

Anholt 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

About PensionDanmark

PensionDanmark is a non-profit labour market pension fund administering the pension schemes of more than 700,000 wage earners. Our members work in 25,700 private and public companies and are covered by collective agreements between 11 trade unions and 29 employers' associations. PensionDanmark received DKK 12.8 billion in contributions in 2016 and manages investments of a total of DKK 230 billion.

About PKA

PKA is one of Denmark's largest pension funds. PKA has 300,000 members working at hospitals, in eldercare, in social services and other mainly public institutions. On their behalf, PKA manages investments of a total of DKK 250 billion.

Ørsted

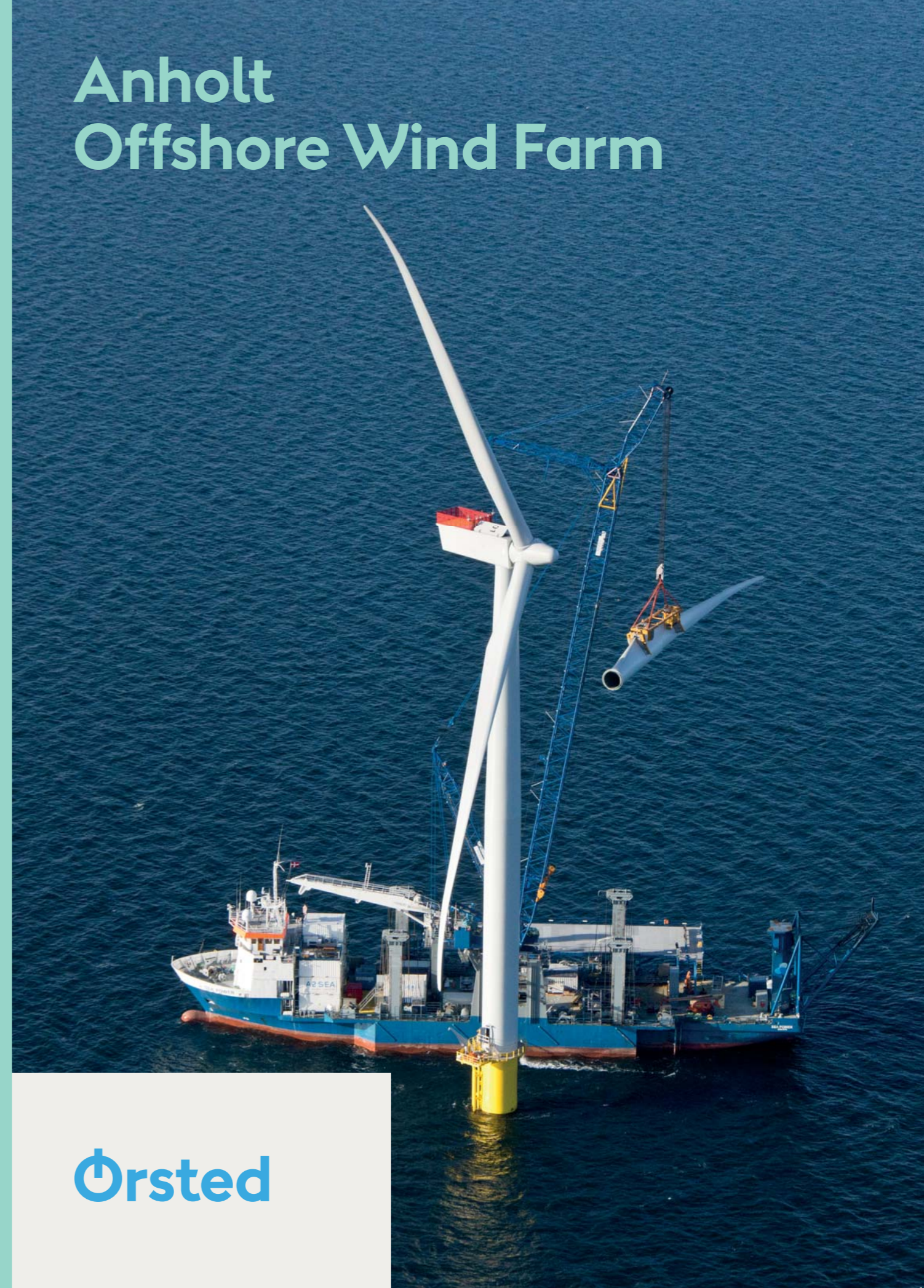
Kraftværksvej 53, Skærbæk
7000 Fredericia
Denmark

