VEOLIA

GreenPath
DIGITAL PLATFORM

CARBON FOOTPRINT 2022

Universidade Católica Portuguesa - Porto Campus

UNIVERSIDADE CATÓLICA PORTUGUESA

26th of march 2025

GREENPATH CERTIFIED TOOL

VEOLIA

GHG* CERTIFICATE

GREENPATH

Veolia certifies that the study Carbon Footprint Assessment 2022 done for

Universidade Católica Portuguesa - Porto Campus

Has been conducted with GreenPath whose GHG calculation methodology complies with the following international standards:

- **GHG Protocol Corporate Accounting and Reporting Standard**
- **Corporate Value Chain (Scope 3) Accounting and Reporting Standard** - Supplement to the GHG Protocol Corporate
- **ISO 14064-1 (2006) and 14069 (2014) GreenHouse Gases**

The calculation methodology used in GreenPath has been externally verified by CITEPA (Interprofessional Technical Center for Atmospheric Pollution). https://www.citepa.org/en/activities/international-studies

CITEPA

Date: 26/03/2025

*GHG : GreenHouse Gases

Contents

01

Background

Católica Porto Campus, from Universidade Católica Portuguesa, stands out in the academic environment from the second largest city in Portugal, Porto.

Porto Campus consists of eight teaching units that include: Católica Porto Business School, Faculty of Biotechnology, Faculty of Education and Psychology, Faculty of Health Sciences and Nursing - Porto, Faculty of Law - Porto School, Faculty of Theology, School of Arts and School of Nursing (Porto).

Católica Porto is committed to sustainability and recognizes the importance of addressing environmental challenges in the academic and business world by giving the example and defining specific strategic goals.

Veolia is helping Católica Porto to calculate its own carbon footprint and assess its environmental performance by identifying the specific sources and activities that contribute most to the institution’s emissions. This information enables Católica to prioritize areas of improvement and develop strategies to reduce its greenhouse gas emissions.

02

Wake up call regarding the greenhouse effect

The greenhouse gases (GHG) keep part of the sun's heat and maintain an average temperature of about 15°C on the surface of the Earth.

The CO_2 concentration, one of the main greenhouse gas effects, is naturally of about 0,04%. Beyond this concentration, the average earth temperature will rise.

Human activities (transport, dwellings, agriculture, etc) increase the proportion of GHG in the atmosphere and create some additional greenhouse effect..

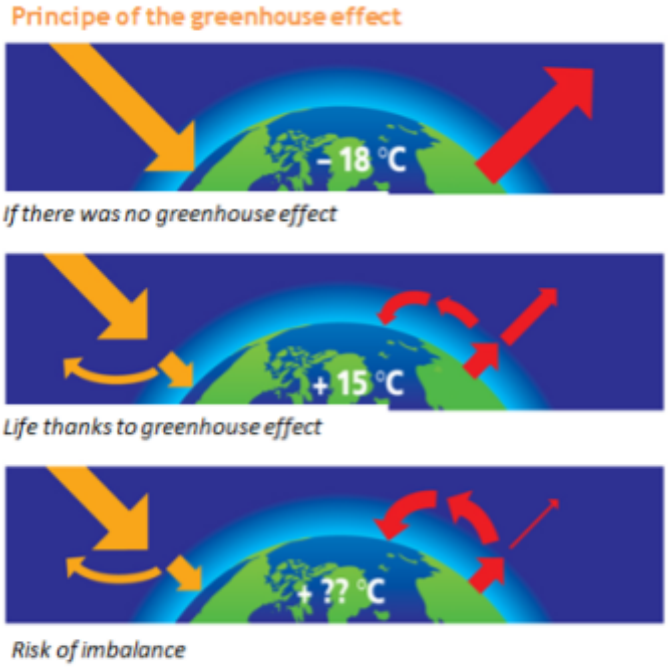


Figure 1: Greenhouse effect principle

03
Selected Approach

3.1. Carbon footprint definition

A product or an activity carbon footprint is a tool that allows assessing and ranking the greenhouse gases generated by the whole physical process needed to produce an activity or create a human activity.

