DEUTSCHE WINDGUARD

Status of Offshore Wind Energy Development in Germany

Year 2025

On behalf of

BWE Bundesverband WindEnergie

BWO Bundesverband Windenergie Offshore e.V.

FOUNDATION OFFSHORE WIND ENERGY

VDMA Power Systems

wab It's only possible with wind

WindEnergy Network

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Notes

The data was obtained through surveys of industry representatives as well as through additional research. Retroactive adjustments to the data are made if required.

The installed capacity of offshore wind energy projects may be lower or higher than the assigned grid connection capacity.

Future offshore wind energy projects are assigned with their total capacity to the respective expected year of full commissioning of the project.

The information provided in the text and figures partially includes rounded values. Therefore, when values are aggregated, deviations from the overall totals may occur.

Photo on Title Page

Turbine Installation OWP EnBW He Dreiht
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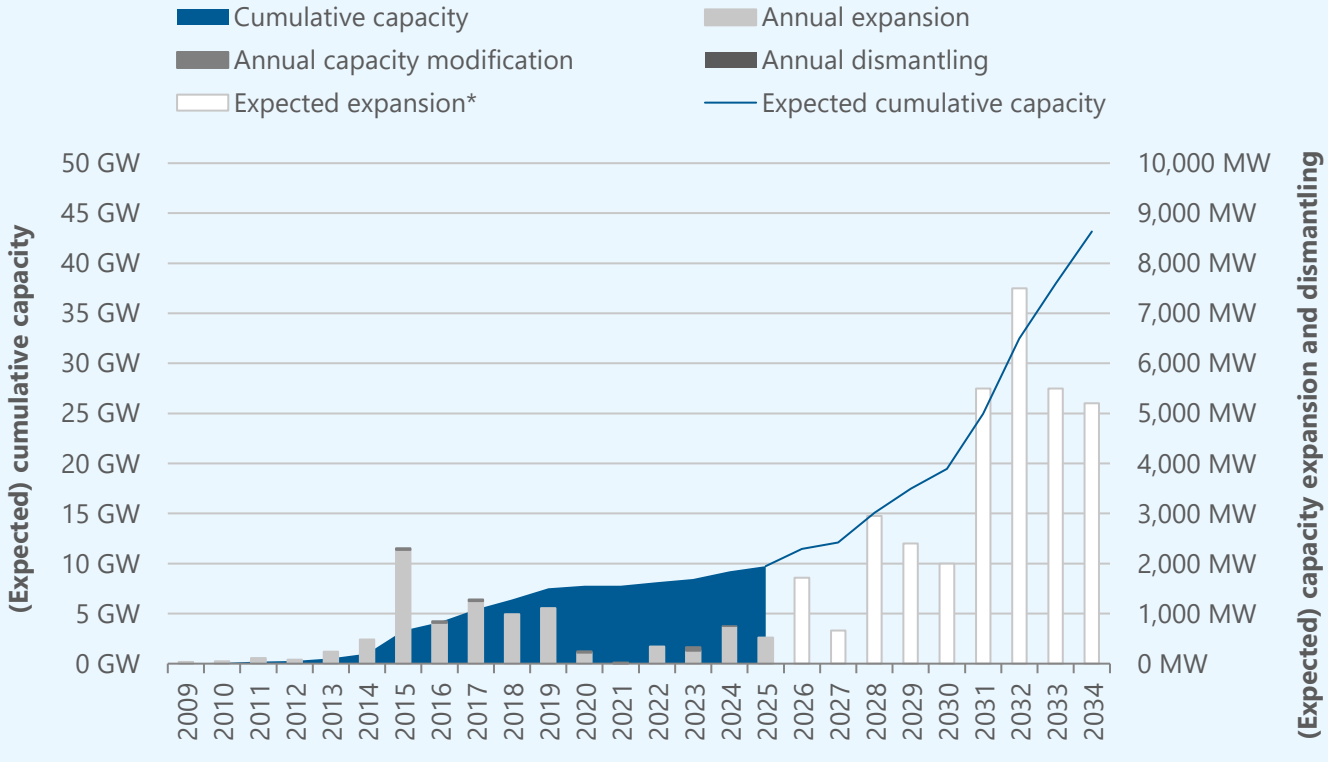
Offshore Wind Energy Development

As of December 31, 2025, 1,680 offshore wind turbines (OWT) with a total capacity of around 9.7 GW are in operation in Germany. Over the course of 2025, 41 offshore wind turbines with a combined capacity of 518 MW fed into the electricity grid for the first time. In addition, further offshore wind turbines and foundations were installed. By the end of 2025, there are a total of 1,752 offshore wind turbines off the German coast, with 72 of these turbines still awaiting their first grid feed-in. In addition, 99 foundations have been installed in the seabed and are expected to be equipped with turbines in the coming months. The expected expansion in the coming years will lead to a significant increase in total installed offshore wind energy capacity in Germany by the end of the decade. According to current plans, an even higher level of expansion is to be achieved at the beginning of the 2030s.

