Carbon Footprint of Ghent University

Short Report

2016, 2017, 2018 and 2019

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Titel: *Carbon Footprint of Ghent University: Short Report 2016, 2017, 2018 and 2019.*

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The '*carbon footprint of Ghent University: 2016, 2017, 2018 and 2019*' was calculated by Climate Lab at the request of Ghent University.

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1. Introduction

1.1 Ghent University

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 56 000 students and 12 000 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 (this campus is however not included in the carbon footprint of this report).

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.

1.2 Ghent University and Sustainability

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.

The principles of a sustainable energy and mobility policy were previously endorsed by the Board, and those for sustainable food, sustainable procurement and materials management and ecological green management have also been well documented by now:

- ✓ The sustainable energy policy plan (2020-2030) aims to reduce total carbon emissions from building heating and electricity supply by an average of 1.5% per year. The plan aims to reduce energy consumption annually through more efficient use of space and energy. From now on, fossil-free building and renovation is the standard.

- ✓ The sustainable mobility policy aims to form the framework within which, in an equitable manner, sustainable mobility is possible for staff and students.
- ✓ 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.
- ✓ A sustainable food policy strives for a healthy, affordable and ecologically responsible diet, with less meat and les non-sustainable fish consumption.
- ✓ The ecological green space management is more sustainable and pesticide-free, and based on a harmonious combination of people- and nature-oriented needs.

Yet, sustainability is a very broad concept, and is thus not easily measurable. Greenhousegas 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 the basic goal of the Paris Agreement).

1.3 Objective and structure of this report

This report quantifies the environmental performance of Ghent University using a carbon footprint methodology. The objective is to provide a quantification tool for reducing CO2 emissions. The report can serve as a detailed source of information on the carbon fluxes and as a baseline 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 greenhousegas 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.

Following to this introductory chapter 1, chapter 2 provides a general background on carbon footprinting. Chapter 3 describes which aspects of the carbon footprint of Ghent University have been included. Chapters 4 and 5 contain the results and recommendations. Chapter 6 provides a general summary.

Appendix 1 describes the relevant datasets.

2. Background

2.1 Different carbon footprint methods

Several methods have been developed to determine and report a carbon footprint. Examples include the EpE protocol, PAS2050, ISO14064-1 and the GHG Protocol. The methodological overlap between these methods is significant.

The above methods differ mainly in the area of application. For instance, while the EpE protocol focusses on the waste treatment sector, PAS2050 is primarily concerned with products, and the GHG Protocol mainly with organizations. The ISO14064 can be used as a quality check on all types of carbon footprint.

The quantification in this report was carried out using the Bilan Carbone® (version 8) method of the Association Bilan Carbone. Bilan Carbone® is a well-known international reference calculation method, able to report according to the Greenhouse Gas Protocol and ISO14064 standard.

2.2 Three Scopes in a carbon footprint

A carbon footprint distinguishes between 3 "scopes" for reporting greenhousegas emissions:

- ✓ **Scope 1**: Direct greenhousegas emissions, from sources owned or controlled by the organisation, e.g. emissions from the incinerators or vehicles.
- ✓ **Scope 2**: Indirect greenhousegas emissions from electricity consumption. Scope 2 thus covers emissions from generating the electricity purchased and consumed by the company. These emissions therefore take place at the power station.
- ✓ **Scope 3**: Other indirect emissions. Scope 3 is a category in which all other indirect greenhousegas emissions can be reported. Scope 3 emissions are caused by activities of the organisation, but are emitted from sources over which the organisation has no control. This can be for example, the production of materials that are purchased, or the use of products, or services of the organisation.

2.3 Carbon footprints for higher education

Different benchmarks 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.

In this report, the carbon footprint of Ghent University will be compared with the footprints of other Belgian Universities. Published carbon footprints from universities are not always fully comparable, mainly due to differences in methodology, scoping or demarcation. Yet, in line with this report, most of the Belgian universities have been working with the Bilan Carbone method. Commonly, 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.

3. Methodology - approach

The carbon footprint is presented for the years 2016, 2017, 2018 and 2019. This is the first time that Ghent University reports its carbon footprint according to international guidelines. The greenhouse gases (GHG) considered are the same as in the Kyoto Protocol: carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorinated hydrocarbons (PFCs), and sulphur hexafluoride (SF6). All scores are expressed in CO2 equivalents. Each greenhouse gas can be translated into tons of CO2 equivalents. The carbon footprint of an organisation is thus expressed in ton of CO2e per year.

