SUBSEA LØSNING FOR SNORRE EXPANSION PROJECT (SEP)


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Snorre-area and infrastructure

Rettighetshavere:

- Statoil
- petoro
- ExxonMobil
- Idemitsu Petroleum Norge
- DEA
- core energy

* Core Energy ikke rettighetshaver i Tordis og Vigdis
Background

And 100,000,000 more could be produced with Snorre extended lifetime to 2040+ and the SN2040 project.
**Snorre Expansion Project (SEP)**

- Drainage strategy: Water alternating Gas injection (WAG)
- Max production: 60,000 bbls/day
- Total recoverable volumes: approx. 30 MSm³ (180 mill bbls)
- Start-up: 01.01.2021

- 6 off four-slot subsea templates tied back to Snorre A
- Topside Modifications on Snorre A
- Drilling of 22 wells - Production and Water/Gas injection
- Gas Import pipeline Snorre A – Gullfaks A
- Oil Export to Gullfaks and later Mongstad
SUBSEA KONSEPT FOR SNORRE EXPANSION «MER ENN SUBSEA»

- Topside mod.
- Boring og brønn
- Subsea
Dagens SEP Subsea layout
FORDELING - SUBSEA DISIPLINENE

- **Subsea Produksjons System**
  - 6 stk 4-slots templates
  - 6 stk subsea manifolder (Prod/WAG)
  - 22 stk juletresystem
  - Subsea Kontroll System
  - Oppkoblingssystemer (Tie-in)

- **Rørledninger, Stigerør, Umbilicals**
  - Statiske umbilicals
  - 2 dynamiske umbilicals
  - Produksjon, gass og vanninjekson flowlines
  - 5 fleksible risere / riserbasestrukturer
  - Y og T-er på rørledninger
  - 4 rørledningsisolasjonsventiler (SSIVs)
  - Gass import rørledning fra SNA til Gullfaks
Typical four slot integrated template structure
Statoil’s corporate ambition and directions for simplification, standardisation and industrialisation (SSI)

**Simplify**
- Design-to-cost - always minimum solution as starting point
- Drive for significant efficiency improvements in all cost elements

**Standardise on the simplified solution**
- Standardise on cost effective design and limit variations
- Extensive effort to remove company’s specific requirements

**Industrialise**
- Systematically strive for re-use and repeatability
- Maximise use of industry standards and supplier solutions
Building blocks of Statoil’s standardisation and industrialisation strategy

Setting the standardisation and industrialisation ambition and direction for Statoil (CEC)

Setting the standardisation and industrialisation ambition and direction per category

Involving the full set of relevant parties

Applying the end-to-end toolbox

1. Int. and ind. standards
2. Requirements
3. Design to cost
4. Re-use at all levels
5. Inquiry
6. Contract models
7. Execution model

Statoil standardisation & industrialisation

Facilities & Subsea

D&W

OPS

Statoil assets

Statoil disciplines

Contractor & suppliers

Peers

Statoil projects
Standardized and configurable

- System is configured to field specific requirements
- Building blocks are standard – but configured as required to meet field requirements, i.e. reservoir conditions, seabed conditions and host platform characteristics

<table>
<thead>
<tr>
<th>System configurations</th>
<th>Building blocks</th>
</tr>
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<tbody>
<tr>
<td>Oil production</td>
<td>4 slot templates</td>
</tr>
<tr>
<td>Oil production w/gas lift</td>
<td>Single slot templates (satellites)</td>
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<tr>
<td>Gas production</td>
<td>Wellhead</td>
</tr>
<tr>
<td>Gas injection</td>
<td>Tubing Hanger</td>
</tr>
<tr>
<td>Water injection</td>
<td>Xmas Tree</td>
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<tr>
<td>Combinations of above</td>
<td>Choke Module</td>
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<tr>
<td></td>
<td>Manifold</td>
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<td></td>
<td>Production Control System</td>
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<tr>
<td></td>
<td>Tie-in tool (normally rented)</td>
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Example - Standard ITS (Integrated Template Structure)

Manifold configurations

- Prod
- Prod+GL
- Prod+GI+GL
- WI
- WAG (WI/GI)

X-Mas tree configurations

Configuration

Standard components

Manufacturing
1. Forging JIP (DNV GL)
   - Phase 1 issued as DNV GL RP0034, phase 2 in progress.
   - Will enable Aker, DrilQuip, FMC, GE, OneSubsea to stock forging
   - Will enable 8-9 ms reduced delivery time for wellheads, subsea trees etc.

2. Well integrity JIP Phase 2 (DNV GL)
   - **Strategy:** build consensus in the industry
   - Improve knowledge on methodology and parameters through dedicated discussion and agree on how to implement the findings
   - Benchmark proposed methodologies against full scale measurements

3. Documentation JIP (DNV GL)
   - A Recommended Practice (DNV GL RP0001) will be generated to describe a basic set of subsea documentation for specific components.
   - At a later stage, this RP may be included in industry guidelines, such as NORSOK U-001, and as a future ISO standard.
   - Phase 1 results (2014) have been incorporated in TR2381.
   - Phase 2 results (2015) present on internal sharing.

6. JIP proposal DNV GL
   - **Subsea welding JIP - Standardization of welding requirements for subsea components**
   - Today, welding procedures for subsea equipment are typically qualified to ASME, ISO, API or DNV GL standards. However, most major operators have their company-specific requirements for both the materials used as well as the qualification of welding procedures. Further there are also unique requirements for quality assurance. This project aims to harmonize welding requirements for subsea components by standardizing and potentially pre-acknowledging which reduces costs and delivery times. In order to address this, the DNV GL is proposing a Joint Industry Project (JIP) to harmonize the welding requirements.
   - **Latest project update:** Launch meeting
     - The launch meeting will be held in Oslo February 11, 2016, 10:00 am - 12:00 am (Norwegian time).
Oppsummering:

• De vanskelige fatene gjennstår å få produsert.
• Snorre Expansion Project vil bidra med betydelige ekstra volumer og aktivitet i bransjen hvis realisert.
• Subsealøsning «mer enn subsea»
• Prosjektøkonomien enda en utfordring.
• Forenkling, standardisering, industrialisering og samarbeid på tvers i bransjen viktig for å få til en nødvendig varig endring i kostnadsnivå.