



# The European offshore wind industry - key trends and statistics 2013

January 2014

A report by the European Wind Energy Association

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# Executive summary

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## Offshore wind power market in 2013

- 418 new offshore wind turbines, in 13 wind farms, worth between €4.6 billion and €6.4 billion, were fully grid connected between 1 January and 31 December 2013, totalling 1,567 MW, 34% more than in 2012.
  - 522 turbines were erected during 2013, an average of 4.3 MW per day. 104 of these turbines are awaiting grid connection.
  - Work is on-going on 12 projects.
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## Cumulative offshore wind power market

- 2,080 turbines are now installed and grid connected, making a cumulative total of 6,562 MW, in 69 wind farms in eleven European countries.
  - 75% of substructures are monopiles, 12% gravity, jackets 5%, tripods 5%, and tripiles 2%.
  - There are also two full-scale grid-connected floating turbines, and two down-scaled prototypes.
- 

## Market outlook for 2014 and 2015

- Once completed, the 12 offshore projects currently under construction will increase installed capacity by a further 3 GW, bringing cumulative capacity in Europe to 9.4 GW.
- 

## Trends: turbines, foundations, water depth and distance to shore

- Average offshore wind turbine size is 4 MW.
  - Average offshore wind farm size was 485 MW in 2013, 78% more than the previous year. The trend towards larger projects is expected to continue over the coming years.
  - The average water depth of wind farms completed, or partially completed, in 2013 was 20 metres (m) and the average distance to shore 30 km.
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## Financing highlights and developments

- Non-recourse debt finance for offshore wind reached €2.13 billion in 2013, increasing on the €1.93 bn reached in 2012 and following €2.33 bn in 2011.
  - Two landmark projects reached financial close in 2013: Butendiek project in Germany, and the refinancing of Masdar's stake in the London Array project in the UK, the largest offshore project in the world.
  - Financing markets remained open for the offshore wind sector in 2013 and active throughout the year across a variety of instruments, with continued sustained activity expected in 2014.
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# Annual market in 2013

## Offshore wind installations

During 2013, work was carried out on 21 offshore wind farms in Europe:

- 7 large-scale wind farms were completed.
- 3 demonstration projects went online.
- Work went on and several wind turbines were erected and connected in two further wind farms.
- Work has started but no turbines are yet connected in 8 other wind farms.
- Work has started in one further demonstration project

TABLE 1: SUMMARY OF WORK CARRIED OUT AT EUROPEAN OFFSHORE WIND FARMS DURING 2013

Wind farm name	Country	Status
Thornton Bank II + III	Belgium	Fully grid connected
London Array	United Kingdom	Fully grid connected
Belwind Alstom demo (Haliade)	Belgium	Fully grid connected
Anholt	Denmark	Fully grid connected
Lincs	United Kingdom	Fully grid connected
BARD offshore 1	Germany	Fully grid connected
Karehamn	Sweden	Fully grid connected
Arinaga Quay (Demo)	Spain	Fully grid connected
Gunfleet Sands 3 (Demo)	United Kingdom	Fully grid connected
Teesside	United Kingdom	Fully grid connected
Northwind	Belgium	Partially completed
Gwynt y Mor	United Kingdom	Partially completed
West of Duddon Sands	United Kingdom	Turbines installed
Methil Demo (Energy Park Fife)	United Kingdom	Turbine installed
Riffgat	Germany	Turbines installed
Meerwind sud/ost	Germany	Turbines installed
Borkum West 2.1	Germany	Turbines installed
Humber Gateway	United Kingdom	Foundations installed
Baltic 2	Germany	Foundations installed
DanTysk	Germany	Foundations installed
Nordsee ost	Germany	Foundations installed
Global tech 1	Germany	Foundations installed

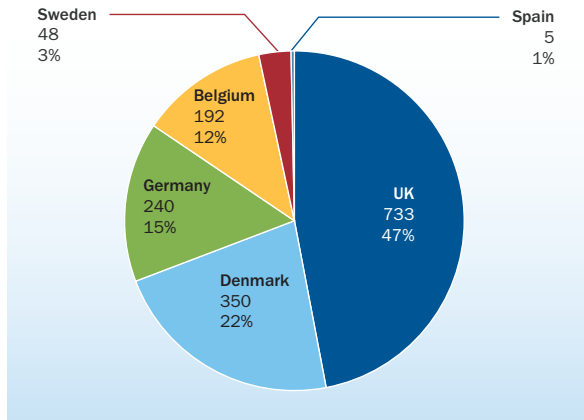


FIG 1: SHARE OF ANNUAL OFFSHORE WIND CAPACITY INSTALLATIONS PER COUNTRY (MW)

1,567 MW of new offshore wind power capacity were connected to the electricity grid during 2013 in Europe: 34% more capacity than the previous year. 47% of all new capacity was installed in the UK (733 MW). The share of total capacity installed in the UK was significantly less than in 2012 (73%). The second largest amount of installations were in Denmark (350 MW or 22%), followed by Germany (240 MW, 15%) and Belgium (192 MW, 12%).

TABLE 2: NUMBER OF TURBINES AND MW FULLY CONNECTED TO THE GRID DURING 2013 PER COUNTRY (MW)

Country	Belgium	UK	Germany	Denmark	Sweden	Spain	TOTAL
No. of farms	3	8	8	1	1	1	22
No. of turbines connected	44	212	48	97	16	1	418
MW connected to the grid	192	733	240	350	48	5	1,567

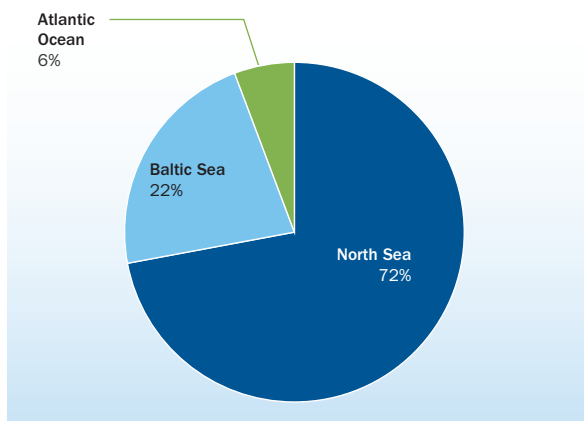


FIG 2: SEA BASIN SHARE OF 2013 ANNUAL INSTALLATIONS

Of the total 1,567 MW installed in European waters, 72% were located in the North Sea, 22% in the Baltic Sea and the remaining 6% in the Atlantic Ocean.

## Annual market share in 2013 - wind turbine manufacturers

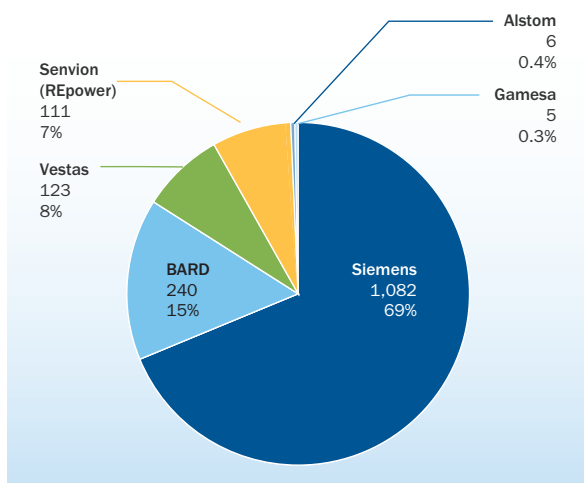


FIG 3: WIND TURBINE MANUFACTURERS' SHARE OF 2013 ANNUAL INSTALLATIONS IN MW

Siemens continues to be the top offshore turbine supplier in terms of annual installations. With 1,082 MW of new capacity connected, Siemens accounts for 69% of the market. BARD (240 MW, 15%), Vestas (123 MW, 8%) and Senvion (REpower) (111 MW, 7%) are the other three turbine manufacturers who had turbines grid connected in full-scale wind farms during 2013. Alstom and Gamesa both installed their first demonstration turbines and Siemens installed the first two of its 6 MW turbines.

