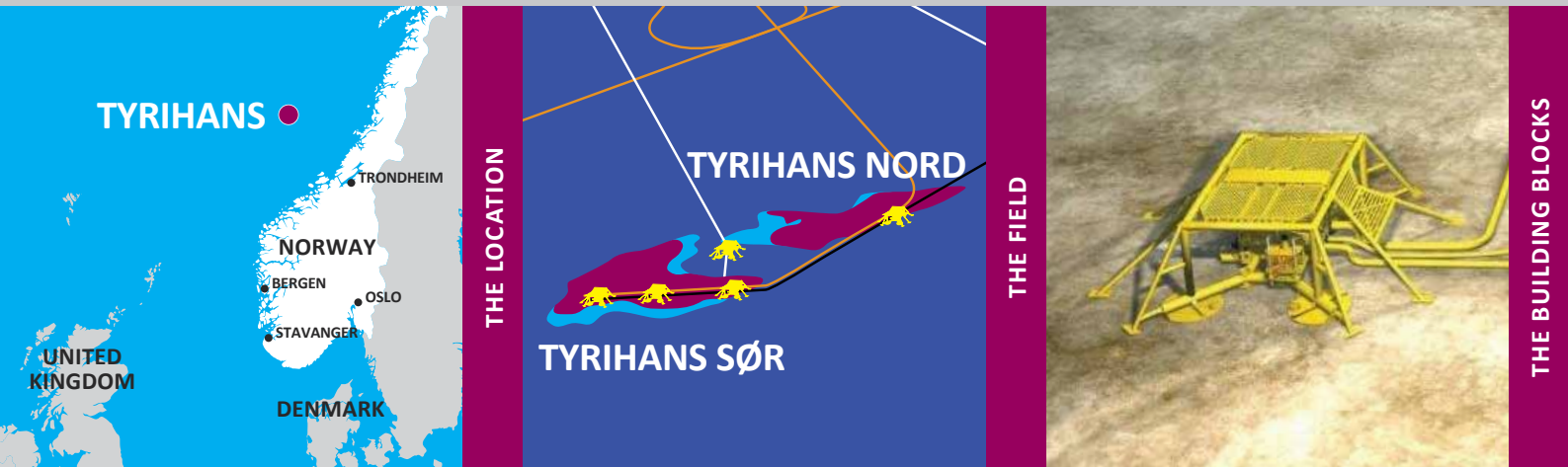




The Tyrihans Case Study



A pathway to lower-carbon oil and gas production

- ✓ Measure and manage
- ✓ Start early
- ✓ Be creative
- ✓ Look ahead

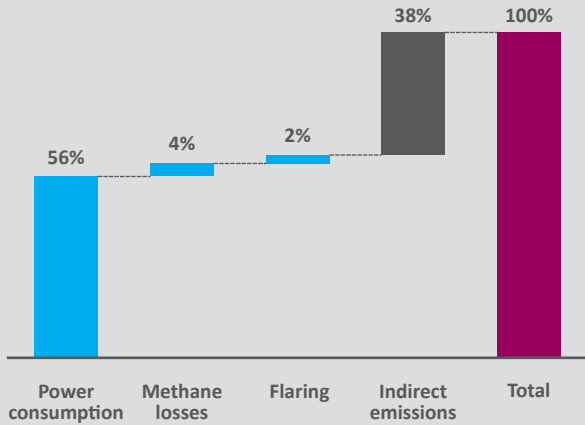
subsea 7

FMC Technologies

Nexans


Statoil

Breakdown of Tyrihans carbon footprint into emissions categories



Working together on a unique project

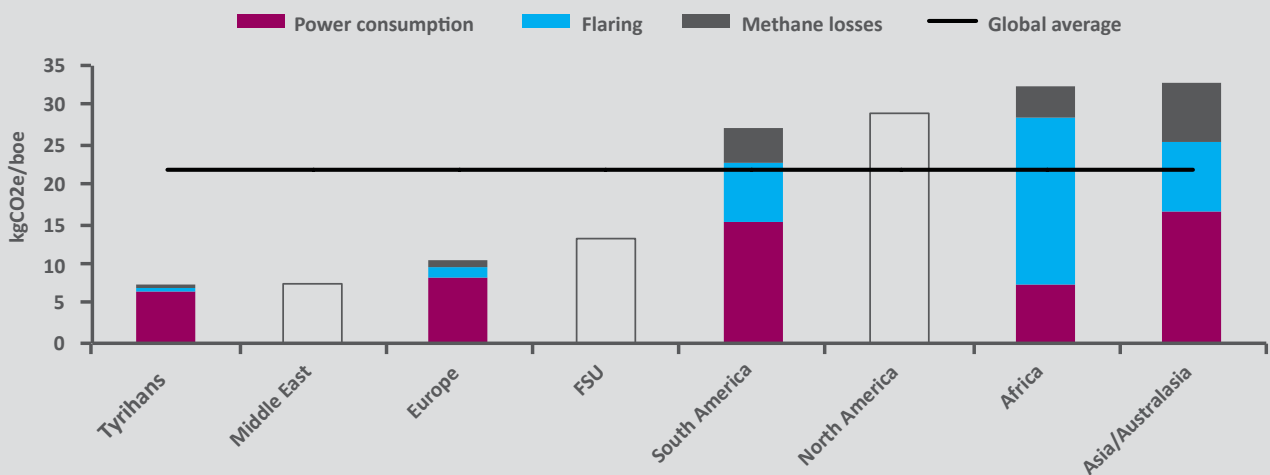
- Statoil, Subsea 7, FMC Technologies and Nexans partnered with Xyntéo to form this Global Leadership & Technology Exchange (GLTE) project. This life-cycle study adds insight to an area where little public information is currently available.
- Using Xyntéo’s Carbon, Decision and Scenario Mapping methodology (CDS), we mapped the carbon footprint of the Tyrihans oil and gas field over its entire life cycle and its supply chain; linked emissions to the decisions that led to them and explored less carbon-intensive alternatives for future developments.

Measure and manage: Tyrihans scores high in carbon efficiency

The estimated carbon intensity of Tyrihans is 11.7 kg CO₂e/boe, including direct and indirect emissions. When comparing direct emissions only, Tyrihans scores about 67 per cent lower than the global average.

