

# Norwegian supply

Britt Aarhus



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1. The Norwegian petroleum sector
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3. Gas infrastructure projects
4. Gas transport outlook towards 2035





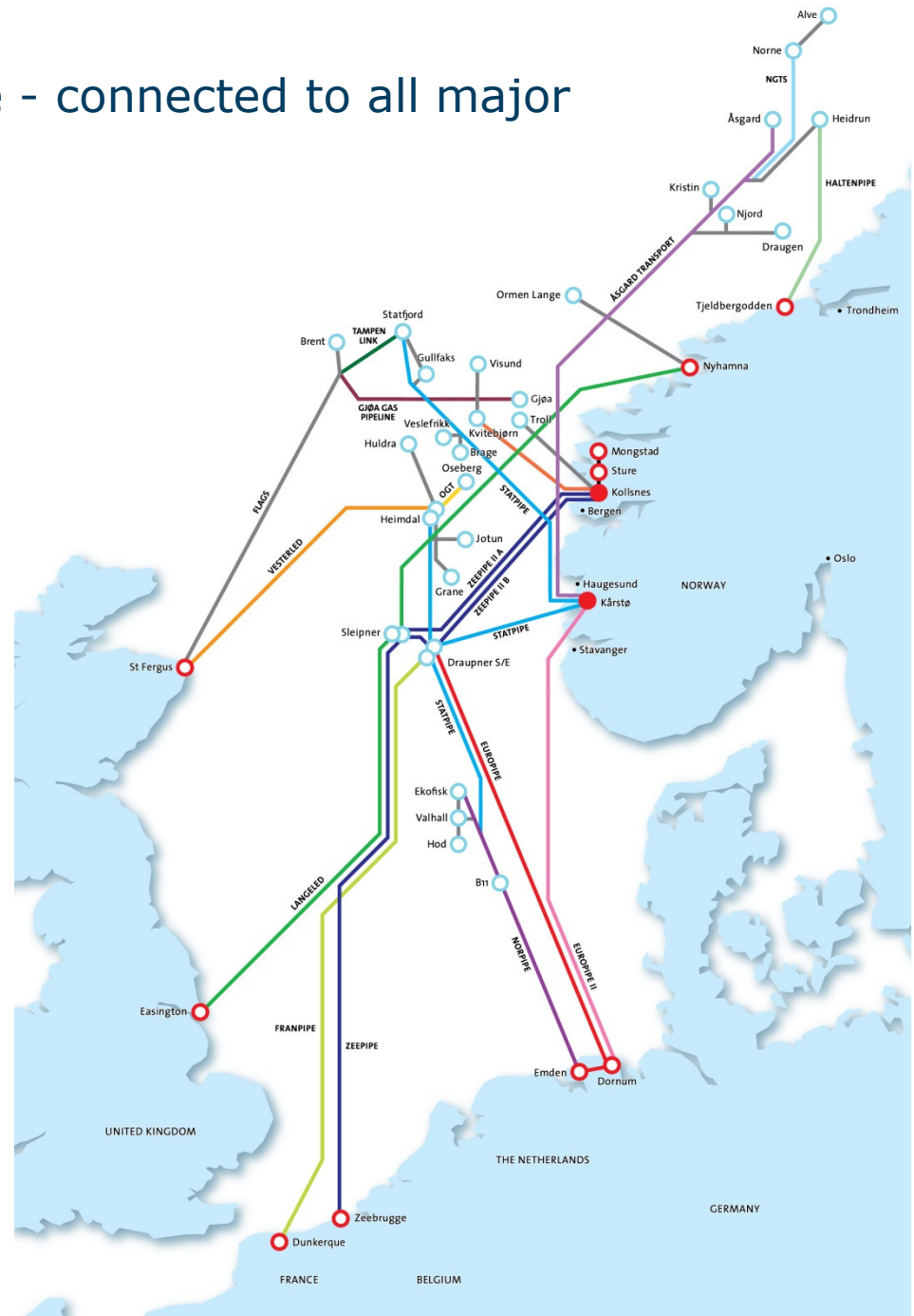
## Norwegian gas - a major source of energy to western Europe

