NORWAY

A bright future

Mating of hull and topsides of Aasta Hansteen platform, due to start production in autumn 2018
Source: Equinor

The Norwegian Petroleum Directorate is bullish about future prospects on the Norwegian Continental Shelf, despite the large number of mature fields soon to reach cessation. *Brian Davis* reports.

Total production in the Norwegian North Sea has climbed for four years in a row. The Norwegian Petroleum Directorate (NPD) anticipates that output could approach the record-breaking year of 2004, when the Johan Sverdrup oil and gas field reaches peak production in 2022.

These optimistic prospects are in line with forecasts by Ingrid Sølvberg, Director of Development and Production at the NPD, speaking of a 'bright future' at the ONS conference in 2016, during the dark days of a very low oil price.

'What I was trying to convey then, is despite the tough times that the industry faced, as a resource manager on the Norwegian Continental Shelf (NCS) we saw a lot of positive things going on.' Indeed, a steady stream of investment decisions has been coming to the authority for evaluation and approval. Few developments have been delayed to much extent, she maintains.

Positive developments

Last year, 2017, was a positive year for development decisions, with nine development projects ongoing – Johan Sverdrup, Martin Linge, Utgard, Oda, Hanz, Aasta Hansteen, Dvalin, Bauge and Trestakk – and 10 plans for development and operation (PDO) submitted. Five fields received a PDO exemption – Goliat (Snadd), Martin Linge (Herja and Hervor), Sindre, Snefrid north and Troll Brent B.

Today, there are approved PDOs for Utgard (gas and condensate field, start-up 4Q2019), Bauge (oil, tied-in to Hyme seabed development, start-up 4Q2019), Trestakk (oil field linked to FPSO (floating production, storage and offloading) vessel, start-up 2Q2019), Dvalin (gas field tied-back to Heidrun, start-up 4Q2020), Fenja (two subsea templates with six wells tied-back to the Njord A facility), Johan Castberg (due onstream in 2019), Oda (subsea development with two production wells tied-back to Ula, start-up 3Q2019), Skogul (subsea tie-back to Alvheim FPSO via the Vilje field), Yme (leased jack-up rig with subsea template), and Aasta Hansteen (spar floating platform with two subsea tie-backs). Martin Linge and Phase 1 of Johan Sverdrup are due onstream in the next couple of years, followed by Johan Sverdrup Phase 2, then Troll Brent B and Hanz.

There are also two extension projects on existing fields. The $4bn Snorre extensions will involve installation of six subsea templates to boost recovery by 300mn boe; and the Njord project (4Q2020, with an amended PDO). There were also go-ahead decisions for a water injection project via a subsea template on Ekofisk 2/4 Victor Charlie, and a similar scheme on the Valhall field's Flank West.

The NPD emphasises the need to have 'an active industry' exploring all opportunities to create the most value from oil and gas deposits on the NCS.

'Drilling new production wells is the most important single measure to increase recovery,' says Sølvberg. The NPD expects to drill 40–50 exploration wells in 2018, against 36 in 2016–2017. Half the wells drilled in 2017 were located in the Barents Sea, and 11 new discoveries were made – six in the Barents Sea, three in the NCS and two in the North Sea. Eleven companies applied for acreage in the 24th licensing round, with most blocks located in immature areas.

Some 83 fields were operational as of 30 June 2018. But no new fields have been put into production so far this year. However, Aasta Hansteen is expected to start production in the autumn.

Total oil production at the end of the first half of 2018 was about 114.9mn cmoe, of this around 43.2mn cm is oil and 10.2mn cm NGLs and condensate. Admittedly, output is lower than last year due to technical problems in some fields and a colder winter than normal.

In addition to ongoing development projects, in May Wintershall applied for development of the Nova (formerly Skarfjell) field, which is planned to

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be connected to the Gjøa facility. Wintershall's first Norwegian Sea development – Maria – started production in 2017 and came in NKr3.7bn ($0.44bn) cheaper than expected in the PDO. In July 2018, Equinor submitted an application to produce gas from Troll West, and is expected to submit a PDO for Johan Sverdrup Phase 2 in 3Q2018.

In the first half of the year, the Norwegian authorities approved seven development applications, including Skogul, Yme, Valhall West Flank, Aerfugl, Fenja, Johan Castberg and the Snorre expansion project. These represent investments of around NKr100bn ($12.3bn). The authorities also approved an application for PDO exemption in the Gullfaks South area.

'We are experiencing a record number of projects in the implementation phase, and several are under planning,' says Sølvberg. She notes that several of the projects aim to increase recovery from mature fields, such as Valhall, Snorre and Njord.