This shows how Statoil, with the help of advanced products and services from some of the world’s most innovative suppliers, is on its way to meeting its goal of becoming an industry leader in carbon efficiency.

Global comparison of Tyrihans direct emissions



When comparing emissions from different regions, it is important to note that the infrastructure and field characteristics vary. Blank bars indicate insufficient public data.

Start early: Tyrihans sets the tone, inspiring others to follow

To reduce the carbon emissions of a new field, it is crucial to take them into account early in the planning process before a concept is selected. We found that about 90 per cent of all Tyrihans carbon emissions are part of Statoil's environmental management process, almost all of which are included early on. This could inspire other companies, including suppliers, to create similar carbon management strategies.

But does the system work? The lower carbon intensity of Tyrihans compared with other fields indicates that it does – measures are implemented, resulting in lower carbon emissions.

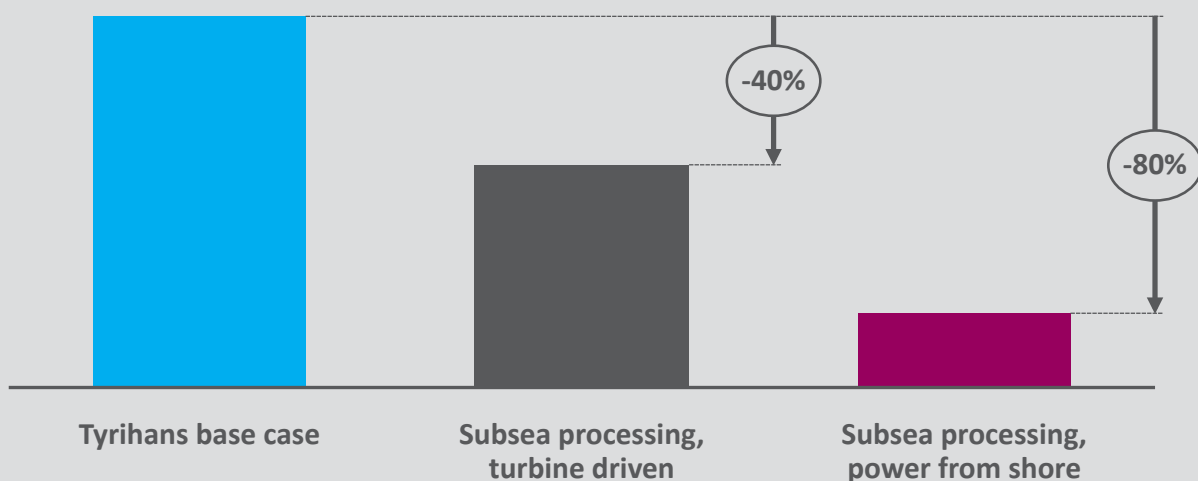
Be creative: The beauty of subsea processing