The following project phases have been completed:

Phase 1: Scope determination and demarcation

In consultation with the Green Office of Ghent University, the relevant scopes and impact categories have been demarcated. Considerations that can play a role in the selection of impact categories are:

- ✓ Does Ghent University pay for it?
- ✓ Does Ghent University have any influence on it?
- ✓ Can the process make a relevant contribution to the total score?
- ✓ Is it common to include the process in a (Bilan Carbone) footprint?

In line with the ISO norm, the GHG Protocol does not prescribe exactly which processes should be included in Scope 3, and states that 'companies should strive for completeness, but we recognize that 100% completeness may not be achievable'. If certain impact categories are left outside of the demarcation, it is important to clearly indicate this. These categories can also be included in later updates of the carbon footprint (see § 5.3 for this report).

Based on the above considerations, the following five relevant impact categories are taken into account in this report:

- ✓ Energy: emissions related to direct energy use (natural gas, fuel oil, electricity consumed);
- ✓ Non-energy: leaking Kyoto halocarbons from university cooling installations;
- ✓ Direct waste: emissions from treatment of waste collected at Ghent University;
- ✓ Freight: emissions from internal transports using (small) university trucks;
- ✓ Mobility: emissions from employee commuting and all "business travel", including indirect emissions from the production of the vehicles and the supply chain of the fuels. Note that student mobility is not yet included (see § 5.3).

Phase 2: Data inventory

All necessary input data were collected through the inventory of Holemans (2018) and Van Damme (2020) (see Annex 1).

Phase 3: Characterisation

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

Phase 4: Interpretation

By means of graphs and tables, the contribution of different processes to the total carbon footprint can be analyzed. This was done for the entire organization as well as per impact category and per year. The multiannual comparison tool of Bilan Carbone ® was used to facilitate analysis.

Phase 5: Data uncertainties

Uncertainty estimates for all input parameters are accounted for in Bilan Carbone. Weaknesses and uncertainties in the data inventory are discussed, and the recommendations indicate how data collection can be improved in the future. For ISO Scope 1 and 2 categories, uncertainty levels should be below 20%, in line with the internationally accepted limit of carbon data uncertainty.

4. Results

4.1. Total carbon footprint

The most recent carbon footprint of Ghent University is **47.572 ton CO2e** (year of analysis 2019). The total uncertainty for the same year is 10,4% (Table 1). Note that the general difference between the years 2016-2017 and 2018-2019 can be (fully) attributed to employee car commuting and airplane travel behavior.

Table 1: Total carbon footprint of Ghent University (2016-2019).

Year of analysis	Total carbon footprint (tCO2e)	Uncertainty (% and tCO2e)
2016	34.929	5,6% (1.951 tCO2e)
2017	35.764	5,5% (1.950 tCO2e)
2018	46.975	10,1% (4.734 tCO2e)
2019	47.572	10,4% (4.968 tCO2e)

The three major determinants of the carbon footprint of Ghent University are (for 2019):

- ✓ Energy use (fuel oil, gas and electricity use): 23.296 ton CO2e (49%);
- ✓ Airline travel: 14.178 ton CO2e (30%);
- ✓ Transporting people (car and public transport for employee commuting and organisational transport): 9035 ton CO2e (19%).

4.2. Carbon footprint per impact category[1]

4.2.1. Energy use

The bulk of the carbon emissions related with energy use is caused by burning of natural gas onsite for the purpose of heating. The share of electricity and purchased heat (through heat networks) is significantly smaller (Figure 1). The carbon footprint of cogeneration, consumption of fuel oil, university solar panels and wind power generation (at the site in Melle) is even smaller.

[1] In this analysis, we focus on the year 2019, as this is the most recent year with the most inclusive dataset available.

