



NORDSEE OST

RWE's first German offshore wind farm

STRONG GROWTH OFF THE COAST.

RWE has been operating offshore wind farms since 2004. The planning, construction and operation of these plants enabled us to gather extensive experience in the still young offshore industry early on. Today, we rank among Europe's biggest investors in offshore wind power. We are currently building about 1,000 megawatts of offshore capacity in the UK, Germany and Belgium. Our lighthouse project in Germany is Nordsee Ost. The construction of this wind farm started late in 2011 with the installation of a measuring tower 30 kilometers north of Heligoland. Nordsee Ost will be equipped with the currently most powerful turbines and will be one of the largest commercial wind power projects off the German coast.

Strong foundation in all weathers

Offshore wind turbines are exposed to enormous stresses by wind and waves. For this reason, the stability of the plants on the bottom of the sea is



Nacelle of a REpower 6M wind turbine



essential. Detailed soil investigations have shown that steel structure foundations are best suited for the construction of Nordsee Ost at water depths of up to 25 meters. The design of these so-called jacket foundations is similar to high-voltage power line pylons. Each of these foundations is up to 50 meters high and has a total weight of approximately 550 tonnes. The base of the foundation covers an area of almost 400 square meters.

XXL turbine technology

The wind turbines are at the heart of any wind farm. They absorb the power of the wind through the rotors and convert it into electrical energy. Today's largest and most powerful wind turbines are used for the Nordsee Ost wind farm. They are of an impressive size: The nacelle has the size of a single-family house, the rotors sweep the area of two football fields and with a height of approx. 160 meters at the blade tips, such a wind power system is even higher than the Cologne cathedral. With an installed capacity of 6 megawatts, the annual output of each individual turbine covers the electricity consumption of the equivalent of 6,000 residential households.

Well connected to the coast

Underwater cables have to be laid to transmit the electricity generated at sea to the consumers on shore. In a first step, the individual wind turbines



Service engineer on site

are connected among themselves. These internal wind farm cable connections are joined in a substation at sea. From here, the electricity is transmitted to the shore via high voltage cable.

It is required to build a second substation because the wind farm is relatively far away from the coast. The local network operator is responsible for the construction of this second substation and for the network connection to the shore. A total of some 200 kilometres of cable will be laid to connect the Nordsee Ost wind farm.

Precision work on the high seas

We have had two special-purpose installation vessels built for the construction of our offshore wind farms. These vessels are operated by RWE Offshore Logistic Company GmbH (OLC), a wholly-owned subsidiary of RWE Innogy. With a length of over 100 metres and a width of 40 metres, these vessels are among the largest of their kind in the world. For the construction work at sea, these vessels are controlled by satellites and can be positioned to an accuracy of centimetres. For this purpose, they have extendable steel legs which hold the vessels firmly in place on the sea bed. This transforms the vessel to a jack-up platform from which foundations can be placed and wind turbines be installed. One of these vessels is deployed from Bremerhaven for the construction of Nordsee Ost.



Offshore base port at Bremerhaven

Permanently based on shore

RWE Innogy is going to realise the construction of the Nordsee Ost wind farm from Bremerhaven. To this end, areas have been rented in the container port at Bremerhaven. Areas of up to 17 hectares are available there for preassembly and storage. The installation vessel will be moored along the 400 meter long quay and be loaded with the large-scale components.

Operational base on Heligoland

RWE Innogy plans to maintain and operate the Nordsee Ost wind farm from the island of Heligoland over the next 20 years. For this purpose, a service and operating station is to be built in the southern port of the island. In the future, vessels with service personnel are to start from there to the Nordsee Ost wind farm every day. These vessels will be loaded with tools and spare parts and be fuelled from the edge of the quay.



Location of the offshore wind farm Nordsee Ost

The Nordsee Ost wind farm

Site:	30 km north of Heligoland
Number of turbines:	48 (REpower 6M)
Foundations:	jacket foundations
Installed capacity:	295 megawatts
Power generation:	approx. 1,000,000.000 kWh p. a.
CO ₂ savings:	approx. 850,000 tonnes p. a.



Further information of the Nordsee Ost wind farm is available on our website:
www.rwenordseeost.com



Co-financed by the European Union

European Energy Programme for Recovery

The European Union is providing some 50 million euros of funding for the realisation of Nordsee Ost as one of its lighthouse projects in the field of renewable energies. EU support is taking place within the framework of the European Energy Programme for Recovery (EPRR).

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