



2022

GREENHOUSE GAS EMISSIONS INVENTORY

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The cover image is of the Barcelona School of Industrial Engineering. The photograph was taken in 1964 and forms part of the [UPCommons digital repository](#). It shows on the facade the first air conditioning units, already present in that year. Over time, the building has accumulated over a thousand units with their respective refrigerants, based on fluorinated gases (F-gases). These gases are gradually being replaced due to their high contribution to global warming. Consequently, the UPC has had to establish a renewal plan as the units break or become obsolete.

SUMMARY OF THE 2022 INVENTORY.....	4
Methodology and scope of the inventory.....	4
Categories and sources of emission.....	5
GHG emissions generated by UPC activity.....	5
Interuniversity indicators.....	6
CampusLAB initiative.....	7
A. DIRECT EMISSIONS.....	8
A1. Fixed sources: natural gas consumption.....	9
A2. Fugitive emissions: refrigerant gases (F-gases).....	9
A3. Mobile sources: vehicles and vessels.....	10
B. INDIRECT EMISSIONS OF PURCHASED ENERGY.....	11
B1. Purchased energy: electricity consumption.....	12
B2. Purchased energy: heat, vapour and cold.....	12
C. INDIRECT EMISSIONS OF TRANSPORT.....	13
C1. Mobility: work-related trips of academic and administrative staff.....	14
C2. Mobility to and from work of academic and administrative staff.....	14
C3. Mobility of clients and visitors (students).....	14
C4. Mobility programmes (students).....	15
D. INDIRECT EMISSIONS OF THE SERVICES USED.....	16
D1. Purchased services: waste treatment.....	17
D2. Purchased services: water consumption.....	17
D3. Purchased services: courier service for campuses.....	17
E. INDIRECT EMISSIONS OF PURCHASED GOODS.....	18
E1. Purchased goods: consumption of paper and copying services.....	19
E2. Purchased goods: ICT equipment.....	19
E2. Purchased goods: construction of buildings.....	19
F. INDIRECT EMISSIONS OF PRODUCTS THAT ARE SOLD.....	19
F1. Emissions from leased assets.....	21
F2. Emissions from investments.....	21

SUMMARY OF THE 2022 INVENTORY

In May 2019, the UPC Senate approved a motion to declare the climate emergency. This urged the University's governing bodies to define a strategy focused on achieving the targets set by the Paris Agreement in 2015. This strategy, with the horizon of 2030 and a work plan for the first two years, was approved in October 2020. The climate action strategy was incorporated into a plan to address sustainability in the areas of management and the community, called the 2030 UPC Sustainable Campus Plan, which was approved in March 2022.

The first of the activities in the work plan was to annually determine the University's carbon footprint and submit it to the UPC's governing bodies. This is the aim of the inventory that, now in its fourth edition, shows the evolution in emissions data, despite the pandemic.

The document presents the data for 2022 aggregated by category in this first section. The other six sections show details and the evolution since 2019 for each emissions category, a description of the methodology used to collect and analyse the data, and a summary of improvements in the inventory.

Therefore, the aim of this inventory is not so much to assess actions to cut emissions or achieve targets as to present the 2022 data, their evolution and the methodology used to obtain them.

Methodology and scope of the inventory

Since 2020, the UPC has adhered to the Catalan Government's Voluntary Agreement Programme. The programme is the responsibility of the Ministry of Climate Action and, ultimately, the Catalan Office for Climate Change (OCCC) of the Catalan government. This entity annually publishes the [Greenhouse Gas Emissions Calculation Guide](#) with updated or new conversion factors for sources and their associated emissions.

This year, a specific section has been added to calculate greenhouse gas (GHG) emissions associated with electrical mobility and the GHG emission factor associated with teleworking, in terms of CO₂ eq/worker*day. Previously, this last element was not considered. This significantly increases emissions due to compulsory mobility as working from home has been overlooked until now.

The geographic scope of the UPC inventory includes the activity carried out on nine physical campuses of the University that are present in six cities, and all of the virtual activity. Regarding activities, all the direct emissions sources are included and all the indirect emissions sources that are significant, that is, those that represent over 5% of the direct sources. The scope of the inventory does not include entities in the UPC Group (owned 100% by the UPC) or other entities associated with the UPC such as spin-offs or participation in consortiums. These entities will be incorporated between 2024 and 2026.

Categories and sources of emission

The sources of emission have been grouped according to the six categories recommended in the [OCCC methodology](#) to which we have adhered, which are:

- A. Direct emissions (Former Scope 1)
- B. Indirect emissions of purchased energy (Former Scope 2)
- C. Indirect emissions of transport (Former Scope 3)
- D. Indirect emissions of services used by the organisation (Former Scope 3)
- E. Indirect emissions of goods purchased by the organisation (Former Scope 3)
- F. Indirect emissions from the use of products sold by the organisation (Former Scope 3)

Category A corresponds to direct emissions: the sources of GHG that can be controlled by the organisation. In other methodologies, these direct emissions comprise Scope 1. The other five categories, from B to F, are part of the indirect emissions, that is, all sources that cannot be controlled by the organisation. In other methodologies, these are included in Scope 2 (category B) and Scope 3 (categories C to F), which enable the organisation's activity.

