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## The Challenges Associated With the Installation of Long-Distance Tiebacks

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### Abstract

The use of subsea production technology as a development solution for deep water fields is now becoming a reality. As a result there are an increasing number of fields, which are developed with a long distance flowline tie-back, which can be in excess of 200 km, either to a host facility or directly to the beach. Consequently the marine operations associated with the installation of these long distance tie-backs must be able to deal efficiently with a range of conditions from the very deep water at the subsea facilities to the shallow water at the landfall area. This paper will address the issues and challenges involved with the installation of long distance tie-backs which include deep and shallow water pipelay from the one ship, extreme seabed bathymetry, tension control for free span mitigation, and operational as well as the challenges from extreme weather conditions.

### Introduction

The Ormen Lange gas field (Figure 1) is located 120km west-northwest of Kristiansund on the Norwegian West Coast. The field is located within a prehistoric slide area, the Storegga Slide, with varying water depths from 250m to 1200m in the planned development area. The seabed in the Storegga Slide is very irregular with soil conditions varying from very stiff clay with boulders to soft clay.

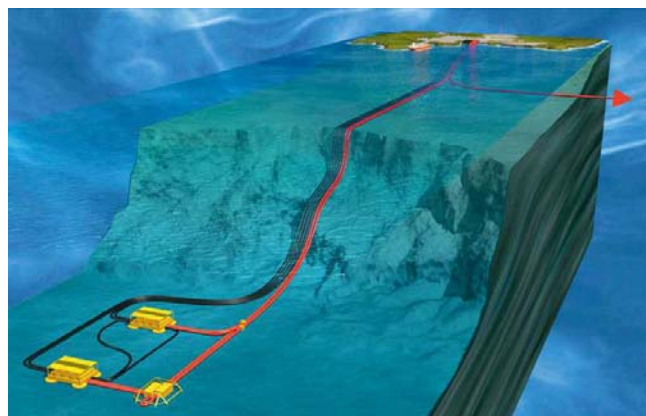


Figure 1 : 3D Visualisation of Ormen Lange Field

As Figure 1 shows the selected concept for Ormen Lange was a subsea tie-back, approximately 120km, to the Nyhamna shore terminal. The Ormen Lange development is the largest single investment in Norway ever, and the Ormen Lange development will be Norway's second largest gas field in production when gas export from Nyhamna to the UK starts in October 2007. The field is developed by Norsk Hydro.

Acergy was awarded the contract for the Ormen Lange MEG Pipelines Installation in May 2004. The contract scope of work was laying and commissioning of two 120km long 6" pipelines from the gas processing plant at Nyhamna to the Ormen Lange manifold in water depths ranging from 0 - 850m. In addition, a 3.6km long 6" infield pipeline between the two production manifolds was to be installed.

### Installation Vessel

The pipelines were installed with pipeline installation vessel *Acergy Falcon* (Figure 2). She is a dynamically positioned vessel, which can install rigid pipelines up to 14" diameter by a "J" lay method in water depths up to 1500 m. The vessel welds the pipe joints in a firing line onboard and can carry up to 2000 tonne of pipe joints. The pipe joints can also be re-supplied at sea. *Acergy Falcon* is also equipped with a Flexible Lay System (FLS) enabling laying of flexible flowlines. Flexible flowlines can be stored below decks in a 1600 tonne capacity powered carousel or on reels on deck. She is also equipped with two work-class ROV's which during pipelay are used for Touch Down Monitoring and survey.