# VEDLEGG - OPPDRAGSBESKRIVELSE: "DYPDYKKSTUDIE - ENERGISIKKERHET". DATO: 14.APRIL 2023

## 1 BACKGROUND

The Russian invasion war on Ukraine has evolved to also become an energy war where Russia has tried to use its clout as an important energy supplier to weaken Western countries' support to Ukraine. Western countries have responded with economic sanctions as well as measures to reduce their independence on Russian fossil fuels and accelerate the energy transition. Energy prices, especially in Europe where Russian gas has been such an important part of the energy mix in the years leading up to the war, have spiked to historical record levels. Providing reliable energy to affordable prices has risen to the top of policy makers agenda.

At the same time, evidence of climate change becomes ever more convincing. IPCC's new reports call for immediate actions to curb emissions of greenhouse gases to reach the Paris agreement targets.

**Solving all the three elements of the energy trilemma has become one of the biggest challenges of our time: *to secure supply of affordable and sustainable energy*.**

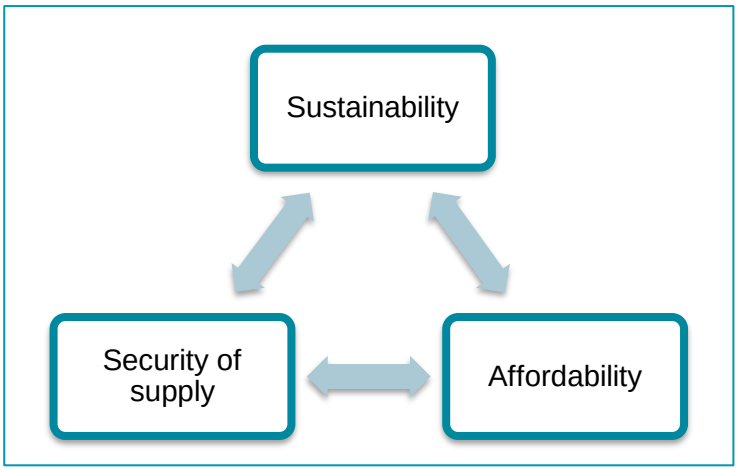


**Figure 1 The energy trilemma**

As Europe grapples with getting rid of Russian fossil fuels, Norway's role as a reliable energy partner to Europe is strengthened. Norway is now the biggest exporter of natural gas to Europe, and the export increased with around 10% in 2022 year-on-year as a response to requests from European customers and price signals.

The European plans to become independent of Russian gas, includes in addition to replacing Russian gas with more LNG and piped gas from reliable providers, an acceleration of the de-carbonization of the energy mix. Norway could play an important role also of this part of the European energy system make-over by providing offshore wind power and hydrogen. CCS is a key technology for the de-carbonization, especially for de-carbonization of gas power and providing low-carbon hydrogen, but it could also make significant contributions to de-carbonize hard-to-abate industries such as cement and steel.

The increased importance of Norway as an energy partner to Europe comes with some challenges. For instance, security threats such as hostile actions, either to the physical infrastructure or cyber-attacks, have increased. And the integration of the Norwegian and European electrical power grids, which has served Norway well over many years and which would be an enabler for new offshore wind, is being challenged when high energy prices in Europe are reflected also in energy prices to Norwegian consumers.

The oil and gas industry plays an important part in the energy transition to ensure energy security, affordable prices, and de-carbonization. **The topic for this study is to investigate the importance of oil and gas related technology in the context of two key strategic questions:**

1. **How important is Norwegian energy supply for the European energy security?**
2. **How important is technology that is being developed and implemented to secure reliable Norwegian energy supply, for maintaining and improving European energy security?**

A related topic to both issues is the challenge of reducing GHG emissions to meet emission targets on the NCS. This topic was investigated by OG21 in 2022.

## 2 PROJECT OBJECTIVE

Project objective: *Identify threats to the energy supply from the NCS needed to meet demand during the energy transition in Europe and describe how the Norwegian O&G sector can contribute with technology and knowledge to eliminate, mitigate, or manage such threats.*

## 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 to a Steering Committee appointed by the OG21 board.

Other TG members 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 meet the project objective.

