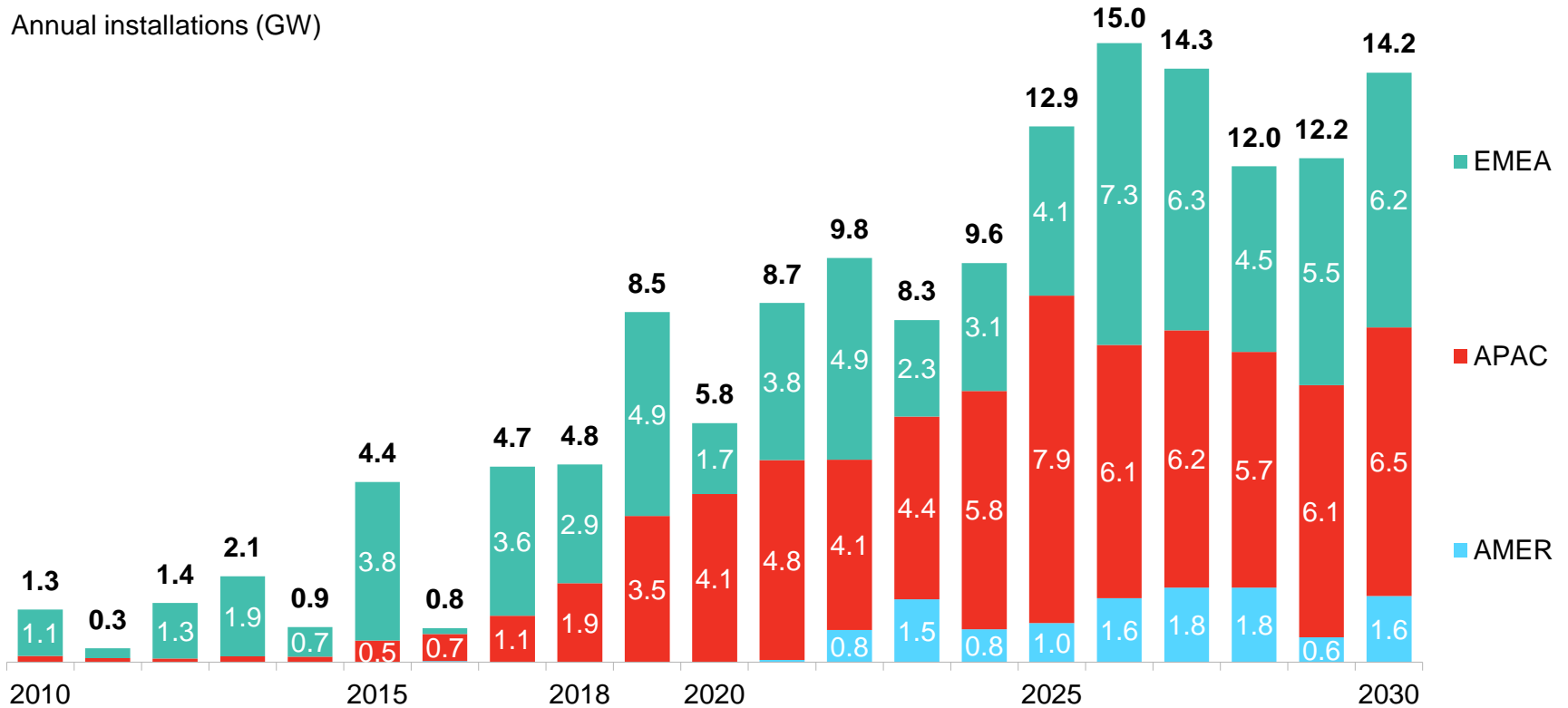
Annual installations (GW)