Subsea concepts create opportunities and can be used to develop new fields in deeper waters and more remote areas, to increase recovery from existing fields and to enable marginal developments. With this in mind, the project partners chose to look at subsea processing for “what if” scenarios.

Our analysis indicates that a hypothetical switch to complete subsea processing at Tyrihans would both lower the carbon intensity and increase the recovery of oil and gas. We found that a turbine-driven subsea processing station could potentially reduce the carbon intensity of direct emissions by up to 40 per cent and by up to 80 per cent if it is powered by electricity from shore.

This underlines the importance of seeking smarter solutions and challenging existing, more conventional concepts to be better equipped for a lower-carbon future.

Emissions abatement is possible



This figure shows the potential for reducing the carbon intensity of Tyrihans using subsea processing. Only direct emissions have been included here. The subsea scenarios are hypothetical and are not based on actual plans for the further development of the Tyrihans field.

Look ahead: How to overcome hurdles to carbon efficiency

How much progress can we expect? The following hurdles to carbon efficiency must be addressed:

- Capital expenditure reductions are increasingly seen as important, making it more difficult to justify large upfront spending for carbon abatement measures.
- Carbon regulations and policies in the oil and gas industry vary greatly from country to country – with few or weak incentive mechanisms in place.
- The lack of a globally harmonised carbon regime makes it less likely for the oil and gas industry and its suppliers to spend a larger share of their resources on carbon efficiency measures.

The Tyrihans CDS study illustrates that one way forward could be to leverage the power of collaboration. Bringing the experience and innovative capacities of a group of suppliers into a joint process is likely to open up new solutions and improve the overall management of carbon emissions, which is often based on the need to optimise energy use. We therefore believe that the Tyrihans CDS study could serve as a model for optimising the carbon efficiency of new solutions.

About GLTE

The Global Leadership & Technology Exchange (GLTE), founded by the international strategic advisory firm Xyntéo, is a one-of-a-kind partnership that brings together world-class businesses engaged in the pursuit of low-carbon growth and innovation. It currently includes Det Norske Veritas (DNV), Deutsche Bank, the Electric Power Research Institute (EPRI), Ericsson, Gazprom, Hess Corporation, PG&E Corporation, Royal Dutch Shell, Siemens, Statoil, Subsea 7, Tata Consultancy Services, Tata Sons, Unilever and Wilh. Wilhelmsen.

About the project partners

Statoil is the developer and operator of the Tyrihans field. The international energy company has operations in over 30 countries and more than 35 years of experience from oil and gas production on the Norwegian continental shelf.

Subsea 7, which installed the subsea infrastructure at Tyrihans, is a seabed-to-surface engineering, construction and services contractor to the offshore energy industry worldwide.

FMC Technologies, which supplied subsea structures to Tyrihans, is a global provider of technology solutions for the energy industry. It designs, manufactures and services technologically sophisticated systems and products, such as subsea production and processing systems.

Nexans, which supplied subsea cables and umbilicals to Tyrihans, is a global player in the cable industry. With energy as the basis of its development, Nexans offers cables and cabling systems to the infrastructure, industry, building and local area network markets.
