

# PROJECT SHEET

**DONG ENERGY & SCOTTISH POWER RENEWABLES**  
WEST OF DUDDON SANDS FOUNDATION INSTALLATION PROJECT

## PROJECT DESCRIPTION

In May of 2012 OWF was awarded the execution of the scour protection and foundation transport & installation scope of the West of Duddon Sands Offshore Wind Farm project. The project was awarded by a joint venture of Dong Energy and Scottish Power Renewables.

The West of Duddon Sands Offshore Wind Farm is located in the East Irish Sea approximately 14 km from the nearest coast on Walney Island, Cumbria (United Kingdom) and comprises 108 wind turbines with a total installed capacity of 389 MW ensuring clean renewable energy for more than 300,000 UK households.

The wind farm is situated in an area with excellent wind resources, favourable water depths and is relatively close to shore. The wave and tidal conditions in the East Irish Sea are complex with a tidal difference of approximately 9 meters

To ensure a safe working environment and timely execution OWF provided discipline to the project, implementing solid measures at the beginning to avoid issues during the execution and consequently delivered the project in the most experienced manner.

## PROJECT EXECUTION

Method statements and complex risk assessments were produced. Specialist installation tools were developed, vessel and site logistical plans were produced and nearly 100 experienced crew

## FEATURES

Client	DONG Energy, Scottish Power Renewables
Location	Irish Sea off the coast of Walney Island, Cumbria
Period	May 2012 – August 2014
Contractor	Offshore WindForce (OWF) a 50/50 Joint Venture between Boskalis Offshore and Volker Stevin Offshore



- A** Project locations
- B** The Boskalis Rockpiper installed 108 filter layers for scour protection

mobilized. In December of 2012 the intermediate storage site in Belfast was mobilized and two months later the first shipment of foundations arrived. Scour protection filter layers were installed ahead of the installation works. Two jack up vessels were mobilized in Rotterdam and started their installation activities in



**B**

May 2013. Installation works were completed in October 2013. OWF installed Foundations within the allocated timeframe and achieved record installation times well within 12 hour per foundation. Scour protection armor layers were installed after the infield cables were connected and wind turbine generators were installed.

**PROJECT LOCATIONS**

The project was executed from 6 locations:

- Aalborg: foundations manufacturing and loading
- Belfast: foundations offloading and intermediate storage
- Rotterdam: mobilization of the installation vessels
- The Irish Sea: foundations installation
- Barrow-in-Furness: secondary works base
- Vlissingen: demobilization of the installation vessels.

**VESSELS**

The Boskalis Rockpiper installed the scour protection filter layers ahead of the foundation installation works. The EIT Palmina (Combilift) transported the foundations from Aalborg to Belfast.

The Pacific Orca (Swire Blue Ocean) and Sea Installer (A2Sea) installed the foundation elements. Several smaller vessels were used for crew transfers to the vessels and to the foundations. The Boskalis Seahorse installed the scour protection armor layer.

**FOUNDATION INTALLATION**

The vessel crane in combination with upending tool and bucket is used to upend and lift the mono pile (weighing up to 516 tons) into a vertical position. The mono pile is positioned into the gripper frame and lowered onto the sea bed. The pile's position and verticality is corrected by the pile gripper frame. A hydrohammer then drives the mono pile into the sea bed. The transition piece (weighing 340 tons) is positioned over the mono pile by the vessel main crane in combination with a hydraulic lifting tool. The TP is levelled within tolerance and the grout hose is connected. A high strength grout mix is inserted into the annulus between the mono pile and transition piece. After completing the grouting operation the installation vessel moves to the next foundation. After the grout is cured a secondary works team removes the leveling bolts and installs earthing wires and a cover tent. In house designed survey tools ensure that all installation works are executed within very narrow tolerances.

Specialist tools were developed for the installation works on two separate jack-up vessels including tailor made upending buckets, piling frames and lifting tools. In addition all secondary steel of the Foundations related to installation works, like the grout skirt and leveling arrangement was developed by OWF. This work also involved finite element calculations of the structures and close interface management with the design team of the client.

**QUALITY AND SAFETY PERFORMANCE**

The Boskalis NINA (No Injuries No Accidents) program was implemented and the safety performance on the project was excellent. Before commencing the installation activities in-depth risk assessments were produced. The installation and vessel crew were trained prior to and during the installation works and continuous improvements were made to the working methods. Well over 314,000 safe man-hours were executed on the project.



C



D



E

- C Pacific Orca (Swire Blue Ocean) one of the two jack up installation vessels
- D The Boskalis Smit Taklift 6 was used to install the gripper frames onto the installation vessels
- E Combilift EIT Palmina transported all 108 foundations from Aalborg to Belfast

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