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• Statoil’s Subsea Factory
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A technology focused upstream company

Corporate strategy

- Continue portfolio management to enhance value creation
- Revitalise NCS with high value barrels
- Apply technology to expand in unconventionals
- Production above 2.5 mill boe/day after 2020
- Develop a leading global exploration company
- Create value from a superior gas position
- Build material positions in 3-5 offshore business clusters

Technology strategy

- Seismic imaging and interpretation
- Drilling and well construction
- Reservoir characterisation
- Subsea technology

Production above 2.5 million boe/d in 2020
Technology for safe and environmental friendly production from ANY field

- Business Case
  - Gas condensate
- Business Case
  - Field life extension
- Business Case
  - Sensitive areas

- New field development concepts
- Increased production efficiency
- Subsea and in-well processing
- Gas processing and LNG
- Power supply and distribution
- Subsea technology
- Automation/unmanned facilities
- Condition monitoring – sensor technology
- Flow modelling and flow assurance
- Integrity management and risk reduction
- Leakage prevention and detection
- Arctic marine operations

Prioritized areas for governmental funded R&D:

- Multiphase pipeline flow and flow assurance
- Subsea power supply and distribution
- Oil/gas/water separation
- Arctic marine operations
- Integrity management and monitoring
- Subsea gas processing
- Advanced sensors for control and early fault detection

OG21 TTA4 Future technologies for production, processing and transportation “Summarized in one figure”
Statoil’s subsea future
- building on the existing toolbox

- Lufeng: Multiphase pumping
- Troll: Water separation
- Tordis: Separation and... 
- Tyrihans: Sea water injection
- Gullfaks: Compression
- Åsgard: Compression

The Statoil Subsea Factory

- Realise by 2020
- Towards 60% recovery
- Improved CAPEX OPEX

HSE
Longer, deeper, colder, heavier and older
Potential subsea factory developments
Defining Subsea Factory

New / improved factory building blocks

**Short term**
- **BROWNFIELD FACTORY**
  - FOR INCREASED RECOVERY
- **SUBSEA-TO-HOST FACTORY**
  - FOR DE-BOTTLENECKING
- **EXTENDED REACH FACTORY**
  - FOR LONG TIE-BACKS

**Medium term**
- **DEEP WATER FACTORY**
  - TO ENABLE 3000m PRODUCTION
- **HEAVY OIL FACTORY**
  - TO ENABLE VISCOUS OIL TIE-BACK

**Long term**
- **ARCTIC FACTORY/ SUBSEA TO GAS MARKET**
- **ARTIFICIAL LIFT ESP & DUAL BOOST**
- **COMPACT SEPARATION**
- **DEEPER INSTALLATION & IMR**
- **HIGH VISCOSITY BOOSTING**
- **LONG DISTANCE OIL TRANSPORT**
- **HIGH CAPACITY BOOSTING**

**Classification: Open**
Subsea Factory - Key Building Blocks

- System design
- Monitoring
- Installation, intervention & IMR
- Controls

Supporting systems:
-Cooling
-Boosting
-Water handling
-Structures Pipelines & Risers
-Subsea Field centre technology

Main processing systems:
-Gas compression
-Separation
-SPS
-Storage
-Gas Treatment
-Oil Treatment
-Power transmission & distribution
-Flow Assurance
Subsea Factory - Key Building Blocks

Main processing systems
- Boosting
- Gas compression
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- Power transmission & distribution
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- Oil Treatment
- Gas Treatment
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Supporting systems
- System design
- Monitoring
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2013-2012
Åsgard Subsea Compression project

- 280 mill bbl additional reserves
- 2 x 11.5 MW subsea compressors
- 40 km step out
- Water depth 250-325 meters
- Production 21 Mill Sm³/d
- Start-up 2015
World class recovery rate

Gas compression

- Recovery rate PDO: 30%
- Recovery rate 2011 (expected): 50%
- Future ambition: 60%

Statoil
Key building block

Subsea compression

Åsgard Subsea Compression Project
Wet gas compression

**Goal:** Simplified subsea compression system based on centrifugal compressor technology (high dp, high flow)
Gas compression
Persistence is key
Subsea gas processing

- Long distance single phase transport
  - Water dew point control
  - Hydrocarbon dew point control

Gas compression
Gas treatment
Statoil Technology development and implementation?

• Governing document: FR12 - Technology Development and Implementation

• Why focus on first use implementation of technology (FUIT)?
• Why focus on multi use implementation of technology (MUIT)?
The Subsea Cost Challenge
Global E&P subsea expenditure ($ billions) going forward

SURF: subsea installation, umbilicals, risers, and flowlines
Subsea equipment: trees, wellheads, manifolds, etc.
Subsea services: inspection, maintenance, and repair

Source: DCube by Rystad Energy
Challenges:
Profitability in the industry is under pressure
Despite increase in oil price

Higher investment cost, reduced production

Total return vs. other industries

Kilde: Statoil; Wood Mackenzie; Bloomberg; JP Morgan; Company reports.
Peer group inkluderer BG, BP, CVX, COP, ENI, XOM, RDS, STL, TOT
Towards The Subsea Factory: How do we reduce cost?
Standardization of interfaces

1. Requirements
2. Adapters
3. Interfaces
The Future in Subsea (Gas) Processing?

- Will depend on profitable technology solutions and cost sharing
- The ability and willingness to establish industry standards
- Solid business cases
- Willingsness (by O&G industry) to take technology bets