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Grosbeak tie-in to Gjøa: Impact Assessment



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Executive Summary

The Gjøa platform is designed as a “hub” for tie-in of 3rd party fields in the Greater Gjøa Area. The platform has an excellent HSEQ track record and is well conditioned for operations all the way to 2040. The partial electrification reduces Gjøa’s environmental footprint and makes it competitive as a hub in a low carbon future.

The platform “hull” is already designed for operations to 2040. Studies show that the Gjøa platform “topsides” lifetime can be extended to 2040 by implementing a designated preventative- and corrective maintenance program. [REDACTED]

[REDACTED] The scope of the program is considered manageable.

As the production over Gjøa declines, continued operation becomes increasingly sensitive to commodity prices. [REDACTED]

A tie-back of Grosbeak to Gjøa has a significant impact on the long term positive cashflow for the Gjøa Hub, it will significantly reduce the sensitivity to short- and long-term commodity price fluctuations, and it is expected to extend the Gjøa platform life by 5 years to 2040.

Grosbeak will contribute to increase Gjøa’s attractiveness as a Host due to increased field life and lower tail-end operational cost share allocation. This will incentivize further exploration activity and enable development of smaller discoveries in the Greater Gjøa Area. [REDACTED]

The prospectivity in the Greater Gjøa Area is high [REDACTED]

Neptune, WintershallIDEA, OKEA, Sval, Wellesley and Spirit are all active explorers in the area, where the Gjøa platform, with its location and facilities, will be the natural “host” for tie-back of new developments. However, as illustrated by the project funnel (Figure 5), most discoveries are now smaller than 50 mmboe, and the size of future discoveries in the Greater Gjøa Area are expected to be in the range 5 – 50 mmboe.

Therefore, from an exploration and development perspective, Grosbeak to Gjøa is important as this will provide a predictable foundation in the form of available infrastructure for future tie-back projects, and thereby lower the commercial threshold for prospects in the area.

A tie-back to Gjøa has been proven technically feasible through a Pre-Concept Phase study in Q2/Q3 2021, and a robust development solution has been offered to the Grosbeak license in Q4 2021.

Purpose

The purpose of this document is to:

- Describe the Gjøa platform suitability for lifetime extension to 2040
- Describe the impact of Grosbeak tie-back to Gjøa with respect to economic “hub” life
- Describe the long-term exploration prospectivity in the Greater Gjøa Area
- Describe the production potential through the Gjøa “hub” given a lifetime extension

Introduction

The Gjøa platform and facilities are located in blocks 35/9 and 36/7 in the North Sea.

The Gjøa field is predominantly a gas reservoir with remaining reserves estimated to [REDACTED] per 1 January 2021. The gas accounts for more than 65% of the total reserves.

The Gjøa field was discovered in 1989. Statoil was the development operator. The operatorship was transferred to GDF SUEZ, which later became Neptune Energy, when production commenced in November, 2010. Gjøa’s Supply Base is located in Florø and secures local jobs in the area.

The platform has shown excellent operational performance since start-up, with high production rates, high regularity and low unit operation costs. Continuous focus on reservoir management and production optimization, together with the recent development of the Gjøa P1 satellite structure, has extended the field life by several years. Gjøa is now set to produce in excess of 100 mmboe more than what was estimated when the development was sanctioned and the PDO delivered at DG3.

The floating production facility has been designed to act as a Hub for the Greater Gjøa Area. The initial Gjøa design includes extensive use of corrosion resistant materials, which has secured the facilities being in excellent operating conditions. The Gjøa platform’s technical life is longer than the expected Gjøa/Vega/Duva/Nova economic production life, and the platform has additional deck space, weight capacity and electrical power supply to accommodate new tie-in fields.

Oil is exported to the Mongstad crude oil terminal on the west coast of Norway. Gas is exported through the FLAGS pipeline system to the SEGAL Terminal in Scotland.

Gjøa was the first floating production platform to be powered from shore. A 100 km submarine cable delivers hydropower-generated electricity from Mongstad. The electricity from the mainland saves approximately 200 000 tonnes in CO₂ emissions annually. The partial electrification reduces Gjøa's environmental footprint and makes it competitive as a hub for future tie-in fields. Further, Neptune has recently initiated a study to evaluate the possibility of full electrification of the Gjøa platform.

