Succeeding with floating wind

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Ørsted

Organized by FWE Quest Offshore

FWS

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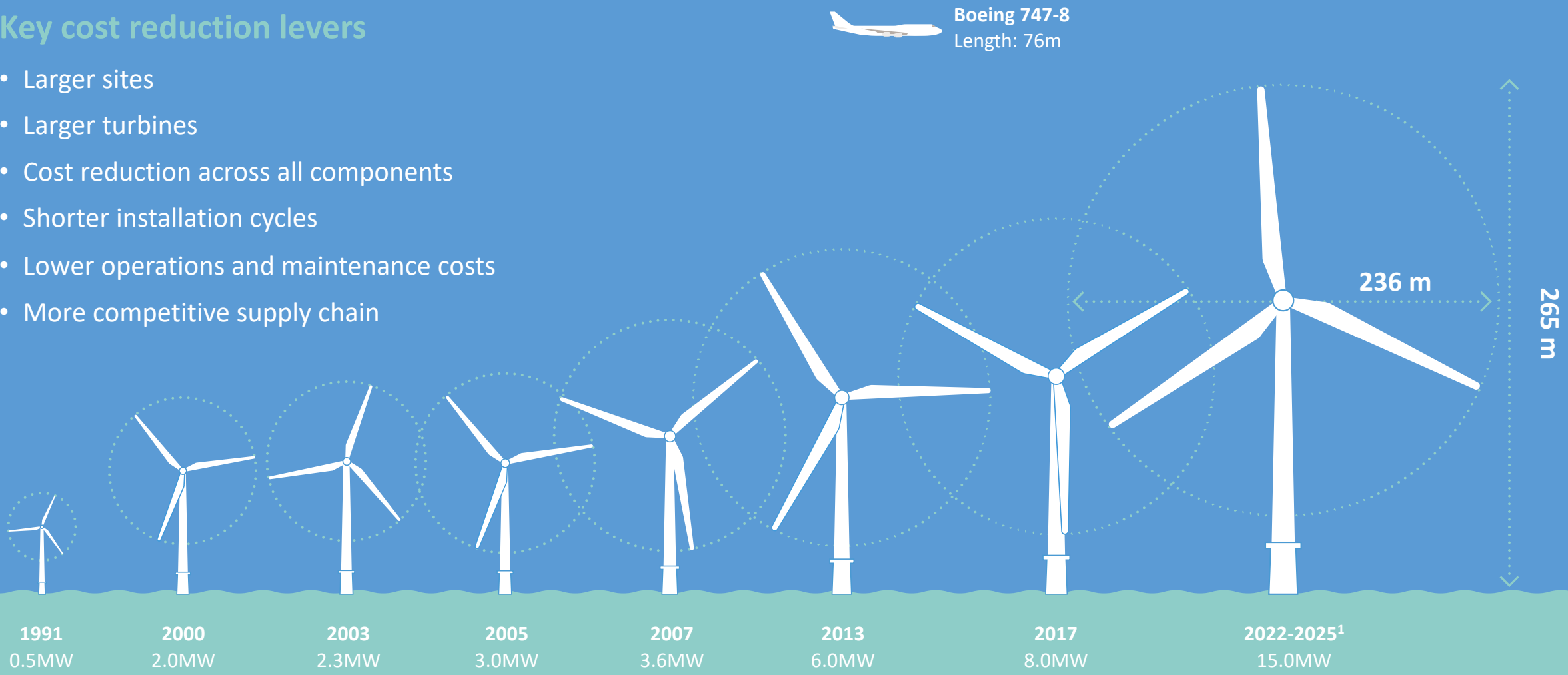
Our vision

Let’s create a world that runs entirely on green energy

Over the past decade, scale and continuous innovation have driven down the cost of offshore wind

