

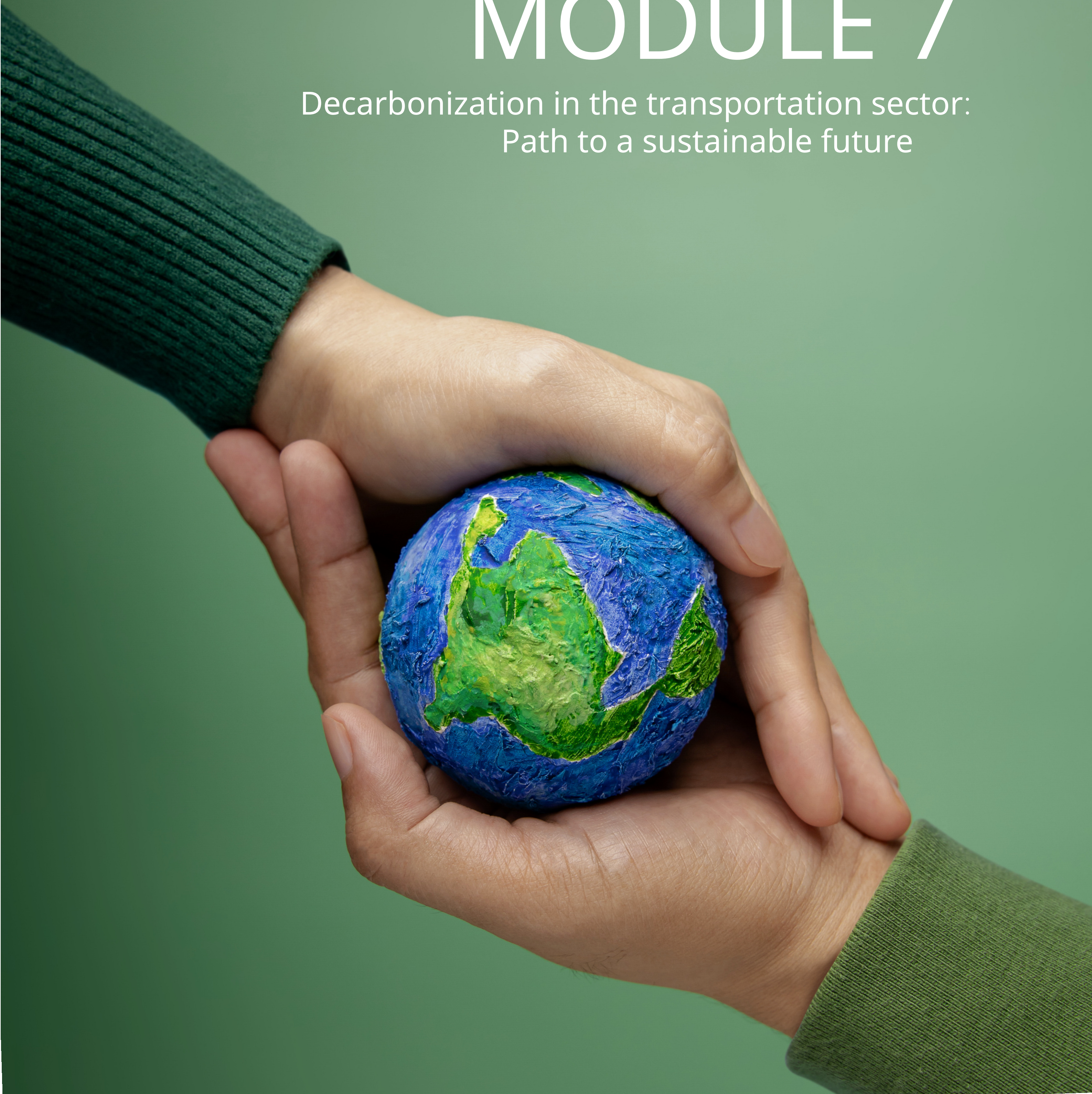


Ministry of Ecology and Natural  
Resources of the Republic of  
Kazakhstan



# MODULE 7

Decarbonization in the transportation sector:  
Path to a sustainable future





## Educational module "Decarbonization in the transport sector: Path to a sustainable future"

**Module Goal:** Develop participants' awareness of the importance and urgency of decarbonizing transportation in Kazakhstan, ensure understanding of the key sources of greenhouse gas emissions, present methods for assessing decarbonization and climate risks, and 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 the transportation sector of Kazakhstan.
- Evaluate and interpret 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 significance of reducing greenhouse gas emissions in the context of climate change and the sustainability of industrial sectors.
2. **Main sources of emissions:** Overview of greenhouse gas emission sources in the transportation sector.
3. **Target indicators and metrics:** Presentation of decarbonization metrics, measurement methods, and their importance for tracking success.

