CARBON FOOTPRINT – 2023

04/09/2024

Ghent University

GHENT
UNIVERSITY

ADMINISTRATIVE DATA

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1 Introduction

The carbon footprint report is made for Ghent University, located at Sint-Pietersnieuwstraat 25, 9000 Gent (Belgium); hereafter referred to as UGent. The year of analysis is 2023.

1.1 Scope and organizational boundary

A carbon footprint is the inventory of the total greenhouse gas emissions caused by an individual, event, organisation or product. The footprint is expressed in tonnage CO_2 equivalent (tCO_2e). The analysis for an organisation can be performed at different levels (Greenhouse Gas Protocol, 2021):

- Scope 1: Direct CO_2e emissions, caused by own sources within the company. This concerns emissions from own building, transport and production-related activities. Examples are own generators, gas consumption and heating installations, own (truck) cars or the use of coolant in cooling equipment and climate installations.
- Scope 2: This includes the indirect emission of CO_2e due to the generation of self-purchased and self-consumed electricity or heat. The company uses this energy internally, but does not generate it internally. It is physically generated elsewhere, for example in a power station.
- Scope 3: Indirect emissions of CO_2e caused by the business activities of another company. These are emissions from sources that are not owned by the company and over which it has no direct influence, such as emissions caused by the production or extraction of purchased raw materials and materials and outsourced activities such as freight transport. Also the indirect emissions as a result of business traffic with private vehicles and business air traffic can belong to scope 3. Scope 3 comprises in fact the CO_2e emissions in the entire life cycle of all products that the company buys, manufactures and/or sells (upstream and downstream).

This emissions inventory has been made in accordance with the requirements of GHG protocol. In accordance with the GHG protocol, a distinction is made between 3 sources of emissions (scopes) in 2 categories: direct emissions (scope 1) and indirect emissions (scope 2 and 3) (see below).

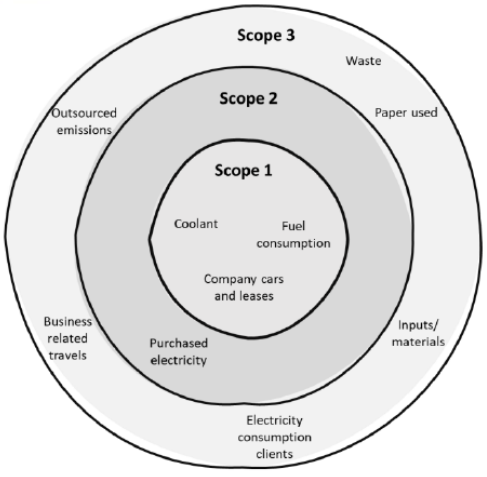

Figure 1: Schematic overview of the three scopes of a carbon footprint (non-limitative)

The organisational and reporting boundary of the carbon footprint is made for calendar year 2023, for the university based in Ghent, Belgium.

1.2 Short description activities and ambitions

The University of Ghent was founded in 1817. The language of instruction at the time was Latin; there were 4 faculties, 16 professors and 190 students. After Belgian independence, in 1830, the language of education changed to French. In 1930, the language again changed to Dutch. In 1991, the State University of Ghent was renamed University of Ghent.

To date, there are more than 130 departments spread over 11 faculties in Ghent. Four educational institutions (Ghent University, Hogeschool Gent, Arteveldehogeschool and Hogeschool West-Vlaanderen) were joined in the Ghent University Association in 2003. This association forms a network of 50.339 students and 9.097 staff members. Ghent University opened its first campus outside Ghent, in Kortrijk, in 2003. In 2004, UGent opened its first foreign campus in Songdo, South-Korea.

Ghent University identifies itself as a socially committed and pluralistic university that is open to all students regardless of their philosophical, political, cultural and social background. The University profiles itself in a broad international perspective, while emphasising its individuality in terms of language and culture. The organisation wants to offer its students a creative development-oriented learning and research environment.

1.3 Sustainability strategy

Ghent University developed a sustainability vision to become a leading knowledge institution for a future that is ecologically, socially and economically sustainable, within a local and global context. To this end, the organisation applies 3 concrete sustainability principles:

- to create substantial support for sustainable development;
- to integrate sustainability into the education, research and services;
- to implement sustainability in all business operations and organisation.

Ghent University supports the EU ambition to be climate neutral by 2050 and makes this path specific for the next 10 years with a climate plan. For all relevant policy domains, goals are set, boundaries are defined and actions are formulated. The results are monitored annually by the Board of Directors and the actions are adjusted where necessary. The Climate Plan deals with 3 major aspects: climate mitigation (CO_2 reduction), climate adaptation and circular economy:

- The sustainable energy policy plan (2020-2030) aims to reduce total carbon emissions from building heating and electricity supply by 40% towards 2030, referred to 1998. From now on, fossil-free building and renovation is the standard.

- Ghent University pursues an integrated mobility policy whereby the campuses are easily accessible, road safety is increased and the environmental impact of travel by staff and students is reduced. The sustainable mobility policy aims for 80% sustainable mobility by 2030; for the remaining automobility, priority will be given to shared cars and electric cars.

- In its sustainable travel policy plan Ghent University commits itself to fly less, more thoughtfully and more sustainably, and thus to reduce the CO_2 emissions of its air travel by at least 1/3rd by 2030 compared to the reference year 2019.

- A sustainable purchasing policy follows the principle of the materials hierarchy and integrates social, environmental and economic criteria at all stages of the purchase of products and services.

- The sustainable food policy is moving towards a healthy, tasty, affordable and ecologically responsible food policy, with less meat and fish consumption. Half of the offer consists of vegetarian and plant-based options by 2025. Food waste is minimized.

- Ghent University will retain and strengthen green space and biodiversity in areas for which it is responsible. In doing so, it achieves progress in both quantity and quality, at campus and institutional level and thus uses a net gain in terms of green space and biodiversity as a starting point.

- Ghent University pursues an integrated water policy that closes water cycles locally as much as possible and mitigates the effects of climate change. This means that Ghent University aims to realise an additional reduction of tap water of 15% by 2030 in comparison with 2020, to make maximum use of alternative water sources depending on the application and strive for 80% reuse in new buildings and renovations.

Yet, sustainability is a very broad concept, and is thus not easily measurable. Greenhouse gas emissions, as determined in a carbon footprint, are a common and relevant proxy to quantify an organisation's general environmental performance.