Each one of these six categories is presented in turn for different emission sources, as shown in Image 1. These emission sources and their evolution since 2019 can be consulted in detail later in this report.

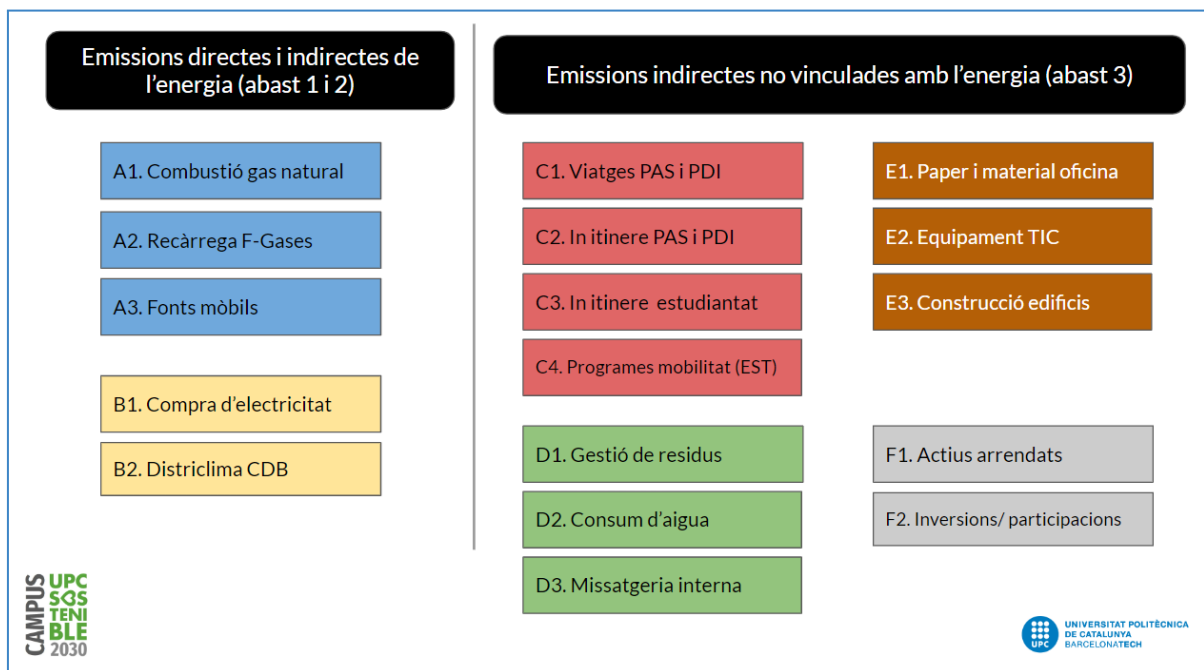


Image 1. Categories and sources of emission

GHG emissions generated by UPC activity

Greenhouse gas emissions that are accounted for and that were generated by UPC activity during 2022 in metric tonnes (MT) of CO_{2eq} add up to **a total of 25,200 MT CO_{2eq}**, as shown in Image 2.