It has already been decided to develop three new fields, P1, Duva and Nova, with tie-in to the Gjøa platform. In addition, it has been decided to expand the Vega field, which is a subsea development tied back to the Gjøa platform since 2011, with three new production wells. These will start production 2021-2022, and is estimated to extend the economic field life

The first of the new developments is the Gjøa P1 structure. This is located to north of Gjøa and developed with two new production wells drilled from a new 4-slot subsea template, which is connected to the existing subsea infrastructure. P1 started production in February 2021, and is estimated to increase the remaining Gjøa reserves by 30%.

The second of the new developments is the Neptune operated Duva field. This is located 12 km to north-east of Gjøa and developed with four new production wells drilled from a new 4-slot subsea template, which is also connected to the existing subsea infrastructure. Duva started production in August 2021,

The third of the new developments is the WintershallDea operated Nova field. This is located 17 km to south-west of Gjøa and will be developed with three production wells and three water injection wells, drilled from two new 4-slot subsea templates. Nova is also a subsea development, tied back directly to the Gjøa platform. The field is estimated to start production in Q3 2022,

These new developments are adding substantial production volumes through the Gjøa facilities and have already increased the economic life of the Gjøa platform (depending on future price regimes). With further addition of new 3rd party fields like Grosbeak, the economic field life of the Gjøa platform can be extended to 2040.

Currently, the Gjøa platform will have available processing capacity from 2024 and onwards. Availability of capacity and technical feasibility has been demonstrated for a tie-in of Grosbeak in 2026/27.

The existing MEG Regeneration facilities on Gjøa makes it a potential host for long tie-back of gas fields, extending the effective radius of technical feasibility related to overcoming flow assurance challenges. This sets the scene for developing possible new gas discoveries in the Greater Gjøa Area through the platform.

As Gjøa Operator, Neptune is committed to extend the field life of existing infrastructure and thereby long-term value creation in the Greater Gjøa Area.

Gjøa Technical Field Life

The Gjøa topside facilities are originally designed for a field life of 20 years, while the Gjøa hull has a design lifetime of 30 years, i.e. until year 2040.

As the Gjøa platform is designed as a hub with possibilities for future tie-back projects, the Gjøa Operator initiated a Topside Life-Time Extension Study which was finalized in year 2020, Ref/1/. The intent was to identify measures which may be required to align the Topside- and Hull lifetime, and thereby extend the operational life of the Gjøa platform topsides to year 2040.

The conclusion from the study is that the Gjøa lifetime extension ambition of 2040 can be met with manageable measures in accordance with a designated preventative- and corrective maintenance program. [REDACTED]

Although some uncertainty regarding the future state of equipment and regulatory requirements are present, no showstoppers have so far been identified. The lifetime extension of Gjøa until year 2040 is feasible with a maintenance- and change out program for the identified items.

Gjøa Economic Field Life

The Gjøa Operator has evaluated the long-term future cash flow (EBITDA) across Gjøa to assess the expected economic field life of the Gjøa Hub (inc. all firm 3rd Party fields, Vega, Nova and Duva), with and without Grosbeak.

Four forward looking oil and gas price regimes have been defined:



The scenarios described above are defined to show of how sensitive Gjøa's economic field life will be with regards to fluctuating price regimes, and how such market conditions may threaten Gjøa's late life economic robustness and reserves.

The scope of this document is not to attribute a specific probability to any of the future price scenarios. The price regimes are merely intended as a realistic range of potential future outcomes, which the industry may experience in a short- or long-term perspective.

Case 1: Current Gjøa Production (without Grosbeak)

Case 1 illustrates the Gjøa Hub EBITDA with all current Gjøa producers, assuming production profiles set out in RNB'2022, expected Gjøa OPEX and the future price scenarios defined in Table 1.



Case 2: GjØa with Grosbeak (Start-up 2027)

Case 2 illustrates the GjØa Hub EBITDA with all current GjØa producers and tie-back of Grosbeak, assuming RNB'2022 production profiles, expected GjØa OPEX, Grosbeak start-up in Q1 2027 and the future price scenarios as defined in Table 1.





The results show that a tie-in of Grosbeak to Gjøa has a significant impact on the long term positive cashflow for Gjøa, which again will help extending the Gjøa economic life to 2040.