External stakeholders will be engaged in accordance with a stakeholder engagement plan that will be developed by the OG21 project team and the Consultant. The engagement will range from active involvement, through consultancy, to information.

# 4 SCOPE OF WORK

## 4.1 General

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

The Consultant shall gather data, conduct analyses, provide pre-read for workshops, participate in workshops, and provide data driven advice for the OG21 project team.

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

## 4.2 Analyses

### 4.2.1 Background analysis

A background analysis shall be prepared, providing the basis for a well-informed identification of threats to the NCS production that again could have impact on energy security in Europe. The analysis should at least include:

- Energy transition scenarios globally, regionally, and domestically. Uncertainty and dependencies on external factors and policies, based on publicly available data and scenarios as well as Consultant's inhouse data and scenarios
- Role of oil and gas in the energy transition, including among others how oil and gas can be phased out in orderly ways (demand destruction as compared to supply destruction, attracting investments, etc.), and the geopolitical role that petroleum and other energy sources play.
- Importance of Norwegian oil and gas in the energy transition, especially in Europe. Short, medium, and long-term market for Norwegian natural gas as compared to identified and assumed resources on the NCS. Risk for stranded assets? Need for decarbonization?
- Integration of oil and gas installations with domestic and regional energy systems, including: current and future electrification power demand as compared to available power from shore; and integration with new offshore power production and grid infrastructure.
- Describe scenarios for offshore wind and possibly gas power with ccs.

### 4.2.2 Identify and analyze threats to energy supply from the NCS

Threats to the energy supply from the NCS shall be identified and analyzed. The analysis should include a discussion of the potential risk the threats pose for energy security, especially in Europe and Norway.

Threats to be analyzed (non-exhaustive and to be further worked in the study):

- Safety risks (use PSA categorization in DSHAs)
- Security threats: cyber and physical
- Competence: Recruitment to relevant studies, attract new talent, retain and develop employees, cross-sector collaboration
- Threats to innovation capability, e.g.:
  - Capability and willingness of NCS production licenses to innovate
  - New business and contract models – innovative or counter-productive?
  - Public R&D funding diminishing

- Reduce GHG emissions, e.g.:
  - Deliver on GHG targets
  - Contribution to energy transition
  - Conflicts btw. reducing GHG emissions and addressing other environmental aspects
- Maintaining societal support, e.g.:
  - Producing with high safety and security standards and with low GHG emissions
  - Seen as a reliable contributor to the energy transition
  - Delivering on societies' energy needs
- Replace production competitively, for instance through exploration, field development and increased oil and gas recovery. It includes efforts to keep costs down and reduce GHG emissions whilst external factors and frame conditions could be changing, e.g.:
  - Production hubs for cost-efficient tie-backs are maturing
  - Industry capacity and risk for cost inflation
  - Legal framework such as including petroleum enterprises under the Security Act
- Other

OG21 will conduct a preliminary workshop on the "Competence" topic during Q2-23. Minutes from the workshops will be provided to the Consultant as input to the study after contract award.

### 4.2.3 Select most important threats that OG21 should address

OG21's purpose as described in the mandate (see www.og21.no for detailed mandate) is:

*"OG21 will work for efficient, safe and environmentally friendly value creation from the Norwegian oil and gas resources. This will be realized through a coordinated engagement of stakeholders in the petroleum cluster involved in education, research, development, demonstration and commercialization.*

*OG21 will inspire the development and use of new and better knowledge and technology adapted to a changing energy system and the goal of reduced greenhouse gas emissions.*

*OG21's main scope is upstream and midstream activities linked to the Norwegian petroleum sector, including CO2 transport and storage. OG21 will also discuss challenges and opportunities that affect entire value chains for petroleum, and in that context seek cooperation with other relevant 21-processes."*

The identified threats to reliable energy supply from the NCS shall be ranked according to the risk they pose for energy security in Europe. The most important that are within OG21's scope and influence area, shall be highlighted and discussed.

Measures to address the highlighted OG21-relevant threats shall be identified and analyzed with respect to improved robustness and reliability/availability of energy supply.

Recommendations shall be based on the analysis of identified measures. Ownership of recommendations split on various stakeholder groups such as government, industry, academia and OG21, shall be suggested.