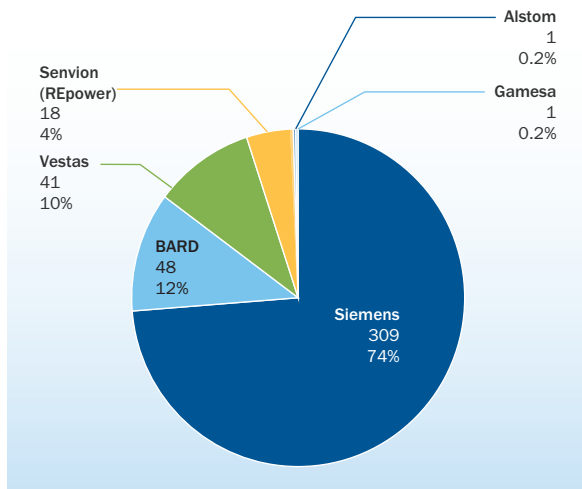


FIG 4: WIND TURBINE MANUFACTURERS' SHARE OF 2013 ANNUAL INSTALLATIONS IN TERMS OF UNITS CONNECTED

Also in terms of units connected, Siemens remains on top with 307 offshore wind turbines of 3.6 MW and two turbines of 6MW (74%) connected in European waters during 2013. Siemens is followed by BARD (48 x 5 MW turbines, 12%), Vestas (41 x 3 MW turbines, 10%) and Senvion (REpower) (18 x 6.15 MW, 4%). Alstom and Gamesa each installed one turbine of respectively, 6 MW and 5 MW.

## Annual market share in 2013 - wind farm developers/owners<sup>1</sup>

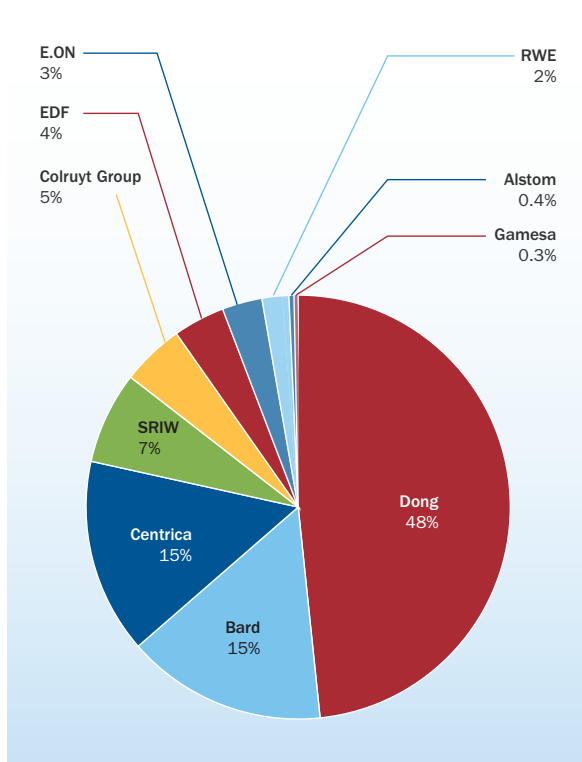


FIG 5: DEVELOPERS' SHARE OF 2013 ANNUAL INSTALLATIONS

DONG remained the biggest developer in the European offshore sector with 48% of total installations in 2013. Power producers DONG, Centrica (15%), EDF (4%), E.ON (3%) and RWE (2%) installed 72% of the capacity that went online during 2013 (In 2012 the power producers' share was 75%). Other developers that connected capacity to the grid in 2013 were BARD (15%), SRIW (7%) and Colruyt (5%). Gamesa, Siemens and Alstom have installed demonstration wind farms between 5 MW and 12 MW.

<sup>1</sup> The grid-connected market shares are indicative only. Projects owned or developed by several companies have been split according to the respective shares. Where the shares are not known, they have been split in equal parts between the partners.

## Annual market share in 2013 - substructures

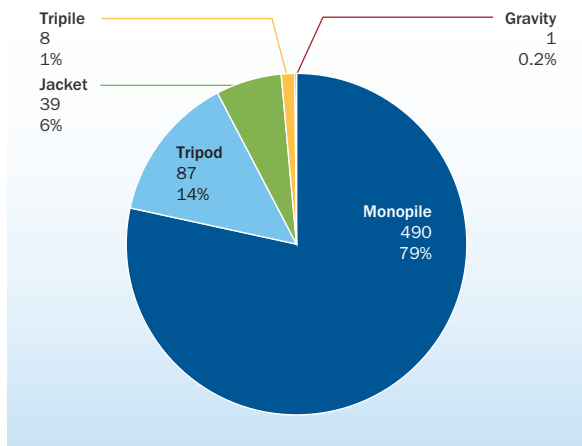
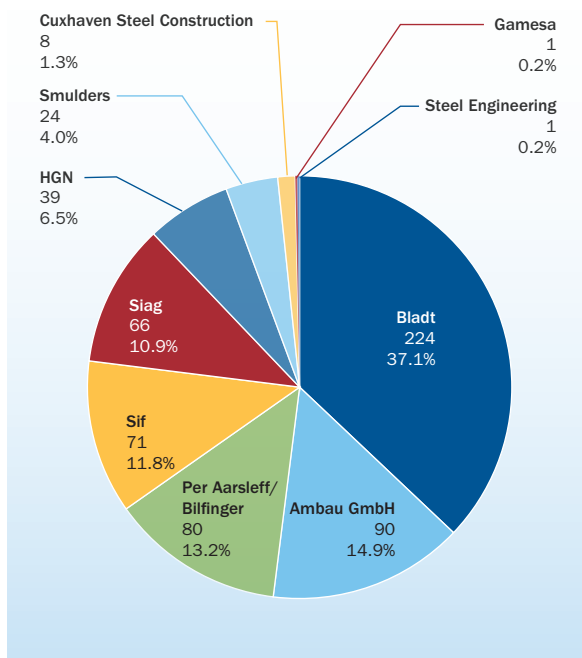


FIG 6: FOUNDATION TYPES' SHARE OF 2013 ANNUAL MARKET

Monopile substructures remained the most popular substructure type in 2013 with 490 installed (79%). 87 tripod foundations were installed, 14% of all newly installed substructures, followed by jackets (39, 6%), tripiles (8, 1%) and 1 gravity foundation.

FIG 7: FOUNDATION MANUFACTURERS' SHARE OF 2013 ANNUAL INSTALLATIONS<sup>2</sup>

Eleven companies supplied foundations to offshore wind energy projects during 2013, four more than in the previous year: Bladt (224 foundations, 36%) followed by Ambau (90 foundations, 14%), Per Aarsleff/Bilfinger (80 foundations, 13%), SIF group (71 foundations, 11%) Siag (66 foundations, 11%), HGN (39 foundations, 6%), Smulders (24 foundations, 4%) and WeserWind (21 foundations, 3%) were the market leaders.

<sup>2</sup> The shares are calculated according to the actual number of individual foundations installed in 2013.

## Annual market share in 2013 - cables

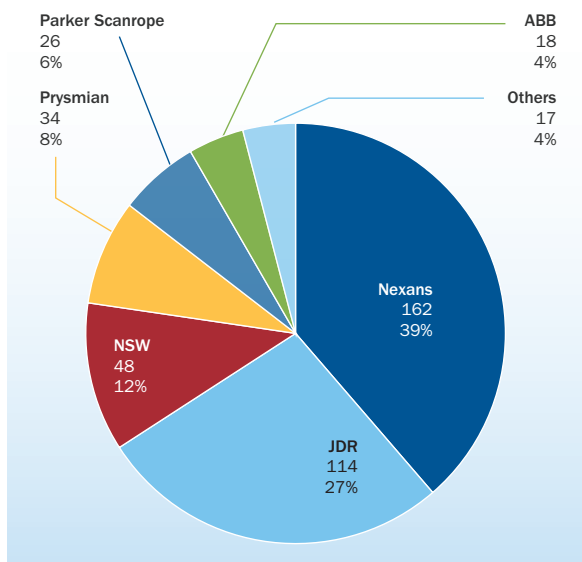


FIG 8: SHARE OF INTER-ARRAY CABLE SUPPLIERS TO OFFSHORE WIND FARMS IN 2013<sup>3</sup>

In 2013, Nexans was contracted to supply 6 wind farms with inter array cables, representing 39% of all energised cables. JDR supplied 2 wind farms (27% of inter array cables), followed by NSW (eight wind farms, 12%), Prysmian (4 wind farms, 8%), Park Scanrope (8 wind farms, 6%) and ABB (4 wind farms, 4%)<sup>4</sup>.

