VEDLEGG 1 - OPPDRAGSBESKRIVELSE: "DYPDYKKSTUDIE – LAVUTSLIPP 2050". DATO: 12.APRIL, 2024

1 BACKGROUND

The global energy use is currently dominated by fossil fuels, accounting for over 80% of primary energy needs (IEA, 2023). Norway is a significant supplier of both oil and gas, making it crucial for global energy security. OG21's in-depth study from 2023 revealed that Norwegian gas plays a critical role in European energy security, accounting for 25-30% of European gas consumption from now until 2040 (Rystad Energy, 2023b). In addition to contributing to energy security, oil and gas are essential inputs for vital products and processes in industries such as fertilizers and petrochemicals.

The Norwegian Offshore Directorate estimates that Norway can continue to be a key supplier of oil and gas in the coming decades. However, the production level depends significantly on exploration, field development, and technology utilization (SD, 2023).

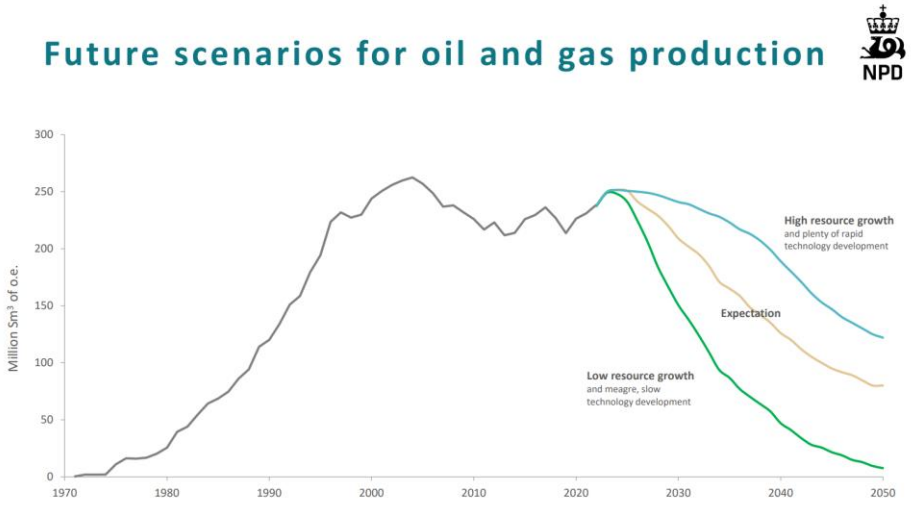

Figure 1 Scenarios for petroleum production from the NCS (SD, 2023)

To avoid significant consequences from global warming, global greenhouse gas emissions must decrease. The International Energy Agency (IEA) projects that the world's energy consumption must transition to primarily renewable energy (exceeding 80%) by 2050 in their Net-Zero Emission scenario (IEA, 2023).

At the Dubai Climate Summit in December 2023, consensus was reached that the world's energy systems must shift away from fossil fuels, with a tripling of efforts toward renewables by 2030.

The European Union (EU) has set clear targets: 55% reduction in greenhouse gas emissions by 2030, 90% reduction by 2040, and net-zero emissions by 2050. These goals are supported through legislation and initiatives such as Fit-for-55, the EU Green Deal, and REPowerEU.

Norway has set comparable goals: 55% reduction by 2030 and a low-emission society by 2050. The petroleum industry aims for a 50% reduction by 2030 and near-zero emissions by 2050.

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The government-appointed Climate Committee states in its report that petroleum is hindering the Norwegian transition and should be reduced faster than planned (Klimautvalget, 2023). This would align with the lower curve in the NPD's production scenarios.

An accelerated phase-out of Norwegian petroleum production would, in OG21's view, be unfavorable. It would exacerbate energy challenges for Europe, have significant socioeconomic implications for Norway, and at best, only marginally impact global greenhouse gas emissions.

OG21 acknowledges that the energy transition is necessary and that greenhouse gas emissions need to be reduced. Therefore, OG21 wants to study how Norway can reduce NCS GHG emissions to near-zero by 2050, whilst maintaining the high production scenario as depicted in Figure 1.