Thanks to this method, observable activities can be translated into greenhouse gas (GHG) emissions using conversion coefficients also called emission factors.

The purpose of the carbon footprint is to take into account six greenhouse gases listed in the Kyoto Protocol (carbon Dioxide [CO_2], methane [CH_4], nitrous oxide [N_2O], hydrofluorocarbons [HFC], perfluorocarbons [PFC], sulfur hexafluoride [SF_6]) and all other emission sources. In fact, this method allows to exhaustively cover the direct and indirect emission perimeter linked to an entity's activity, i.e. the scope.
Scopes 1, 2 and 3 have different perimeters, summarized as follows and shown in FIgure [2].

Scope 1 refers to direct emissions of GHGs from the combustion of fossil fuels of controlled or possessed resources (Ex: consumption of oil-fired boilers, consumption of fuels for company vehicles, etc).

Scope 2 refers to indirect GHG emissions induced by the purchase or production of electricity (Ex: electricity consumption).

Scope 3 refers to other indirect GHG emissions not considered in Scope 2 that occur in the company's value chain, both up and downstream (Ex: consumables, telephones, waste, commuting, transport of visitors and customers, fixed assets, etc).

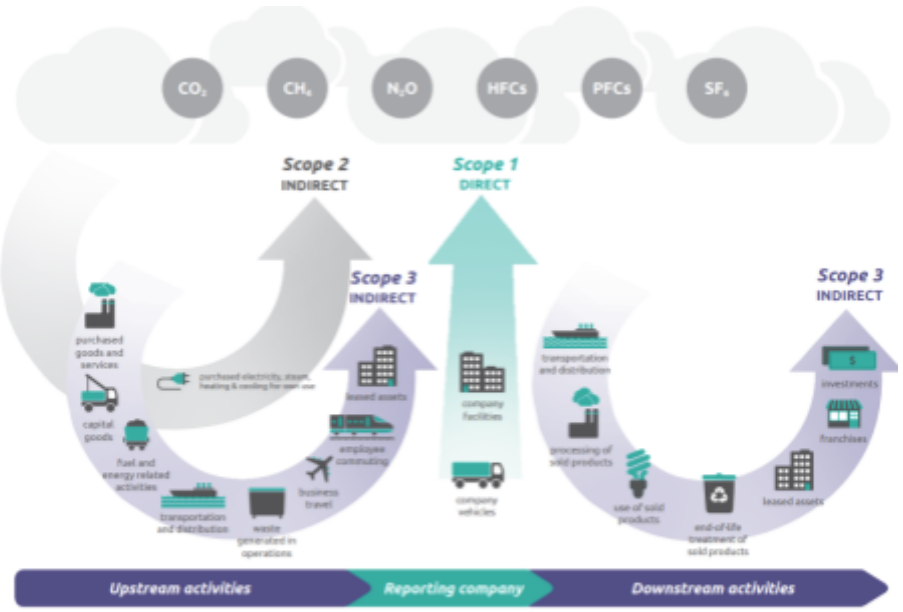


Figure 2: Overview of GHG Protocol scopes and emissions across the value chain
(Source: Corporate Value Chain (Scope 3) Accounting and Reporting Standard)

The carbon footprint (expressed in tCO_{2eq}) assessment is carried out by the multiplication of the activity data by the emission factors in a given perimeter:

$$\sum_{i=1}^{i} A_i \times FE_i$$

Where,
i : is the analysis perimeter
A_i : the activity data (kWh, natural gas, tons of steel, tons-kilometers of freight, etc).
FE_i: the emission factors (value that allows converting data into greenhouse gas emissions)

For each gas, a conversion factor is used to integrate the effect of the various GHG: the global warming potential (GWP) measures the importance of the contribution to global warming of a given greenhouse gas mass against CO_2. For instance, 1 ton of fossil CH_4 is the equivalent of 30 tons of CO_2. The GWP values retained are those given in the 5th IPCC report.

Conversions are automatically calculated by the GreenPath tool.

3.2. The tool: GreenPath

To carry out a greenhouse gas emissions inventory, Veolia developed a tool to calculate the carbon footprint based on the ISO 14064 norm and completed by the IPCC, ASTEE, EcoInvent, Carbone 4 and Veolia emission factors.

