

Barrow Offshore Wind Farm

Generating clean electricity

British and Danish energy groups Centrica and DONG Energy have developed a 90MW wind farm in the East Irish Sea approximately 7km south west of Walney Island, near Barrow-in-Furness. The project is called Barrow Offshore Wind (BOW).

The wind farm comprises 30 modern, efficient, wind turbines, each capable of producing 3MW of electricity, delivering power to the existing grid system at Heysham via buried subsea and onshore cables.

Anticipated annual production is 305GWh, which is capable of supplying around 65,000 homes - equivalent to more than double the annual consumption of all the houses in Barrow-in-Furness. This figure is based on average wind availability and efficiency ratings of the wind turbines.

Consent granted

Initial plans for BOW were promoted by Warwick Energy Limited and full consent was granted for the development in 2003, prior to BOW's acquisition by Centrica and DONG Energy.

In July 2004, a consortium comprising Vestas-Celtic Wind Technology Ltd and Kellogg Brown & Root Ltd was awarded a contract for construction of the wind farm. Vestas-KBR are contracted to operate and maintain the wind farm for an initial period of five years.

Engineers have been recruited locally in the Barrow area and have been trained to carry out maintenance work during the lifetime of the wind farm.

Offshore substation

BOW's rectangular site covers an area of approximately ten square kilometres and the farm has its own offshore electrical substation, the first in UK waters. This was fitted out with electrical components in Barrow-in-Furness, providing work for a 20-strong team from the local firm Agrilek.

Centrica's subsidiary British Gas takes all of the electricity produced by the wind farm under a long-term power purchase agreement.

British Gas is the UK's biggest household electricity supplier with around 6 million customers.

Centrica and DONG Energy kept local people informed about the development plans and timescales through media announcements and exhibitions. For information and photographs visit www.bowind.co.uk



Talking detail

The 30 turbines that harness the natural power of the wind to generate electricity are 3MW machines supplied by Vestas of Denmark.

Each turbine is 75m high and with a rotor diameter of 90m, giving a total height to the blade tip of 120m. The towers, which are made of steel, are bolted onto steel monopile foundations. The blades are made from reinforced glassfibre.

The wind farm has an operational life of 20 years.



Resolution:
Turbine installation vessel

Barrow Offshore Wind Farm construction

Construction and commissioning work for Barrow Offshore Wind Farm was completed in June 2006, a little over a year after offshore work got underway in the East Irish Sea.

The 480 tonne substation was installed using a specialist vessel called the Matador 3. Stafford-based firm Areva were responsible for the substation electrical design. It transforms the 33kV power generated from the wind turbines up to 132kV, which is then exported to the national grid connection point at Heysham on the Lancashire coast through a 27km long subsea transmission cable. Installation of the subsea export cable was carried out by a vessel called the Pontramaris.

Offshore work to install monopiles, the cylindrical steel foundations which provide a base for the turbine towers was completed in November 2005. The work was undertaken by Middlesbrough-based firm Marine Projects International (MPI) using a turbine installation vessel called the Resolution.

This 38m-wide ship also installed the turbine towers, nacelles and blades, and by March 2006 it was possible to generate clean electricity from the first row of turbines.

Offshore construction process

The monopile is a cylindrical steel foundation, which provides a firm base for the turbine. These were driven or 'piled' to varying depths depending on seabed conditions, using a large hydraulic hammer. Geotechnical survey work was carried out in advance to determine the nature of the seabed and in some cases, due to the geology, some drilling was used to allow the monopile to reach the desired design depth.

A transition piece was then lifted into position, slid over the monopile and secured with a cement adhesive. The transition piece includes a boat landing arrangement, ladders and a platform to allow future maintenance access to the turbine.

Cable laying within the wind farm was carried out before the turbine installation. The cable which has been laid to transmit power to shore from the offshore substation consists of copper conductors as well as a number of fibre optics for communication and control purposes.

The 75 metre tall towers were installed by bolting them onto the transition pieces. The Barrow turbine towers consist of a lower, an intermediate and an upper section. The towers were pre-fitted onshore with ladders, personnel lifts, power cables, switchgear, lights and other essential equipment.

The remainder of the turbine assembly consists of a nacelle (the housing at the top of the tower that contains the generator, gearbox and transformer) hub and blades. To minimise offshore lifts, the nacelle, hub and two of the three blades were assembled onshore in what is referred to as a 'bunny ear' configuration and transported by the Resolution to site.

This was lifted into place as a single assembly and the final lift was the third blade, which is bolted into the hub.

Onshore work to enable power to be exported from the wind farm to the national grid included cabling and the building of a new substation at Heysham.



33/132kV offshore substation



Remotely Operated Vehicle (ROV) used for offshore cabling