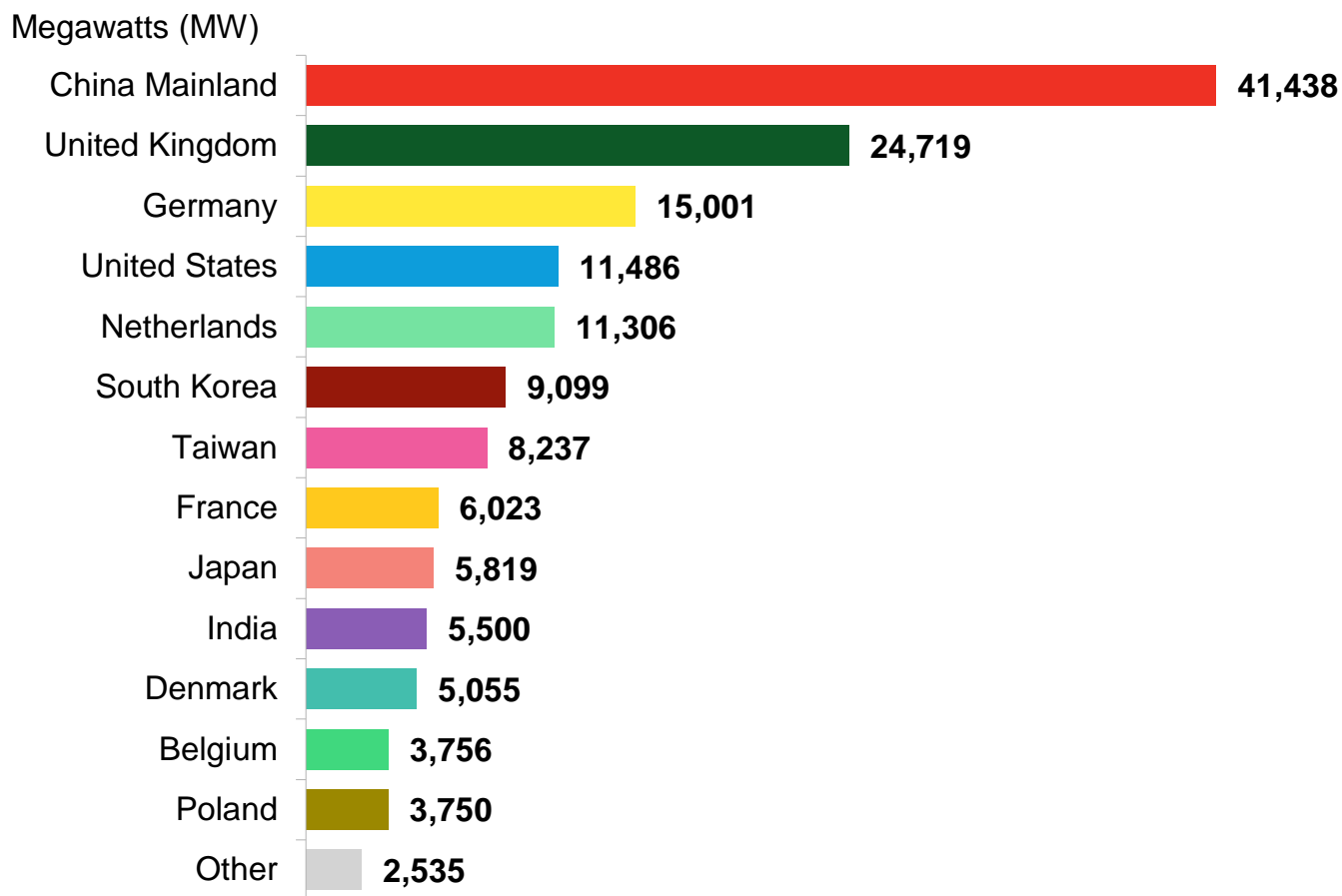
Source: BloombergNEF. Note: 'Other' -- Sweden, Ireland, Norway, Finland, Portugal, Spain, Italy.

Global offshore wind installations, by region

Annual installations (GW)