2 VISION OF SUCCESS AND PROJECT OBJECTIVES

Project objective: The project aims to explore how technology and knowledge can reconcile the desire for high production on the Norwegian continental shelf with the Norwegian society's goal of becoming a low-emission society by 2050.

Key questions to be addressed:

1. What technologies and business models does the Norwegian petroleum industry need to achieve near-zero production emissions by 2050?
2. What is the current maturity of these technologies and mechanisms, both commercially and technologically?
3. What research, development, demonstration, and innovation (RD&D) efforts are currently underway? What needs more attention and effort?

3 ORGANIZATION

OG21 has established a project core team consisting of the leaders of OG21's five technology groups (TGs) and the OG21 secretariat leader. The team reports directly to a Steering Committee appointed by the OG21 board.

Other TG members and relevant stakeholders will be engaged through workshops and document reviews.

OG21 wants to engage a Consultancy firm (*the Consultant*) that will support OG21 in its efforts to reach the vision of success and the project objectives.

4 SCOPE OF WORK

4.1 General

The Consultant's work shall at least include the elements listed in the table below.

The Consultant shall gather data, conduct analyses, participate in five half-day workshops in OG21's five Technology Groups (TGs), provide pre-read for and participate in a full-day industry workshop, and provide data driven advice for the OG21 project team.

Analyses and recommendations shall be based on reliable and high-quality data.

4.2 Scope of Consultant's analysis

Scope:

1. **Background and Problem Understanding:**
   a) Describe how the energy transition leads to changes in oil and gas demand. To be based on published scenarios from well recognized organizations such as the International Energy Agency (IEA), the International Renewable Energy Agency (IRENA), and others.
   b) Describe the importance of Norwegian oil and gas for energy security and as a factor in critical industries like fertilizers and petrochemicals. Build on well recognized reports such as Rystad Energy (2023b), BP Energy Outlook (2023), and others.
   c) Describe the global importance of oil and gas and what it is used for. Describe how it could be substituted over time in various sectors, drivers and challenges, and residual demand by 2050. Build on already published work by IEA (2023), BP (2023), and others.
   d) Discuss the NCS production potential and what it would require to deliver on the higher production trajectory towards 2050 in the scenarios from the Norwegian Offshore Directorate.
   e) Describe Norwegian and international climate goals and commitments, including targets set for the Norwegian petroleum industry.
   f) Provide an overview of Norwegian energy and climate plans, including a discussion of relevant public reports (such as the Government's climate status and plan, "Grønt industriløft", and the Climate Committee's report)

2. **Technology and Business Solutions for Achieving Near-Zero Emissions from Norwegian Petroleum Production by 2050:**
   a. Identify technologies that already or in the years towards 2050, have the potential to reduce production emissions from the NCS. Examples include electrification from shore, offshore wind, gas power with carbon capture and storage (CCS) and nuclear power.
   b. Describe opportunities within each of the OG21 technology group disciplines for reducing greenhouse gas emissions. This should also include the potential associated with data science methods like artificial intelligence.
   c. Quantify how much each technology can contribute to emissions reduction by 2050. Consider factors such as technical potential on the Norwegian shelf, costs, technical maturity, commercial viability, environmental aspects, and societal acceptance.
   d. Discuss opportunities and challenges related to alternative business models for reducing production emissions, such as CO2 quotas, offsets, and capture technologies used elsewhere to offset own emissions.
   e. Describe the strategic alignment between technology opportunities and Norwegian strengths. Discuss the potential for industrial development in Norway.
   f. Discuss how continued high production from the Norwegian shelf, assuming industry climate goals are met, aligns with government priorities (or lack thereof) regarding power production, demand, emissions, and industrial development.
   g. Consider whether resource requirements (such as human resources, supplier capacity, materials, etc.) for sustained high NCS petroleum production conflict with other societal priorities during the transition to a low-emission society.
   h. Evaluate ongoing research and innovation efforts related to the described technologies and business models. Recommend changes or additional efforts needed to realize their likely potential.
   i. Develop a roadmap for the development and implementation of identified solutions toward near-zero emissions or better by 2050, see Figure 2 for a conceptual outline.