Status of the offshore wind energy development

		Capacity	Number
Development 2025	OWT (feeding in)	518 MW	41 OWT
	Capacity modifications of existing OWT	0 MW	0 OWT
	Installed OWT (no feed-in)	278 MW	19 OWT
	Foundations w/o OWT		65 Foundations
Cumulative 2025-12-31	OWT (feeding in)	9,740 MW	1,680 OWT
	Installed OWT (no feed-in)	890 MW	72 OWT
	Foundations w/o OWT		99 Foundations



(Expected) development of the offshore wind energy capacity in Germany
(Database: own surveys, MaStR, draft amendment to FEP 2025)

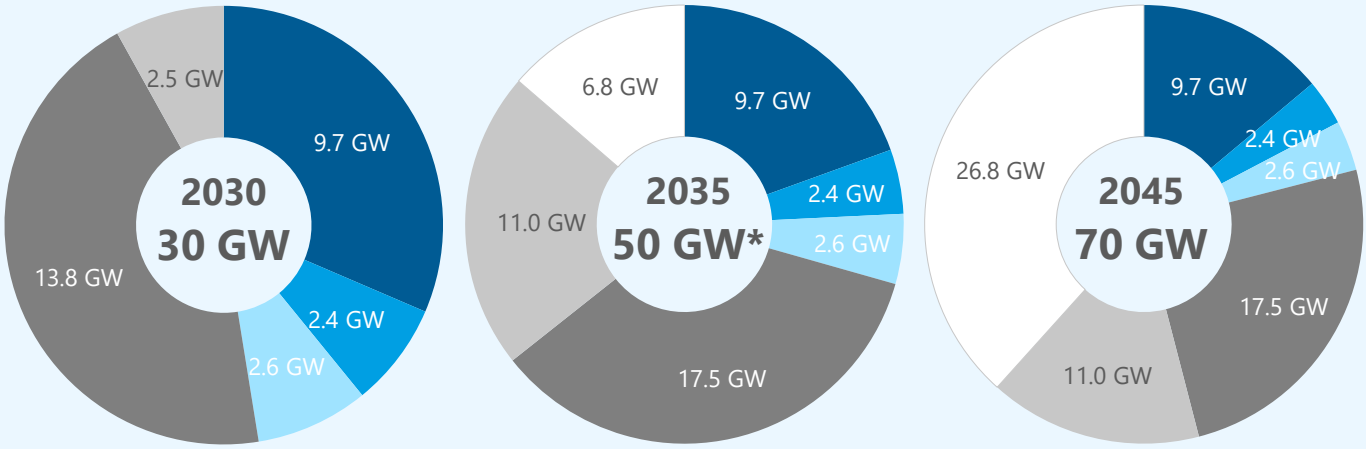
* Expected projects are assigned with their total project capacity to the year of the expected full commissioning. The actual commissioning of partial project sections may differ.

Expansion Targets Offshore Wind Energy

The expansion targets for offshore wind energy are defined in the German Offshore Wind Energy Act (German: Windenergie-auf-See-Gesetz or WindSeeG). It specifies that the installed capacity of offshore wind turbines connected to the grid is to be increased to at least 30 GW by 2030, to at least 40 GW by 2035 and to at least 70 GW by 2045. According to the Offshore Realisation Agreement of November 2022, the legally specified minimum target of 40 GW by 2035 is set to be exceeded, with offshore wind energy capacity reaching 50 GW by 2035.

To achieve these expansion targets for offshore wind energy, the Federal Maritime and Hydrographic Agency (German: Bundesamt für Seeschifffahrt und Hydrographie or BSH) continuously designates new sites for future expansion in the Site Development Plan (German: Flächenentwicklungsplan or FEP). The FEP 2025, published by the BSH in January 2025, provides specifications for offshore wind energy sites and grid connection systems up to 2034. In December 2025, the BSH published a draft amendment to the FEP 2025, providing for several changes to the scheduling of tender rounds and commissioning dates.

According to current plans and the specifications of the FEP 2025 and its draft amendment, the legally defined expansion target of 30 GW set for 2030 is expected to be reached in 2032, provided that all sites designated are tendered, awarded, and realised as planned. The WindSeeG target of 40 GW for 2035 could be achieved slightly earlier if implementation proceeds according to current plans. In order to achieve the increased expansion target of 50 GW in 2035, further specifications are required. This also applies to achieving the long-term legally defined expansion target of at least 70 GW offshore wind energy capacity by the end of 2045.



Development status (2025-12-31)

- In operation
- Under construction
- Final investment decision
- Awarded/grid connection claim
- Tenders scheduled
- Additional specifications required

* According to the WindSeeG, the installed offshore wind energy capacity is to be increased to at least 40 GW by 2035. The Offshore Realisation Agreement of November 2022 between the federal government, the six northern federal states and the three responsible transmission system operators aims to exceed the WindSeeG expansion target by reaching 50 GW by 2035.