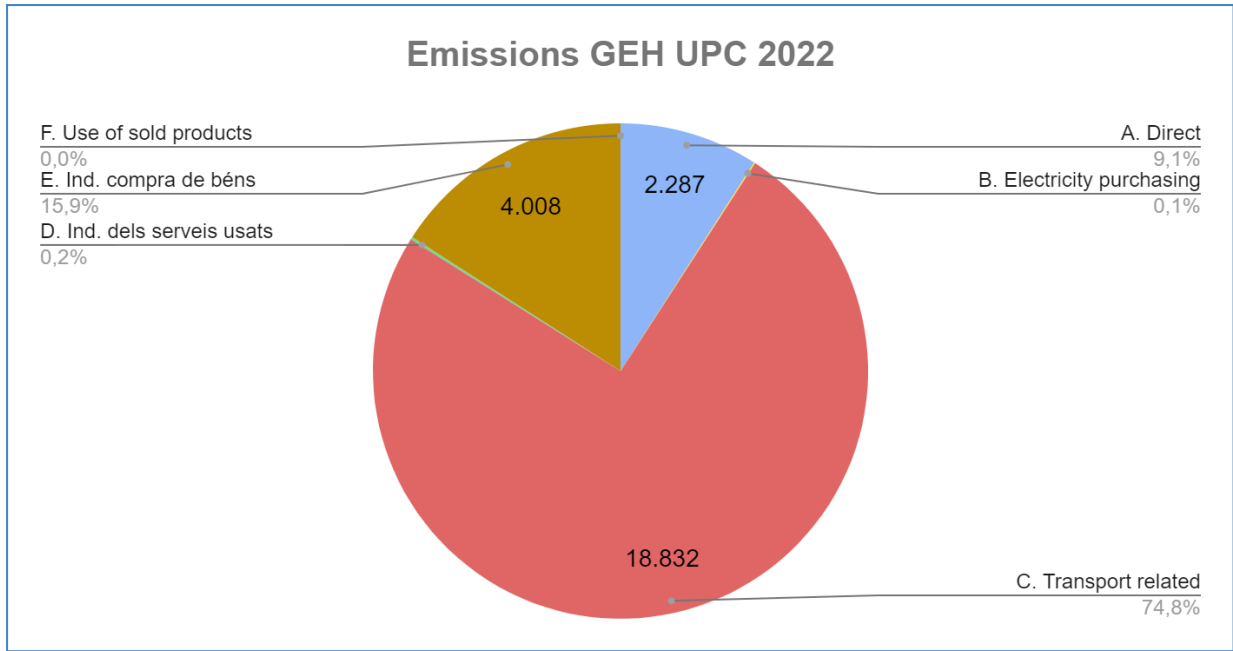


Image 2. Distribution of GHG emissions of the UPC for 2022

Interuniversity indicators

To compare the evolution of buildings, campuses or universities, it is very useful to use figures such as the constructed area, enrolled ECTS credits, number of members of the community (or the staff that work there) and the institution’s budget. The work group of the Catalan Association of Public Universities (ACUP), of which the UPC forms part, is discussing a joint proposal of indicators related to Scope 1 and 2 emissions, to share actions and seek efficiency.

A first proposal works with four indicators of the University’s activity: enrolled ECTS credits, constructed area, management and academic staff, and budget. By dividing Scope 1 and 2 emissions between these indicators, we obtain the second table (taking 2019 as a baseline). In it, we can appreciate a significant drop in the figures in all cases.

Emissions (Kg CO _{2eq}) for indicators of activity	2019	2020	2021	2022	2019–2022 %
Scope 1 and 2 / ECTS (bachelor and master)	2.23	2.04	3.17	1.72	-23.01%
Scope 1 and 2 / constructed area (m2)	5.45	5.13	8.21	4.41	-19.02%
Scope 1 and 2 / Academic + administrative staff	505.4	470.0	746.5	410.4	-18.81%
Scope 1 and 2 / k€ budget	9.20	8.54	14.12	7.27	-21.02%

CampusLAB initiative

The CampusLAB initiative is one of the actions foreseen in the 2030 UPC Sustainable Plan. It is a learning tool that connects the technical knowledge of administrative staff, the preparation of final theses by students, and the academic supervision of teaching and research staff working on processes, infrastructure and campus services. The initiative was inspired by the model of living labs and the more recent concept of green villages. The proposals for the 2023-2024 academic year [can be found at this link](#).

Since 2004, the UPC's Libraries Service has been labelling all the final theses that have resolved or analysed problems on UPC campuses. The aim of this initiative was to increase the visibility of this effort, organise it, and recognise the agents (administrative staff, teaching and research staff and students) who participate in it and form part of the sustainable UPC community.

In 2022, this tool was used to work on aspects of gathering and analysing inventory data with projects like the following three:

- [The carbon footprint of international mobility at the UPC](#)
- [Building decarbonisation strategies. Building renovation passport: The UPC campus as a case study](#)
- [Mobility on UPC campuses. Analysis and proposals](#)

A. DIRECT EMISSIONS

Direct emissions are those generated by sources that can be controlled by the organisation. In the case of the UPC, direct emissions are i) the combustion of boilers for heating, ii) recharging of refrigerant gases and iii) transport using the University's fleet. These data are obligatory information in the Voluntary Agreement Programme, whether or not they are significant.

The evolution of direct emissions was affected by the pandemic. In 2022, a certain degree of normality was recovered. In the assessment of the evolution of direct emissions, note the drop between **2019 and 2022, which is 16%**.