The aim of the GreenPath tool is to supply a diagnosis of greenhouse gas (GHG) emissions linked to the various Veolia activities in the water, waste and energy sectors.

GreenPath covers direct and indirect emissions perimeters i.e. Scopes 1, 2 and 3.
By taking into account all the components of a carbon footprint (direct and indirect emissions), the authors have a complete vision and the levers for action to reduce GHG emissions are more numerous and more easily identifiable. Stakeholders are thus adopting an ambitious and virtuous climate policy!

GreenPath Carbon calculation tool has been audited by third parties and is recognized as compliant with the international GHG calculation protocols: GHG Protocol Standard (revised edition) and ISO 14064-1 (2006) and ISO 14069-2 (2014) GreenHouse Gases. Certificate of the study according to GHG and certificate of compliance are available in Appendix 3 and 4, respectively.

3.3. Results reporting format (BEGES, ISO, GHG)

Green Path proposes three results restitution formats:

- Article 75
- GHG Protocol
- ISO

Article 75 of the Grenelle II Act requires legal entities employing more than 500 employees to take into account their greenhouse gas emissions. They must report on their greenhouse gas emissions.
The reporting is disclosed. It is updated every three years. It had to be established for the 31st December 2012.

The ISO 14064 norm 2006 defines specifications and guidelines at organization level, to quantify and disclose emissions and removal of greenhouse gas. It includes requirements for the design, adjustment, management, writing of the reports, and checking the greenhouse gas inventory of an organization.

The GHG Protocol was published to guide enterprises and voluntary organizations to measure their GHG emissions. It defines the greenhouse gas emissions accounting and reporting standards and provides guidelines for the perimeter, the evaluation of emissions over time and their reporting. It also provides avenues to implement management programmes aiming at reducing the enterprise's GHG emissions, or that of the organization assessing the emissions.

04

General information on the site studied

4.1. Study perimeter

This study aimed to calculate the carbon footprint of Universidade Católica Portuguesa (UCP), Porto Campus, that integrates eight teaching units. The activity data refers to 2022, and the analysis was conducted based on available information provided by the School, following the operational control approach.

Regarding the Operational Boundary, Scopes 1 and 2 were considered and the GHG Protocol categories relevant to the study were defined, as summarized below:

Scope	GHG Protocol Category
Scope 1	1.1 Fuel Consumption from Stationary Sources - Off-road Diesel
	1.1 Natural Gas Consumption
	1.2 Fleet Fuel Consumption - Diesel
	1.4 Refrigerant Gas Leaks
Scope 2	2.1 Electrical Energy Consumption

Table 1: Operational Boundary and respective categories according to the GHG Protocol

05

Input data, Assumptions and Methodology

This section summarizes the approaches followed in GreenPath to insert data and assumptions for the scenario of year 2022.

In terms of emissions inventory, the flows to be considered were as follows:

- Off-road diesel consumption from generators (Scope 1)
- Natural gas consumption (Scope 1)
- Fleet Fuel consumption (Scope 1)
- Refrigerant Gas Leaks (Scope 1)
- Energy consumption (Scope 2)

5.1. Input Data

- **Scope 1 - C1. Off-road diesel consumption:** quantity of fuel consumption in Liters;
- **Scope 1 - C1. Natural Gas Consumption:** purchased Natural Gas in kWh Low Heat Value (LHV);
- **Scope 1 - C2. Fleet Fuel Consumption - Diesel:** Quantity of fuel consumption in Liters;
- **Scope 1 - C4. Refrigerant Gas Leaks:** quantity of refrigerant gas recharged in kg;
- **Scope 2 - C1. Purchase of Electricity:** quantity of Purchased Electricity in MWh.

5.2. Main Assumptions

Activity data regarding UCP Porto were obtained through different information flows (internal and external):

- Scope 1 - C1. Off-road diesel consumption: information obtained from internal control maintenance sheets;
- Scope 1 - C1. Natural Gas Consumption: information obtained from gas provider invoices and internal control sheets from the school;
- Scope 1 - C2. Fleet Fuel Consumption - Diesel: information obtained from estimates based on monetary value spent;
- Scope 1 - C4. Refrigerant Gas Leaks: information obtained from internal maintenance sheets and CENTERM audits;
- Scope 2 - C1. Purchase of Electricity: information obtained from electricity provider invoices and internal control sheets from the school.