The carbon footprint of Ghent University can be used to first determine the climate baseline, and then monitor progress in performance. The carbon footprint also helps to prioritize which aspects of the organisation have the greatest climate impact, and which possible actions have the highest climate returns.

Ultimately, the carbon footprint identifies the challenges to achieve climate neutrality before 2050 (being one basic implication of the Paris Agreement).

2 Aim of GHG reporting

Ghent University is the intended user of the GHG inventory. Climate Lab is the responsible author preparing and producing the GHG report. The report quantifies the environmental performance of Ghent University using a carbon footprint methodology and tracks it over time. The objective is to provide a quantification tool for reducing CO_2 emissions. The report can serve as a source to compare proposed climate actions with the footprint of the organisation at large. The report also contributes to the transparency on the impact of all operations at the University. The processes within Ghent University that make the largest contributions to the greenhouse gas score have been mapped out, as well as the areas of greatest environmental gains. This analysis can constitute a basis for further development of Ghent University's climate strategy.

This report provides the data for calendar year 2023 and will be updated regularly (e.g. yearly or every few years). The report is prepared in accordance with GHG protocol and may become publicly available. The inventory has not been verified.

3 Approach

Several methods are available to determine and report a carbon footprint. Examples are the EpE protocol, PAS2050, ISO14064-1/ISO14069:2013 and the GHG protocol. The methodological overlap between these methods is considerable.

The above methods differ mainly in their field of application. For example, the EpE protocol focuses on the waste management sector, while PAS2050 mainly concerns products and the GHG protocol mainly concerns organisations. The ISO14069 can be used as a quality check for all types of carbon footprints.

Different benchmarks also exist for assessing and comparing carbon footprints at higher education institutions, although the programs of ACUPCC and STARS, developed in the US, are most widely known.

ACUPCC was initiated by Second Nature in late 2006, when a group of visionary college and university presidents initiated the American College & University Presidents' Climate Commitment (ACUPCC). Through this network a database was created with carbon footprints of American higher education institutions. An ACUPCC implementation guide is available with guidance on developing a University Climate Action Plan.

The Sustainability Tracking, Assessment & Rating System (STARS) is another transparent, self-reporting framework for colleges and universities to measure their sustainability performance, in which the carbon footprint is a component. STARS has its own guidelines on how the carbon footprint should be reported.

The quantification in this report was carried out using the Bilan Carbone® (version 8) method of the Bilan Carbone Association. Bilan Carbone® is a well-known international reference calculation method, capable of reporting according to the Greenhouse Gas Protocol and the ISO standard.

The Bilan Carbone quantification methodology and quantification model characteristics minimize uncertainty and yield accurate, consistent and reproducible results. The model accurately represents the emissions and removals and is therefore acceptable for calculating and monitoring the carbon footprint of UGent. The GHG emissions and removals are calculated using Base Carbone® in accordance with the latest IPCC's GWPs. All relevant GHG sources and sinks are included.

The carbon footprint is presented for the calendar year 2023. The greenhouse gases (GHGs) considered are the same as in the Kyoto Protocol: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorinated hydrocarbons (PFCs), and sulphur hexafluoride (SF_6). All scores are expressed in CO_2 equivalents. Each greenhouse gas can be translated into tonnes of CO_2 equivalents. The CO_2 footprint of the organisation is thus expressed in "tonnes of CO_2 equivalents per year".

In this report, the carbon footprint of Ghent University will be compared over time. Published carbon footprints from universities are not always fully comparable, mainly due to differences in methodology, scoping or demarcation. Yet, a general picture emerges that university

footprints are dominated by Scope 1 and 2 emissions, while commuting and business (flight) traffic also make an important contribution.

The following project phases were completed:

Phase 1: Scope determination and boundary definition

In consultation with the environmental department, the relevant scopes and impact categories were delineated. Considerations that may play a role in the choice of impact categories are:

Does the organisation pay for it? Does the organisation have influence on it? Can the process make a relevant contribution to the total score? Is it usual to include the process in a (Bilan Carbone) footprint?

In line with the ISO standard, the GHG Protocol does not prescribe exactly which processes should be included in Scope 3, stating that "companies should strive for completeness, but we recognise that 100% completeness may not be achievable". If certain impact categories are left out of the scope, it is important to state this clearly. These categories can be included in later updates of the carbon footprint.

Based on the above considerations, the following relevant impact categories are considered in this report:

- Energy: emissions related to direct energy use (e.g. gas, fuel, heat network, electricity consumed) in Belgium;
- Non-Energy: expected leakage of heat pumps, cooling systems and air conditioning;
- Direct waste: emissions from processing the direct university waste streams;
- Mobility: from all business travel emissions and employee commuting (including indirect emissions from vehicle production and the fuel supply chain);
- Freight: intraorganizational transports using the university vans and trucks;
- Carbon depreciation related with the construction of the university buildings included;

The following categories are not included within the current boundaries, but may be included in future carbon footprints:

- Inputs that can be derived from financial data: quantities of purchasing food at student restaurants, packaging, cost of buying paper and ICT equipment and yearly cost of different services and consultancy;
- Capital goods: Surface and typology of car parks, yearly cost of machinery, equipment and vehicles owned by the university;
- Student mobility, possibly through a survey, including airplane travel by foreign students.

Phase 2: Data inventory and choice of base year

All necessary input data were collected via a site visit and a follow-up transfer of specific datasets requested. The year 2019 is used as base year.

Phase 3: Characterisation

In line with the ISO standard and the GHG protocol, organisations have to determine the specific emission factors for their activities themselves as much as possible. There is no prescribed list of emission factors per process or activity. In this report, all calculations are based on the Bilan Carbone® reference database, a European standard applied to the Belgian context.

Phase 4: Interpretation

By means of graphs and tables, the contribution of different processes to the total CO_2e footprint can be analysed. This is done for the entire organisation, but also per impact category and per year. Bilan Carbone ® was used to facilitate the analysis.

Phase 5: Uncertainties in the data

In Bilan Carbone, uncertainty estimates are taken into account for all input parameters. For ISO Scope 1 and ISO Scope 2 categories, the uncertainty levels must be below 20%, in accordance with the internationally accepted limit on uncertainty in carbon data.

