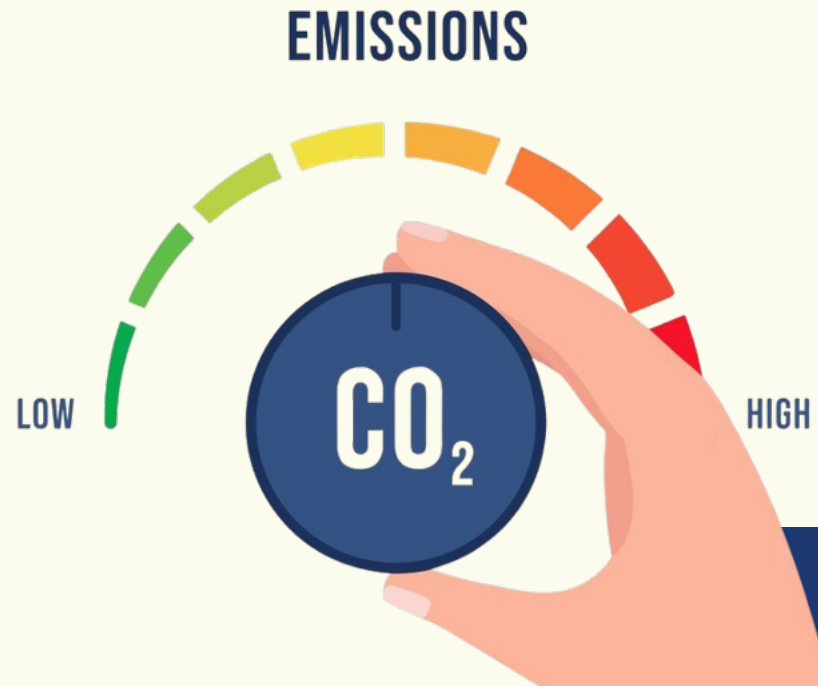
MINGACHEVIR
STATE
UNIVERSITY

NET-ZERO EMISSIONS ROADMAP 2030

Scope	Information
Document Title	Net-zero emissions roadmap
Document Type	Plan
Version	1.1
Initial Release Date	2023
Last Revision Date	2026
Validity Period	2023-2030
Document Status	Approved
Information Classification	Public
Prepared by	Sustainability Committee; Environmental Sustainability and Climate Change Center; Department of Natural Sciences
Approved by	Academic Council of Mingachevir State University
Responsible Unit	Environmental Sustainability and Climate Change Center
Owner	Sustainability Committee
Scope	Academic staff, students, visiting scholars, and researchers
Related Documents	Climate Action Plan; Sustainable Development Plan 2023–2030
Superseded Document	Initial version dated 2023
Distribution	Official university website and internal systems
Storage Location	Electronic Document Management System

Table Of Content

01 Introduction & Commitment
02 Organizational Boundary
03 GHG Inventory
04 Reduction Target
05 Reduction Strategies (Action Plan)
06 Monitoring & Reporting
07 GHG Emissions Calculation and Analysis (MSU – Recalculation year - 2025)
08 Comparative Summary KPI table
09 Net-Zero Strategy



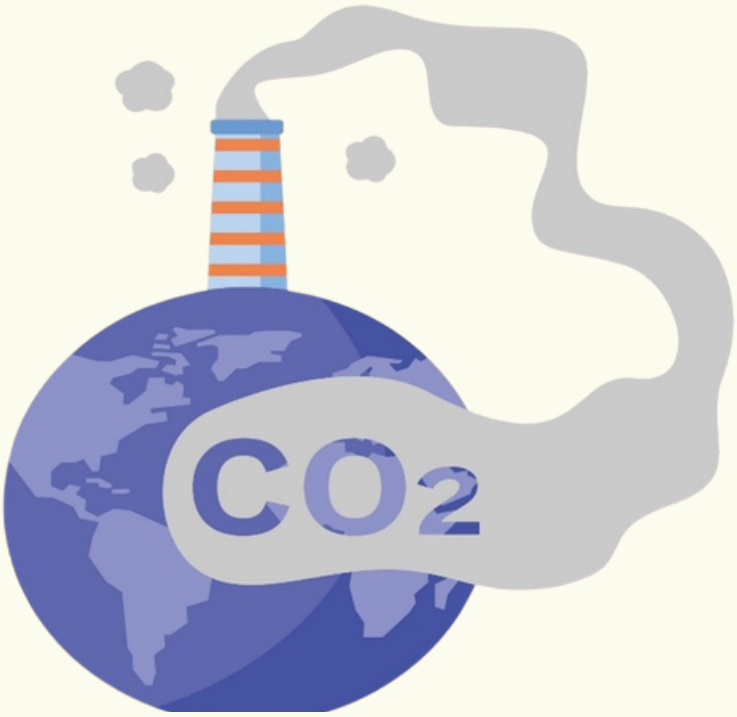
Introduction & Commitment

University Approach to Climate Change

In the context of increasing global environmental challenges, climate change has become one of the most pressing issues of our time, requiring coordinated, evidence-based, and long-term responses across all sectors. Higher education institutions play a crucial role in this process, not only through the creation of knowledge and innovation but also by integrating sustainability principles into their institutional practices and societal engagement.

Mingachevir State University views climate change as a multidimensional challenge that intersects environmental, social, and economic domains. In alignment with the national development priorities of the Republic of Azerbaijan and internationally recognized sustainability frameworks, the University considers environmental stewardship and responsible resource management as core elements of its strategic mission.

This commitment is reflected in the systematic integration of sustainable development principles into teaching, research, innovation, governance, and community engagement activities. The University's climate action efforts are guided by its broader institutional strategies, including the "MSU 2030: Development Strategy" and the "Sustainable Development Plan 2023–2030," which collectively define a long-term vision for sustainable growth and regional leadership.



These strategic directions are further informed by key international and national policy frameworks, ensuring that the University's approach remains aligned with global climate priorities and local development needs. At the core of the University's approach is its commitment to achieving net-zero greenhouse gas emissions (Scope 1 and Scope 2) by 2030. This objective is supported by the "Net-Zero Emissions Roadmap 2023–2030," which provides a structured framework for measuring, monitoring, and reducing emissions across institutional operations. In preparing this action plan, key international standards such as the GHG Protocol, the Paris Agreement adopted at the 21st Conference of the Parties to the United Nations Framework Convention on Climate Change, the United Nations Sustainable Development Goals (SDGs)—specifically SDG 13—the Ministry of Ecology and Natural Resources, as well as Mingachevir State University's documents —including the "MSU Sustainable Development Plan," "MSU 2030: Development Strategy," "Zero Emission" policy, "Climate Action SDG13" report, "Climate Action Plan," and "MSU Sustainable Development Plan 2023–2030"—were taken as the basis.

The roadmap emphasizes a data-driven and transparent approach, including baseline assessments, regular monitoring, and the implementation of targeted mitigation measures to achieve measurable reductions. The University adopts a comprehensive climate action model that includes assessing historical emissions, developing reduction scenarios, and applying carbon offset mechanisms where necessary. In addition, the plan defines clear targets, interim review points, and performance indicators to ensure continuous progress and accountability. Financial planning and resource allocation are also integrated into the implementation process to enable effective execution of planned activities. Recognizing the importance of collaboration, the University actively promotes partnerships with industry, government, and other stakeholders to support the implementation of climate solutions and the dissemination of best practices. At the same time, it seeks to raise environmental awareness and foster a sustainability-oriented mindset among students and staff, encouraging active participation in climate-related initiatives and innovation. Through this integrated and strategic approach, Mingachevir State University aims to strengthen its contribution to climate change mitigation and adaptation, support the transition to a low-carbon and resource-efficient future, and reinforce its role as a responsible and forward-looking academic institution committed to sustainable development.

Climate Action, Net-Zero Commitment, and International Alignment

Mingachevir State University's greenhouse gas (GHG) emissions inventory has been developed in accordance with the GHG Protocol Corporate Accounting and Reporting Standard. The University applies the operational control approach to define organizational boundaries and reports Scope 1 and Scope 2 emissions. Emissions are calculated using recognized emission factors and activity-based data derived from institutional records. The base year for emissions tracking is 2023.