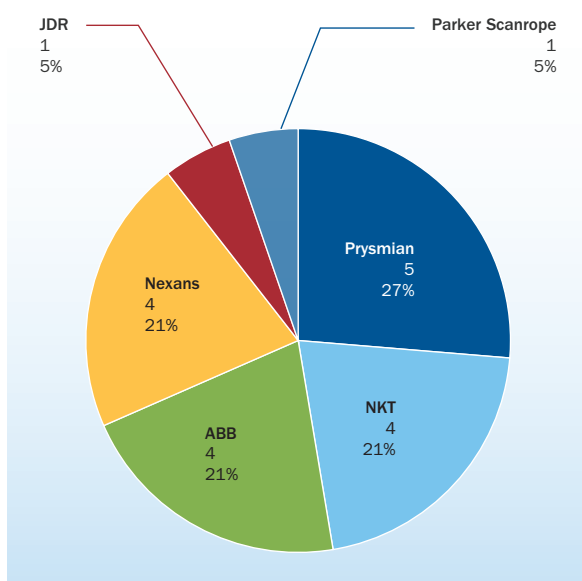


FIG 9: SHARE OF EXPORT CABLE SUPPLIERS IN 2013 (NO. OF FARMS)

In terms of export cables, in 2013 Prysmian supplied 5 wind farms with export cables (27%). Nexans, NKT and ABB all supplied 4 wind farms (21% each) and JDR and Parker Scanrope both supplied 1 wind farm each<sup>5</sup>. Each of the 3 wind farms that had capacity connected to the grid for the first time in 2013 had a different export cable supplier, Prysmian, JDR and Nexans<sup>6</sup>.

<sup>3</sup> The shares are calculated taking into account the number of turbines grid connected in each wind farm during 2013.

<sup>4</sup> The two demonstration projects and Karehamn wind farm are not included in this calculation.

<sup>5</sup> Arinaga Quay is not taken into account due to its proximity to shore. Similarly, Alstom's demonstration turbine is not taken into account as it connects to Belwind's substation.

<sup>6</sup> The two demonstration wind turbines and Karehamn were not included in this calculation.



## Wind turbine capacity and wind farm size

The weighted average capacity rating of the 418 off-shore wind turbines connected to the grid in 2013 was 4 MW, similar in size to 2012. The continued dominance of Siemens 3.6 MW turbine explains why the average size of turbines remains around the 4 MW mark, despite numerous bigger models being commercialised.

The average size of the 22 wind farms being constructed during 2013 was 485 MW, 70% more than 2012. This confirms the sector's trend towards larger turbines and bigger wind farm projects.

## Water depth and distance to shore

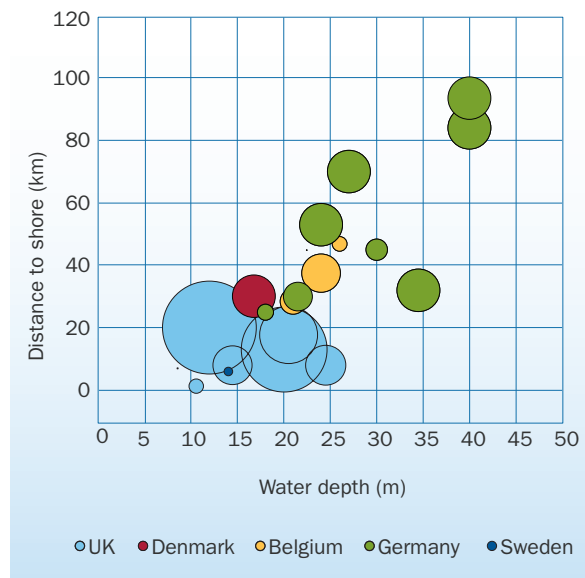


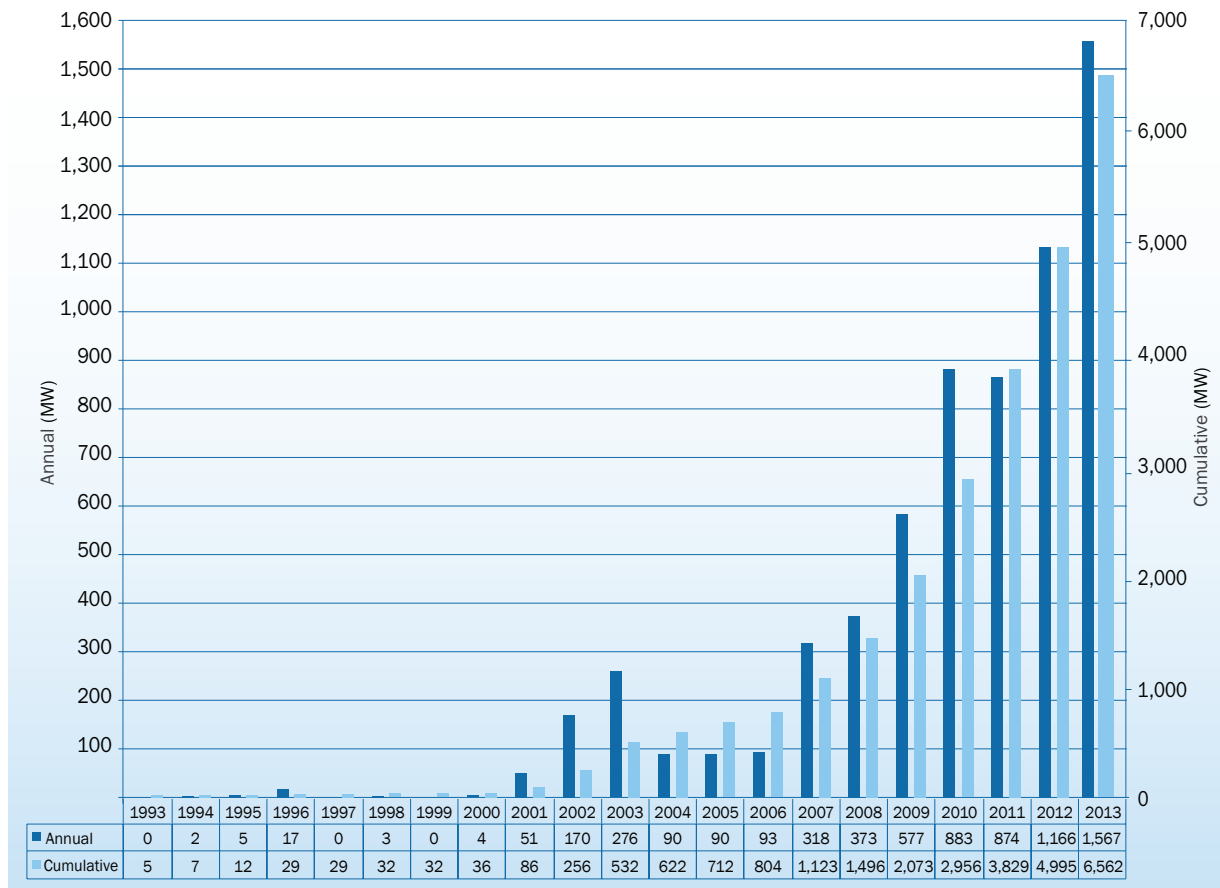
FIG 10: WATER DEPTH, DISTANCE TO SHORE AND SIZE OF OFFSHORE WIND FARMS UNDER CONSTRUCTION DURING 2013

The weighted average water depth of offshore wind farms where work was carried out in 2013 was 20 m, slightly lower than in 2012 (22 m). The average distance to shore for those same projects was 30 km, almost the same as in 2012 (29 km).