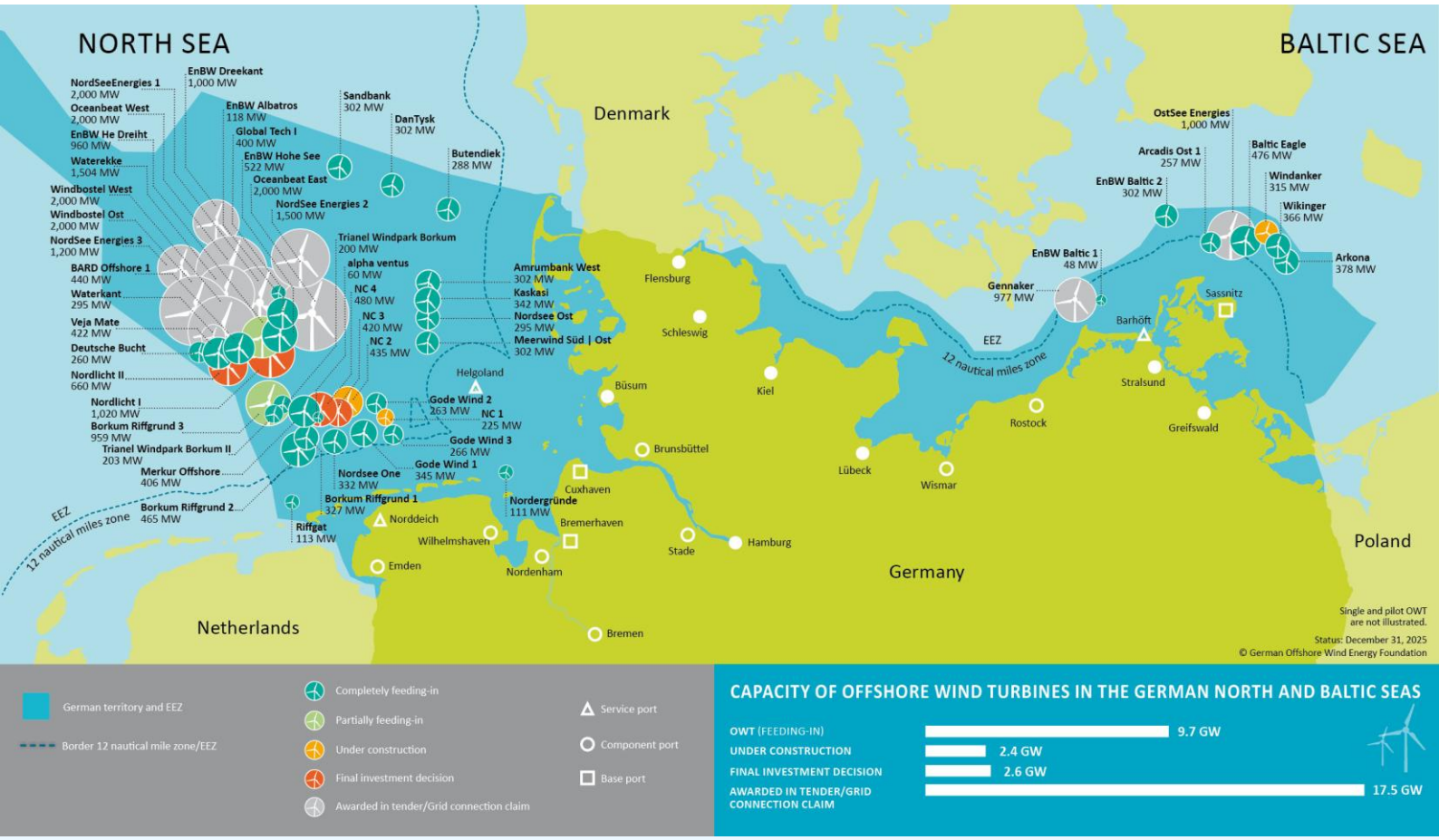
Development status of offshore wind energy capacity with expansion targets by 2030, 2035 and 2045 (Database: own surveys, MaStR, draft amendment to FEP 2025)

Activities in Offshore Wind Energy Projects

By the end of 2025, 31 offshore wind energy projects (OWP) were fully operational in Germany. In the two projects Borkum Riffgrund 3 and EnBW He Dreiht, the first offshore wind turbines were commissioned by the end of 2025, with the remaining turbines to follow in early 2026. At the Borkum Riffgrund 3 OWP, installation of the offshore wind energy turbines has been fully completed since the beginning of 2025, while at the EnBW He Dreiht project, around half of the turbines has been erected by the end of 2025. In the NC 1 and NC 2 (North Sea Cluster A) and Windanker projects, the foundation installations were successfully completed by the end of 2025. Furthermore, for the first German OWP alpha ventus, which was fully commissioned in the year 2010, it was announced in May 2025 that the development of a decommissioning concept has begun.

Overview of future offshore wind energy projects

OWP	Status	Expected commissioning	Expected capacity
Borkum Riffgrund 3	Partially feeding-in	2026	959 MW
EnBW He Dreiht	Partially feeding-in	2026	960 MW
Windanker (O-1.3)	Under construction	2026	315 MW
NC 1 (N-3.7)	Under construction	2027	225 MW
NC 2 (N-3.8)	Under construction	2027	435 MW
Nordlicht I (N-7.2)	FID	2028	1,020 MW
Nordlicht II (N-6.6)	FID	2028	660 MW
Gennaker	Grid connection claim	2028	977 MW
Waterkant (N-6.7)	Awarded	2028	295 MW
NC 3 (N-3.5)	FID	2029	420 MW
NC 4 (N-3.6)	FID	2029	480 MW
Waterekke (N-9.3)	Awarded	2029	1,504 MW
Oceanbeat West (N-12.2)	Awarded	2030	2,000 MW
OstSee Energies (O-2.2)	Awarded	2031	1,000 MW
Windbostel Ost (N-9.1)	Awarded	2031	2,000 MW
NordSee Energies 1 (N-12.1)	Awarded	2032	2,000 MW
Oceanbeat East (N-11.1)	Awarded	2032	2,000 MW
Windbostel West (N-9.2)	Awarded	2032	2,000 MW
EnBW Dreekant (N-12.3)	Awarded	2033	1,000 MW
NordSee Energies 2 (N-11.2)	Awarded	2033	1,500 MW
Nordsee Energies 3 (N-9.4)	Awarded	2034	1,200 MW

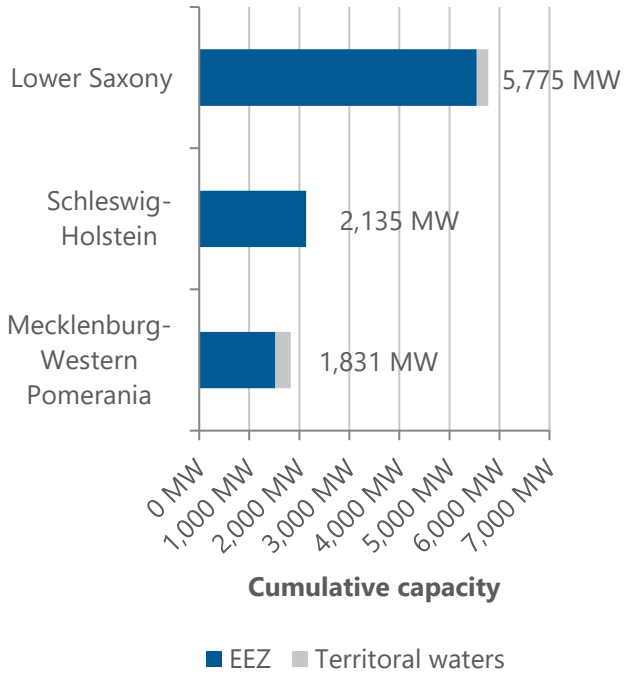


Overview map of offshore wind energy in Germany (© German Offshore Wind Energy Foundation)

