Carbon Footprint Report 2024

Engineering Services Department

Health, Safety, and Environment

Prepared by: Eng. Ghosna Almarri

Reviewed by: Madawi Al-shafi

REPORT CONTENT

This report presents the results of the greenhouse gas (GHG) emissions calculations, highlighting the overall emissions profile and key findings. It provides valuable insights to support sustainability planning and inform future environmental actions. The GHG assessment is part of Qatar University's ongoing commitment to sustainability, with carbon footprint calculations conducted regularly since 2016.This report covers the pertinent Scope 1, 2, and 3 emissions from anthropogenic sources of greenhouse gases (GHG) within Qatar University's organizational boundary. The methodology aligns with the GHG Protocol Guidance.[1]

WHO WE ARE?

The Health, Safety, and Environment Section comes directly under the Engineering Services Department - Administration and Financial Affairs. We are here to design and build practical solutions and to assure that our operations are performed in a sustainable way. Conserving our natural resources, planning to decrease our campus carbon footprint, managing wastes, promoting recycling, and increasing the community awareness are all under our scope.

We are also monitoring the project performance to ensure that all operational work is done in environmentally friendly way.

REACH US

We are here to hear from you,

Email: ess@qu.edu.qa

Prepared by: Eng. Ghosna Almarri

Reviewed by: Madawi Al-Shafi

[1] GHG Protocol Guidance - https://ghgprotocol.org/corporate-standard

MESSAGE FROM THE DIRECTOR

"The State shall preserve the environment and its natural balance in order to achieve comprehensive and sustainable development for all generations." ***Permanent Constitution***

Following what stated in our state constitution and the fourth pillar in Qatar's vision toward 2030 – Environmental Development, we at Qatar University affirm our endeavor toward achieving the required balance between the development needs and protecting the environment, and this could not be done without the cooperation of all sectors in campus. The sustainability model of Qatar University represents an opportunity to embody a more sustainable society by working on the application of various relevant research and academic outputs. This will enable the University to provide Qatari society with the nation's largest and oldest national businesses, which will equip qualified personnel to lead sustainable development through their future positions in various sectors of institutions and society. With the global warming and climate change issues arising every day, it is very important to understand the environment around us and predict our contribution as Qatar University towards global climate change.

Thus, the Health, Safety, and Environment Section at Qatar University are calculating the QU carbon footprint on annual basis, and summarized all the measurements done in this report, which will enable us setting targets, and building strategies and programs.

Together for a green and sustainable campus,

Eng. Jawaher Fakhroo
Director of Engineering Services Department,
Qatar University

ACKNOWLEDGMENT

In the very outset, we would like to express our gratitude to all people who put their efforts in this project directly or indirectly; including all professional engineers, administrative people, operators, and student trainees or part-time student employees provided by the university.

Our special thanks go to Eng. Jawaher Fakhroo Director of Engineering Services Department for her endless support and professional assistance given through this journey.

We also would like to thank the Institutional Research and Analytic Department represented by Ms. Sara Alorfali for providing us with the institutional data-population part.

Thanks to the Civil, Electrical, Mechanical, Agricultural, and Transportation teams from the Engineering Services Department for their professional and skillful help in calculating the core data required in this work.

Our sincere thanks go to Ms. Madawi Al-Shafi, the Health, Safety and Environment Section Head, for her continuous and dedicated support to accomplish this work.

We believe that without your efforts, this work would not have been possible.

Carbon Footprint Calculation Team,
Health, Safety, and Environment – ESD,
Qatar University

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1. INTRODUCTION

1.1. QATAR'S INFLUENCE ON GLOBAL CLIMATE CHANGE

Qatar is a small, arid subtropical desert country, heavily reliant on its petroleum and natural gas reserves, the oil and gas industry is the backbone of the economy, which accounts for over 61% of the government's revenue. The country experienced a significant increase in economic growth and population since 1970s, which was largely contributed to the abundance of natural resources, especially oil and gas reserves, and the trading of these resources [2], the rapid population growth in Qatar was fueled by expatriates in preparations for FIFA World Cup 2022 which in turn caused rapid industrial growth where the population rose from 0.46 million in 1960 to 2.8 million in 2019. The projected 2030 population increase hints at a rise in fossil fuel utilization and is expected to increase by 1.5 times their 2020 values resulting increase in CO_2 emissions. Between 2004 and 2016, Qatar experienced rapid growth in both population and economic activity, with annual rates of approximately 10% and 15%, respectively. This expansion was largely financed by revenues generated from hydrocarbon resources. However, the extraction and use of oil and gas have had considerable environmental impacts, contributing to a steady rise in atmospheric greenhouse gas (GHG) emissions across the country. These emissions significantly influence global warming by increasing surface and air temperatures. According to the IPCC, Qatar ranks among the highest countries globally in terms of per capita CO_2 emissions [3], largely due to its status as a major producer of oil and gas. Nevertheless, Qatar plays a key role in supplying natural gas, which is considered the cleanest fossil fuel, thereby supporting improvements in air quality and reductions in anthropogenic CO_2 emissions worldwide. In line with these efforts, Qatar National Vision 2030 targets a 25% reduction in GHG emissions[4]

[2] Abulibdeh A. Modeling electricity consumption patterns during the COVID-19 pandemic across six socioeconomic sectors in the State of Qatar. *Energy Strategy Reviews*. 2021;38. doi:10.1016/J.ESR.2021.100733
[3] Al-Asmakh, M., & Al-Awainati, N. (2018). *Counting the Carbon: Assessing Qatar's Carbon Dioxide Emissions*. *2018*(1), EEPD592. https://doi.org/10.5339/QFARC.2018.EEPD592

[4] https://www.gco.gov.qa/en/state-of-qatar/qatar-nationalvision-2030/environmental-development/

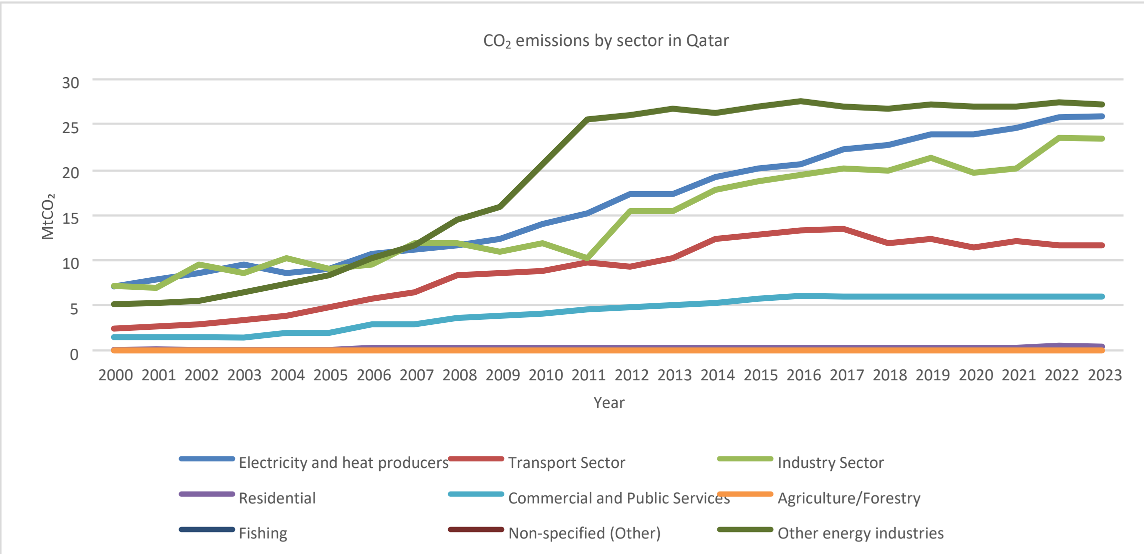


Figure 1. GHG emissions by sector in Qatar[5]

As shown in Figure 2, In 2024, Qatar recorded an average annual maximum surface air temperature of approximately 34°C, placing it among the warmest years on record. This reflects a long-term increase from values near 32°C in the early 1900s to around 34°C in recent decades, highlighting a sustained rise in maximum temperatures over the past century.

