

# Horns Rev 2 Offshore Wind Farm

## Main suppliers and partners

### About Ørsted

Ørsted has a vision of creating a world that runs entirely on green energy. Ørsted develops, builds and operates offshore wind farms, bioenergy plants and innovative solutions that convert waste into energy and supplies its customers with intelligent energy products. Ørsted has 5,600 employees and is headquartered in Denmark. Read more at [orsted.com](http://orsted.com)

### Energinet

Owner of offshore substation and export cable

### Siemens Gamesa Renewable Energy

Supplier of wind turbines

### Aarsleff/Bilfinger Berger J.V. I/S (Bladt Industries A/S)

Supplier of foundations

### A2SEA A/S

Supplier of vessels for installation of wind turbines and foundations

### Semco Maritime A/S

Supplier of accommodation platform

### Nexans Deutschland Industries GmbH & Co. KG

Supplier of cables

### Visser & Smit Hanab bv

(Global Marine Systems Ltd.)

Supplier of cable installation

### Port of Esbjerg

Installation and service harbour

### Ørsted

Kraftværksvej 53, Skærbæk  
7000 Fredericia  
Denmark

### Horns Rev 2 Offshore Wind Farm

Fiskerihavngade 8  
6700 Esbjerg  
Denmark

### Contact us

Tel. +45 99 55 11 11  
[info@orsted.com](mailto:info@orsted.com)  
[www.orsted.com](http://www.orsted.com)



