

**Year  
2015**

*DEUTSCHE*  
**WINDGUARD**

## STATUS OF OFFSHORE WIND ENERGY DEVELOPMENT IN GERMANY

On behalf of:

**AGOW**  
Arbeitsgemeinschaft  
Offshore-Windenergie e.V.

 **BWE**  
Bundesverband WindEnergie

  
STIFTUNG  
**OFFSHORE  
WINDENERGIE**

**wab** windenergie  
agentur

  
**VDMA**  
Power Systems

## STATUS OF OFFSHORE WIND ENERGY DEVELOPMENT

Within the present factsheet the development of offshore wind energy in Germany during 2015 and as of the 31 December 2015 is described. Table 1 summarises the data of additions during 2015, as well as the cumulative offshore portfolio data.

### TURBINES FEEDING INTO THE GRID

During 2015 546 offshore wind turbines (OWT) with a cumulative capacity of 2 282.4 MW achieved their first feed-in to the grid. The newly feeding in OWT belong to nine offshore wind energy projects (OWP). 297 of the newly online OWT (1 339.8 MW) were installed during previous years (2013/14), whereas the remaining 249 OWT (923.2 MW) were installed and commissioned within 2015. In addition, a total capacity increase of 19.4 MW occurred at two OWP, one of which was commissioned in 2015, the other which originally began feeding in in 2014.

Table 1: Offshore wind energy development, as of 2015-12-31

	Status of Offshore Wind Energy Development	Capacity [MW]	Number of OWT
Additions 2015	OWT's (feeding in)	2 282.4	546
	Installed OWT's (no feed-in)	246.0	41
	Foundations w/o OWT		122
Cumulative (2015-12-31)	OWT's (feeding in)	3 294.9	792
	Installed OWT's (no feed-in)	246.0	41
	Foundations w/o OWT		122

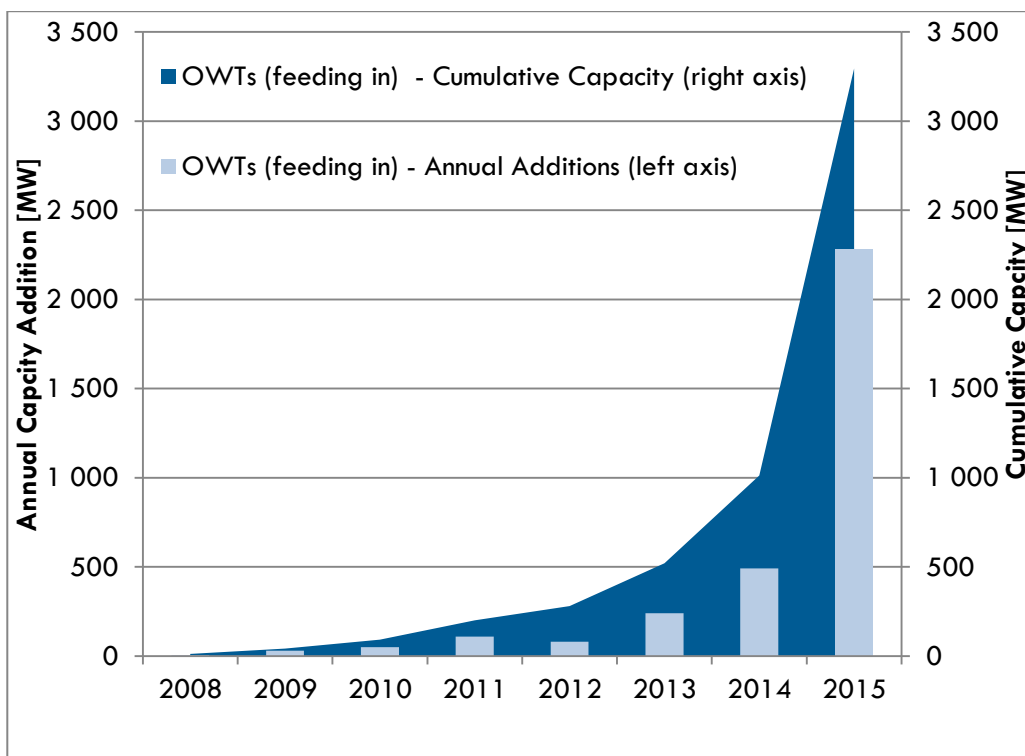


Figure 1: Development of offshore wind energy in Germany (capacity of OWT feeding in) as of 2015-12-31

Figure 1 illustrates the expansion of offshore wind energy in Germany, with regard to online OWT (in MW).