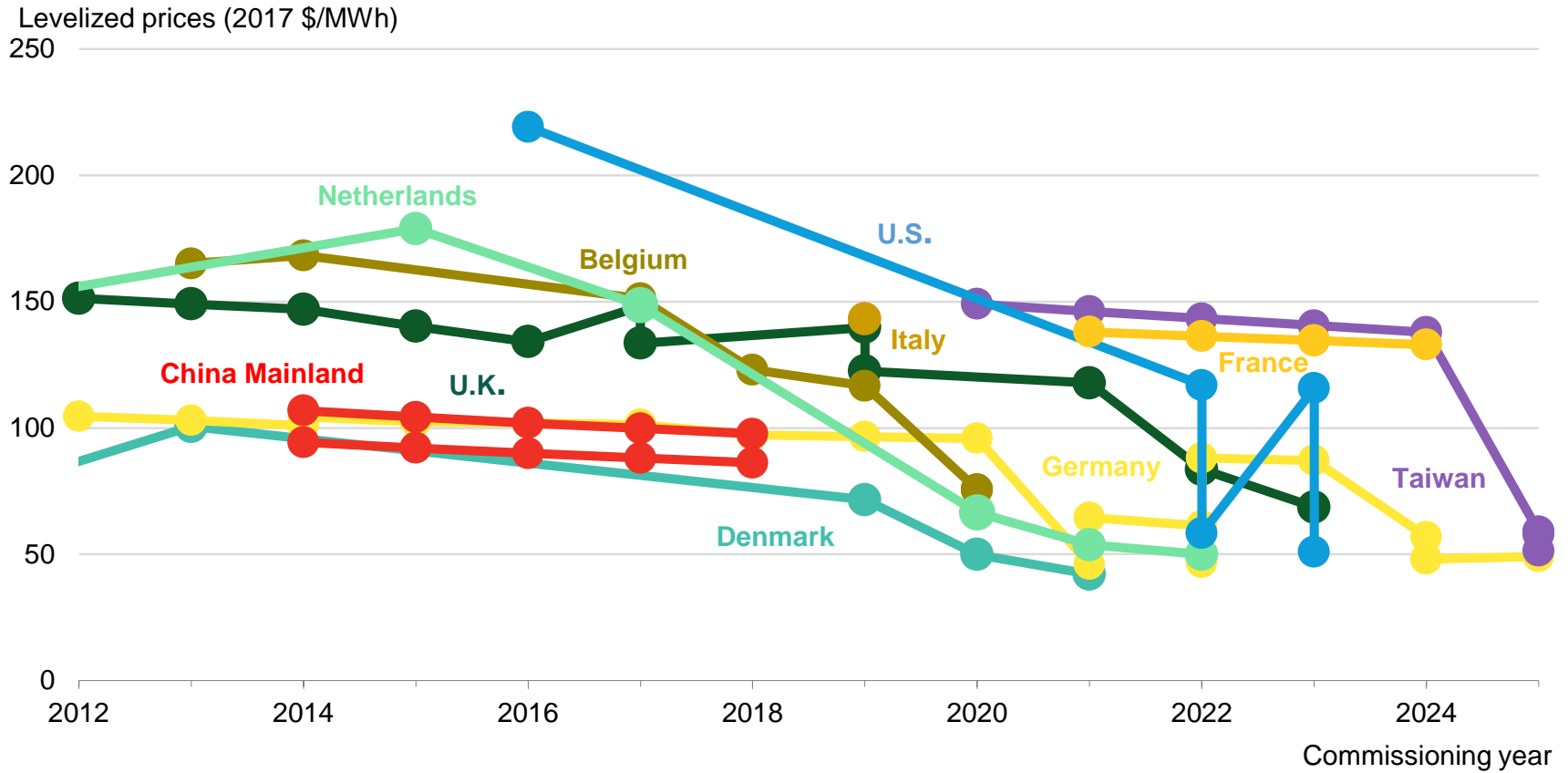


Offshore wind country ranking in 2030



Source: BloombergNEF. Notes: Only includes capacity in the 2030 forecast. 'Other' -- Sweden, Ireland, Norway, Finland, Portugal, Spain, Italy.