- 117 BCM of natural gas was exported from the NCS during 2015
- Gas export to Europe is on the same level as Russia
- 82 fields in production

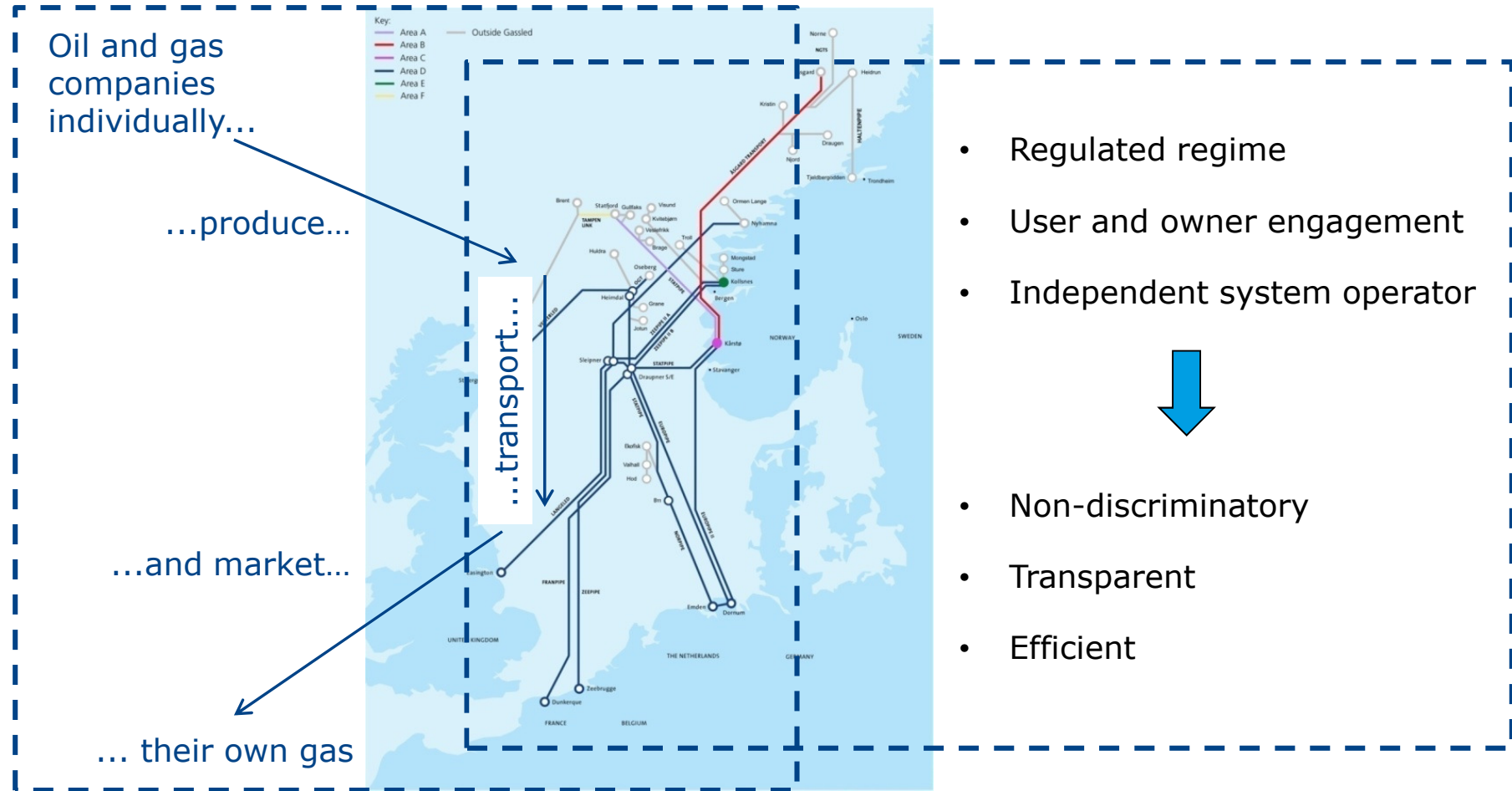


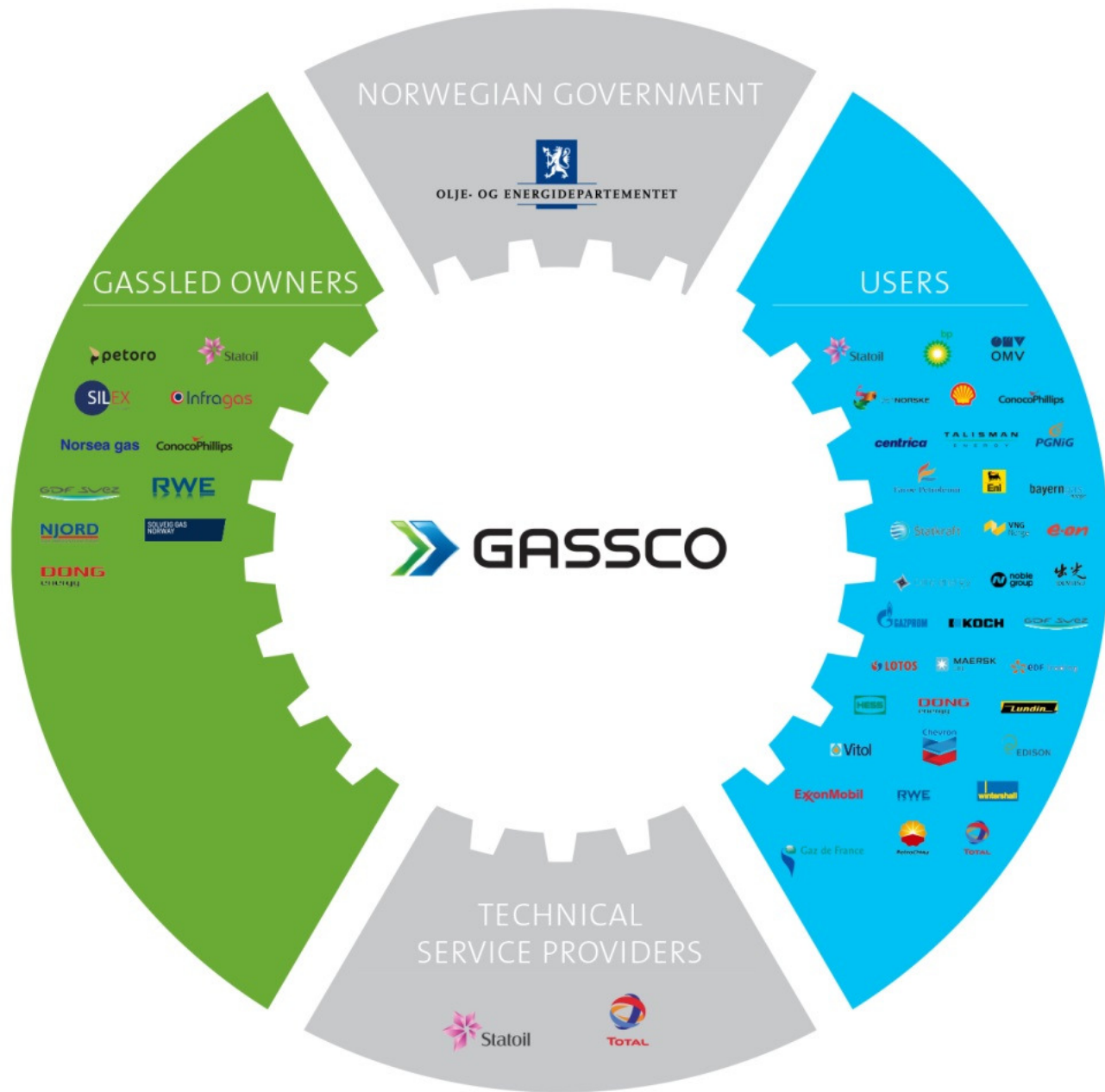
## The Norwegian gas infrastructure - connected to all major gas producing fields

- ... and connected to major downstream gas transmission systems
- 8000 km of large-diameter, high-pressure pipelines
- Riser platforms
- Large processing facilities
- Receiving terminals in four European countries