Anholt Offshore Wind Farm

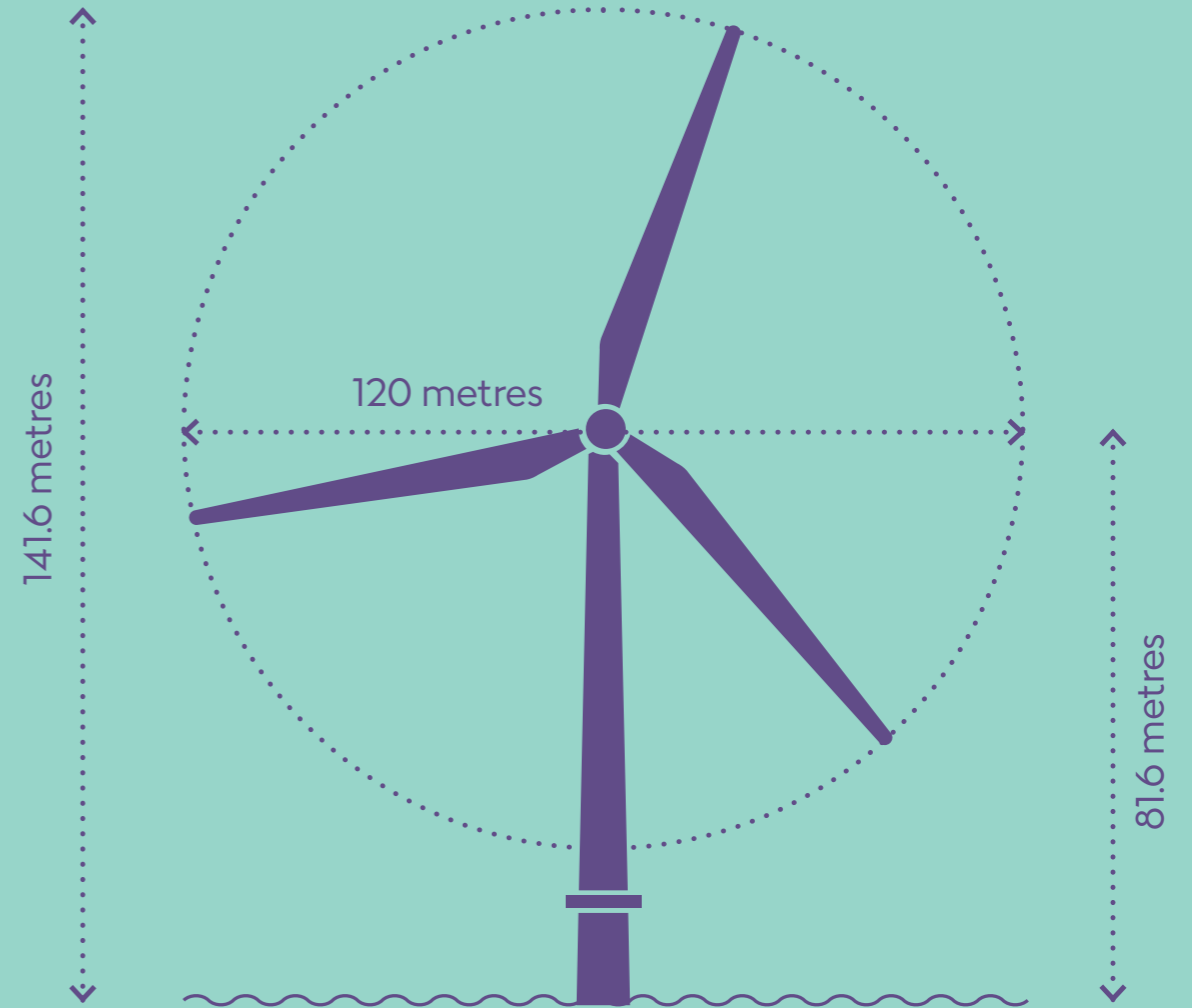