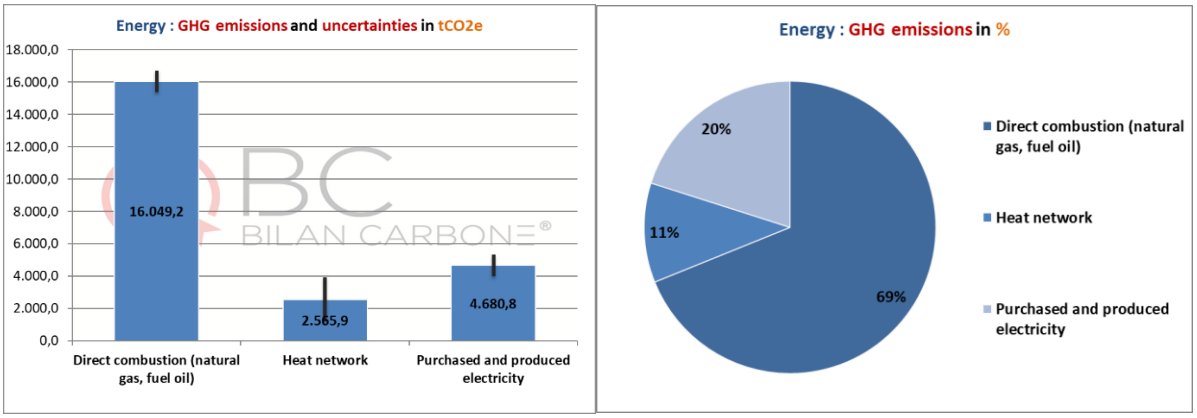


Figure 1: Share of GHG emissions per energy impact category (in tCO2e).

4.2.2. Mobility of employees

The carbon footprint of the mobility of university staff is clearly dominated by airplane traffic, and to a smaller extent by employee commuting. A very small share of the carbon footprint consists of employees using university cars during working hours and performing business trips by train (Figure 2).

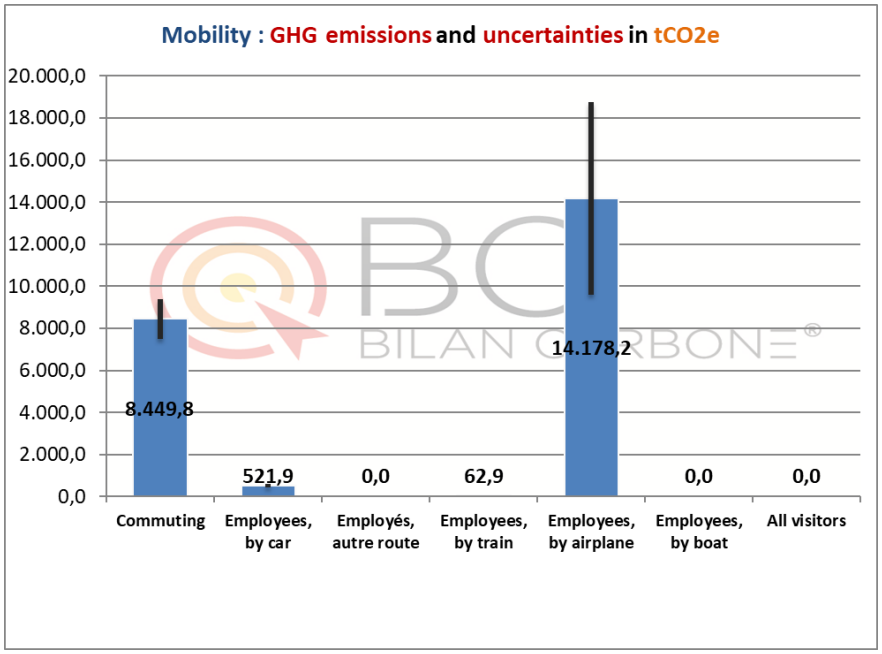


Figure 2: Quantification of GHG emissions per mobility impact category (in kg CO2e).

