

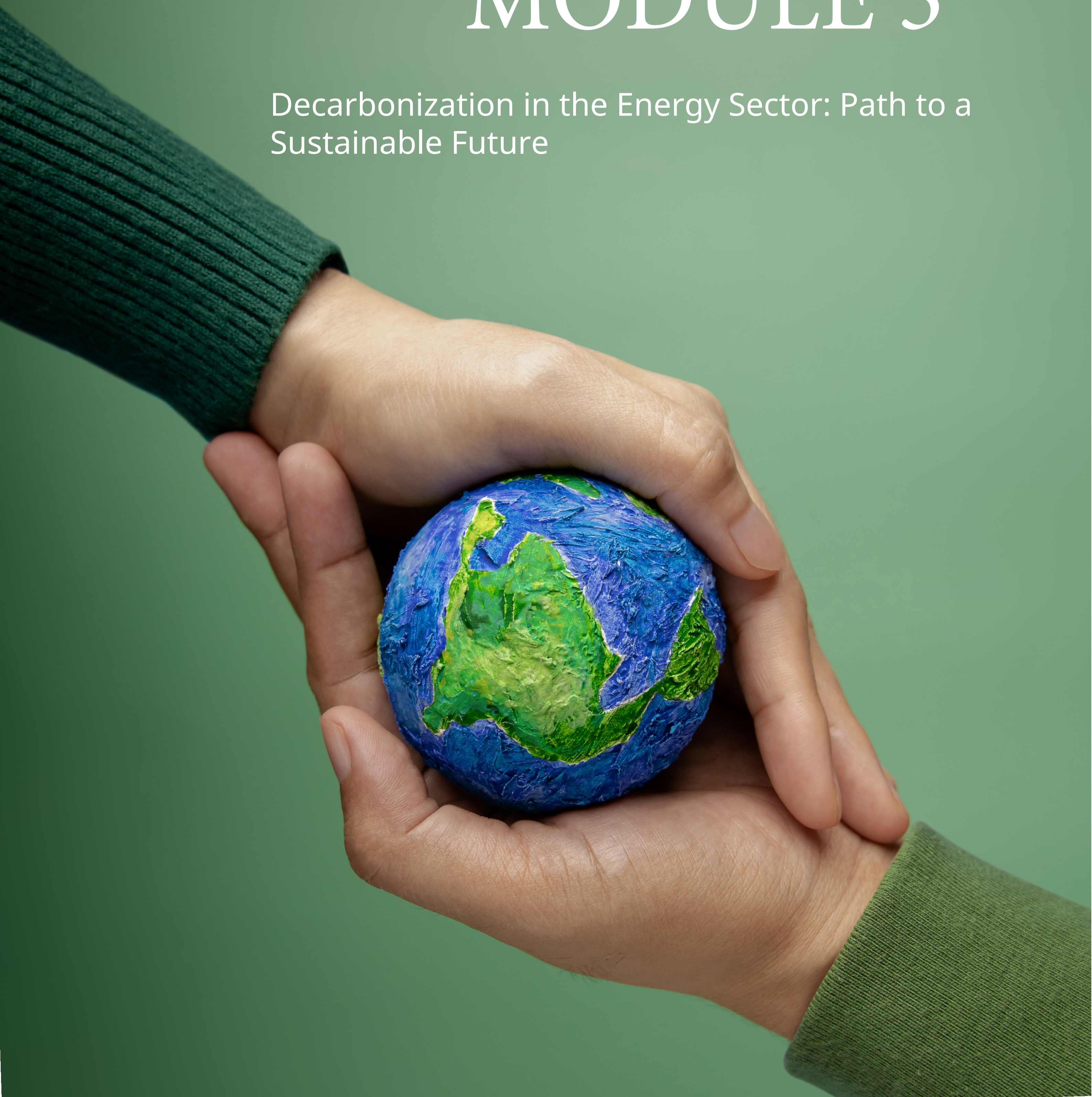


Ministry of Ecology and Natural
Resources of the Republic of
Kazakhstan



MODULE 3

Decarbonization in the Energy Sector: Path to a
Sustainable Future



Educational Module "Decarbonization in the Energy Sector: Path to a Sustainable Future"

