BRIGHT FUTURE FOR OFFSHORE WIND?
CHALLENGES IN THE NORDIC-BALTIC REGION.

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WindEurope
Offshore wind the no. 1 power source in the EU by 2040

Share of electricity generation by source in the EU, 2018-50
Europe’s Offshore Wind Farms

25 GW

3% of Europe’s electricity demand

Status of Offshore Wind Projects
- Online
- Partially online
- Planned
- Under construction
- Under permitting procedure
- With permits
Share by Sea Basin today

European cumulative offshore wind installed capacity

25 GW

North Sea: 78%
Irish Sea: 12%
Baltic Sea: 10%
Atlantic Ocean: <1%
2030 Offshore Wind Outlook
Annual installations by sea basin

Source: WindEurope
### 2030 Outlook for Baltic Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Capacity by 2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>2,100 MW</td>
</tr>
<tr>
<td>Denmark</td>
<td>3,100 MW</td>
</tr>
<tr>
<td>Poland</td>
<td>6,000 MW</td>
</tr>
<tr>
<td>Sweden</td>
<td>300 MW</td>
</tr>
<tr>
<td>Finland</td>
<td>100 MW</td>
</tr>
<tr>
<td>Lithuania</td>
<td>700 MW (+ 500 MW – date n.a.)</td>
</tr>
<tr>
<td>Latvia</td>
<td>500 MW</td>
</tr>
<tr>
<td>Estonia</td>
<td>500 MW (+ 1000 GW - date n.a.)</td>
</tr>
</tbody>
</table>

**Total: 13+ GW**
€7.5bn EU GDP contribution

1 new offshore wind turbine = €15m to the economy
77,000 offshore wind jobs in Europe today

200,000 offshore wind jobs in Europe in 2030
Cost of offshore wind continue decreasing

Auction results

<table>
<thead>
<tr>
<th>Year</th>
<th>Price (€/MWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>1.32 USD/EUR</td>
</tr>
<tr>
<td>2015</td>
<td>1.11 USD/EUR</td>
</tr>
<tr>
<td>2016</td>
<td>1.11 USD/EUR</td>
</tr>
<tr>
<td>2017</td>
<td>1.13 USD/EUR</td>
</tr>
<tr>
<td>2018</td>
<td>1.18 USD/EUR</td>
</tr>
<tr>
<td>2019</td>
<td>1.12 USD/EUR</td>
</tr>
</tbody>
</table>

-75%

Source: WindEurope, 2020
Offshore turbines are getting larger

Yearly average of newly-installed offshore wind turbine rated capacity

- 8.2 MW in 2020
- 15 MW
1. Planning

<table>
<thead>
<tr>
<th>Phase</th>
<th>Leasing</th>
<th>Consenting</th>
<th>Financial Close</th>
<th>Installation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity</td>
<td>Determine wind farm locations. Environmental and spatial planning</td>
<td>Early site survey work. Grid and building permits, early site layout, technology review and feasibility studies</td>
<td>Detailed design, supplier selection. Final decision on wind farm construction through competitive auctions, PPAs, etc.</td>
<td>Manufacture and pre-assembly of components</td>
</tr>
<tr>
<td>Timing</td>
<td>2 years</td>
<td>4 years</td>
<td>2 years</td>
<td>3 years</td>
</tr>
</tbody>
</table>

Source: WindEurope, 2019
Maritime Spatial Planning

1. Land sea interactions
2. Ecosystem Based approach
3. Integrated coastal management
4. Involvement of stakeholders
5. Best available data
6. Member States and third countries cooperation

Wind Europe
2. The offshore wind supply chain
Ports will need to have enough space too
3. Regional Cooperation
4. Offshore hybrid interconnectors

Project status
- Operational
- Cooperation signed
- Under discussion

Offshore hybrid projects
1. Kriegers Flak
2. Estonia – Latvia
3. WindConnector
4. Bornholm Energy Island
5. North Sea Energy Island
6. North Sea Wind Power Hub
7. Nautilus
8. Sørlige Nordsjø II

Source: WindEurope