While every effort has been made to ensure data accuracy and completeness, certain assumptions and estimations have been applied where necessary. The University remains committed to transparency, consistency, and continuous improvement in its GHG accounting practices.

As part of its climate action commitment, the University has established a net-zero target covering Scope 1 and Scope 2 emissions, aiming to achieve zero emissions by 2030. This target is supported by the "Net-Zero Emissions Roadmap 2023–2030," which outlines a structured pathway for emissions reduction.

Key priority areas include sustainable transportation (transition to low-emission and electric vehicles, and promotion of cycling), energy transition (increased use of renewable energy and energy innovation), building optimization (improving the energy efficiency of existing infrastructure), and materials management (waste reduction, recycling, and sustainable resource use).

In addition, resilience measures are considered to address climate-related risks, such as extreme weather events and their impacts on infrastructure and communities. The University adopts a combination of strategic approaches to carbon reduction, including prevention, reduction, replacement, and elimination.

These approaches focus on improving energy efficiency, transitioning from fossil fuels to low-carbon energy sources, upgrading technologies, and eliminating pollution sources. Supporting measures include the improvement of technological processes, modernization of infrastructure, and enhancement of environmental performance through operational improvements and innovation.

The University also promotes student engagement in climate action through research and laboratory-based activities, including the analysis of carbon-related parameters. A renewable energy assessment study will be conducted to evaluate the campus's solar energy potential and support future investments. Implementation efforts are carried out in collaboration with relevant stakeholders and partners. The University's approach is aligned with key international and national climate frameworks, including the Paris Agreement and the United Nations Sustainable Development Goals, particularly SDG 13 Climate Action.

This alignment reinforces the University's commitment to contributing to global climate action while supporting national sustainability priorities. Through research, conferences, publications, and environmental education initiatives, the University actively promotes awareness and participation in climate change mitigation and sustainable development.

Organizational Boundary

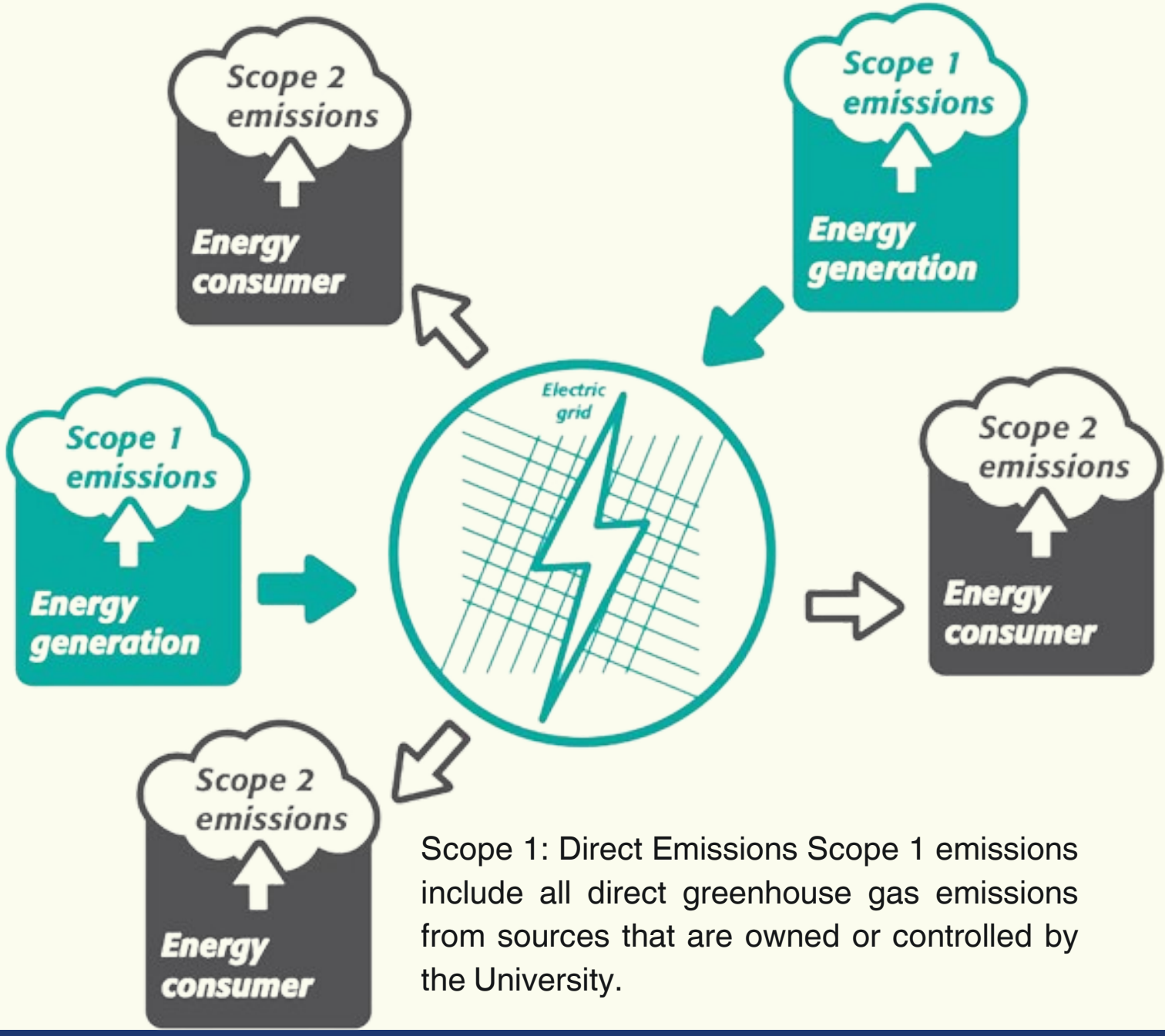
Operational Boundary (Operational Control Approach)

Mingachevir State University (MSU) defines its operational boundary in accordance with the principles of the Greenhouse Gas (GHG) Protocol Corporate Standard, applying the operational control approach. Under this approach, the University accounts for all greenhouse gas emissions arising from operations over which it has full authority to introduce and implement operating policies.

The organizational boundary encompasses all physical and operational assets under the University's control. This includes: All university campuses and associated infrastructure Academic buildings, including faculties, lecture halls, and classrooms Administrative buildings and offices Research laboratories and technical facilities Libraries, student centers, and other support facilities Ancillary buildings such as storage areas and maintenance units In addition, the boundary includes emissions generated from university-owned and operated transportation, such as service vehicles, official cars, and buses used for institutional purposes. All emission sources within these boundaries are considered in the University's GHG inventory, ensuring a comprehensive and consistent accounting framework aligned with international standards.

Emission Categories

In line with the GHG Protocol, MSU classifies and reports its greenhouse gas emissions into distinct categories (scopes) to ensure transparency, comparability, and effective emissions management.



Scope 1: Direct Emissions Scope 1 emissions include all direct greenhouse gas emissions from sources that are owned or controlled by the University.

These emissions arise from on-site fuel combustion and University-operated assets, including: Combustion of fuels such as natural gas, diesel, or gasoline for heating and energy generation Fuel consumption in university-owned vehicles, including cars, buses, and service transport Any other direct emissions from stationary or mobile sources under University control These emissions are physically generated within the University's operational boundary and are directly influenced by institutional activities and energy use practices.

Scope 2: Indirect Emissions from Purchased Electricity Scope 2 emissions refer to indirect greenhouse gas emissions associated with the consumption of purchased electricity. These emissions occur at the power generation source but are attributed to the University due to its electricity consumption. This category includes: Electricity used in academic and administrative buildings Power consumption for lighting, heating, cooling, and equipment operation Energy use in laboratories, libraries, and student facilities Although these emissions occur off-site, they represent a significant portion of the University's overall carbon footprint and are a key focus area for energy efficiency improvements and renewable energy integration.

Baseline Year

Mingachevir State University (MSU) has selected 2023 as the baseline year for its greenhouse gas (GHG) emissions inventory and reduction strategy.

