POMPEU FABRA UNIVERSITY CARBON FOOTPRINT DURING 2022

- Executive summary -

STUDY CONDUCTED FOR

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CÀTEDRA UNESCO DE **CICLE DE VIDA I CANVI CLIMÀTIC**

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**UNESCO ESCI-UPF Chair in Life Cycle and Climate Change*
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The UNESCO ESCI-UPF Chair in Life Cycle and Climate Change was established in 2010 at the **School of International Business** (ESCI-UPF, Barcelona), by agreement between Pompeu Fabra University (UPF) and the United Nations Educational, Scientific and Cultural Organization (UNESCO). It was established in the Environmental Management Research Group (GiGa, created in 2002), as a **centre of excellence in life cycle analysis (LCA) and its applications for mitigating climate change.** In 2011, the GiGa became the UNESCO ESCI-UPF Chair in Life Cycle and Climate Change.

The UNESCO ESCI-UPF Chair, together with the Mango Chair of Corporate Social Responsibility (CSR) and the ESCI-UPF Research Group in International Studies and Economics (RISE), is the **research division that deals with the three dimensions of sustainability (economic, environmental and social).**

In line with the objectives set out in its agreement with UNESCO, the Chair aims to **promote scientific research, cooperation, education and communication on the sustainable development of products and services nationally and internationally for the benefit of the environment and society**. It thus **facilitates alliances between researchers, lecturers and professors of universities and other internationally renowned institutions in Europe, Latin America, the Caribbean and Africa**, among others. The Chair prioritizes conducting research, training programmes and dissemination at national and international level, in institutions of higher education, scientific research and professional training, joining forces with UNESCO to achieve **the 2030 Agenda for Sustainable Development**.

The UNESCO ESCI-UPF Chair has participated in and/or coordinated a significant number of national and international projects, including cross-border collaboration on **life cycle analysis (LCA), Ecodesign, procurement with ecological criteria and environmental communication of products (ecolabels), carbon and water footprint, governance in environmental management, and the integration of social and economic considerations** in the assessment of environmental impacts. These projects, funded by public and private organizations, provide compatibility with market requirements, the diversity of social preferences and respect for the environment, thus integrating the three dimensions of sustainable development.

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1 INTRODUCTION

This study aims to calculate the corporate carbon footprint of Pompeu Fabra University (UPF) for the period spanning 1 January 2022 to 31 December 2022. Calculations have been made following the greenhouse gas protocol[1] (GHG Protocol) and the ISO 14064 standard.

Specifically, the purpose of the report is to carry out a corporate carbon footprint calculation study of the activity carried out on the Poblenou, Ciutadella and Mar campuses, as well as at the Mercè corporate building. The results of calculation must enable ascertaining the environmental impact of the activity of UPF, identify points for improvement, and prepare a verifiable corporate carbon footprint report.

1.1 Commitments undertaken by UPF

UPF declared the climate emergency in May 2019 and as a sign that it is taking decisive actions to mitigate climate change and reduce GHG emissions, it has undertaken to reduce its emissions by 25% compared to 1996 by 2025, 50% by 2030 and achieve carbon neutrality by 2040.

1.2 Actions already carried out at UPF to reduce emissions

Since first signing the Citizens Commitment to Sustainability and the Agenda 21, UPF has been making progress towards mitigating its GHG emissions. Thus, numerous measures are already implemented in existing buildings or when major renovations are carried out, such as sensors to detect open doors and windows that stop air conditioning, or presence detectors to control the

[1] Greenhouse Gas Protocol Corporate Accounting and Reporting Standard, developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD)

lighting, in addition to the air conditioning or photoelectric cells to control when it is dark enough to turn on the lights. It also seeks to be able to connect to Districlima once it is available.

Likewise, since 2018, through the Consortium of University Services of Catalonia (CSUC), it has been purchasing electricity solely from renewable sources, and also in 2018 it began a fight against disposable plastic, replacing meeting bottles with refillable jars and disposable plastic glasses with compostable glasses. Vegan menus were introduced to its cafeterias in 2020. A complete list of these measures can be found on the climate emergency website.

