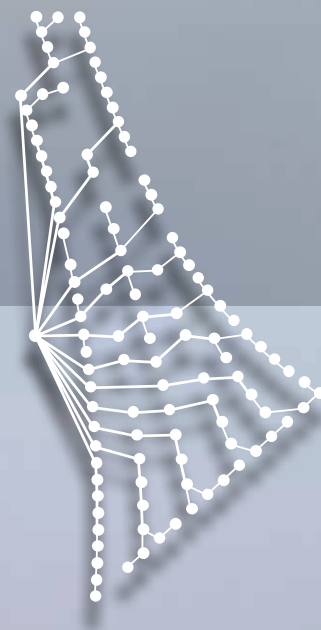


# ANHOLT OFFSHORE WIND FARM



PensionDanmark

**DONG**  
energy

# DENMARK'S LARGEST OFFSHORE WIND FARM

DONG Energy is to build Denmark's next large-scale offshore wind farm between Djursland and the island of Anholt in the Kattegat. Anholt Offshore Wind Farm will be Denmark's largest offshore wind farm with a total capacity of 400MW.

The wind farm will be able to supply more than 400,000 Danish households with CO<sub>2</sub>-free power every year. This corresponds to 4% of the overall Danish power consumption, and is thus a significant contribution to meeting Denmark's objective of ensuring that the share of renewable energy reaches 30% by 2020.

Anholt Offshore Wind Farm will be constructed according to well-known principles based on DONG Energy's vast experience. Construction works will commence at the turn of the year 2011/2012 and will involve a large number of special-purpose vessels and employees operating in and around the area to ensure that the 111 wind turbines are in operation by the end of 2013.

## Ensuring the highest possible production level

The wind farm comprises an area of 88km<sup>2</sup> with a water depth of 15-19 metres, and the chosen layout of the wind farm provides the most optimum position of the wind tur-

bines. The prevailing wind direction in the area comes from west-south-west, and to exploit the wind to the largest possible extent, the geometric layout of the wind farm emphasises that the wind turbines are placed to obtain optimum wind exposure. This ensures that Anholt Offshore Wind Farm produces optimally and to the greatest possible extent contributes to reducing CO<sub>2</sub> emissions.

## Considering the environment

Experience from the construction of existing offshore wind farms at Horns Rev and Rødsand has shown that by means of relatively simple measures, it was possible to construct the wind farms without causing any long-term adverse impacts on the surrounding environment.

During the construction and operation phases, environmental management systems will be implemented to minimise the risk of chemical and oil spills.

Moreover, systems designed for scaring off marine mammals will be implemented prior to pile driving of the monopiles, and the working area will be clearly marked to reduce the risk of ship collisions in the construction phase.

## Background information

Anholt Offshore Wind Farm is jointly owned by DONG Energy (50%), PensionDanmark (30%) and PKA (20%).

DONG Energy is responsible for the construction and operation of the offshore wind farm.

**DONG Energy** is one of Northern Europe's leading energy companies headquartered in Denmark, with a business based on procuring, producing, distributing, trading and selling energy and associated products across Northern Europe.

**PensionDanmark** is a customer-owned labour market pension fund offering defined contribution pension, insurance and health care products on the basis of collective agreements covering 600,000 individuals employed in 22,000 companies within the private and public sector.

**PKA** is the largest administration company for occupational pension funds in Denmark administering eight occupational pension funds with a total of 245,000 members. Approximately 90% of these are women. The members work within the social and health care sector and in the municipalities.



# SPECIAL-PURPOSE VESSELS HANDLE OFFSHORE INSTALLATION

The wind farm will be constructed by means of a number of special-purpose vessels designed to handle offshore installation. First, the foundation is installed. The foundation consists of a round steel pipe, a monopile with a diameter of approximately 5 metres. A large hydraulic hammer mounted on the installation vessel, Svanen, drives the steel pipe approximately 20-30 metres into the seabed, and a so-called transition piece will be cast onto the monopile. For navigation safety reasons, the transition piece is painted yellow.

