Opportunities and challenges for jacket foundations in offshore wind power
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Speaker introduction

Speaker

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DONG Energy
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Agenda

1. Introduction to DONG Energy

2. The opportunities in the offshore wind market from a steel perspective

3. The challenge to be overcome to unlock the potential
DONG Energy has a leading position in the European offshore wind market

Footprint

- Wind farms in operation
- To be commissioned 2013
- Projects committed

DONG Energy market position

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<tr>
<th>Share of capacity, % (Europe, Sep 2013)</th>
<th>Current pipeline</th>
<th>In operation</th>
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<tbody>
<tr>
<td>DONG energy</td>
<td>24%</td>
<td>37%</td>
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<td>e-on</td>
<td>5%</td>
<td>8%</td>
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<td>RWE</td>
<td>7%</td>
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<td>VATTENFALL</td>
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<td>16%</td>
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<td>SSE</td>
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<td>4%</td>
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<tr>
<td>centrica</td>
<td>3%</td>
<td>8%</td>
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1. 2012 offtake price Walney 2 (UK)
2. UK market – 2020 Final Investment Decision

Source: DONG Energy
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The role of steel in offshore wind power

Steel required per wind farm element for Anholt wind farm

- Substations: 4,000 Tons
- Foundations: 49,500 Tons
- WTG towers: 22,200 Tons
- Total: 75,700 Tons

Source: DONG Energy
The amount of steel required per MW offshore wind capacity

**Key observations**

- For the most proximate part of the DONG Energy offshore wind pipeline 180 tons of steel have been required for each MW of turbine capacity installed.

- The foundation weight depends heavily on the soil conditions, water depth and sea conditions of the specific site.

- We do not see that the foundations get lighter in the future as there is a trend for turbines to get bigger and water depths to get deeper.

Source: DONG Energy
MW and steel potential by 2025

European offshore wind capacity added: 2014-2025
Giga Watt

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<td>5.8</td>
<td>6.5</td>
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Estimated steel orders for offshore wind foundations: 2012-2023
Million tons

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Source: IHS Emerging Energy Research and DONG Energy
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The cost of energy challenge

Bloomberg New Energy Finance – Levelised Cost Of Electricity
USD/MWh

Source: Bloomberg New Energy Finance
DONG Energy
Foundations will be instrumental in overcoming the LCOE challenge for offshore wind power

**Key observations**

- Foundations make up a large proportion of the total investment when establishing an offshore wind farm and is therefore a natural focus area when looking for saving potentials.

- Through greater standardisation DONG Energy believe that the cost can be reduced.

- Continuous work with suppliers and sub-suppliers shall ensure that cost is taken out of the supply chain.

Source: DONG Energy
Jacket foundations will be phased into the concept portfolio

Jacket and Monopile foundations

Jacket commercialisation plan

Step 1
2013/2014
1 in 77

Step 2
2014/2015
20 in 110

Step 3
2015 - 2020
?? in hundreds

Source: DONG Energy
For the jacket concept to fully materialise its potential the steel value chain has to perform to its best.

Everybody in the value chain has a responsibility of challenging the way of working to eliminate unnecessary waste and cost inefficiencies. This way the industry can drive down cost and maintain profitability.
Summing up

- DONG Energy is a company primarily held by the Danish state.
- DONG Energy’ footprint is in North Europe, where we also have a market leader position in offshore wind power.
- Offshore wind power is a strategic focus area with high expectations to the future growth.

- Substantial amounts of steel goes into the development of offshore wind power.
- If the offshore wind power business takes off it can be big business for the steel industry as well.

- Offshore wind power has to overcome the LCOE challenge for investments beyond 2020 to be approved.
- Bringing down the cost of foundations is a key element to lowering the LCOE.
- The entire steel value chain has to perform to its best to eliminate waste and ensure that everybody does what they do best.
Thank you for your attention

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