

# Thornton Banks

## Turnkey offshore wind power connection

### 325 MW Thornton Bank Wind Farm, North Sea

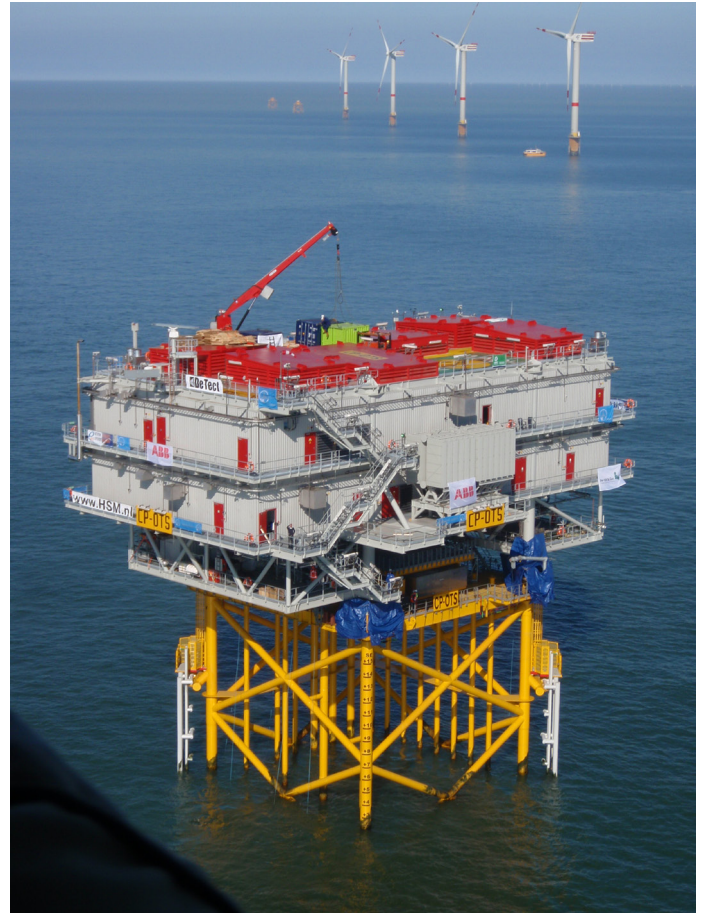
- Complete offshore wind power connection for one of the largest offshore wind farms in Europe
- Turnkey solution – from system studies to manufacture, erection and grid code compliance
- Rapid delivery of high-profile renewable energy project

#### ABB's scope of supply

- Electrical system studies
  - Static and dynamic studies
  - Grid compliance and system dimensioning
- Submarine cable systems
  - 36 kV AC infield cables (60 km)
  - 170 kV AC export cables (2 x 35 km)
- Offshore substation
  - 170 and 200 MVA 33kV/155kV power transformers
  - 36 kV gas insulated switchgear - incoming feeders from wind turbine arrays
  - 170 kV gas insulated switchgear - outgoing feeders to land
  - 36 kV shunt reactors for reactive power compensation
  - Neutral grounding reactors for grounding the main electrical system
  - Protection and control systems
  - Reactive power control
- Onshore grid connection
  - 170 kV underground cable system (2 x 3 km)
  - Connection to the high voltage transmission system at Slijkens Substation
- Design, engineering, supply, installation, testing and commissioning of cable systems and offshore substation.

#### Thornton Bank Wind Farm

C-power is a special purpose company created by several Belgian and European renewable energy utilities and publicly owned organizations. In 2003, the company was awarded the concession to build the 325 megawatt Thornton Bank Wind Farm - the first offshore wind farm in the Belgian North Sea and one of the largest in Europe. Thornton Bank is located 30 kilometers off the Belgian coast. When full production capacity is achieved in 2013, the site will generate around



1,000 gigawatt-hours of clean electricity annually - enough to meet the needs of 300,000 households and avoid some 415,000 tons of carbon dioxide emissions a year. This will make Thornton Bank a major contributor to Belgium's 2020 renewable energy targets. The project comprises three phases:

- Phase 1: 6 x 5 MW turbines and the first of two 150 kV submarine cables (completed in 2009)
- Phase 2: 30 x 6,15 MW turbines, offshore substation and the second 150 kV submarine cable (completed in 2012)
- Phase 3: 18 x 6,15 MW turbines (to be completed in 2013)

## Why ABB

ABB was selected by C-Power for its ability to provide a complete offshore wind power connection that would ensure the safe and reliable delivery of energy from the wind farm to the onshore transmission grid.

ABB was contracted at an early stage of the project to help develop the overall wind farm concept and perform the electrical system studies and ensure grid code compliance.

ABB is the only company that can provide a complete electrical offshore wind farm connection consisting entirely of its own products – high voltage submarine and underground cable systems, offshore substation and onshore grid connection. This enabled ABB to optimize the solution in terms of equipment and materials to meet the requirements of C-Power for cost efficiency and performance.

AC and DC offshore wind power connections are an ABB specialty. In addition to Thornton Bank, ABB has delivered, or is currently delivering, turnkey offshore wind power connections for three large wind farm clusters in the German North Sea: a 400 MW HVDC Light transmission link for the world's most remote offshore wind farm cluster, BorWin1; an 800 MW HVDC Light transmission link for DoIWin1, and a 900 MW HVDC Light transmission link for DoIWin2.

## ABB solution

ABB is a market and technology leader in high voltage AC and DC cables for submarine and underground applications. The submarine cable systems comprise 60 km of 36 kV infield cables that link the turbines to the offshore substation. Two 170 kV export cables transfer the power from the substation to shore. At the onshore cable landing point the export cables are joined to two 170 kV underground cables, which deliver the power to the Slijkens substation, about 3 km inland.

The offshore substation is a large four-deck structure weighing some 2,000 tons. It comprises two power transformers, gas insulated switchgear for incoming and outgoing current, shunt reactors to provide reactive power compensation, neutral grounding reactors to limit the current in case of a fault, and substation protection and control systems. All the electrical and control products are designed and manufactured by ABB to meet the demanding requirements and harsh operating conditions of offshore wind farms.

ABB is the market and technology leader in each one of these products – power and distribution transformers, air and gas insulated switchgear, shunt reactors and substations.

## Customer benefits

- Turnkey solution from a leading supplier of offshore wind power connections
- High quality products and expert project execution
- Rapid delivery of high-profile renewable energy project



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For more information please contact:

## ABB AB

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