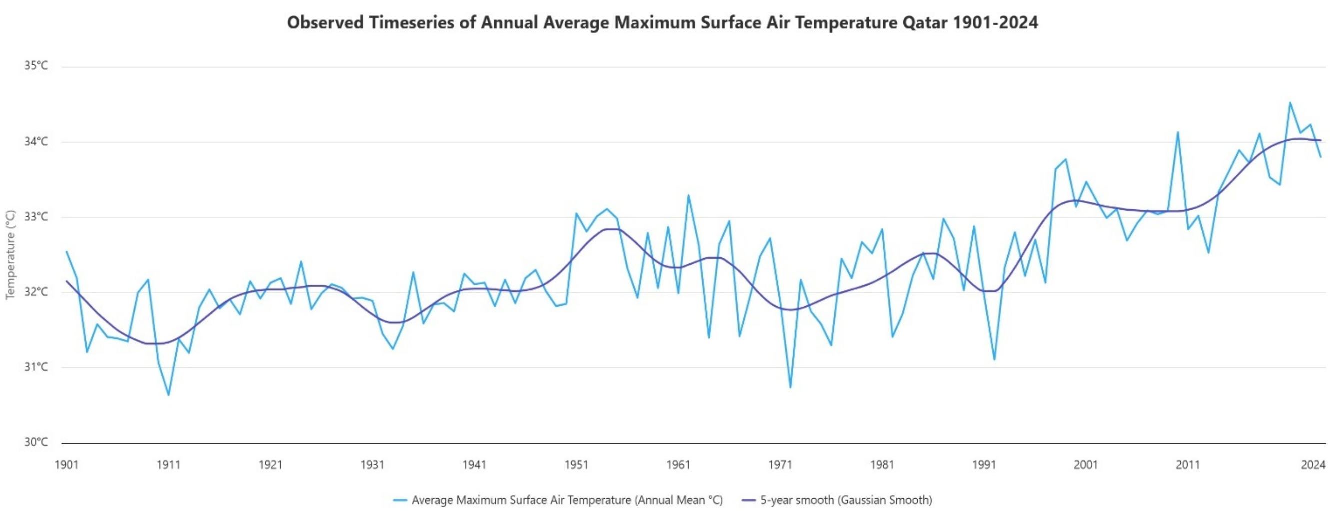


Figure 2. Average annual maximum temperature in Qatar.[6]

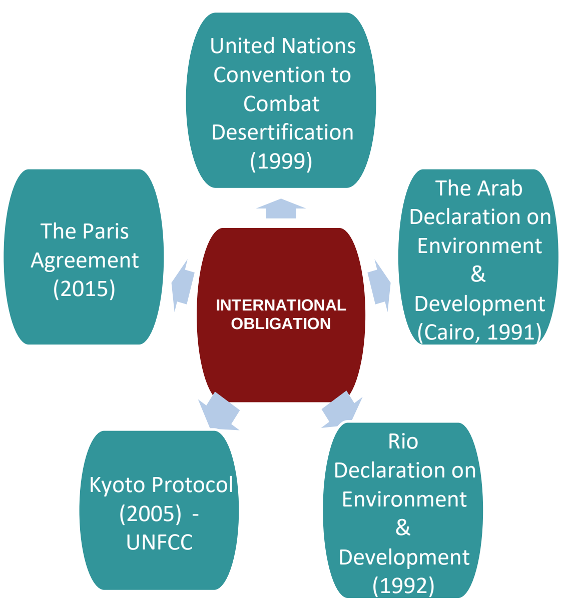
[5] https://www.iea.org/countries/qatar/emissions
[6] Qatar - Climatology (CRU) | Climate Change Knowledge Portal

In comparison with the global ecological footprint, Qatar has the highest ecological footprint in the world. This is linked to its oil and gas industry, comparatively smaller population, area, desalination plants, landfills, excessive consumption of water, energy, and goods, and the lack of robust environmental conservation initiatives. From 1980 to 2016, its footprint rose from 5.8 gha to 12.7 gha, reaching 13.1 gha presently (Climate Action Tracker, 2022). If global per capita footprints matched Qatar's, 4.8 planets would be needed to sustain the population.

1.2. QATAR & IT'S CLIMATE COMMITMENT

Climate change is the most pressing issue of the century and is caused primarily by greenhouse gas (GHG) emissions, with CO_2 emissions from fossil fuel combustion being the main driver
(IPCC 2022: Climate Change 2022: Mitigation of Climate Change). Climate change worsens natural disasters like droughts, fires, and strong storms while raising sea levels. Addressing global climate change and promoting sustainable development are urgent matters requiring immediate action.

> "We need to care for our natural environment for it was entrusted to us by God to use with responsibility and respect for the benefit of humankind. If we nurture our environment, it will nurture us."
>
> — Her Highness Sheikha Moza bint Nasser, Qatar



One of the drawbacks of fossil fuel extraction and processing is the resulting high CO_2 emissions per capita. Qatar acknowledges its role in climate change and is committed to various national and international treaties aimed at environmental protection and sustainable development. The Environmental Protection Law No. 30, as well as Qatar National Vision 2030, emphasizes sustainable development.

> "Qatar National Strategy for Environment and Climate Change identifies environmental priorities, including reducing greenhouse gas emissions by 25% by 2030, as part of efforts to contribute to achieving the 1.5 degrees Celsius goal. Qatar's sovereign wealth fund is a key supporter of green investment. The country prioritizes technology and innovation to address climate change challenges, emphasizing global partnerships and backing technological research and development institutions to provide solutions for mitigation and adaptation across various sectors."
>
> HE Sheikh Dr Faleh bin Nasser bin Ahmed Al Thani,
>
> Minister MoECC

1.3. Qatar University's Commitments and Sustainable Development Initiatives"

QU has made big steps in being more sustainable by collaborating with other universities like University of Oxford for United Nations' ecosystem restoration program (UNEP), and “Zero Waste” plan that aims to cut down on campus waste by following circular economy principles.

Higher Educational Institutions like QU operates on large amounts of energy as they host thousands of students and staff, and it has significant negative effect on climate change. As centers for education and research, QU is accountable in shaping responsible graduates for sustainable development. To set an example for its students and staff and society, calculating, tracking, and reporting their carbon footprint (CF) is the first step towards sustainability.

QU is actively undertaking various initiatives to minimize its environmental impact. These include installing solar panels to lower energy consumption, recycling paper, repurposing wood waste into furniture, and converting food waste into fertilizer for landscaping. For instance, *Figure 3* illustrates an initiative by the Engineering Services Department that promotes sustainability through the recycling and repurposing of wood into furniture. Furthermore, Qatar University actively participates in environmental initiatives across the country such as the World Environmental Day and Qatar Environment Day, in collaboration with governmental ministries. These initiatives include campus planting activities, as well as delivering lectures and conducting research related to the environment and sustainability.