Distribution across Federal States and North and Baltic Sea

The installed capacity of German offshore wind turbines connected to the grid as of December 31, 2025, is predominantly located in the North Sea (7.9 GW). The Baltic Sea accounts for considerably less capacity (1.8 GW). There is also a clear focus in terms of distribution between the Exclusive Economic Zone (EEZ) and territorial waters: most of the offshore wind turbines in the North Sea and Baltic Sea are installed in the EEZ (9.2 GW), with only a few turbines installed in territorial waters (0.5 GW).

The capacity installed at sea can be allocated to the federal states based on the location of the respective grid connection point. Lower Saxony accounts for around 5.8 GW of the installed capacity in the North Sea and Schleswig-Holstein for 2.1 GW. The installed capacity of 1.8 GW in the Baltic Sea is fully connected in Mecklenburg-Western Pomerania.



Distribution of cumulative capacity of OWT (feeding in) across the federal states and maritime areas

Distribution across the North and Baltic Sea

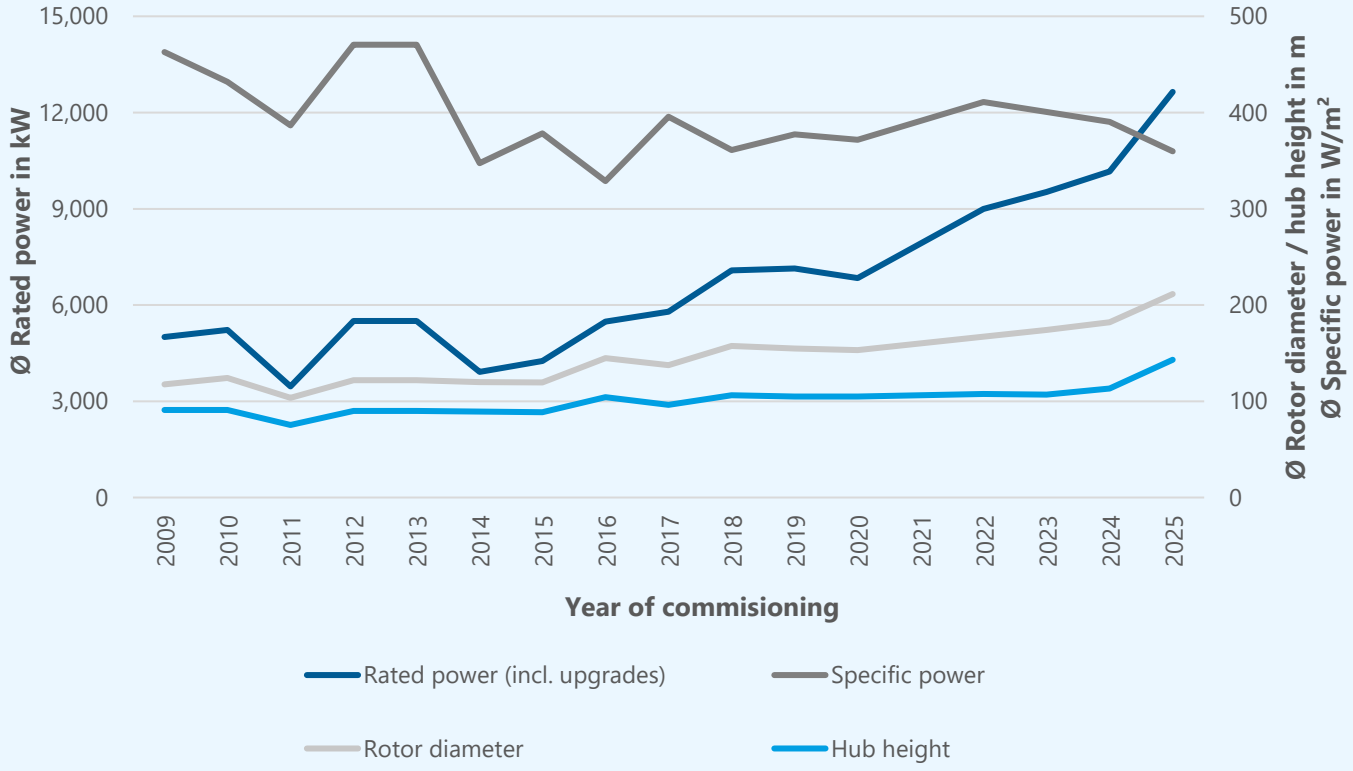
		North Sea		Baltic Sea	
		Capacity	Number	Capacity	Number
Development 2025	OWT (feeding in)	518 MW	41 OWT	0 MW	0 OWT
	Capacity modifications of existing OWT	0 MW	0 OWT	0 MW	0 OWT
	Installed OWT (no feed-in)	278 MW	19 OWT	0 MW	0 OWT
	Foundations w/o OWT		44 Foundations		21 Foundations
Cumulative 2025-12-31	OWT (feeding in)	7,910 MW	1,371 OWT	1,831 MW	309 OWT
	Installed OWT (no feed-in)	890 MW	72 OWT	0 MW	0 OWT
	Foundations w/o OWT		78 Foundations		21 Foundations

Turbine Configuration

With the expansion of offshore wind energy in Germany, the technology of offshore wind energy turbines has also undergone continuous development. The offshore wind turbines in operation in the German North Sea and Baltic Sea as of December 31, 2025, have an average turbine capacity of 5.8 MW. In 2025, the first offshore wind energy turbine with a capacity of 15 MW was installed and commissioned in Germany. Accordingly, the turbines commissioned in 2025 have significantly higher average capacities than those that have been commissioned in the past. This also applies to the rotor diameter and hub height. The existing turbines across all commissioning years have an average rotor diameter of 138 metres and a hub height of 97 metres. The turbines commissioned in 2025 have significantly higher values: an average rotor diameter of 211 metres and a hub height of 143 metres. The ratio of installed capacity to rotor area, known as the specific power, of the new turbines has fallen slightly compared to the total installed portfolio.