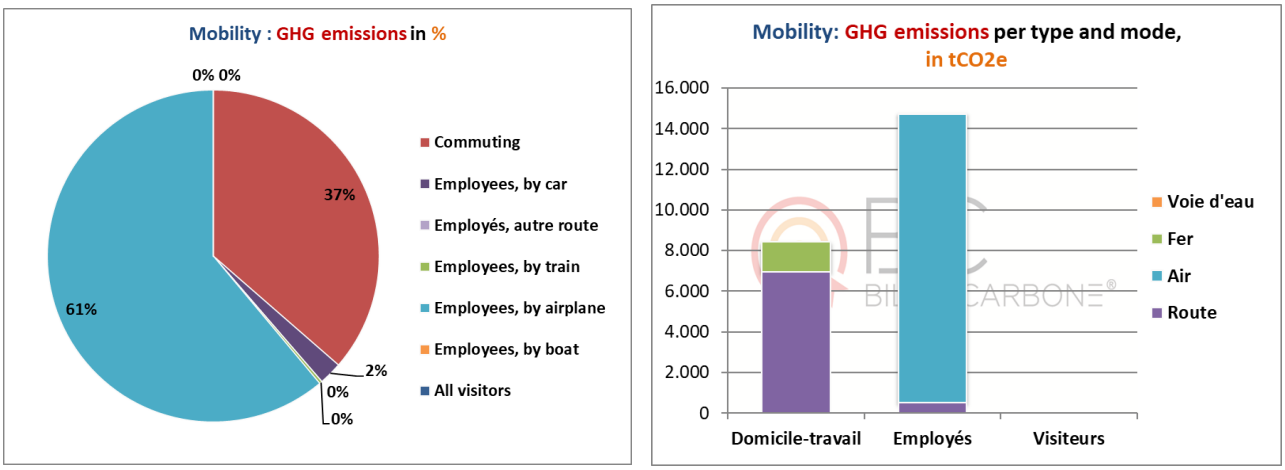


Figure 3: Share of GHG emissions (a) per mobility impact category (in kg CO2e) and (b) per type and mode.

4.2.3. Other emissions

The carbon footprint of Ghent University is finalized by including the treatment of waste (1 %), the escape of refrigerants (0,4 %) and internal freight transport using small university trucks (1 %) (Figure 4). These processes only attribute a very small share of the total carbon footprint.

4.2.4. Overall assessment for organisational processes

Considering all physical activities separate, it is clear that the carbon footprint of Ghent University is dominated by only a few organisational processes: 80% of the total carbon footprint is related to (i) natural gas consumption, (ii) airplane travel and (iii) employee commuting (Figure 4).