## Cumulative market

A total of 2,080 wind turbines are now installed and connected to the electricity grid in 69 offshore wind farms in 11 countries across Europe. Total installed capacity at the end of 2013 reached 6,562 MW, producing 24 TWh in a normal wind year, enough to cover 0.7% of the EU's total electricity consumption<sup>7</sup>.

FIG 11: CUMULATIVE AND ANNUAL OFFSHORE WIND INSTALLATIONS (MW)



The UK has the largest amount of installed offshore wind capacity in Europe (3,681 MW): 56% of all installations. Denmark follows with 1,271 MW (19%). With 571 MW (8.7% of total European installations), Belgium is third, followed by Germany (520 MW: 8%), the Netherlands (247 MW: 3.8%), Sweden (212 MW: 3.22%), Finland (26 MW: 0.4%), Ireland (25 MW), Norway (2.3 MW), Spain (5 MW) and Portugal (2 MW).

Country	BE	DE	DK	ES	FI	IE	NL	NO	PT	SE	UK	Total
No. of farms	5	13	12	1	2	1	4	1	1	6	23	69
No. of turbines	135	116	513	1	9	7	124	1	1	91	1,082	2,080
Capacity installed (MW)	571	520	1,271	5	26	25	247	2	2	212	3,681	6,562

<sup>7</sup> According to Eurostat's latest figures (2011), the EU's gross domestic consumption of electricity was 3,311 TWh.

FIG. 12: INSTALLED CAPACITY - CUMULATIVE SHARE BY COUNTRY, (MW)

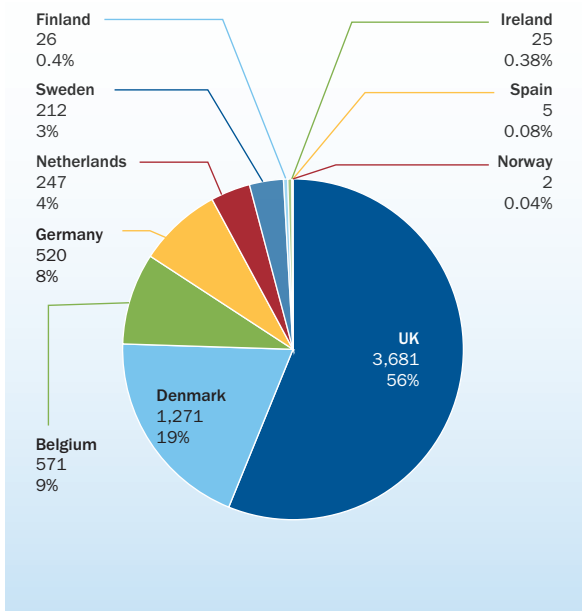


FIG. 13: INSTALLED WIND TURBINES - CUMULATIVE SHARE BY COUNTRY

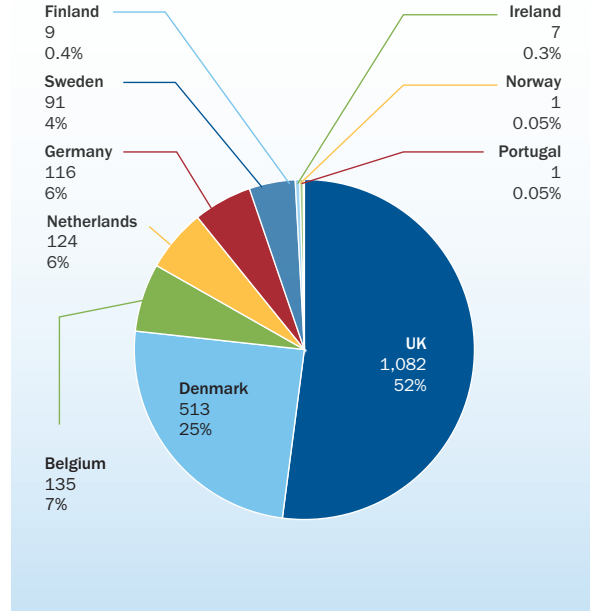
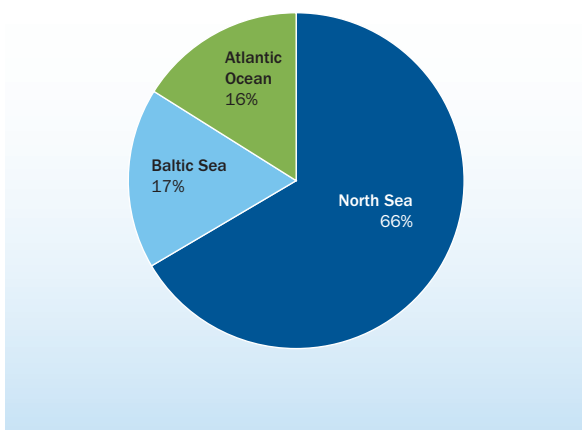


FIG. 14: INSTALLED CAPACITY, CUMULATIVE SHARE BY SEA BASIN



In terms of the number of wind turbines installed in Europe, the UK is leading with 1,082 (52%), followed by Denmark (513 wind turbines: 24.6%), Belgium (135 turbines: 7%), the Netherlands (124 turbines: 6%), Germany (116 turbines: 6%), Sweden (91 turbines: 4.37%), Finland (nine turbines: 0.4%) and Ireland (seven units), Norway, Portugal, and Spain all have one wind turbine each.

The 6,562 MW of offshore wind capacity are mainly installed in the North Sea (4,363 MW: 66%). 1,143 MW or 17% are in the Baltic Sea and 1,056 MW (16%) in the Atlantic Ocean.

## Cumulative market share: wind turbine manufacturers

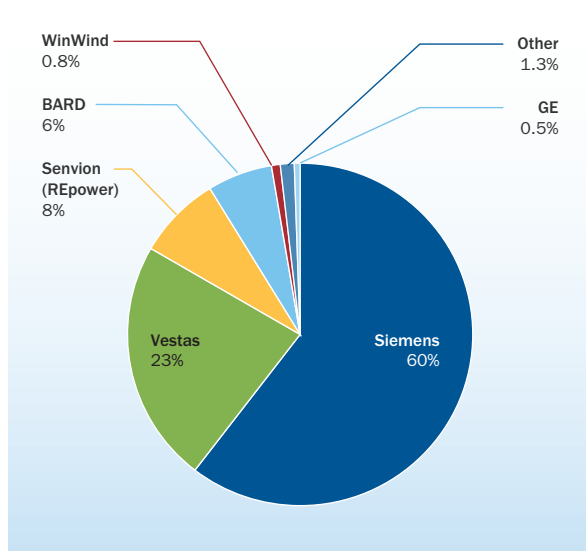


FIG. 16: WIND TURBINE MANUFACTURERS' SHARE AT THE END OF 2013 (MW)

Siemens is the lead offshore wind turbine supplier in Europe with 60% of total installed capacity. Vestas (23%) is the second biggest turbine supplier, followed by Senvion (REpower) (8%), BARD (6%), WinWind and GE with respectively 0.8% and 0.5%. Other suppliers together make up just over 1% of the market.

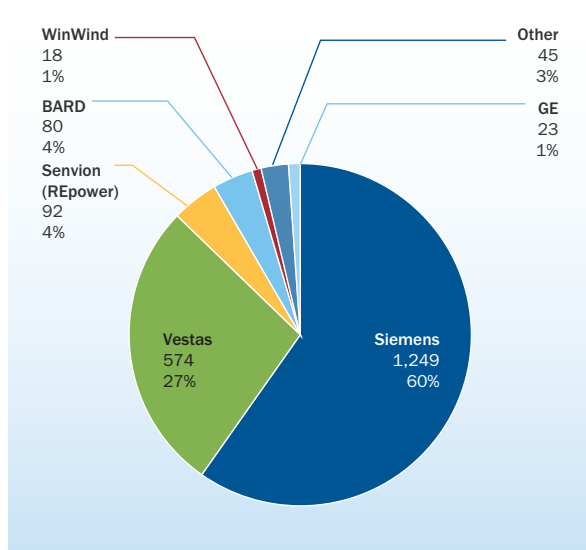


FIG. 17: WIND TURBINE MANUFACTURERS' SHARE AT THE END OF 2013 (TURBINES INSTALLED)

In terms of number of wind turbines installed at the end of 2013, Siemens remains the top supplier with 1,249 turbines. Vestas has installed and grid connected 574 turbines representing 27% of total turbines, followed by Senvion (REpower) (92 turbines: 4%), Bard (80 turbines: 3%), GE (23 turbines: 1%) and WinWind with 18 wind turbines (0.8%).