Table 2 presents the activity data considered in this study for the year 2022, for Porto Campus.

Activity Data	Year 2022	Units
Scope 1 - C1. Fuel Consumption from Stationary Sources		
Fuel Consumption from Stationary Sources - Off-road Diesel	150	L
Natural Gas Consumption	134.4	MWh
Scope 1 - C2. Fleet Fuel Consumption		
Fleet Fuel Consumption - Diesel	7002	L
Scope 1 - C4. Refrigerant Gas Leaks		
HFC Gas Leakage	121	kg
Scope 2 - C1. Purchase of Electricity		
Purchase of Electricity	2810.9	MWh

Table 2: Data provided by Católica Porto (2022)

5.3. Methodology

- **Scope 1 - C1. Off-road diesel consumption:** calculation approach using off-road diesel consumption for stationary sources of combustion;
- **Scope 1 - C1. Natural Gas Consumption:** calculation approach using natural gas LHV (10.55 KWh/m^3);
- **Scope 1 - C2. Fleet Fuel Consumption - Diesel:** calculation approach using diesel consumption, considering Diesel B7 (most common in Portugal);
- **Scope 1 - C4. Refrigerant Gas Leaks:** calculation approach using natural gas LHV (10.55 KWh/m^3);
- **Scope 2 - C1. Purchase of Electricity:** calculation approach using Portugal's energy mix emission factor for the year studied.

Table 3 summarizes the emission factors considered for each emissions category, as well as their Scopes, approaches and sources for consultation.

Item	Emission Factor	Unit	GHG	Comments	Source
Scope 1 - C1. Fuel Consumption from Stationary Sources					
Off- road Diesel	0.26	kg CO_2eq/L	CO_2	Fossil fuel consumption volume: Off-road diesel	[1]
	0.00218	kg CO_2eq/L	N_2O		[1]
	0.00000977	kg CO_2eq/L	CH_4		[1]
Scope 1 - C1. Natural Gas Consumption					
Natural Gas	0.202	kg CO_2eq/kWh	CO_2	Natural Gas Consumption in kWh	[1]
	0.00239	kg CO_2eq/kW	N_2O		[1]
	0.00054	kg CO_2eq/kW	CH4		[1]
Scope 1 - C2. Fleet Fuel Consumption					
Diesel	2.47	kg CO_2eq/L	CO_2	Fossil fuel consumption volume: Diesel B7	[1]
	0.0213	kg CO_2eq/L	N_2O		[1]
	0.000857	kg CO_2eq/L	CH_4		[1]
Scope 1 - C4. Refrigerant Gas Leaks					
HFC Gas Leakage	2100	kg CO_2eq/kg	CO_2	Type of Recharged Gas: R410a	[1]
Scope 2 - C1. Purchase of Electricity					
Purchase of Electricity	0.2359	kg CO_2eq/kWh	CO_2	Portugal's energy mix	[2]

Table 3: Emission factors used and conversions considered for the Católica Porto study

[1] Base Carbone ADEME - 2023, Origin: France
[2] IEA 2022, International Energy Agency (Scope 2), Origin: Portugal

5.3. Uncertainty Assessment

The Greenpath tool takes into account two kinds of uncertainties: The activity data uncertainty and emission factors uncertainty. The emission factors uncertainty is provided by the tool's database and the activity data uncertainty is considered with the following criteria shown in Table 4.

Uncertainty (%)	Activity Data Source
0	Exact data collected from analyzers or SI files (Example: EDP declaration of kWh consumed through in-house software)
5	Detailed primary data that may contain omissions in the margin
10	Data estimated from company experience (Example: data estimated from the history of recent years)
15	Data reconstructed from primary data or where the source files have been reprocessed (Example: kWh estimate from m² heated)
20	Data extrapolated from a sample
30	Data extrapolated from a similar company/activity
50	Data not collected and use of statistical data

Table 4: Uncertainty Criteria for Activity Data

Table 5 provides more details regarding the uncertainties attributed to the different categories of activity data.