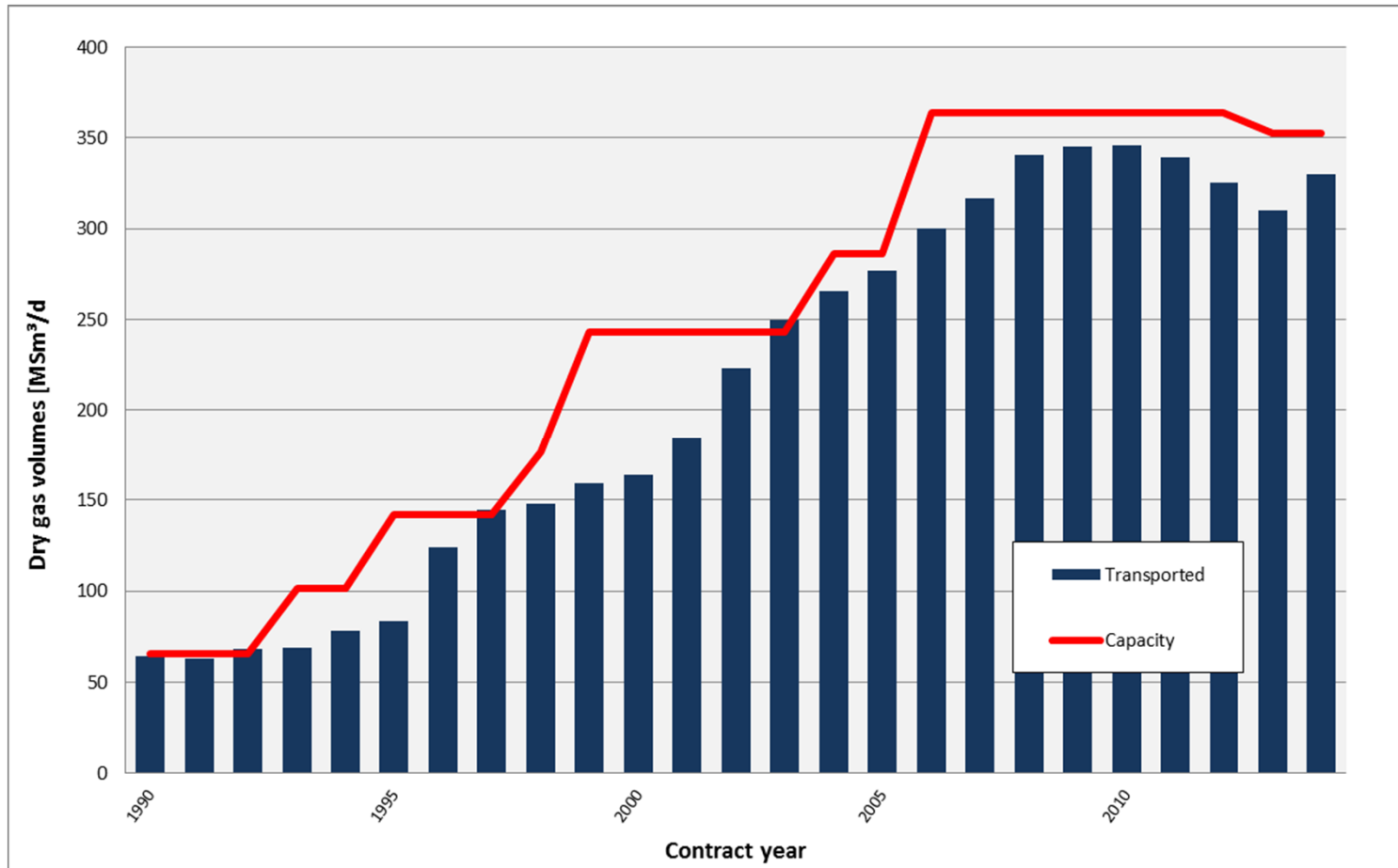


# Integrated gas infrastructure



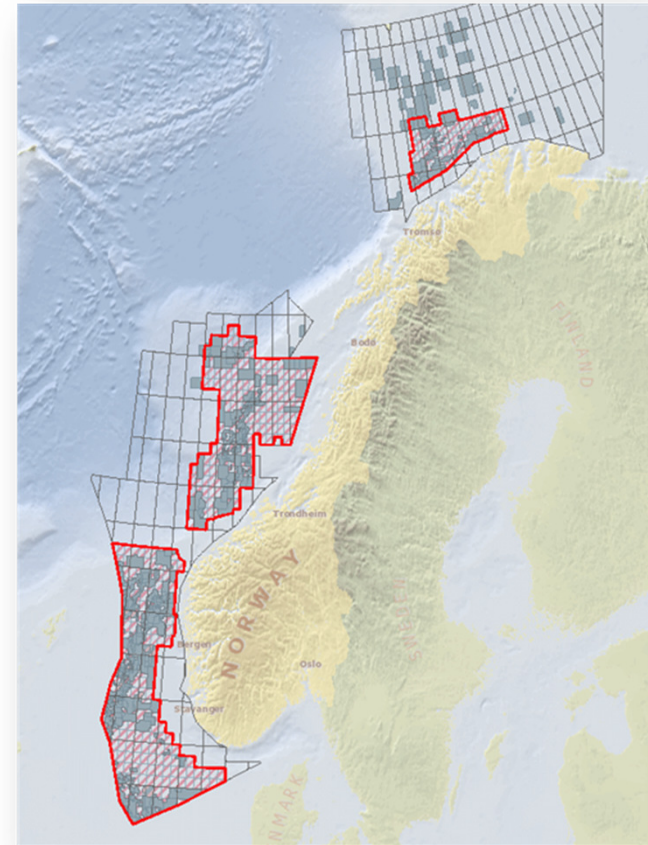


Utilisation is high  
- what about the future...



## The Norwegian Continental Shelf - three petroleum provinces

- The North Sea
  - Still going strong
- The Norwegian Sea
  - New and exciting projects
- The Barents Sea
