

PROJECT SHEET

SNØHVIT LNG FIELD DEVELOPMENT PROJECT NORWAY

BOSKALIS OFFSHORE: SKILLS, RESOURCES, EXPERIENCE

Boskalis Offshore brings together the offshore skills, resources and experience of Royal Boskalis Westminster.

The group's offshore capabilities include seabed rectification works for pipeline/ cable and platform installation, construction of pipeline shore approaches and landfalls, offshore mineral mining, offshore supply and support services and decommissioning services.

Boskalis provides clients with tailored, project-specific solutions for above dredge related offshore services, as illustrated by the following project summary.

SNØHVIT LNG FIELD DEVELOPMENT PROJECT

The Snøhvit development comprises three fields – Snøhvit, Albatross and Askeladd. These are located in the Barents Sea, about 140 kilometres north-west of Hammerfest in northern Norway. All primarily contain natural gas with small quantities of condensate. The estimated recoverable reserves are 193 billion m³ of natural gas, 113 million



B

FEATURES

Client	Statoil
Location	Barents Sea, Norway
Period	2004 – 2007
Contractor	Boskalis Offshore



A

- A Location map
- B DPFV 'Sandpiper' at Melkøya
- C DPFV 'Seahorse' at Hammerfest

barrels of condensate (light oil) and 5.1 million tonnes of natural gas liquids. The gas from Snøhvit will be used for LNG production.

Statoil operates the development, with a total of 21 wells, on behalf of six gas companies owning licenses namely Petoro, Total, GDF Suez, Statoil, Hess and RWE Dea.

Snøhvit is the first major development on the Norwegian continental shelf without surface installations. Instead, subsea production facilities stand on the seabed in water depths of 250 to 345 metres. The gas is transported through a 143 kilometre long pipeline to the land-based processing facility for LNG at Melkøya in the north of Norway. Besides the main line, a carbon dioxide



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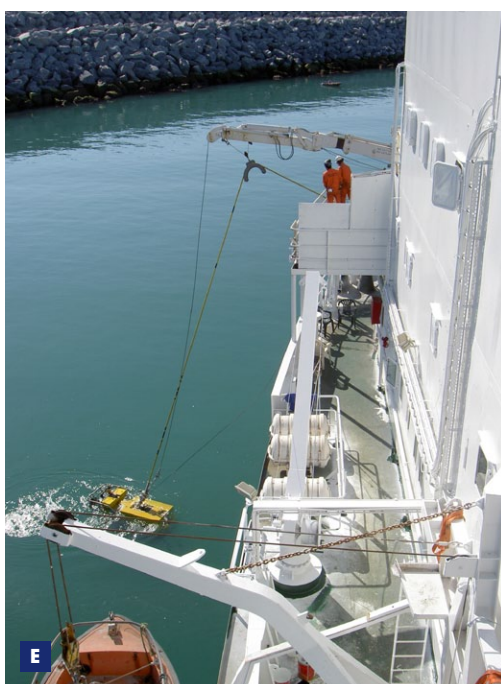
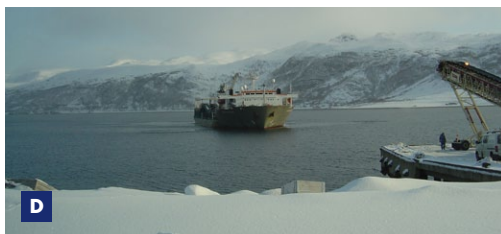
injection pipeline, two chemical lines and an umbilical connect the field with Melkøya.

The pipeline route is characterized by an uneven seabed the first 20 km from shore and pockmarks and iceberg plough marks at the field. The soil varies from hard clay closest to shore, sand in the mid section and soft clay at the field. The maximum water depth is approximately 345 metres at the field and 445 metres along the pipeline route.

Boskalis Offshore was awarded a contract for subsea rock placement, which was required during the pre- and post-installation phases. The contract was executed under the so-called Statoil Frame Agreement that came into force in 1997. Under this Frame Agreement, the longest running contract in the Royal Boskalis Westminster history, Boskalis Offshore installed more than 8.2 million tonnes of rock at 48 different Statoil projects over a period of 10 years.

SUBSEA ROCK INSTALLATION WORKS

Challenging conditions, with temperatures below -20 degrees centigrade, 24 hours of darkness a



day in the mid winter period, a remote area and a complex work scope with 1.2 million tonnes of rock and water depths of up to 445 metres characterized the subsea rock installation works. The tolerances for the rock installation works were plus or minus 0.2 metre.

Boskalis deployed two dynamically positioned fallpipe vessels (DPFV), Sandpiper and Seahorse, to perform the rock installation works with high accuracy. Both are DP Class 2 vessels; Sandpiper is equipped with a free flying ROV, Seahorse with a fallpipe ROV.

The works were executed in three campaigns, one pre-installation campaign in 2004 and two post-installation campaigns in 2005 and 2007.

Prior to the installation of the subsea structures and pipelines, DPFV Sandpiper placed 75,000 tonnes of rock to create a suitable foundation for the structures and to prepare the pipeline routes.

During the post-installation phases, DPFV Seahorse placed the 1.1 million tonnes of rock required to protect the various pipelines and the subsea structures, and to stabilize steep slopes along the pipeline route.

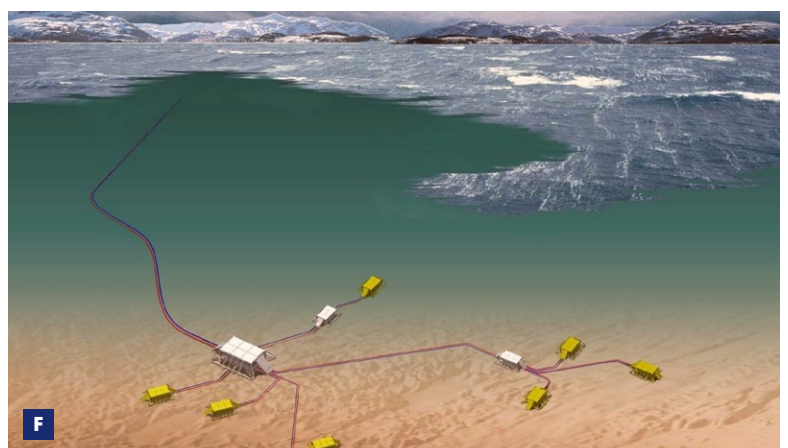
ROCK MATERIAL

About 95% of all the rock used for the project, totalling approximately 1.2 million tonnes mainly 1-5" granite, was produced and loaded at the Halsvik Aggregates AS quarry in Kvalsund. In order to maintain optimal production, high quality and efficient logistics, close cooperation between the Statoil and Boskalis project teams and Halsvik Aggregates management was required. Through a strict system of reporting and meetings the project was brought to a success for all parties.

CONCLUSION

Despite the remote working area and above harsh conditions, Boskalis Offshore installed the significant rock volume successfully, spending 480 vessel days on the project without a Lost Time Injury (LTI).

Statoil achieved first gas from the field on the 13th of September 2007.



- D** DPFV 'Seahorse' mooring at Kvalsund
- E** Free flying ROV 'Sandpiper'
- F** Field impression

Royal Boskalis Westminster N.V.
PO Box 43
3350 AA Papendrecht
The Netherlands
T +31 78 69 69 000
F +31 78 69 69 555
royal@boskalis.com
www.boskalis.com