Item	Uncertainty Activity data	Comments	Uncertainty Emission Factor	Comments
Scope 1 - C1. Fuel Consumption from Stationary Sources				
Off-road diesel	5	Internal maintenance sheets	5	GreenPath Database
Scope 1 - C1. Natural Gas Consumption				
Natural Gas	5	Supplier's invoices and internal control sheets	5	GreenPath Database
Scope 1 - C2. Fleet Fuel Consumption				
Diesel	0	Internal control sheets based on invoices	10	GreenPath Database
Scope 1 - C4. Refrigerant Gas Leaks				
R410a recharged	5	Internal maintenance sheets and CENTERM audits	30	GreenPath Database

Scope 2 - C1. Purchase of Electricity				
Purchase of Electricity	5	Consumption recorded in the supplier's invoices	50	GreenPath Database

Table 5: Uncertainties considered for Activity Data and Emission Factors

To calculate the amount of uncertain emissions, the following equation was used:

$$uncertain\ emissions\ = CE\ \times \sqrt{uad^2 + uef^2}$$

Where,

CE : Carbon emissions calculated by multiplying activity data with correspondent emissions factors.

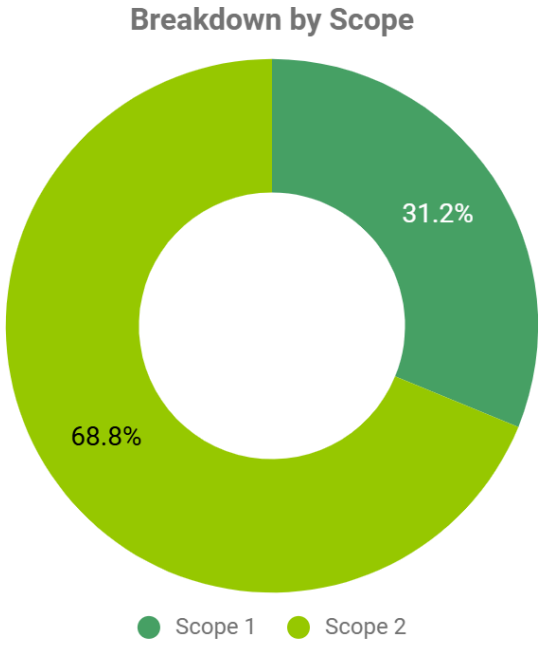
uad : uncertainty of activity data in percentage.

uef: uncertainty of emissions factor in percentage.

06
Results

Based on the data provided and restricting the analysis to Scopes 1 and 2, the overall carbon footprint for Católica Porto in 2022 was 963.65 CO_2eq. The total amount of emissions resulting from uncertainty was 414.4 ton CO_2eq. The final and summarized result is then 963.65 +/- 414.4 ton CO_2eq.

