

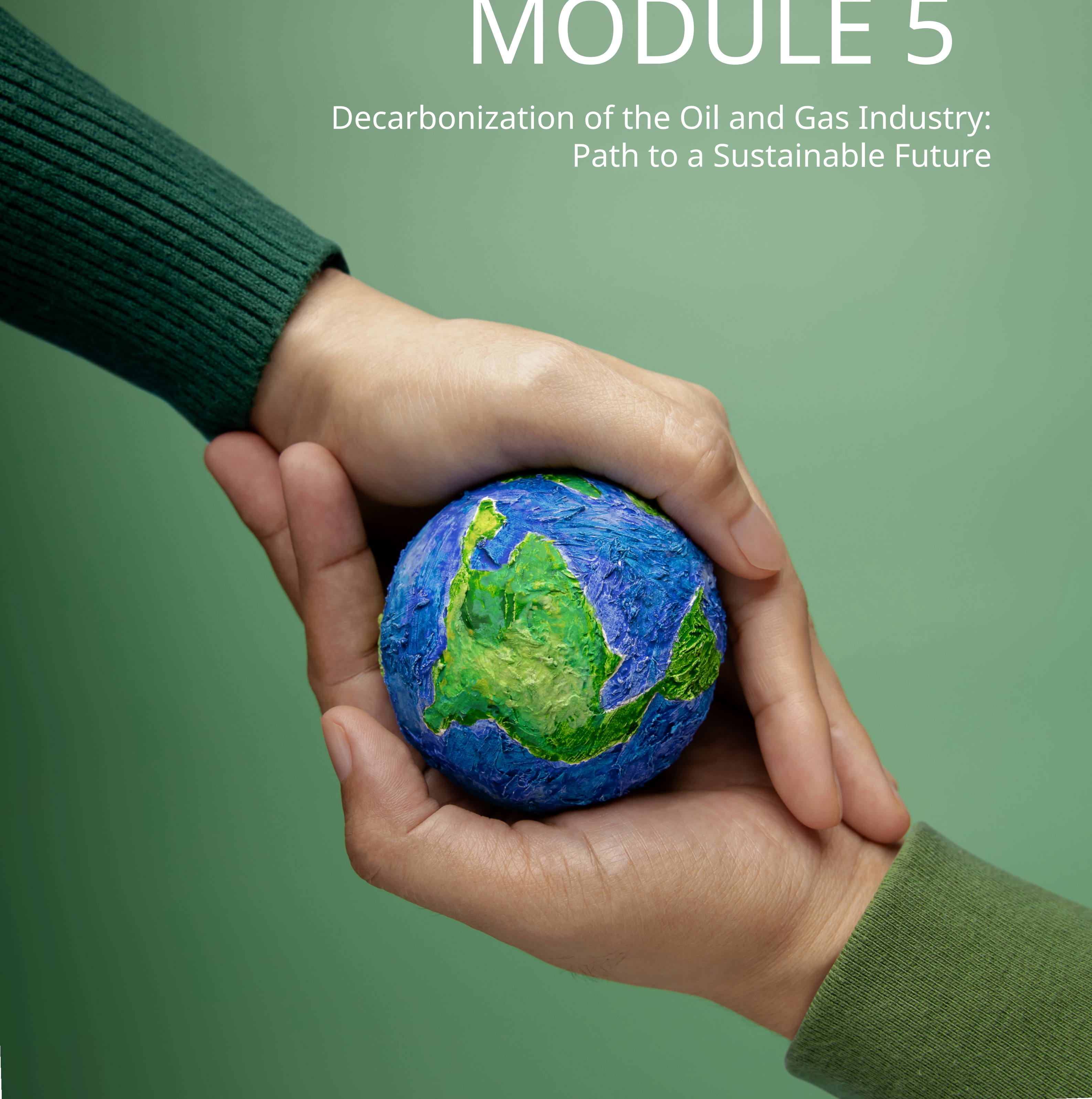


Ministry of Ecology and Natural
Resources of the Republic of
Kazakhstan



MODULE 5

Decarbonization of the Oil and Gas Industry:
Path to a Sustainable Future



Educational Module "Decarbonization of the Oil and Gas Industry: The Path to a Sustainable Future"

Module objective: To raise participants' awareness of the importance and urgency of decarbonizing the oil and gas industry in Kazakhstan, to provide an understanding of the key sources of greenhouse gas emissions, to present methods for assessing decarbonization and climate risks, and to provide an overview of the most effective measures and technologies for achieving sustainability.