Average offshore wind turbine configuration

Average Configuration	Cumulative 2025-12-31	Additions 2025
Rated power (incl. upgrades)	5,798 kW	12,644 kW
Rotor diameter	138 m	211 m
Hub height	97 m	143 m
Specific power	378 W/m²	360 W/m²



Turbine configuration over course of time

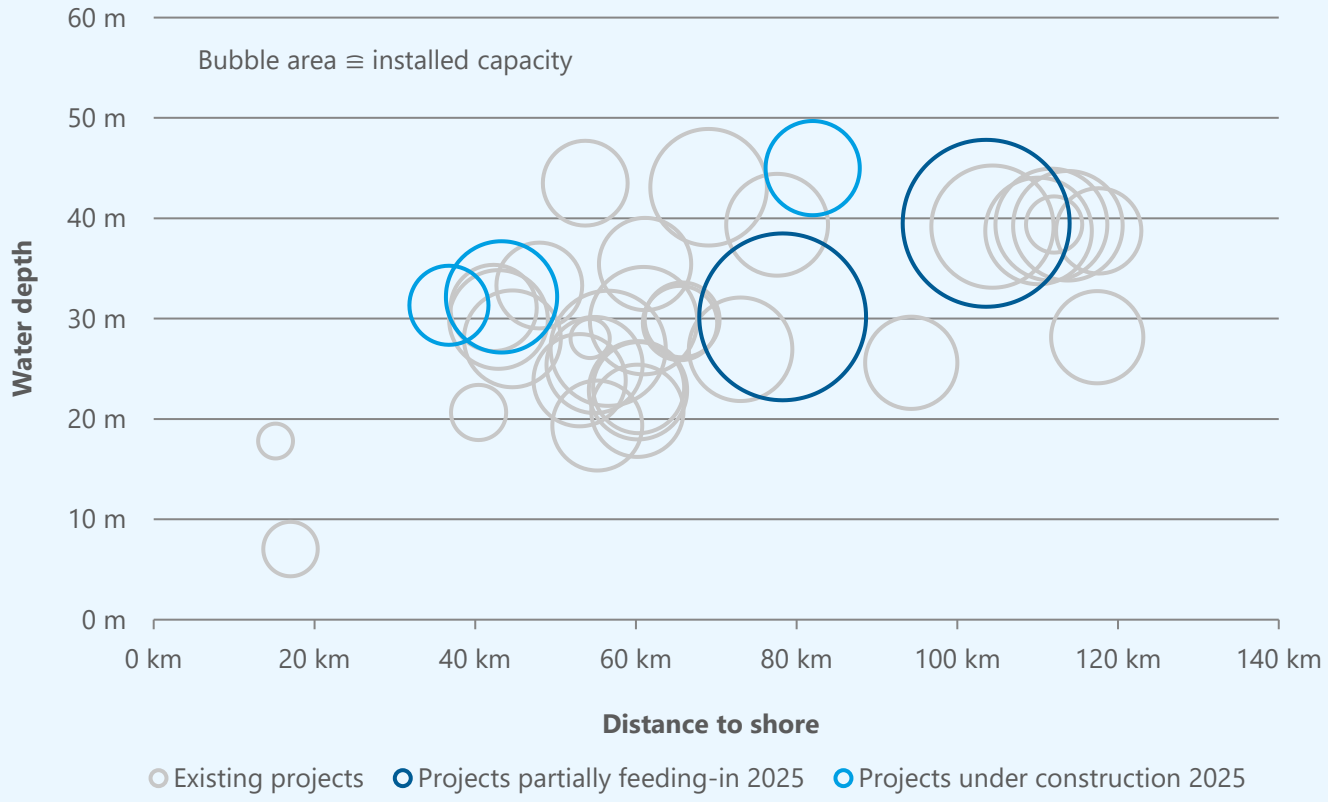
Water Depth and Distance to Shore

The majority of offshore wind energy projects off the German coast are located at least 40 km from the shore in water depths of 20 m or more; only a few projects are located in shallow waters close to the coast. Some of the projects are installed at locations up to 120 km from the shore and in water depths of over 40 m. On average, the existing projects have a water depth of approx. 31 m and a distance from the shore of approx. 73 km. The two projects, which became partially feeding-in at the end of 2025 with some turbines already in operation, have a greater average water depth and are also located further away from the shore than the existing projects. In the long term, the expansion of offshore wind energy will increasingly shift to offshore areas in the German EEZ further away from the shore.

In terms of foundation type, the monopile foundation has been established as the most commonly used type in Germany. The projects under construction at the end of 2025 also used this type of foundation. In parallel with the growing dimensions of offshore wind turbines, the dimensions of monopile foundations are also steadily increasing.