The baseline year serves as the reference point against which future emissions performance, reduction targets, and progress will be measured. Establishing a clear and consistent baseline year is essential to ensure comparability over time and to support transparent reporting in line with international best practices.

All emissions data reported for subsequent years will be evaluated relative to the 2023 baseline, enabling the University to track trends, assess the effectiveness of mitigation measures, and demonstrate progress toward its emission reduction goals.

Rationale for Selecting 2023 as the Baseline Year

The selection of 2023 as the baseline year is based on several key considerations:

- **Availability of reliable and comprehensive data:** The year 2023 represents the most recent period for which complete and verifiable activity data (e.g., energy consumption, fuel use, and electricity usage) is available across all relevant University operations.

- **Data quality and consistency:** Data collection systems and internal reporting mechanisms have been significantly improved by this period, ensuring higher accuracy and reliability of emissions calculations.

- **Relevance for future comparison:** Using a recent baseline year allows for more meaningful tracking of emissions trends and ensures that reduction efforts reflect current operational realities.

- **Alignment with strategic planning cycles:** The baseline year aligns with the University's sustainability planning timeline, including the implementation of medium- and long-term climate action strategies.

This approach ensures that MSU's emissions reduction targets are grounded in realistic, evidence-based data and are aligned with institutional development priorities.

Calculation Methodology

MSU calculates its greenhouse gas emissions in accordance with the GHG Protocol Corporate Accounting and Reporting Standard, using internationally recognized methodologies and emission factors.

Emission Calculation Formula

The general formula applied for emissions calculation is:

Emissions = Activity Data × Emission Factor

Where:

- **Activity Data** refers to measurable data such as fuel consumption (liters), natural gas use (m^3), or electricity consumption (kWh).
- **Emission Factor** represents the amount of greenhouse gases emitted per unit of activity, typically expressed in kg CO_2e per unit.

This methodology ensures consistency, transparency, and comparability of emissions data across reporting periods.

Data Management and Calculation Tools

To support accurate calculation and reporting, MSU utilizes digital tools and platforms for data collection, processing, and analysis. These may include:

- **Microsoft Excel-based calculation models,** developed in accordance with GHG Protocol guidelines, for structured data entry and emissions estimation

- Specialized carbon accounting platforms such as SIMAP (Sustainability Indicator Management and Analysis Platform), which are widely used by higher education institutions for GHG inventory management

These tools enable systematic data management, facilitate verification processes, and enhance the overall quality and credibility of the University's emissions reporting.

GHG Inventory

Mingachevir State University (MSU) develops and maintains a comprehensive greenhouse gas (GHG) inventory in accordance with the GHG Protocol Corporate Standard. The inventory focuses on the systematic identification, quantification, and reporting of emissions sources within the defined organizational and operational boundaries.

Scope 1 and Scope 2 Emissions (Mandatory Reporting)

MSU reports its Scope 1 and Scope 2 emissions as mandatory categories, ensuring compliance with international carbon accounting standards.

The primary activity data used for emissions calculation include:

- **Electricity consumption (kWh)** – representing purchased electricity used across all university facilities (Scope 2)
- **Natural gas consumption (m^3)** – used for heating and energy generation within university buildings (Scope 1)
- **Fuel consumption (liters)** – including gasoline and diesel used in university-owned vehicles and equipment (Scope 1)

These data sources form the basis of the University's emissions inventory and are collected annually from utility records, fuel logs, and institutional databases.

Reduction Target

Official Target

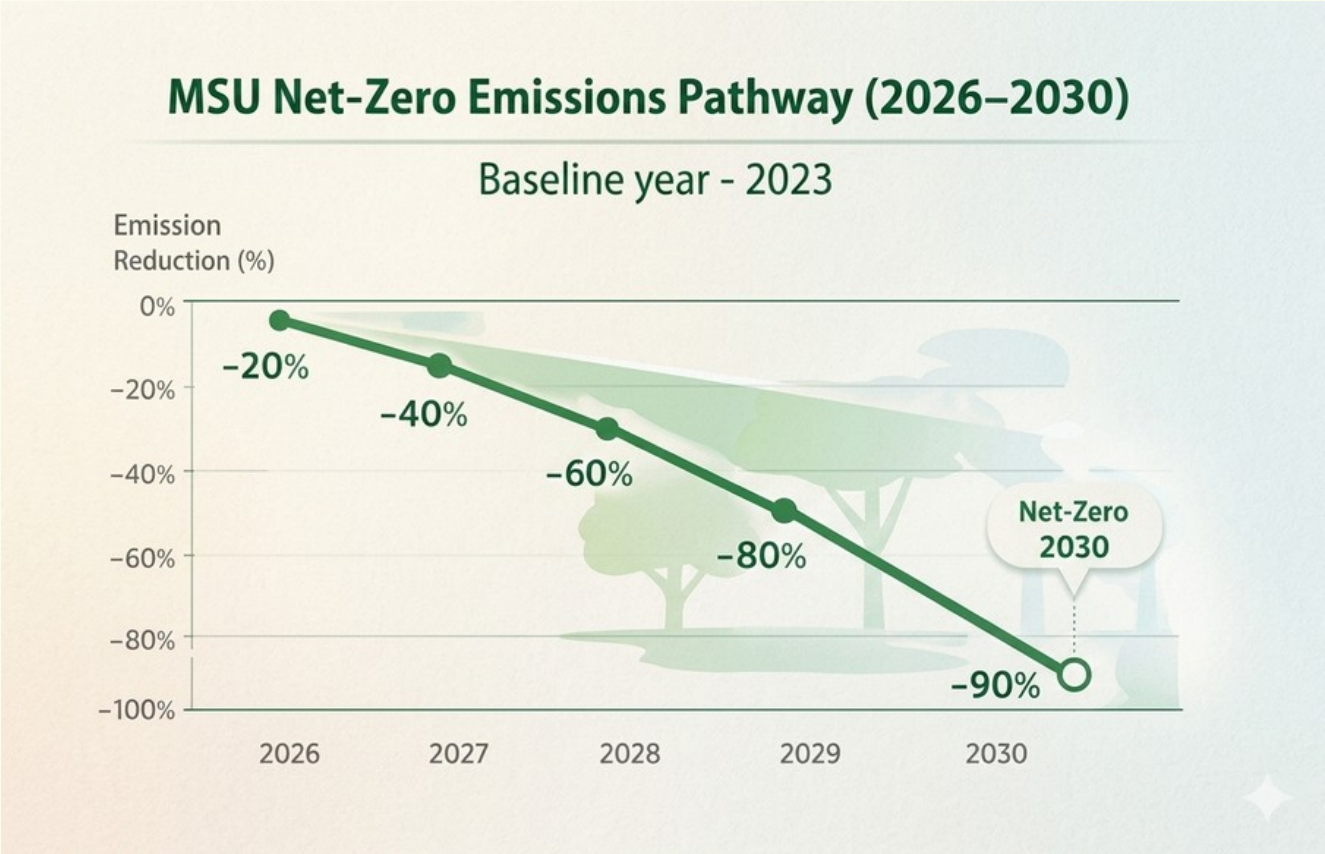
Mingachevir State University has established a clear and ambitious emissions reduction target:

Achieve Net-Zero emissions for Scope 1 and Scope 2 by 2030

This target reflects the University's commitment to climate action and alignment with global efforts such as the Paris Agreement. Achieving net-zero emissions will involve a combination of emissions reduction measures, energy transition strategies, and, where necessary, the use of credible carbon offset mechanisms.

The target will be regularly reviewed and updated in line with technological developments, policy changes, and institutional progress.

Interim Targets



These interim targets are defined relative to the baseline year 2023 and apply to both Scope 1 and Scope 2 emissions. Emissions have been calculated based on activity data from 2025, which serves as the most recent reference year for inventory development. The targets will be supported through the implementation of energy efficiency measures, electrification of campus operations, and increased use of renewable energy sources.

Progress toward each milestone will be monitored annually, and corrective actions will be introduced where necessary to ensure alignment with the overall Net-Zero 2030 commitment.