## 4.3 Preparations for and participation in workshops

OG21 has a network of around 100 subject matter experts (SMEs) from industry enterprises, research institutes, universities, and governmental bodies. The SMEs are organized in five Technology Groups (TGs), see www.og21.no for more details.

Members of the TGs will primarily be engaged through workshops, but the Consultant can also engage the SMEs in one-to-one interviews or correspondence.

OG21 plans on running:

- One workshop for each of the five TGs, in September 2023. Each TG will send 1-2 representatives also to the other TG's workshops.
- One full-day cross-functional workshop, in October 2023. External relevant stakeholders will be invited.

The Consultant will provide pre-reads for the workshops and present the pre-reads in the workshops.

The Consultant will take notes during the workshops and prepare minutes or notes from the workshops.

## 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 period until the OG21 Project Report has been finalized.

## 4.5 Presentation, communication, and up-dates of report

The Consultant shall present its draft report to the OG21 board on 2 November 2023.

The Consultant shall present the highlights from the draft report at the OG21-forum, 16 November 2023.

3-4 topics from the draft report will be selected for discussions in break-out sessions at the OG21-forum. Comments and feed-back during the break-out sessions will be collected and evaluated as part of the commenting process.

The Consultant's draft report will be published for public commenting in connection with the OG21-forum. Commenting will be open until 16 December. The Consultant and OG21 will discuss comments and agree on which to be addressed in the final report.

The final report shall be presented to the OG21 Board in February 2024.

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

## 4.6 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 objective.
- The approach and methodology to be used in the study.

- How they intend to involve and engage OG21-resources as well as other stakeholders, in a time-efficient and constructive manner.
- How workshops could be organized and how the Consultant will participate to obtain maximum benefit for the project.
- 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 objective.
- Any assumptions and limitations applied in the formulation of the proposal.

# 5 STUDY ASSUMPTIONS AND LIMITATIONS

The study emphasizes the European energy systems, and the importance of the Norwegian oil and gas industry during the energy transition.

Meeting the petroleum industry as well as Norway national GHG emission targets, is a given.

The study will cover scenarios short and medium term (2030) and long-term (2040-2050).

The analysis of security threats shall not increase vulnerability, e.g. by putting together information that in isolation is open and unclassified, but which combined expose vulnerabilities.

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 for the tendering process is provided in "Konkurransegrunnlaget".

Indicative dates for the execution phase are provided in Section 4 of this Project Description. All dates are preliminary and can be altered by OG21 at any time during the project.

## 6.2 Project deliverables

The Consultant shall as part of this project provide:

- Pre-reads for TG workshops and 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.

### 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 LITERATURE

### 7.1 OG21 studies

OG21 has gathered data and conducted several studies over the last 5 years that could be relevant for this study.


OG21 (2022). *Low-emission technologies to meet 2030 climate goals*. www.og21.no

DNV (2022). *Low-emission technologies to decarbonize the Norwegian petroleum value chain*. www.og21.no

OG21 Strategy (2021). *Next Chapter*. www.og21.no.

Rystad Energy (2021). *OG21 Strategy Revision – Supporting report*. www.og21.no.

OG21 (2020). *External factors analysis*. www.og21.no

OG21 (2020b). *Machine learning in the Petroleum Industry*. www.og21.no

DNV GL (2020). *OG21-study on Machine learning in the Norwegian petroleum industry*. www.og21.no

OG21 (2019). *Technologies for cost and energy efficiency*. www.og21.no

Rystad Energy (2019). Technologies to improve NCS competitiveness. www.og21.no

OG21 (2019b). *Hydrogen fra naturgass med CCS*. www.og21.no

OG21 (2018). *Risk assessments and impact on technology decisions*. www.og21.no

Rystad Energy (2018). *Risk assessments and impact on technology decisions*. www.og21.no

Boston Consulting Group (2017). *New business models and contract strategies to improve NCS competitiveness.* www.og21.no

OG21 (2017). B*usiness models and technology acceleration.* www.og21.no


### 7.2 Other studies

A host of reports have been published over the last year that are relevant to this study. The Consultant should list in its proposal an overview of studies it deems relevant for this study and describe why the studies have been included. The list will be part of demonstrating that the Consultant has in-depth knowledge of the topics to be discussed in the study.

OG21 has put together its own literature list that will be shared with the Consultant after Contract award.