Offshore wind energy: 2019 mid-year statistics

WindEurope Market Intelligence
This report summarises offshore wind installations from 1 January 2019 to 30 June 2019.

WindEurope tracks project updates regarding the offshore wind installations, industry supply chain and investments to produce the following analysis.

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## Content

<table>
<thead>
<tr>
<th>Highlights</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offshore Wind Installations</td>
<td>5</td>
</tr>
<tr>
<td>Industry activity &amp; supply chain</td>
<td>17</td>
</tr>
<tr>
<td>Finance highlights</td>
<td>26</td>
</tr>
</tbody>
</table>
HIGHLIGHTS

- 1.9 GW (264 turbines) were connected to the grid in 4 countries taking the total European installed capacity to 20.3 GW
- The UK remains the leading country in offshore wind with 48% of all new installations in the first half of the year
- 4 wind farms were fully commissioned in the first half of 2019, taking the total number to 106 wind farms in European waters
- Siemens Gamesa Renewable Energy supplied half of the connected turbines, followed by MHI Vestas (39%) and GE Renewable Energy (13%)
## Offshore Wind Installations

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual installations</td>
<td>6</td>
</tr>
<tr>
<td>Half year installations per country</td>
<td>7</td>
</tr>
<tr>
<td>Half year installations per wind farm</td>
<td>8</td>
</tr>
<tr>
<td>Wind farm examples</td>
<td>11</td>
</tr>
<tr>
<td>Cumulative installations per country</td>
<td>14</td>
</tr>
<tr>
<td>Cumulative installations per sea basin</td>
<td>16</td>
</tr>
</tbody>
</table>
With 1,927 MW connected in the first half of 2019, Europe is on track to break an installations record this year.

WindEurope forecasts a record 3,390 MW by the end of 2019.

*Offshore wind farms partially connected and online.

Source: WindEurope
Half of the new grid-connected capacity is located in the UK

Annual offshore wind capacity installations per country in first half of 2019

- United Kingdom: 931 MW
- Denmark: 374 MW
- Belgium: 370 MW
- Germany: 252 MW

Source: WindEurope
4 wind farms fully commissioned and 1 partially online in the first half of 2019

Projects connected to the grid per country

- Hornsea 1: 616 MW (online)
- United Kingdom: 931 MW (online)
- Denmark: 374 MW (online)
- Belgium: 370 MW (online)
- Germany: 252 MW (online)
- Norther: 370 MW (partially online)
- Merkur Offshore: 252 MW (partially online)
- Horns Rev 3: 374 MW (partially online)
- Beatrice 2: 315 MW (partially online)

Source: WindEurope
Hornsea 1 is on track to become the largest offshore wind farm (1,218 MW) by 2020

Works carried out at offshore wind farms with grid connections in the first half of 2019

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>WIND FARM</th>
<th>CAPACITY CONNECTED IN FIRST HALF 2019 (MW)</th>
<th>NUMBER OF TURBINES CONNECTED</th>
<th>TURBINE MODEL</th>
<th>TYPE OF FOUNDATION</th>
<th>STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>United Kingdom</td>
<td>Beatrice 2</td>
<td>315</td>
<td>45</td>
<td>SWT-7.0-154</td>
<td>Jacket</td>
<td>●●●●● ●</td>
</tr>
<tr>
<td></td>
<td>Hornsea 1</td>
<td>616</td>
<td>88</td>
<td>SWT-7.0-154</td>
<td>Monopile</td>
<td>●●</td>
</tr>
<tr>
<td>Denmark</td>
<td>Horns Rev 3</td>
<td>374</td>
<td>45</td>
<td>V164-8.3 MW</td>
<td>Monopile</td>
<td>●●●●○ ○</td>
</tr>
<tr>
<td>Belgium</td>
<td>Norther</td>
<td>370</td>
<td>44</td>
<td>V164-8.4 MW</td>
<td>Monopile</td>
<td>●●●●● ●</td>
</tr>
<tr>
<td>Germany</td>
<td>Merkur Offshore</td>
<td>252</td>
<td>42</td>
<td>Haliade 150-6 MW</td>
<td>Monopile</td>
<td>●●●●● ●</td>
</tr>
</tbody>
</table>
Germany will finish turbine installations and grid connection of 3 wind farms by the end of 2019