4 Overview of emissions

4.1 Energy use and cooling agents

GENERAL

The 2023 electricity consumption of UGent equalled 52.549.989 (kWh) including the CHP, PV panels and wind turbines:

- Of this 7.388.415 kWh came from 3 wind turbines (Luminus)
- Another 1.579.486 kWh was generated by the 2 CHPs (HHV);
- Another 905.540 kWh was generated by the PV plants;
- The rest was purchased as 100% green electricity from VEB: 42.676.548 kWh
  This contract is a part of a group purchase, moderated by VEB.

In the same year, the natural gas purchased from VEB was 61.107.284 kWh (HHV). 5.308.763 kWh was meant for the two CHP's:

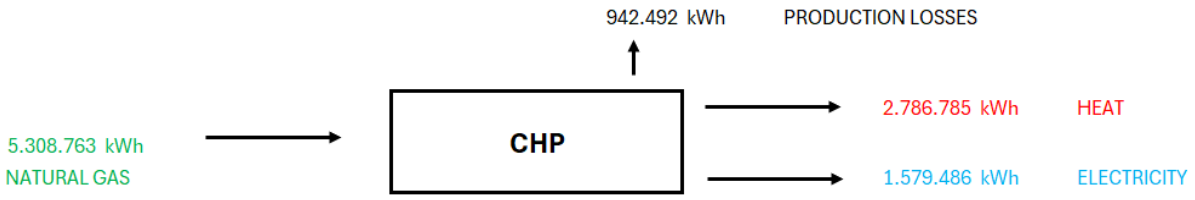

Figure 2: Overview CHP's inputs and outputs

The production of the CHP's is fully used by UGENT. While the production of the PV panels not directly. Approximately a few 100 kWh are injected into the grid. This injected electricity is then shared with campus Sterre via energy sharing.

The heating oil purchased from Maes amounted to 381.787 kWh. District heating purchased from EDF Luminus equalled 11.186.072 kWh and the heat purchased from the university hospital amounted to 1.229.791 kWh.

In accordance with the GHG-protocol, the emissions from electricity consumption may be reported both under a market-based and location-based approach (dual reporting). Under the market-based approach, 100% local renewable energy certificates disclosed in a contract can be accounted for as local renewable energy. The used electricity in 2023 was purchased as "green electricity" from the VEB. The origin was derived from VREG (= Flemish Regulator for gas and electricity market).

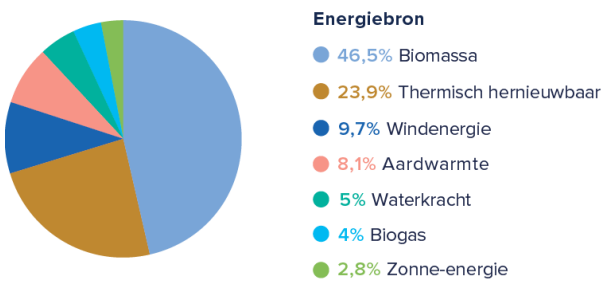

Figure 3: Electricity VEB - Origins

Overall, heating oil consumption was significantly higher in 2023 than in 2022. Gas consumption and heat delivered from heat networks were not so different than in 2022 (+/- 2% higher).
The electricity use in 2023 was lower than in 2022. The electricity purchased from VEB was similar to 2022. The three wind turbines were used significantly less than the previous year.

The leakage of cooling gasses from diverse cooling systems and air conditioning installations is also taken into account. It is assumed that all installations comply with the local environmental legislation (Vlarem II - Art. 5.16.3.3), limiting cooling system gas losses to a maximum of 5% per year. UGENT uses Climapulse as an online tool for monitoring the maintenance of the cooling systems on the different UGENT sites. The amount of added coolants can be found in this tool (see Table 1):

Table 1: Overview coolants added

Refrigerant code	Total 2023 [kg]
R410A	3,20
R449A	4,50
R134A	286,59
R32	0,40

The significant amount of added R134A is due to a repair and replacement of a cooling installation at the Science Park in Zwijnaarde.

UZ GENT

The energy consumption (electricity, natural gas and water) in the UGENT buildings on the UZ GENT site is not included in the general energy accounting of UGENT. The energy cost has been incorporated into a UZ GENT – UGENT agreement. The buildings are in possession of UGENT, but not all energy data is available. For example, the main electricity meters are known, but not all meters are included. The following data was found:

- Electricity: 3.384.097 kWh
- Natural gas: 3.723.870 kWh (HHV)
- Water: 9.112 m³ (incl. in 4.2 Waste streams)

The total energy consumption (general energy accounting and UZ GENT) was used to calculate the carbon footprint. The following table (see Table 2) gives an overview of the total energy emissions per category:

Table 2: Overview UGENT energy footprint

Energy	Emissions			Uncertainties	
	kg CO_2e	t CO_2e	%	kg CO_2e	%
Direct combustion*	14.011.261	14.011	58	573.323	4
Heat network**	1.212.075	1.212	5	508.198	42
Electricity*** (purchased & produced)	8.925.993	8.926	37	829.301	9
Total energy	**24.149.329**	**24.149**	**100**	**1.129.029**	**5**
Cooling agents	**452.774**	**453**	**100**	**131.578**	**29**

* High-calorific gas, dominant in the province of East Flanders. ** Emission factor based on heating grids connected to HCPs (EDF Luminus) and waste treatment facilities (IVAGO) *** Emission factor of the average Belgian mix (Location based reporting).

4.2 Waste streams

Waste streams of the university (including the different laboratories) have been inventoried in Belgium. When not weighted directly, waste volumes have been converted to waste mass based on the mass densities of Stimular (2024).

Table 3: Overview UGENT waste streams footprint

Waste stream	Emissions			Uncertainties	
	kg CO_2e	t CO_2e	%	kg CO_2e	%
Construction waste	5.210	5	1	434	8
Mineral waste	1.936	2	0	687	36
Organic waste (inactivated fermentation biomass) *	134.256	134	16	34.152	25
Plastic waste **	4.027	4	0	1.430	36
Household waste	433.822	434	51	195.934	45
Dangerous waste	221.466	221	26	73.501	33
Waste water	57.677	58	7	6.205	11
Total	**858.394**	**858**	**100**	**212.133**	**25**

* Emission factor assumes incineration. ** Emission factor of mixed plastics treatment including further recycling processing, such as rolling, remelting, and partial incineration of soft plastics.