Carbon footprint (CF) is a valuable tool for monitoring activities that are associated to CO_2 emissions and it serves as a baseline to check the effectiveness of future efforts to reduce impacts on campus. Once the carbon emissions are calculated, we can assess the impact and can implement reduction strategies, and also target the most problematic or high carbon emission source.

Figure 3. Repurposed wood furniture.

1.4. GHG Protocol

The Greenhouse Gas (GHG) Protocol, developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD), is the most widely used and accepted methodology for greenhouse gas accounting. It provides a framework for businesses, governments, and entities to measure and report greenhouse gas emissions that support ongoing reduction efforts in a consistent manner.

Under the GHG Protocol, emission sources are divided into scopes 1, 2 and 3. Scope 1 emissions are a result of an organization's direct operations, whereas scope 2 and 3 emissions result from indirect activities through importing electricity (scope 2) and from the value chain (scope 3). The figure below provides a description of the emission categories by scope.

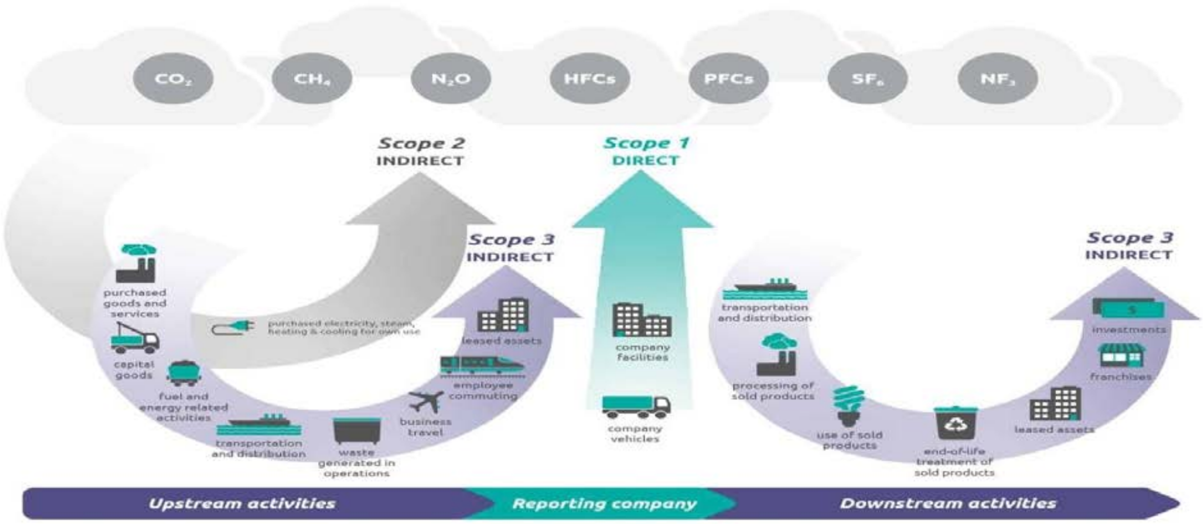


Figure 4. Overview of Scope 1, 2, and 3 greenhouse gas (GHG) emissions.

1.5. Greenhouse Gases covered

The GHG Protocol Corporate Standard requires the inclusion of the seven GHGs covered by the Kyoto Protocol:

- carbon dioxide (CO_2),
- methane (CH_4),
- nitrous oxide (N_2O),
- hydrofluorocarbons (HFCs),
- perfluorocarbons (PFCs),
- nitrogen trifluoride (NF_3), and
- sulphur hexafluoride (SF_6).

Each gas has its own global warming potential (GWP). By comparing each gas's GWP to that of Carbon Dioxide (CO_2), it is possible to derive a Carbon Dioxide equivalent value (CO_2e). E.g., if 1kg of methane is emitted, this can be expressed as 28kg of CO_2e (1kg CH_4 * 28 = 28kg CO_2e).

The emissions calculated for Qatar University are expressed in terms of tonnes of CO_2e.

1.6. Data sources

The data sources used to calculate Qatar University's emissions are listed below:

Table 1. Data Source used to Calculate Qatar University's emissions

Published by	Description	Link
UK Department for Energy Security and Net Zero and Department for Business, Energy & Industrial Strategy	UK based Emission factors for all sizes of company reporting	Link
Intergovernmental Panel on Climate Change (IPCC)	2006 IPCC Guidelines for National Greenhouse Gas Inventories	Link
International Energy Agency (IEA)	Qatar's country-based emission factor	2024 database
US EPA's Supply Chain Greenhouse Gas Emission Factors v1.3 by NAICS-6.	Supply Chain Greenhouse Gas Emission Factors v1.3 by NAICS-6	Link

2. Methodology

A purpose-designed carbon footprint calculator was used to quantify greenhouse gas emissions in accordance with the GHG Protocol, ensuring consistency, transparency, and accuracy across emissions calculation and reporting.

2.1 Scope 1 emissions

2.1.1 Overview

Scope 1 emissions are direct GHG emissions from sources that are owned or controlled by Qatar University. Sources of Scope 1 emissions include fuel combustion from both stationary, mobile sources, fugitive emissions from the leakage of refrigerants, fire suppression and other processed industrial reactions.

2.1.2 Reporting period

Reporting is aligned to the calendar year: 1st January 2024 - 31st December 2024.

2.1.3 Boundaries

All operations were considered for the calculation of scope 1 emissions. For stationary combustion, mobile combustion, refrigerant leakage, fire suppression and fertilizers used, all Qatar University generators, owned vehicles and refrigerant cylinders were considered.

2.1.4 Assumptions

As 2024 data was unavailable, 2023 data for fire suppression, refrigerant gases and others were used.

Qatar University has operational control over daily employee and student transportation to and from the campus. The vehicles are either leased or owned and operated by Qatar University. As such, this data has been included under Scope 1 mobile combustion.

2.1.5 Data owners

All information were provided by the department (operations) team.

2.1.6 Exclusions

All activities required for scope 1 reporting have been included in the GHG emissions calculations.

2.1.7 Unit of measurement

Scope 1 carbon emissions are reported in tonnes of carbon dioxide equivalent (tCO_2e).

2.1.8 Emission factors

The emission factors used for calculating scope 1 emissions were derived from BEIS 2024 GHG Conversion Factors and IPCC (specifically for processed emission from fertilizers).

Table 2. Description of Subcategoris.