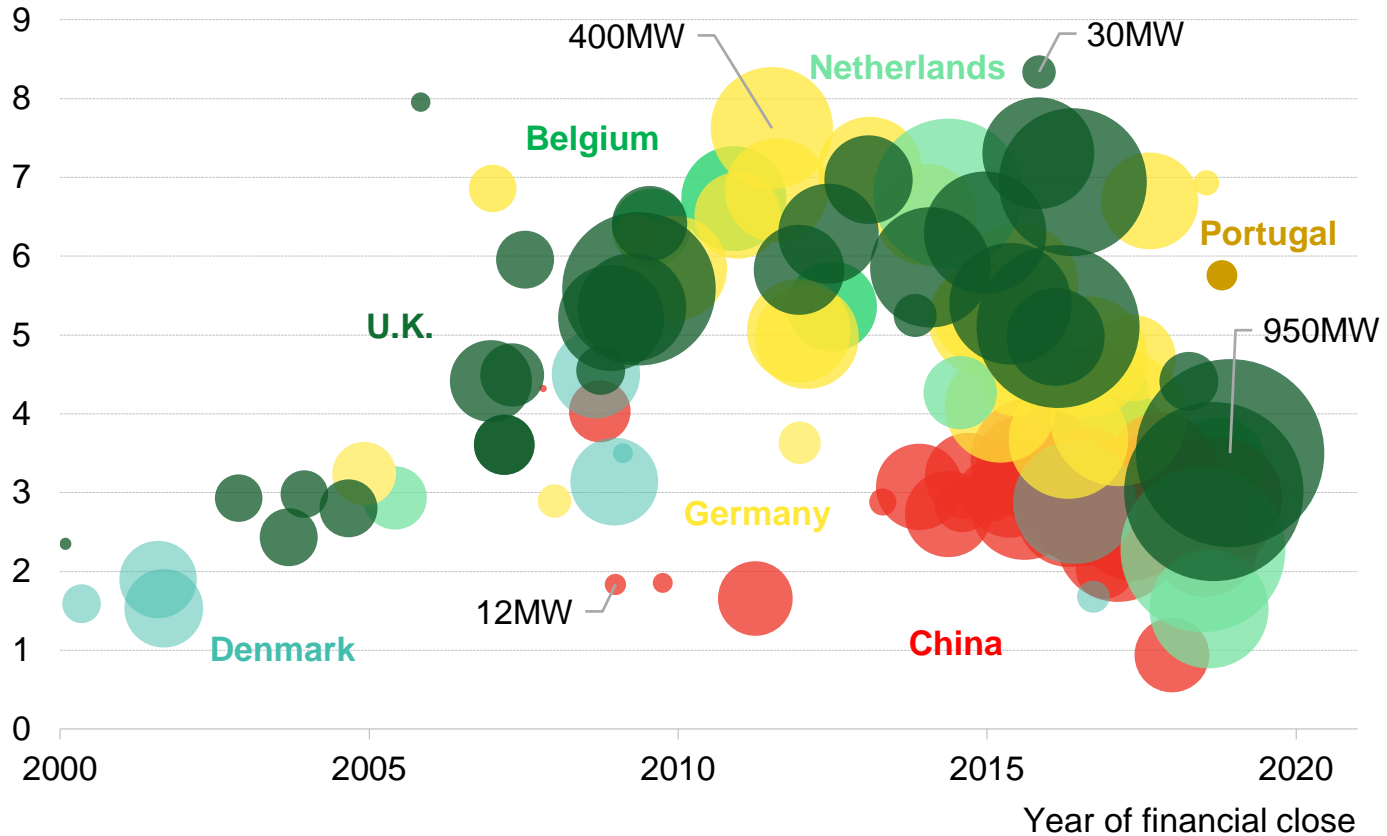
Levelized offshore wind prices



Source: BloombergNEF. Notes: Figures refer to an estimated levelized price, taking into account tariff price and length, inflation, a merchant tail assumption and a 25-year project lifetime.

