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Offshore Wind Farm London Array

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Transition pieces with concrete platforms

Project data
Total amount of steel: 100,000 t
Total amount of concrete: 6,500 m³

Monopiles
Length: up to 60 m
Diameter: 4.7 - 5.7 m
Wall thickness: 50 - 120 mm
Weight: up to 650 t

Transition pieces
Length: 27 m
Weight: 350 t

Location
20 km (12 miles) off the coasts of Kent and Essex in the outer Thames Estuary

Construction time
11/2009 to 12/2012 (36 months)

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General information
The London Array Offshore Wind Farm is located more than 20 km (12 miles) off the coasts of Kent and Essex in the outer Thames Estuary in a strategic area the UK Government has identified for offshore wind farm development.

The wind farm was constructed in two phases. Phase one consisted of 175 wind turbines, installed on two sandbanks Long Sand and Kentish Knock and in the Knock Deep channel that lies between in water depths ranging from 0 to 25 metres.

Phase one covered an area of 100 km², and the total capacity installed is 630 MW. Planning and construction extended over a period of 36 months from November 2009 to December 2012.

Upon completion of both phases, 341 wind turbines will generate up to 1,000 MW, which is enough to meet the electricity needs of 750,000 homes and this is 10% of the UK Government's renewable energy target for 2010. At that stage, the wind farm will occupy an area of around 245 km².

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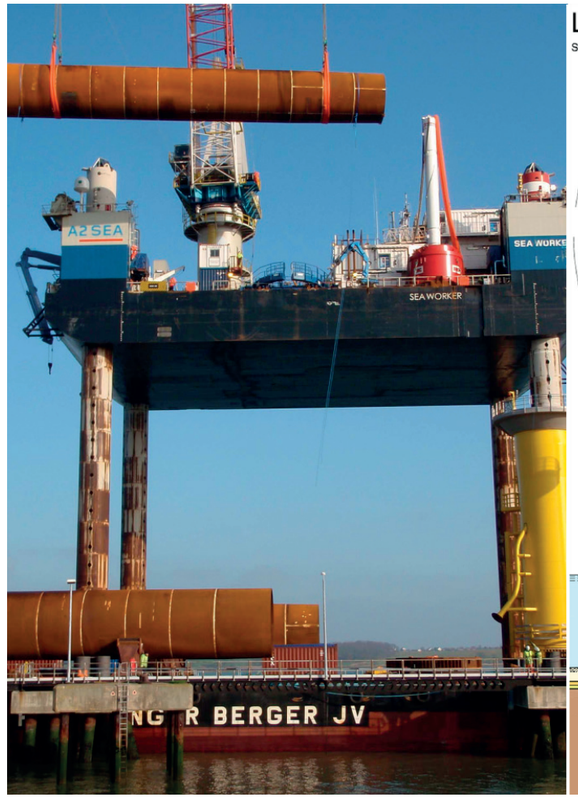
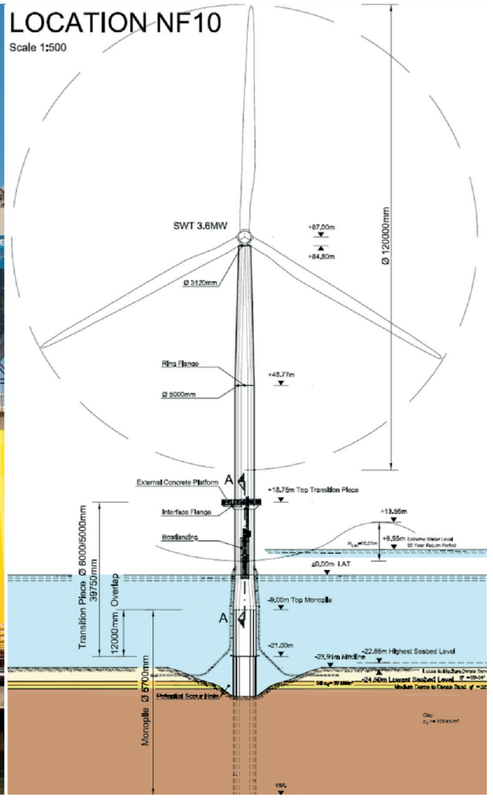
Transition piece production

Monopile production

Load-out on jack-up barge "SEA WORKER"





Contract

The project is developed by a consortium called London Array Limited, consisting of three shareholders: Dong Energy from Denmark, E.ON Climate & Renewables and Masdar Initiative from Abu Dhabi.

In 2009, the Aarsleff Bilfinger Berger Joint Venture (ABJV) was awarded the contract to execute phase one of the London Array project, the world's largest offshore wind farm upon completion. This turnkey contract included the construction of the foundations for 175 wind turbines and 2 substations as well as transport and installation of the 175 × 3.6 MW wind turbines supplied by Siemens.

Design

The contract included design, production and installation of 177 monopiles, measuring up to 60 metres in length. The steel piles have a diameter of 4.7 to 5.7 metres, and the longest pile weighs approx. 650 tons. The monopiles were driven into the seabed at a depth of up to 25 metres.

In order to connect the wind turbines with the monopiles, transition pieces of a weight of approx. 350 tons and a length of 27 metres form the intermediate element of the foundation structure.

The foundations are designed by a joint venture of COWI A/S and IMS Ingenieurbaugesellschaft mbH and manufactured by a consortium of EEW Special Pipe Constructions GmbH and Bladt Industries A/S.

A total of 100,000 tons of steel are used for the foundations.

Conventionally, the platforms for offshore wind farm foundations are made of steel. However, concrete platforms are used for the London Array project, as they do not corrode and thus require less maintenance.

Transport and installation

The monopiles were manufactured at EEW in Rostock, Germany. During transport, they were seafastened and shipped to Aalborg in Denmark on four 30.5 metres × 100.5 metres ABJV-owned oceangoing North Sea barges. The transition pieces were manufactured at Bladt Industries in Aalborg, Denmark. Together with the monopiles, the transition pieces were loaded onto the ABJV-owned barges, each barge accommodating six foundations at a time. The four oceangoing barges were then hauled by tugboats to the Port of Harwich in the UK.

The client was responsible for supplying the installation vessels. The jack-up barge "A2SEA SEA WORKER" was used for installations in shallow water and the purpose-built jack-up vessel "MPI ADVENTURE" for installations in deep water. The foundations was provided directly from the barges to the installation vessels.