Subsea prosjekter – Muligheter og utfordringer

Rune Mode Ramberg  Chief Engineer  Subsea Technology and Operations
Ole Økland Leading Advisor Subsea Processing
Statoil ASA
Overview of Statoil subsea fields in operation
Operator of 545 wells + Service provider for 9 wells (per 01.07.2016)

50 % of Statoil's production
2. largest subsea operator in the world
Subsea timeline

1. generation
- Gullfaks
- Tommeliten

2. & 3. generation
- Sleipner og Statfjord sat.
- Heidrun, Norne
- Yme, Lufeng, Åsgard,
- Gullfaks sat2, Sygna, Sigyn,
- Troll

3. & 4. generation
- Kristin, Morvin, Snøhvit, Ormen Lange
- Vega, Gjøa

Fast track I, II and III
- Aasta Hansteen
- Tordis SSBI, Tyrihans, ÅSC, GSC
- Pazflor, Marlim; Rosa;Clov, J&amp;SM, Julia, OL Pilot.

Subsea catalog and Subsea processing

Industrialization
- 2015-2025

Cost reduction, Collaboration
- Copy /reuse

BROWNFIELD Solutions
- Njord, Visund +

SUBSEA-TO-HOST
- Barents sea + 23. round

DEEP WATER
- TGP, BdN, Brazil

JC, JS fase 2, Grane N,
- Trestakk, Vigdis Booster,
- Hoop, TGP, BdN, Brazil
Project high-lights

Recent achievement: Åsgard subsea compression
Execution: Johan Sverdrup
Pre-sanction: Johan Castberg
Future opportunities: BM-C-33 & BM-S-8
Competitive at all times

**Increased project robustness**

<table>
<thead>
<tr>
<th>2013</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>70 USD/bbl</td>
<td>41 USD/bbl</td>
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</table>

*Average break-even price project portfolio*

**Increased drilling and well efficiency**

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Meters per day</td>
<td>Days per well</td>
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<tr>
<td>50 %</td>
<td>30 %</td>
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</tbody>
</table>
Statoil’s corporate ambition and directions for simplification, standardisation and industrialisation (SSI)

Deliver year 2000 cost-level again - more than 50% reduction!

**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
NCS: Many small marginal discoveries
Few large and many small projects pre Concept select; - maturing new, competitive business cases is key

**Portfolio characteristics:**

- Large field developments ongoing
  - Johan Sverdrup
  - Gina Krogh
  - Aasta Hansteen
  - Mariner
  - Peregrino II
- Large sub-sea tie-back portfolio
- Large modification portfolio
- Varied size, complexity and profitability
- Key pre-sanction assets in:
  - Brazil
  - East Canada
  - Tanzania
  - GOM
Subsea solutions

- Less scope
- Less Capex and Opex
- Less environmental footprint
- Open to standardize
- Remote operation

- Cost efficient and reliable operation
- Life extension of existing production systems
- IOR from subsea wells
- Access into new areas
- Standardisation to increase efficiency
SPS potential demand, 2018+

Competitiveness is key to future activity level
Subsea processing plants in Statoil

**Lufeng**
Seabed pumping
- Installed 1997
- 12 years in operation
- Enabler for FD

**Gullfaks**
Water Separation
- Installed 1999
- 10 000 bopd

**Asgard**
Compression
- Installed 16 September 2015
- Inc. recovery: 306 mill boe

**Troll**
Water Separation
- Installed 2007
- Designed to increase oil recovery from 49% to 55%

**Tordis**
Separation and boosting
- Designed to increase oil recovery from 49% to 55%

**Tyrhians**
Sea water injection
- Installed 2009
- Design: 10% increase in total recovery

**Tyrihans**
Sea water injection
- Installed 2009
- Design: 10% increase in total recovery

100% Availability
ÅSC - Module Installation in 2015 (As Built)

First Gas 14th of September
Train #2 12 days faster than Train #1
Module Installation 70 days faster

Train No. 1

Train No. 2

May June July August September


CM 08.09.15

May
June
July
August
September

Statoil
Statoil's offshore business

Deeper water, and/or longer tie-backs
Cap-X | Standardisation, technology and innovation in practice

- Subsea production system
- Subsea standardisation vehicle
- Innovation platform
- SURF cost cutter
- Subsea well cost cutter
- Shallow reservoir solution
All Electric

• From All Hydraulic
  − to Electro Hydraulic
  − to All Electric

• All major operators assess All Electric Technology

• All SPS Vendors have developed a strategy for All Electric

• There is a competitive situation in the supply chain

• DC/FO technology is seen as Subsea All-Electric enabler

• Reduce Cost (Capex and Opex)

• Improve HSE
BCT SUBSEA

Cleaner, Leaner, Smarter

- Staircases with implementation roadmaps produced for all «subsea» topics
- Subsea Factory strategy developed in 2011
- Strategy change from taking subsea longer-deeper-colder to cleaner-leaner-smarter.
- The two first subsea gas compression stations in production

Achievements 2012-2015

<table>
<thead>
<tr>
<th>2012 ÅSC</th>
<th>2015 ÅSC</th>
<th>2015 GSC</th>
<th>2015 Aasta Hansteen</th>
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<tbody>
<tr>
<td>Retrofit Tee hot tap</td>
<td>Subsea compression train</td>
<td>Subsea compression station</td>
<td>Subsea on deep water</td>
</tr>
</tbody>
</table>
Innovation and technology development | The future?

- Subsea satellite Cap-X
- Subsea template
- Seawater cleaning
- Control cable
- Gaslift
- Oil pump
- Water injection pump
- Active cooler
- Unmanned wellhead platform
- Unmanned processing platform
- Power umbilical
- Oil export to host
- Gas export to rich gas pipeline
- Subsea template