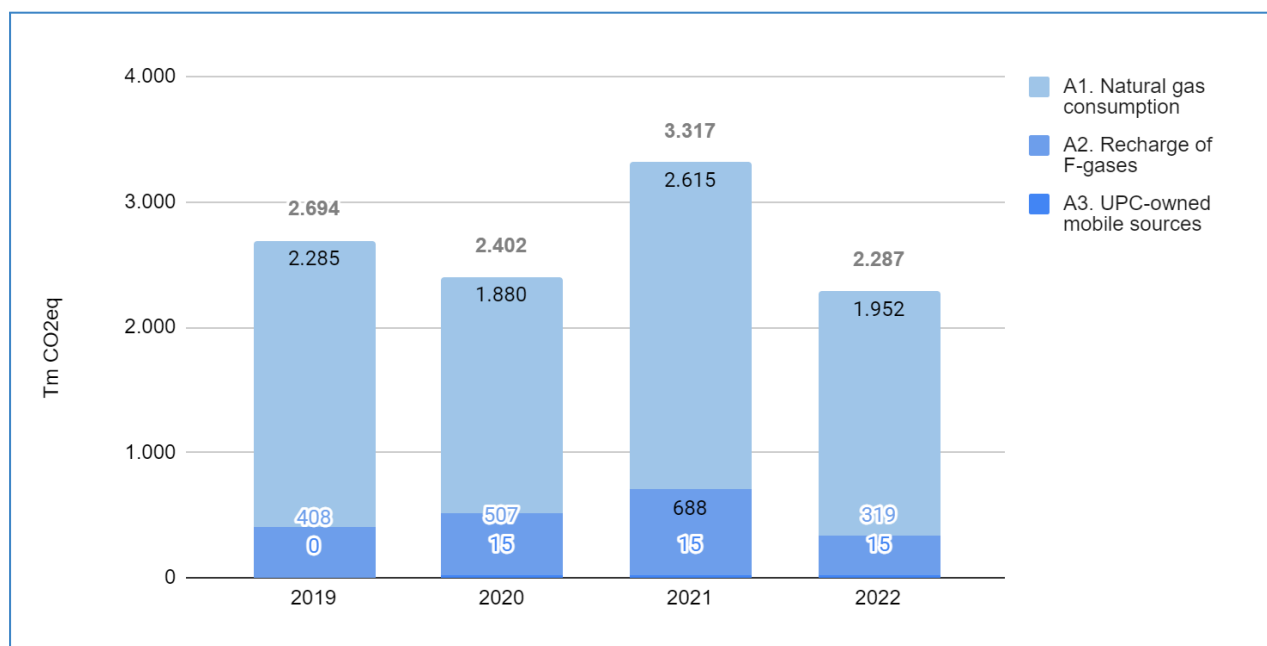


Image 3. Evolution of direct emissions

The steps that have been taken over these years and the actions planned for 2023 to improve the inventory in this category are the following.

- 2019:** Initial data collection for the inventory.
- 2020:** Incorporation of gas consumption data for 2020, per campus.
Improvement in the collection of recharge gas volume.
First inventory of vehicles and vessels.
- 2021:** Initial analysis of the air conditioning inventory (Infrastructure Service).
Monitoring of purchases to determine if any vehicles have been bought.
- 2022:** Inclusion of the air conditioning inventory in the maintenance contract.
Monitoring of purchases to determine if any vehicles have been bought.
- 2023:** Completion of the inventory of air conditioning machines with their respective gases (Barcelona School of Industrial Engineering, ETSEIB).
Preparation of an inventory of vehicles and emissions (every 3 years).

A1. Fixed sources: natural gas consumption

The annual natural gas consumption of UPC boilers for 2022 was 10,741,534 kWh, which represents after conversion a total of 1,952 MT of CO_{2eq}. This figure was significantly lower than that of 2021 (2,614 MT), due to the consumption reduction measures and the fact that in 2021 winter classes were carried out with the windows open and the heating on, to maintain ventilation due to COVID-19. In any case, **a 15% reduction in GHG emissions was observed compared to the baseline year of 2019.**

Most UPC buildings have this source of heating energy. Very few have fully electric heating or district heating, like the Diagonal-Besòs Campus buildings. In total, there are around 90 boilers, each one with its own record and efficiency. The boilers are often managed in a distributed, complementary way by varying their load. The only fuel used is natural gas.

In 2022, with the increase in energy cost, the UPC designed and launched an energy emergency plan that has enabled savings in energy and gas consumption, and emissions cuts in the latter case. The plan includes a detailed analysis of UPC boilers and coolers and a programme for their gradual replacement with condensing boilers up until 2025.

Data origin and availability

The consumption data are obtained from supply company bills. Each campus and, in some cases, different buildings have volumetric meters. Data are gathered on the SIRENA digital platform, which also collects electricity and water consumption data. However, unlike electricity data, a verification and checking task must be carried out on the meters and bills. In 2022, the CO₂ energy conversion factor was 0.18 kg CO_{2eq}/kWh, according to the guide published by the OCCC.

A2. Fugitive emissions: refrigerant gases (F-gases)

In 2022, air conditioning units have been recharged with a total of 164 kg of refrigerant gases. This is equivalent to 281 MT of CO_{2eq}, according to the OCCC conversion table. This value is lower than the 409 MT of 2021. However, it is an arbitrary value because, except for planned shutdowns of the systems, it reflects unforeseen faults in the cooling units. The UPC uses six types of refrigerant gas, each with its own global warming potential and consequently a different emission factor. Notably, here the issue is not the electricity that the units consume, but the refrigerant gases. Although these gases are present in small quantities, they have global warming potential (GWP) values that are up to 23,000 times that of CO₂, which is the unit taken as a reference.

The EU [has introduced a new directive](#) that regulates the gradual disappearance of these gases by replacing them with gases that have a GWP close to 1. This means that many of the units installed at the UPC will no longer be rechargeable from 2025.

Data origin and availability

Unlike the consumption of electricity or gas, the internal procedure for gathering these data was not established in 2022, even though great improvement had been made compared to 2019. In addition, the preparation of the inventory of units has improved. Only the units at the ETSEIB still need to be inventoried at this time. The volumes of gases range from 0.8 in the small exterior units to 20 l in the large units on the roof. Data are gathered based on the volume of

gas recorded on the bill sent to the UPC by the company that supplies the recharge gas. This volume is multiplied by the GWP value and the final data are obtained. The new units are not included in this inventory, as the supplier notifies the administration about them.

A3. Mobile sources: vehicles and vessels

This section includes all of the UPC's vehicles and vessels that run on fossil fuel. Thirty years ago, universities' fleets of vehicles were quite large. Now, numerous services have been outsourced and few vehicles are owned by the institution. Many of the UPC's remaining vehicles are associated with research projects that require field trips regularly, or they are vessels used by the Barcelona School of Nautical Studies (FNB) as a teaching tool. An example of vehicles owned by the UPC are Nissan NV200, Renault Express, Nissan Patrol, Land Rover 109D, Citroën Berlingo, Dacia Dokker, Suzuki Vitara, Renault Trafic. The University also owns two outboard engines and a sailing boat.