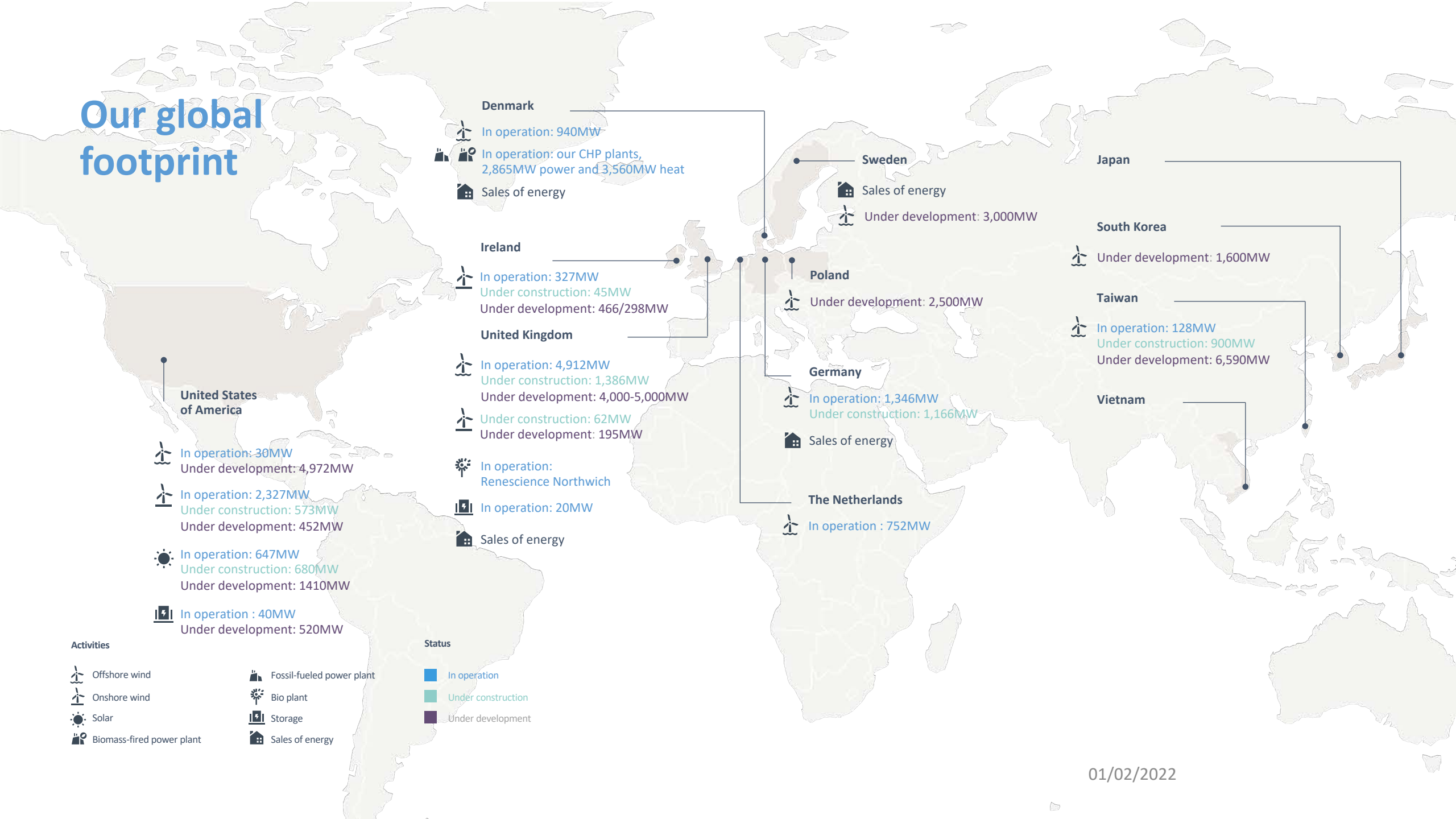
Key cost reduction levers

- Larger sites
- Larger turbines
- Cost reduction across all components
- Shorter installation cycles
- Lower operations and maintenance costs
- More competitive supply chain



