



Climate Action and Greenhouse Gas Reduction Report

Northern Technical University (NTU)

Introduction

Northern Technical University (NTU) demonstrates a strong institutional commitment to addressing climate change through the systematic reduction of greenhouse gas (GHG) emissions and the adoption of sustainable campus operations. This commitment is embedded within the university's sustainability strategy, which integrates renewable energy deployment, resource efficiency measures, and environmentally responsible policies across academic, administrative, and operational activities.

By advancing clean energy solutions and promoting sustainable practices, NTU aims to reduce its environmental footprint while fostering a resilient, environmentally responsible university ecosystem aligned with global sustainability objectives.

Greenhouse Gas Reduction at Northern Technical University

Northern Technical University actively implements strategic initiatives to minimize its carbon footprint through sustainable resource management, energy transition measures, and climate-conscious institutional planning. Monitoring and reducing greenhouse gas emissions constitute a core component of the university's sustainability mission and environmental stewardship framework.

Carbon Footprint Overview (2024)

Institutional Commitment:

Reducing environmental impact through targeted greenhouse gas (GHG) emission mitigation and responsible water resource management.

Total Annual Emissions:

Approximately 1398.8 tons CO₂ annually, calculated in accordance with the Greenhouse Gas Protocol methodology.

Emissions Distribution

- Scope 1 (Direct Emissions): 198 tCO₂ (Fleet & Stationary Combustion).
- Scope 2 (Indirect - Energy): 1,200.8 tCO₂ (Purchased Electricity).
- Scope 3 (Value Chain): 9,927.3 tCO₂ (Calculated Student & Staff Commuting).
- Total Institutional Baseline: 11,326.1 tCO₂



Renewable Energy Infrastructure

To reduce dependence on conventional energy sources, NTU has invested in expanding renewable energy solutions across its campuses.

Solar photovoltaic (PV) power stations with a combined installed capacity of 11,000 kW have been deployed strategically to maximize solar energy utilization. These installations supply a significant proportion of campus energy demand through clean and renewable electricity generation.

The solar infrastructure represents a cornerstone of NTU's greenhouse gas reduction strategy, simultaneously lowering emissions and improving long-term energy efficiency.

1.2 Rooftop Solar Systems

Solar panels have been installed on rooftops of major university buildings and academic facilities. These installations enhance sustainable energy generation while reducing reliance on fossil fuel-based electricity sources, contributing directly to emission reduction targets.

Sustainable Campus Policies

2.1 Energy-Efficient Building Design

Northern Technical University integrates energy-efficient architectural principles into campus development and infrastructure upgrades. Key features include:

- Double-glazed windows to improve thermal insulation
- Advanced thermal construction materials
- Open-space architectural layouts optimizing natural lighting and ventilation

These measures significantly reduce the need for artificial heating, cooling, and lighting, thereby lowering energy consumption and GHG emissions.

2.2 Smart Resource Management Systems

The university employs intelligent energy management systems that monitor and optimize electricity consumption across campus facilities. Real-time energy control mechanisms ensure efficient resource utilization and support institutional emission reduction goals.

Community and Educational Engagement

3.1 Environmental Awareness and Student Participation

NTU promotes a culture of environmental responsibility through sustainability workshops, academic courses, and campus-wide environmental initiatives. Engineering and technical



programmes encourage students to integrate climate action and emission reduction principles into applied projects and research activities.

This approach ensures graduates acquire practical competencies aligned with sustainable development and environmental innovation.

3.2 Support for Green Entrepreneurship

Through innovation and entrepreneurship initiatives, the university supports environmentally responsible start-ups and sustainable business ideas. Students, graduates, and community members receive mentorship and institutional support to develop projects contributing to climate action and green economic development.

Sustainability Initiatives at Northern Technical University

Northern Technical University is committed to establishing a sustainable campus environment guided by green infrastructure principles and environmentally responsible operational practices.

3.3.1 Renewable Energy and Resource Conservation

Solar Energy: Renewable energy systems supply clean electricity, reducing reliance on external energy sources.

Water Reuse: Treated water is reused for landscape irrigation.

Waste Management: Recycling initiatives include paper recycling and organic waste composting to minimize landfill impact.

3.3.2 Sustainable Transportation

Promotion of carpooling and shared transportation options among students and staff.

Shuttle transportation services connecting university locations and residential areas.

Reduced parking availability to encourage sustainable mobility alternatives.

3.3.3 Flexible and Digital Learning

Adoption of digital learning platforms supporting hybrid and remote education models.

Online meetings, academic reviews, and assessments reduce travel-related emissions and energy consumption.

3.3.4 Community Engagement and Social Responsibility

NTU actively engages with the local community through sustainability-focused events, educational outreach programmes, and social responsibility initiatives supporting environmental awareness and societal well-being.



