EUFORES Workshop NL

Joël Meggelaars
Representing the whole wind industry

<table>
<thead>
<tr>
<th>Category</th>
<th>Examples</th>
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<tbody>
<tr>
<td>Wind turbine manufacturers</td>
<td>Siemens, Gamesa, MHI Vestas, GE Renewable Energy</td>
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<tr>
<td>Wind farm developers</td>
<td>Acciona, RES, Ørsted, Vattenfall</td>
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<tr>
<td>Power utilities</td>
<td>E.on, Eneco, Enel, Iberdrola Renovables</td>
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<td>Component manufacturers</td>
<td>ABB, LM Wind Power, BASF, ZF</td>
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<tr>
<td>Installation / logistics</td>
<td>Seaway Heavy Lifting, Van Oord, Damen</td>
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<td>Financial &amp; legal services</td>
<td>Allianz, Rabobank, Baker McKenzie</td>
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<td>Ports</td>
<td>Groningen Seaports, Green Port, Port Saint Nazaire, Port Oostende</td>
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</table>

+ National wind associations
Wind energy today

173 GW
By 30 June 2018

12%
of 2017 EU power demand

GW installed
Penetration

Wind EUROPE
2018-2022: wind will keep growing in Europe

European annual gross installations will represent 87 GW
2018-2022 expected onshore installations

- Germany: 18.5 GW
- France: 9.6 GW
- Spain: 7.2 GW
- Sweden: 4.7 GW
- Norway: 3.3 GW
- Italy: 3.2 GW
- Turkey: 3.2 GW
- Netherlands: 3.1 GW
- Finland: 2.3 GW
- Russia: 2.2 GW
- Denmark: 1.6 GW
- Greece: 1.4 GW
- Ireland: 1.4 GW
- Ukraine: 1.3 GW
- Austria: 1.2 GW
- Belgium: 1.1 GW
- Other: 5.0 GW

Source: WindEurope
2018-2022 expected offshore installations

Source: WindEurope

UK: 5.46 GW
Germany: 3.09 GW
Netherlands: 2.68 GW
France: 2.13 GW
Belgium: 1.45 GW
Denmark: 1.38 GW
Ireland: 0.19 GW
Spain: 0.03 GW
Italy: 0.03 GW
Portugal: 0.02 GW

Total: 16.5 GW

19%
Wind will become the largest power source in the EU before 2030

Share of electricity generation by source in the EU, 2017-40

Source: International Energy Agency (IEA)
1. Drive offshore build-out

- Introduce a new long-term auction schedule
Clarity on the pipeline helps the Dutch supply chain
1. Drive offshore build-out

- Maintain long-term auction schedule
- Do not introduce concession payments
Rationale for concession payments is linked to scarce resources

**Scarce**
- **Oil & gas**: Limited resource and low/no impact on world market price
- **Mobile phone network**: Limited range of frequency bands to be used
- **Fishing**: Limited resource and risk of overfishing

**Non-scarce**
- **Offshore wind energy**: Wind is non-scarce and sites are non-scarce at North Sea level, direct impact on local/regional market price

**Potential: Northern Seas**
- App. 600 GW ≈ 80% of EU’s electricity consumption
- Max LCOE €65/MWh in 2030, incl. transmission asset to shore
- Other uses, seabed, distance, Natura 2000 areas etc. taken into consideration
Market driven development brings cost reductions

Illustrative example

- Government controlled build-out
- Market price with restricted build-out
- LCOE - offshore wind energy

Time

GW
1. Drive offshore build-out

- Maintain long-term auction schedule
- Do not introduce concession payments
- Keep current de-risking approach
- Combine it with the UK Contracts for Difference (CfD)
CfD: potentially cost-neutral to society

New UK offshore wind projects could be effectively "subsidy-free"

Rising prices for coal, gas and carbon have pushed up wholesale prices

- UK wholesale power price
- Record-low offshore wind prices (2023 delivery)
1. Drive offshore build-out

- Maintain long-term auction schedule
- Do not introduce concession payments
- Keep current de-risking approach
- Combine it with the UK Contracts for Difference (CfD)
- Pursue ambitious electrification agenda to accelerate offshore wind deployment
2. Drive demand for electricity

Final Energy demand

- Power: 31%
- Heat: 45%
- Transport: 8%
- Share of renewables in the sector: 30%
- Share of renewables in the sector: 18%
Breaking new ground

<table>
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<tr>
<th>Europe's Energy System</th>
<th>Today</th>
<th>2050 Paris-compatible</th>
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<tbody>
<tr>
<td>Electrification Rates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial Processes</td>
<td>24%</td>
<td>62%</td>
</tr>
<tr>
<td>Transport</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1%</td>
<td>51%</td>
<td></td>
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<tr>
<td>Buildings</td>
<td>36%</td>
<td>64%</td>
</tr>
<tr>
<td>Energy Demand</td>
<td>13,098 TWh/year</td>
<td>-33% 8,820 TWh/year</td>
</tr>
<tr>
<td>Energy-related Emissions</td>
<td></td>
<td>-90%</td>
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</table>
Ambitious electrification is affordable

Energy costs

% of GDP

Source: DNV GL for WindEurope
System flexibility helps integration of variable RES

- Increased interconnection capacity within/between regions
- Power-to-gas
- Demand response
- Flexible power plants
- Renewables flexibility
- Storage
- New technologies (heat pumps, etc.)
- Electric vehicles

Source: DNV GL for WindEurope
THANK YOU

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