## Cumulative market share: wind turbine developers/owners

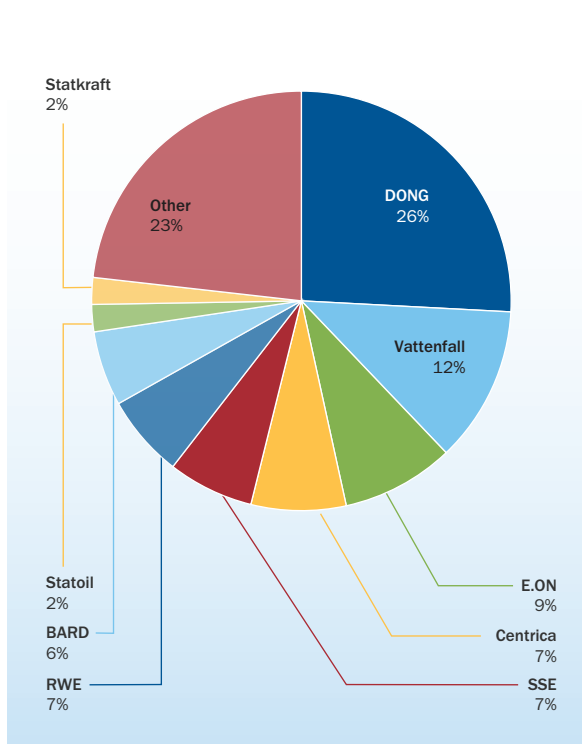


FIG. 18: OWNERS SHARE OF INSTALLED CAPACITY IN MW<sup>8</sup>

Dong maintains its position as the biggest owner of offshore wind power in Europe with 26% of cumulative installations at the end of 2013. Vattenfall (12%), E.ON (9%), Centrica (7%), SSE (7%), RWE (6%) and Bard (6%) follow.

## Substructures

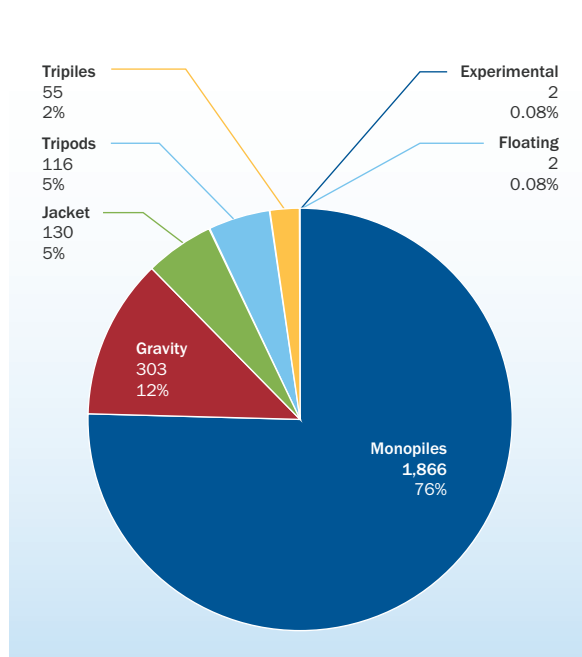


FIG. 19: SHARE OF SUBSTRUCTURE TYPES FOR WIND TURBINES

There were 2,474 substructures fully installed at European offshore wind farms at the end of 2013. The most common substructures used are monopiles: 1,866 monopiles were installed at the end of 2013 (76% of all installed foundations). Gravity based foundations are the second most common with 303 units installed (12%), followed by jacket foundations (130 units: 5%), tripods (116 units: 5%) and tripiles (55 units: 2%). There are two experimental and two full scale floating substructures.

<sup>8</sup> Market shares are indicative only. Projects owned or developed by several companies have been split according to the respective shares. Where the shares are not known, they have been split in equal parts between the partners.

# Market outlook for 2014 and 2015

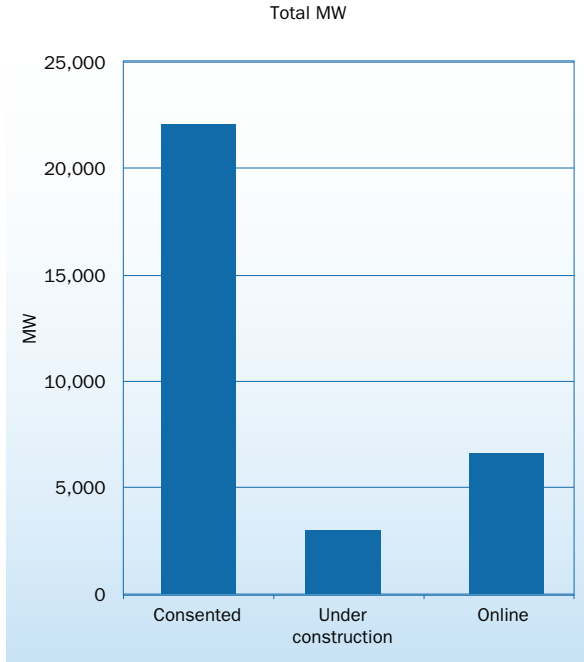


FIG. 20: OFFSHORE MARKET: PROJECTS ONLINE, UNDER CONSTRUCTION AND CONSENTED (MW)

7 full-scale offshore wind farms were fully completed in 2013, together with 3 demonstration projects. Ten others plus one demonstration project were still under construction or only partially grid connected. Once fully completed, the latter will connect to the grid a further 2,879 MW of capacity, taking total installed offshore wind capacity in Europe to 9,448 MW.

With the completion of the wind farms that are currently under construction, some 3 GW of new capacity will come online in the coming years, which suggests that annual installations will remain stable in 2014 and 2015. Moreover, EWEA has identified 22 GW of consented offshore wind farms in Europe and future plans for offshore wind farms totalling more than 133 GW.

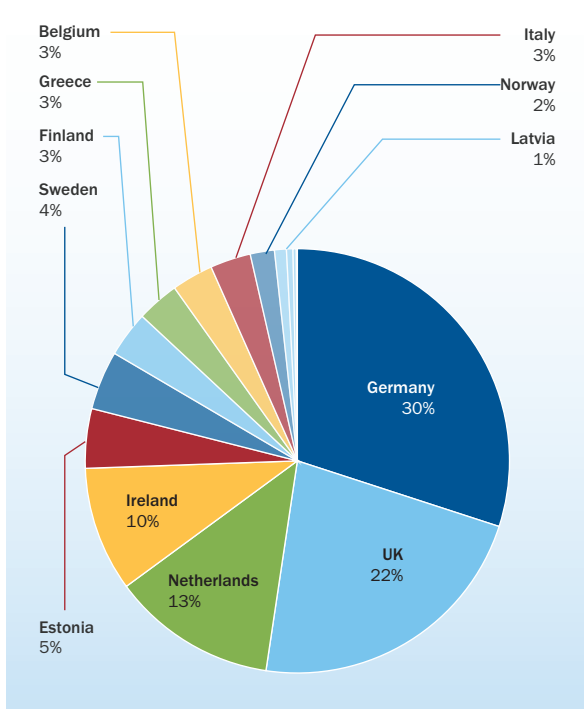


FIG. 21: SHARE OF CONSENTED OFFSHORE CAPACITY PER COUNTRY (MW)

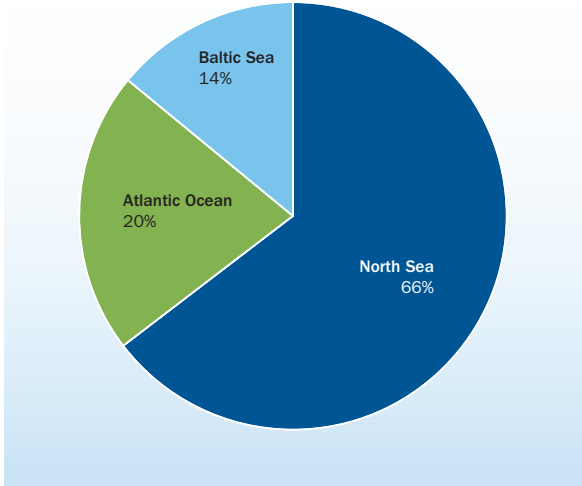


FIG. 22: SHARE OF OFFSHORE WIND FARMS UNDER CONSTRUCTION BY SEA BASIN

When looking at wind farms currently under construction per sea basin, it is clear that the North Sea will continue to be the main region for offshore deployment (66% of total capacity). The Atlantic Ocean (20%) and the Baltic Sea (14%) will, however, continue to attract important developments. No significant developments are expected in the Mediterranean Sea in the short term.

