Schlumberger

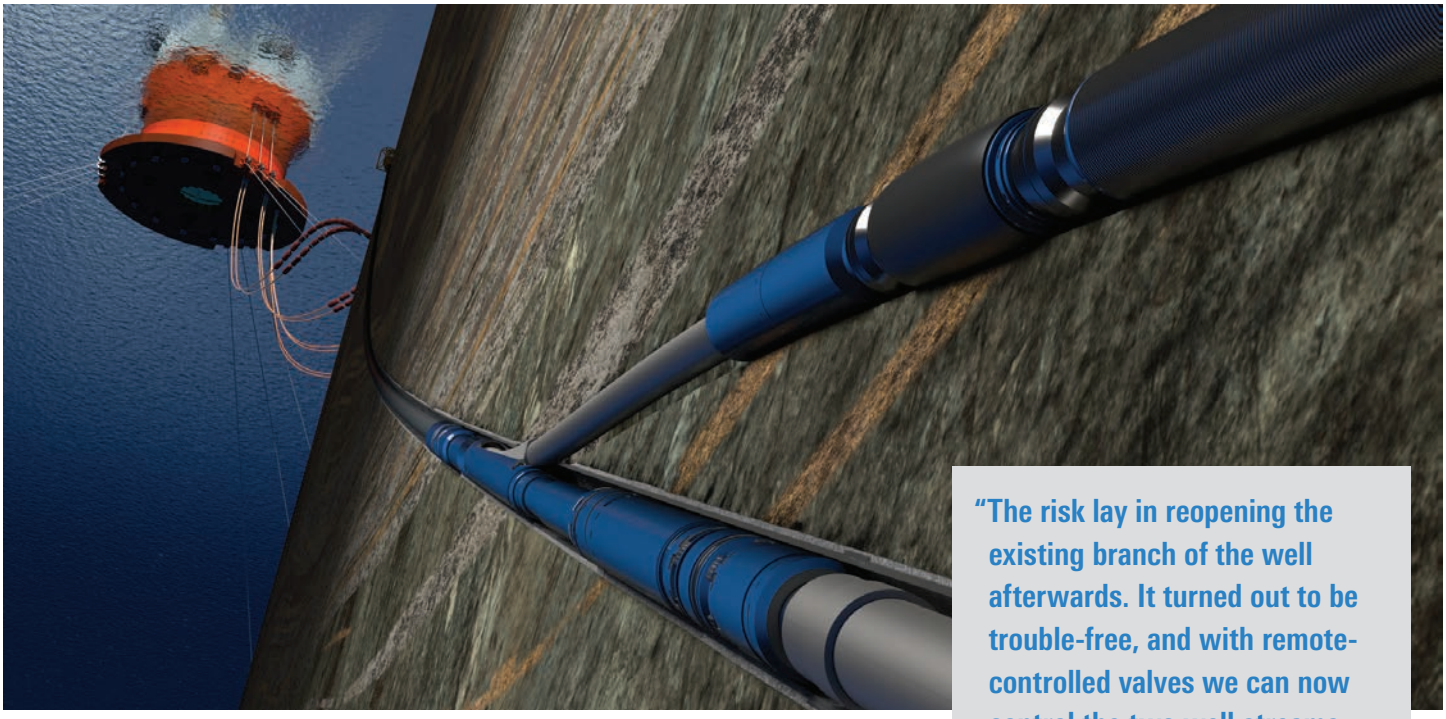
Case study: Completion

Location: Barents Sea, Norway

Aligned with United Nations Sustainable Development Goals:
12—Responsible consumption and production,
13—Climate action.

Vår Energi Saves Millions with Industry's First Subsea Retrofit Multilateral Wells

Without adding additional infrastructure, RapidX junctions deliver access to 7 to 8 million bbl of oil from subsea reservoirs with minimal CO_2 emissions impact



For the first time, the RapidX TAML 5 high-strength, hydraulic-sealed multilateral junction with an intelligent completion was deployed as a subsea retrofit, transforming two single-bore subsea wells into multilateral producers with independently controlled branches.*

> **"The risk lay in reopening the existing branch of the well afterwards. It turned out to be trouble-free, and with remote-controlled valves we can now control the two well streams. It's simply quite fancy."**
>
> Rune Oldervoll,
> Operations Director, Vår Energi

Emissions Avoided:
5,000–10,000 t of CO_2 equivalent emissions

To rapidly increase production from the Goliat Field utilizing existing subsea infrastructure, Vår Energi transformed two single-bore subsea wells into multilateral producers with independently controlled branches.

Add oil production in challenging conditions and economics

To boost production in the mature Goliat Field of the Barents Sea, Vår Energi wanted to reach different targets of the Snadd and Goliat West discoveries. The subsea infrastructure combined with the economic conditions of low oil prices set limits to the options available to the company.

Reach new reservoirs without additional subsea infrastructure

Vår Energi engineers first reviewed the conventional option of drilling new wells. The field's subsea templates had no open well slots, and the company wanted to avoid waiting 1 to 2 years for a new arctic-capable template, tree, or field flowlines. Mobilizing a modular offshore drilling unit added further timing and economic constraints to that option. All of the field's wells continued to produce, so plugging a well and then sidetracking was not an option.