While recognising the value of big discoveries like Johan Castberg and Johan Sverdrup, the NPD is also eager to encourage companies to develop small pools where existing infrastructure can be utilised.

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Ingrid Sølvberg, Director of Development and Production, Norwegian Petroleum Directorate

Cutting costs

There have also been considerable efforts to cut capital expenditure (capex) and operating expenditure (opex) in the Norwegian sector. 'A combination of different measures has yielded benefits in terms of increased efficiency, development optimisation, lower contractor costs and more standardised solutions,' says Sølvberg.

Development costs have been cut by 30–50% over the last few years. New development projects are now believed to be robust at break-even prices of $30–40/b. Opex has been reduced by 30% from 2013/2014, due mainly to efficiency measures, streamlining and reduced supplier prices.

'As a resource manager, we have to look quite a few years ahead. One of our main tasks is to push companies to "turn stones" to discover new ways of exploiting what may be considered unprofitable resources today to become profitable resources,' says Sølvberg. 'We have vast volumes of "discovered" oil and gas on the NCS where there are currently no plans to develop. As we enter a new phase, we are pushing companies to make an effort not only to explore for new reserves, but also to hunt difficult reserves which are currently considered unprofitable by most companies. The NPD is working hard to convince companies to develop new technology, which is not only tested at pilot-scale but actually brought into use.'

Work is underway on tight reservoirs, which are mainly in the southern North Sea and Norwegian North Sea, and look likely to remain shut-in under current plans. 'If the producing fields are shut-in in accordance with today's plans, an average of 53% of the oil in place will be left in the ground. We are pushing companies to exploit new technology and depletion methods, so part of this oil will be profitable to develop. The key is enhanced oil recovery.'

Cessation

About 20 fields (up to 25% of NCS fields) are mature and nearing shutdown within five years. 'This might sound dramatic', admits Sølvberg. 'But output from the relevant fields has only a minor impact on total production from the NCS, and accounts for only 2% of production.'

Shutdown and disposal costs over the past five years are estimated to have totalled NKr32.5 bn ($3.9bn) and NKr8.5 bn ($1.02bn) respectively. These amounts may appear large but are relatively small compared with expenditure on E&P and revenues from the fields. The NPD estimates that 40–50 wells will need to be plugged annually over the next few years.

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Testing and technology

The NPD believes there is urgent need for full-scale field tests of new technology. 'This is necessary to verify applicability, to reduce risk and demonstrate improved recovery potential through various advanced injection methods and new technology, before relevant fields are shut down,' says Sølvberg. 'We want to turn over every stone to squeeze out the last drops before fields are shut down. New technical solutions are a decisive factor in ensuring that even more of the proven oil and gas is profitable to produce.'

The Directorate wants to see more full-scale testing under real conditions. However, this requires that the licensees should prioritise and conduct such tests. 'Companies are reluctant to take on the risks and costs, and some claim lack of a business case,' she says. 'As a resource manager, we are very keen to see full field tests. Simulation is all very well, but full field tests can verify whether the assumptions are really correct.' Examples for tests include advanced wells, managed pressure drilling and pressure cementing, shallow drilling and tight reservoir techniques.

Drilling efficiency has also improved. However, Sølvberg remarks: 'It could be unfortunate if part of the cost saving and improvement in drilling efficiency means that easier targets take priority over more demanding ones. This could be at the expense of technological progress and prudent recovery.'

Under terms of the PDO for the Johan Castberg development, which was approved in July, a condition was made to identify and implement new technologies that can improve value creation as the development matures. The operator is committed to come back to the authorities by 1 January 2025 with a complete plan for which new technologies will be implemented in order to increase value creation from the field. In addition, they are committed to the use of a permanent reservoir monitoring system for 4D seismics.

Research and development

Digitalisation is also regarded as an important key to a lasting reduction of costs. Research centres such as the International Research Institute of Stavanger (IRIS) and Sintef in Trondheim, play a big role in the oil sector as well as cross-fertilising technology and knowledge from other sectors. The NPD has an advisory role in the Oil & Gas21 (OG21) and Demo 2000 programmes to encourage oil and gas technology research.

Although subsea systems have been used since the 1980s, there is also progress in the development and deployment of unmanned wellhead and processing systems on the NCS.

Looking ahead, Sølvberg does not expect to see the same number of investment decisions for authority approval over the next two/three years as were seen in 2017 – probably five to 10 investment decisions. But Troll Phase 3 and Johan Sverdrup Phase 2 will have significant impact.

The future looks bright. However, given the volatility of oil prices, there is still need for caution in E&P forecasts on the NCS. ●