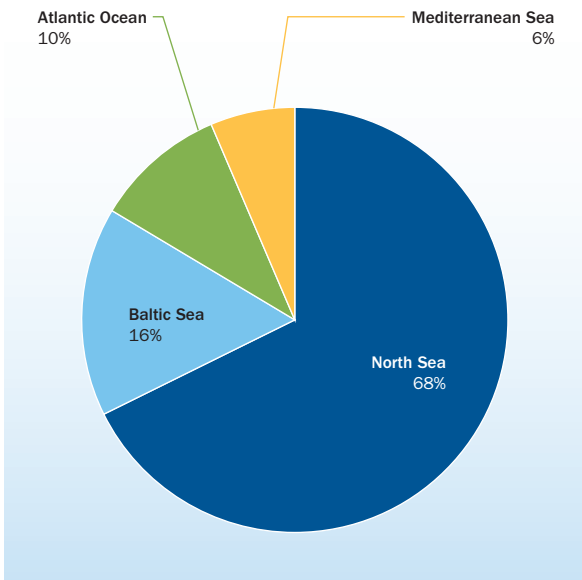


FIG. 23: SHARE OF CONSENTED OFFSHORE WIND FARMS BY SEA BASIN

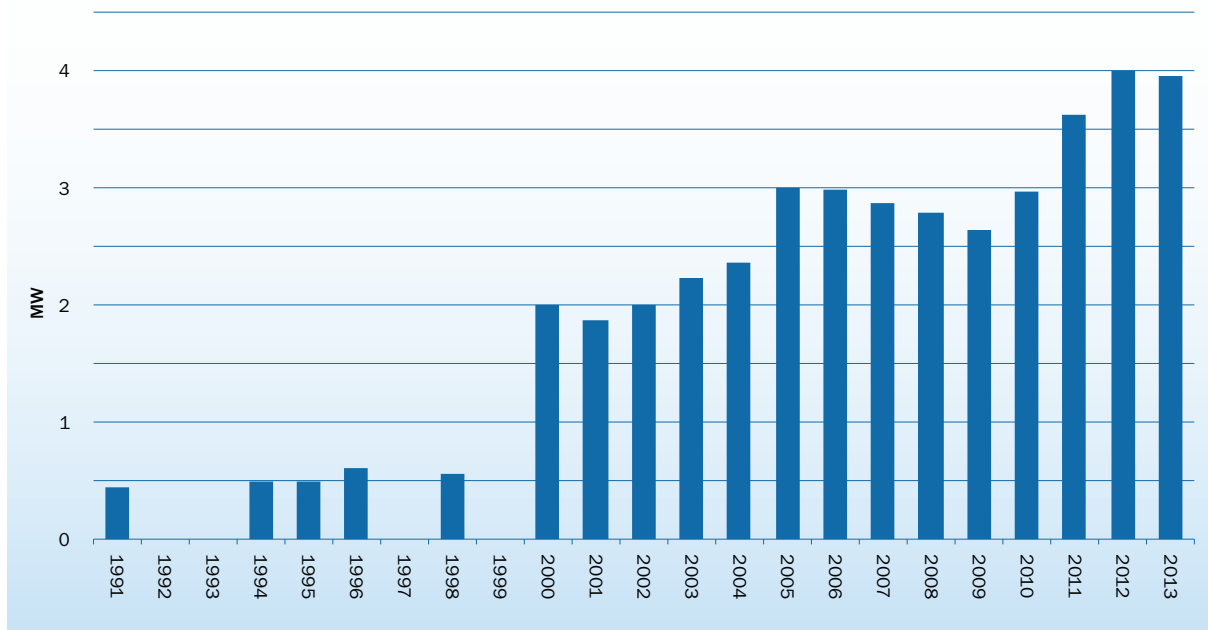
In the medium term, an analysis of consented wind farms confirms that the North Sea will remain the main region for offshore deployment (68% of total consented capacity) with significant developments are also foreseen in the Baltic Sea (16% of consented capacity). The Mediterranean could begin exploiting its offshore potential (6% of consented capacity).

# Trends: turbines, water depth and distance to shore

## Wind turbine capacity

Since 1991 the average size of wind turbines installed in European waters has increased significantly. During 2013, the average capacity of new wind turbines installed was 3.9 MW, the same as in the previous year. Looking at wind farms under construction, it is expected that average turbine capacity will remain around 4 MW in 2014, due to the market dominance of the Siemens 3.6 MW model.

FIG. 24: AVERAGE OFFSHORE WIND TURBINE RATED CAPACITY

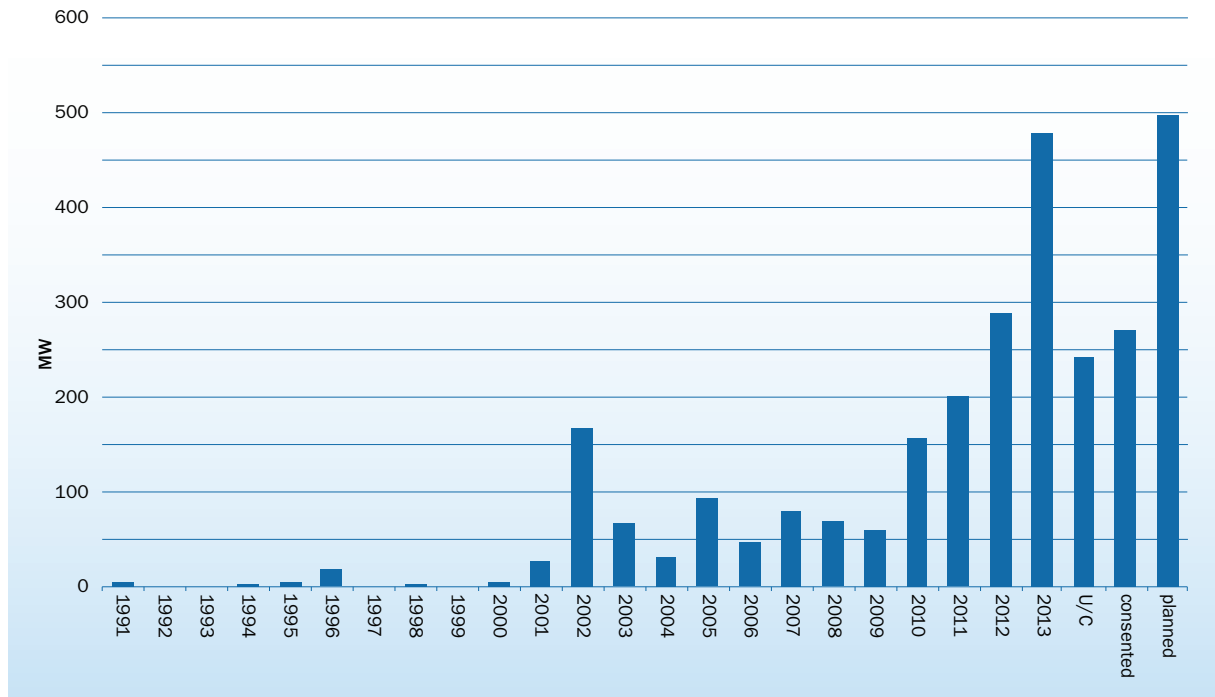




## Wind farm size

In 2012, the average size of offshore wind projects was 286 MW while in 2013 it was 482 MW.