Expected Outcomes:

By the end of the module, participants will be able to:

- Identify the main sources of greenhouse gas emissions in Kazakhstan's oil and gas industry.
- Assess and interpret the target indicators and metrics of decarbonization in the industry.
- Determine the most significant climate risks for companies in this sector.
- Analyze and compare various measures and technological solutions for decarbonization in the short and long term.

Organizational Forms:

- Lectures: Presentation of information on decarbonization, sources of emissions, and target indicators.
- Group Discussions: Discussion of climate risks and their prioritization for companies in the sector.
- Case Studies and Examples: Analysis of successful practices by companies implementing decarbonization projects.
- Interactive Surveys: Assessment of participants' understanding and readiness to implement decarbonization.

Content:

Informational-Theoretical Part:

1. **Introduction to decarbonization:** The importance of reducing greenhouse gas emissions in the context of climate change and the sustainability of industrial sectors.
2. **Major sources of emission:** An overview of the stages of extraction, processing, and transportation that affect the level of carbon emissions.
3. **Target indicators and metrics:** Presentation of decarbonization metrics, measurement methods, and their significance for tracking success.

Practical part:

1. **Climate risk assessment:** Group work to identify and prioritize the most significant climate risks for companies in the oil and gas sector.
2. **Analysis of Measures and Technologies:** Discussion and comparison of various technological and strategic solutions for reducing emissions in the short and long term.

Development of decarbonization plans: Creating practical action plans for implementing measures and technologies in companies, considering climate risks and unique characteristics.

Conclusion:

Summarizing the module with an emphasis on the importance of each company's involvement in the decarbonization process to achieve sustainability and reduce negative environmental and climate impacts.

Detailed content:

Lecture 1 "The Concept of Decarbonization and Climate Challenges in the Oil and Gas Industry"

The lecture will present current data on the impact of the oil and gas industry on the climate and greenhouse gases. Participants will learn about the main sources of emissions associated with different stages of production, as well as the climate risks that could affect business stability.

Part 1: Introduction to decarbonization and its significance

- **Definition of Decarbonization:** Explanation of decarbonization as the process of reducing greenhouse gas emissions (primarily carbon dioxide) to mitigate climate change and achieve sustainable development.
- **Significance of Decarbonization in the Oil and Gas Industry:** Discussion of the role of the oil and gas industry in climate change, the main sources of greenhouse gas emissions, and the urgency of taking action.
- **Extraction and Processing Processes:** Overview of key processes related to the extraction and processing of oil and gas and their impact on the carbon footprint.

Part 2: Climate challenges and their impact on the industry

- **Key Climate Challenges:** Overview of the main climate challenges facing the oil and gas industry, including changes in weather conditions, environmental regulations, and resource instability.

- Company Examples and Issues: Presentation of real examples of companies facing climate challenges, such as production shutdowns due to weather disasters or shifts in regulations.

Part 3: Decarbonization goals in the oil and gas industry

- Key Decarbonization Goals: Discussion of the main decarbonization goals for the oil and gas industry, such as reducing energy consumption, transitioning to clean energy sources, and optimizing processes.
- Examples of Successful Decarbonization Goals: Presentation of examples of companies that have successfully set and achieved their decarbonization goals, including emission reductions and improved efficiency.

Part 4: Sources of Decarbonization Funding

- Investments and Financing: Examination of various sources of funding for implementing decarbonization measures, including internal investments, government support, subsidies, and private investors.
- Green Bonds and Standards: Overview of the concept of "green bonds" and other financing mechanisms aimed at environmentally sustainable projects. Mention of standards and certifications for validating decarbonization efforts.

Conclusion:

A summary overview of the key concepts and ideas presented in the lecture, highlighting the importance of understanding climate challenges and the urgency of implementing decarbonization measures in the oil and gas industry. A concluding statement on how participants can contribute to this process and the significance of their involvement for the future of the industry and the planet as a whole.



Group Work 2 "Identifying and Prioritizing Climate Risks"

The group work "Identifying and Prioritizing Climate Risks" is a key part of the decarbonization workshop for the oil and gas industry. Its goal is to facilitate the analysis and understanding of the most significant climate risks faced by the industry, as well as to develop a strategy for prioritizing actions to mitigate these risks. The group work will involve the following stages and questions.