2 DESCRIPTION OF THE ORGANIZATION

UPF is an international public university with a strong focus on research, which in just 25 years has reached the level of the best European universities. Distinguished by the Ministry of Education as a Campus of International Excellence (CIE), the University also stands out in several benchmark rankings.

Its budget in 2022 was €156.58 million. Its teaches 27 undergraduate programmes, 33 master's degree programmes and 9 doctorate programmes.

	Surface area (m²)	PAS	PDI	Students	Users
UPF Units	144,392	705	1,950	13,048	15,703
Mercè building	4,879	228		0	228
Poblenou campus	34,266	121	662	3,702	4,485
Ciutadella campus	86,197	273	819	8,055	9,147
Mar campus	19,050	83	469	1,291	1,843

Table 1: UPF in numbers (2021-2022 academic year)

3 METHOD OF CALCULATION

The most important methodological aspects used to calculate UPF's carbon footprint for 2022 according to the GHG Protocol are set out below.

3.1 Boundaries taken into account

The boundaries of the organization used to calculate greenhouse gas (GHG) emissions are the architectural boundaries of the three main campuses (Ciutadella, Poblenou and Mar) and the Rectoral building (Mercè).

Operational boundaries include emissions associated with the organization's operations, classifying them as direct or indirect emissions according to the organization's boundaries. In this case, the emissions of scope 1, scope 2 and part of scope 3 are included (see Figure 1).

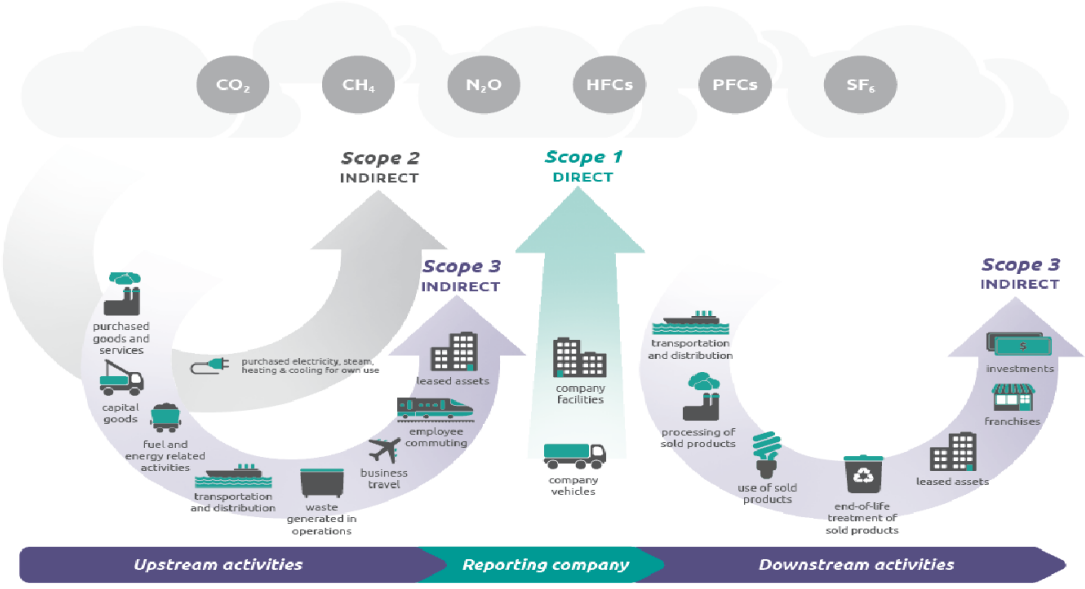

Fig. 1: Scopes and emissions in the value chain

3.2 Processes included and hypotheses

The processes included in each scope and the main hypotheses and data sources considered are set out in Table 2.