Works carried out at offshore wind farms without grid connection in the first half of 2019

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>WIND FARM</th>
<th>FOUNDATIONS INSTALLED IN FIRST HALF 2019</th>
<th>CUMULATIVE AND (TOTAL) NUMBER OF FOUNDATIONS</th>
<th>TURBINE MODEL</th>
<th>TYPE OF FOUNDATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>United Kingdom</td>
<td>East Anglia Offshore Wind 1</td>
<td>53</td>
<td>90 (102)</td>
<td>SWT-7.0-154</td>
<td>Three legs jacket</td>
</tr>
<tr>
<td>Germany</td>
<td>Deutsche Bucht</td>
<td>2</td>
<td>31 (31)</td>
<td>V164-8.4 MW</td>
<td>Monopile</td>
</tr>
<tr>
<td></td>
<td>EnBW Albatros</td>
<td>16</td>
<td>16 (16)</td>
<td>SWT-7.0-154</td>
<td>Monopile</td>
</tr>
<tr>
<td></td>
<td>EnBW Hohe See</td>
<td>8</td>
<td>71 (71)</td>
<td>SWT-7.0-154</td>
<td>Monopile</td>
</tr>
</tbody>
</table>
Hornsea 1
1,218 MW
Partially online (50%)
On schedule to become the largest offshore wind farm

United Kingdom
Ørsted (50%) & Global Infrastructure Partners (50%)
Under construction – 2020 expected
172 turbines model SWT-7.0-154
Bottom-fixed monopile
JDR Cables (inter-array) & NKT (export cable)
33 m depth, 103 km from shore
East Anglia 1
714 MW
Under construction (2020 expected)

United Kingdom
Scottish Power Renewables (100%)
102 turbines model SWT-7.0-154
Bottom-fixed three legs jacket
JDR Cables (inter-array) & Nexans (export cable)
36 m depth, 49 km from shore

Courtesy of Scottish Power Renewables
Norther
370 MW
Fully commissioned

Belgium
Eneco (25%), Mitsubishi (25%) & Nethys (50%)
44 turbines model V164-8.4 MW
Bottom-fixed monopile
Prysmian (inter-array) & LS Cable & System (export cable)
23 m depth, 24 km from shore

Courtesy of the Belgian Offshore Platform
Offshore Wind in Europe

20,381 MW Connected to the grid
11 Countries
4,811 Turbines
106 Wind Farms
The UK has almost half of the offshore wind capacity in Europe, with over 2,100 turbines.

Cumulative installed capacity and number of turbines by country:
- UK: 45% (9,116 MW / 2,108 turbines)
- Germany: 33% (6,586 MW / 1,351 turbines)
- Denmark: 8.5% (1,703 MW / 559 turbines)
- Belgium: 7.5% (1,555 MW / 318 turbines)
- Netherlands: 5.5% (1,118 MW / 365 turbines)
- Others: 1.5% (302 MW / 110 turbines)

TOP 5 REPRESENT 99% OF ALL CAPACITY CONNECTED

Source: WindEurope
The North Sea has 3/4 of the total installed capacity in Europe

Cumulative installed capacity by sea basin (MW)

- North Sea: 15,219 MW
- Irish Sea: 2,930 MW
- Baltic Sea: 2,219 MW
- Atlantic Ocean*: 12 MW

*Installations in the English Channel have been reassigned to the North Sea according to the French Ministry of Environment

Source: WindEurope
## Industry activity and supply chain

<table>
<thead>
<tr>
<th>Component</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind turbines suppliers</td>
<td>18</td>
</tr>
<tr>
<td>Wind farms owners’ share</td>
<td>21</td>
</tr>
<tr>
<td>Foundations</td>
<td>23</td>
</tr>
<tr>
<td>Cables</td>
<td>25</td>
</tr>
</tbody>
</table>
The market is dominated by 3 turbine suppliers with Siemens Gamesa supplying half of the volume in the first half of 2019.