Average water depth and distance to shore

Average location	Existing projects 31.12.2025	Projects partially feeding-in 2025	Projects under construction 2025
Water depth	31 m	35 m	36 m
Distance to shore	73 km	91 km	54 km



Water depth and distance to shore of existing projects, projects partially feeding-in and projects under construction

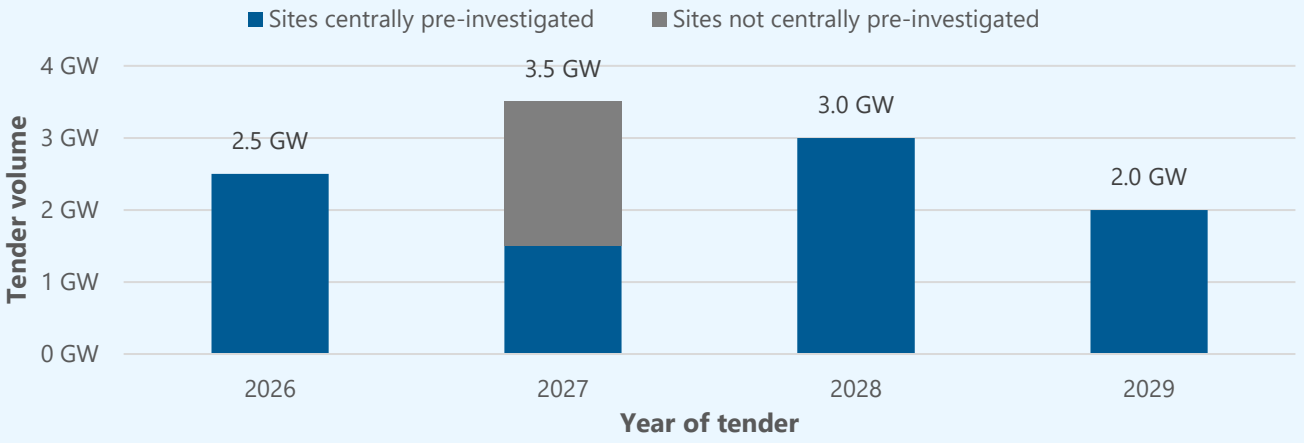
Tenders for Offshore Wind Energy

Since the year 2023, the Federal Network Agency (German: Bundesnetzagentur or BNetzA) conducts two tender rounds per year. A distinction is made between tenders for sites that have not been centrally pre-investigated and tenders for sites that have been centrally pre-investigated by the BSH. The tendering procedure differs depending on the type of site.

In June 2025, the tender round for a site not centrally pre-investigated took place. Site N-9.4 with 1 GW was put out to tender. The FEP 2025 states for this site that the actual installed capacity should exceed the allocated grid connection capacity by 20%. In the tender, two bidders submitted 0-cent-bids, which means that they do not receive funding, and a dynamic bidding procedure had to be carried out. TotalEnergies was awarded with a bid value of €180,000/MW.

In August 2025, two centrally pre-investigated sites (N-10.1 and N-10.2) with a total volume of 2.5 GW were put out to tender by the BNetzA. The award was to be made on the basis of a bidding process with additional qualitative criteria. However, no bids were submitted. The German Offshore Wind Energy Act stipulates that in such cases, a new tender should be issued on the next tender date in the other tender procedure. Accordingly, the two sites are to be put out to tender again in June 2026 in the tender round for sites not centrally pre-investigated.

In addition, the FEP 2025 provides for further sites for future tender rounds with a total volume of 8.5 GW, which are to be carried out by 2029. The calendar years for the tender rounds and commissioning dates have been partially adjusted in the draft amendment to the FEP 2025.



Site name (planned commissioning and capacity)	2026	2027	2028	2029
Not centrally pre-investigated (■)		N-12.4 (2034, 1 GW)		
		N-12.5 (2034, 1 GW)		
Centrally pre-investigated (■)	N-10.1 (2031, 2 GW)*	N-13.1 (2032, 0.5 GW)	N-6.8 (2033, 2 GW)	N-12.6 (2034, 2 GW)
	N-10.2 (2031, 0.5 GW)*	N-13.2 (2032, 1 GW)	N-9.5 (2033, 1 GW)	

* No bids were submitted for the N-10.1 and N-10.2 sites in the tender round of August 1, 2025, for centrally pre-investigated sites. In accordance with the WindSeeG, they will be re-tendered in the tender round of June 1, 2026, in accordance with the procedure for tenders for not-centrally pre-investigated sites. However, this does not change the status of the sites as centrally pre-investigated sites.

Offshore sites for tenders 2026 to 2029 (Database: draft amendment to FEP 2025)

Overview of Grid Connection Capacities

In Germany, a total of 21 grid connection systems with a total capacity of ca. 9.9 GW are fully operational by the end of 2025.
Thirteen of the grid connection systems realised to date are located in the North Sea and eight in the Baltic Sea. Two further grid connection systems are about to be finally commissioned. The first commissioning of a grid connection system in accordance with the new 2 GW standard is planned for 2029.

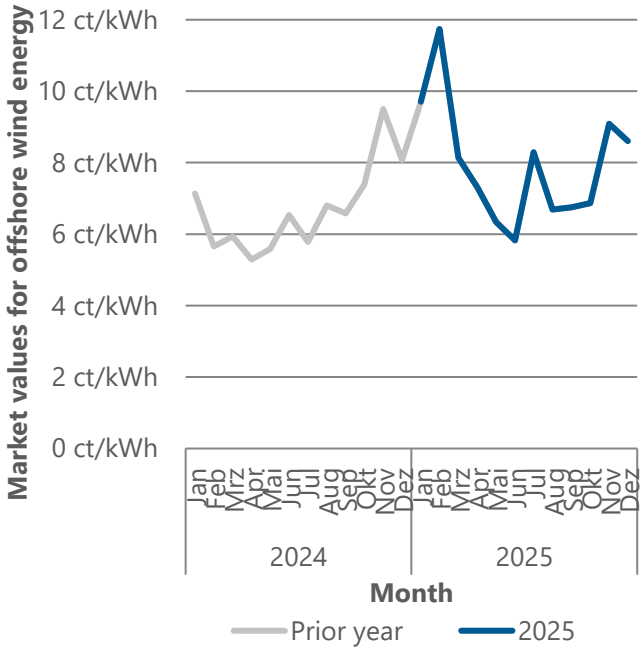
Installed and planned grid connections (to converter station or bundling point) in the North and Baltic Seas (Database: 1. Draft of grid development plan electricity 2037/2045, draft amendment to FEP 2025, TSO, research)