Reduction Strategies (Action Plan)

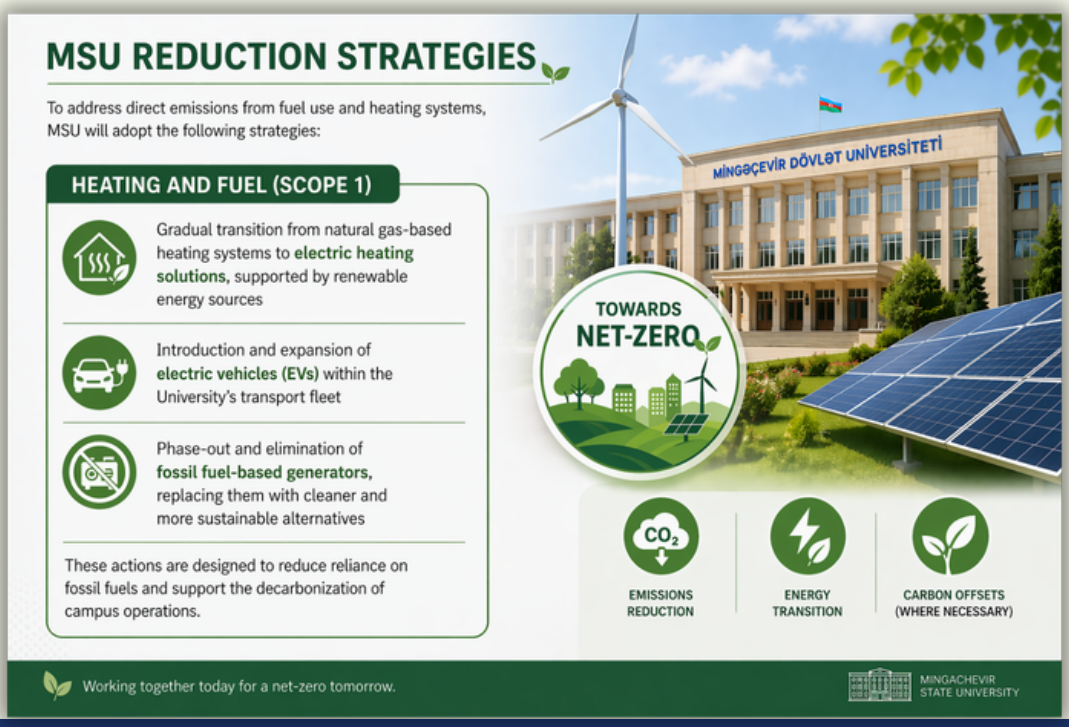
MSU implements a range of targeted strategies to reduce greenhouse gas emissions across its operations, focusing on key emission sources within Scope 1 and Scope 2.

Heating and Fuel (Scope 1)

To address direct emissions from fuel use and heating systems, MSU will adopt the following strategies:

- Gradual transition from natural gas-based heating systems to electric heating solutions, supported by renewable energy sources
- Introduction and expansion of electric vehicles (EVs) within the University's transport fleet
- Phase-out and elimination of fossil fuel-based generators, replacing them with cleaner and more sustainable alternatives

These actions are designed to reduce reliance on fossil fuels and support the decarbonization of campus operations.



Energy (Scope 2)

To reduce emissions associated with electricity consumption, the University will implement the following measures:

- Installation of solar photovoltaic panels on campus buildings to generate renewable energy on-site
- Transition to 100% green electricity procurement contracts, where available, to ensure that purchased electricity comes from renewable sources
- Replacement of conventional lighting systems with LED technology and implementation of energy-efficient equipment and smart energy management systems

These measures aim to significantly reduce indirect emissions while improving overall energy efficiency.

Monitoring & Reporting

MSU establishes a robust monitoring and reporting framework to track emissions performance and ensure accountability.

- Preparation and publication of an annual GHG emissions report, documenting Scope 1 and Scope 2 emissions
- Use of Key Performance Indicators (KPIs) to measure progress, including:
  - Emissions intensity (tCO_2e per student)
  - Total and per capita energy consumption
- Implementation of a recalculation policy, ensuring that emissions data are updated when there are significant changes in methodology, emission factors, or organizational structure

This framework ensures transparency, consistency, and continuous improvement in emissions management.

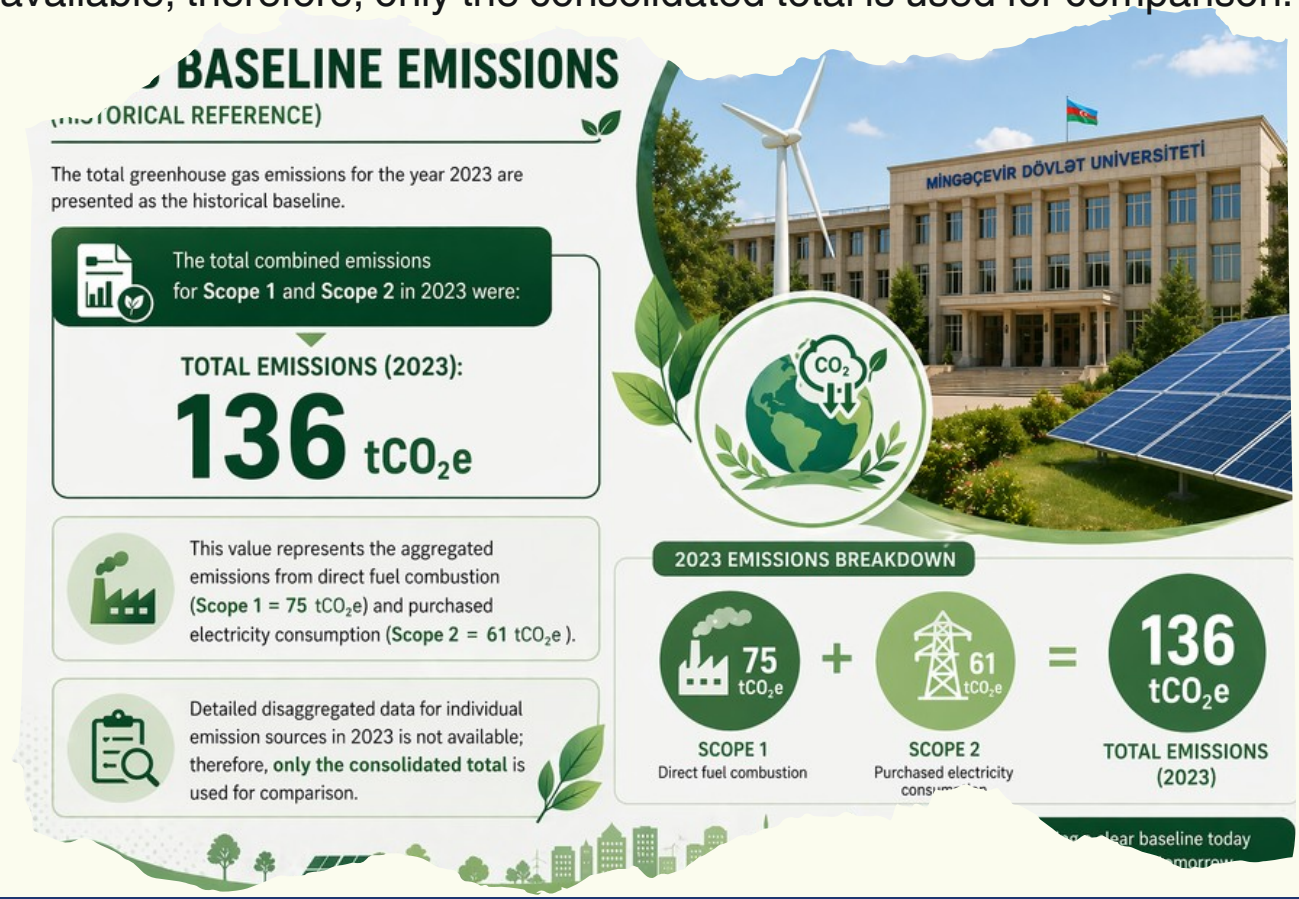
2023 Baseline Emissions (Historical Reference)

The total greenhouse gas emissions for the year 2023 are presented as the historical baseline. The total combined emissions for Scope 1 and Scope 2 in 2023 were:

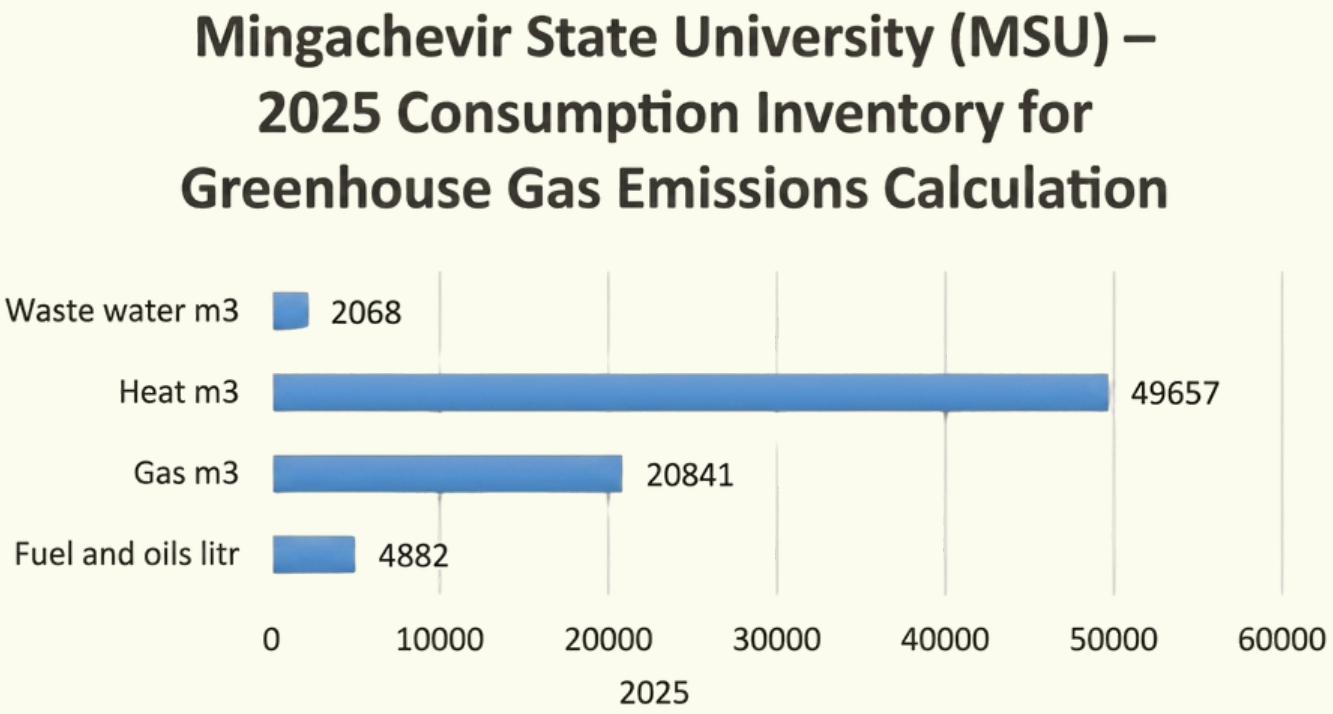
Total emissions (2023): 136 tCO_2e

This value represents the aggregated emissions from direct fuel combustion (Scope 1 = **75 tCO_2e**) and purchased electricity consumption (Scope 2 = **61 tCO_2e**).

Detailed disaggregated data for individual emission sources in 2023 is not available; therefore, only the consolidated total is used for comparison.



GHG Emissions Calculation and Analysis (MSU) Recalculation year - 2025



Methodology

Greenhouse gas (GHG) emissions were calculated in accordance with the GHG Protocol, using activity-based data and nationally appropriate emission factors. The calculation approach follows the standard formula:

Emissions (tCO_2e) = Activity Data × Emission Factor

The following emission factors were applied:

- Electricity: 0,45 kg CO_2/kWh
- Natural Gas: 1,92 kg CO_2/m^3
- Gasoline (Petrol): 2,31677 kg CO_2/liter

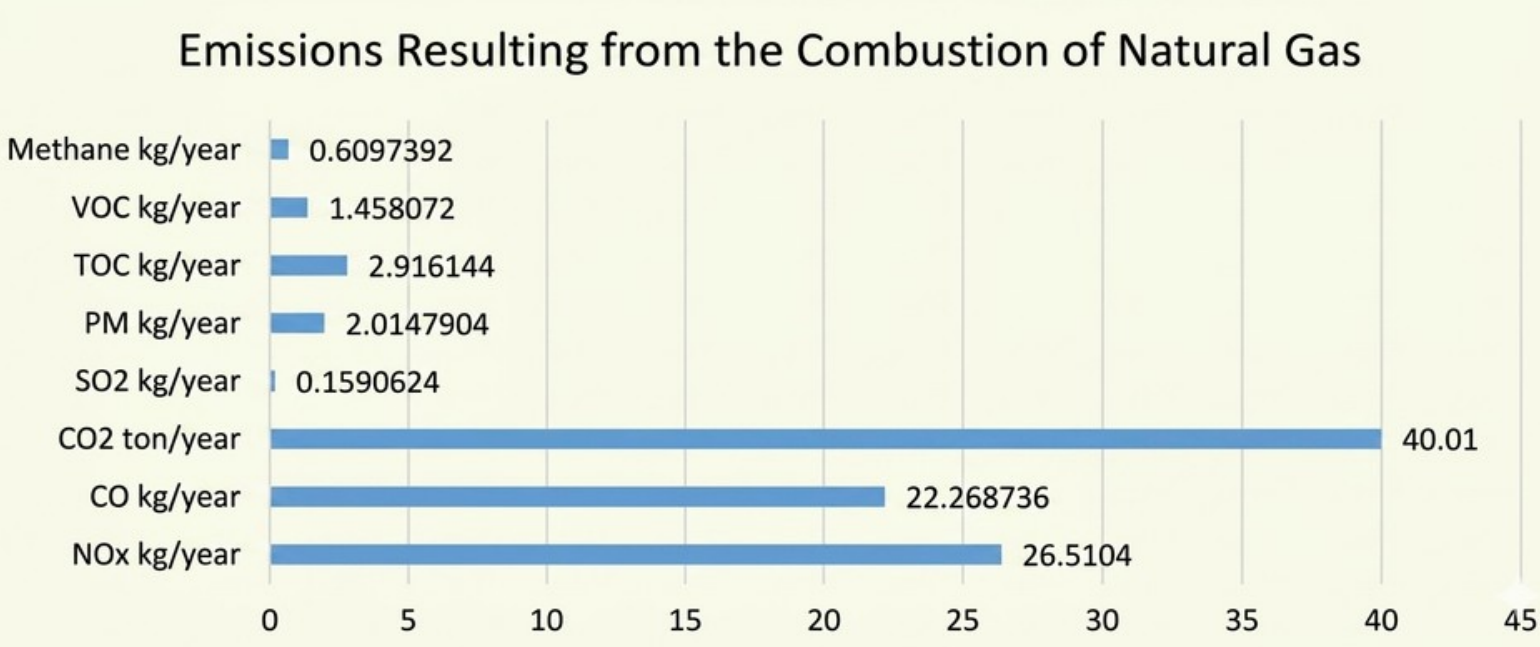
Scope 1 Emissions (Direct Emissions)

Scope 1 includes emissions from sources that are directly controlled by the university, such as fuel combustion for heating and transportation.