Stage 1: Identification of Climate Risks

At this stage, participants should identify a broad range of potential climate risks that could impact the oil and gas industry. This may include:

- Changes in Weather Conditions: What extreme weather events (such as floods and droughts) could affect operations and infrastructure?
- Changes in Water Resource Availability: How might changes in water levels and the availability of water resources impact the production process?
- Environmental Regulations: How might changes in environmental regulations and legislation affect the oil and gas industry?
- Shifts in Resource Demand: How could changes in the global economy and consumer demand influence the market for your products?
- What is the likelihood of each risk occurring?
- What could be the potential consequences for operations, safety, and the company's reputation?

Stage 2: Assessment of Risk Significance



- Which risks may have the greatest impact on greenhouse gas emissions?
- Which risks are long-term, and which might manifest in the near future?

Stage 3: Risk Prioritization and Strategy Development

At this stage, participants select the most significant and likely risks and identify priority measures for managing them.

Discussion questions:

- Which of the identified risks should be considered the most critical for the company?
- What actions and measures can reduce the impact of these risks on operations?
- What innovative technologies and approaches can help minimize these risks?
- What is the optimal sequence and timeline for implementing these measures?

Stage 4: Presentation and Discussion of Results

Each group presents the results of their work, discusses them with other workshop participants, and receives feedback. This creates a platform for exchanging ideas and best practices on managing climate risks in the oil and gas industry.

The group work "Identifying and Prioritizing Climate Risks" facilitates a deeper understanding among participants of which climate challenges may impact their companies and how to develop the most effective strategies for decarbonization and sustainable development.

Lecture "Decarbonization of the Oil and Gas Industry: Technologies and Pathways to Emission Reduction"

This lecture will provide an in-depth overview of the most effective and applicable technologies for decarbonization. Special attention will be given to both short-term measures and long-term strategies that will help the industry reduce its carbon footprint.

Part 1: Technological Pathways to Decarbonization

- **Effective Reservoir Management:** Implementation of extraction optimization methods to reduce emissions and increase efficiency.
- **Methane Emission Reduction:** Discussion of technologies and methods for reducing methane emissions, such as leak detection, emission reduction equipment, and other approaches.
- **Carbon Capture:** Overview of carbon capture technologies in oil and gas extraction and production processes.
- **Electric Machinery and Renewable Energy:** Examination of the use of electric machinery instead of traditional equipment and the integration of renewable energy sources.

Part 2: Examples of Successful Practices and Companies

- **Emission Reduction Projects:** Presentation of successful examples of projects implementing decarbonization technologies, such as coal-to-hydrogen gasification.
- **Leading Decarbonization Companies:** Mention of companies that are actively adopting new technologies and strategies to reduce carbon emissions.

Part 3: Challenges and Perspectives

- **Technical Challenges and Issues:** Analysis of the difficulties faced by companies and the industry in transitioning to decarbonization.
- **The Future of Decarbonization in the Oil and Gas Industry:** Discussion of the prospects and trends in the development of clean technologies and alternative energy sources.

Conclusion: Summarizing the lecture with an emphasis on the importance of decarbonization for the sustainable development of the oil and gas industry, reducing negative climate impacts, and preventing global warming.

Digital Survey 4 "Assessing Readiness and Interest in Implementation"

After completing the module, participants will take an interactive survey to assess their understanding of decarbonization, readiness to implement new methods and technologies, and interest in collaboration and knowledge sharing in this area. Questions for the interactive survey:

- What processes lead to Scope 1 and 2 greenhouse gas emissions at your company?
- Does your company have established decarbonization goals?
- Assess the technical and economic feasibility of implementing decarbonization measures at your company (from 1 - low to 5 - high):
- What measures have already been implemented at your company?
- Assess the IMPACT that a risk may have on your company and the PROBABILITY that the risk will materialize (from 1 - low to 5 - high):

Action	Technologically possible	Economically justified
Energy efficiency and modernization		
Reduction of methane emissions and leaks		
Transition to alternative energy sources		
Utilization of green hydrogen		
Carbon capture and storage		

Risk	Impact	Possibility
Credit risk: Access to capital		
Regulatory risk: Stricter legislation		
Market risk: Taxation of imports		
Customer risk: Loss of markets		
Operational Risk: Changes in precipitation levels		
Operational Risk: Extreme temperatures		
Operational Risk: Extreme weather conditions		
Operational risk: Water scarcity		

Final Discussion and Action Plan

The module concludes with a discussion of survey results and the development of an action plan. Participants exchange ideas on the steps each company can take to improve its environmental performance and long-term sustainability.

This educational module provides participants with a comprehensive understanding of the climate challenges associated with the oil and gas industry and teaches practical methods for reducing greenhouse gas emissions. It allows participants to assess the current situation in their companies, share experiences, and build a knowledge base for making sustainable decisions in the future.