Grid connection system	Status	(Excpected) commissioning	(Expected) capacity	(Preliminary) assigned offshore wind energy projects and sites
North Sea				
NOR-2-1 (alpha ventus)	In operation	2009	62 MW	alpha ventus
NOR-6-1 (BorWin1)	In operation	2010	400 MW	BARD Offshore 1
NOR-0-1 (Riffgat)	In operation	2014	113 MW	Riffgat
NOR-2-2 (DolWin1)	In operation	2015	800 MW	Borkum Riffgrund 1, Trianel Windpark Borkum, Trianel Windpark Borkum II
NOR-4-1 (HelWin1)	In operation	2015	576 MW	Meerwind Süd | Ost, Nordsee Ost
NOR-4-2 (HelWin2)	In operation	2015	690 MW	Amrumbank West, Kaskasi
NOR-5-1 (SylWin1)	In operation	2015	864 MW	Butendiek, DanTysk, Sandbank
NOR-6-2 (BorWin2)	In operation	2015	800 MW	Deutsche Bucht, EnBW Albatros, Veja Mate
NOR-3-1 (DolWin2)	In operation	2016	916 MW	Gode Wind 1, Gode Wind 2, Nordsee One
NOR-0-2 (Nordergründe)	In operation	2017	111 MW	Nordergründe
NOR-2-3 (DolWin3)	In operation	2018	900 MW	Borkum Riffgrund 2, Merkur Offshore
NOR-8-1 (BorWin3)	In operation	2019	900 MW	EnBW Hohe See, Global Tech I
NOR-3-3 (DolWin6)	In operation	2023	900 MW	Gode Wind 3, NC 1, NC 2
NOR-1-1 (DolWin5)	Ready for operation	2026	900 MW	Borkum Riffgrund 3
NOR-7-1 (BorWin5)	Ready for operation	2026	900 MW	EnBW He Dreiht
NOR-7-2 (BorWin6)	Under construction	2027	980 MW	Nordlicht I
NOR-3-2 (DolWin4)	Under construction	2028	900 MW	NC 3, NC 4
NOR-6-3 (BorWin4)	Under construction	2028	900 MW	Nordlicht II, Waterkant
NOR-9-3 (BalWin4)	Under construction	2029	2,000 MW	Waterekke, N-10.2
NOR-9-1 (BalWin1)	Under construction	2030	2,000 MW	Windbostel Ost
NOR-12-1 (LanWin1)	Under construction	2030	2,000 MW	NordSee Energies 1
NOR-12-2 (LanWin2)	Under construction	2030	2,000 MW	Oceanbeat West
NOR-9-2 (BalWin3)	Under construction	2031	2,000 MW	Windbostel West
NOR-10-1 (BalWin2)	Under construction	2031	2,000 MW	N-10.1
NOR-11-2 (LanWin4)	Under construction	2031	2,000 MW	NordSee Energies 2, N-13.1
NOR-13-1 (LanWin5)	Planned	2031	2,000 MW	EnBW Dreekant, N-13.2
NOR-11-1 (LanWin3)	Planned	2032	2,000 MW	Oceanbeat East
NOR-9-4 (BalWin5)	Planned	2033	2,000 MW	NordSee Energies 3, N-9.5
NOR-6-4 (BorWin7)	Planned	2034	2,000 MW	N-6.8
NOR-12-3 (LanWin6)	Planned	2034	2,000 MW	N-12.4, N-12.5
NOR-12-4 (LanWin7)	Planned	2034	2,000 MW	N-12.6
Baltic Sea				
OST-3-1 (Baltic 1)	In operation	2011	50,6 MW	EnBW Baltic 1
OST-3-2 (Baltic 2)	In operation	2015	288 MW	EnBW Baltic 2
OST-1-1 (Ostwind 1)	In operation	2018	250 MW	Wikinger
OST-1-2 (Ostwind 1)	In operation	2019	250 MW	Arkona
OST-1-3 (Ostwind 1)	In operation	2019	250 MW	Arkona, Wikinger
OST-2-1 (Ostwind 2)	In operation	2023	250 MW	Arcadis Ost 1
OST-2-2 (Ostwind 2)	In operation	2024	250 MW	Baltic Eagle
OST-2-3 (Ostwind 2)	In operation	2024	250 MW	Baltic Eagle
OST-1-4 (Ostwind 3)	Under construction	2026	300 MW	Windanker
OST-6-1 (Gennaker)	Under construction	2028	927 MW	Gennaker
OST-2-4 (Ostwind 4)	Planned	2031	2,000 MW	OstSee Energies