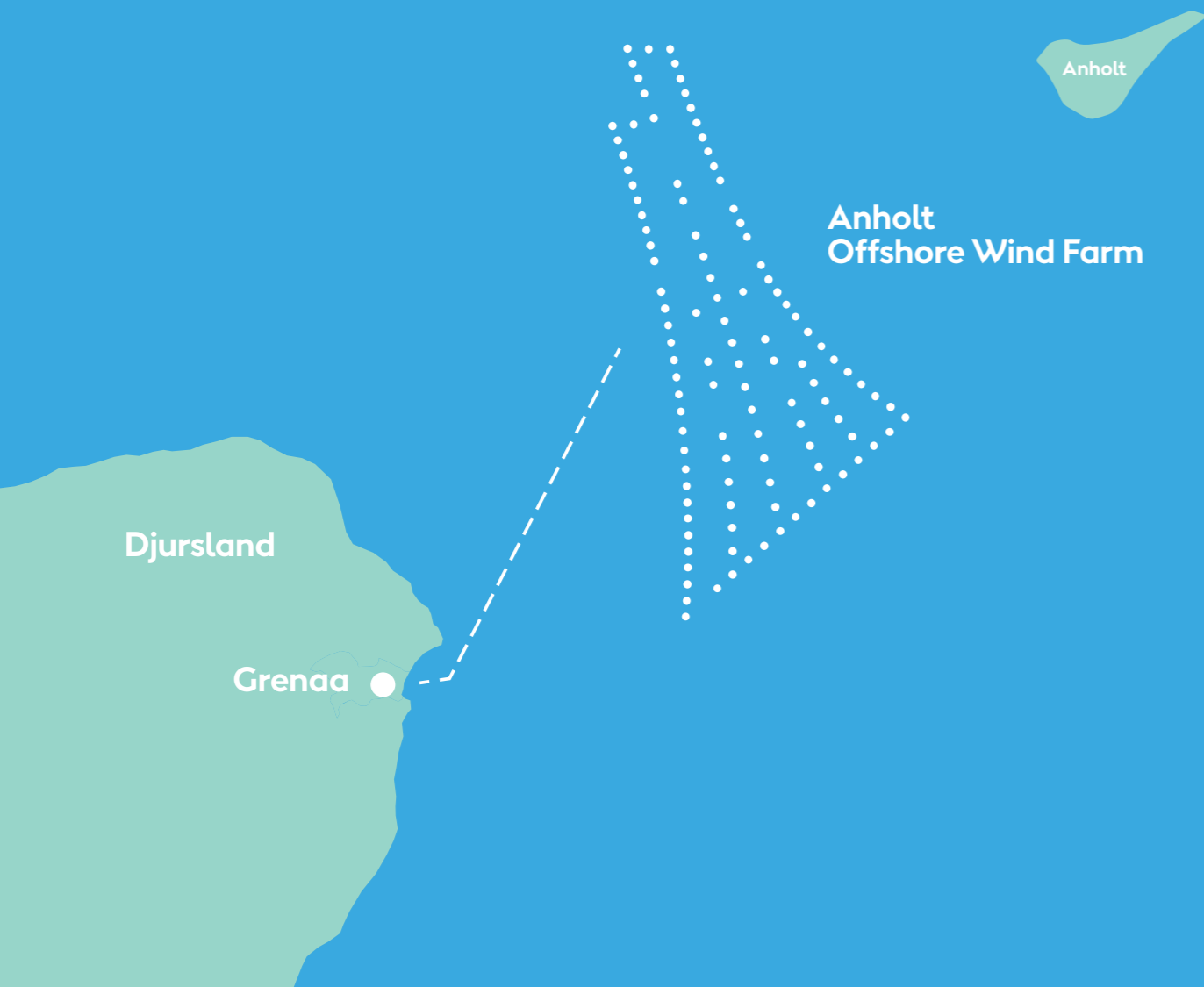
Nordre Kajgade 13
8500 Grenaa
Denmark