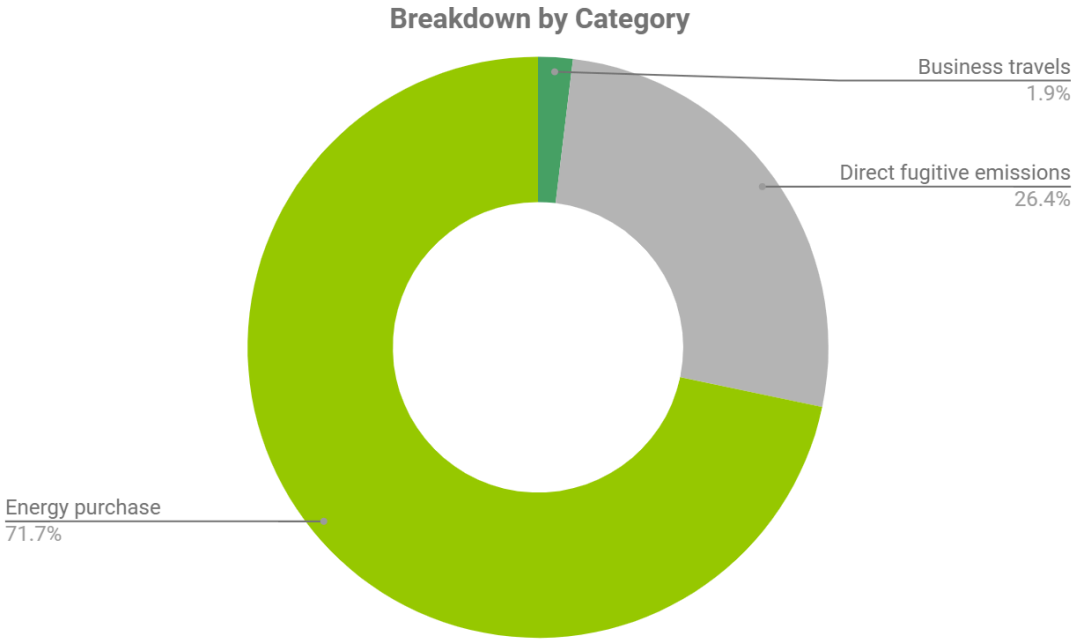
It is shown a high predominance for Scope 2 activities, making up 663.1 ton CO_2eq, around 68.8% of the total emissions, followed by Scope 1 (31.2%), as shown in Graph 1.



Graph 1: GHG Emissions breakdown by Scope

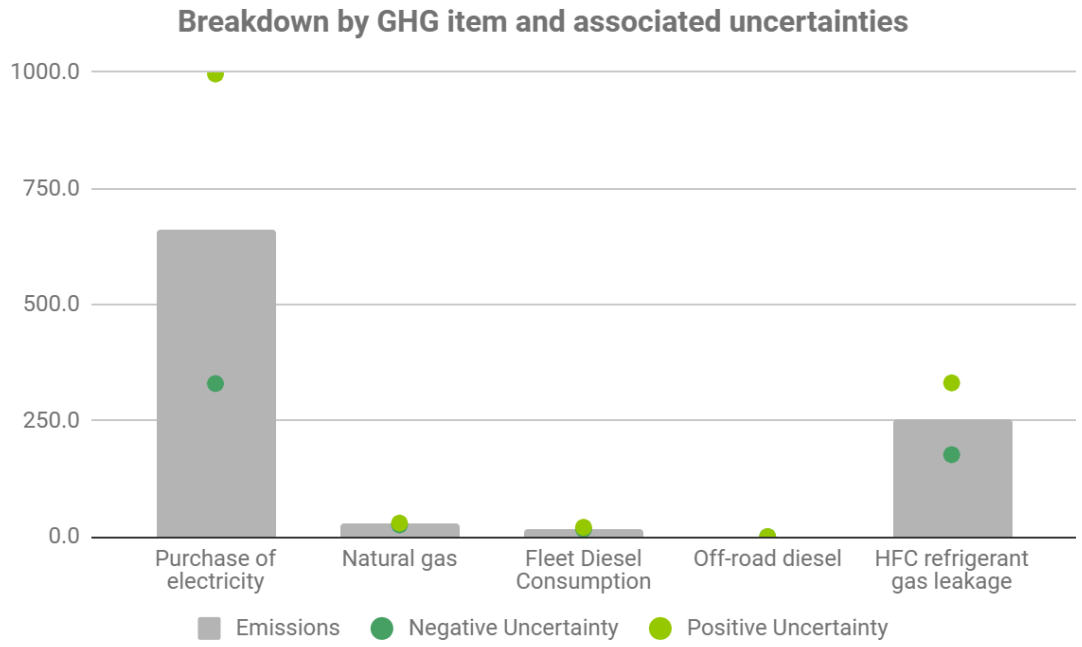
Breaking down the results by category (Graph 2), energy purchase related emissions (electricity, off-road diesel and natural gas consumption) assume the highest contribution achieving 71.7% of Católica Porto emissions. Direct fugitive emissions,

due to a significant gas leak in air conditioning equipment, assumed a relevant contribution of 26.4% of total emissions. Business travels category, which includes the fleet diesel consumption had a residual representativity of 1.9%.