Scope	Hypotheses and data sources
Scope 1	Emissions due to the following emission sources are reported: a) Corporate vehicles owned by UPF, which have been allocated to the Mercè centre. b) Combustion of Ciutadella, Mercè and Mar boilers. c) Fugitive emissions that have been detected in some air conditioning equipment in which refrigerant refills have been carried out. In particular, recharges with R407C and R134-A have been detected on the Mar and Ciutadella campuses. No direct emission was omitted from scope 1. All emission factors considered in this scope come from the ones recommended by the OCCC.
Scope 2	Emissions due to the following emission sources are reported: a) Electricity consumption associated with each building, although in the Mercè building (Rectoral building) and on the Ciutadella and Poblenou campuses it does not affect the inventory as it is electricity from renewable sources. On the Mar campus, some of the electricity is renewable (50%) and some is not (50%). b) In the case of the Poblenou campus, energy consumption associated with the use of the Districlima network has also been taken into account. No indirect emissions associated with the consumption of electrical or thermal energy have been omitted from scope 2. All emission factors considered in this scope come from the ones recommended by the OCCC, except those of Districlima. In this case, the emission factors for both heating and cooling are provided by the resource provider itself.
Scope 3	
Category 1. Procurement of goods and services	This category reports the emissions derived from the extraction and manufacture of raw materials, products and services used by UPF users. The following are included: a) Production of bleached and recycled paper.

	Services such as water, cleaning, cafeterias, restaurants, catering, residences, and servers have not been included.
Category 6. Business travel	This category includes trips on off-premises transportation systems. The following emission sources have been included: a) Air travel. In this case, the data have been provided directly by the travel agencies from which the tickets are purchased in a centralized manner. b) Long-distance train travel. All emission factors considered in this scope come from the ones recommended by the OCCC (trains) or from the data provided by the travel agencies themselves (aircraft).
Category 7. Transport of workers and users	This category reports the emissions associated with transport related to the activity of UPF: a) Of employees b) Of students Data have been included from the latest mobility survey of 2022 regarding the means of transport used by UPF users to travel to and from the campuses/Mercè building. This information includes both the type of transport and the kilometres travelled in each case. All emission factors considered in this scope come from the ones recommended by the OCCC.

Table 2: Categories included within scopes 1, 2 and 3

Other considerations for calculation

- To calculate scope 3 category 7 emissions, data were used from a 2022 survey. For cars and motorcycles, if the respondent was the driver, all associated emissions have been taken into account. If the respondent was a passenger, the driver and passenger were considered to be independent and half of the emissions were accounted for. For motorcycles, an average consumption of 1/3 of that of a small car has been assumed.

- With regard to paper consumption, air travel, high-speed train travel and coach travel, data refer to UPF as a whole, not to each campus. In this case, the kilometres and the corresponding emissions have been assigned to each campus proportionally to the total number of users (58% to Ciutadella, 29% to Poblenou, 12% to Mar, and 1% to Mercè).

4 RESULTS

This study determines that **UPF's GHG emissions** during 2022 total 2,238 **tonnes of CO_2eq**.[2]

4.1 Distribution of emissions by campus

Below are the total GHG emissions for each campus and also the contribution by each campus to GHG emissions in each scope. Scope 3 activities stand out as being responsible for 69% of GHG emissions. 57% of these emissions are related to the Ciutadella campus. 19% are scope 1 emissions, 70% of which correspond to the Ciutadella campus. Only 12% are scope 2 emissions, 55% of which come from the consumption of electricity on the Mar campus.

UPF Total		CO_2eq EMISSIONS	2,238,307 kg CO_2eq	100%
Mercè building		**50,704 kg CO_2eq**	2%	
Poblenou campus		**583,392 kg CO_2eq**	26%	
Ciutadella campus		**1,188,016 kg CO_2eq**	53%	100%
Mar campus		**416,195 kg CO_2eq**	19%	
Scope 1	**Direct energy uses for carrying out academic activity**	**kg CO_2eq EMISSIONS**	**433,548 kg CO_2eq**	**19%**

[2] CO_2eq: CO_2 equivalence is an amount that, for a given mixture and amount of greenhouse gases, describes the amount of CO_2 that would cause the same global warming potential.