In 2020, an inventory of university-owned vehicles was drawn up to confirm that the volume of emissions was not significant compared to global emissions, considering the requirements of ISO 14064-2018. The result was around 15 MT of $\text{CO}_{2\text{eq}}$. In any case, this figure is not significant. However, this value must be reported, as it is part of Scope 1 or direct emissions, according to the protocol.

Data origin and availability

The data are obtained from the kilometres travelled or the volume of fuel purchased. The resources and services unit of each campus must be informed. Once the information has been gathered, the conversion factors from the official guide must be applied for every vehicle or type of vehicle. Given the low emissions figure for 2022 and the lack of change in this area, data were not collected. Data will be gathered every three years. The schools that are responsible for the vehicles have been asked to report any unusual mileage.

B. INDIRECT EMISSIONS OF PURCHASED ENERGY

Indirect emissions of purchased energy are emissions relating to energy that in previous versions of the methodology were called Scope 2. At the UPC, they include consumption of electricity and generation of heat and cold in the Diagonal-Besòs Campus through the method of district heating.

The evolution of emissions in this category was stable between 2019 and 2022. In fact, the most important factor is that of district heating. The emissions due to the purchase of electricity were zero in 2017, as the electricity is of a renewable origin. As explained in the 2021 report, the emissions from electricity consumption increased greatly because one of the electricity supply companies went bankrupt and it was not possible to accredit that the electricity was of renewable origin for two months. For this period, the conversion factor of the Spanish electricity mix was used. In the case of heat and vapour for this campus, the rise in 2021 was due to greater use than expected of natural gas, instead of heat from the incinerator. In any case, in 2022, there was a return to normality in the consumption of electricity, which again had a guarantee of origin certificate, and in the parameters specified in the contract with the company Districlima.

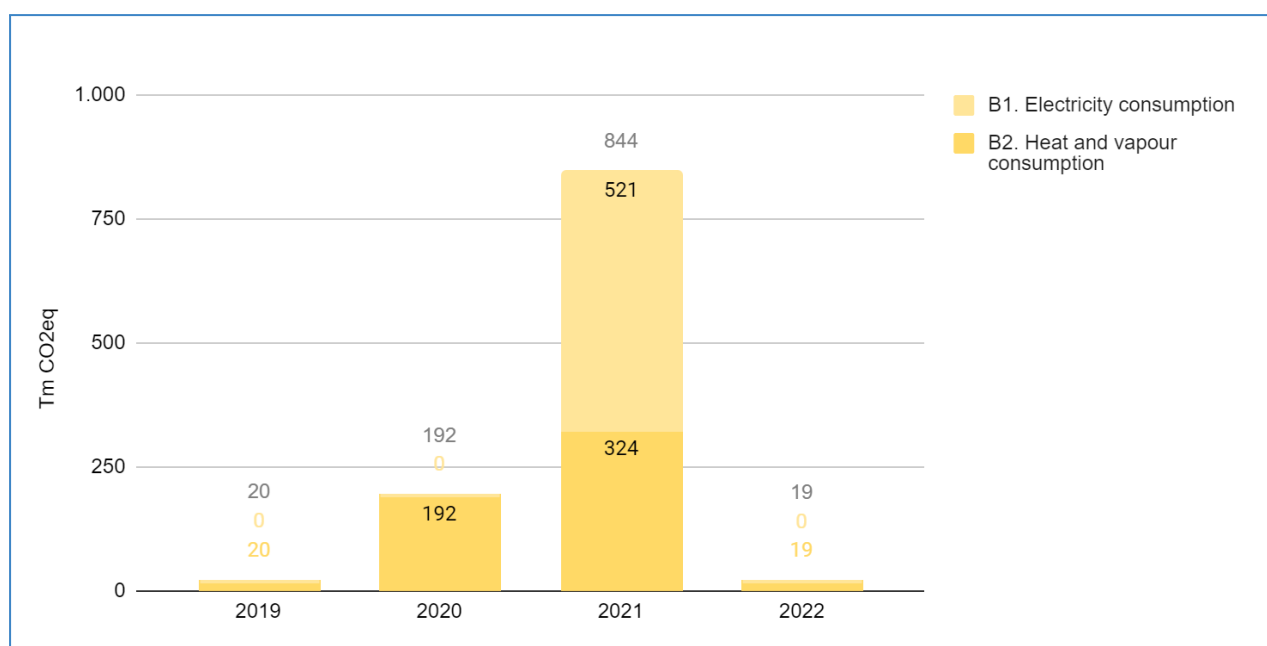


Image 4. Evolution of indirect emissions of energy acquisition

The steps that have been taken over these years and the actions planned for 2023 to improve the inventory in this category are the following.

- 2019:** Initial data collection for the inventory.
- 2020:** Incorporation of data on the consumption of purchased energy per campus.
- 2021:** Description of emissions differentiated by heat and cold at the Barcelona East School of Engineering (EEBE).
- 2022:** Established procedure.