Graph 2: GHG Emissions breakdown by category

Graph 3 represents the breakdown of GHG emissions by the different items analyzed from Scopes 1 and 2.



Graph 3: Breakdown of total emissions and uncertainties associated with each category studied

Taking into account the uncertainty methodology presented previously in section 5.3, the disaggregated results are as follows:

Scope 1: 300.57 +/- 81.2 ton CO_2eq
Scope 2: 663.08 +/- 333.2 ton CO_2eq

The table shown in Appendix 1 summarizes the results according to GHG Protocol.

It is important to highlight that the overall results presented contain a total degree of uncertainty of around 47%, given the diversity of data sources or the absence of reliable data that would allow for a more solid analysis. Additionally, since electricity purchase is the most contributive item and given that the emission factor for Portugal electricity mix has an associated uncertainty of around 50%, the total amount of uncertain emissions assumes a significant value for this category.

07

Results interpretation and ways to improve

In this study, the carbon footprint for 2022 of Católica Porto was analyzed. By measuring the greenhouse gas emissions, we can provide valuable insights into the school's environmental impact. Based on the results, it is possible to assess that the most impactful activity is electric energy consumption, which represents 68.8% of the total calculated emissions.

It is highly important to improve the data acquisition process in order to obtain maximum reliability values and reduce possible uncertainties associated with the study. This improvement is essential to ensure that the information collected is accurate, consistent and representative of the reality of Católica Porto.

In order to reduce carbon footprint in the analyzed boundary, it is important to efficiently monitor the activities that consume energy. Because more than a half of the carbon footprint is related to energy consumption, it is important to invest in energy efficiency and energy conservation measures. Consumption monitoring and analysis, replacing existing equipment for more efficient models and having a good percentage of renewable energy supply are the most common examples in reducing Scope 2 emissions.

It is crucial to highlight the importance of Scope 3 in calculating the carbon footprint. This covers indirect emissions that occur throughout the organization's value chain, both upstream and downstream, and including this scope in the calculation is essential to obtain a complete and accurate view of the GHG emissions profile. By analyzing the value chain in detail, numerous opportunities for action and optimization arise, with the identification of the categories of emissions that most contribute to the school carbon footprint.

APPENDIX

Appendix 1: Results according to the GHG Protocol (Year 2022)

GHG Protocol											
		GES							Total	
		CO_2 (TCO_2eq)	CH_4 (TCO_2eq)	N_2O (TCO_2eq)	HCFCs TCO_2eq)	HFCs (TCO_2eq)	PFCs (TCO_2eq)	SF_6 (TCO_2eq)	**CO2e (TCO_2-eq)**	**Uncertainty (TCO_2-eq)**
Scope 1 Direct emissions	1.2 - Direct emissions from stationary sources of combustion	28	0	0.3	0	0	0	0	28	1.9
	1.2 - Direct emissions from mobile sources of combustion	18	0	0.1	0	0	0	0	18	1.9
	1.4 - Fugitive direct emissions	0	0	0	0	254	0	0	254	77
	Sub-total	44	0	0	0	254	0	0	299	81
Scope 2 Indirect emissions associated with energy	2.1 - Indirect emissions from electricity consumption								663	333
	Sub-total								663	333
Total									963	414

Appendix 2: GreenPath certificate of compliance

CITEPA

CERTIFICATE OF COMPLIANCE

CITEPA certifies that the company

VEOLIA

has established a calculation tool of carbon footprint

GREENPATH v. 2.02.05-2

in compliance with guidelines

BUILT ON GHG PROTOCOL ISO International Organization for Standardization	**GHG Protocol standard Revised Edition** **ISO 14064-1:2018 – Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals** **ISO 14069- 2:2013 Greenhouse gases – Quantification and reporting of greenhouse gas emissions for organizations – Guidance for the application of ISO 14064-1**
Certificate issued on	*March 3rd, 2022*
Recommendation report from CITEPA	*« Mise à jour de l'audit du volet Empreinte carbone de GreenPath – Mars 2021 » The non-compliances identified in the report have been lifted. This certificate does not include the sections relating to the calculations of avoided emissions.*
Carbon expertise	https://www.citepa.org/en/activities/international-studies

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