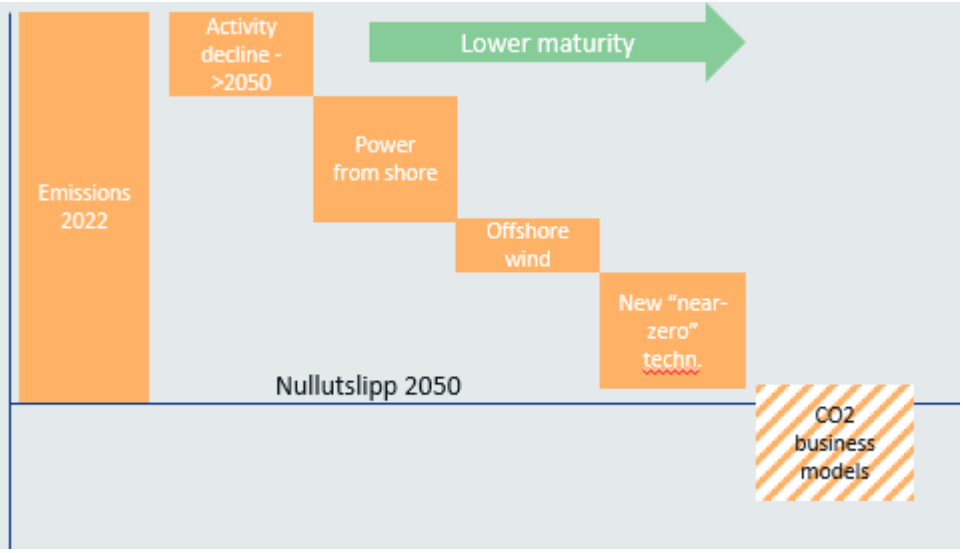

Figure 2 Conceptual outline of roadmap towards near-zero or carbon-negative scope 1 emissions

4.3 Preparations for and participation in workshops

OG21 plans on running:

- One half day workshop for each of the five TGs, in June 2024. OG21 will plan and conduct these workshops. The Consultant is expected to participate to gather information.
- One full-day cross-functional workshop, on 20 August,2024. External relevant stakeholders will be invited. OG21 will plan and conduct the workshop, but the Consultant is expected to provide and present a pre-read based on their preliminary analysis.

4.4 Strategic advice to the OG21 project team

The OG21 project team will develop the OG21 Project Report based on the Consultant's report and output from the workshops. The Consultant should be available for giving strategic advice to the OG21 project team during the time period until the OG21 Project Report has been finalized.

4.5 Proposal

The Consultant's proposal shall describe/demonstrate:

- How they could best, within the budget and time limits for the project, assist OG21 in achieving the project objectives.
- The approach and methodology to be used in the study.
- How they intend to involve and engage OG21-resources as well as other industry resources, in a time-efficient and constructive manner.
- An overview and understanding of published relevant information, and convincingly describe how available data and analyses will be used efficiently.
- Any additional elements that the Consultant deems necessary to properly address the project objectives.
- Any assumptions and limitations applied in the formulation of the proposal.

5 STUDY ASSUMPTIONS AND LIMITATIONS

OG21 support the industry's GHG ambitions and targets as expressed by Konkraft (2023).

The Consultant should specify any additional assumptions and limitations in its proposal.

6 PRELIMINARY TIME SCHEDULE AND DELIVERABLES

6.1 Time schedule

The time schedule is preliminary and can be altered by OG21 at any time during the project. The time schedule will be discussed and possibly adjusted at the kick-off meeting.

- Invitation to tender: 15 April 2024
- Proposal due date: 6 May 2024
- Award: 15 May 2024
- Kick-off meeting: 27 May 2024
- Pre-read for cross-functional workshop: 16 August 2024
- Cross-functional workshop: 20 August 2024
- Draft report: 10 October 2024
- Final report: 31 October 2024
- Presentation at OG21-forum: 13 November 2024

6.2 Project deliverables

The Consultant shall provide:

- Pre-read for a cross-functional workshop.
- Draft and final versions of project report.
- Presentation slide deck in ppt-format for final project report.
- Bi-weekly progress reports.