1. Expected year of commissioning of Mid-Atlantic cluster

Our global footprint



Denmark
- In operation: 940MW
- In operation: our CHP plants, 2,865MW power and 3,560MW heat
- Sales of energy

Ireland
- In operation: 327MW
- Under construction: 45MW
- Under development: 466/298MW

United Kingdom
- In operation: 4,912MW
- Under construction: 1,386MW
- Under development: 4,000-5,000MW
- Under construction: 62MW
- Under development: 195MW
- In operation: Renescience Northwich
- In operation: 20MW
- Sales of energy

United States of America
- In operation: 30MW
- Under development: 4,972MW
- In operation: 2,327MW
- Under construction: 573MW
- Under development: 452MW
- In operation: 647MW
- Under construction: 680MW
- Under development: 1410MW
- In operation : 40MW
- Under development: 520MW

Sweden
- Sales of energy
- Under development: 3,000MW

Poland
- Under development: 2,500MW

Germany
- In operation: 1,346MW
- Under construction: 1,166MW
- Sales of energy

The Netherlands
- In operation : 752MW

Japan

South Korea
- Under development: 1,600MW

Taiwan
- In operation: 128MW
- Under construction: 900MW
- Under development: 6,590MW

Vietnam

Activities
- Offshore wind
- Onshore wind
- Solar
- Biomass-fired power plant
- Fossil-fueled power plant
- Bio plant
- Storage
- Sales of energy

Status
- In operation
- Under construction
- Under development

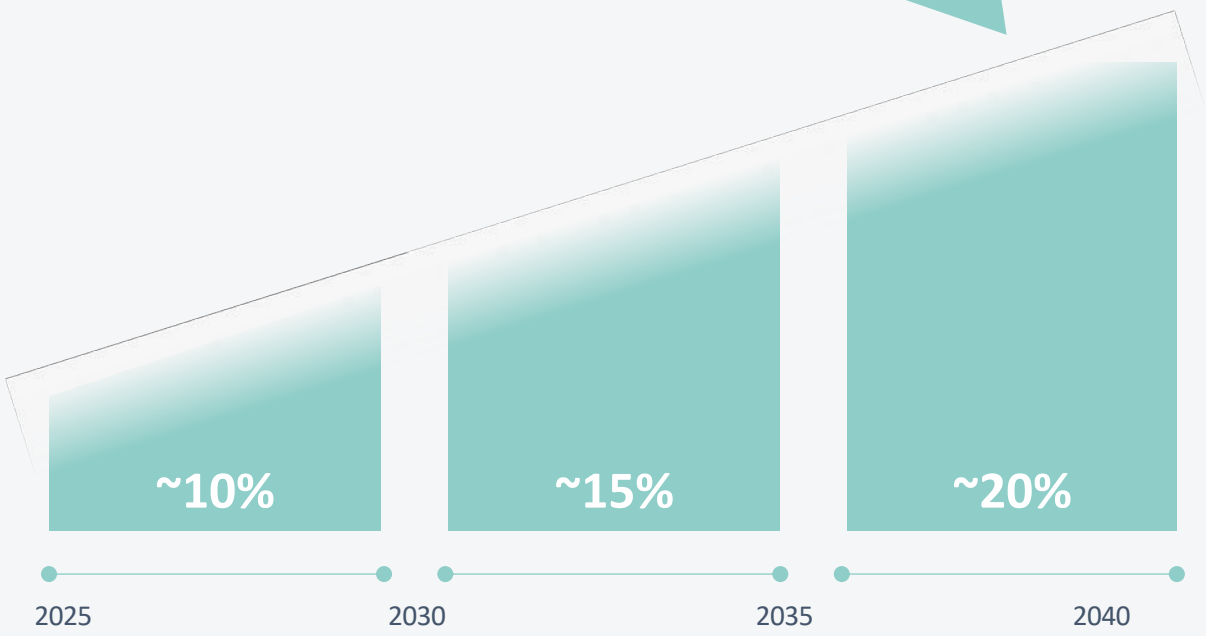
01/02/2022

Ørsted's floating wind ambition seeks to solidify our leading OFW market position by ensuring we have a leadership position in this potentially massive long term OFW market

