

CASE STUDY: SHTOKMAN LNG SHIPPING



Introduction

The Shtokman natural gas field has 3.9 trillion cubic metres of natural gas and more than 56 million tons of gas condensate in reserves. Not only is it one of the world's largest gas fields, it is also the world's northernmost. Discovered in 1988, it is located in the central Russian sector of the Barents Sea, 600 kilometres north of the Kola Peninsula.

The field is named after Soviet oceanologist Vladimir Shtokman, and is under development by Gazprom and its Phase 1 partners Total and Statoil. Pipeline gas production is planned to begin in 2016, with liquid natural gas (LNG) production following in 2017.

The complexities presented by Shtokman's location, harsh weather conditions and remote location meant that Gazprom and its Phase 1 partners needed to plan extremely carefully for the future operation of the field.

Sourcing a Simulation Partner

Following a careful analysis of the marketplace, Gazprom chose Lanner Group as its simulation software partner to develop a detailed simulation of proposed operations, including a wide range of variables, such as weather and potential equipment downtime.

Frederik Smits van Oyen, Business Development Manager at Gazprom Global LNG, comments: "Lanner was able to demonstrate in-depth knowledge and understanding of the logistics involved in delivering LNG, as well as experience of dozens of similar,

complex projects. It understands the key levers and the drivers of efficient LNG transportation."

Key objectives for the project were to use the model to find answers to questions such as what fleet configuration would be most logistically effective for various marketing scenarios. The model would also be used to test the reliability of the supply chain and to gauge potential risks.

Model Behaviour

During 2009, Gazprom and Lanner Group scoped out a simulation model that covers every aspect of delivering LNG from the Shtokman field. This includes the ability to assess different fleet configurations to transport LNG from the site, various routes that can be used taking into account weather conditions, operating conditions at receiving terminals and environmental factors that could impact the operation of the field.

It is crucial for Gazprom to uphold its reputation as a reliable supplier of gas. Therefore the model was tailored to allow Gazprom to rigorously assess the specific challenges associated with the location of the Shtokman field and peculiarities of upstream complex performance. Conditions in the Arctic can be harsh and needed to be fully taken into account, including relevant weather data for all routes that ships might take.

The model that the team developed also captured detailed research on the performance of upstream equipment. Unlike most models, which average out performance statistics over a set period of time, the Shtokman model covers LNG plant and gas production performance.

"Working with Shtokman Development, we managed to get accurate data relating to the entire value chain and sufficient for downstream modelling purposes," said Frederik Smits van Oyen. "This meant that key uncertainties could be reflected in the model, and major supply risks appropriately addressed."

Benefits

As a result of the simulation, the team at Shtokman is able to use its model in advance in order to rigorously test the full operation of the value chain. For example,

it can try out different configurations and types of shipping travelling across different routes.

The model logs a number of key performance measures as it runs, including the ability of ships to meet delivery windows assigned by the program and manually defined supply commitments; and various parameters for utilisation of the shipping fleet. More detailed results are available on top of these, including delays, time on berth, cause of delays, slots not delivered, slots arrived at late, and early arrivals and can help to isolate particular bottlenecks in the chain for further analysis.

This means that the team can make informed decisions about fleet choices and investment. But it also allows Gazprom and its Phase 1 partners to have confidence in their ability to build schedules and meet commitments for prospective clients.

"This project is all about demonstrating our knowledge of the how the field will operate and the factors that we need to take account of," explained Frederik Smits van Oyen.

"We can test out the robustness of proposed schedules and plans to ensure we can meet our commitments to clients. We are able to do this in a rigorous way as the operation grows and different scenarios become evident. The key is that we are able to optimise the reliability of our operations in a complex environment using fact-based scientific analysis and be aware of possible risks."

The value that the simulation model brings to a project like Shtokman cannot be overstated. Delays in delivery can have a massive impact on the bottom line of any gas supplier and its clients, and as one of the world's largest fields Shtokman has stakes that are higher than those of many others.

As with any simulation project, the key aim with Shtokman is to keep costs, performance, service and revenues in balance in order to optimise supply reliability, investment and returns. The difference is that Shtokman will operate with so many different variables, including challenging local environmental conditions.

The Future

Looking forward, Gazprom plans to continue using their Lanner-based simulation model to test out different scenarios and ensure that factors that are likely to have an impact on the Shtokman operation are built in.

"We are working continuously to challenge ourselves and improve the reliability of our operations," concludes Frederik Smits van Oyen. "Ability to run the field in a virtual environment means that we are well prepared for the future. This is all about our ability to deliver LNG across different markets confidently and reliably."

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