Succeeding with floating wind

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Orsted
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

<table>
<thead>
<tr>
<th>Year</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991</td>
<td>0.5MW</td>
</tr>
<tr>
<td>2000</td>
<td>2.0MW</td>
</tr>
<tr>
<td>2003</td>
<td>2.3MW</td>
</tr>
<tr>
<td>2005</td>
<td>3.0MW</td>
</tr>
<tr>
<td>2007</td>
<td>3.6MW</td>
</tr>
<tr>
<td>2013</td>
<td>6.0MW</td>
</tr>
<tr>
<td>2017</td>
<td>8.0MW</td>
</tr>
<tr>
<td>2022-2025</td>
<td>15.0MW</td>
</tr>
</tbody>
</table>

Boeing 747-8
Length: 76m

236 m
265 m
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.

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.
Coastal lines with technical potential for floating and bottom-fixed OSW

Floating only

Bottom-fixed

Orsted core markets

Orsted development markets

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

MARKETS

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

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

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**WHAT IT TAKES T WIN**

**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

<table>
<thead>
<tr>
<th>Typical customer demands of FL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Price</strong></td>
</tr>
<tr>
<td>Price expected to be main bidding criteria in most pace-setting FL markets</td>
</tr>
<tr>
<td>Some initial leasing rounds – such as Scotwind – may not feature price as the key bid criteria, as governments aim to kickstart industry, but <strong>subsidy bids will all entail competition on cost</strong></td>
</tr>
<tr>
<td><strong>Non-price</strong></td>
</tr>
<tr>
<td>Local content</td>
</tr>
<tr>
<td>Track record</td>
</tr>
<tr>
<td>Project design, risk awareness and feasibility</td>
</tr>
<tr>
<td>Innovation / system integration</td>
</tr>
</tbody>
</table>

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

**Indicative floating wind cost-out drivers**

LCOE, EUR/MWh

1. Current LCOE
2. Project scale-up (capex & opex)
3. Turbine scale (9 to 15 MW)
4. 30 year lifetime
5. WACC to BF rates
6. LCOE before negative effects
7. Negative effects
8. Destination LCOE

**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

**Journey from current project LCOE**

- Starting point highly dependent on site conditions

**Varying markets estimates realisation 2030-40**

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

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

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

**WHAT IT TAKES TO WIN**

Develop robust floater selection method to ensure best fit for given site conditions.
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**

- **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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