The cumulative number of OWT feeding into the grid has increased to 792 OWT with a total capacity of 3 294.9 MW. This equals a growth of 225% compared to the previous year level.

### INSTALLED TURBINES AND FOUNDATIONS

Installation activities took place within eight OWP during 2015. Additional 290 OWT with a capacity of 1 169.2 MW have been installed from 1 January 2015 until 31 December 2015. 41 of these OWT with a capacity of 246.0 MW did not achieve first feed in during 2015. During 2015, additional 192 foundations were installed. By the end of 2015, 122 of these were not yet supplemented with an OWT.

### POLITICAL DEVELOPMENT TARGET AND ASSIGNED GRID CONNECTION CAPACITY

The current political target for offshore wind energy, set by the federal government of Germany, aims for a total installed capacity of 6 500 MW by 2020. The maximum legally assignable grid connection capacity until the end of 2017 is 7 700 MW for projects that can be installed and online by 2020. The progress towards the implementation of this capacity, as of 31 December 2015, is shown in Figure 2 below. The figure depicts the total capacity of OWT feeding into the grid, as well as capacity of OWT installed and under construction (if at least the construction of the foundations at the OWP had commenced) and capacity of OWP for which final investment decisions have been made.

In addition to feeding in 3 295 MW and completely installed 246 MW, a capacity of 956 MW was under construction as of 31 December 2015. A final investment decision had been made for another 865 MW. In total, 70% of the assigned grid connection capacity, 7 700 MW, has been finalised or is in solid progress, as of 31 December 2015. Grid connection commitment for an additional capacity of approximately 2 338 MW has been assigned to OWP, which are to be financed and implemented within the next couple of years.

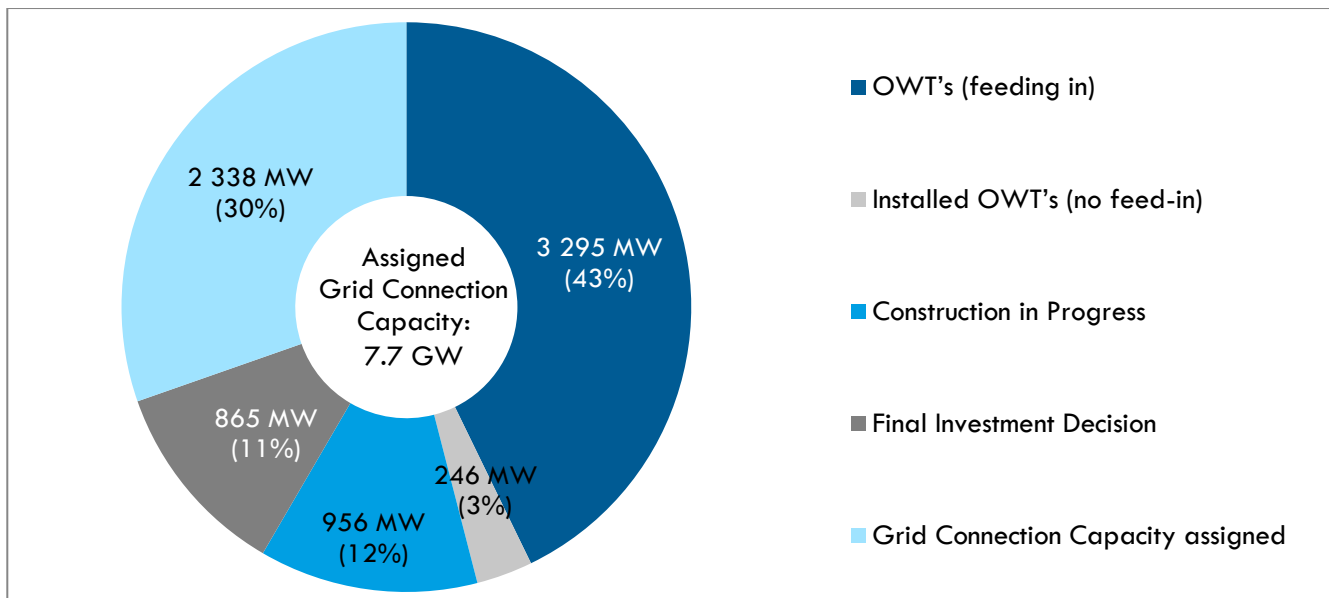


Figure 2: Offshore capacity in solid progress (meaning at least final investment decision) and its share of the assigned grid connection capacity as of 2015-12-31