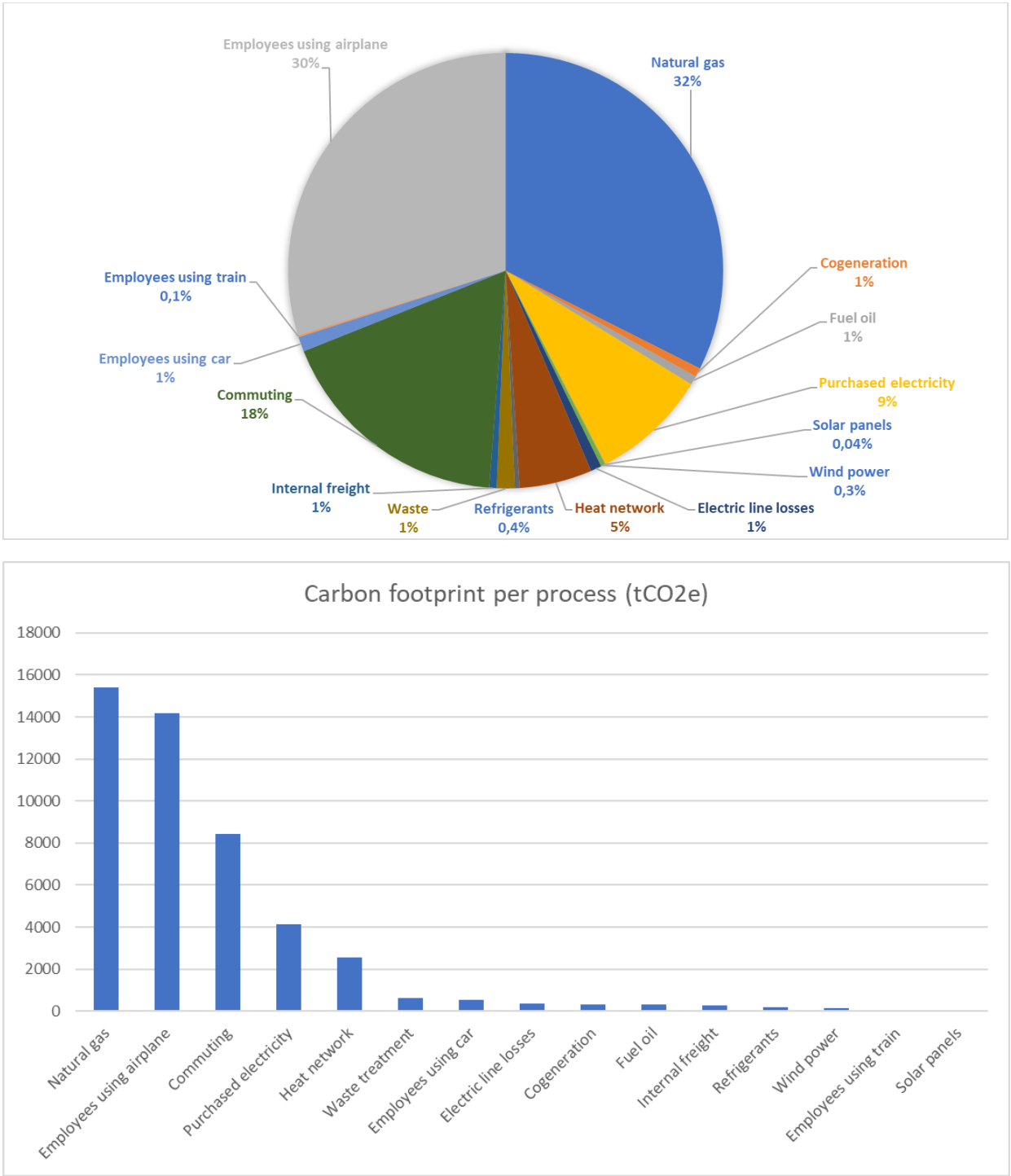


Figure 4 (a and b): Overall carbon assessment of all organisational activities (a) as a share of the total footprint, and (b) in tonnes CO2-equivalent.

4.3. Carbon footprint per employee and per student

The carbon footprint per employee and per student provides insight in the carbon intensity of the university (Table 2). Based on the numbers of 2018 and 2019, the carbon footprint of Ghent University equals about **6 tCO2e per employee** (5,75 in 2019). Taking into account the student population, the carbon footprint equals about **1 tCO2e per student** (1,03 in 2019). Note that the footprint per employee and per student simply represents a relative share of the total footprint (total footprint over the total population). Consequently, it does not necessarily imply a causal connection with the analyzed group, since for instance students do not participate in the business travel by airplane.

Table 2: Total carbon footprint of Ghent University (2016-2019), relative to the number of students and employees.

Year of analysis	Total carbon footprint (tCO2e)	Number of employees	Number of students	tCO2e per employee	tCO2e per student	tCO2 per person (FTE+student)
2016	34.929	9000	42000	3,88	0,83	0,68
2017	35.764	9000	42000	3,97	0,85	0,70
2018	46.975	7816	44421	6,01	1,06	0,90
2019	47.572	8268	46020	5,75	1,03	0,88

4.4. Comparison with Master scriptions

The carbon footprint of the Master scriptions of Holemans (2018) and Van Damme (2020) are generally lower as compared to the assessment in this report. The carbon footprint of Ghent University in 2019, for instance, was quantified by Thomas Van Damme at 32.961 ton CO2e. This difference of approximately 14500 tonnes can be explained as follows:

1. The emission factor for commuter traffic in the theses is about half of the emission factor in Bilan Carbone (0.127 kg CO2/km versus 0.254 kg CO2/km). The emission factor in the theses is based on the De Lijn website and is in any case too low ("tank to wheel"), also in comparison with the Dutch dataset. It seems a bit inconsistent because the theses always rely on the Dutch dataset, and then suddenly on data from De Lijn. Bilan Carbone's emission factor is in line with the Dutch emission factor and takes into account both the "well to wheel" emissions and the manufacturing of the car.

2. The emission factor for combustion of natural gas and fuel oil is lower in the theses than in Bilan Carbone. However, the theses do not take into account the correction for natural gas production, the "PCS/PCI" conversion and the fact that gas in East Flanders is high-calorific and not low-calorific as in the Netherlands.