## Practical part:

1. **Climate risk assessment:** Group work to identify and prioritize the most significant climate risks for companies in the transportation sector.  
**Analysis of Measures and Technologies:** Discussion and comparison of various technological and strategic solutions for reducing emissions in the short-term and long-term.
2. **Development of decarbonization plans:** Developing 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 Buildings and Construction"

The lecture will present current data on the impact of transportation on climate and greenhouse gases. Participants will learn about the main sources of emissions associated with different types of transportation, 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 Transportation:** Discussion of the role of transportation in climate change, main sources of greenhouse gas emissions, and the urgent need for action.

#### Part 2: Climate Challenges and Their Impact on the Industry

- **Key Climate Challenges:** Overview of the main climate challenges facing transportation, including changes in weather conditions, environmental regulations, and resource instability.
- **Company Examples:** Presentation of real-world examples of companies facing climate challenges and their solutions, including Tesla, UPS (United Parcel Service), Maersk, and Airbus



## Part 3: Sources of Financing for Decarbonization

- **Investments and Financing:** Examination of various funding sources 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 for validating decarbonization efforts.

### Conclusion:

**Summary Review:** A summary of the key concepts and ideas presented in the lecture, emphasizing the importance of understanding climate challenges and the urgency of implementing decarbonization measures in transportation. 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 in the Transportation Sector"



This group work aims to develop participants' ability to analyze and understand the most significant climate risks in the transportation sector and to formulate a strategy for prioritizing actions to mitigate these risks. Here are the steps that can be included in this group work:

### Stage 1: Identification of Climate Risks

**Task Definition:** 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 transportation sector, such as extreme weather events, changes in regulatory environments, increased resource costs, etc.

## Stage 2: Risk Significance Assessment

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

## Stage 3: Development of 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

- Strategy Presentation: Each group presents their priority action strategy, explaining which risks were selected 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, which risk prioritization principles they applied, and which measures they consider most effective.
- Conclusions and Lessons: Discussion of key takeaways and lessons learned from analyzing and prioritizing climate risks in the transportation sector.

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





## Lecture: "Decarbonizing the Transportation Sector: Technologies and Pathways 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 can help the sector reduce its carbon footprint.

### Part 1: Major Emission Sources in Transportation

- **Internal Combustion Engines:** Overview of the impact of automobile engines on greenhouse gas emissions and air pollution levels.

### Part 2: Technological Pathways to Decarbonization

- **Electrification of Transportation:** Examination of the role of electric vehicles, hybrids, and other electric transport options in reducing emissions.
- **Hydrogen Technologies:** Discussion of the potential of hydrogen fuel cells for vehicles.
- **Public Transport and Multimodality:** Introduction to the role of public transportation and the integration of various modes of transport.

### Part 3: Infrastructure and Innovations

- **Charging and Refueling Infrastructure:** Overview of the development of charging stations for electric vehicles and other related infrastructure.
- **Autonomous and Smart Vehicles:** Examination of the prospects for autonomous and technologically advanced vehicles.

### Part 4: Examples of Successful Practices

- **Electric Vehicle Initiatives:** Presentation of successful projects and initiatives aimed at promoting the adoption of electric vehicles.
- **Public Transport and Bicycles:** Overview of urban programs that support the use of public transportation and bicycles.

### Part 5: Challenges and Perspectives

- **Infrastructure and Financial Challenges:** Analysis of the difficulties faced by infrastructure in developing low-carbon technologies.

- Future of Transportation: Discussion on the prospects of developing transportation with minimal emissions that aligns with environmental requirements.

**Conclusion:**

Summary of the Lecture: Emphasis on the importance of decarbonizing the transportation sector to reduce its negative impact on the climate and ensure the sustainability of urban and regional transportation systems.

## 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 field.

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

Action	Technologically possible	Economically justified
Electrification of transport		
Transition to alternative fuels		
Promotion of public transport		
Transition to alternative modes of transport		



Risk	Impact	Probability
Credit Risk: Access to capital		
Regulatory Risk: Stricter legislation		
Customer Risk: Loss of markets		
Operational Risk: Changes in precipitation levels		
Operational Risk: Extreme temperatures		
Operational Risk: Extreme weather conditions		
Operational Risk: Water resource 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 transportation sector 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.