The wind turbines will then be connected to Energinet.dk's offshore substation via cables laid and jetted by specially constructed cable laying vessels. Energinet.dk constructs the transformer platform and is responsible for the export cable and the connection to the national grid at Trige. Finally, the wind turbines are erected by means of large special-purpose vessels with extendable legs or by means of jack-up vessels. A crane mounted on the vessels will then lift the wind turbine components into place in six lifting operations. In addition to the special-purpose vessels, a large number of transport vessels, barges, tug boats and crew vessels will contribute to the construction of Denmark's largest offshore wind farm.

## Extensive logistics

The construction of the Anholt Offshore Wind Farm will involve lively activity in and out of the Port of Grenaa.

Very heavy foundations, cables and wind turbines will be transported to the wind farm. Some of the components will be delivered at the wind farm, but most of the components will be trucked or shipped to the Port of Grenaa for storage and preparation prior to assembly.

- The foundations, monopiles and transition pieces, are manufactured by Bladt Industries in Aalborg. From here the components are shipped directly to the wind farm.
- The cables connecting the wind turbines in the wind farm to the offshore substation are manufactured by Nexans in Germany. The cables are delivered either by rail to a harbour on the east coast or trucked to the Port of Grenaa. Here the cables are collected by the installation vessels.
- The wind turbines will be stored and prepared for installation at the Port of Grenaa. The nacelles are manufactured at Siemens' plant in Brande and trucked to the Port of Grenaa. Likewise, the wind turbine blades will be trucked from Siemens' rotor blade plant in Aalborg to the Port of Grenaa. The wind turbine towers are expected to be manufactured in Denmark and will be delivered by ship or truck.

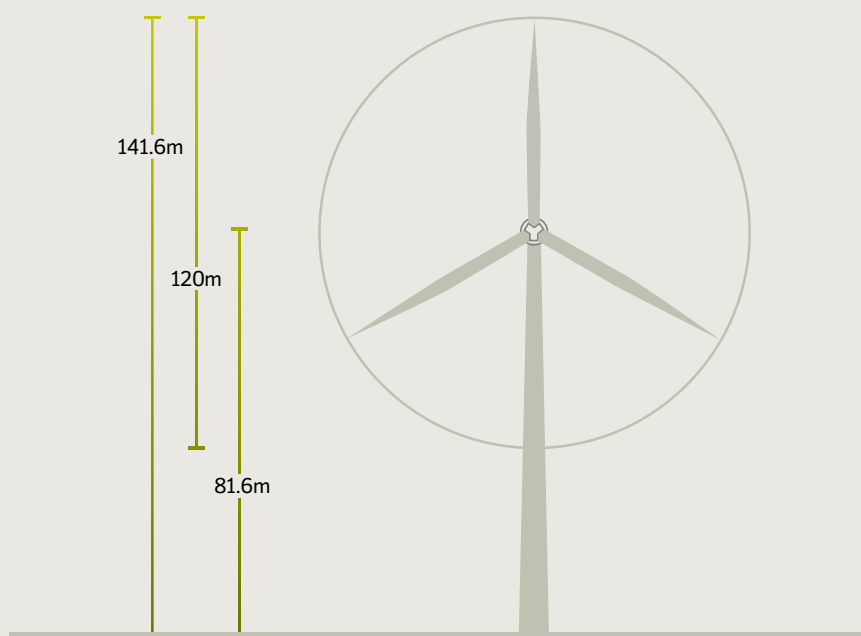


## KEEP UP-TO-DATE

You can keep up-to-date with Denmark's largest offshore wind farm at [www.anholthavmoellepark.dk](http://www.anholthavmoellepark.dk)

### FACTS

Wind turbines:	Siemens 3.6MW-120	Weight, foundation:	400-630 tonnes
Number of wind turbines:	111	Pile driving depth:	20-30 metres
Wind turbine capacity:	3.6MW	Water depth:	15-19 metres
Total capacity:	400MW	Length, monopile:	33-47 metres
Hub height:	81.6 metres	Start wind:	4m/s
Rotor diameter:	120 metres	Full production from	13m/s
Total height:	141.6 metres	Stop wind:	25m/s
Weight, blade:	18 tonnes	Distance to shore:	15km
Weight, tower:	200 tonnes	Wind farm area	88km <sup>2</sup>
Weight, nacelle:	205 tonnes	Construction period:	2012-2013
Total weight:	460 tonnes	In operation :	Autumn 2013



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