Future Plans for GHG Reduction

Northern Technical University plans to further expand renewable energy capacity by:

- Increasing solar photovoltaic installations across campuses
- Exploring additional renewable energy technologies
- Enhancing smart energy monitoring systems
- Strengthening low-carbon operational policies

These initiatives form part of a long-term roadmap aimed at achieving continuous reductions in greenhouse gas emissions and advancing institutional climate resilience.

Summary of verified emissions

The Total Carbon Footprint (CO₂ emission in the last 12 months, in metric tons) is calculated using the method used according to GREEN METRIC Ranking (2023-2024)

$$\begin{aligned} \text{CO}_2 \text{ (electricity)} &= \frac{\text{electricity usage per year (kWh)}}{1000} \times 0,84 \\ &= \frac{1523000 \text{ kWh}}{1000} \times 0,84 \\ &= 1279.32 \text{ metric tons} \end{aligned}$$

$$\begin{aligned} \text{CO}_2 \text{ (bus)} &= \frac{\text{number of shuttle bus in your university} \times \text{total trips for shuttle bus service each day} \times \text{approximate travel distance of vehicle each day inside campus only (KM)} \times 240}{100} \times 0,01 \\ &= \frac{20 \times 3 \times 6 \times 240}{100} \times 0,01 \\ &= 8.64 \text{ metric tons} \end{aligned}$$

$$\begin{aligned} \text{CO}_2 \text{ (cars)} &= \frac{\text{number of cars entering your university} \times 2 \times \text{approximate travel distance of vehicle each day inside campus only (KM)} \times 240}{100} \times 0,02 \\ &= \frac{1000 \times 2 \times 2 \times 240}{100} \times 0,02 \\ &= 192 \text{ metric tons} \end{aligned}$$

$$\begin{aligned} \text{CO}_2 \text{ (motorcycle)} &= \frac{\text{number of motorcycle entering your university} \times 2 \times \text{approximate travel distance of vehicle each day inside campus only (KM)} \times 240}{100} \times 0,01 \\ &= \frac{40 \times 2 \times 3 \times 240}{100} \times 0,01 \\ &= 5.76 \text{ metric tons} \end{aligned}$$

$$\begin{aligned} \text{CO}_2 \text{ (total)} &= 1279.32 + 8.64 + 192 + 5.67 \\ &= 1485.63 \text{ metric tons} \end{aligned}$$

The Total Carbon Footprint (CO₂ emission in the last 12 months, in metric tons)
(2024-2025)



CO₂ (electricity)

$$\begin{aligned} &= \frac{\text{electricity usage per year (kWh)}}{1000} \times 0,84 \\ &= \frac{1429556 \text{ kWh}}{1000} \times 0,84 \\ &= 1200.827 \text{ metric tons} \end{aligned}$$

CO₂ (bus)

$$\begin{aligned} &= \frac{\text{number of shuttle bus in your university} \times \text{total trips for shuttle bus service each day} \times \text{approximate travel distance of vehicle each day inside campus only (KM)} \times 240}{100} \times 0,01 \\ &= \frac{25 \times 3 \times 6 \times 240}{100} \times 0,01 \\ &= 10.8 \text{ metric tons} \end{aligned}$$

CO₂ (cars)

$$\begin{aligned} &= \frac{\text{number of cars entering your university} \times 2 \times \text{approximate travel distance of vehicle each day inside campus only (KM)} \times 240}{100} \times 0,02 \\ &= \frac{900 \times 2 \times 2 \times 240}{100} \times 0,02 \\ &= 172.8 \text{ metric tons} \end{aligned}$$

CO₂ (motorcycle)

$$\begin{aligned} &= \frac{\text{number of motorcycle entering your university} \times 2 \times \text{approximate travel distance of vehicle each day inside campus only (KM)} \times 240}{100} \times 0,01 \\ &= \frac{100 \times 2 \times 3 \times 240}{100} \times 0,01 \\ &= 14.4 \text{ metric tons} \end{aligned}$$

CO₂ (total)

$$\begin{aligned} &= 1200.8 + 10.8 + 172.8 + 14.4 \\ &= 1398.8 \text{ metric tons} \end{aligned}$$

Carbon footprint= 1398.8 metric tons

Conclusion

Northern Technical University is actively advancing climate action through integrated renewable energy investments, sustainable campus policies, and community engagement initiatives. By prioritizing energy efficiency, environmental education, and emission reduction strategies, NTU positions itself as a leading technical institution contributing to sustainable development.

The university's commitment to reducing its carbon footprint reflects a strategic vision focused on environmental stewardship, innovation, and the creation of a sustainable future for current and future generations.