Subcategory	Description	Year
Diesel consumption	Scope 1 > Fuels > Liquid fuels > Diesel (100% mineral diesel) > liters	2024
Petrol & Diesel consumption for distance activity data	Scope 1 > Delivery vehicles > Vehicle type > Vehicle fuel > km	2024
R410A	Scope 1 > Refrigerant & other > Blends > R410A > Emissions including only Kyoto products > kg	2024
HCFC-22/R22	Scope 1 > Refrigerant & other > Blends > HCFC22/R22> Emissions including only non-Kyoto products > kg	2024
HFC-134a	Scope 1 > Refrigerant & other > Blends > HFC-134a > Emissions including only Kyoto products > kg	2024
R407C	Scope 1 > Refrigerant & other > Blends > R407C> Emissions including only Kyoto products > kg	2024
HFC-125	Scope 1 > Refrigerant & other > Blends > HFC-125 > Emissions including only Kyoto products > kg	2024
Carbon dioxide/CO2	Scope 1 > Refrigerant & other > Blends > Carbon dioxide/CO2 > Emissions including only Kyoto products > kg	2024
Fertilizers	Scope 1 > Description/Source > Nitrogen content > kg	2024

2.1.9 Calculation methodology

Scope 1 emissions were calculated using the activity-based approach, whereby activity data was multiplied by its corresponding emission factor as follows:

$$Emissions\ from\ petrol\ combustion\ (t\ CO_2e) = Petrol\ EF\left(\frac{Kg\ CO_2e}{litre}\right) x \frac{Petrol\ consumption\ (litres)}{1000\left(\frac{Kg\ CO_2e}{tCO_2e}\right)}$$

$$Emissions\ from\ diesel\ combustion\ (t\ CO_2e)$$

$$= Diesel\ EF\left(\frac{Kg\ CO_2e}{litre}\right) x \frac{Diesel\ consumption\ (litres)}{1000\left(\frac{Kg\ CO_2e}{tCO_2e}\right)}$$

$$Fugitive\ emissions\ from\ refrigerant\ leakage\ (t\ CO_2e)$$

$$= Refrigerant\ EF\left(\frac{Kg\ CO_2e}{kg}\right) x \frac{Refirgrant\ leakage\ (kg)}{1000\left(\frac{Kg\ CO_2e}{tCO_2e}\right)}$$

$$Emissions\ from\ fire\ suppression\ (t\ CO_2e)$$

$$= fire\ suppression\left(\frac{Kg\ CO_2e}{litre}\right) x \frac{Inventory\ change\ (kg)}{1000\left(\frac{Kg\ CO_2e}{tCO_2e}\right)}$$

$$Emissions\ from\ Processed/Other(t\ CO2e) = N_2O\ EF\ \left(\frac{kgN_2O}{Kg\ N}\right) x\ GWP\ of N_2O$$

$$\begin{aligned} Total\ scope\ 1\ emissions\ (t\ CO_2e) &= Emissions\ from\ petrol\ combustion\ (t\ CO_2e) \\ &+ Emissions\ from\ diesel\ combustion\ (t\ CO_2e) \\ &+ Fugitive\ emissions\ from\ refrigerant\ leakage\ (t\ CO_2e) \\ &+ Emissions\ from\ fire\ suppression\ (t\ CO_2e) \\ &+ Emissions\ from\ Processed/Other(t\ CO_2e) \end{aligned}$$

2.1.10 Results

Table 3. Results of Scope 1.

Scope 1 category	Emissions (t CO_2e)
Stationary Combustion	10.32
Mobile Combustion	616.23
Refrigerant Gases & Others	187.68
Fire Suppression	1,967.03
Processed / Other emissions sources	4,679.90

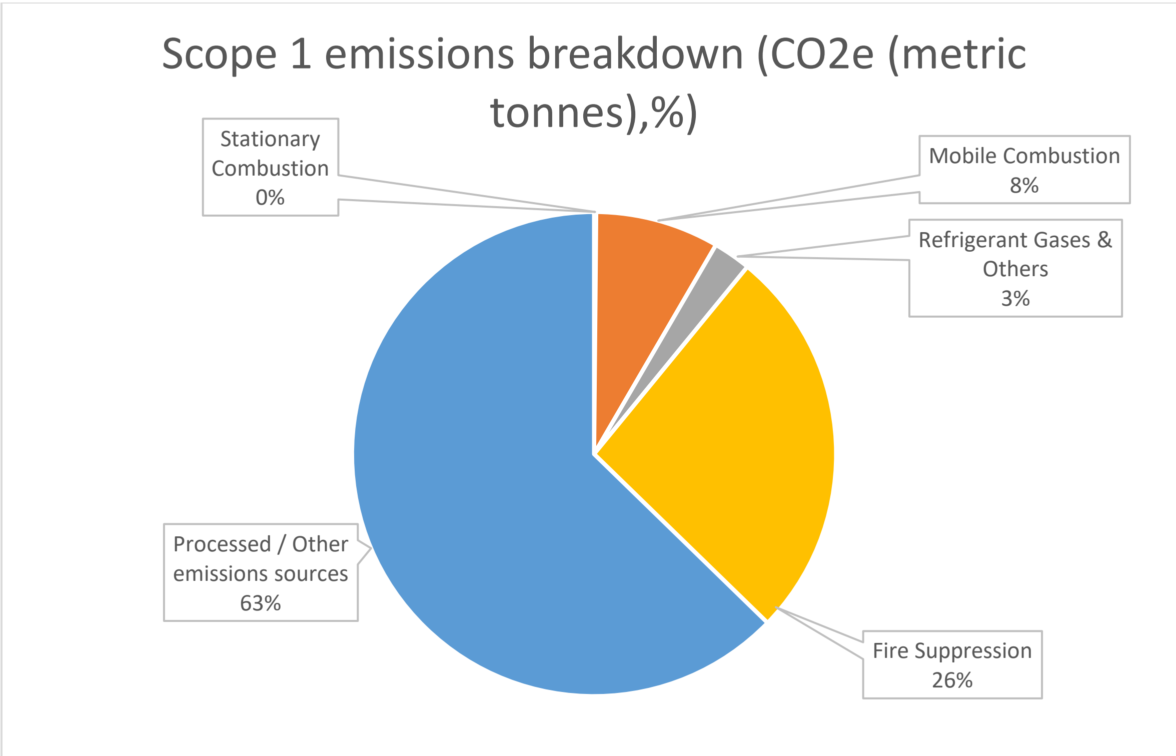


Figure 5. Scope 1 results.

2.2 Scope 2 emissions

2.2.1 Overview

Scope 2 GHG emissions include indirect emissions from the consumption of purchased electricity and district cooling.

2.2.2 Reporting period

Reporting is aligned to the calendar year: 1st January 2024 - 31st December 2024.

2.2.3 Boundaries

All campus buildings of Qatar University were considered for the calculation of scope 2 GHG emissions.

2.2.4 Assumptions

No assumptions were made for calculating scope 2 emissions.

2.2.5 Data owners

The electricity consumption and district cooling information were provided by the department (operations) team.

2.2.6 Exclusions

All activities required for scope 2 reporting have been included in the GHG emissions calculations.

2.2.7 Unit of measurement

Scope 2 carbon emissions are reported in tonnes of carbon dioxide equivalent (tCO_2e).

2.2.8 Emission factors

The electricity and district cooling emission factors used for calculating scope 2 emissions was derived from International Energy Agency (IEA).

Table 4. Electricity and district cooling emission factor sourc.

Published by	Description	Year
International Energy Agency (IEA)	Qatar's country-based emission factor	2024 database

2.2.9 Calculation methodology

Scope 2 emissions were calculated using the activity-based approach, whereby electricity consumption data was multiplied by the IEA's electricity emission factor as follows:

$$Emissions\ from\ electricity\ consumption\ (t\ CO_2e)$$

$$= \text{IEA's EF}\left(\frac{kgCO_2}{\text{kWh}}\right) \text{x} \left(\frac{Electricity\ consumption\ (kWh)}{1000\left(\frac{kgCO_2e}{tCO_2e}\right)}\right)$$

$$Emissions\ from\ district\ cooling\ (t\ CO_2e)$$

$$= \text{Heat and steam EF}\left(\frac{kgCO_2}{\text{kWh}}\right) \text{x} \left(\frac{Amount\ purchased\ (kWh)}{1000\left(\frac{kgCO_2e}{tCO_2e}\right)}\right)$$

$$Total\ scope\ 2\ emissions\ (t\ CO_2e)$$

$$= Emissions\ from\ electricity\ consumption\ (t\ CO_2e) + Emissions\ from\ district\ cooling\ (t\ CO_2e)$$

2.2.10 Results

Table 5. results of scope 2.