Offshore wind capex

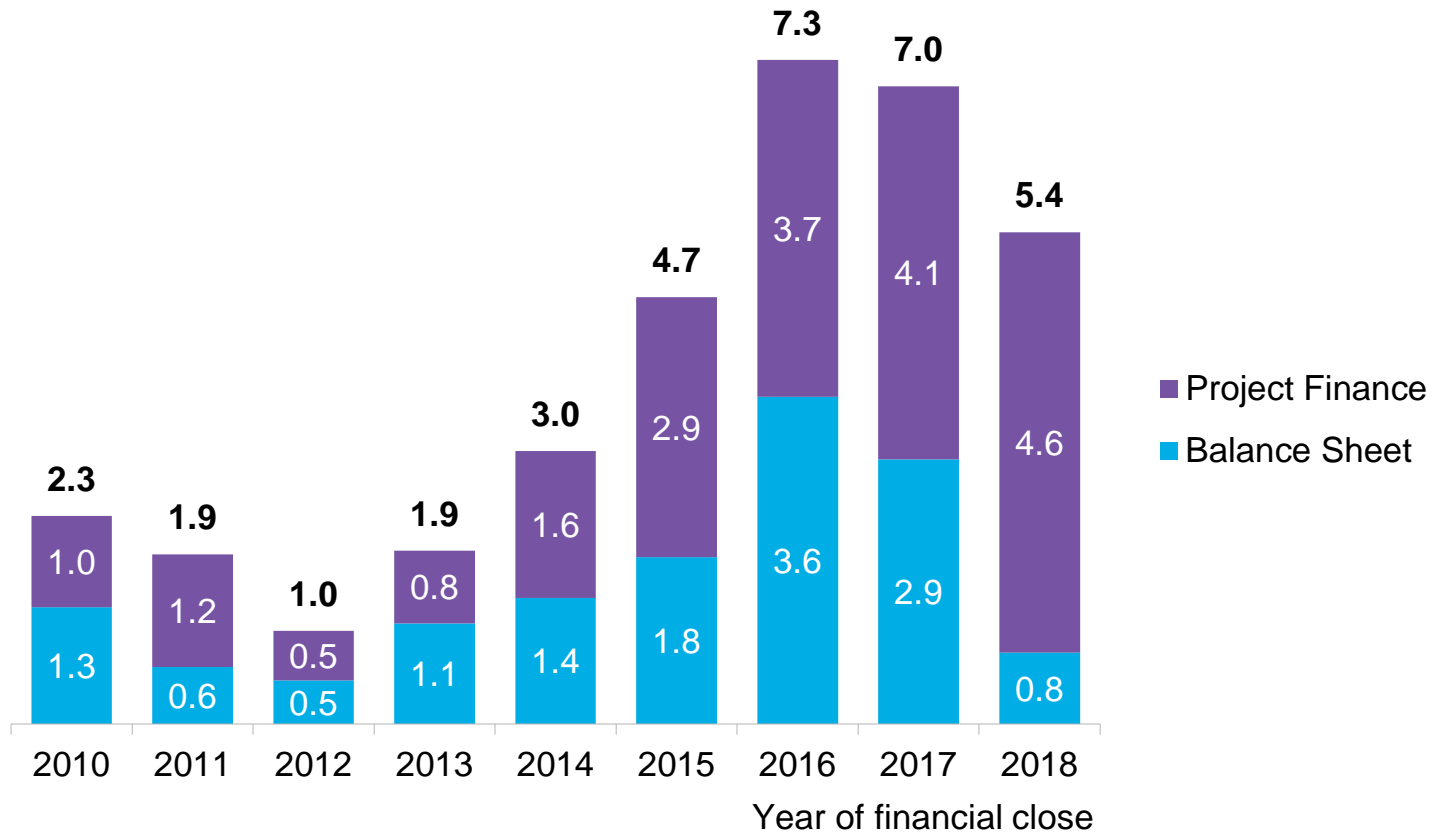
New-build multiples (2018 \$m/MW)



Source: BloombergNEF. Notes: Includes only disclosed values. Exchange rate on day of project financial close. Deal count is 135.