B1. Purchased energy: electricity consumption

Since 2018, the UPC has been supplied by electricity of a renewable origin, with certification. There are zero emissions from this source, according to the methodology used. The purchase is joint through the University Services Consortium of Catalonia (CSUC), with public procurement for universities and research centres. To get an idea of the volume of emissions due to the purchase of electricity up to 2017, we can go back to the last year before the University purchased renewable energy. The emissions for that year were 11,495 MT of CO_{2eq}, which is a much higher value than the approximately 2,500 MT of natural gas and purchase of cold and heat. The total consumption of grid electricity was 26,299 MWh during 2022.

The inventory must also include electricity consumption from the installation of self-supply facilities. In 2022, the Solar Campus continued to be rolled out on various roofs of the UPC. This now provides 687 KWp of photovoltaic solar power ([see the 2022 SIRENA report](#)). The total self-supply energy generated was 315 MWh.

In 2022, with the increase in energy cost, the UPC designed and launched an energy emergency plan that has enabled savings in energy and gas consumption, and emissions cuts in the latter case.

Data origin and availability

In the case of electricity, the UPC has the [SIRENA system](#), which enables monitoring of the consumption of different spaces. This means that comparisons can be made and nocturnal consumption can be controlled, which is high due to servers and their cooling.

B2. Purchased energy: heat, vapour and cold

The Diagonal-Besòs Campus is heated and air conditioned through the Districlima network of heat and cold that feeds the entire district. Hot water is generated from residual heat from the waste treatment plant (TERSA) and natural gas. The emissions value fluctuates depending on the combination of both sources every year. Cold is generated from renewable electricity, and therefore does not count as an emission. In 2022, a total of 18 MT of CO_{2eq} were recorded, which is much lower than the 192 MT of 2021 and brings the level back to that of 2019.

Data origin and availability

The Districlima company issues bills that indicate the emissions conversion factor of Co2eq. For 2022, this was 19 g CO_{2eq}/kWh for vapour. For more information on the company and the operation, see [this public document](#).¹

¹ http://www.districtlima.com/districtlima/uploads/PDF/2012_Guia_de_l_Usuari_Districtlima.pdf

C. INDIRECT EMISSIONS OF TRANSPORT

Indirect emissions of transport are the indirect emissions relating to mobility and transport. Although the protocol includes a source associated with the distribution of products, this does not apply to the UPC. We count four elements: work-related trips, mobility of administrative staff and teaching and research staff to and from work, mobility of students to and from the University, and international mobility programmes for studies.

As the various emission sources and the corresponding consolidation of data collection and analysis have been incorporated gradually, it makes no sense to make comparisons between years. It is more prudent to take the data for 2022 as the new baseline and state that **transport emissions represent 75% of total UPC emissions**. The year 2022 was the first in which emissions from UPC mobility programmes were included.

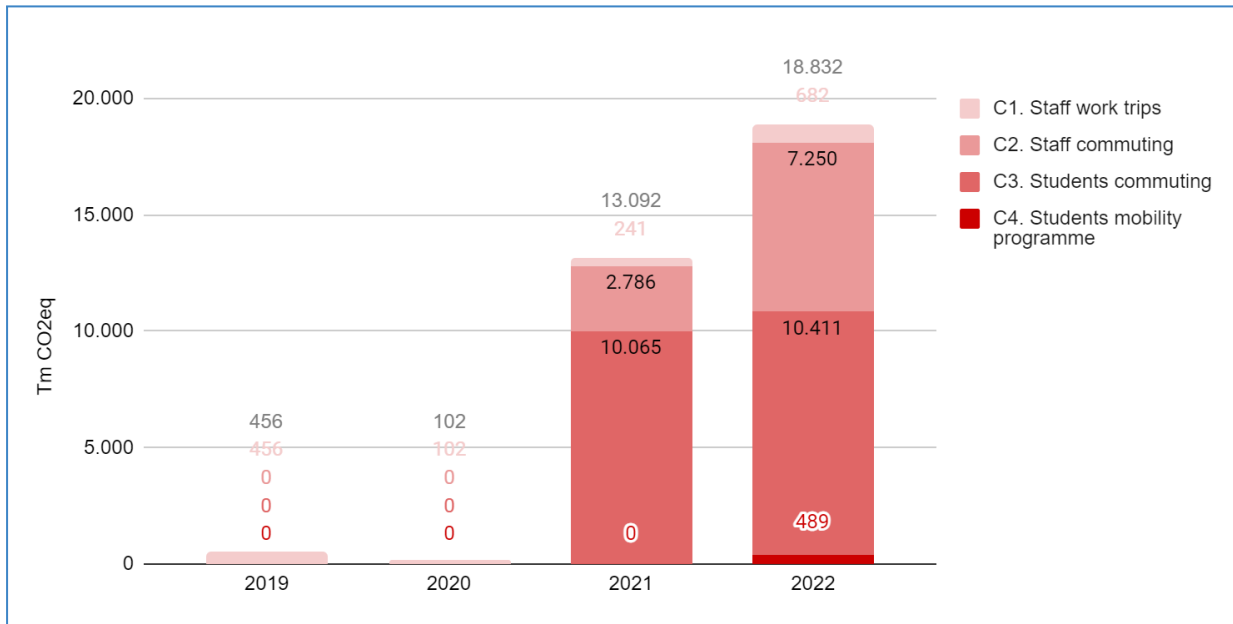


Image: Evolution of indirect emissions from transport

The steps that have been taken over these years and the actions planned for 2023 to improve the inventory in this category are the following.