Mercè building	**21,903 kg CO_2eq**	5%	
Poblenou campus	**0 kg CO_2eq**	0%	
Ciutadella campus	**303,261 kg CO_2eq**	70%	100%
Mar campus	**108,385 kg CO_2eq**	25%	
Scope 2	**Indirect energy uses for carrying out academic activity**	**CO_2eq EMISSIONS**	**263,993 kg CO_2eq**	**12%**
Mercè building	**0 kg CO_2eq**	0%	
Poblenou campus	**120,028 kg CO_2eq**	45%	
Ciutadella campus	**0 kg CO_2eq**	0%	100%
Mar campus	**143,964 kg CO_2eq**	55%	
Scope 3	**Indirect activities associated with academic activity that generate CO_2 emissions**	**CO_2eq EMISSIONS**	**1,540,766 kg CO_2eq**	**69%**
Mercè building	**28,802 kg CO_2eq**	2%	
Poblenou campus	**463,364 kg CO_2eq**	30%	
Ciutadella campus	**884,755 kg CO_2eq**	57%	100%
Mar campus	**163,846 kg CO_2eq**	11%	

Table 3: Emissions according to scope and UPF campus

4.2 Distribution of emissions according to scope

Scope 1 accounts for 19% of UPF's total GHG emissions. The largest contribution is due to the combustion of natural gas for heating.

Scope 2 has a lower overall contribution, accounting for just 12% of total emissions. The biggest contribution in this case (slightly more than half) is due to electricity consumption.

Finally, it should be noted that scope 3 contributes the most to total emissions, accounting for 69%. Within this block, air transport emits most emissions, accounting for 42% of total emissions of this scope.

UPF Total	**2,238,307 kg CO_2eq**

Scope 1	Direct energy uses for carrying out academic activity	kg CO_2eq EMISSIONS	433,548 kg CO_2eq	19%
Fossil fuels for heating		**266,335 kg CO_2eq**		61%
	Natural gas	266,335 kg CO_2eq		
	Propane	0 kg CO_2eq		
	Butane	0 kg CO_2eq		
	Diesel fuel	0 kg CO_2eq		
	Biomass	0 kg CO_2eq		
	Others			
Fossil fuels associated with personnel movement (organization-owned vehicle)		**3,668 kg CO_2eq**		1%
	95 octane petrol	3,668 kg CO_2eq		
	98 octane petrol	0 kg CO_2eq		
	Diesel	0 kg CO_2eq		
	Hybrid	0 kg CO_2eq		
	Plug-in hybrid	0 kg CO_2eq		
	Electric	0 kg CO_2eq		
	Others			
Fugitive emissions		**163,546 kg CO_2eq**		38%
	Refills for cooling machines and/or heat pumps			

Scope 2	Indirect energy uses for carrying out academic activity	CO_2eq EMISSIONS	263,993 kg CO_2eq	12%
Electricity		**143,964 kg CO_2eq**		54.5%
	From the grid	143,964 kg CO_2eq		
	From a renewable-certified grid	0 kg CO_2eq		
	Self-consumption through renewables	0 kg CO_2eq		
	Others			
Heat, steam or cold (use of external resources: Districlima or residual industrial heat/cold)		**120,028 kg CO_2eq**		45.5%
	Heating	2,793 kg CO_2eq		
	Cooling	117,235 kg CO_2eq		

Scope 3	Indirect activities associated with academic activity that generate CO_2 emissions	CO_2eq EMISSIONS	1,540,766 kg CO_2eq	69%
Emissions associated with personnel and student body movement (NON-organization-owned vehicle)		**75,114 kg CO_2eq**		5%
Emissions associated with personnel and student body movement (urban and interurban bus/coach)		**233,093 kg CO_2eq**		15%