4.3 Mobility

Daily commuting emissions are calculated based on the home-office distance for all respective working days (taking into account parttime regimes, telework days and transport modi). We use the assumption of 40% telework and 220 working days per year. For commuting, in 2023, a total

of 11.742.483 km was travelled by car, 18.511.061 km by train and 1.615.391 by De Lijn (assumption: bus).

The company cars used 4.693 litre diesel, 3.767 litre gasoline and 1.760 kg CNG. The fuel consumption was based on a spreadsheet with all the vehicles, their total distance driven and their fuel type. There was no distinction between freight vehicle or person car. By using average consumption data per fuel type, the consumption was calculated:

Table 4: Fuel type vs average consumption

Fuel type	Average consumption	Unit
Gasoline	5,5	liter / 100 km
CNG	4,7	kg / 100 km
Electricity*	18	kWh / 100 km
Diesel	5,2	liter / 100 km

* Included in 4.1 Energy use and cooling agents

Business related flight travel included 44.261.821 km and business related train travel (HST) accounted for 2.719.736 km. The Google map API Excel plugin was used to automate calculations of train movements overland in 2022. Since there was no data available from 2023, the km from business related train travel were estimated based on the FTE's from 2022 and 2023.

The business travel with employees' cars and the car sharing platform, Cambio, amounts to a total of 1.789.901 km driven.

Table 5: Overview UGENT mobility footprint

Mobility component	Emissions			Uncertainties	
	kg CO_2e	t CO_2e	%	kg CO_2e	%
Commuting	4.147.973	4.148	29	462.040	11
Car travel	485.125	485	3	58.170	12
Train travel	10.036	10	0	4.350	43
Plane travel	9.883.665	9.884	68	3.196.035	32
Total	14.526.799	14.527	100	3.229.787	22

4.4 Freight and transports

In 2022, freight emissions were calculated for all UGent-owned trucks. The calculations were based on the transaction records of the fuel cards. This data was not available in 2023. This time there was a list shared with all the vehicles, their total distance driven and their fuel type. There was no distinction between freight vehicle or person car. The fuel use has been included in total in “Business car travel” in 4.3 Mobility.

4.5 Carbon depreciation of university buildings

The yearly carbon attribution of the building materials embedded within the university buildings also needs to be considered, depreciated over a lifetime of 30 years. The spatial footprint of the sites includes:

- Total gross area of university buildings: 804 195 m².

This emissions post is reported for reasons of completeness, but not included in the final GHG Summary due to the very large uncertainties.

Table 6: Overview UGENT real estate footprint

Carbon depreciation	Emissions		
	kg CO_2e	t CO_2e	Uncertainty %
Real estate depreciation	11.794.860	11.795	50

5 Total GHG impact 2023

Table 7 gives a summary of the yearly emissions for the different GHG emission posts (location based). A full representation is provided in Annex (total emission in tCO_2e per post, in line with GHG Protocol) and the representation per scope is provided in Figure 4 (location based).

Table 7: Summary of total emissions per post in tCO_2e in 2023 (Bilan Carbone, 2023).

Summary CO_2e	Emissions		Uncertainties	
	t CO_2e	%	t CO_2e	%
Energy	24.149	60	1.129	5
Cooling agents	453	1	132	29
Mobility	14.527	36	3.230	22
Direct waste streams	858	2	212	25
Total	39.987	100	3.431	9

The 2023 carbon footprint of Ghent University is 39.987 t CO_2e (±10%). The uncertainty levels are below 20%, in accordance with the internationally accepted limit on uncertainty in carbon data. According to the GHG Protocol, the UGENT emissions are aggregated in 9 categories, subdividing direct emissions and different sources of indirect emissions. This GHG emissions table can be consulted in annex. Subdivided per scope, according to the GHG protocol and following the location-based approach, the relative share of the emission includes:

- 31% in scope 1 (direct emissions): 12.565 ton CO_2e
- 22% in scope 2 (indirect emissions from electricity consumption): 8.810 ton CO_2e
- 47% in scope 3 (other indirect emissions): 18.612 ton CO_2e

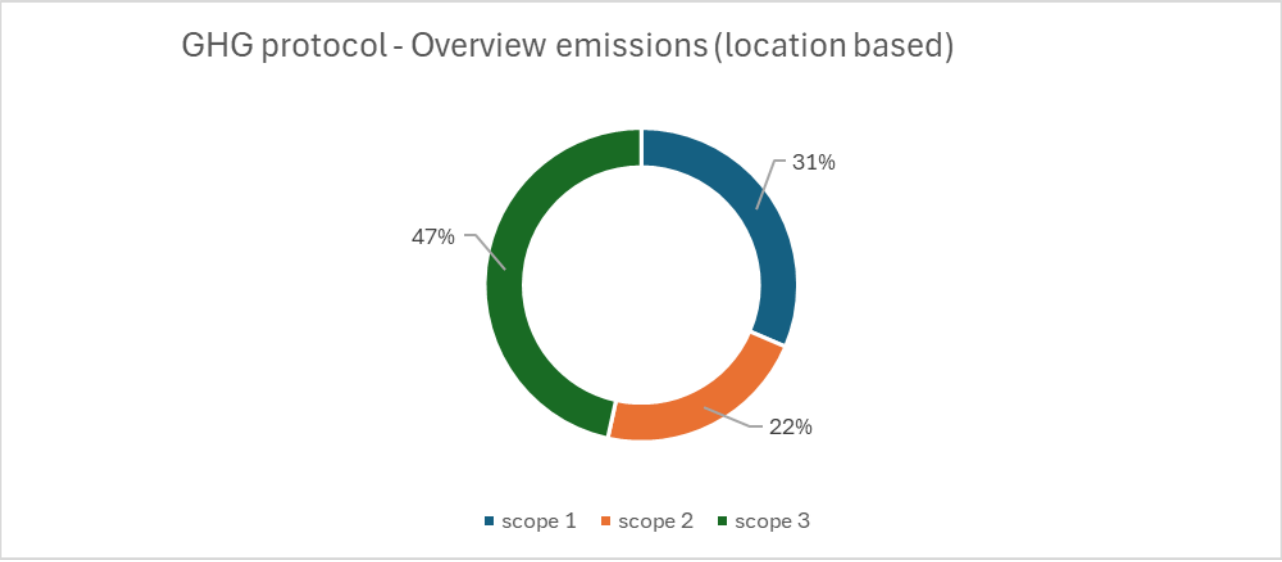

Figure 4: GHG protocol - Overview emissions (location based)