3. The emission factor for the purchase of electricity is higher, according to Bilan Carbone, since the purchase of “guarantees of origin” unfortunately does not count as 'green electricity'. Bilan Carbone's emission factor is the inventoried value for EDF Luminus in Belgium. We did take into account the windmills in Melle.

4.5 Comparison with other universities

4.5.1. Methodological differences

The following relevant impact categories were left outside of the current demarcation for Ghent University, but have been included in the footprint studies of several other Flemish universities. This explains the remaining differences between the universities. These categories can be included in later updates of the carbon footprint of Ghent University.

- ✓ Inputs: emissions from purchasing food at student restaurants, buying paper or ICT equipment and purchasing different services;
- ✓ Capital goods: emissions related with the construction of buildings, infrastructure, machinery, equipment and vehicles owned by the university;
- ✓ Student mobility, including their car use and their use of public transport, but also including the airplane travel by foreign students.

4.5.2. Differences in the carbon footprints

The yearly footprint per person (student plus FTE employee; 0,9 tCO2/person in 2019) is generally smaller as compared to the other Flemish universities, mainly because of methodological reasons (see §4.5.2). UAntwerp (2018) has a footprint of 1.6 ton CO2e per person, compared to 1.7 ton CO2e for the VUB (2016). KULeuven (2010) and KHLeuven (2010) have carbon footprints of 1,9 tCO2/person and 0,9 tCO2/person respectively.

When comparing the three most significant determinants of the carbon footprint of Ghent University (direct use of fossil fuels for heating, airplane travel and commuting), the following is however clear:

- ✓ Burning fossil fuels for heating buildings has quite a similar impact as compared to other universities. At Ghent University, this accounts for 0,31 tCO2/person (2018), while at UA this is 0,32 ton CO2/person (2018) and at KULeuven only 0,26 tCO2/person (2010).
- ✓ Ghent University has a relatively large attribution of airplane traffic in the total carbon footprint. For instance, at the UA, airplane travel behavior accounted for 662 km/person (2018) while at Ghent University, this accounted for 888 km/person in the same year. An average FTE employee at Ghent University traveled 6360 km by airplane in 2018, while at the UA this was only 3536 km in the same year.
- ✓ Ghent University also has a relatively large attribution of employees commuting by car in the total carbon footprint. Employees commuting by car create a total footprint of 8290 tCO2/yr in 2018 (1.1 tCO2 per employee). At the UA, in the same year, this was only 3952 tCO2/yr (0,8 tCO2 per employee).

5. Recommendations

5.1 Carbon reduction strategy

About 80% of the total carbon footprint of Ghent University is related to three main sources: (i) natural gas consumption, (ii) airplane travel and (iii) employee commuting (see Figure 4). It can be recommended to start focusing on these three sources, to significantly reduce the carbon footprint of Ghent University:

- ✓ Reduce the consumption of natural gas, in line with sustainable energy policy plan (2020-2030) which aims to reduce total carbon emissions from building heating and electricity supply by an average of 1.5% per year.
- ✓ Reduce business travel by plane by encouraging teleconferencing.
- ✓ Promote public transport and bicycle use among students and staff, and reduce student commuting using tele-lectures.

For all cases, it will be interesting to compare the carbon footprint of 2020, with **Covid-measures**, with the carbon footprint of 2019. Also it would be interesting to perform additional Bilan Carbone simulations in order to quantify the emission reductions that can be expected under the current university policies (**simulations of the already decided policy**). Simulations can thus quantify the impact of the current sustainable energy policy plan, the sustainable mobility plan, sustainable purchasing policy, the biodiversity policy and food policy. Such simulations can quantify the "**emission gap**" that would remain under the already decided policy and could be helpful to decide on future paths.

5.2 Long-term climate plan with path to climate neutrality

It is recommended to draft a **university climate plan** that can translate long-term climate goals for 2030 or 2050 into specific quantifiable actions that can further reduce the emissions gap. An annual GHG emission reduction goal (e.g. 3% per year to meet the Paris committments) could be fixed. It is important that such a climate plan is consistent with the existing or future policies on energy, food, biodiversity and procurement.

Moreover, the complementary potential of **carbon compensation** programs can also be investigated for the remaining emissions. Instead of through buying climate credits, compensation is also possible through starting carbon projects with the university itself, or through launching a compensation bid for (university) carbon projects to compete with each other (e.g. similar to the former VLIR carbon compensation scheme). As such, the University could sign the Climate Neutral Now Pledge. This pledge represents a growing movement of organizations taking the lead on reducing emissions and accelerating the global journey to a climate-neutral future.