Emissions associated with the use of rail transport by personnel and students	**520,924 kg CO_2eq**	34%
RENFE HIGH SPEED (AVE)	2,997 kg CO_2eq	
RENFE AVANT	0 kg CO_2eq	
RENFE LONG DISTANCE	13,879 kg CO_2eq	
RENFE MEDIUM DISTANCE (REGIONAL)	0 kg CO_2eq	
RENFE RODALIES (COMMUTER TRAINS)	256,652 kg CO_2eq	
FGC	61,880 kg CO_2eq	
TRAM	7,504 kg CO_2eq	
UNDERGROUND	178,012 kg CO_2eq	
Emissions associated with the use of maritime transport by personnel and students	**0 kg CO_2eq**	0%
Emissions associated with the use of air transport by personnel and students	**651,166 kg CO_2eq**	42%
Emissions associated with reprographics	**60,469 kg CO_2eq**	4%
Paper consumption	57,557 kg CO_2eq	
Recycled paper consumption	2,912 kg CO_2eq	

Table 4: Emissions according to scope and UPF activity

5 FOLLOW-UP INDICATORS

Below are the follow-up indicators for 2022 as well as an analysis of their evolution with respect to the benchmark year, 1996, and other subsequent years.

5.1 Indicators from 2022

Table 5 shows that the campus with the highest contribution to the main indicators is Mar campus. This campus is above the UPF average for kg CO_2eq emissions per m^2 and per total users. This campus covers 50% of its energy needs from the grid, unlike other centres that are certified as having emissions of renewable origin.

In contrast, the Ciutadella campus, the largest in size and the one with the most students, is the campus with the lowest emissions both per m^2 and per user.

	Emissions/m²	Emissions/user
UPF Total	16	143
Mercè building	10	222
Poblenou campus	17	130
Ciutadella campus	14	130
Mar campus	22	226

Table 5: Indicators by surface area and user (emissions in kg CO_2eq)

5.2 Comparison of results and evolution of indicators

Figure 2 shows the comparison of emissions between the benchmark year (1996) and the years 2018 and 2022.

It should be borne in mind that in 1996 UPF was very different in size from today and, therefore, a comparison in absolute values of emissions could lead to erroneous conclusions. In addition, with regard to scope 3, only paper consumption was included in 1996; it was not until 2018 that work travel and daily trips by staff and students were included.

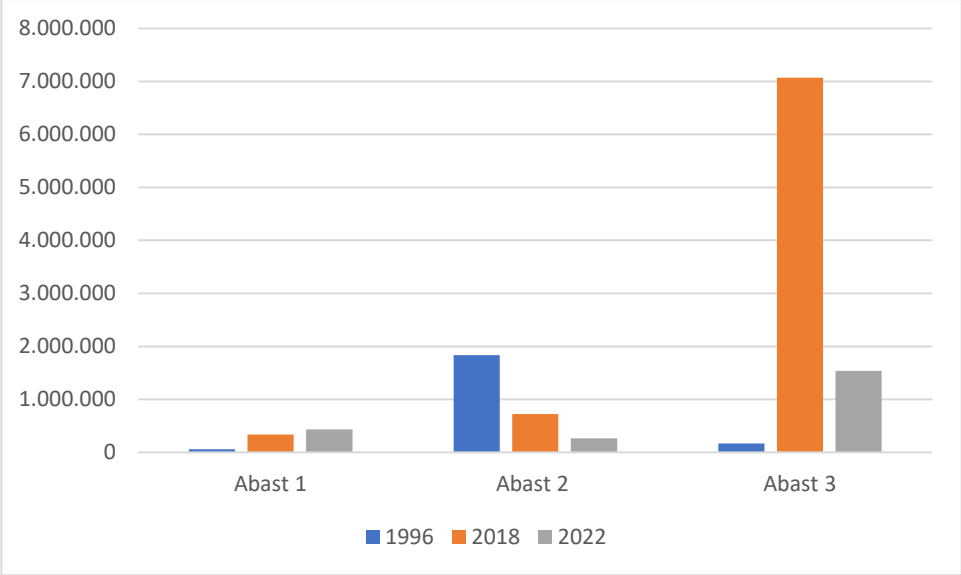

Fig 2. Evolution of emissions since 1996 according to scope (in kg of CO_2eq.)

