Centrica renewables background

Centrica is Britain's leading energy supplier, better known through its British Gas, Scottish Gas and Nwy Prydain brands. With key interests in upstream gas and power assets it has also played a significant role in supporting the development of renewable generation.

Centrica's primary focus has been on the development of offshore wind farms, building on a larger scale and taking advantage of the significant wind resource around Britain's coastline. Since its early involvement, Centrica has built a skilled and experienced renewables team and established itself as one of the world's leading offshore wind developers.

Centrica believes the development of renewables is crucial, reducing carbon emissions and improving security of supply as Britain becomes increasingly dependent on imported gas.

Centrica onshore

Centrica's first step was the Glens of Foudland wind farm, in Aberdeenshire. The 26 MW wind farm (20 1.3MW turbines) was commissioned in the summer of 2005 and is capable of meeting the average annual demand of more than 13,000 homes. TCW acquired a 50% stake in this wind farm in 2009.

In late 2005, Centrica announced that it would purchase the entire power output of Airtricity's 72 MW Braes of Doune wind farm in Stirlingshire (36 2MW turbines). On 1 August, 2007, which coincided with take over of the completed site, it acquired a 50 per cent joint venture stake in the wind farm. Braes of Doune is expected to generate sufficient power to meet the annual demand of more than 40,000 Scottish Gas households. Braes of Doune is a 50% Joint venture with SSE.

Centrica offshore

Centrica's key developments are offshore, with interests currently in six offshore wind farm developments. Barrow Offshore Wind is fully operational, 7km off Barrow in Furness, Cumbria. The 90 MW wind farm (30 3MW turbines) is a joint venture with Danish energy group DONG Energy, and is capable of supplying more than 65,000 homes.

Two further wind farms, Lynn and Inner Dowsing, which have an installed capacity totalling 194 MW (54 3.6MW turbines) are also operational 5km off the Lincolnshire coast. TCW acquired a 50% stake in Lynn and Inner Dowsing in 2009.

In October 2009 Centrica's Board gave approval for construction of the consented Lincs wind farm, a 270MW project 8km off the Lincolnshire coast. Onshore construction work commenced in April 2010. The Lincs project is a joint venture with DONG Energy and Siemens Project Ventures.

In December 2008 Centrica submitted a consent application to the Department of Energy and Climate Change for its proposed Docking Shoal offshore wind farm (up to 540MW). A consent application for the proposed Race Bank offshore wind farm (up to 620MW) was submitted in late January 2009.