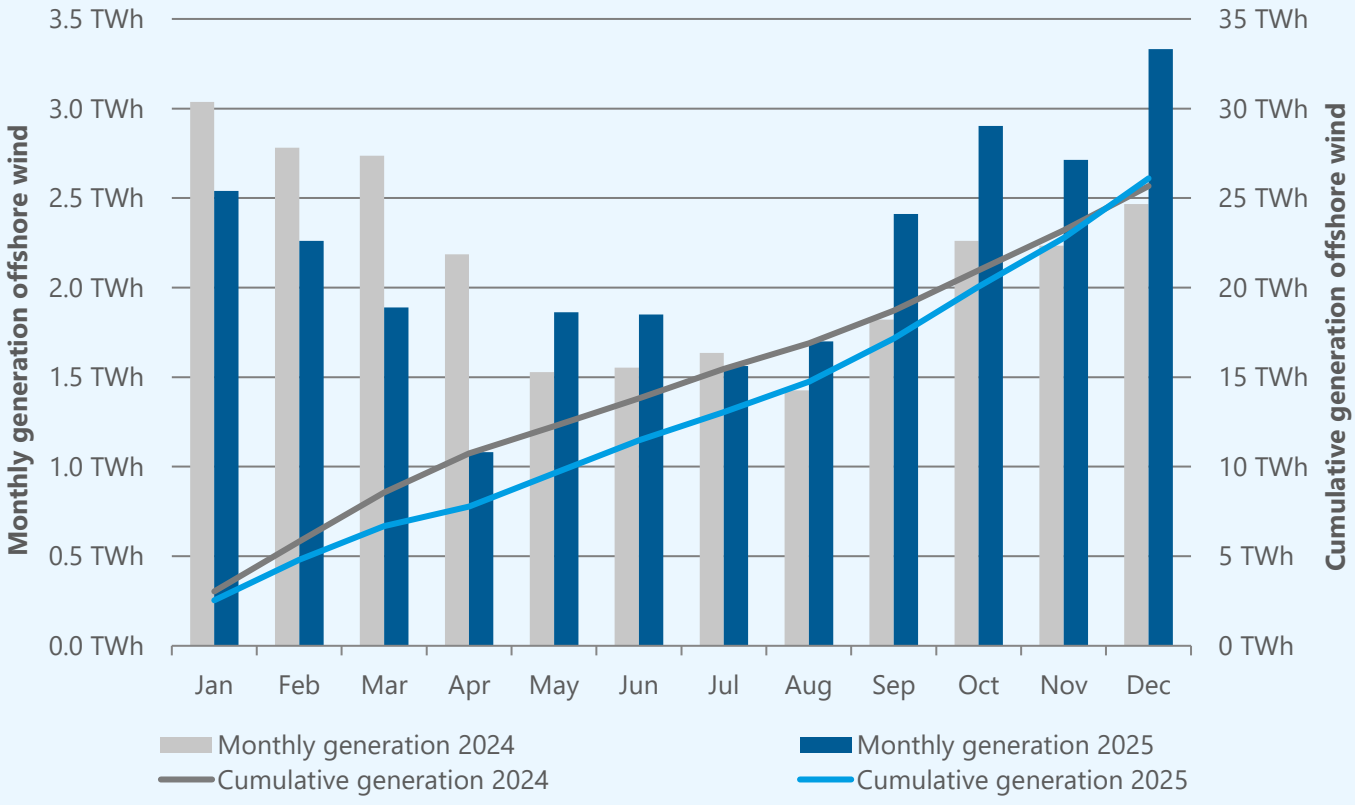
Power Generation and Market Values

Over the course of 2025, the monthly market values for electricity from offshore wind energy ranged from a minimum of 5.82 ct/kWh (June 2025) to a maximum of 11.74 ct/kWh (February 2025). Overall, the annual market value in 2025 was at a higher level (8.06 ct/kWh) than in the previous year (6.78 ct/kWh). The increase in the annual average for 2025 compared to the value for 2024 is just under 20%.

Offshore wind energy generated a total of 26.1 TWh of electricity in 2025. The lowest monthly generation was achieved in April 2025 with 1.1 TWh, while German OWP achieved their highest monthly generation in December 2025 with 3.3 TWh. Overall, electricity generation was at a similar level to 2024. The share of offshore wind energy in German electricity generation was 6.0% in 2025, the highest value ever achieved.



Monthly market values for offshore wind energy (Database: Netztransparenz)



Power generation offshore wind (Database: Bundesnetzagentur | SMARD.de)

About Deutsche WindGuard

In the complex energy market, Deutsche WindGuard is committed to providing unbiased, manufacturer-independent consulting and comprehensive scientific, technical and operational services.

About the German Windenergy Association (BWE)

The German Wind Energy Association (BWE) is a partner to more than 3.000 companies in the wind industry sector and represents the interests of its approximately 17.000 members. BWE pools the combined know-how of a diverse industry sector.

About the German Offshore Wind Energy Association (BWO)

The aim of the BWO is to represent the political interests of the offshore wind industry in Germany. The BWO acts as central point of contact for politicians and authorities at federal and state level for all questions relating to offshore wind energy.

About the German Offshore Wind Energy Foundation

The non-profit organization's overall purpose is to consolidate the role of offshore wind energy in the energy mix of the future in Germany and Europe and to promote its expansion in the interests of environmental and climate protection. Since 2005, it has been established as a non-partisan, supra-regional and cross-sector think tank as well as an independent communication platform for the entire offshore wind energy industry.

About VDMA Power Systems

VDMA Power Systems is the association for the power plant engineering. It represents the interests of manufacturers and suppliers of electricity and heat systems in Germany and abroad. These include wind energy, photovoltaic and hydropower plants, engines and thermal power plants as well as storage and sector coupling technologies.

About WAB e.V.

The WAB is the nationwide contact for the offshore wind industry, the onshore network in the Northwest and promotes the production of green hydrogen from wind power. The association includes around 250 smaller and larger companies as well as institutes from all areas of the wind industry, the maritime industry, the emerging hydrogen economy and science.

About WindEnergy Network e.V. (WEN)

The WEN is the leading company network for wind energy in the northeast region with around 100 member companies. The aim is to promote the expansion of companies and supply chains in order to enhance regional value creation in the future sector renewable energies. The key topics are windenergy on- and offshore, maritime technologies in connection with offshore windenergy as well as the development of green hydrogen.