When following a market-based approach, only the electricity coming from biomass has an impact on the carbon footprint. These are upstream emissions, and are located in scope 3, cat 3: Fuel- and Energy-Related Activities (Not Included in Scope 1 or Scope 2). Now, the relative share of the emissions looks like this:

- 39% in scope 1 (direct emissions): 12.565 ton CO_2e
- 3% in scope 2 (indirect emissions from electricity consumption): 1.060 ton CO_2e
- 58% in scope 3 (other indirect emissions): 18.957 ton CO_2e

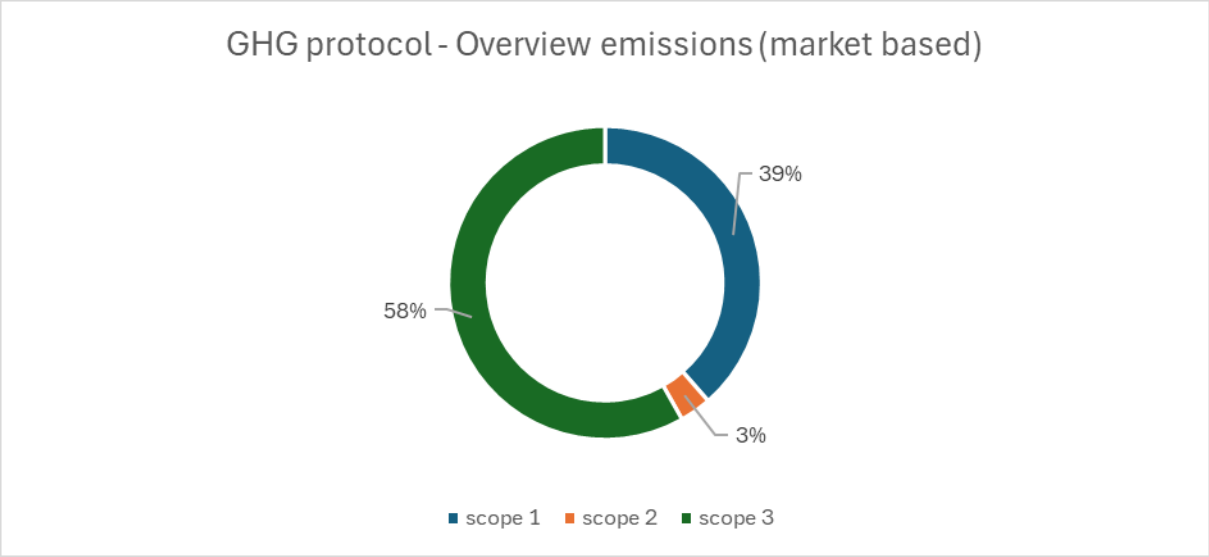

Figure 5: GHG protocol - Overview emissions (market based)

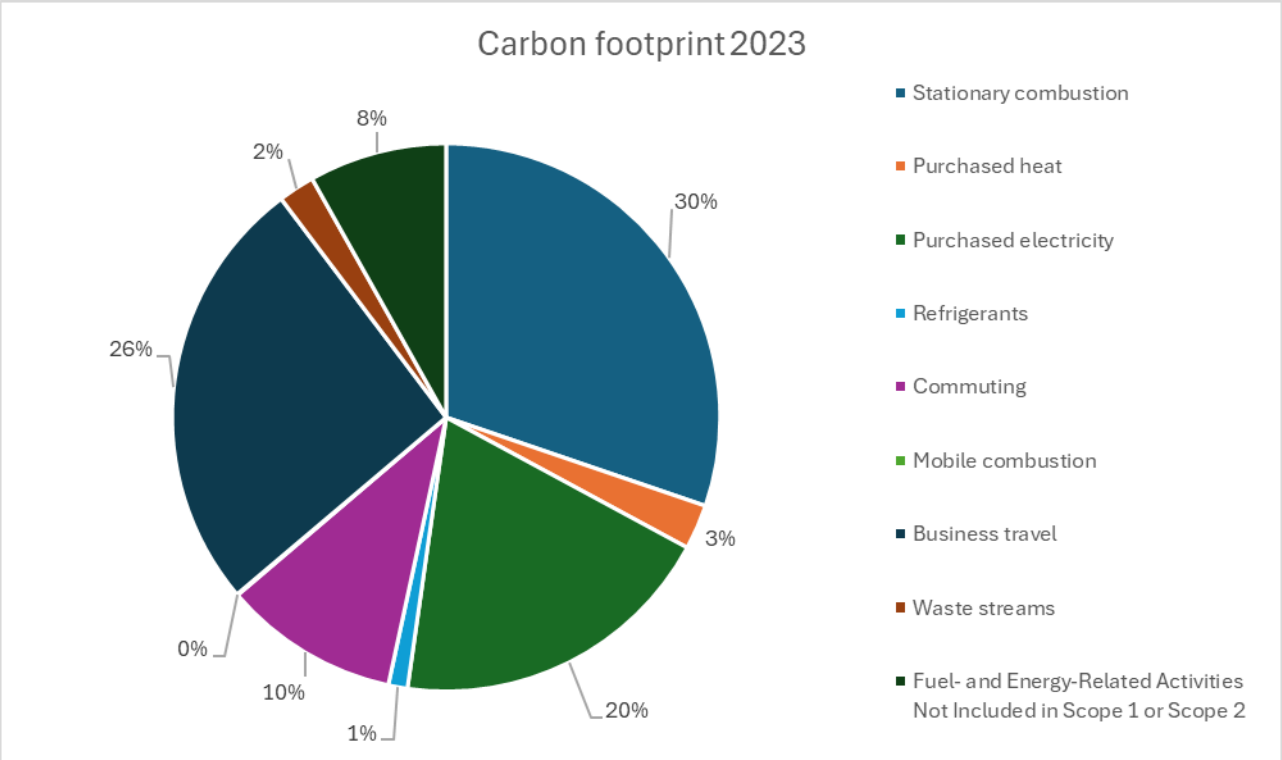

Figure 6: Overall carbon assessment (location based) of all organisational activities/processes as a share of the total footprint (year of analysis 2023)

5.1 Recalculating carbon footprint 2022

For the calculation of the carbon footprint of 2023, updated emission factors were used. To make a fair comparison with the previous year, the carbon footprint of 2022 has been recalculated with the updated emission factors (see Annex 6.3).

