Ministry of Ecology and Natural Resources of the Republic of Kazakhstan

MODULE 2

Decarbonization in the Metallurgical Industry: Pathway to a Sustainable Future

Educational Module "Decarbonization in the Metallurgical Industry: Pathway 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 metallurgical 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. **Climate Risk Assessment:** Group work to identify and prioritize the most significant climate risks for companies in the metallurgical industry.
2. **Analysis of measures and technologies:** Discussing and comparing various technological and strategic solutions for emission reduction in the short-term and long-term perspectives.

Decarbonization Planning: Creating practical action plans for implementing measures and technologies in companies, considering climate risks and unique characteristics.

Conclusion:

Module conclusion with emphasis on the importance of each company's participation in decarbonization processes to achieve sustainability and reduce negative environmental and climate impact.

Detailed Content:

1. **Lecture "Concept of Decarbonization and Climate Challenges in the Metallurgical Industry"** will present current data on the metallurgical industry's impact on climate and greenhouse gases. Participants will learn about the primary sources of emissions associated with various stages of production, as well as climate risks that could affect business stability.

Part 1: Introduction to Decarbonization and Its Importance

- Decarbonization Definition: Explanation of decarbonization as the process of reducing greenhouse gas emissions (primarily carbon dioxide) to mitigate climate change and achieve sustainable development.
- Importance of Decarbonization in the Metallurgical Industry: Discussing the role of the metallurgical industry in climate change, major sources of greenhouse gas emissions, and the urgency of action required.

Part 2: Climate Challenges and Their Impact on the Industry

- Major Climate Challenges: Overview of key climate challenges facing the metallurgical industry, including weather pattern changes, environmental regulations, and resource instability.
- Company Examples and Issues: Presentation of real-life examples of companies facing climate challenges, such as halting operations due to weather disasters or shifts in legislation.

Part 3: Decarbonization goals in the metallurgical industry

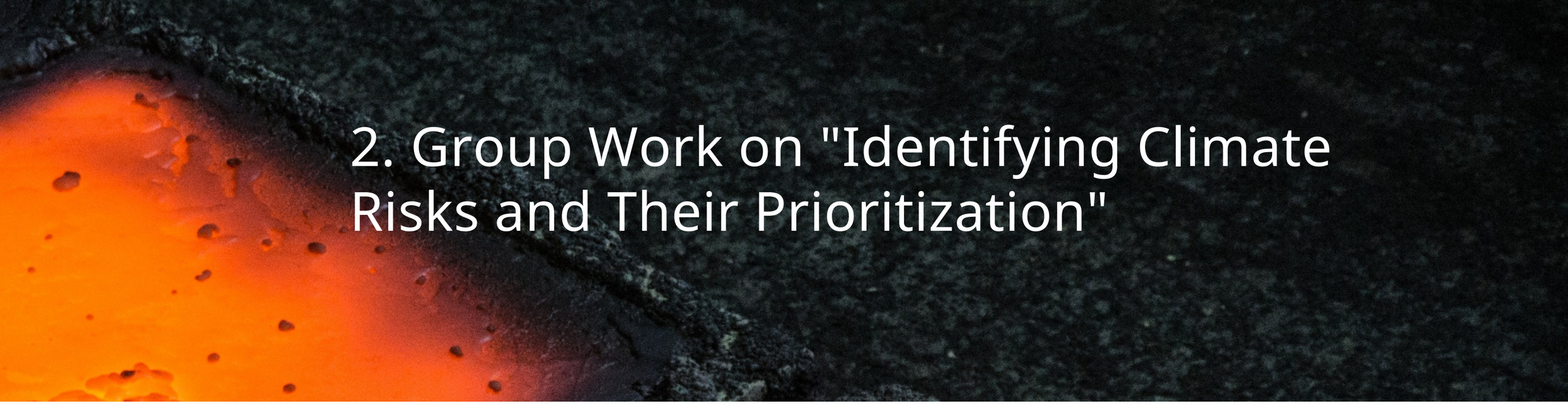
- Key Decarbonization Goals: Discussing the primary objectives of decarbonization for the metallurgical industry, such as reducing energy consumption, transitioning to clean energies, and optimizing processes.
- Examples of Successful Decarbonization Goals: Presenting examples of companies that have successfully set and achieved their decarbonization goals, including emission reductions and efficiency improvements.

Part 4: Sources of Decarbonization Financing

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

Conclusion:

A concluding 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 metallurgical industry. A final word on how participants can contribute to this process and its significance for the industry's future and the planet as a whole.



