Barents Sea Gas Infrastructure

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CFO and Executive Vice President
The petroleum sector – Norway’s largest industry

2013

- 76 fields are in production – more than 40% of the discovered resources are produced
- 55 companies are license holders on the Norwegian Continental Shelf (NCS)
- 42 wells drilled in 2012
- The investment level in 2012 was more than 20 B€ (incl. exploration cost)
- Oil production (incl. NGL and condensate) in 2012 was about 1.9 million bbl/d
- Gas sale in 2012 was 114.8 GSm³
The integrated Norwegian gas transportation system

- Connected to all major gas-producing fields on the NCS
- 7,975 km of large-diameter, high-pressure pipelines
- Riser platforms
- Large processing facilities in Norway
- Receiving terminals in four European countries
- Connected to major downstream gas transmission systems in Europe and the UK
Several field- and infrastructure development projects are ongoing on the NCS

- 16 fields under development
- 84 fields undergoing evaluation
- New gas and oil infrastructure projects in the Sleipner- and Tampen area
- Several upgrading and robustness projects, e.g. Kårstø expansion project, Gassco Emden project
- Polarled investment decision 1Q 2013
- Barents Sea Gas Infrastructure (BSGI) forum established

Source: NPD, Gassco
On the Utsira High in the North Sea significant oil and gas discoveries have been made - after 40 years of exploration

• The Gudrun field will start the production in 2014. Light oil from Gudrun will be processed at Kårstø.

• Edvard Grieg and Draupne discoveries are planning export of gas via the SAGE system to UK with start-up in 2015 and 2016 respectively.

• Johan Sverdrup, one of the largest discovery ever made on the Norwegian Continental Shelf, is planned to start-up in 2018. The gas and oil export solutions are currently being studied.
The Aasta Hansteen field development and the Polarled pipeline together with modifications at the Nyhamna gas plant, will be one of Europe's largest industrial projects the next years.

- First crossing of Artic circle with a subsea pipeline.
- Deepest field development and pipeline on NCS.
- Investment decision 1Q 2013, start-up 2016.
Development of the resources in the Barents Sea require infrastructure solutions

Several promising discoveries are made in the Barents Sea the recent years.

The industry interest and expectations in the Barents Sea is high.

The exploration activity in the Barents Sea is extraordinary high.

Long distance to existing infrastructure require development evaluation in an area perspective.
Gassco has together with the industry started a significant work program for the Northern areas.
Technology neutral evaluation of transport solutions

Potential gas production from the Northern areas for different resource outcomes
Maximum daily production, MSm3/day

Focus on understanding of the transportation needs in and from the Barents Sea

Evaluation of applicable transport solutions for different resource and market scenarios
1 Significant exploration programs - will yield new information on resources
Existing discoveries may justify a new gas transport solution

- Illustrative transport costs from the Barents Sea, tariffs in NOK/GSm³

**Norvarg/Ververis outcome**

- **From Melkøya to market**
  - Low: 0.38
  - Medium: 0.31
  - High: 0.28
  - Current Åsgard: 0.32

- **From Norvarg/Ververis to market**
  - Low: 0.52
  - Medium: 0.40
  - High: 0.35
  - Current Åsgard: 0.32

**Low:** 50 GSm³  
**Medium:** 100 GSm³  
**High:** 150 GSm³

100 GSm³
Impact of and on existing system – gas resources from the north will impact the investment decisions

**Description**

**Heimdal/Vesterled/St. Fergus**
- The utilization of the Heimdal-Vesterled-St. Fergus chain is dependent on new resources after 2020
- Investments required in the Heimdal-Vesterled-St. Fergus chain. Decisions dependent on the utilization of the infrastructure

**Kårstø**
- The supplies from existing areas indicate a gradual decline of the utilization of Kårstø from 2021 and onwards
- Investments to maintain capacity or shut in capacity will be dependent on additional resources
4 Polarled precedence: 8-10 years to startup

- Halten-Nordland Area Study
  - Victoria
  - Aasta Hansteen
  - Linnorm

- NSGI Pre Feasibility (DG1)
  - Victoria
  - Aasta Hansteen
  - Linnorm

- NSGI Feasibility (DG2)
  - Aasta Hansteen
  - Linnorm
  - Constrained Area B volumes
  - Upside volumes: Gro, Dalsnuten

- NSGI Concept decision (DG3)
  - Aasta Hansteen
  - Linnorm
  - Zidane
  - Constrained Area B volumes
  - Upside volumes: Asterix, Gro

- NSGI FEED (DG4)
  - Aasta Hansteen
  - Linnorm
  - Zidane
  - Constrained Area B volumes

- Production startup
  - Kristin volumes from Oct. 2016
  - Aasta Hansteen startup Q3 2017
Further mature the resource basis in the Barents Sea and evaluate the need for increased export capacity

BSGI Forum

Establish sponsor group

Confirm feasibility

Concept selection

FEED

Indicative Barents Sea infrastructure schedule

Potential timeline of events

NPD Barents Southeast est.

Awards 22. license round

Barents Sea Southeast opening

Awards 23. license round

~25 wells drilled - new discoveries

New Barents gas transport
How we work

Barents Sea Gas Infrastructure Forum (steering committee)

BSGI secretariat (Gassco)

Resources and production

Technology

Market

Gas transport solutions

NCS synergies

Northern Area considerations
Illustration of potential transport solutions for the northern area
## A potential Barents Sea pipeline vs. other NCS pipelines

<table>
<thead>
<tr>
<th>Pipeline</th>
<th>Length in kilometers</th>
<th>Route</th>
<th>Startup year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vesterled</td>
<td>350</td>
<td>• Heimdal – St. Fergus</td>
<td>1978</td>
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<tr>
<td>Norpipe</td>
<td>440</td>
<td>• Ekofisk – Emden</td>
<td>1977</td>
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<tr>
<td>Europipe II</td>
<td>650</td>
<td>• Kårstø – Domum</td>
<td>1999</td>
</tr>
<tr>
<td>Europipe I</td>
<td>660</td>
<td>• Draupner – Domum</td>
<td>1995</td>
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<tr>
<td>Åsgard Transport</td>
<td>707</td>
<td>• Åsgard – Kårstø</td>
<td>2000</td>
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<tr>
<td>Zeepipe I</td>
<td>814</td>
<td>• Sleipner – Zeebrugge</td>
<td>1993</td>
</tr>
<tr>
<td>Franpipe</td>
<td>840</td>
<td>• Draupner – Dunkerque</td>
<td>1998</td>
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<tr>
<td>Statpipe</td>
<td>880</td>
<td>• Statfjord – Kårstø – Ekofisk</td>
<td>1985</td>
</tr>
<tr>
<td>Barents sea pipeline</td>
<td>1000</td>
<td>• Melkøya – Åsgard Transport</td>
<td>?</td>
</tr>
<tr>
<td>Langeled</td>
<td>1200</td>
<td>• Nyhamna – Easington</td>
<td>2007</td>
</tr>
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Development of new oil and gas resources are dependant on cost effective solutions

Gasscos role is to contribute to maximize the value creation from the petroleum resources on the Norwegian Continental Shelf