1. Natural Gas Consumption (Heating)

Total natural gas consumption in 2025 was 20841 m^3.
Calculation:

- 20841 × 1,92 = 40015 kg CO_2
- Converted to tonnes: 40,01 tCO_2e

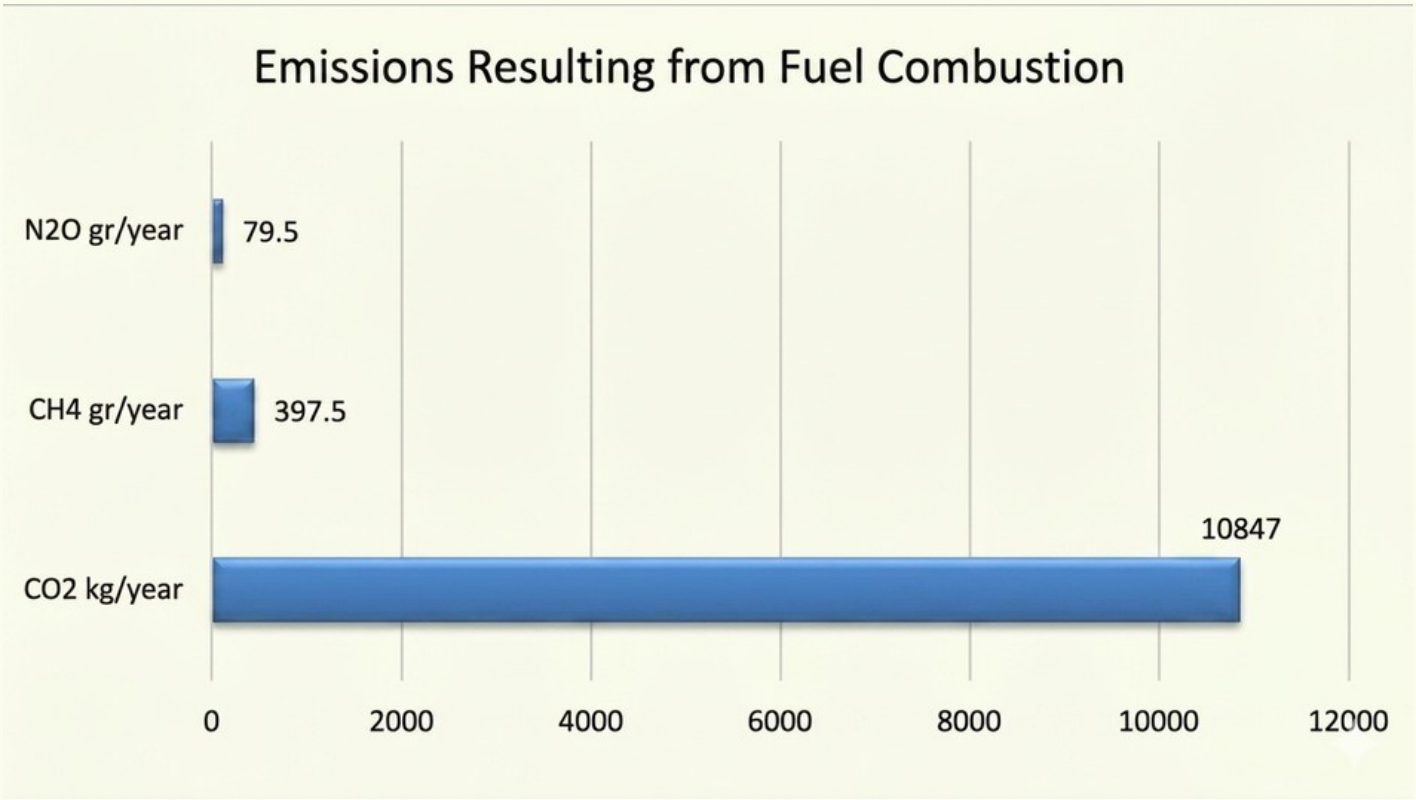


Natural gas represents the largest share of Scope 1 emissions, mainly due to heating requirements across university buildings.

2. Fuel Consumption (University Transport – Petrol)

Total gasoline consumption was 4882 liters.
Calculation:

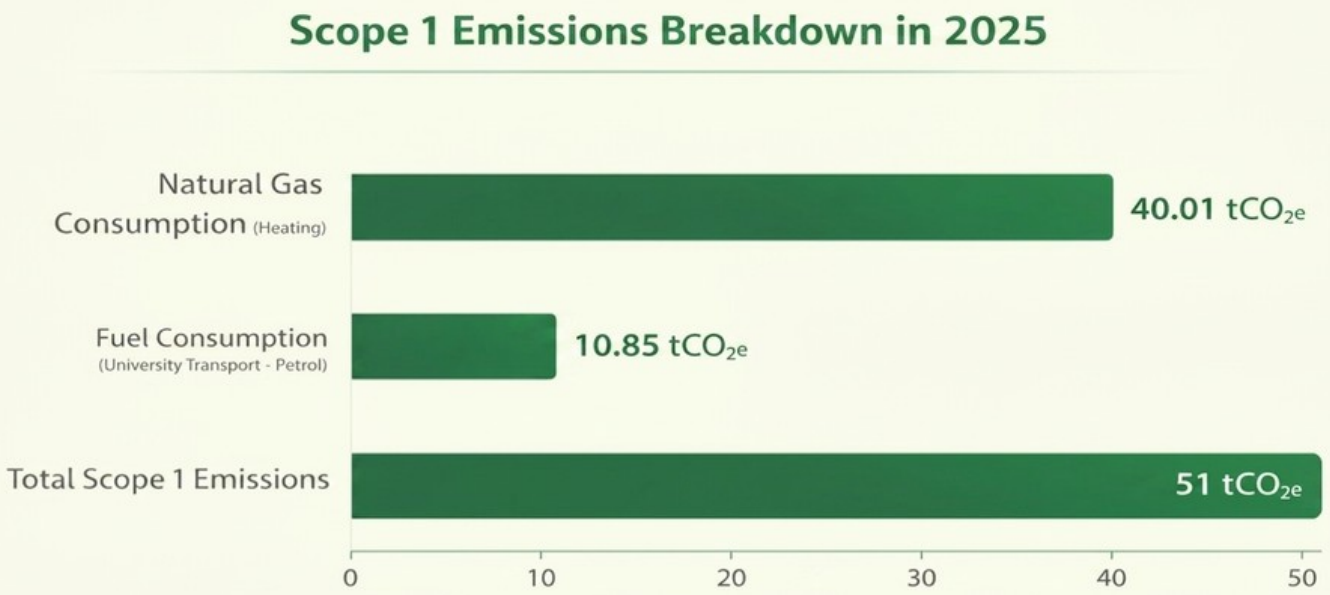
- $4882 \times 2{,}31677 = 10847$ kg CO_2
- Converted to tonnes: 10,85 tCO_2e



Transport-related emissions remain relatively limited, indicating low dependence on university-owned vehicles.

Total Scope 1 Emissions

- **40.01 + 10,85= 51 tCO_2e**

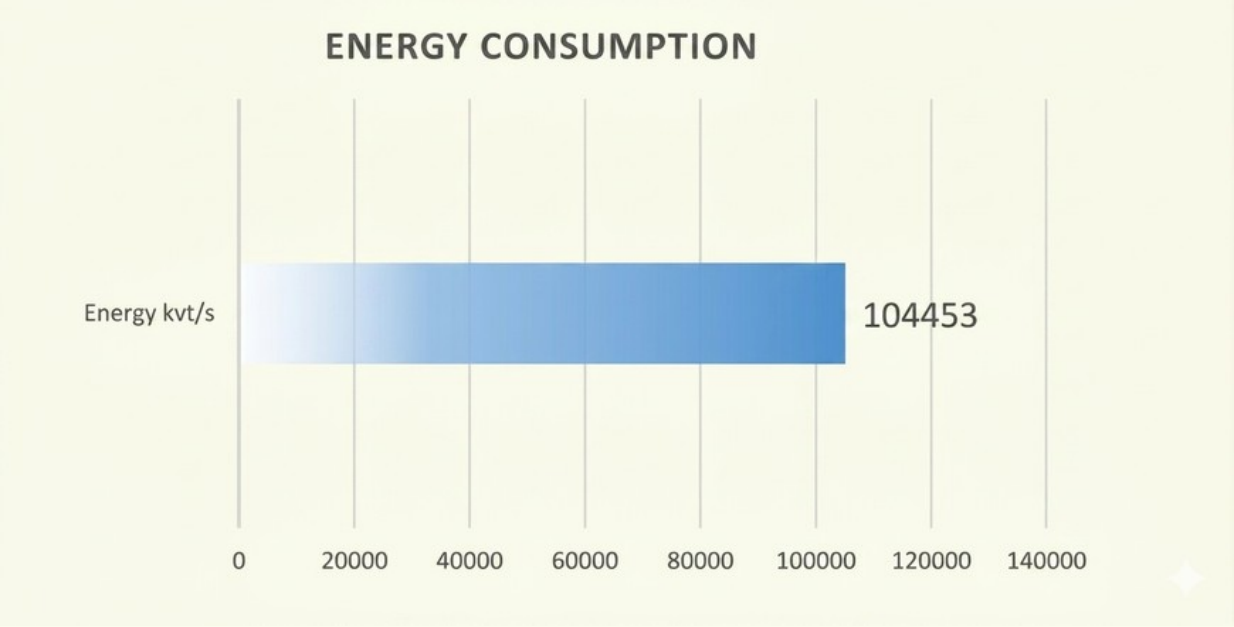


Scope 2 Emissions (Indirect – Electricity)

Scope 2 covers emissions from purchased electricity consumed by the university.