## DISTRIBUTION ACROSS THE NORTH AND BALTIC SEAS

The distribution of installations and commissioning activities within the North and the Baltic Seas in 2015 is shown in Table 2. Additionally, the cumulative status of the development for both offshore regions is displayed. During 2015, installation activities, as well as first feed-in, took place in both sea basins. In the North Sea 466 OWT with a capacity of 1 994.4 MW achieved first feed-in during 2015. In the Baltic Sea 80 OWT with a capacity of 288.0 MW fed into the grid for the first time.

Overall, by 31 December 2015, 690 OWT located within the North Sea with a cumulative capacity of 2 956.1 MW fed into the grid, and 102 OWT with 338.8 MW in the Baltic Sea. This corresponds to shares of 90% in the North Sea and 10% in the Baltic Sea. Additionally, another 41 OWT (246.0 MW) were installed in the North Sea but without feeding into the grid. Furthermore, 122 foundations without OWT were installed by the end of 2015. As of 31 December 2015, no OWT or foundations were under construction in the Baltic Sea.

Table 2: Distribution across the North and Baltic Seas as of 2015-12-31

Regional Distribution		North Sea		Baltic Sea	
		Capacity [MW]	Number of OWT	Capacity [MW]	Number of OWT
Additions Year 2015	OWT (feeding in)	1 994.4	466	288.0	80
	Installed OWT (no feed-in)	246.0	41	0.0	0
	Foundations w/o OWT		122		0
Cumulative (2015-12-31)	OWT (feeding in)	2 956.1	690	338.8	102
	Installed OWT (no feed-in)	246.0	41	0.0	0
	Foundations w/o OWT		122		0

## TURBINE CONFIGURATION

The average turbine configuration is displayed in Table 3. The average nameplate capacity of OWT feeding in for the first time in 2015 was 4 145 kW. The average rotor diameter was 119.7 m and the average hub height was 88.5 m. Compared to the average turbine configuration of OWT commissioned during the previous year, average rotor diameter and hub height decreased slightly (by 1.2% and 0.2%, respectively), whilst the average nameplate capacity increased by 9.5% compared to OWT feeding in for the first time during the previous year.

The average nameplate capacity of all turbines feeding in was 4 160 kW, the average rotor diameter was 119.3 m and the average hub height was 88.6 m.

Table 3: Average turbine configuration of OWT (feeding in) as of 2015-12-31

Average Turbine Configuration of OWT (feeding in)	Additions Year 2015	Cumulative (2015-12-31)
Average Nameplate Capacity	4 145 kW	4 160 kW
Average Rotor Diameter	119.7 m	119.3 m
Average Hub Height	88.5 m	88.6 m

**OFFSHORE-WIND PROJECTS – ACTIVITIES IN 2015**

During the year 2015, full commissioning of nine OWP (Amrumbank West I, Baltic II, Borkum Riffgrund 1, Butendiek, DanTysk, Global Tech I, Meerwind Süd/Ost, Nordsee Ost und Trianel Windpark Borkum (Phase 1)) was achieved. Therefore, as of 31 December 2015, there are thirteen OWP, as well as three near-shore turbines completely feeding into the grid. One OWP, which started feeding in in 2014 (Riffgat), as well as one OWP feeding in for the first time in 2015 (Amrumbank), received capacity increases in 2015.

During 2015 four additional OWP started installation activities. After the completion of all foundations, one OWP (Gode Wind 2) began to erect OWT, which are expected to become operational in 2016. Installation of foundations had been concluded by 31 December 2015 in one OWP (Gode Wind 1). Two OWP (Nord See One and Sandbank) will continue installation of foundations in 2016.

A final investment decision is available for another three OWP and one individual turbine (Nordergründe, Veja Mate, Wikinger and GICON SOF). A graphical overview of the status and the location of the German OWP is displayed in Figure 3.