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

Expected Results:

On completion of the module, participants will be able to:

- Identify the main sources of greenhouse gas emissions in the energy industry of Kazakhstan.
- Assess and interpret key indicators and metrics for decarbonization in the industry.
- Determine the most significant climate risks for companies in this sector.
- Analyze and compare various initiatives and technological solutions for decarbonization in both the short-term and long-term perspectives

Organisational forms:

- Lectures: Presentation on decarbonization, emission sources, and targets.
- Group discussions: discussing climate risks and prioritizing them for companies in the sector.
- Case studies and examples: analyzing successful practices of companies implementing decarbonization projects.
- Interactive surveys: assessing participants' understanding and readiness to implement decarbonization efforts..

Content:

Informational-theoretical part:

1. **Introduction to Decarbonization:** The importance of reducing greenhouse gas emissions in the context of climate change and industrial sustainability.
2. **Primary Sources of Emissions:** Overview of stages in extraction, processing and transportation impacting carbon emission levels.
3. **Target Indicators and Metrics:** Presentation of decarbonization metrics, measurement methods, and their significance in tracking success.

Practical Part:

1. **Assessment of Climate Risks:** Group work to identify and prioritize the most significant climate risks for companies in the energy 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.
3. **Development of Decarbonization Plans:** Creation of practical action plans for implementing measures and technologies in companies, considering climate risks and unique characteristics.

Conclusion:

Summary of the module: emphasizing the importance of each company's participation in the decarbonization process to achieve sustainability and reduce negative environmental and climate impacts.

Detailed Content:

1 Lecture "The Concept of Decarbonization and Climate Challenges in the Energy Sector":

The lecture will present current data on the impact of the energy sector on 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 can affect business stability.

Part 1: Introduction to decarbonisation and its importance

- Definition of decarbonization: Explanation of the concept of decarbonization as the process of reducing greenhouse gas emissions (mainly carbon dioxide) to mitigate climate change and achieve sustainable development.
- The importance of decarbonization in the energy sector: Discussion of the role of the energy sector in climate change, the main sources of greenhouse gas emissions, and the urgency of taking action.

Part 2: Climate challenges and their impact on the industry

- Key climate challenges: Overview of the main climate challenges facing the energy sector, including changing weather patterns, environmental constraints, and resource instability.
- Examples of companies and problems: Presentation of real-life examples of companies facing climate challenges, such as production shutdowns due to weather disasters or shifts in legislation.

Part 3: Targets of decarbonisation in the energy sector

- Key goals of decarbonization: Discussion of the main goals of decarbonization for the energy sector, such as reducing energy consumption, transitioning to clean energy, and optimizing processes.
- Examples of successful decarbonization goals: Presentation of examples of companies that have successfully set and achieved their decarbonization goals: CLP Group (Singapore), SSE (UK), CEZ Group (Czech Republic)

Part 4: Sources of funding for decarbonisation

- 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 focused on environmentally sustainable projects. Mention of standards and certifications to validate decarbonization efforts.

Conclusion:

Summary overview of key concepts and ideas presented in the lecture, emphasizing the importance of understanding climate challenges and the urgency of implementing decarbonization measures in the energy sector. Concluding remarks 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.



2 GROUP WORK "IDENTIFYING AND PRIORITISING CLIMATE RISKS IN THE ENERGY SECTOR"

The goal of this group work is to develop participants' ability to analyze and understand the most significant climate risks in the energy sector and to formulate a strategy for prioritizing actions to minimize these risks. Here are the stages that can be included in this group work:

Step 1: Identification of Climate Risks

Task Setting: Introduction to the task and objectives of the group work.