Table 6 shows the evolution of the indicators per m^2 and per total users for scopes 1 and 2. Scope 3 emissions have not been incorporated so as not to distort the results.

As can be seen in the Table, the evolution of all the indicators is most positive. Per m^2, emissions have gone from 29 kg CO_2eq. in 1996 to 5 kg CO_2eq. in 2022, i.e., a reduction of almost 83%. Per user, emissions have gone from

248 kg CO_2eq. in 1996 to 44 kg CO_2eq. in 2022, i.e., a reduction of almost 83%.

	Emissions scopes 1+2 (Kg CO_2eq)	Emissions/m²	Emissions/user
1996	1,893,051	29	248
2018	1,060,561	7	139
2022	697,541	5	44

Table 6: Evolution of the indicators for scopes 1 and 2 with respect to the benchmark year (1996)

6 CONCLUSIONS

The 2022 footprint was reduced by 5.8 tonnes of CO_2 equivalent compared to 2018, mainly due to the use of electricity from renewable resources and the reduction of scope 3 emissions, demonstrating substantial progress towards UPF's climate emergency commitments.

The distribution of UPF's greenhouse gas (GHG) emissions related to scopes 1 and 2 reveals a favourable position to achieve carbon neutrality. Only 30.8% of all GHG emissions correspond to emissions from scopes 1 and 2, where UPF has a more significant impact. It is feasible to approach zero emissions in these areas by implementing additional reduction measures and offsetting schemes. However, scope 3 emissions, which account for 69% of UPF's total emissions, present challenges due to the exclusion of numerous emission sources in the initial study. The direct influence of UPF on the processes of scope 3 studied depends rather on contextual conditions such as the electrification of means of transport and the improvement of the electricity mix in Catalonia through the implementation of renewable energies.

7 PROPOSALS FOR IMPROVEMENT

The following table sets out a series of proposals for improving the assessment, mitigating emissions and consolidating organizational resilience. Once the recommendations have been implemented, it will be possible to apply emission compensation measures in those areas where reduction has reached its limit.

Proposals for improving the assessment
• Take waste generation and treatment into account campus by campus. Take advantage of European Waste Prevention Week to classify the waste from each campus.
• Take water consumption into account campus by campus. The influence of water on the global emissions calculation will be low, but it is important to monitor its consumption in a segregated manner to improve efficiency.
• Take food into account campus by campus. The agri-food sector is responsible for a large part of global GHG emissions, and the population as a whole should also be aware of its responsibility in this respect. And this is also seen at Pompeu Fabra University where research teams and students have emerged for this purpose. It would be interesting to be able to calculate the emissions generated by the set menus of the cafeterias.
• Separately measure per activity (to be determined) on each campus would facilitate greater depth in the assessment and, therefore, greater efficiency in the approach to measures for improvement.
• Separate measurement for each use (lighting, power, HVAC,...) in each building.
• Have disaggregated data available on long-distance travel by campus.
• Have disaggregated data available on paper consumption by campus.
Proposals for mitigating emissions
• Obtain the renewable electricity certificate for the remaining 50% of electricity on Mar campus.
• Promote telematic meetings that save travelling.
• Increase self-generated renewable electricity.
• Reduce losses by refrigeration machines.
• Improve the energy efficiency of energy-consuming equipment.
• Improve the building envelope, including the possibility of certifying their sustainability with BREEAM[3]-, LEED[4]- or WELL[5]-type certificates.
• Use only recycled paper: this would reduce the corresponding emissions by about 14 tonnes.
• Plan a scheme to offset non-preventable emissions.

[3] BREEAM: http://www.breeam.es/
[4] LEED: https://www.usgbc.org/leed
[5] WELL: https://www.wellcertified.com/

• Set targets for GHG emission reduction and neutrality as well as the roadmap to achieve them.
Proposals for consolidating the resilience of the organization
• Self-generate and store electricity.

Table 7: Proposals to reduce the carbon footprint at UPF