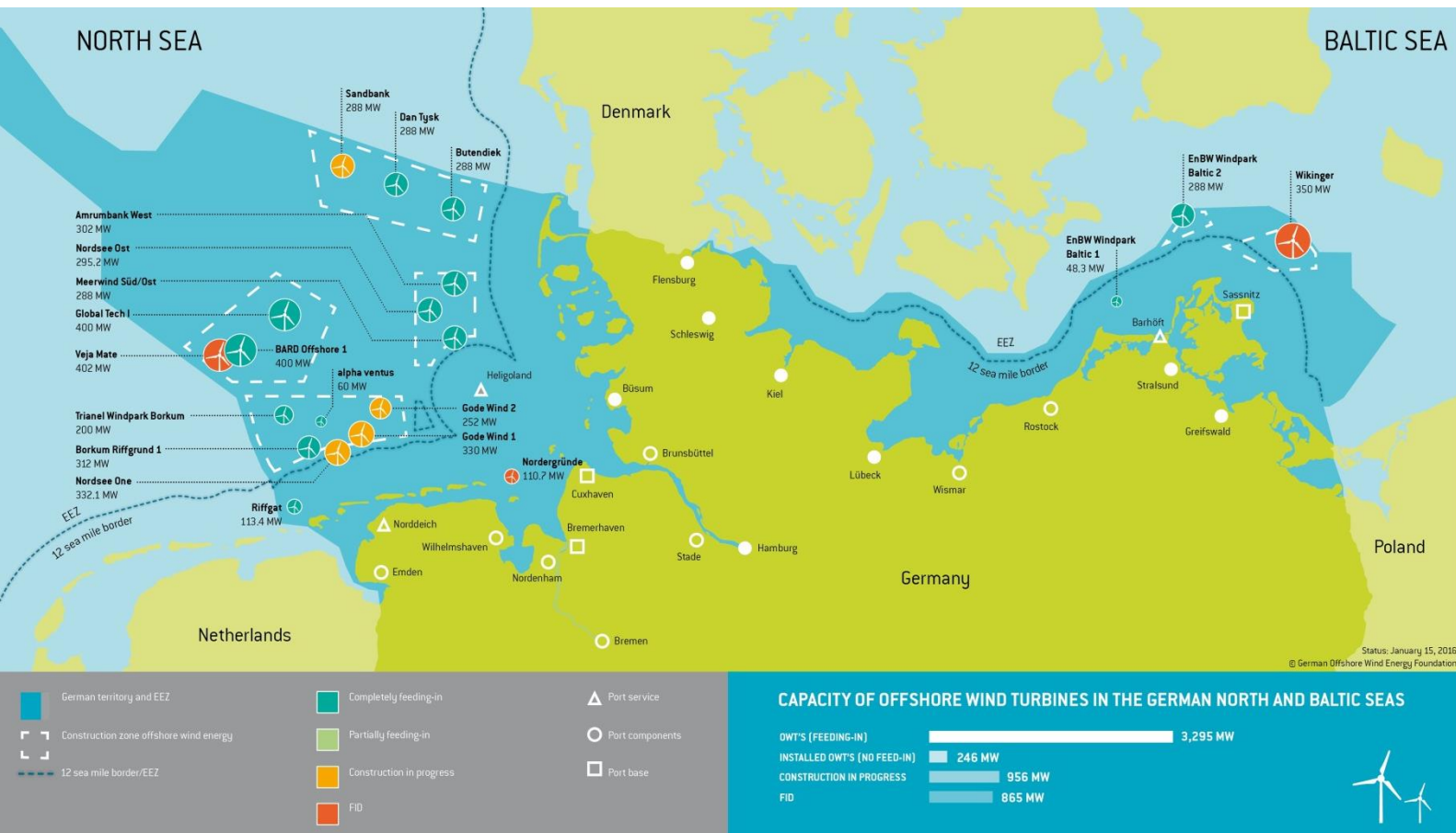


Figure 3: Completely feeding in OWP, OWP under construction and OWP with final investment decision as of 2015-12-31

**Data Collection and Adaptation:**  
Deutsche WindGuard GmbH  
Silke Lüers  
Dr.-Ing. Knud Rehfeldt  
[www.windguard.com](http://www.windguard.com)

The data was obtained through a survey with industry representatives, as well as additional research.

Data for the previous year was adjusted.