  - The emerging area





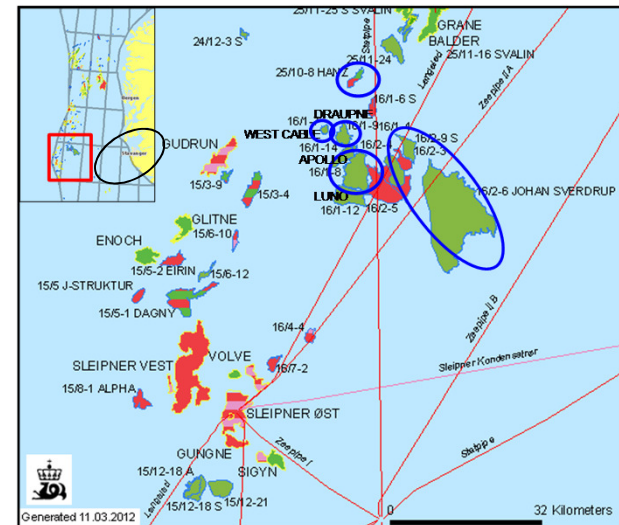
# North Sea - significant oil and gas discoveries have been made

## Edvard Grieg and Ivar Aasen

- Start-up in 2015 and 2016 respectively
- Gas will be export via the SAGE system to UK

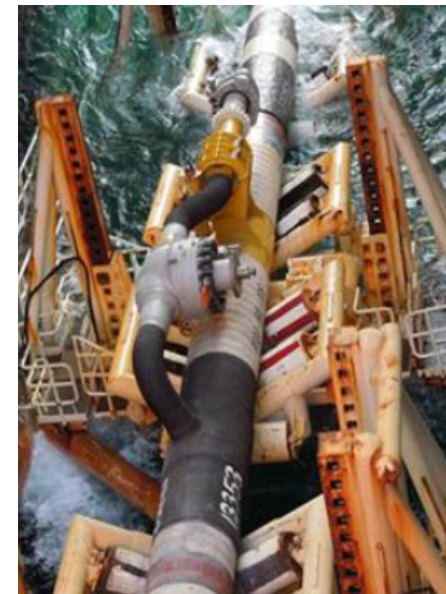
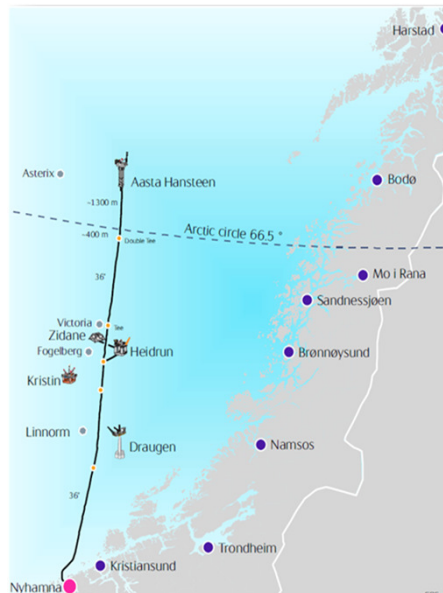
## Johan Sverdrup

