

# PROJECT SHEET

## BALTIC II OFFSHORE WIND FARM GERMANY, BALTIC SEA

### BOSKALIS' ENERGY SOLUTIONS

Boskalis is a leading global dredging and marine expert. With safety as our core value we provide innovative, sustainable and all-round solutions for our clients in the energy market. Realizing projects in remote locations with a heightened environmental focus is one of our specialties. Under brands such as Boskalis, Dockwise, Fairmount, VBMS and Smit we offer more services than any other company in our industry, making us your next one-stop solution provider.

We support the development, construction, maintenance and decommissioning of oil and gas import and export facilities, fixed and floating exploration and drilling facilities, pipelines and cables and offshore wind farms.

### BALTIC II PROJECT

EnBW AG has developed the Baltic II Offshore Wind Farm, formerly known as Kiegersflak, in the western part of the Baltic Sea. With 80 wind turbines Baltic II will generate electricity for approximately 340,000 households annually. ArGe (JV of Hochtief and GeoSea Nordsee) secured the design and build contract for Baltic II. The offshore wind farm consists of, amongst other foundation types, forty-one 690 to 740t weighing three-legged foundations (jackets) with a maximum height of 58m. Boskalis was awarded two contract scopes:

- Design & fabrication of sea-fastening on three North Sea barges for the jacket transportation from load-out port Odense (Denmark) to feeder port Trelleborg (Sweden).
- T&l: Transportation of jackets from feeder port to offshore installation locations and installation of jackets in pre-piled foundation piles.



### FEATURES

Project	Baltic II Offshore Wind Farm
Company	EnBW AG
Contractor	ArGe – JV Hochtief, GeoSea Nordsee
Sub-contractor	Boskalis Offshore Marine Contracting
Location	Germany, Baltic Sea (approx. 32 km north of the island of Rügen)
Period	Preparation December 2013 - May 2014, execution June 2014 - October 2014



**A** Location map

**B** Union Sapphire preparing anchor installation Taklift 4

**C** Taklift 4 and Union Sapphire en route to Baltic II Offshore Wind Farm

### DESIGN & FABRICATION

Three North Sea barges were equipped with nine sea-fastenings each to accommodate three jackets for transportation from Odense to Trelleborg. The sea-fastenings were designed for a sea state of 3.0 m significant to optimize the operational weather windows. The sea-fastenings were equipped with an innovative system of clamps and pretension bolts to allow quick and safe securing of the jackets without welding.



## TRANSPORTATION AND INSTALLATION

For the transportation and installation of the jackets Boskalis deployed the self-propelled floating sheerleg Taklift 4, equipped with its fly-jib to provide sufficient lifting capacity and height, and anchor handling tug (AHT) Union Sapphire.

In Trelleborg the Taklift 4 lifted the jackets from the barge with an internal lifting tool or flange gripper, operated such that involvement of personnel was minimized. After load-out, the Taklift 4 connected to AHT Union Sapphire and transported the jackets suspended in the hook from Trelleborg to the offshore installation location at approximately 25nm south of the feeder port. The water depth at the installation locations ranges from 30 m up to 45 m. Upon arrival at the installation location Union Sapphire disconnected and assisted Taklift 4 with the anchor installation. The mooring pattern of the Taklift 4 had been developed for each location specifically and consisted of four anchors. A predetermined sequence of anchor deployment and vessel movement prevented the mooring wires from running over cable trenches and possible power cables. Next Taklift 4 moved into installation position and started lowering of the jacket.

A combination of survey and live ROV footages enabled accurate positioning of the jacket legs in the pre-piled piles. An innovative steering line configuration ensured precise rotation of the jacket.

After a final survey the flange gripper was released remotely and Taklift 4, assisted by Union Sapphire, retrieved its four mooring anchors and connected to the AHT for the transit back to the feeder port to load the next jacket.



## SAFETY

With all Boskalis' projects safety is an essential part. The project was executed in a safe and prudent manner. The Contractor's safety standards and regulations were applied during the execution of the project. The Boskalis safety standard contributed to the entire safety culture.

## PROJECT CHALLENGES

The main challenges effectively dealt with during project preparation and execution were:

- Design and construction of 27 sea-fastenings with an innovative clamping system for easy and quick connection of the jackets in a limited time of three months;
- Preparation for upward potential: Making use of preparation time to detail and design opportunities for the execution phase;
- Flexibility in execution: Continuous and open communication with Contractor and local authorities assured flexibility in execution, utilizing potential transportation and installation weather windows;
- Steering line configuration: A simple but innovatively designed steering line configuration ensured accurate positioning of jackets before and during installation;
- Anchor patterns: Specific anchor patterns per installation location and a predetermined sequence guaranteed safe anchorage and installation works in an infrastructural dense area.

## CONCLUSION

Boskalis provided the required service in time to Client and Contractor, dealing with all the given engineering and operational challenges.

Managing expectation, clear lines of communication and integration of operational best practices with engineering analysis were decisive for the safe, controlled and successful execution of this offshore transportation and installation project.

Before above offshore T&I works, Boskalis' affiliates also provided cable installation and protection works related to Baltic II Project.



**D** Taklift 4 load-out jacket at Trelleborg

**E** Taklift 4 commencing jacket installation

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