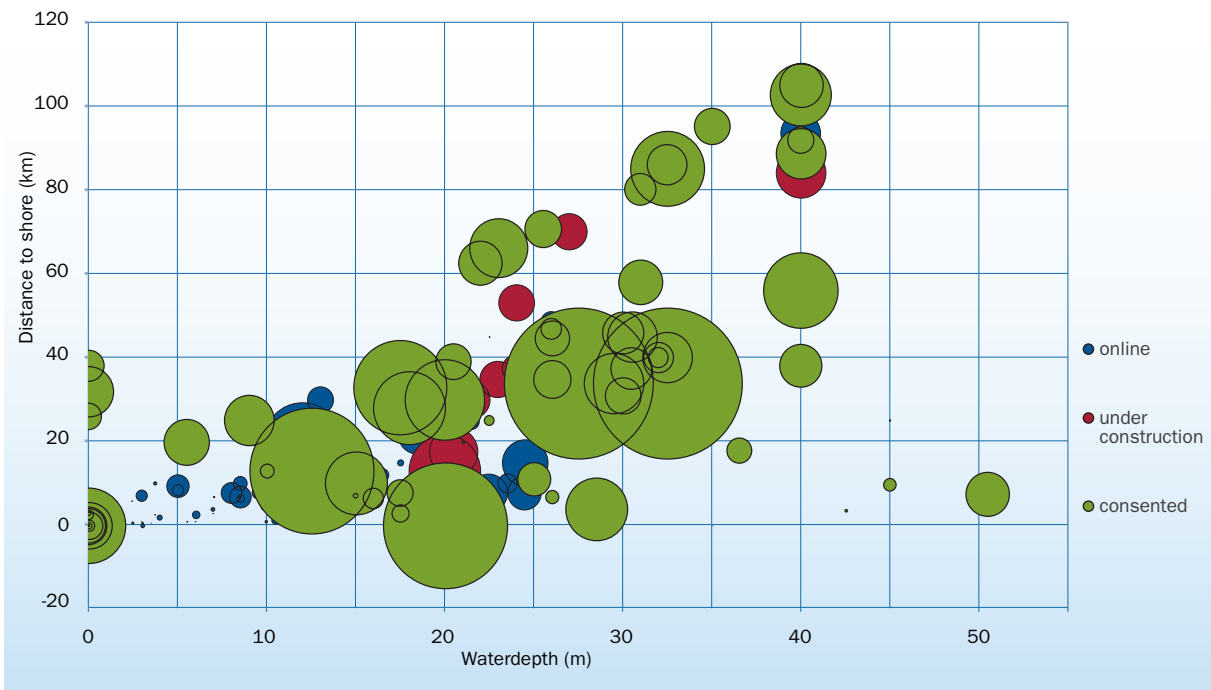
FIG. 25: AVERAGE SIZE OF OFFSHORE WIND FARM PROJECTS



## Water depth and distance to shore

Over the years, offshore wind farms have moved further from shore and into deeper waters. At the end of 2013, the average water depth of online wind farms was 16 m and the average distance to shore 29 km<sup>9</sup>. Looking at projects under construction, consented or planned, average water depths and distances to shore are likely to increase.

FIG. 26: AVERAGE WATER DEPTH AND DISTANCE TO SHORE OF ONLINE, UNDER CONSTRUCTION AND CONSENTED WIND FARMS



9 The demonstration turbines at Arinaga Quay and Methil have been excluded from this calculation.

# Financing

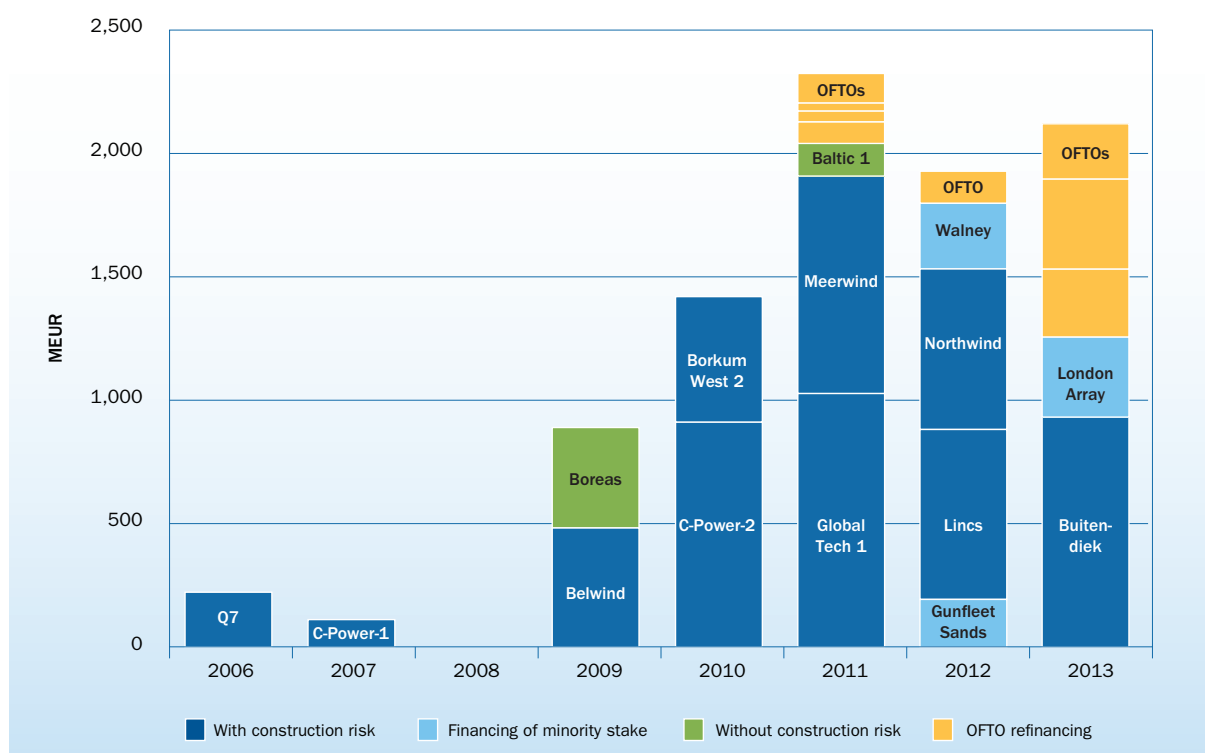
## Financing highlights and developments in 2013, and outlook for 2014

2013 was a transition year on the financing side, reflecting that fewer projects were launched this year due to regulatory instability in both the UK and Germany. However, transactions with respect to operating assets were numerous, reflecting the increase in the installed capacity. Overall volumes were stable compared to previous years.

Altogether, non-recourse debt finance for offshore wind reached €2.13 billion in 2013, increasing on the €1.93 bn reached in 2012 and following €2.33 bn in 2011. Over the past three years, project finance funding has represented around 40% of the net amounts invested in offshore wind for the construction of new wind farms.

Year	Gross capacity financed (MW)	Total debt volumes (EUR M) <sup>10</sup>	Debt volumes (construction) (EUR M)	Debt volumes (operations) (EUR M)	Debt volumes (OFTOs) (EUR M)
2011	736	2,332	1,913	138	282
2012	1,025	1,932	1,342	458	132
2013	908	2,126	937	319	870

FIG. 27: FINANCING OF OFFSHORE WIND FARMS 2006 TO 2013 (MW)



<sup>10</sup> Exchange rate is 1 GBP = 1.2 EUR. Includes OFTO transactions

### Non-recourse debt

Two non recourse financings for landmark projects reached financial close in 2013: the financing of the Butendiek project in Germany, one of the earliest offshore wind projects to be developed in the country, and the refinancing of Masdar's stake in the London Array project in the UK, the largest offshore project in the world.