Scope 2 Category	Emissions (t CO_2e)
Purchased and Consumed Electricity	104,593.64
Purchased District Heat and Steam and District Cooling	34,825.57
Total scope 2 emissions	139,419.22

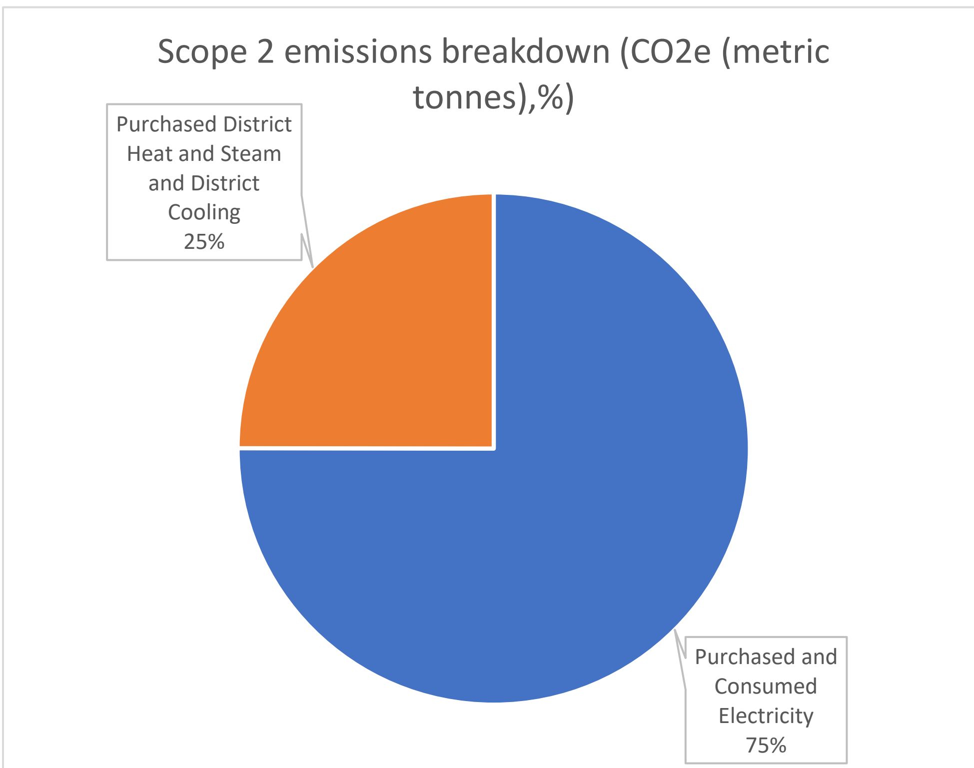


Figure 6. Scope 2 results

2.3 Scope 3 emissions

2.3.1 Category 1: Purchased goods and services (PG&S)

2.3.1.1 Overview

This category includes all upstream (i.e., cradle-to-gate) emissions from the production of products purchased or acquired by Qatar University in the reporting year. Products include both goods (tangible products) and services (intangible products).

2.3.1.2 Boundaries

No boundaries have been established.

2.3.1.3 Assumptions

No assumptions were made for calculating scope 3 – category 1 emissions.

2.3.1.4 Data Owners

No information on purchased goods and services invoices was provided by the Procurement Team.

2.3.1.5 Exclusions

No activities have been included in the GHG emissions calculations due to data availability constraints.

2.3.1.6 Unit of measurement

Scope 3 carbon emissions are reported in tonnes of carbon dioxide equivalent (tCO2e).

2.3.1.7 Emission factors

Scope 3 category 1 emission factors were sourced from the US EPA's Supply Chain Greenhouse Gas Emission Factors v1.3 by NAICS-6.

2.3.1.8 Calculation methodology

The average spend-based method was used to calculate emissions resulting from Purchased Goods and Services (PG&S) using the US EPA's Supply Chain Greenhouse Gas Emission Factors v1.3 by NAICS6. The dataset defines emissions produced per commodity per US Dollar (USD).

To calculate emissions from PG&S for Qatar University:

- The emissions can be calculated as per the formula below:

$$Emissions\ from\ PG\&S\ (t\ CO_2e) = Supply\ chain\ EF\ with\ margins\ \left(\mathrm{kg}\frac{\mathrm{CO_2e}}{\mathrm{USD}}\right) x \frac{QU\ \text{Purchase Amount (USD)}}{1000\ \left(\frac{\mathrm{kg\ CO_2e}}{\mathrm{t\ CO_2e}}\right)}$$

2.3.2 Category 2: Capital goods

2.3.2.1 Overview

This category includes all upstream (i.e., cradle-to-gate) emissions from the production of capital good purchased or acquired by Qatar University in the reporting year.

2.3.2.2 Boundaries

No boundaries have been established.

2.3.2.3 Assumptions

No assumptions were made for calculating scope 3 – category 2 emissions.

2.3.2.4 Data Owners

No information on capital goods invoices was provided by the Procurement Team.

2.3.2.5 Exclusions

No activities have been included in the GHG emissions calculations due to data availability constraints.

2.3.2.6 Unit of measurement

Scope 3 carbon emissions are reported in tonnes of carbon dioxide equivalent (tCO2e).

2.3.2.7 Emission factors

Scope 3 category 2 emission factors were sourced from the US EPA’s Supply Chain Greenhouse Gas Emission Factors v1.3 by NAICS-6.

2.3.2.8 Calculation methodology

The average spend-based method was used to calculate emissions resulting from Capital Goods using the US EPA’s Supply Chain Greenhouse Gas Emission Factors v1.3 by NAICS-6. The dataset defines emissions produced per commodity per US Dollar (USD).

To calculate emissions from Capital goods for Qatar University:

• The emissions can be calculated as per the formula below:

$$Emissions\ from\ Capital\ goods\ (t\ CO_2e) = Supply\ chain\ EF\ with\ margins\ \left(\mathrm{kg}\frac{\mathrm{CO_2e}}{\mathrm{USD}}\right) x \frac{QU\ \text{Purchase Amount (USD)}}{1000\ \left(\frac{\mathrm{kg\ CO_2e}}{\mathrm{t\ CO_2e}}\right)}$$

2.3.3 Category: 3: Fuel and energy related activities

2.3.3.1 Overview

This category includes emissions related to the production of fuels and energy purchased and consumed by Qatar University in the reporting year that are not included in scope 1 or scope 2.

The emissions subcategories calculated for Qatar University are:

- Upstream emissions of purchased electricity: emissions from the extraction, production, and transportation of fuels consumed in the generation of electricity, steam, heating, and cooling that is consumed by Qatar University.
- Upstream transmission and distribution (T&D): emissions resulting from the transmission and distribution electricity losses.
- Upstream emissions of purchased fuels: emissions from the extraction, production, and transportation of fuels consumed by Qatar University.

2.3.3.2 Boundaries

All offices, facilities, and assets (vehicles, etc.) were considered for the scope 3 emissions related to upstream fuel and energy not captured under scope 1 and 2.