Contact us

Tel. +45 99 55 11 11
info@orsted.com
www.orsted.com

The Ørsted logo is displayed in a white box at the bottom left of the image. It consists of the word "Ørsted" in a blue, sans-serif font, with a stylized blue circle containing a white 'O' shape to the left of the text.

Green energy for more than 400,000 Danish households



Technical key data

Wind turbines	Siemens Gamesa Renewable Energy, SWT 3.6-120	Total weight	450 tonnes
Number of wind turbines	111	Weight, foundation	440–630 tonnes
Wind turbine capacity	3.6MW	Pile driving depth	18-36 metres
Total capacity	400MW	Water depth	15-19 metres
Hub height	81.6 metres	Length, monopile	37-55 metres
Rotor diameter	120 metres	Cut-in wind speed	4m/s
Total height	141.6 metres	Full production	from 13m/s
Weight, blade	18 tonnes	Distance to shore	15 kilometres
Weight, tower	200 tonnes	Offshore wind farm area	88 square kilometres
Weight, nacelle	195 tonnes	Construction period	2012-2013
		Commissioned	Summer 2013

The offshore wind farm is approximately 20 kilometres long and 5 kilometres wide and covers an area equivalent to four times the island of Anholt, and it was probably the largest construction project in Denmark in more ways than one. The construction project involved 100 vessels, 3,000 people and more than two million working hours and included 111 monopiles, 333 tower components, 333 blades, 111 transformers and 111 hubs.

Immense logistics challenge

The 120 metres long and 100 metres high giant floating crane Svanen kicked off the project by driving the monopiles into the seabed and was followed by the modern vessel Jumbo Javelin, which used its excellent manoeuvrability via computer-controlled dynamic positioning (DP2) to install the yellow transition pieces. The cable installation vessels, Stemat 82 and the DP2 vessel Toisa Wave, laid 111 cables on the seabed, and a second DP2 vessel, Swiber Else Marie, jetted the cables into the seabed to an appropriate depth.

A total of four wind turbine installation vessels were used during the construction of Anholt Offshore Wind Farm, with up to three being used at the same time. SEA POWER, an old converted freighter, began the installation in September 2012 and was later joined by SEA WORKER and SEA JACK. A2SEA's purpose-built wind turbine installation vessel SEA INSTALLER joined the project in February 2013. All offshore wind turbines were in operation by June 2013, and in September 2013, Anholt Offshore Wind Farm was officially inaugurated.

Green growth in the wake of Anholt Offshore Wind Farm

Ørsted's construction of Denmark's largest offshore wind farm is the result of a major cooperation involving many companies and a lot of skilled employees.

The Danish Energy Agency has estimated the total employment effect of the construction phase of Anholt Offshore Wind Farm to be 8,000 jobs. The main suppliers for the offshore wind farm were both Danish and international companies.

Of Ørsted's total investment of DKK 10 billion, orders totalling almost DKK 7 billion were placed with Danish-based companies. At the same time, Djurs Wind Power – a network consisting of 32 local companies in Djursland – demonstrated how local companies can benefit from large infrastructure projects.

The 32 member companies secured orders for more than DKK 450 million and created 330 jobs in connection with the construction of Anholt Offshore Wind Farm.

Many companies have won contracts

Following a European public procurement process, a number of suppliers were awarded contracts for delivery of parts and services. MT Højgaard (DK) was responsible for the production and installation of foundations and used Bladt Industries A/S (DK) as a sub-supplier for the production of monopiles and transition pieces. Siemens Gamesa Renewable Energy (DK) delivered and installed the wind turbines. Nexans Deutschland GmbH (DE) supplied the array cables connecting the wind turbines to the transformer platform.