Table 8: Recalculation of the carbon footprint of 2022, in comparison with 2023

Summary CO_2e	2022		2023	
	t CO_2e	%	t CO_2e	%
Energy*	25.079	61	24.149	60
Cooling agents	667	2	453	1
Freight	86	0	0	0
Mobility	14.163	35	14.527	36
Direct waste streams	951	2	858	2
Total	40.945	100	39.987	100

* Emission factor of the average Belgian mix (Location based reporting).

The following table shows more detail concerning the mobility part since this is an important aspect within the climate plan of the University of Ghent:

Table 9: Comparison mobility carbon footprint 2022 and 2023

Mobility	2022 [tCO2e]	2023 [tCO2e]
Commuting	5.136	4.148
Car travel	344	485
Train travel	9	10
Plane travel	8.674	9.884
Total	14.163	14.527

5.2 Conclusions

The 2023 carbon footprint of Ghent University is 39.987 t CO_2e (±10%). Since the base year 2019, the footprint has markedly decreased (from 55.803 t CO_2e in 2019) (see Table 8).

The impact from energy usage has decreased significantly (- 4%) in comparison with last year. Also the added coolants are lower than the previous year. This year, UGENT was able to collect specific data concerning added coolants to the cooling installations. A reduction in waste related emissions (-10%) was achieved. Only the mobility part has seen an increase when comparing 2022 with 2023 (+ 3%). Employees commuted less in 2023 by all modes of transportation. The increase in mobility emissions from 2022 to 2023 is directly related to an increase in business travel: Car (+ 30%), train (+ 10%) and flights (+ 12%)

Table 10: Evolution of the carbon footprint of Ghent University since base year 2019.

Summary CO_2e	2019 [tCO2e]	2020 [tCO2e]	2021 [tCO2e]	2022 [tCO2e]	2023 [tCO2e]	Change [%] (2022 → 2023)
Energy	28.696	27.375	33.341	25.079	24.149	-4
Cooling agents	555	555	555	667	453	-32
Freight	260	260	260	86	NA	NA
Mobility	25.667	12.345	11.295	14.163	14.527	+3
Direct waste streams	626	626	626	951	858	-10
Total	55.803	41.161	46.076	40.946	39.987	-2

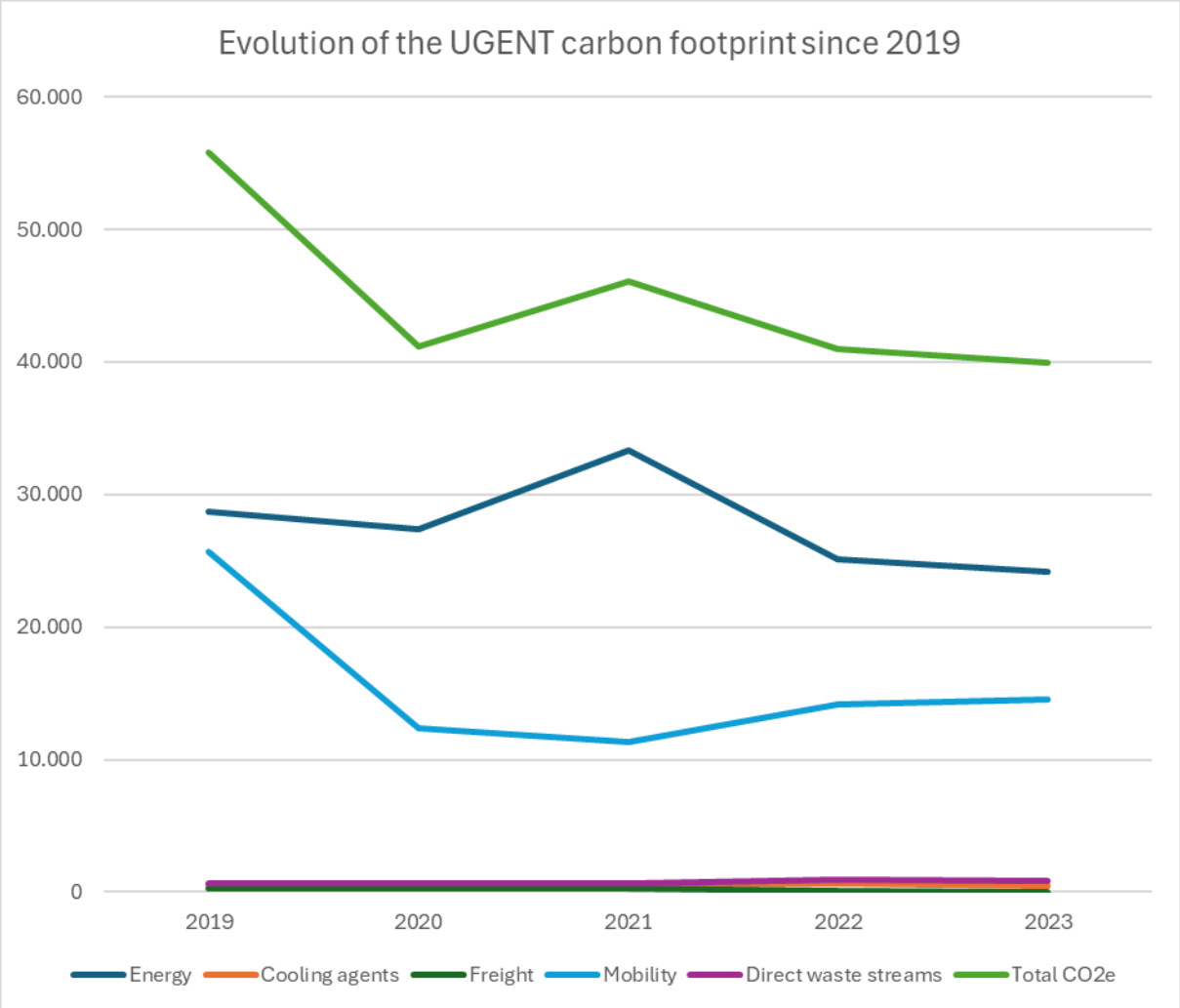

Figure 7: Evolution of the UGENT carbon footprint since 2019

By calculating the carbon footprint per employee and per student, insights are provided in the carbon intensity of UGENT. In 2019, the carbon footprint of Ghent University equalled approximately 6,7 ton CO_2e per employee and 1,2 ton CO_2e per student.

