

# AVEDØRE HOLME NEW WIND TURBINES DONG ENERGY'S TEST AREA



## FACTS ABOUT THE WIND TURBINES



● Location reserved for wind turbine: M1 ● Erected wind turbines: M2/Hvidovre Vindmøllelaug - M3/DONG Energy

### Wind farm facts

Turbine type:	SWT - 3.6	Weight, nacelle:	189 tonnes
Number of wind turbines:	2	Weight, tower:	300 tonnes
Capacity of each wind turbine:	3.6MW	Weight, foundation:	2,800 tonnes
Total maximum effect in the wind farm:	7.2MW	Total weight of each turbine (excl. foundation) approx:	540 tonnes
Expected annual production:	22.13GWh	Start wind (light winds):	4m/s
Total height including blade:	151.5 metres	Full production (strong winds) from:	13m/s
Tower height:	88 metres	Stop wind (storm):	25m/s
Blade length:	58.5 metres	Water depth on location (approx.):	2 metre
Foundation below sea surface:	3.5 metres	Distance to shore:	less than 10 metres
Blade diameter (rotor):	120 metres	Distance between wind turbines:	460 metres
Nacelle (engine housing) (3.5 x 3.5 metres cross-section):	10 metres long	Construction period:	2009
Hub height:	93 metres	In operation from:	2009
Weight, blade:	18 tonnes	Total construction costs:	>DKK 100 million.

### 135 tonnes of air per second

At a wind speed of 10m/s, approximately 135 tonnes of air passes each wind turbine's rotor area per second.

The rotor's sweeping area is about 11,300m<sup>2</sup>, so at 10m/s, 10 x 11,300m<sup>3</sup> = 113,000m<sup>3</sup> of air passes per second.

Each cubic metre of air weighs about 1.2kg, totalling 1.2 x 113,000 = approx. 135 tonnes of air per second.

### Would you like to know more?

Read more about Avedøre Holme – New Wind Turbines at:  
[www.dongenergy.com/avedore](http://www.dongenergy.com/avedore)

Wind speed (m/s)	Production per wind turbine (kW)	Number of coffee makers the wind farm can power
7	1,036	7,400
8	1,563	11,164
9	2,236	15,971
10	3,059	21,850
12 - 25	3,600	25,714

At wind speeds over 25m/s, the wind turbines stops due to safety.

## Denmark's largest wind turbines – near Copenhagen

At the sea wall south of Avedøre Holme in Hvidovre, two new MW wind turbines have been erected. The total capacity of the two wind turbines is 7.2MW, which corresponds to the annual power consumption of approximately 4,900 households.

The wind turbines demonstrate supreme offshore wind power technology. The two wind turbines are of the same type as the 500 wind turbines which DONG Energy has ordered from Siemens Wind Power for wind activities for instance in England.

The water depth is approximately 2 metres

and the distance to shore is less than 10 metres. A location so close to shore and the easy access to the offshore wind turbines by means of a footbridge is the main idea behind the project. This gives us a unique opportunity to test and optimise new wind turbine concepts before they are implemented on a large-scale in offshore wind farms.

### A playground for wind technology

Test areas for testing large wind turbines are hard to find and this makes the sea wall at Avedøre very unique and important in terms of future development and improvement of wind turbine technology. In

addition to the two erected wind turbines, the test area also includes a space for a possible third wind turbine.

### Wind turbine sold in shares

DONG Energy is the contractor on the project. When commissioned, one of the wind turbines is still owned by DONG Energy whereas the other was handed over to the Hvidovre Vindmøllelaug I/S (Hvidovre Wind Turbine Cooperative) which was established in 2007. The cooperative has sold 10,700 wind turbine shares to private persons.

### Climate partnerships

Similar to the world's largest offshore wind farm, Horns Rev 2, the construction of Avedøre Holme is also linked to climate partnerships, where each climate partner contributes to the project economy by purchasing electricity from the wind turbines over a longer period of time. At the moment, the partners who have chosen to purchase electricity from the wind farm include Tivoli, Codan Insurance and KLS Grafisk Hus.

The basic idea behind a climate partnership agreement is that DONG Energy helps a company or organisation realise energy savings which will then be invested in promoting a new renewable energy project in Denmark.

### Find out more on our website:

[www.dongenergy.dk/erhverv](http://www.dongenergy.dk/erhverv)



If the test results are positive for the 120-metre rotor, the new type of rotor is expected to be applied at Walney 2 in the Irish Sea during 2011.

### Bent blade tip

The wind turbines at Avedøre Holme have extraordinary long blades; 58.5 metres against the usual 52 metres on a similar wind turbine. The blade will have a characteristic design as the blade tips bend forward. If the blades did not bend in the last joint, the wind pressure would push the blade tips into the tower. Based on

the current design, the blades will straighten when put under pressure by the wind.

This is the first time that DONG Energy and Siemens Wind Power test these extra long blades in full scale, and test results and experience are gathered by both companies.

### Main suppliers and partners

#### Hvidovre Vindmøllelaug I/S (local wind cooperative)

Owner of wind turbine M2

#### Siemens Wind Power A/S

Wind turbine supplier

#### Arkil A/S

Contractor on foundations

#### S&D, DONG Energy A/S

Cable supplier

#### S&D, DONG Energy A/S

Cable installation supplier

#### Total Wind A/S

Dismantling of old wind turbines