Maintaining leading OFW position

Est. floating share of new OFW installations, %

By late 2030s, FL foundations could represent **nearly a quarter of new global OFW installations**



Floating wind ambition

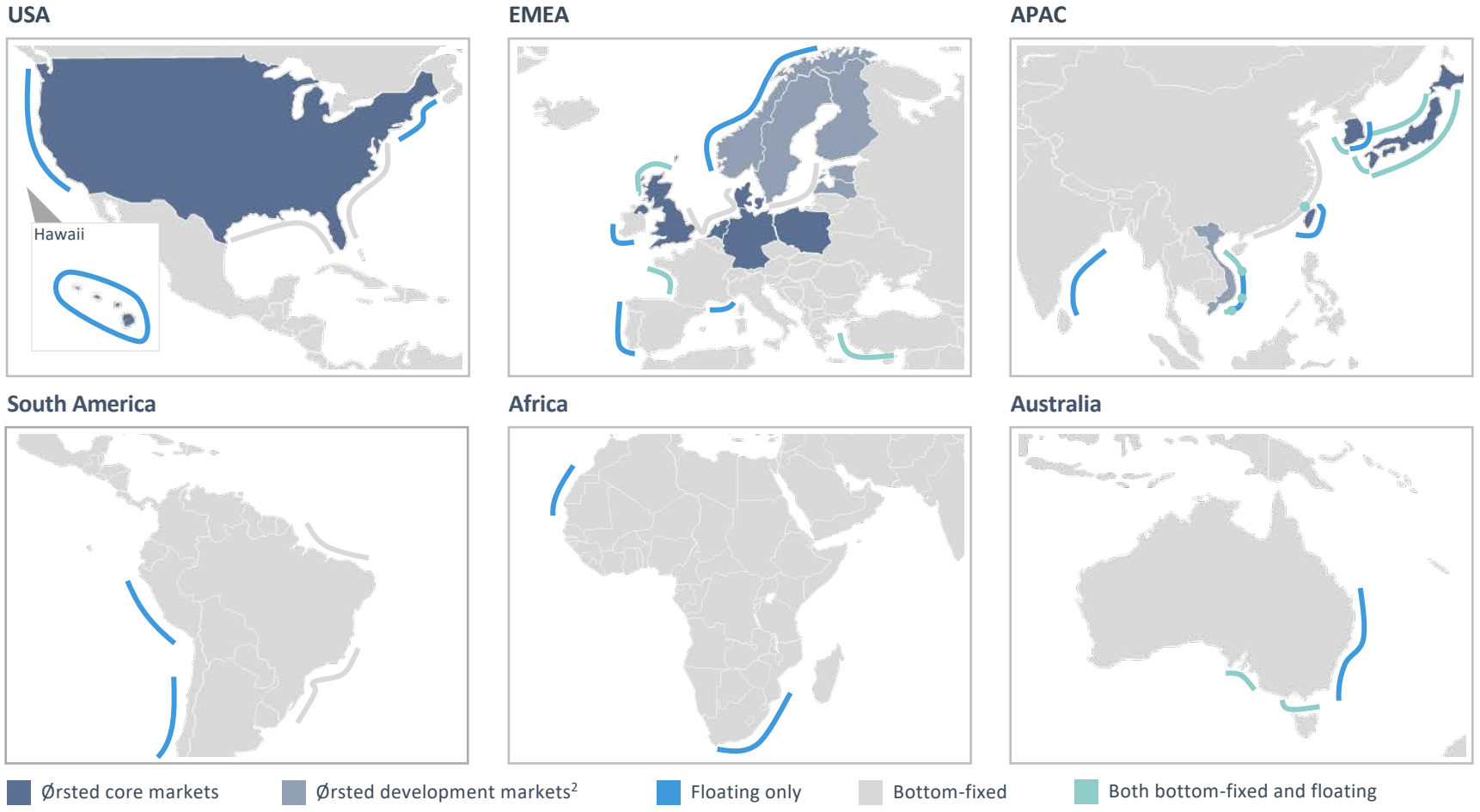
Ørsted will **aim for a position amongst the leaders in floating wind** in order to **remain the leading developer of offshore wind globally**