- 2019:** First collection of mobility data on journeys of administrative staff and teaching and research staff.
- 2020:** Consolidation of the model of collecting mobility data for journeys of administrative staff and teaching and research staff.
- 2021:** First collection of data on travel to and from work, based on the survey of 2020.
- 2022:** First data collection from mobility programmes.
- 2023:** Collection of data via [Mobilitapp](#).
Collection of data via activation of the library card.
Preparation of the 2025 survey of services.
Improvement in the collection of data on the student mobility programme.

C1. Mobility: work-related trips of academic and administrative staff

This element includes trips that are part of work activities, such as flights or trains to go to a conference or research meeting. The 2019 inventory established a baseline at around 450 MT. However, this figure was not very reliable, as some travel agents did not provide the necessary information. Using the same methodology but with more consolidated data from the various travel agencies, in 2022 a total of **682 MT of CO_{2eq}** were generated by journeys of administrative staff and teaching and research staff. This figure was far above that of 2021, which was affected by the pandemic, and in line with the estimation from 2019.

Data origin and availability

The data on the distance travelled, the type of flights, the associated emissions and other data of interest were provided by the travel agencies, and include the methodology used by each agency. The data are provided in an individualised way for each trip (with the associated transport mode) or accommodation.

C2. Mobility to and from work of academic and administrative staff

This concept is defined as the emissions generated by UPC staff in their journeys to and from work on the campus where their activity is centred. It is generally measured from home and back home. In 2017, a final thesis was submitted, written by Hao Luo Wang and supervised by Professor Elisabeth Roca. This thesis studied the mobility in the first year of activity of the Diagonal-Besòs Campus. This is the most recent estimation available with standard mobility statistics. The study calculated 720 kg of CO_{2eq} per capita for teaching and research staff, 375 kg for administrative staff and 521 kg for each student on the Campus.

In 2022, a survey was administered to the entire community in which information on mobility was requested for the first time. The participation of 22% of administrative staff and teaching and research staff enabled an estimation of the total emissions generated by staff journeys of **7,250 MT Co_{2eq}**. Notably, the campuses of the city of Barcelona generate a lot more emissions in relative terms than those in the suburbs, due to the lack of public transport.

Data origin and availability

The data were obtained from a survey of satisfaction with UPC services, which is carried out every three years. There are other ways of obtaining this information that should be worked on in coming years. These include the [Mobilitapp](#) or the usual place of residence combined with teleworking data.

C3. Mobility of clients and visitors (students)

Based on the same survey, the UPC's global emissions could be estimated. In the case of clients and visitors (students) and considering that participation was only 5% in this case, the total was **10,411 MT of Co_{2eq}**. This is the highest figure of all the sources and distorts the other values due to its magnitude.

Data origin and availability

The mobility survey, which includes teleworking days, provides an initial idea of emissions. However, it is carried out every three years and the student sample is too small. Enrolment data

often do not correspond with students' real journeys because they indicate the family home or do not consider journeys at the weekend, for example.

C4. Mobility programmes (students)

In line with EU policies, the UPC encourages students to complete learning periods abroad during their studies (this is often referred to as Erasmus but goes beyond the Erasmus programme). In the case of the UPC, despite the preliminary data, the minimum is about 600 MT per year for students who go abroad, using a model of one return journey in a plane per semester. This volume justifies work in this area to refine and consolidate the data collection process, with the collaboration of the corresponding European bodies.

Although there are international programmes for administrative staff, these have not been considered yet.

Data origin and availability

The first data available and analysed correspond to 2019. They only indicate the dates of the stay and the host university. They are from the survey administered by the EU and should be complemented to obtain the financial contribution associated with the stay. Some people do not complete this survey, and in any case it should be improved to obtain the number of journeys and the mode of transport. For the first estimation, a simple model was used in which it is assumed that a return trip is made between the UPC and the closest airport to the host university, and that this journey is made by plane. The data are collected by the International Relations Bureau (GRI).

D. INDIRECT EMISSIONS OF THE SERVICES USED

This group includes the emissions sources of services that are contracted. It is a section that contains little information. This is because the supply companies have to pass on the information, there is no law that obliges them to do so and therefore this factor cannot be included in tenders, and because in many cases the methodology has not been published by the Catalan government's Office for Climate Change.

Currently, three sources of emissions are gathered for the UPC: waste management, drinking water consumption and the courier service between the campuses. The emissions are not significant and are collected more for the purpose of control and reduction than to present to the responsible bodies. Work is under way to also include cloud services and services such as the maintenance of campuses, gardening, etc.