- Start-up in 2019
- Oil and gas will be transported to Mongstad and Kårstø respectively
- Planning for 50 years of production - a peak production rate will represent 25% of the total oil production



## Norwegian Sea - extending the gas infrastructure further north

- Aasta Hansten and Polarled - one of Europe's largest industrial projects the next years
- First subsea pipeline crossing of the Arctic circle
- 1300m water depth
- Start-up 2017/18



# Barents Sea – an extensive study has been performed



## Barents Sea Gas Infrastructure

Barents Sea Gas Infrastructure



### 6 Main observations

**1. The Barents Sea has the resource potential to play a key role in sustaining NCS gas production during the 2020s and beyond.**

As natural gas production from other areas on the NCS is expected to decline in the early 2020s (ref. Figure 18), new production from the Barents Sea is the main opportunity reduce the decline.

The analysis show that in a p50 scenario (Scenario E), the Barents Sea could produce around 35 MSm<sup>3</sup> per day by the mid-2020s from the 2014 to 2017 exploration outcome and existing fields and discoveries (excluding Melkøya). This would represent an addition of about 15 percent to overall NCS natural gas production.

**2. Existing discoveries are not sufficient to justify investment in new gas infrastructure from the Barents Sea, both from a post- and pre-tax perspective.**

Postponing new developments and production until capacity frees up in existing infrastructure is a capital efficient, solid-return solution that currently is better than investing in new gas infrastructure (16 percent vs 9 percent real IRR post-tax, ref. Figure 8). Also pre-tax NPV at 7 percent discount rate is marginally lower for new infrastructure (24 vs 23 billion NOK), showing that more resources are required also for socioeconomic perspective.

**3. New gas infrastructure is socioeconomically more profitable in four out of five near-term exploration scenarios, and marginally lower than LNG lifetime extension in one of the scenarios. Both pipeline and LNG are relevant export solutions.**

Pre-tax NPV is positive for scenarios covering the entire range of scenarios for exploration up to 2017, and increases as further resources are added later (ref. Table 2).

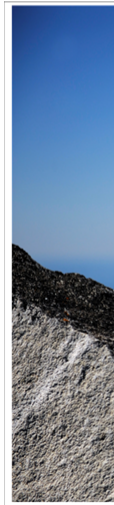
For e.g. Scenario E the 2014 to 2017 exploration portfolio is expected to double the natural gas resource base in the Barents Sea (ref. Figure 5). A new transport solution would yield a higher pre-tax NPV compared to lifetime extension of LNG facilities and delaying production (44 vs. 28 billion NOK at 7 real discount rate, ref. Figure 10).

**4. It will be challenging to realise new gas infrastructure from the Barents Sea from a post-tax project-robustness.**

Even if an investment in the gas value appears robust from a socioeconomic perspective, such projects would have to compete for capital among individual company's portfolio of development projects, where the project selection criteria may vary.

For e.g. Scenario E the 2014 to 2017 exploration portfolio it appears challenging to sanction the gas transport solution providing the highest pre-tax NPV as the LNG alternatives yield higher pre-tax and post-tax IRR (15 percent vs. 14 percent pre-tax and 15 vs. 10 percent post-tax ref. Figure 10).