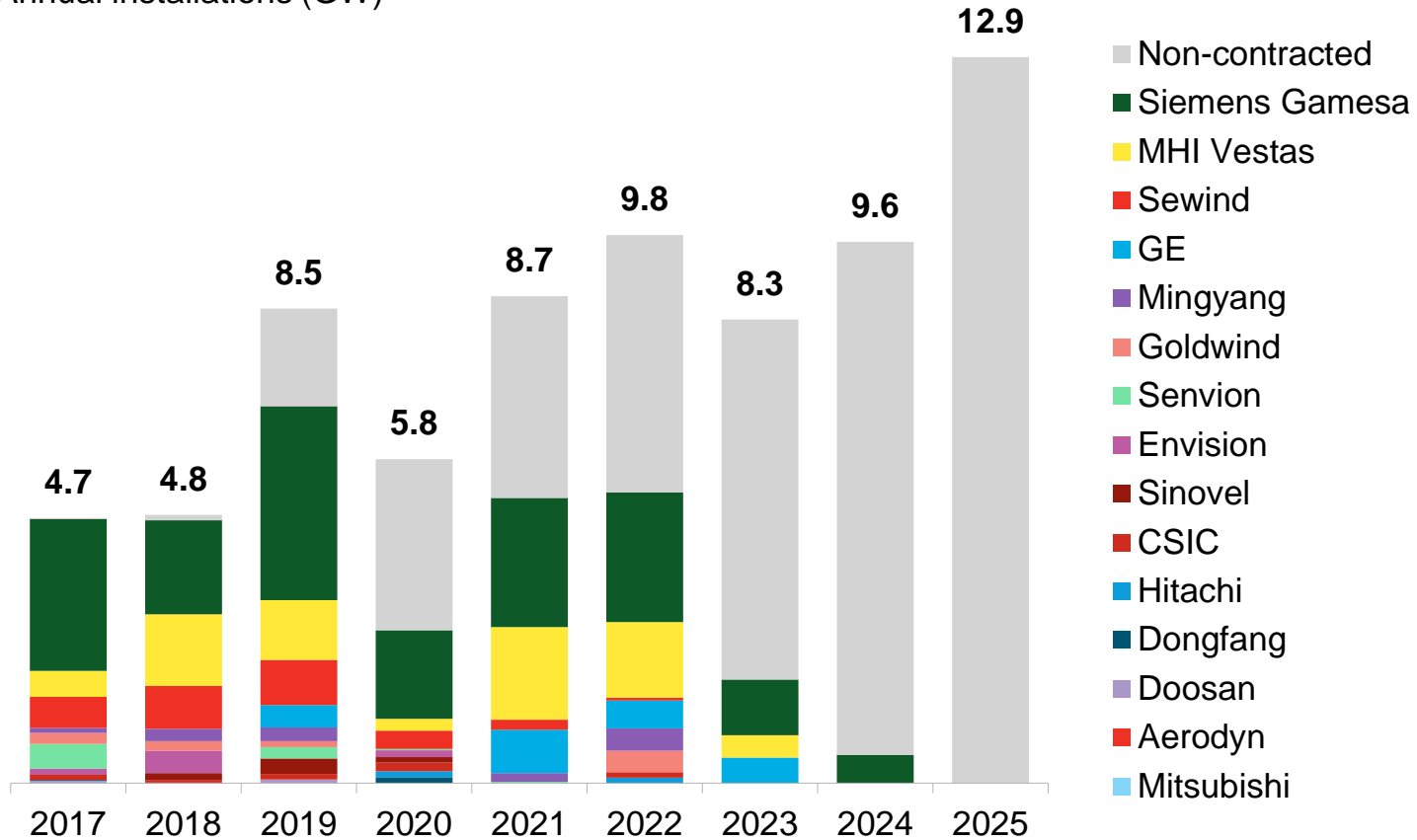
Global offshore wind new-build capacity

New-build financed capacity (GW)