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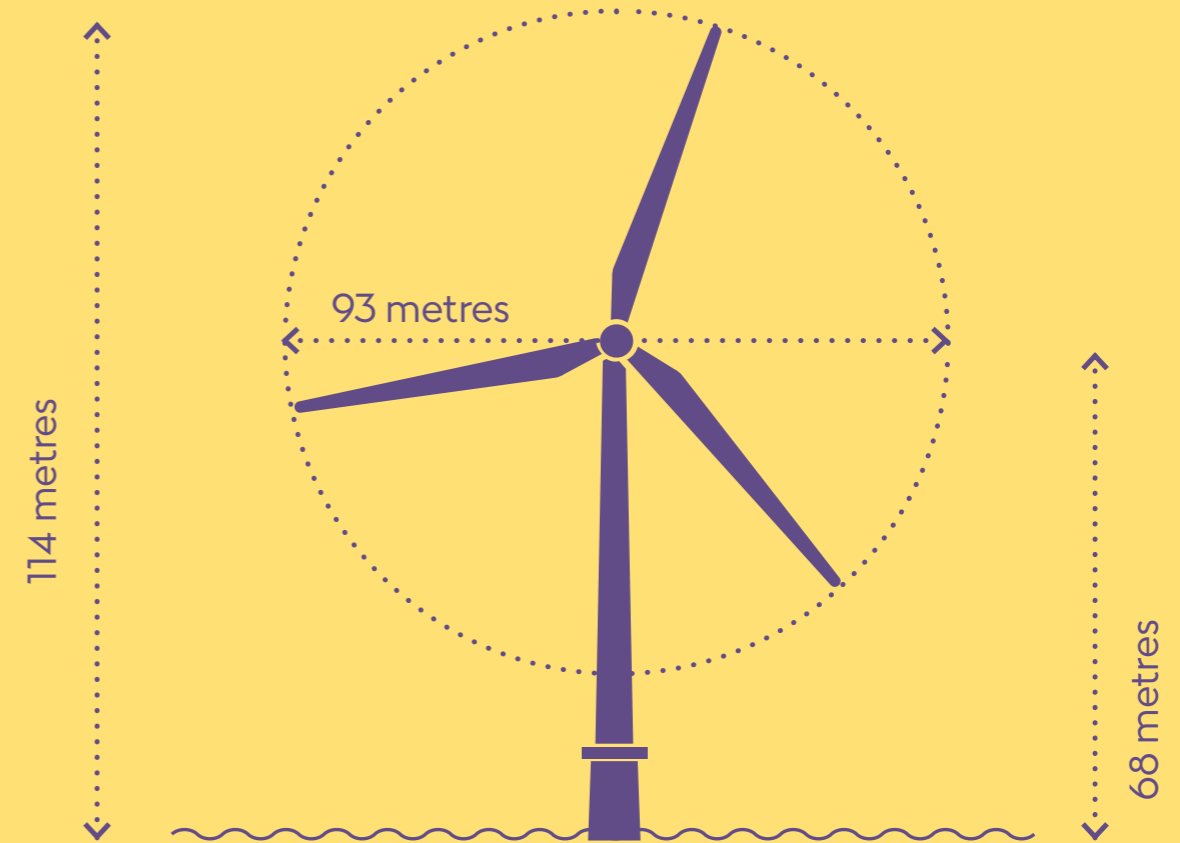
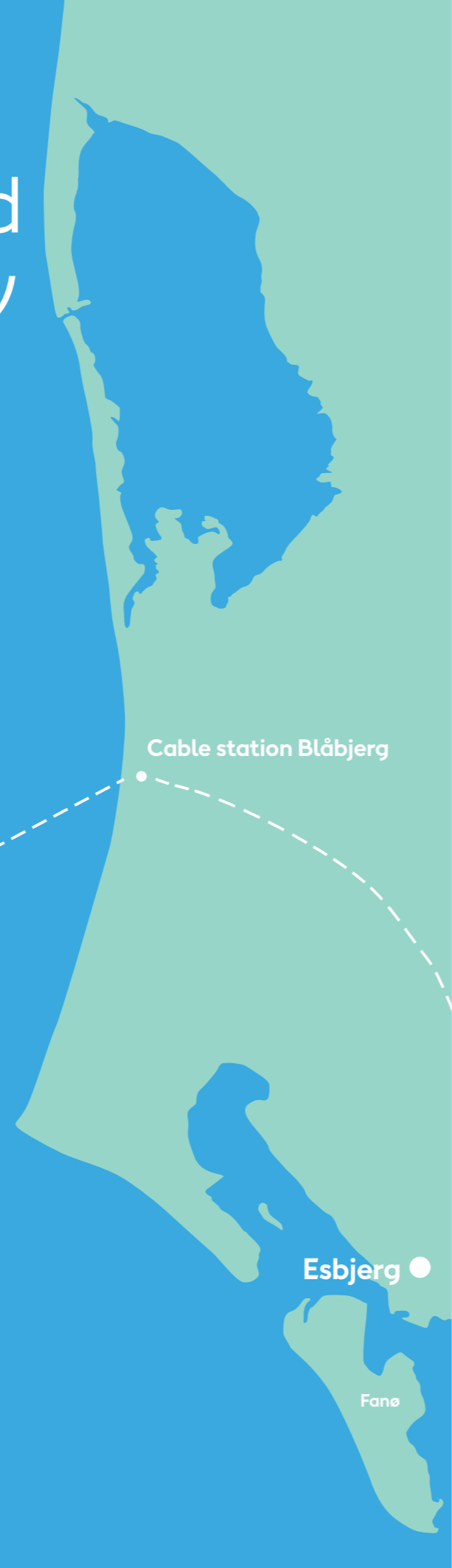
We want a world that runs entirely on green energy



Horns Rev 2



Horns Rev 1



### Technical key data

Wind turbine type	Siemens Gamesa Renewable Energy, SWT 2.3-93	Weight, nacelle	80 tonnes
Number of wind turbines	91	Weight, tower	92 tonnes
Wind turbine capacity	2.3MW	Weight, foundation	150-200 tonnes
Total wind farm capacity	209MW	Total weight of each wind turbine	approx 400 tonnes
Expected annual production	800GWh	Cut-in wind speed	4m/s (gentle breeze)
Total height including blade	114 metres	Full production	from 13m/s (high winds)
Tower height	68 metres	Cut-out wind speed	25m/s (storm)
Blade length	45 metres	Water depth on location	9-17 metres
Foundation below sea surface	30-40 metres	Distance to shore	30 kilometres
Blade diameter (rotor)	93 metres	Distance between wind turbines	500 metres
Nacelle (engine housing)	16 metres long	Offshore wind farm area	35 square kilometres
Hub height	68 metres	Commissioned	2009
Weight, blade	12 tonnes	Total construction costs	DKK 3.5 billion

### Climate partnerships are vital

The concept of a climate partnership is that Ørsted helps a company or organisation realise energy savings. The company then uses the savings to buy, for example, energy from offshore wind turbines, thus promoting renewable energy projects in Denmark.