5.3 Improving carbon footprint methodology

For future carbon footprints (2020 and beyond), we recommend to include the following data:

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

6. Summary

In this report, we present the carbon footprint of Ghent University. A carbon footprint can be used to determine the baseline of the climatic impact of an organisation, and then to monitor progress in climate performance.

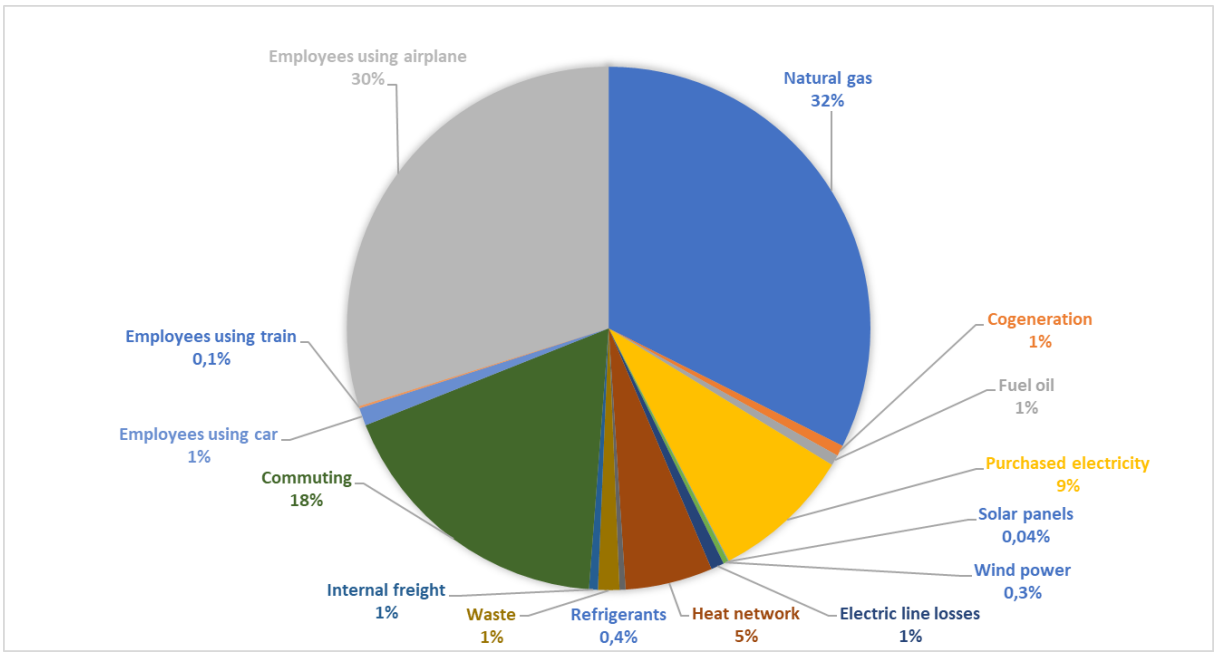
The Bilan Carbone® (version 8) method of the Association Bilan Carbone was applied. Bilan Carbone® is an international reference calculation method, reporting in line with the Greenhouse Gas Protocol and the ISO14064 standard.

The most recent carbon footprint of Ghent University is **47.572 ton CO2e** (year of analysis 2019), with an estimated uncertainty of 10,4%. Circa 80% of the total carbon footprint of Ghent University can be attributed to only three main sources: (i) natural gas consumption, (ii) airplane travel and (iii) employee commuting. Other impact categories have much smaller climate impacts (see Summary Figure).

As compared to the carbon footprint of other Belgian universities, Ghent University has a relatively large attribution of airplane traffic and employee commuting in the total carbon footprint. These aspects deserve additional policy attention.

From a methodological perspective, it can be recommended (i) to perform additional Bilan Carbone simulations of "Covid-year" 2020, (ii) to quantify the *emission gap* of the *already decided policy,* and (iii) to gather more data on input materials and services, capital goods and student mobility.