Global offshore turbine manufacturer market share

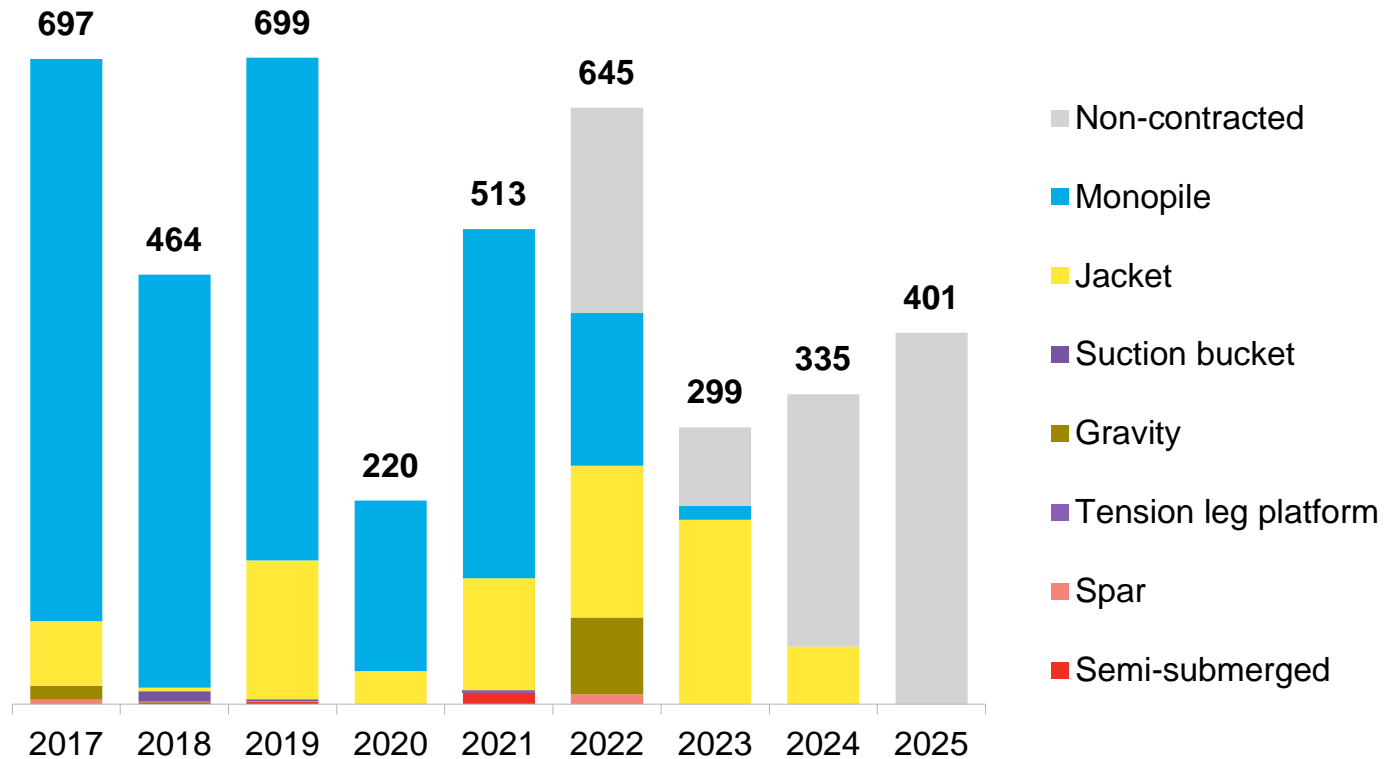
Annual installations (GW)



Source: BloombergNEF. Note: Includes conditional, unconditional and preferred supplier agreements.

European unit installations by foundation type

Annual installations (units)



Source: BloombergNEF. Note: Tension leg platform, Spar and Semi-submerged are floating solutions.



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What are we facing?

Current offshore challenges

- Converters- the good & bad
- Cables – mistakes are expensive
- Leading edge erosion – God hates us
- MW arms race - will bigger continue to be better
 - Final size will probably be set by people in this room
- Need for industrialized floaters
 - Will drive huge installation numbers
- Penetration ceiling – Offshore wind is big too expensive to curtail so what is the solution (Ammonia as a maritime fuel??)
- Need applied robotics today
 - Extra set of eyes & ears
 - Increase redundancy & safety

Challenges we face going forward

- Wish - 2 floater designs that are easy to industrialise
- How we break the historic inertia of the legacy grid to enable high impact penetration of wind.
- As machines get bigger and time to market and maturity times decrease- we will need super engineering and scientific skills to prevent "Big bangs"
 - Customers expect next generation to be cheaper = Help for R&I funding vital
- Can the supply chain deliver quality and technology at the required level of lower prices.

Possible future in 15 years

- Offshore still drives the state of the art in wind
- Machines of 15MW on average
- Standard average parks of 1GW+
- Offshore in 15 years costs same as onshore today
- Parks become fish recovery sancturies
- Hi-Tech Blade shells easily replaced every 5 years
- Foundation technology allows repowering so offshore sites will produce for 70 years

In Summary

- Offshore can deliver the bulk power needed for the energy transition.
- When offshore hits power parity it will be the biggest disrupter in the power industry - in newer times,
- China will become a leading driver of scale going forward – continued 2 way mutual cooperation is essential for local and global benefit.
- Delivering the promise of offshore will be an enormous effort driven by the research innovation community and investors seeing the opportunity.



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“A humbled pilgrim now leaves as in the past, having visited this place of knowledge. Thank you all for sharing your work and helping to maintain the stubborn passion needed to drive the continued success of this sector.”

Batteries now at 100% for the year ahead! 😊