2.3.3.3 Data Owners

All electricity and fuel consumption data were provided by the department (Operations) team.

2.3.3.4 Exclusions

There are no exclusions, all consumption activity related to electricity or fuel consumption provided by Qatar University was included in the calculation.

2.3.3.5 Assumptions

To calculate the upstream emissions of purchased fuels for mobile combustion under Scope 3

Category 3, the fuel consumption was estimated in liters based on the distance travelled in kilometres. All vehicle types were assumed to be cars by market segment, due to the availability of relevant data and corresponding emission factors.

2.3.3.6 Unit of measurement

Scope 3 carbon emissions are reported in tonnes of carbon dioxide equivalent (tCO_2e).

2.3.3.7 Emission factors

Scope 3 category 3 emission factors were sourced from the UK Department for Energy Security and Net Zero.

2.3.3.8 Calculation methodology

- **Upstream emissions of purchased electricity**: Emissions were calculated by multiplying Qatar University's purchased electricity by the 2024 UK Department for Energy Security and Net Zero WTT Qatar generation EF as follows:

$$Emissions\ from\ generation\ (t\ CO_2e)$$

$$= WTT\ Qatar\ (generation)\ \left(\frac{\text{kg CO2e}}{\text{kWh}}\right) \times \left(\frac{\text{QU electricity consumption (kWh)}}{1000\ \left(\frac{\text{kgt CO}_2\text{e}}{tCO_2\text{e}}\right)}\right)$$

- **Upstream transmission and distribution (T&D)**: Emissions were calculated by multiplying Qatar University's purchased electricity by the 2024 UK Department for Energy Security and Net Zero WTT Qatar T&D EF as follows:

$$Emissions\ from\ T\&D\ losses\ (t\ CO_2e)$$

$$= WTT\ Qatar\ (T\&D)\left(\frac{kgCO_2e}{kWh}\right) x \left(\frac{\text{QU electricity consumption (kWh)}}{\left(\frac{\text{kgt CO}_2\text{e}}{tCO_2\text{e}}\right)}\right)$$

- **Upstream emissions of purchased fuels**: Emissions were calculated by multiplying Qatar University's purchased petrol and diesel quantities by the corresponding 2024 UK Department for Energy Security and Net Zero emission factors for petrol and diesel as follows:

$$Emissions\ from\ purchased\ fuels\ (t\ CO_2e) = WTT\ emission\ factor\ \left(\frac{\text{kg CO2e}}{\text{liter of fuel}}\right) \times \left(\frac{\text{QU electricity consumption (kWh)}}{\left(\frac{\text{kgt CO}_2\text{e}}{tCO_2\text{e}}\right)}\right)$$

Total emissions:

$$Emissions\ from\ fuel\ and\ energy\ related\ activtites\ (t\ CO_2e) = Emissions\ from\ generation\ (t\ CO_2e) + Emissions\ from\ T\&D\ losses\ (t\ CO_2e) + Emissions\ from\ purchased\ fuels\ (t\ CO_2e)$$

2.3.4 Category 5: Waste generated in operations

2.3.4.1 Overview

This category includes emissions resulting from the third-party treatment or disposal of wastes generated from Qatar University's owned or controlled operations.

2.3.4.2 Boundaries

All offices and facilities were considered for the scope 3 emissions resulting from generated waste.

2.3.4.3 Assumptions

All organic waste that was reported as being given back to staff was classified under the "Re-use" disposal method. In cases where no disposal method was specified, it was assumed that the waste was sent to landfill.

2.3.4.4 Data Owners

All waste data was provided by the (Operations) department.

2.3.4.5 Exclusions

All waste data provided by Qatar University was included in the calculation. Qatar University monitors paper and organic waste generation.

2.3.4.6 Unit of measurement

Scope 3 carbon emissions are reported in tonnes of carbon dioxide equivalent (tCO_2e).

2.3.4.7 Emission factors

Scope 3 category 5 emission factors were sourced from the UK Department for Energy Security and Net Zero.

2.3.4.8 Calculation methodology

- **Paper recycling**: Emissions from recycling paper waste were calculated as follows:

$$Emissions\ from\ waste\ (t\ CO_2e) = Disposal\ method\ EF\ \left(\frac{\text{kg CO2e}}{\text{tonne of waste}}\right) \times \left(\frac{\text{QU waste generated (tonnes)}}{1000\left(\frac{\text{kgt CO}_2\text{e}}{tCO_2e}\right)}\right)$$

2.3.5 Category 6: Business travel

2.3.5.1 Overview

This category includes emissions resulting from the transportation of employees for business-related activities in vehicles owned or operated by third parties, such as aircraft, trains, buses, and passenger cars.

2.3.5.2 Boundaries

No boundaries have been.

2.3.5.3 Assumptions

- The distance travelled by air was calculated using airport coordinates sourced from Datahub Airport codes dataset. The specific departure and arrival airports were assumed to be the main ones.
- The emission factors used were derived from UK Department for Energy Security and Net Zero 2024 GHG Conversion factors for international travel as no regional dataset exists.

2.3.5.4 Data owners

No information on business travel was provided by the Human Resources department.

2.3.5.5 Exclusions

No activities have been included in the GHG emissions calculations due to data availability constraints.

2.3.5.6 Unit of measurement

Scope 3 carbon emissions are reported in tonnes of carbon dioxide equivalent (tCO_2e).

2.3.5.7 Emissions factors

Scope 3 category 6 emission factors were sourced from the [UK Department for Energy Security and Net Zero].

2.3.5.8 Calculation methodology

- The flight distance was calculated in kilometres (km) and multiplied by the number of passengers and by the corresponding emission factor. The emissions from business air travel can be calculated as follows:

$$Emissions\ from\ air\ travel\ (t\ CO_2e) = number\ of\ passengers\ (passengers) \times \left(\frac{Flight\ distance\ (km)}{1000\ \left(\frac{\text{kgt } CO_2e}{tCO_2e}\right)} \right) x\ Flight\ class\ EF\ \left(\frac{kgCO_2e}{passenger.km}\right)$$

2.3.6 Category 9: Downstream transportation and distribution

2.3.6.1 Overview

This category includes emissions resulting from the transportation and distribution of products sold by the reporting company in the reporting year between the reporting company's operations and the end consumer (in vehicles and facilities not owned or controlled by the reporting company).

2.3.6.2 Boundaries

All the registered international students at the university in 2024.

2.3.6.3 Assumptions

- For this category, the activity data is based on international student travel, as recommended in the Standardised Carbon Emissions Reporting Framework developed by **Environmental Association for Universities and Colleges** (EAUC).

- Each international student is assumed to take two round-trip flights per year from their home country—one for each regular semester.
- The distance travelled by air was calculated using airport coordinates sourced from Datahub Airport codes dataset. The specific departure and arrival airports were assumed to be the main ones from each student nationality country origin.
- The emission factors used were derived from UK Department for Energy Security and Net Zero 2024 GHG Conversion factors for international travel as no regional dataset exists.
- As Qatar University has control over students' daily commute and accommodation, emissions from these activities have been accounted for under Scope 1 (Mobile Combustion) and Scope 2 (Electricity), respectively.

2.3.6.4 Data owners

All information on registered international student was provided by the Student Affairs department.

2.3.6.5 Exclusions

All Qatari students have been excluded from the GHG emissions calculations.