**5. The rate of return from field investments could be improved if separated from investments in the gas transportation system with regulated return.**



**Barents Sea Gas Infrastructure (BSGI)**

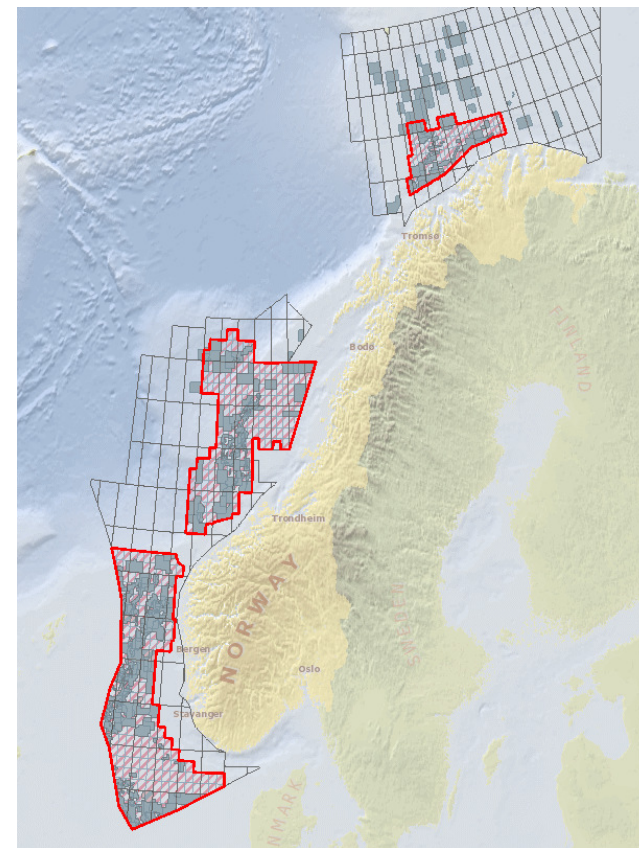
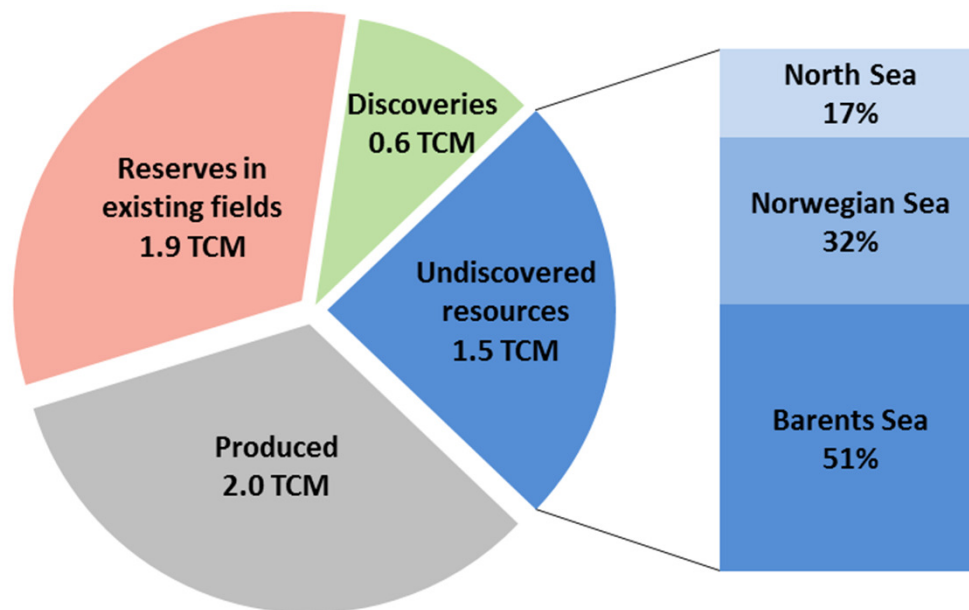

**Prosjektstøtte**

**Observatører**

**Statnett**

- New gas infrastructure is expected to be profitable based on results from near-term exploration program
- Challenging commercial decision
- LNG and pipeline are main alternatives

## Large remaining gas resources on the NCS



Source: NPD



## Outlook towards 2035 and beyond