Wind turbine manufacturer’s share of grid-connected turbines in the first half of 2019:

- **GE Renewable Energy**: 13% (42 turbines, 252 MW connected)
- **MHI Vestas Offshore Wind**: 39% (89 turbines, 743 MW connected)
- **Siemens Gamesa**: 48% (133 turbines, 931 MW connected)

*Source: WindEurope*
Siemens Gamesa remains the largest supplier and GE enters the top 5

Wind turbine manufacturer’s share at end of June 2019

- Siemens Gamesa: 67.5% (13.7 GW / 3,248 turbines)
- MHI Vestas: 24% (4.5 GW / 1,157 turbines)
- Senvion: 4.3% (1.2 GW / 206 turbines)
- Bard Engineering: 1.7% (0.4 GW / 80 turbines)
- GE Renewable Energy: 1.5% (0.4 GW / 74 turbines)
- Others: 1% (0.07 GW / 46 turbines)

TOP 3 REPRESENT 96% OF ALL CAPACITY CONNECTED

Source: WindEurope
Turbine models highlights

- **SWT 7.0-154**: Most installed turbine* in the first half of 2019 with 133 units

- **V164-8.4 MW**: Largest operational turbine in the waters, with 89 units installed* in the first half 2019

- **Haliade 150-6 MW**: 42 turbines connected to the grid in first half 2019 at the Merkur Offshore Wind Farm (66 in total)

*Only grid-connected turbines*
3 companies own half of the capacity installed in the first half of 2019

Owners’ share of first half 2019 installations (MW)

- Vattenfall: 19%
- Ørsted: 16%
- Global Infrastructure Partners: 16%
- Elicio: 10%
- SSE: 7%
- Partners Group: 7%
- Copenhagen Infrastructure Partners: 6%
- Eneco: 5%
- Mitsubishi Corporation: 5%
- SDIC Power: 4%
- InfraRed Capital Partners: 3%
- Others (below 50 MW): 3%

Source: WindEurope
Over 40% of the installed capacity is owned by 5 companies. With 3.3 GW in their portfolio, Ørsted is leading.
4 suppliers had significant market share with jackets and monopiles

Foundations installed in first half of 2019 by manufacturing company

- Lamprell
- Sif
- Navantia-Windar Consortium
- EEW

Source: WindEurope
Over 3/4 of all the offshore turbines are on monopile foundations

Share of foundation types for grid-connected wind turbines

- Monopile: 4,149 Foundations
- Tripod: 126 Foundations
- Gravity base: 301 Foundations
- Jacket: 456 Foundations
- Tripile: 80 Foundations
- Floating Spar: 6 Foundations
- Floating Semi-Sub: 2 Foundations
- Floating Barge: 1 Foundations
- Others: 16 Foundations

Source: WindEurope
JDR supplied 3/4 of all inter-array cables while NKT supplied half of the export cable in the first half of 2019

Cables installed by manufacturer in the first half of 2019

Inter-array Cable
- PRYSMIAN Powerlink 45 cables
- JDR Cable Systems 133 cables

Export Cable
- NKT Group 3 cables
- LS Cable & System 1 cable
- Nexans 2 cables

Source: WindEurope
Finance

New offshore wind investments........................................ 27
Breakdown per project.................................................... 29
First half of 2019 saw €2.4bn of investment for 0.9 GW of new offshore wind capacity
Investments in the first half of 2019 were similar to those in the first half of 2018

Investments in the offshore wind sector in the first halves of 2018 and 2019

- Construction of new offshore wind projects:
  - H1 2019: €2.4bn
  - H1 2018: €2bn

- Refinancing offshore wind projects:
  - H1 2019: €1.6bn
  - H1 2018: €2.3bn

Source: WindEurope
Final Investment decisions taken for 4 projects (€2.4bn), including the first offshore wind farm in Italy and a vertical-axis floating demonstrator in Norway

Investments in European offshore wind farms in the first half of 2019

<table>
<thead>
<tr>
<th></th>
<th>TOTAL INVESTMENTS (€bn)</th>
<th>NEW CAPACITY FINANCED (MW)</th>
<th>NUMBER OF PROJECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Netherlands</td>
<td>0.5</td>
<td>380</td>
<td>1</td>
</tr>
<tr>
<td>France</td>
<td>1.8</td>
<td>450</td>
<td>1</td>
</tr>
<tr>
<td>Italy</td>
<td>0.1</td>
<td>30</td>
<td>1</td>
</tr>
<tr>
<td>Norway</td>
<td>0.0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2.4</strong></td>
<td><strong>861</strong></td>
<td><strong>4</strong></td>
</tr>
</tbody>
</table>

Source: WindEurope
THANK YOU

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