From a policy perspective, it can be recommended to draft a coherent university climate plan that can translate a long-term goal for climate neutrality into specific quantifiable actions that can further reduce the emissions gap. Instead of just "buying carbon credits", it is also recommended to start compensation schemes with the university itself, or to launch a compensation bid for (university) carbon projects to compete with each other (i.e. similar to the former VLIR UOS scheme).



Summary Figure: Overall carbon assessment of all organisational activities/processes as a share of the total footprint of 47.572 ton CO2e (year of analysis 2019).

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Appendix 1

Appendix 1 (below) presents the original data that formed the input of the carbon footprint calculations in Bilan Carbone. For a description of the data collection, we refer to Holemans (2018) and Van Damme (2020).

Year				**2016**	**2017**	**2018**	**2019**
Population		Students	#	41000	41000	44421	46020
		Personnel	#	9000	9000	7816	8268
Direct sources	Electricity generated	Cogeneration	kWh	2014000	1608646	1808495	1439640
		Solar panels	kWh	122363	182313	354891	369709
	Heating for buildings	Natural gas	kWh	72397464	70703031	69725522	70169818
		Fuel oil	MWh	1988.54	1659.89	2074.966	1028.799
		Biomass	GJ	1945.382	97110	0	0
	University vehicles	Cars	diesel (km)	29920	29920	26614	26614
			gasoline (km)	68860	68860	86647	86647
		Small vans	diesel (km)	190400	190400	103791	103791
			gasoline (km)	75020	75020	116447	116447
			gas (km)	0	0	47863	47863
			electricity	22440	22440	11966	11966
		Large vans	diesel (km)	84510	84510	80550	80550
			gasoline (km)	7480	7480	5664	5664
	Leakage of refrigerants	R134A	kg	NA	NA	47.63	2.91
		R404a	kg	NA	NA	2.22	29.43
		R407F	kg	NA	NA	0	0
		R410A	kg	NA	NA	46.41	6.43
		R507	kg	NA	NA	2.3	9.69
		R407C	kg	NA	NA	26.97	4.12
		R507a	kg	NA	NA	0	0
		R22	kg	NA	NA	0	0
		R32	kg	NA	NA	0	0
Indirect sources	Electricity purchased, including wind turbines in Melle		Kwh	50816798	52549112	51971867	51638330
	Heat purchased (heat networks)		GJ	61635.064	61285.95	57812.19	51265.83

Other indirect sources	Commuting	Cars	km	79023.869 pd	79023.869 pd	24706480 py	24772477 py
		train	km	58190.578 pd	58190.578 pd	27342616 py	30590633 py
		bus	km	4504.355 pd	4504.355 pd	2432831 py	2103456.3 py
		tram	km	900.871 pd	900.871 pd	486566 py	420691.3 py
		public transport	km	22914.651 pd	22914.651 pd	/	/
		carpool	km	2496.232 pd	2496.232 pd	617402 py	707036.87 py
		motorcycle	km	2152.676 pd	2152.676 pd	617402 py	707036.87 py
		bike	km	12337.99 pd	12337.99 pd	5779835 py	5645619.2 py
		foot	km	102.817 pd	102.817 pd	8758.86 py	8953.56 py
	Business travel	airplane	km	NA	NA	46370959	49713157
		train	km	NA	NA	1300031.1	1300031.1
		car	km	2332347	2332347	2079862.24	1940342
	Water use (waste water)		m^3	248835	234142	234514	235638
	Waste (all data in tonnes)	Chemical waste	Other treatment	NA	NA	27.195	316.8
			Recycling	NA	NA	25.80535	26.272
			Landfill	NA	NA	0.019	0.03
			Burning	NA	NA	110.767	119.4735
		Animal waste	Burning	NA	NA	393.21	40.726
		Household waste	Other treatment	NA	NA	9.374	0
			Compost	NA	NA	0	5.865
			Recycling	NA	NA	123.715	279.6655
			Burning	NA	NA	64.74	0.052
		Dangerous waste	Recycling	NA	NA	2.483	2.664
		Medical waste	Burning	NA	NA	107.934	99.142185
		Technical waste	Other treatment	NA	NA	760.31	43.323
			Recycling	NA	NA	350.797609	475.864
			Revalorisation	NA	NA	5.935	5.205
			Sorting	NA	NA	0	0

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