#### Transaction highlights:

##### Butendiek (288 MW, €937 million)

- First transaction in Germany following the change in law with respect to grid connection.
- The financing involved a simultaneous equity transaction, with the Marguerite Fund, Industriens Pension, PKA and Siemens Financial Services acquiring 90% of the project from developer wpd.
- It was the first time that pension funds and infrastructure funds took full construction risk in offshore wind, a welcome development for the industry as it seeks to attract more investors, and a sign of both the increased sophistication of the investors and the improved understanding by the financial markets of the risks associated with construction at sea.
- The transaction involved the EIB, EKF from Denmark and KfW (under its offshore wind programme) as well as 9 commercial banks, following the traditional pattern of mixing public and private funding under a market-tested structure.

#### Transaction highlights:

##### London Array (20% of 630 MW, £266 million)

- Refinancing of a minority stake in an operating project, following a trend set in previous years with the Gunfleet Sands and Walney financings
- The transaction involved five international lenders with Bank of Tokyo-Mitsubishi, KfW-IPEX Bank, Siemens Bank, SMBC and the UK Green Investment Bank
- A transaction which confirms the development of a secondary market in operating offshore wind farms assets.

Activity has been sustained in the later part of the year, with the Gemini project (600 MW, Netherlands) launched on the debt market in November to raise over €2 billion of non-recourse debt, and several other projects in active negotiation with banks. Beyond Gemini, MEG 1 (400 MW)

and Innogy Nordsee 1 (295 MW) in Germany are expected to close in 2014.

### Offshore Transmission Owner (OFTO) transactions

In addition, activity was strong in respect of OFTO assets in the UK. Two large transactions involving the sale and non-recourse refinancing of offshore cables previously built and disposed of by their owners closed on the banking market: Sheringham Shoal (July, GB£190 million) and London Array (September, GB£230 million).

Further, the acquisition of the Greater Gabbard transmission assets by the Green Energy Transmission consortium was financed through the issue of senior secured project bonds (in an amount of GB£305 million), including credit enhancement supported provided by the European Investment Bank (under the European Union-supported project to support infrastructure investment). This transaction sets a precedent for future capital market transactions in the sector and creates an additional source of financing for offshore wind assets.

Altogether, debt for OFTO assets reached €870 million in 2013, after €130 million in 2012, reflecting the fact that several large Round 2 projects were completed in the past year.

### Policy-driven lenders

As in previous years, public financing institutions were active, with each of the EIB, GIB, EKF, and KfW involved in transactions. In addition to non recourse debt, EIB also provided corporate financings (such as the €500 million financing to EnBW for the Baltic 2 project or funding to Tenet in respect of the offshore grid connections it is building in Germany (€500 million for the 576 MW HelWin1, 800 MW DoIWin1, and the 864 MW SylWin1 connections) and structured support to transactions such as the credit enhancement bond for the Greater Gabbard OFTO. GIB, in addition to closing its second non-recourse financing with London Array, was also involved on the equity side, as mentioned below.

### Equity finance

The equity finance market for offshore wind continued to be active across the value chain (early stage development, permitted projects, projects at start of construction, operational projects, as well as transmission assets) with a number of notable transactions in the second semester.

Japanese trading houses have been especially active and have acquired a number of assets across the industry; the number of players in the market is also generally growing, with power producers increasingly active on the sell side.

Transactions for development stage assets continued to be active but we note an increased appetite for operational assets, in line with the growth of installed capacity. Most transactions this year happened in Germany, the UK and the Netherlands.

#### Notable equity transactions

- Marguerite Fund, Industriens Pension, PKA and Siemens Financial Services bought 90% of the Butendiek (288 MW, Germany) project from developer wpd at the same time as debt was provided; CDC Infra purchased a 7.5% from Marguerite later in the year.
- Mitsubishi bought 50% of the Luchterduinen wind farm (129 MW, Netherlands, in construction) from Eneco, as part of a broader agreement to fund 50% of other Eneco projects.
- Greencoat and the Green Investment Bank jointly acquired a 49% stake from RWE in the operational Rhyl Flats wind farm (90 MW, UK).
- PNE bought three early stage development projects, Aquamarin, Bernstein and Citrin from developer BARD (1,200 MW, Germany).
- Wpd bought the Nordergründe project (110 MW, Germany) from Energiekontor.
- Dong acquired the Race Bank project (580 MW, UK) from Centrica.

A number of sale processes have also been announced without having formally closed:

- Northland Power (55%), Siemens Financial Services (20%), Van Oord (10%) announced their commitment to acquire stakes in the Gemini project (600 MW, Netherlands), to take place simultaneously with the debt financing closing;
- Sumitomo announced the acquisition of minority shares of projects in Belgium from Colruyt group (39% of the 165 MW Belwind project and 33% of the 216 MW Northwind project).
- In Denmark, Danish energy company SEAS-NVE announced the acquisition of 80% of Rødsand II (207 MW, DK) from E.ON, subject to regulatory approval.

Overall, announced transactions involved around 4 GW of assets at different stages of development, a figure similar to that in 2012.

On the transmission side, in addition to the OFTO transactions (with Transmission Capital Partners acquiring the Sheringham Shoal OFTO, Blue Transmission taking over the London Array OFTO and Green Energy Transmission buying the Greater Gabbard OFTO), activity was sustained in Germany with Mitsubishi buying 49% of a portfolio of German interconnector systems (BorWin1, BorWin2, Helwin2 and BolWin2) from Tennet.

#### Conclusion

Financing markets remained open for the offshore wind sector in 2013 and active throughout the year across a variety of instruments, with continued sustained activity expected in 2014.

The year saw a continued broadening of the investor base active in the sector, with financial investors taking construction risk for the first time on Butendiek, and a bond market transaction closed for an offshore transmission asset (Greater Gabbard OFTO). Infrastructure investors are more actively looking at the sector and it is likely that yet more new names will appear in forthcoming transactions. Traditional players, including public financing institutions like EIB and GIB on the debt side, and power producers like DONG, remained active contributors to the sector.

A number of transactions expected in the coming months, including the debt and equity funding of Gemini in the Netherlands, of MEG1 and Innogy Nordsee 1 in Germany. Power producers are expected to continue to adapt their portfolios through both sales and acquisition of stakes in operational assets as well as projects under development, allowing investors to find opportunities with various risk profiles.

While transactions remain complex, the offshore wind financing markets can increasingly be seen as maturing and can be expected to remain vibrant, and support the industry's efforts as it builds more capacity.

## Annual investment in offshore wind by investor type

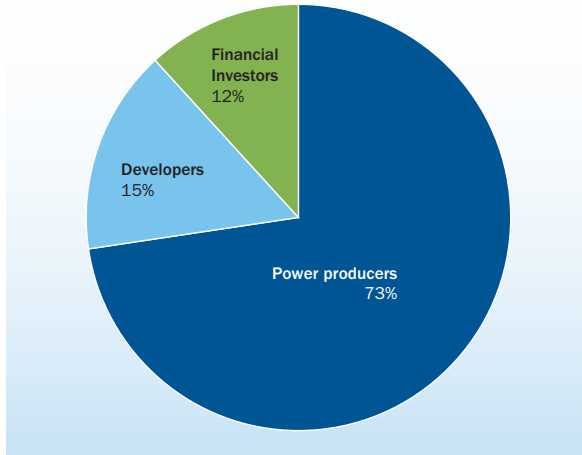


FIG. 28: INVESTMENT IN OFFSHORE WIND FARMS BY INVESTOR TYPE IN 2013

In 2013, 73% of the annual online capacity was financed by power producers. Developers have been active in financing (15% of the annual online capacity), followed by financial investors whose investments represent 12% of total capacity in 2013.

## Annual investment in offshore wind farms

In 2013, investment in offshore wind farms ranged from €4.6 billion to €6.4 billion. A range is given as average project costs can vary significantly depending on size and location of the wind farms.

Taking into account average installation costs per MW, annual investments in offshore wind farms in Europe since 2000 are presented in Figure 29 below.

FIG. 29: ANNUAL INVESTMENTS IN OFFSHORE WIND FARMS