5 Source: FL forecasts from Ørsted market intelligence

Floating wind technical potential occurs at the intersection of power demand, water depth and suitable wind speeds globally

Coastal lines with technical potential for floating and bottom-fixed OSW[1]

Illustrative & not exhaustive



Floating foundations open opportunities in many markets

- The technical potential for floating wind is global
- In many countries with large offshore wind potential fixed and floating will co-exist complementarily
- Floating may become dominant in some markets with limited bottom fixed opportunities

1. Determined by water depth and population density. Current bottom-fixed technology is assumed to be infeasible for water depths over 60m-80m
2. Markets in post-2030 proprietary pipeline.
Sources: Map based on Wood Mackenzie and DNV

Price competition in floating will be critical but customers are already demand strong local content, technical competence and demonstration of a track record

Customer demands in floating wind

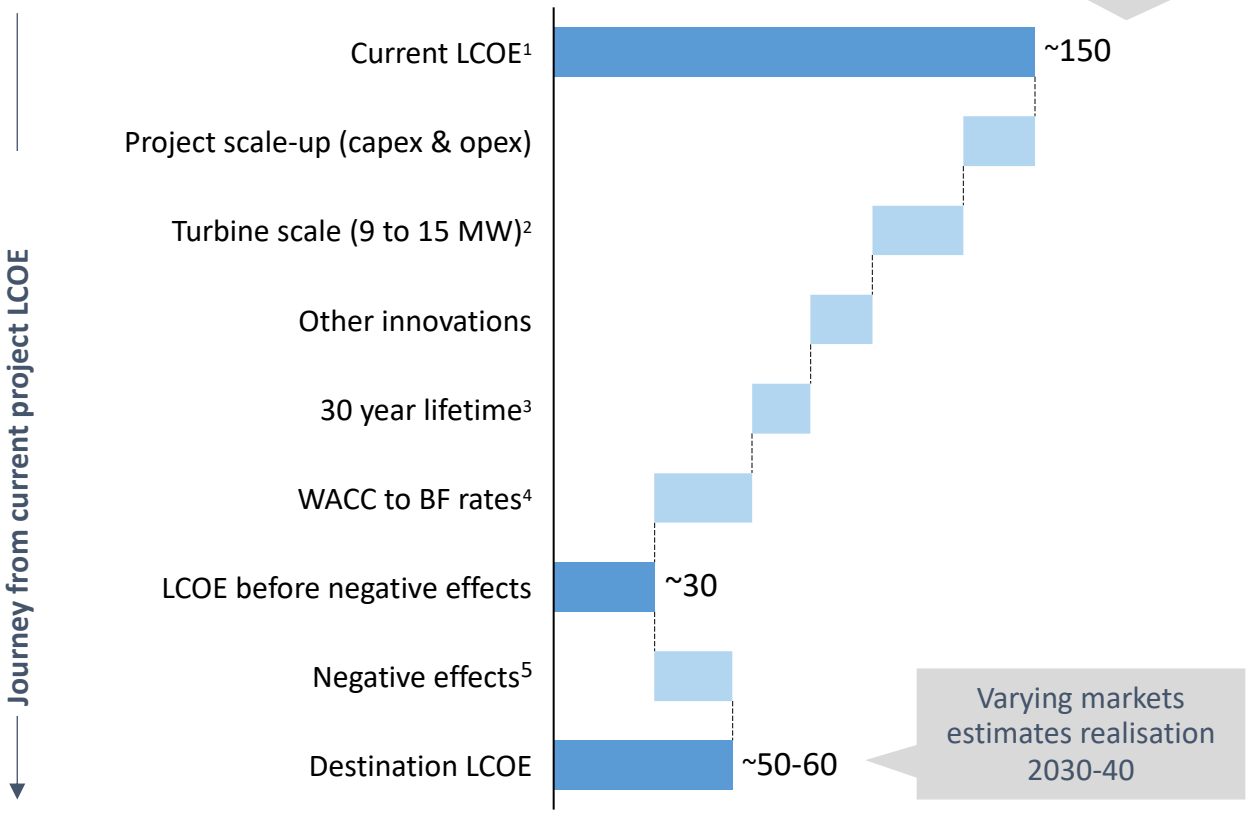
Typical customer demands of FL

Price	Price expected to be main bidding criteria in most pace-setting FL markets	Some initial leasing rounds – such as Scotwind – may not feature price as the key bid criteria, as governments aim to kickstart industry, but **subsidy bids will all entail competition on cost**
Non-price	Local content	Governments support floating wind for a variety of **economic benefits** and also demand safe and high-quality execution; these non-price criteria will either be required to qualify for FL projects or will account for **significant proportions of bid scores**
	Track record	
	Project design, risk awareness and feasibility	
	Innovation / system integration	

Floating wind cost-out will take place under four headline themes

Indicative floating wind cost-out drivers

LCOE, EUR/MWh



Trajectory above represents **indicative levers** modelled by market intelligence provider, **not definitive** path to cost-competitiveness

High-level cost out themes

Industrialisation	Benefitting from **efficiencies of supply chain scale and maturity** resulting from **purchasing volume**
Integration & optimisation	Cost-out derived from the **adoption, integration and optimisation of best-in-class components**
Execution	Cost-out derived from **innovation and excellence in construction, operations and maintenance**
De-risking	**Reduction of assessed risk** in floating developments leading to **lower investment hurdle rates** and **inbuilt cost contingencies**