Case study: Vår Energi Saves Millions with Subsea Retrofit Multilaterals

Vår Energi and Schlumberger decided that the best option was to retrofit two existing wells as multilaterals. Each well would maintain production from its original bore while adding new production from one lateral. This option required multilateral technology with mechanical stability and hydraulic integrity. Furthermore, the completion would need to include a way to independently control each lateral so that reservoir contribution could be managed to balance production and ultimate recovery under the reservoir drainage program.

Retrofit two wells with field-proven multilateral technology

Schlumberger recommended the RapidX TAML 5 high-strength, hydraulic-sealed multilateral junction with an intelligent completion enabling independent control of each lateral. The technology had been deployed in other locations but never before as subsea retrofits.

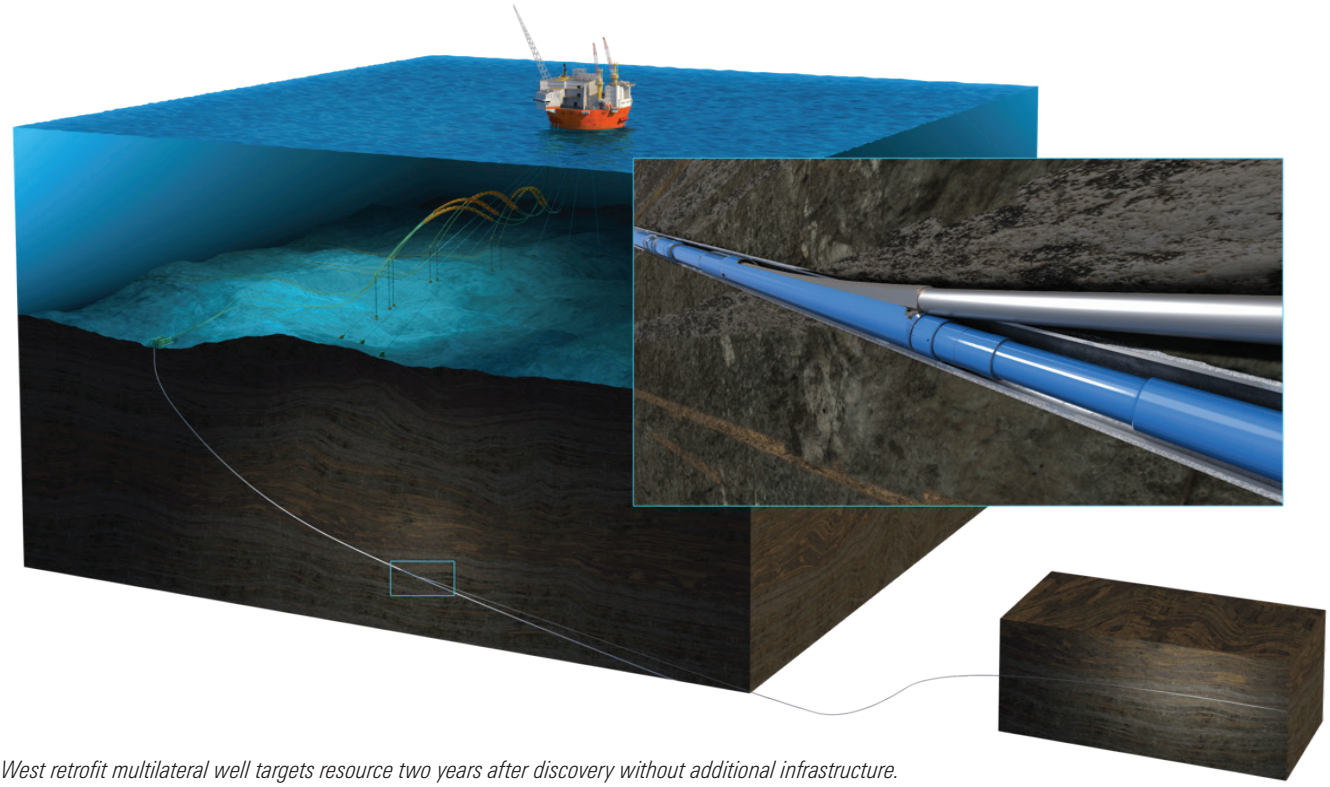
To mitigate the risks for this subsea development, Schlumberger experts worked in constant collaboration with engineering teams from Vår Energi and its partners to optimize final completion design and develop comprehensive procedures and contingencies.

COVID-19 restrictions began after the project was underway, adding the additional challenge of no international personnel mobilizations, so remote monitoring and other means of digital validation were used to verify the quality of some components and systems. System integration tests verified interoperability and functionality with third-party gauges and subsea tree.

Save time and capex while achieving accretive production

The new laterals were added to the existing wells, and the RapidX junction was installed and tested. The intelligent completion was installed and independent branch production initiated.

In addition, this operation has an estimated savings for the customer of 5,000–10,000 t of CO_2 equivalent emissions (CO2e)[†] when considering the avoidance of drilling two new subsea wells and procuring and installing the associated infrastructure.



Goliat West retrofit multilateral well targets resource two years after discovery without additional infrastructure.

[†] The estimated emissions total savings is based on assumptions as to what the alternative field expansion solution would potentially be. The estimation's main contributors are embodied sources and construction activities for which we used The Inventory of Carbon and Energy (also known as the ICE database), the 2020 UK DEFRA conversion factors, and Mineral Products Association (MPA) Fact Sheet 18: Embodied CO2e of UK Cement, Additions and Cementitious Material.

slb.com/multilaterals

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