Risk Identification: Participants discuss and create a list of potential climate risks that could impact the energy sector, such as extreme weather events, changes in regulatory environments, increased resource costs and so on.

Step 2: Assessing the Significance of Risks

- Risk Prioritization: Groups select a few of the most significant risks from the created list and justify why they chose these specific risks.
- Impact Assessment: Participants analyze the potential impact of each selected risk on the energy sector, including operational, financial, and reputational aspects.

Stage 3: Development of a Priority Action Strategy

- Analysis of Possible Measures: Groups discuss and propose specific measures and actions that could help manage the selected climate risks
- Effectiveness Assessment: For each measure, groups analyze how well it can mitigate the risks and what resources and efforts are required for its implementation.



Stage 4: Presentation of Results and Discussion

- Presentation of Strategy: Each group presents their priority action strategy, explaining which risks were chosen and why, what measures are proposed, and the expected outcomes.
- Discussion and Feedback: After each presentation, a discussion is held where other participants can ask questions, share their opinions, and suggest additional ideas.

Stage 5: Reflection and Conclusions

- Reflection: Participants analyze what they learned from the group work, the principles of risk prioritization they applied, and which measures they consider most effective.
- Conclusions and Lessons: Discussion of the general conclusions and lessons that can be drawn from analyzing and prioritizing climate risks in the energy sector.

The group work "Identifying and Prioritizing Climate Risks in the Energy Sector" helps participants develop analytical and strategic skills, as well as gain a deeper understanding of the importance of managing climate risks for the sustainability and effectiveness of the industry.

3 Lecture "Decarbonization of the Energy Sector: 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: Introduction

- The Importance of Decarbonizing the Energy Sector: Explanation of the significance of transitioning to clean energy sources to reduce greenhouse gas emissions and limit global warming.

Part 2: Major Sources of Emissions in the Energy Sector

- Sources of Carbon Emissions: Overview of the main sources of CO2 emissions in the energy sector, including the burning of coal, oil, and gas.

Part 3: Technological Pathways to Decarbonization

- Transition to Renewable Energy Sources: Discussion on the importance of integrating solar, wind, hydro, and other renewable sources to reduce the carbon footprint.
- Energy Efficiency and Improvement: Presentation of technologies aimed at enhancing the efficiency of energy production and usage.
- Carbon Capture and Storage Technologies: Overview of methods for capturing CO2 from emissions and storing it to prevent its release into the atmosphere.
- Hydrogen Energy: Discussion on the role of hydrogen as a clean energy carrier and its production using renewable sources.

Part 4: Assessment of Decarbonization Pathways

- Economic Aspect of Decarbonization: Analysis of the economic benefits and challenges of implementing new technologies and approaches.
- Legal and Regulatory Aspects: Overview of legislative measures and incentives aimed at supporting decarbonization.

Part 5: Technological experience

- Examples of Successful Projects: Presentation of practical cases and projects demonstrating which technologies and solutions have helped reduce emissions: CLP Group (Singapore), SSE (UK), CEZ Group (Czech Republic)

Part 6: Overcoming Challenges and Future Perspectives

- Technical Challenges and Issues: Analysis of the difficulties that companies and the industry may face when implementing new technologies.
- The Future of Decarbonization in the Energy Sector: Discussion of prospects and future trends in the development of clean energy sources.

Conclusion:

Summary of the Lecture: Emphasis on the importance of decarbonization for sustainable development and a call to action for reducing greenhouse gas emissions in the energy sector.

4. Digital Survey "Assessment of 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		
Investments in New Renewable Energy Projects		
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		

5 Final Discussion and Action Plan



The module concludes with a discussion of the 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 energy sector and trains them in practical methods for reducing greenhouse gas emissions. It enables participants to assess the current situation in their companies, share experiences, and build a knowledge base for making sustainable decisions in the future.