2.3.6.6 Unit of measurement

Scope 3 carbon emissions are reported in tonnes of carbon dioxide equivalent (tCO_2e).

2.3.6.7 Emissions factors

Scope 3 category 6 emission factors were sourced from the UK Department for Energy Security and Net Zero.

2.3.6.8 Calculation methodology

- The flight distance was calculated in kilometres (km) and multiplied by the number of passengers and by the corresponding emission factor. The emissions from business air travel were calculated as follows:

$$Emissions\ from\ air\ travel\ (t\ CO_2e) = number\ of\ passengers\ (passengers) \times \left(\frac{Flight\ distance\ (km)}{1000\ \left(\frac{kgt\ CO_2e}{tCO_2e}\right)}\right) x\ Flight\ class\ EF\ \left(\frac{kgCO_2e}{passenger.km}\right)$$

2.3.7. Results

Table 6. Results of Scope 3.

Scope 3 category	Emissions (tCO_2e)
Purchased Goods and Services (Cat. 1)*	-
Capital Goods (Cat. 2)*	-
Fuel & Energy Related Activities (Cat. 3)	34,239.15
Waste Generated in Operations (Cat. 5)	17.03
Business Travel (Cat. 6)*	-
Downstream transportation and distribution (Cat. 9)	9,365.60
Total scope 3 emissions	**43,621.78**

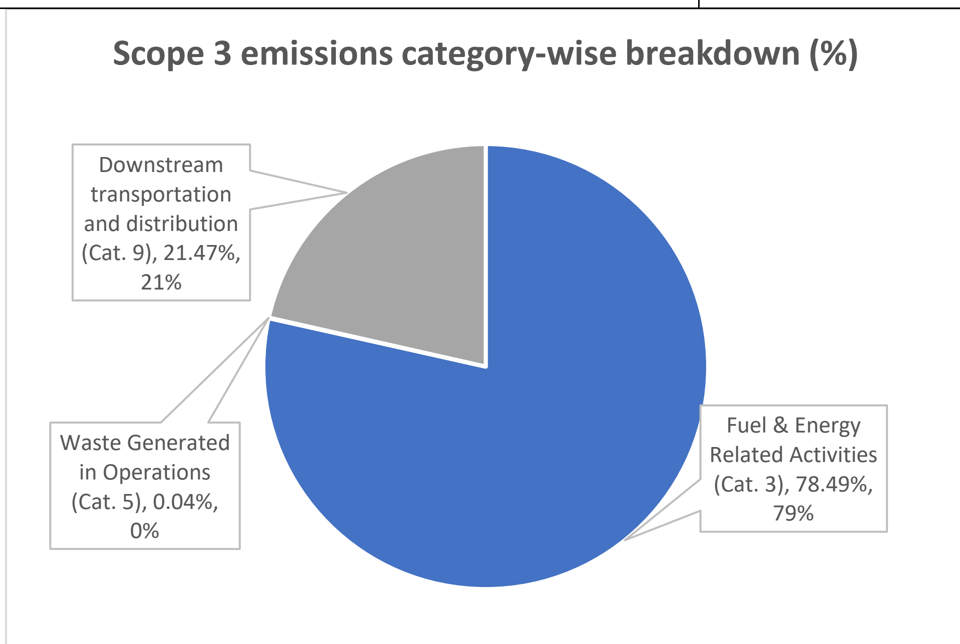


Figure 7. Scope 3 results

* The category is applicable to Qatar University; however, it has not been calculated due to insufficient data.

3. Results and Insights

The Scope 1, 2, and 3 greenhouse gas emissions for 2024 have been assessed, and the overall breakdown is summarized in *Table 7.*

Table 7. Summary of scope 1,2 and 3 GHG emissions results

Scope	Emissions (t CO_2e)
Stationary Combustion	10.32
Mobile Combustion	616.23
Refrigerant Gases & Others	187.68
Fire Suppression	1,967.03
Processed / Other emissions sources	4,679.90
Total of scope 1	**7,461.15**
Purchased and Consumed Electricity	104,593.64
Purchased District Heat and Steam and District Cooling	34,825.57
Total scope 2	**139,419.22**
Purchased Goods and Services (Cat. 1)	-
Capital Goods (Cat. 2)	-
Fuel & Energy Related Activities (Cat. 3)	34,239.15
Waste Generated in Operations (Cat. 5)	17.03
Business Travel (Cat. 6)	-
Downstream transportation and distribution (Cat. 9)	9,365.60
Total scope 3 emissions	**43,621.78**
Total Scope 1, 2 and 3 Emissions	**190,502**

Figure 8, Figure 9, and Figure 10 illustrate the QU's energy profile and greenhouse gas (GHG) emissions distribution across scopes and activities. Energy consumption is predominantly sourced from electricity, which accounts for 77% of total usage, followed by purchased district heat, steam, and cooling at 22%, while mobile and stationary combustion contribute minimally at 1% and 0%, respectively. Correspondingly, the GHG emissions profile is heavily driven by Scope 2 emissions, representing 73% of the total, due to the reliance on purchased electricity, whereas Scope 3 contributes 23% and Scope 1 only 4%. A detailed activity-wise breakdown of Scope 1, 2, and 3 emissions shows that purchased and consumed electricity constitutes the largest share at 49%, with district heating and cooling contributing an additional 29%. Fuel- and energy-related activities add 14%, downstream transportation and distribution account for 5%, while smaller contributions arise from processed materials (2%) and fire suppression (1%). Overall, the data highlights the central role of electricity and district energy in both consumption and emissions, underscoring the importance of decarbonizing purchased energy sources to achieve meaningful reductions.