Electricity Consumption

Total electricity usage in 2025 was 104453 kWh.



Calculation:

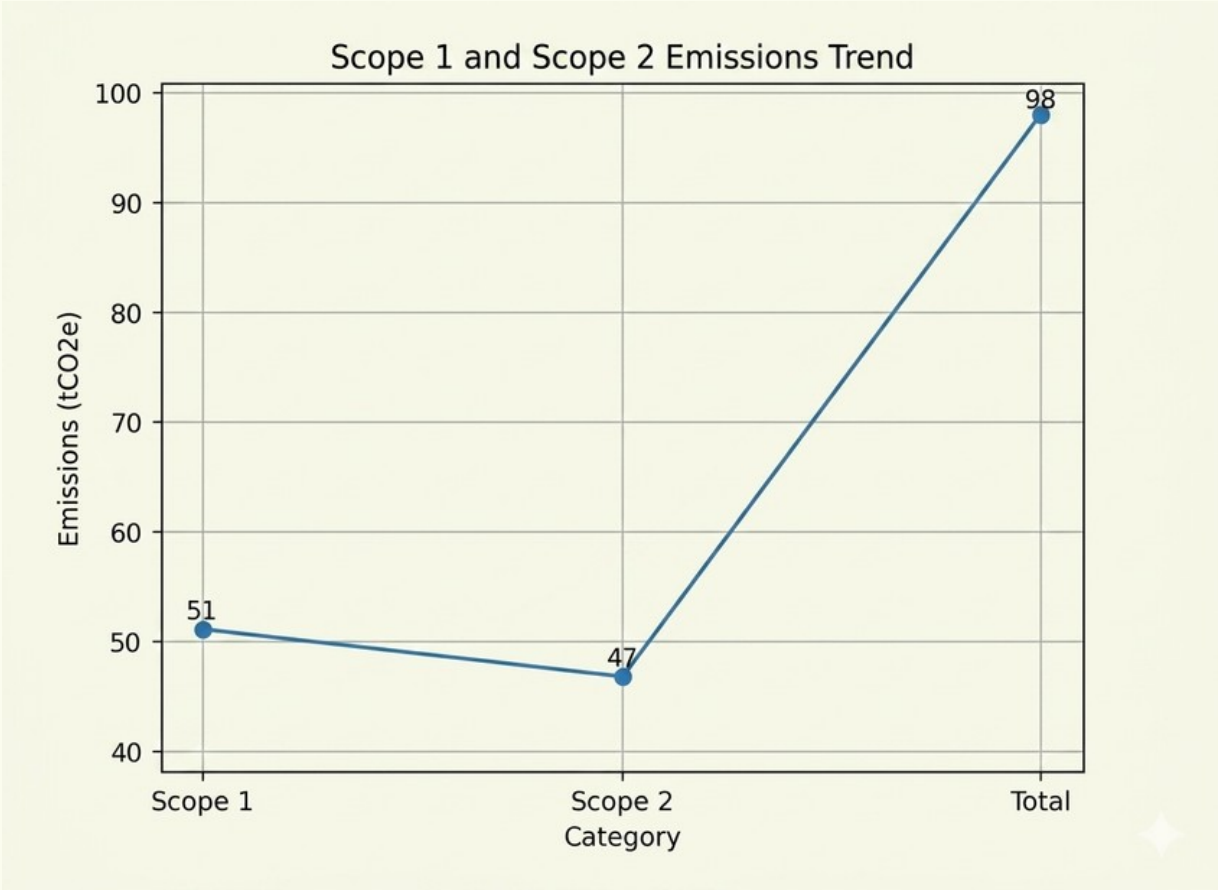
- 104453 × 0,45 = 47004 kg CO_2
- Converted to tonnes: 47 tCO_2e

Electricity consumption forms the largest single emissions category overall, reflecting dependence on grid-based energy.

Total Scope 2 Emissions

- **47 tCO_2e**

Total Scope 1 and Scope 2 Emissions = 51tCO_2e+47tCO_2e = 98tCO_2e



Per Capita Emissions Analysis

Total university population:

- Staff: 743
- Students: 5691
- Total: 6434

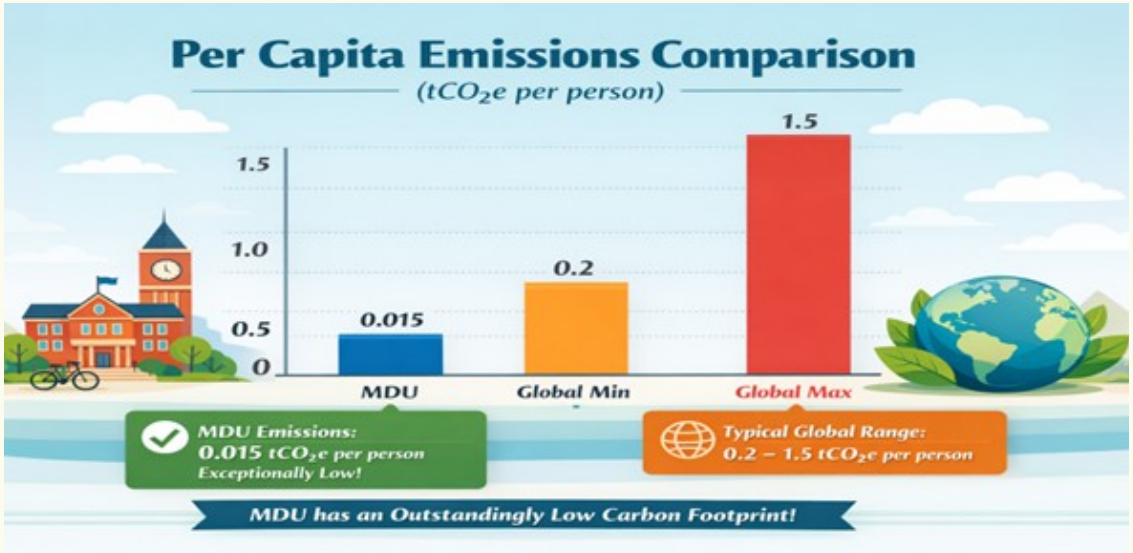
Per capita emissions:

- 98 / 6434 = 0,015 tCO_2e per person
- Equivalent to 15 kg CO_2 per person annually

Performance Evaluation (Global Context)

When compared with international benchmarks, MDU's emissions are significantly lower than the global university average.

- Typical global range:
  - 0,2 – 1,5 tCO_2e per capita
- MDU result:
  - 0,015 tCO_2e per capita



This indicates an exceptionally low carbon footprint, positioning the university favorably in sustainability rankings.