1. Based on bottom-up analysis of nearshore FL OFW with costs in line with Hywind Tampen; 2. Includes AEP and O&M benefits as well as turbine scale economies; 3. Compared to initial 20 years lifetime; 4. WACC from 7.5% to 4.5%. 5. Blockage & wake effects (from 4 to 10%) plus transmission requirements

Source: 4C Offshore: Global Floating Wind Update (2021), Version: 03 September 2021

A cost-reduction pathway for floating wind will depend on fundamental maturation of the technology landscape across all themes

Priority drivers of cost-out

	Key drivers of cost-out →				
Industrialisation	**Reduce field of floating concepts** to facilitate greater standardisation	**Provide turbine OEMs with scale** and foundation **certainty** to adapt turbines	**Scale up** mooring system & dynamic cable **supply chain**	Develop effective local **procurement networks**	**Develop pipeline scale** to bulk-order components
Integration & optimisation	Adapt components to **facilitate larger turbines**	Develop robust **floater selection method** to ensure best fit for given site conditions	Identify and develop **integrated system efficiencies**	Optimisation of components for **integration and mass production**	Identify and validate cost-efficient **floating substation solutions**
Execution	**Optimise installation** from quayside assembly to final anchoring	Develop cost effective major **component exchange methods**	Innovate **inspection and maintenance** methodologies	**Ease logistics** through plug & play modularization	
De-risking	Develop ability to **effectively estimate project risks**	Develop ability to **effectively estimate project costs**	Aim to **standardise offerings**		

The cost-reduction pathway will require the following market conditions

Coexistence goodwill

Stable support regimes with long term growth visibility

Existing infrastructure with expansion opportunities

Markets

Attractive site conditions

Ambitious and supported grid expansion plans

Existing supply chain with expansion opportunities

Progressive permit regime

Floating wind has vast potential, but this can only be realized if the industry demonstrates a clear and credible cost reduction pathway

- Ørsted aims for a position among the leaders in floating wind
- As an industry we need to provide a pathway to significant cost reduction of floating wind
- The success of floating wind requires all stakeholders working together to ensure the right conditions

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