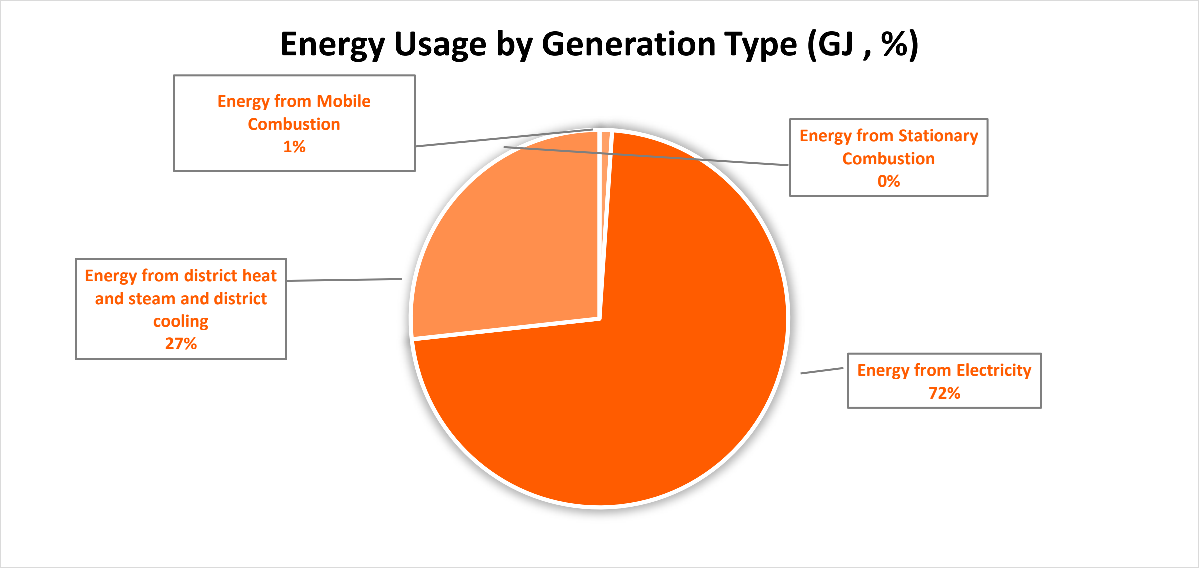


Figure 8. Energy usage by Generation Type

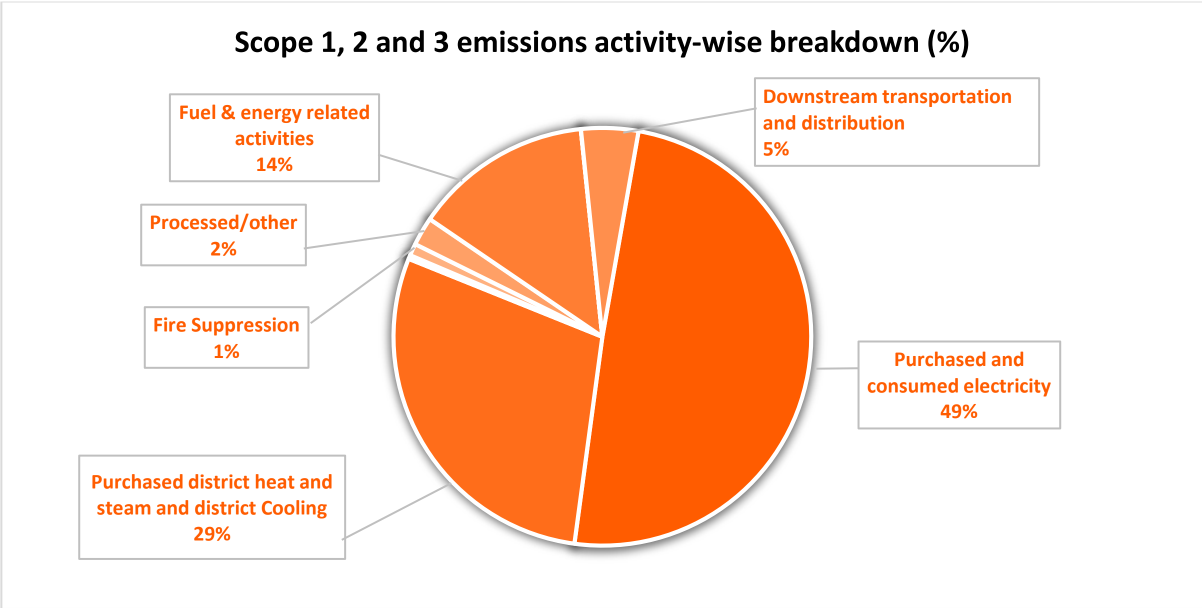


Figure 9. Scope 1, 2 and 3 emissions activity-wise breakdowns.

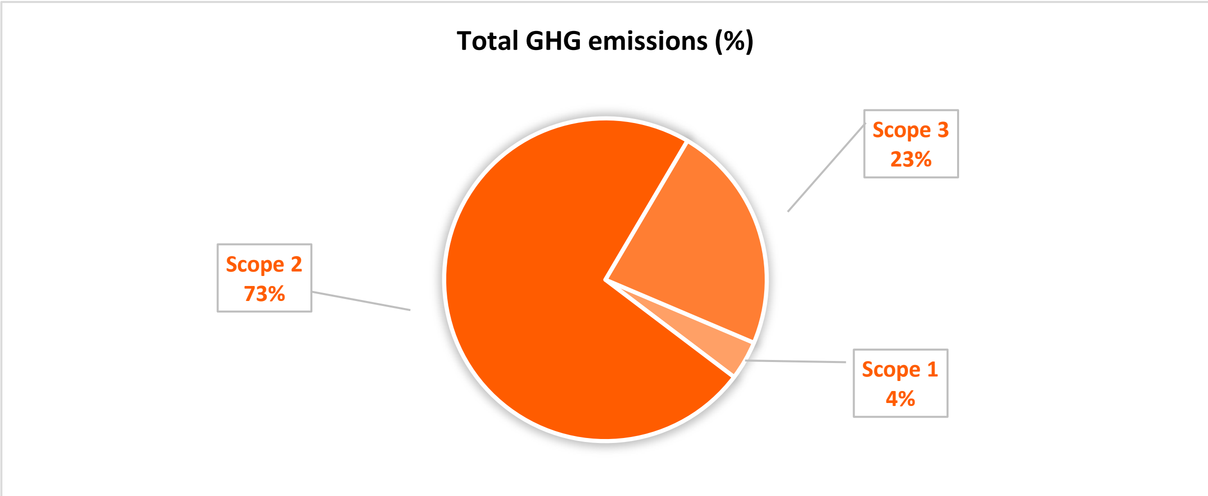


Figure 10. Total GHG emissions.

4. Opportunities and areas of improvement

4.1 scope 1

- **Mobile combustion:** To further improve the accuracy and reliability of emissions calculations, fuel consumption for mobile combustion activities will be monitored in liters instead of relying solely on distance travelled. This will allow for more precise emissions quantification and support more effective emissions management.

4.2 scope 2

- The electricity consumption and cooling data provided was sufficient for calculating GHG emissions.

4.3 scope 3

- **Category 1 (Purchased goods and services):** Collect detailed procurement data (including descriptions, amount spent, quantities, and vendor names) for all goods and services purchased during the reporting year. Examples include raw materials, stationary, food items, IT services, etc. The sources may be via internal data systems, bills of materials and purchasing records.
- **Category 2 (Capital goods):** Collect detailed procurement data (including descriptions, amount spent, quantities, and vendor names) for all capital goods purchased during the reporting year. Examples of capital goods include equipment, machinery, buildings, facilities, and vehicles. The sources may be via internal data systems, bills of materials and purchasing records.
- **Category 6 (Business travel):** Gather comprehensive travel data for all employee business trips, including travel mode, distance, frequency, class, and purpose, supported by travel invoices or booking records.
- **Category 9 (Downstream transportation and distribution):** Conduct a survey of national and international students to better understand their commuting patterns to and from home during semester breaks, enabling more accurate estimation.

5. Terminologies and Acronyms

Table 8. Terminology and Definition

Term	Definition
Anthropogenic sources	Emissions of greenhouse gases (GHGs) and aerosols caused by human activities such as carbon dioxide, methane, nitrous oxide,
Scope 1	Direct (GHG) emissions that occur from sources that are controlled or owned by an organization
Scope 2	Indirect GHG emissions associated with the purchase of electricity, steam, heat, or cooling
Scope 3	Indirect greenhouse gas emissions resulting from activities associated with an organization but occurring from sources not owned or controlled by that organization.

Table 9. Acronyms.

Acronym	Full form
BEIS	Business, Energy and Industrial Strategy
CO2	Carbon dioxide
EF	Emission factor
EPA	Environmental Protection Agency
GHG	Greenhouse gas
GWP	Global warming potential
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
Kg	Kilogram
kWh	Kilowatt hour
NAICS	North American Industry Classification System
tCO2e	Metric tonnes of carbon dioxide equivalent
Acronym	**Full form**
tonnes or t	Metric tonnes
US EPA	United States Environmental Protection Agency
WTT	Well-to-tank

6. References

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