Table 11: Total carbon footprint of Ghent University (2019-2023), relative to the number of students and employees.

Year	Total impact [tCO_2e]	FTE	# students	tCO2e per FTE	tCO2e per student
2019	55.803	8.268	46.020	6,75	1,21
2020	41.161	8.758	47.033	4,70	0,88
2021	46.076	8.826	49.870	5,22	0,92
2022	40.946	8.800	50.000	4,65	0,82
2023	39.987	9.097	50.339	4,40	0,79

The following three evolutions are key to be able to obtain the 2030 climate targets:

1. Regarding the energy impact: In 2019, the energy footprint equalled 28.7 ktCO2e, which dropped in 2020 towards 27.4 tCO2e as Covid happened. The relatively cold year 2021 had higher heating oil consumption, gas consumption and heat purchases from heat networks. The higher heating demand was also needed to maintain indoor temperatures when windows were open (ventilation requirement due to Covid). The 2022 energy footprint dropped again, just below the level of 2019. The gas consumption in 2023, as well as the electricity use, were slightly lower than in 2022.

Table 12: Evolution of the partial UGent energy footprint since 1998

Energy	1988 [tCO2e]	2019 [tCO2e]	2020 [tCO2e]	2021 [tCO2e]	2022 [tCO2e]	2023 [tCO2e]
Direct burning	25.363	16.049	15.645	19.111	14.653	14.011
District heating	872	2.566	2.464	3.233	1.392	1.212
Electricity Purchased and produced	8.541	10.081	9.266	10.997	9.033	8.926
Total energy impact	**34.777**	**28.696**	**27.375**	**33.341**	**25.079**	**24.149**
Total refrigerant impact	**-**	**555**	**555**	**555**	**667**	**453**

2. Regarding the commuting impact: In 2023, a total of 11.742.483 km was travelled by car. This is a significant reduction from the base year 2019, when car commuting accounted for 24.772.477 km. In comparison with 2022, employees commuted less by all modes of transportation.

3. Regarding airplane travel: Business related flight travel included 38.845.053 km in 2022 and 44.261.821 km in 2023. Even though this was higher in 2023 than in 2022, these are remarkable reductions from the base year 2019, when airplane travel equalled 58.316.983 km.

6 Annex

6.1 GHG Protocol emissions statement for CO_2, CH_4, N_2O, FC and other appropriate GHG groups in tonnes of CO_2e – Location based

			Valeurs calculées										
			Emissions de GES										Emissions évitées de GES
Catégories d'émissions	Numéros	Postes d'émissions	CO2 (t CO2e)	CH4 (t CO2e)	N2O (t CO2e)	HFCs (t CO2e)	PFCs (t CO2e)	SF6 (t CO2e)	Autres gaz (t CO2e)	Total (t CO2e)	CO2 b (t CO2e)	Incertitude (t CO2e)	Total (t CO2e)
Scope 1	1-1	Emissions directes des sources fixes de	12.089	0	0	0	0	0	0	12.089	0	566	0
	1-2	Emissions directes des sources mobiles de	24	0	0	0	0	0	0	24	1	1	0
	1-3	Emissions directes des procédés	0	0	0	453	0	0	0	453	0	132	0
	1-4	Emissions directes fugitives	0	0	0	0	0	0	0	0	0	0	0
	Total Scope 1		12.113	0	0	453	0	0	0	12.565	1	581	0
Scope 2	2-1	Emissions indirectes liées à la consommation	7.750	0	0	0	0	0	0	7.750	0	820	0
	2-2	Emissions indirectes liées à la consommation de	1.060	0	0	0	0	0	0	1.060	0	0	0
	Total Scope 2		8.810	0	0	0	0	0	0	8.810	0	820	0
Scope 3	Emissions du Scope 3 amont												
	3-1	Produits et services achetés	0	0	0	0	0	0	0	0	0	0	0
	3-2	Biens immobilisés	0	0	0	0	0	0	0	0	0	0	0
	3-3	Emissions liées aux combustibles et à l'énergie (r	3.257	0	0	0	0	0	0	3.257	-1	121	0
	3-4	Transport de marchandise amont et distribution	0	0	0	0	0	0	0	0	0	0	0
	3-5	Déchets générés	858	0	0	0	0	0	0	858	1.573	212	0
	3-6	Déplacements professionnels	10.348	0	0	0	0	0	0	10.348	0	2.285	0
	3-7	Déplacements domicile travail	4.148	0	0	0	0	0	0	4.148	0	480	0
	3-8	Actifs en leasing amont	0	0	0	0	0	0	0	0	0	0	0
		Autres émissions indirectes amont	0	0	0	0	0	0	0	0	0	94	0
	Emissions du Scope 3 aval												
	3-9	Transport de marchandise aval et distribution	0	0	0	0	0	0	0	0	0	0	0
	3-10	Transformation des produits vendus	0	0	0	0	0	0	0	0	0	0	0
	3-11	Utilisation des produits vendus	0	0	0	0	0	0	0	0	0	0	0
	3-12	Fin de vie des produits vendus	0	0	0	0	0	0	0	0	0	0	0
	3-13	Actifs en leasing aval	0	0	0	0	0	0	0	0	0	0	0
	3-14	Franchises	0	0	0	0	0	0	0	0	0	0	0
	3-15	Investissements	0	0	0	0	0	0	0	0	0	0	0
		Autres émissions indirectes aval	0	0	0	0	0	0	0	0	0	0	0
	Total Scope 3		18.612	0	0	0	0	0	0	18.612	1.572	2.350	0

6.2 GHG Protocol emissions statement for CO_2, CH_4, N_2O, FC and other appropriate GHG groups in tonnes of CO_2e – Market based

