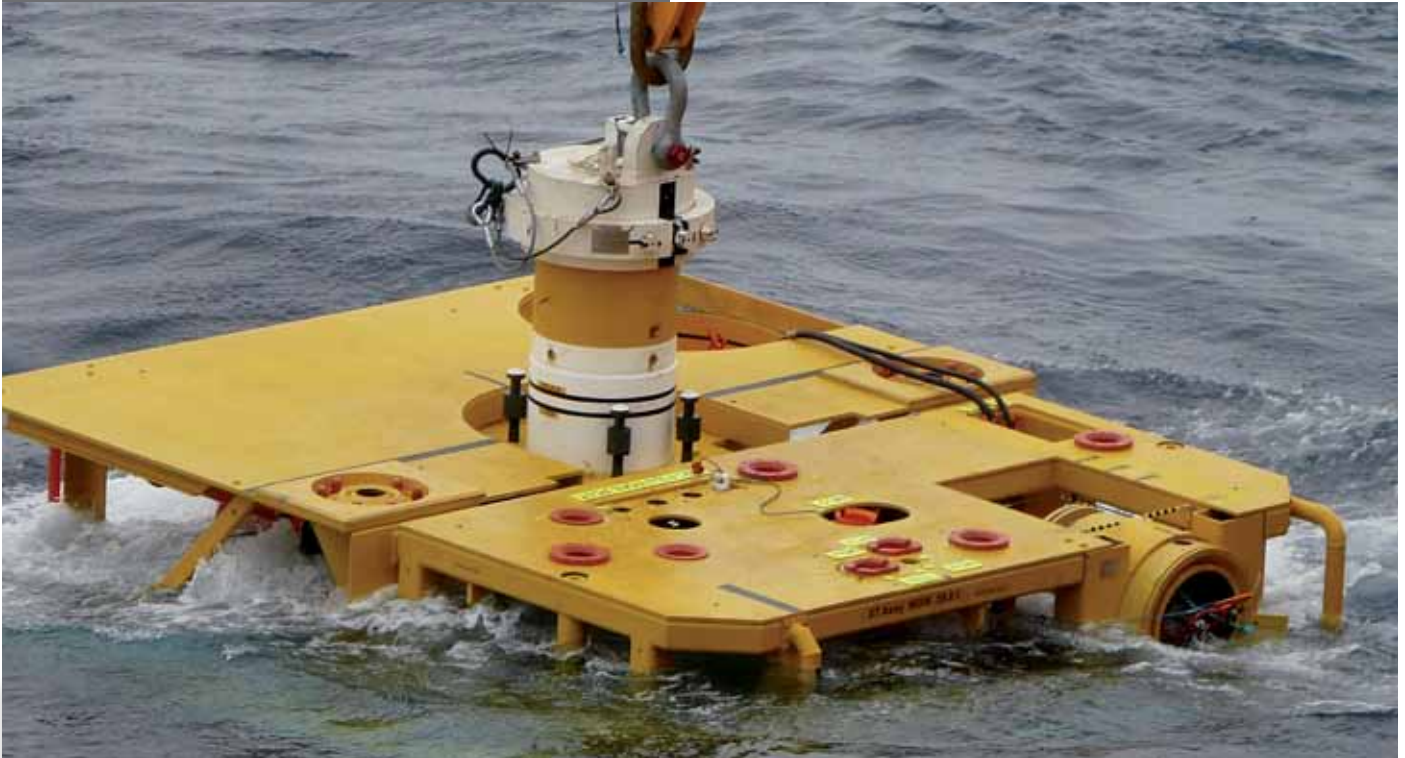


# Ormen Lange

## Shell Tree on Wire - Xmas Tree Installation

### PROJECT OVERVIEW

*Xmas Tree being deployed at Ormen Lange*



'Tree on Wire' is a unique project entailing the installation of Xmas Trees from the Skandi Seven construction vessel at the Ormen Lange field, offshore Norway for Shell Upstream International – a more flexible and cost effective solution to traditional Xmas Tree Installation, saving an average \$4 million per tree installed.

Project included the following elements:

- Subsea construction vessel utilised to install Xmas Trees
- Tree lowered from vessel's crane into location in template
- Monitoring, orientation, connection and testing carried out by ROV
- No need for tree running tool and associated umbilical
- Flexible and cost effective solution leading to accelerated production
- 4 trees installed by Subsea 7 to-date at Ormen Lange

**LOCATION**

The Ormen Lange field is situated 120km northwest of Kristiansund Norway, where water depths vary between 800 and 1100 metres.

**CLIENT**

Shell Upstream International, Europe

**PROJECT DURATION**

Executed under the long-term Shell Underwater Services Contract (USC)	
Start of feasibility study	November 2008
Project commenced	December 2008
Offshore trials	February 2009
First two trees installed	March 2009
Second two trees installed	April 2009

**ASSETS**

Skandi Seven complete with Shell USC Remotely Operated Vehicle Support Vessel spread, 250te offshore crane and dedicated tooling skids for functioning tree connectors and leak testing the connections.



Subsea 7 Tree on Wire Skid interfaced to the installation vessel Workclass ROV



Xmas Tree correctly orientated and moving towards the empty Wellbay

**SCOPE OF WORK**

Xmas trees at Ormen Lange are usually 'run' from a dynamically Positioned drill ship. The drill ship lowers the tree, which is locked on to a Tree Running Tool (TRT) with a drill string. Stands of drill-string are added until the tree is at the required depth. Once the tree is installed, the drill ship completes the well, before commissioning and production can commence through the tree to the production manifold.

Subsea 7 has a long-term relationship with Shell Upstream International, Europe, which includes a wide variety of work from inspection, repair and maintenance to light construction for Shell's European subsea oil and gas related infrastructure.

Shell approached Subsea 7 in October 2008 to investigate the possibility of installing a Xmas tree from a monohull construction vessel, a technique now referred to as 'Tree on Wire' at its Ormen Lange gas field.

Similar techniques have been used before by Subsea 7 on the Anadarko Independence Hub project in the Gulf of Mexico, and in South Africa on the PetroSA project, but never before on a live template and in the North Sea.

Tree on wire involves using a less expensive asset, i.e. a construction vessel and in this case, the Skandi Seven, to lower the tree with its crane from the deck of the vessel into location in the template. Monitoring of the installation, orientation of the tree, connection and testing is all carried out via the construction vessels remotely operated vehicles (ROVs), removing the requirement for the TRT and its associated umbilical.

Initially only two installations were planned in this way however following the success of the first two trees, another two were brought forward in the schedule to be installed immediately afterwards.

Both time and cost are saved using this method. The method is a quicker and more flexible solution, reducing time between installation and commissioning and most importantly, freeing up valuable time for the drill ship - allowing the ship to continue drilling, leading to accelerated production, with more wells coming on stream earlier.

The method is also extremely cost effective - Shell has put a minimum cost saving of \$4million per tree installed using the Tree on Wire method. To date, Subsea 7 has installed 4 trees for Shell using this method, with 3 planned in 2010 and 4 in 2011 - a significant cost saving in the region of \$44million.

Subsea 7 is currently exploring options in which it will be able to recover trees, as well as deploy them - a realistic possibility further increasing the reliability of the operation in Ormen Lange and adding potential for involvement in tree replacement workscopes and tree recoveries in field decommissioning operations.