2. Group Work on "Identifying Climate Risks and Their Prioritization"

Group Work on "Identifying Climate Risks and Prioritization" is a crucial part of the seminar on decarbonizing the metallurgical industry. Its goal is to facilitate the analysis and understanding of the most significant climate risks facing this sector, as well as to develop a strategy for prioritizing actions to minimize these risks. Within this group work, the following stages and questions will be addressed:

Stage 1: Identification of Climate Risks

At this stage, participants should identify a broad spectrum of potential climate risks that could impact the metallurgical industry.
This may include:

- Weather pattern changes: What extreme weather events (floods, droughts) could affect operations and infrastructure?
- Changes in water resource availability: How could changes in water levels and water resource availability impact metallurgical and processing operations?
- Environmental Regulations: How can changes in environmental norms and legislation impact metallurgical operations?
- Shifts in Resource Demand: How can changes in the global economy and consumer demand affect the market for your products?

Stage 2: Assessment of Risk Significance

After identifying risks, participants should assess their significance in terms of impact on business and the environment. Discussion questions could include:

- What is the probability of each risk occurring?
- What potential consequences could there be for operations, safety, and the company's reputation?

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

Stage 3: Risk Prioritization and Strategy Development

At this stage, participants identify the most significant and probable risks and prioritize measures for their management. Discussion questions could include:

- Which of the identified risks should be considered most critical for the company?
- What actions and measures can reduce the impact of these risks on operations?
- Which 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 their work results, discusses them with other seminar participants, and receives feedback. This creates a platform for exchanging ideas and best practices in managing climate risks in the metallurgical industry

Group Work on "Climate Risk Assessment and Prioritization" contributes to 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 3: "Decarbonization of Metallurgy: Technologies and Solutions to Emission Reduction"

This lecture will provide an in-depth overview of the most effective and applicable technologies for decarbonization. Significant 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 Role of Metallurgy in Climate Change: Identifying the contribution of metallurgy to greenhouse gas emissions and its impact on climate change

Part 2: Major Sources of Emissions in Metallurgy

- Metallurgical Processes and Their Emissions: Overview of the main stages of metallurgical operations (smelting, processing, casting, etc.) and the emissions associated with them.

Part 3: Technological Solutions for Decarbonization

- Renewable Energy Sources: Discussing the role of solar, wind, and hydro energy in reducing carbon footprint in metallurgical processes.
- Renewable Energy Sources: Discussing the role of solar, wind, and hydro energy in reducing carbon footprint in metallurgical processes.
- Efficient Resource Utilization: Implementing methods for material reuse and recycling to reduce energy consumption.

Part 4: Climate Risks and the Need for Decarbonization

- Impact of Climate Risks on the Metallurgical Industry: Discussion on weather disasters, resource scarcity, and changing legislation.

Part 5: Application of Technologies in Reality

- Examples of Companies: Illustration of practical examples of metallurgical companies successfully implementing decarbonization technologies: Arcelor Mittal (EU, USA, India, Kazakhstan), JSW Steel (India), Hydro (Norway, Brazil, USA)

Part 6: Challenges and Perspectives

- Technical and Economic Challenges: Overview of difficulties companies may encounter when implementing new technologies.
- Transition Period and Potential Benefits: Discussion on the necessity of gradual implementation of changes and mention of economic advantages.

Part 4: Long-Term Decarbonization Strategy

- Integration and Planning: Discussion on the importance of developing long-term decarbonization strategies that include phased integration of new technologies and approaches.
- Collaboration and Knowledge Exchange: Emphasizing the role of knowledge exchange among companies, industrial partners, and government bodies for successful decarbonization.

4 Digital Survey "Readiness and Interest Assessment for Implementation"

After the module, participants will take an interactive survey to assess their understanding of decarbonisation, their readiness to adopt new methods and technologies, and their interest in cooperation and exchange of experience in this field. Questions for the interactive survey:

- What processes lead to GHG emissions under scopes 1 and 2 at your enterprise?
- Are there decarbonization-related goals set at your enterprise?
- Evaluate the technical and economic feasibility of implementing decarbonization measures at your enterprise (from 1 – low to 5 – high).
- What measures have already been implemented at your enterprise?
- Assess the IMPACT that risk could have on your enterprise, and the PROBABILITY of the risk materializing (from 1 – low to 5 – high)

Action	Technologically possible	Economically justified
Energy Efficiency and Modernization		
Transformation of Steelmaking		
Transition to low-carbon fuels		
Maximizing scrap metal usage		
Purchasing clean electricity		

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 survey results and the development of an action plan. Participants exchange ideas on steps each company can take to improve their environmental performance and long-term sustainability.

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