			Valeurs calculées										
			Emissions de GES										Emissions évitées de GES
Catégories d'émissions	Numéros	Postes d'émissions	CO2 (t CO2e)	CH4 (t CO2e)	N2O (t CO2e)	HFCs (t CO2e)	PFCs (t CO2e)	SF6 (t CO2e)	Autres gaz (t CO2e)	Total (t CO2e)	CO2 b (t CO2e)	Incertitude (t CO2e)	Total (t CO2e)
Scope 1	1-1	Emissions directes des sources fixes de	12.089	0	0	0	0	0	0	12.089	0	566	0
	1-2	Emissions directes des sources mobiles de	24	0	0	0	0	0	0	24	1	1	0
	1-3	Emissions directes des procédés	0	0	0	453	0	0	0	453	0	132	0
	1-4	Emissions directes fugitives	0	0	0	0	0	0	0	0	0	0	0
	Total Scope 1		12.113	0	0	453	0	0	0	12.565	1	581	0
Scope 2	2-1	Emissions indirectes liées à la consommation	0	0	0	0	0	0	0	0	0	0	0
	2-2	Emissions indirectes liées à la consommation de	1.060	0	0	0	0	0	0	1.060	0	0	0
	Total Scope 2		1.060	0	0	0	0	0	0	1.060	0	0	0
Scope 3	Emissions du Scope 3 amont												
	3-1	Produits et services achetés	0	0	0	0	0	0	0	0	0	0	0
	3-2	Biens immobilisés	0	0	0	0	0	0	0	0	0	0	0
	3-3	Emissions liées aux combustibles et à l'énergie (r	3.602	0	0	0	0	0	0	3.602	-1	89	0
	3-4	Transport de marchandise amont et distribution	0	0	0	0	0	0	0	0	0	0	0
	3-5	Déchets générés	858	0	0	0	0	0	0	858	1.573	212	0
	3-6	Déplacements professionnels	10.348	0	0	0	0	0	0	10.348	0	2.285	0
	3-7	Déplacements domicile travail	4.148	0	0	0	0	0	0	4.148	0	480	0
	3-8	Actifs en leasing amont	0	0	0	0	0	0	0	0	0	0	0
		Autres émissions indirectes amont	0	0	0	0	0	0	0	0	0	141	0
	Emissions du Scope 3 aval												
	3-9	Transport de marchandise aval et distribution	0	0	0	0	0	0	0	0	0	0	0
	3-10	Transformation des produits vendus	0	0	0	0	0	0	0	0	0	0	0
	3-11	Utilisation des produits vendus	0	0	0	0	0	0	0	0	0	0	0
	3-12	Fin de vie des produits vendus	0	0	0	0	0	0	0	0	0	0	0
	3-13	Actifs en leasing aval	0	0	0	0	0	0	0	0	0	0	0
	3-14	Franchises	0	0	0	0	0	0	0	0	0	0	0
	3-15	Investissements	0	0	0	0	0	0	0	0	0	0	0
		Autres émissions indirectes aval	0	0	0	0	0	0	0	0	0	0	0
	Total Scope 3		18.957	0	0	0	0	0	0	18.957	1.572	2.351	0

6.3 Overview sources emission factors

Scope	Emission source	Emission factor [kg CO_2e/unit]	Unit	Source
Scope 1 – stationary	Natural gas	0,185	kWh HHV	https://www.co2emissiefactoren.be/factoren#brandstoffenenergieopwekking
Scope 1 – stationary	Heating oil	2,652	litre	https://www.co2emissiefactoren.be/factoren#brandstoffenenergieopwekking
Scope 1 – Mobile	Gasoline	2,176	litre	https://www.co2emissiefactoren.be/factoren#brandstoffenvoertuigen
Scope 1 – Mobile	Diesel	2,468	litre	https://www.co2emissiefactoren.be/factoren#brandstoffenvoertuigen
Scope 1 – Mobile	CNG	2.255	ton	https://www.co2emissiefactoren.be/factoren#brandstoffenvoertuigen
Scope 1 – refrigerants	Refrigerant losses	NA	kg	https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Chapter07_SM.pdf https://www.ashrae.org/technical-resources/standards-and-guidelines/ashrae-refrigerant-designations
Scope 2 – purchased electricity	Electricity consumption (market based)	0,000	kWh	https://www.co2emissiefactoren.be/factoren#elektriciteit
Scope 2 – purchased electricity	Electricity consumption (location based)	0,145	kWh	https://www.co2emissiefactoren.be/factoren#elektriciteit
Scope 2 – purchased heat	Heating grid EDF Luminus	21,610	GJ	https://www.co2emissiefactoren.be/factoren#warmtelevering
Scope 2 – purchased heat	Heating grid IVAGO	23,100	GJ	https://ce.nl/publicaties/ketenemissies-warmtelevering/
Scope 3 – Energy	Natural gas	0,029	kWh HHV	https://www.co2emissiefactoren.be/factoren#brandstoffenenergieopwekking

Scope 3 – Energy	Heating oil	0,816	litre	https://www.co2emissiefactoren.be/factoren#brandstoffenenergieopwekking
Scope 3 – Energy	Gasoline	0,645	litre	https://www.co2emissiefactoren.be/factoren#brandstoffenvoertuigen
Scope 3 – Energy	Diesel	0,787	litre	https://www.co2emissiefactoren.be/factoren#brandstoffenvoertuigen
Scope 3 – Energy	CNG	353	ton	https://www.co2emissiefactoren.be/factoren#brandstoffenvoertuigen
Scope 3 – Energy	Electricity consumption (market based): biomass	0,044	kWh	https://www.co2emissiefactoren.be/factoren#elektriciteit
Scope 3 – Energy	Electricity consumption (location based)	0,022	kWh	https://www.co2emissiefactoren.be/factoren#elektriciteit
Scope 3 – Energy	Heating grid EDF Luminus	3,440	GJ	https://www.co2emissiefactoren.be/factoren#warmtelevering
Scope 3 – Energy	Heating grid IVAGO	3,400	GJ	https://ce.nl/publicaties/ketenemissies-warmtelevering/
Scope 3 - Waste	Waste	NA	ton	https://base-empreinte.ademe.fr/donnees/jeu-donnees
Scope 3 – business travel & commuting	Car	0,254	vehicle km	https://base-empreinte.ademe.fr/donnees/jeu-donnees
Scope 3 – business travel & commuting	Bus	0,167	passenger km	https://base-empreinte.ademe.fr/donnees/jeu-donnees
Scope 3 – business travel & commuting	Train	0,048	passenger km	https://base-empreinte.ademe.fr/donnees/jeu-donnees
Scope 3 – business travel & commuting	TGV	0,00369	passenger km	https://base-empreinte.ademe.fr/donnees/jeu-donnees
Scope 3 – business travel & commuting	Plane	0,223	passenger km	https://base-empreinte.ademe.fr/donnees/jeu-donnees