Ballast Nedam Equipment Services (NL) supplied the main vessel for the installation of the foundation, and A2SEA A/S (DK) supplied the vessels for the installation of the offshore wind turbines. Finally, GEO (DK) conducted the geotechnical and geophysical surveys.

Energinet constructed and now operates the offshore substation. The power is converted from 33kV to 220kV before being sent to shore via a 25-kilometre submarine cable. The carbon-free energy is fed into the Danish power grid at Trige near Aarhus.

Skilled people make the blades turn

In 2012/2013, Ørsted established a service organisation with up to 70 permanent jobs in order to operate and maintain Anholt Offshore Wind Farm. In the five-year guarantee period, Ørsted will operate the wind farm in cooperation with turbine supplier Siemens Gamesa Renewable Energy. When the guarantee period expires, Ørsted will take over full responsibility for operation and maintenance of the offshore wind farm.

The service organisation consists of highly skilled wind turbine technicians, service vessel crew and administrative functions. Anholt Offshore Wind Farm is operated locally from new offices, storage and workshop facilities in Grenaa located directly on the quay, providing easy access to the service vessels.

In the summer period, the technicians perform scheduled service and work intensively in shifts of 12 hours per day for seven days, after which they're off duty for seven days. In the winter, only repair and start-up of defective wind turbines are performed.

Anholt Offshore Wind Farm is Denmark's largest offshore wind farm with a total capacity of 400MW.

The offshore wind farm consists of 111 offshore wind turbines with a capacity of 3.6MW each and is located between Djursland and the island of Anholt in the Kattegat.



The wind turbine technicians maintaining the turbines have their workplace in the Kattegat at heights of up to 82 metres. It's therefore important to bring the right tools and the right spare parts the first time. The technicians work in teams and have a set schedule for service and inspection work.

Anholt Offshore Wind Farm supplies enough carbon-free power to cover the annual power consumption of more than 400,000 Danish households. It corresponds to approx 4% of Denmark's total power consumption and provides a significant contribution towards meeting Denmark's objective of renewable energy constituting 35% of the overall energy production by 2020.

The Danish Parliament gave the green light to the construction of the offshore wind farm in 2008, and Ørsted (then DONG Energy) tendered for the project in 2010 knowing that it would be a huge challenge to install 111 offshore wind turbines over the course of two winters and one summer.

However, with good planning and efficient project management, Ørsted succeeded in completing the project on time and within budget, and this despite the fact that the weather conditions in autumn and winter 2012 were more challenging than normal.

In the course of the next 20-25 years, Anholt Offshore Wind Farm will produce carbon-free energy at a level that will reduce carbon emissions by 1.3 million tonnes of CO₂ per year compared to a coal-fired power station.

Three companies with a common interest

More than 850,000 Danish pension holders became co-owners of Anholt Offshore Wind Farm when the pension funds PensionDanmark and PKA entered into a partnership agreement with Ørsted and purchased 50% of Anholt Offshore Wind Farm.

PensionDanmark's share is 30%, while PKA acquired a 20% share. The partnership model enabled Ørsted, PensionDanmark and PKA to make a long-term investment in Anholt Offshore Wind Farm because they share operating expenses and earnings.

After the tender phase, a licence to build Anholt Offshore Wind Farm was awarded in 2010. The licence ensures the owners a fixed payment of DKK 1.051 per kWh (without price adjustments) for the first 20TWh (20,000,000,000kWh), which corresponds to approximately 12 years of production. After that period, the power generated is sold on market conditions without any subsidies. Ørsted was responsible for the construction and is also responsible for the operation and maintenance of the wind farm.

Anholt Offshore Wind Farm was one of Denmark's largest construction projects. It took a total of three years from the award of the contract in 2010 until the entire offshore wind farm was commissioned in 2013. The actual construction phase only lasted 18 months.

Installation lift at 82 metres. Each blade weighs 18 tonnes, and it takes calm weather and precision to lift the blades into place.