Comparative Summary

Year	Total Scope 1 + Scope 2 Emissions (tCO_2e)	Note
2023	136	Historical baseline (aggregated)
2025	98	Calculated based on activity data

Emissions Reduction (2023 → 2025)

Absolute reduction:

136 – 98 = 38 tCO_2e

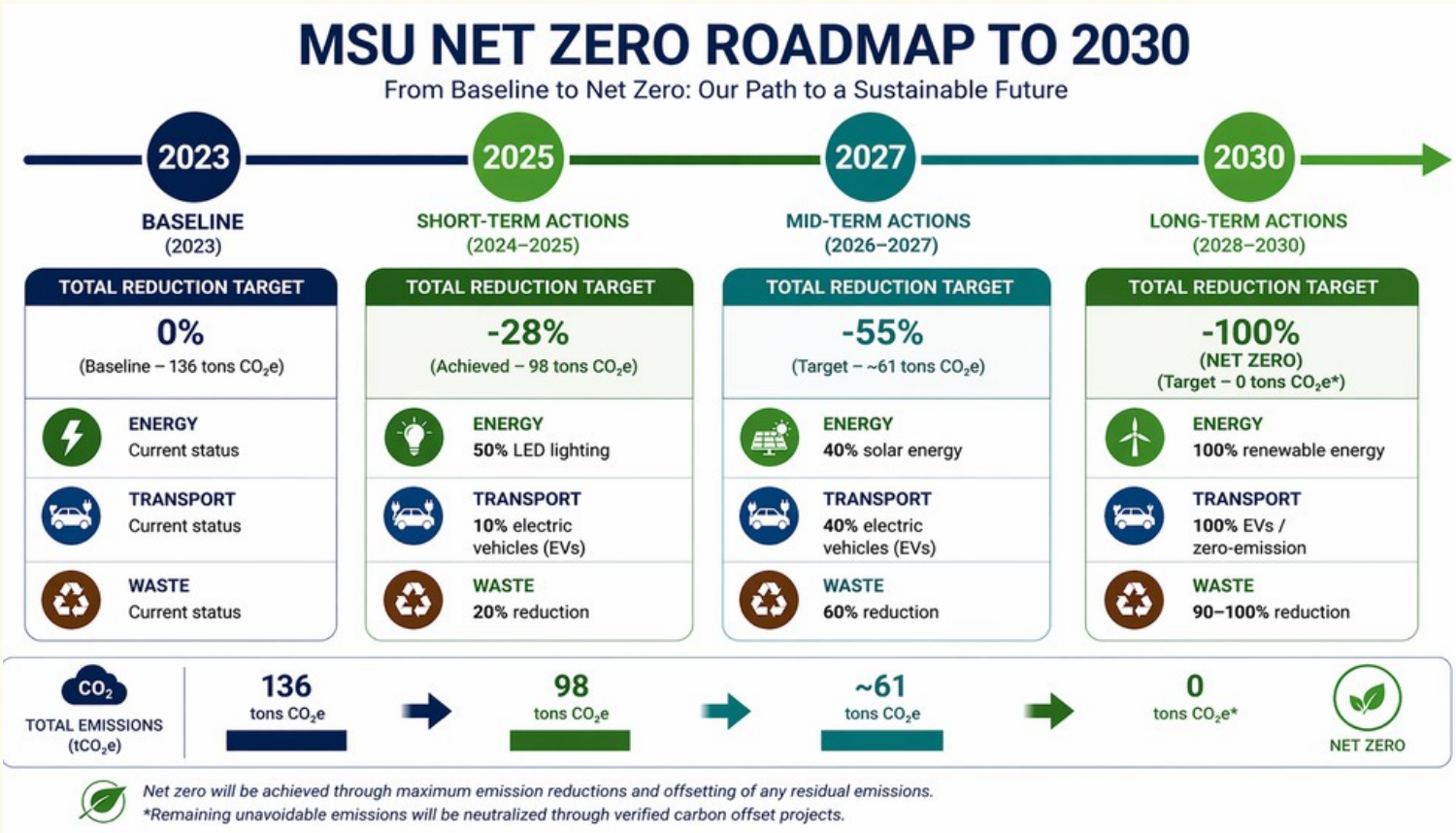
Percentage reduction:

(38 / 136) × 100 = 27.94% reduction

The reduction in emissions between 2023 and 2025 reflects improvements in energy efficiency, data accuracy, and operational monitoring systems across the university

KPI Table (Baseline: 2023)

Year	Total Reduction Target (vs 2023 baseline)
2023	0% (Baseline – 136 tons CO_2e)
2025	-28% (achieved)
2027	-55%
2030	-100% (Net Zero)



Interpretation of Low Emissions

Several factors explain this result.

A key structural reason is the relatively small and compact campus, which limits overall energy demand. Shorter distances, fewer large-scale facilities, and optimized building use reduce both electricity and heating requirements.

Operational efficiency also plays an important role. Energy consumption appears to be managed carefully, avoiding excessive or unnecessary use.

At the same time, active sustainability measures implemented by the university contribute directly to emissions reduction.

Emission Reduction Measures

The university has introduced a range of initiatives aimed at lowering its environmental impact.

Renewable energy integration has begun through the installation of solar panels within the campus, reducing reliance on carbon-intensive grid electricity.

Transport-related emissions are being addressed by encouraging alternative mobility options. A dedicated Velopark project has been introduced to promote bicycle usage among students and staff, helping to reduce fuel consumption.

Energy efficiency improvements are visible across campus infrastructure. Conventional lighting has been replaced with LED systems, significantly lowering electricity demand. The use of sensor-based hand dryers and automated devices further optimizes energy consumption in shared facilities.

Green initiatives extend beyond energy use. The university has expanded its tree-planting programs, contributing to carbon absorption and improving the campus ecosystem.

Awareness-building efforts also support long-term impact. Regular educational campaigns and sustainability-focused events encourage behavioral change and strengthen environmental responsibility within the university community.

Important Considerations

Despite the strong performance, certain limitations should be acknowledged.

The current inventory includes only Scope 1 and Scope 2 emissions. Other indirect emissions (Scope 3), such as commuting, waste, and procurement, are not yet accounted for and may increase the total carbon footprint once included.

Additionally, the defined operational boundary remains relatively limited, which may also contribute to the lower reported emissions.

Conclusion

Overall, Mingachevir State University demonstrates a low-emission operational profile, supported by both structural characteristics and proactive sustainability initiatives.

Continued progress will depend on expanding emissions coverage, improving data accuracy, and further integrating renewable energy and efficiency measures.

With these steps, the university is well-positioned to strengthen its environmental performance and achieve higher recognition in international sustainability rankings.

Net-Zero Strategy

Mingachevir State University's Net-Zero Strategy establishes a long-term framework to eliminate or offset all greenhouse gas (GHG) emissions arising from its academic and operational activities. The Strategy is aligned with international frameworks, including the Paris Agreement and the United Nations Sustainable Development Goals, as well as relevant national sustainability policies.

The University will follow a phased implementation approach, prioritizing high-impact and cost-effective measures in the short term, while progressively advancing toward deeper decarbonization through renewable energy adoption, infrastructure improvements, and low-carbon technologies.

Progress toward net-zero will be continuously monitored through defined KPIs and supported by transparent reporting mechanisms, ensuring accountability, data-driven decision-making, and alignment with international best practices.

Governance and Responsibilities

Structure / Role	Responsibilities
Rectorate and Strategic Development Department	Provide overall leadership and ensure institutional alignment with the Net Zero Emissions Roadmap; Approve strategic priorities and oversee implementation; Facilitate cooperation with government bodies and external stakeholders
Sustainability Committee	Coordinate the implementation of roadmap actions across all units; Define key performance indicators (KPIs) and emission reduction targets; Monitor and report on sustainability performance
Quality Assurance and Accreditation Office	Monitor progress against KPIs and sustainability targets; Ensure alignment with quality standards and accreditation frameworks; Support reporting and evaluation processes
Environmental Sustainability and Climate Action Center	Lead climate action initiatives and emission reduction programs; Conduct carbon footprint assessments and environmental analyses; Ensure coordination across institutional units
Finance and Procurement Department	Allocate financial resources for sustainability initiatives; Implement green procurement practices; Monitor the efficiency of climate-related investments
Facilities and Operations Department	Manage energy, water, and waste systems; Implement energy efficiency and green infrastructure projects; Ensure sustainable campus operations
Communications and Public Relations Office	Ensure transparency and public disclosure of sustainability performance; Publish sustainability reports; Manage stakeholder communication and outreach

Contact Us

+994 242753272

info@mdu.edu.az

www.mdu.edu.az

D.Aliyeva st. 21.
Mingachevir