A scenario where only the Sognefjord gas is routed to Gjøa and the Brent oil is routed to Troll, is being considered in the Grosbeak license. In such a scenario, the Sognefjord gas production alone will have to carry a significantly higher unit operating cost on Gjøa. Such a gas-only development would be much less robust in the face of a reduction in volumes and/or a low price scenario. We see the Sognefjord gas only tie-back to Gjøa as having a low chance of contributing significantly to an extension of the Gjøa economic lifetime and no analysis of such a scenario has therefore been included in this report.

Summary of GjØa's Economic Field Life Evaluation

In summary, a tie-back of Grosbeak to GjØa is expected to materially extend GjØa's economic field life and significantly reduce the sensitivity to short- and long-term commodity price fluctuations.

Furthermore, as will be addressed in the next section, Grosbeak is expected to contribute to increase GjØa's attractiveness as a Host due to increased lifetime robustness and lower tail-end operational cost share allocation. This will incentivize further exploration in the area and enable the development of smaller fields in the proximity of GjØa.

Greater Gjøa Area Long Term Prospectivity

Gjøa is located in the North-Eastern part of the very prospective North Sea. Since Gjøa was discovered in 1989 more than 1000 mmboe of oil and gas have been found in this area. Around 30 exploration wells have been drilled, resulting in 22 discoveries. The exploration success-rate of more than 75 % is impressive. Neptune Energy perspective is that the area is still underexplored, [REDACTED]

Neptune Energy has a strong exploration portfolio in the area (ref. Figure 5). At present, Neptune and License Partners are planning to drill 2 exploration wells in 2022 (Hamlet and Ofelia). [REDACTED]

[REDACTED] Neptune's expectation is that the existing exploration portfolio within the Greater Gjøa Area can deliver another 3 to 4 drilling candidates within the next 2-4 years. Further, replenishment of the portfolio is expected by relinquishment of existing licenses and active participation in the yearly APA rounds in the area. Neptune, WintershallDEA, OKEA, Sval, Wellesley and Spirit are all active explorers in the area around Gjøa

The value of new discoveries in the Greater Gjøa Area is regarded as high since production from the Gjøa platform is expected to fall below production capacity within a few years (ref. Figure 4) generating spare capacity for new developments. [REDACTED]

[REDACTED] Grosbeak to Gjøa is important from an exploration perspective, as this will provide a predictable foundation for future projects and thereby maintain a lower economic threshold for prospects in the area, incentivizing further exploration activity and development.



Figure 5 below summarizes Neptune's project funnel for the Greater Gjøa Area. As discussed, a considerable resource potential exists, from producing fields, to undeveloped discoveries and exploration prospects. The project funnel illustrates this being an attractive area for further value creation. The Gjøa and Vega fields are the largest discoveries in the Greater Gjøa Area with recoverable reserves 300 – 500 mmboe. The typical field size in the area has historically been 50 – 100 mmboe, as seen in the Duva, Nova and Grosbeak discoveries. However, as illustrated by the project funnel, most discoveries are now smaller than 50 mmboe, with the exception of Grosbeak and Peon. The size of future discoveries in the Greater Gjøa Area are expected to be in the range 5 – 50 mmboe.

In summary, the key to success in the area is to;

1. Provide a predictable foundation for Gj​øa Hub lifetime to 2040. This will ensure a low commercial threshold for development of discovered resources, and incentivize further exploration activity in the Greater Gj​øa Area
2. A tie-in of Grosbeak and/or Peon to Gj​øa will secure Gj​øa Hub lifetime to 2040
3. Identify low risk prospects in the Greater Gj​øa Area with high probability of containing economic reserves. The commercial threshold could be as low as ~10 mmboe
4. Ensure timely development of discovered resources and drilling of exploration prospects so that these resources can be produced within the predicted Gj​øa Hub life.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]



List of References

1. Lifetime Extension for Gjøa semi topside, Aker Solutions study 105464-NEP001-AS-Z-001, May 2020

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Table 1: Future Price Scenarios

Table 2: NPV comparisons of analyzed scenarios

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Figure 2: Case 2, Gjøa with Grosbeak (2027 Start-up)

Figure 3: Greater Gjøa Area Exploration Potential

Figure 4: Gjøa Platform Processing Capacity

Figure 5: Project funnel in the Greater Gjøa Area