OG21 expects the Consultant to possess sufficient technology and business competence and skills to form its own judgement on the topics in scope for this study. The Consultant's study report represents the Consultant's own views and opinions, which do not necessarily have to align fully with OG21's positions.

OG21 intends to publish the Consultant's final report at OG21's web site.

6.3 OG21's use of project deliverables

It is a requirement that OG21 may use the Consultant's deliverables from this project as basis for its own analyses, reports, and communication material. The Consultant's deliverables will in such cases be referred to.

7 RELEVANT DOCUMENTS

Examples of relevant documents for this study:

BP (2023). *BP Energy Outlook 2023*. https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/energy-outlook/bp-energy-outlook-2023.pdf

DNV (2022). *Low-emission technologies to decarbonize the Norwegian petroleum value chain*. https://www.og21.no/siteassets/dypdykk-2022-lavutslipp/2022_low-emission-technologies-to-decarbonise-the-norwegian-petroleum-value-chain.pdf

IEA (2023). *World Energy Outlook 2023. https://iea.blob.core.windows.net/assets/86ede39e-4436-42d7-ba2a-edf61467e070/WorldEnergyOutlook2023.pdf*

Klimautvalget (2023). *Omstilling til lavutslipp. Veivalg for klimapolitikken mot 2050*. https://files.nettsteder.regjeringen.no/wpuploads01/sites/479/2023/10/Klimautvalget-2050.pdf

Konkraft (2023). *Climate Strategy Towards 2030 and 2050 - Status report 2023*. https://www.konkraft.no/contentassets/9652374dfefe4d50b2b6bc17165d3e08/the-energy-industry-of-tomorrow-2023.pdf

Nærings- og fiskeridepartementet (2023). *Grønt industriløft. Veikart 2.0*. https://www.regjeringen.no/contentassets/b5a51f3220474b3197ea21feb260f5b3/no/pdfs/veikart-2_0-gront-industriloft.pdf

OG21 (2023). *Forsyningssikkerhet fra norsk sokkel. Sammendragsnotat*. https://www.og21.no/siteassets/dypdykk-2023-forsyningssikkerhet/forsyningssikkerhet_og21_sammendragsnotat_9-11-2023.pdf

OG21 (2022). *Report on low-emission technologies*. https://www.og21.no/siteassets/dypdykk-2022-lavutslipp/og21_report---low-emission-technologies_final_20221026.pdf

Prop. 1 S (2023-2024). Vedlegg. *Regjeringas klimastatus og –plan*. https://www.regjeringen.no/contentassets/28965e11d8044ceb94d0f958b8a45869/nn-no/pdfs/regjeringas_klimastatus_og_-plan.pdf

Sokkeldirektoratet (2023). *Sokkelåret 2022*. https://www.sodir.no/globalassets/1-sodir/publikasjoner/sokkelaret/sokkelaret-2022/sokkelaret-2022.pdf

Sokkeldirektoratet (2022). *Ressursrapport 2022*. https://www.sodir.no/aktuelt/publikasjoner/rapporter/ressursrapporter/ressursrapport-2022/

UK Gov. (2021). *Net Zero Strategy: Build back greener*. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033990/net-zero-strategy-beis.pdf

Thema (2023). *Elektrifisering av sokkelen – Har det global klimaeffekt?* https://offshorenorge.no/contentassets/97cb69dec47d4ecbaff23c16af5ce50c/thema-rapport-2022-23_elektrifisering-av-olje--og-gassektoren-_har-det-global-klimaeffekt---endelig.pdf

Rystad Energy (2023). *Netto klimagassutslipp fra økt olje- og gassproduksjon på norsk sokkel*. https://www.regjeringen.no/contentassets/f5fc522f50674c1f9e0b5db47c264dbe/netto-klimagassutslipp-fra-okt-olje-og-gassproduksjon-pa-norsk-sokkel_sammendrag.pdf

Rystad Energy (2023b). *Deep-dive study on energy security*. https://www.og21.no/siteassets/dypdykk-2023-forsyningssikkerhet/20240131-rystad-energy---og21---dypdykkstudie-om-forsyningssikkerhet---final-report.pdf