The climate partners who've helped make Horns Rev 2 possible by purchasing power from the wind farm are: Novo Nordisk, Novozymes, Rockwool, Toms, KMD, Albertslund Municipality, Fredericia Municipality, Ballerup Municipality, Kalundborg Municipality, DAB, Boligkontoret Danmark, Fonden DBK and the Danish Society of Engineers, IDA.

### Ørsted invests heavily in wind power

Ørsted's long-term vision is clear: We want a world that runs entirely on green energy. Wind power plays an important role towards fulfilling our long-term vision, and the construction of large offshore wind farms like Horns Rev 2 is therefore of vital importance. More – and even larger – offshore wind farms are in the pipeline.

Our ambition is to be able to supply 30 million people with energy from our offshore wind farms by 2025. We've for example just started construction of the offshore wind farm Hornsea Project One.

The production capacity in the first phase alone will be six times greater than at Horns Rev 2, and with a capacity of 1.2GW, it'll be the world's largest offshore wind farm once it's ready for production in 2020.

### The first in the world

With Horns Rev 2 being placed far from shore, Ørsted has installed an accommodation platform in connection with an offshore wind farm for the first time in history. This reduces transport time to and from the wind farm. A walkway connects the accommodation platform and the substation.

The accommodation platform is a 750-square metre, three-storey 'hotel', which can accommodate 24 people for several weeks at a time. In addition to 24 single rooms, the platform also contains shower facilities, a kitchen, dining room, TV lounge, gym and technical room.

### From offshore wind turbine to outlet socket

Power from the 91 wind turbines is sent to the substation. Here, the voltage is stepped up from 34kV to 150kV. Each of the 13 turbine rows is interconnected in series and may be put in and out of operation if necessary.

The power is sent from the substation through an approx 42 kilometres long submarine cable to Blåbjerg Klitplantage on the Danish west coast. The submarine cable and the substation are owned and operated by Energinet.

Onshore, the buried cable is 56 kilometres long and runs from Blåbjerg Klitplantage to Endrup, where the cable is connected to the existing high-voltage grid.

**Horns Rev 2 was the world's largest offshore wind farm at its inauguration in 2009. The offshore wind farm is located in the North Sea, 30km west of Blåvandshuk on the Danish west coast.**

**The 91 offshore wind turbines have a total capacity of 209MW and supply renewable energy equivalent to the annual power consumption of 200,000 households.**



Technicians preparing an offshore wind turbine for installation.

### Innovation – our trademark

The technology within offshore wind is developing very quick, and Ørsted is one of the main drivers.

At Horns Rev 2, we've used lessons learned from other projects to think innovatively. For example, we've placed the 91 wind turbines in a fan-shaped formation to get more out of the wind. We've chosen a type of wind turbine where it's possible to adjust the generator to suit the wind conditions, we've found new methods to install the array cable, and we've designed the foundations in both steel and concrete to make them better equipped to withstand the extreme conditions at sea. Finally, for the first time in history, we've installed an accommodation platform in connection with an offshore wind farm.

### An experienced player in the market

Ørsted is a worldwide market leader within offshore wind power, and we've built five of the world's ten largest offshore wind farms. We have more than 25 years of experience planning, constructing and operating offshore wind farms. Horns Rev 2 strengthens our position, while also being an important step towards producing more carbon-free energy.

The construction of Horns Rev 2 was an important milestone in Ørsted's history. It was the first time that a large-scale offshore wind farm project was part of a climate partnership where each climate partner contributed to the project economy by committing to long-term procurement of power from the wind turbines.

The service vessel takes the wind turbine technicians to the offshore wind turbines to perform service and maintenance.