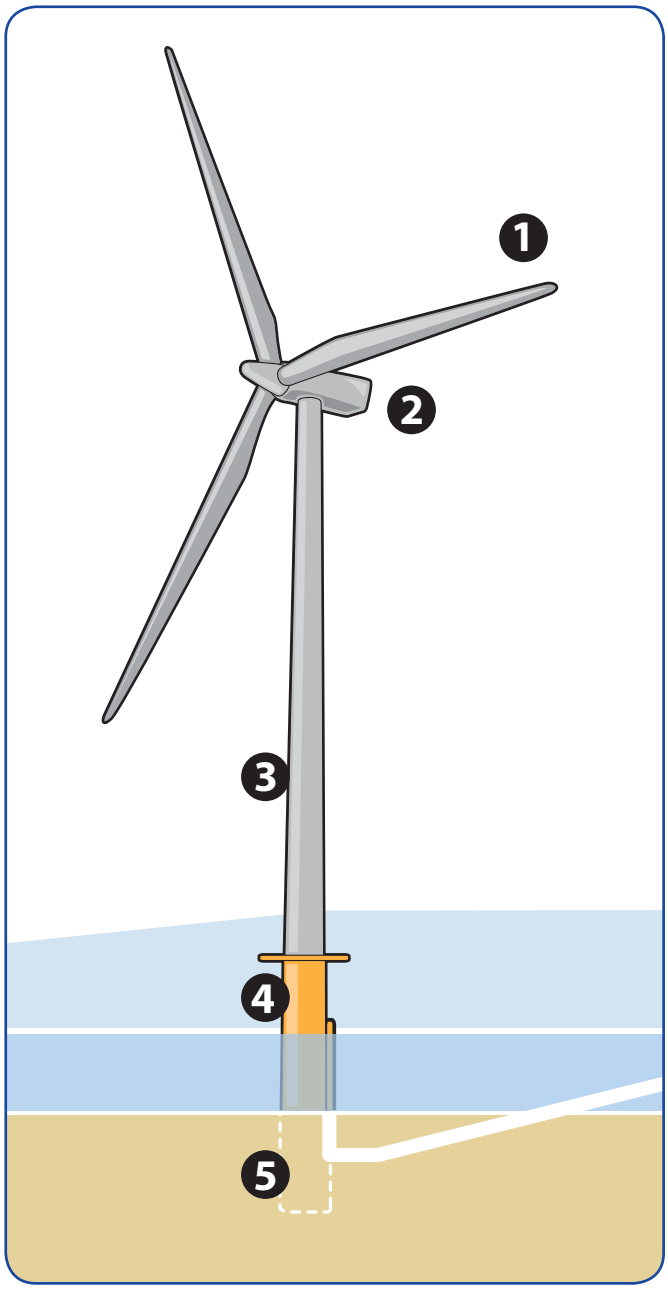
Round 3

In January 2010, Centrica was awarded exclusive development rights to the Irish Sea zone. It is one of nine areas around Britain's coastline identified under The Crown Estate Round 3 programme for offshore wind. Through Round 3, The Crown Estate aim to deliver up to 25GW of new offshore capacity by 2020. The Irish Sea zone has a potential capacity of up to 4.2GW, enough to provide zero carbon electricity for over 3 million homes.

How an offshore wind turbine works

A wind turbine uses the energy in the wind to turn its rotor which in turn spins a shaft connected to a generator via a gearbox to produce electricity this is distributed via the national grid system to customers – you and I!

There are many elements to the common wind turbine which all play a role in extracting and delivering energy from wind.



1. The rotor – the large spinning bit!

The rotor is composed of three blades and the hub.

The blades are aerodynamically designed (a wing shape in cross section) so that wind interacting with the blades creates lift and so causes them to move, similar to the way an aeroplane uses the shape of its wing to generate lift and get it off the ground.

The hub connects all three blades to the nacelle, where the drive shaft attaches to the rotor.

2. The nacelle

The nacelle houses the generator, gear box, power electronics and all other ancillaries (such as safety systems, hoist, etc).

The Gearbox is connected to the drive shaft where rotational speeds are stepped up. This allows the generator to spin at its required rate and deliver an electrical current at a frequency acceptable to the UK grid system.

The Generator is made up of a series of magnets or magnetically induced coils on the stator that interact with spinning magnets housed on the rotor. The rotor spins within the stator and creates an electrical current which is exported to the offshore substation.

3. The tower

The tower is a cylindrical structure which sits on the transition piece. Tower heights vary from 70 to 85m in length. A yawing track is situated at the top of the tower which allows the entire nacelle and rotor to weathervane into the wind for maximum efficiency. The yawing system is powered by an electric motor housed in the nacelle.

4. The transition piece

The transition piece is the yellow structure which supports the tower and which is connected to the foundation with specialised marine grout. The TP structure serves a number of purposes. Its primary purpose is to create a level surface on which the turbine tower can be placed. It also has boarding ladders and access systems for the maintenance teams. Every TP will have J-tubes which protects the inter array cables as they enter and exit the turbine.

5. The foundation

The foundation is the structure which sits in or on the sea bed allowing the WTG to be positioned above sea level. Foundation designs depend on a variety of factors such as water depth, geology, ocean currents and wave regimes. The most common designs to date are monopiles, jackets, tripods and gravity base foundations.

Offshore

The offshore substation

The offshore substation is a structure which is connected to all of the turbines via inter array cables. Its purpose is to synchronise and step-up the electrical voltage from the wind turbines so that losses along the export route can be minimised.

The export cable and on-shore substation

The export cable is a larger cable with a higher voltage capacity than inter array cables. It connects the offshore sub station to the onshore substation.