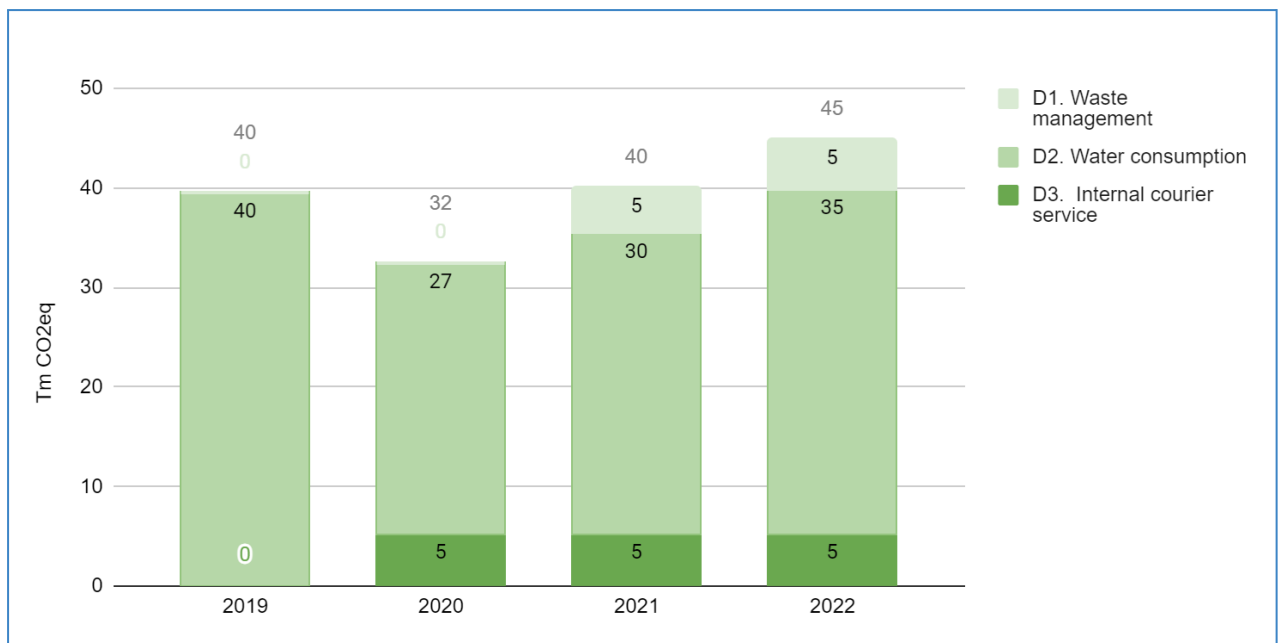


Image 6. Evolution of indirect emissions from the use of services

The steps that have been taken over these years and the actions planned for 2023 to improve the inventory in this category are the following.

2019: Collection of data on water (invoice) and external courier service (km and model).

2020: Verification of 2019 data.

2021: First estimate of municipal waste management emissions

2022: -

2023: Verification of data gathered on waste.

Inclusion of cloud services.

Obtain data on the km and model of vehicle of the courier service by default

Inclusion of information on emissions in new tenders (maintenance, gardening, etc.).

D1. Purchased services: waste treatment

In July 2023, the volume of UPC waste was not available in a systematised way, although we are working with the company to obtain this information. In 2022, the UPC had just introduced the [Punts UPC recircula](#) (UPC recycling points). Today, we have some data that indicate emissions in the order of 5 MT of CO_{2eq}. However, for 2023 we need to obtain a more accurate figure for all of the UPC.

Data origin and availability

There are two methods to obtain data: from the UPC or from the waste collection service. The second method is still not possible on most of the campuses, given that waste collection is municipal and does not separate UPC waste from that of dwellings or businesses surrounding the campus, even though the bins are separate. This leaves the internal method, which is being carried out with the collaboration of the cleaning company, which periodically (once a year, for example) analyses the composition of the waste fractions.

D2. Purchased services: water consumption

The **water consumption** of UPC campuses in 2022 was 89,000 m³, which generated 34 MT of CO_{2eq}. This value is a little lower than that of 2019, partly due to the UPC water saving campaigns and an improvement in management.

Data origin and availability

In the case of water, CO_{2eq} is estimated from the consumed volume indicated on bills and the conversion using the tables of the Catalan government's guide. This information is available for each campus.

D3. Purchased services: courier service for campuses

The courier service between campuses is provided by a company. It has a vehicle that travels established, fixed routes throughout the year. As the model of vehicle (Citroën Berlingo) and the kilometres travelled (37,000) are known, the emissions can be estimated at around **5,700 MT per year**. In any case, the service is monitored and clauses are expected to be incorporated to change to an electric vehicle when the contract is renewed.

Data origin and availability

The data on kilometres travelled and the model of the vehicle are provided by the company annually at the request of the UPC.

E. INDIRECT EMISSIONS OF PURCHASED GOODS

This group includes the emissions generated in the manufacture, use and end of life treatment of products purchased by the UPC, whether they can be inventoried or are perishable. At this time, we have data on the purchase of paper and copying services, the annual purchase of ICT equipment (laptops, monitors, etc.) and the 50-year amortisation of emissions due to the construction of UPC buildings.

These emissions are quite high and significant. The purchase of ICT equipment, with 710 MT CO_{2eq} that was not considered previously, is a good example. This is an initial estimate, as some material has not been inventoried or has not been withdrawn from the inventory when it is no longer in use.

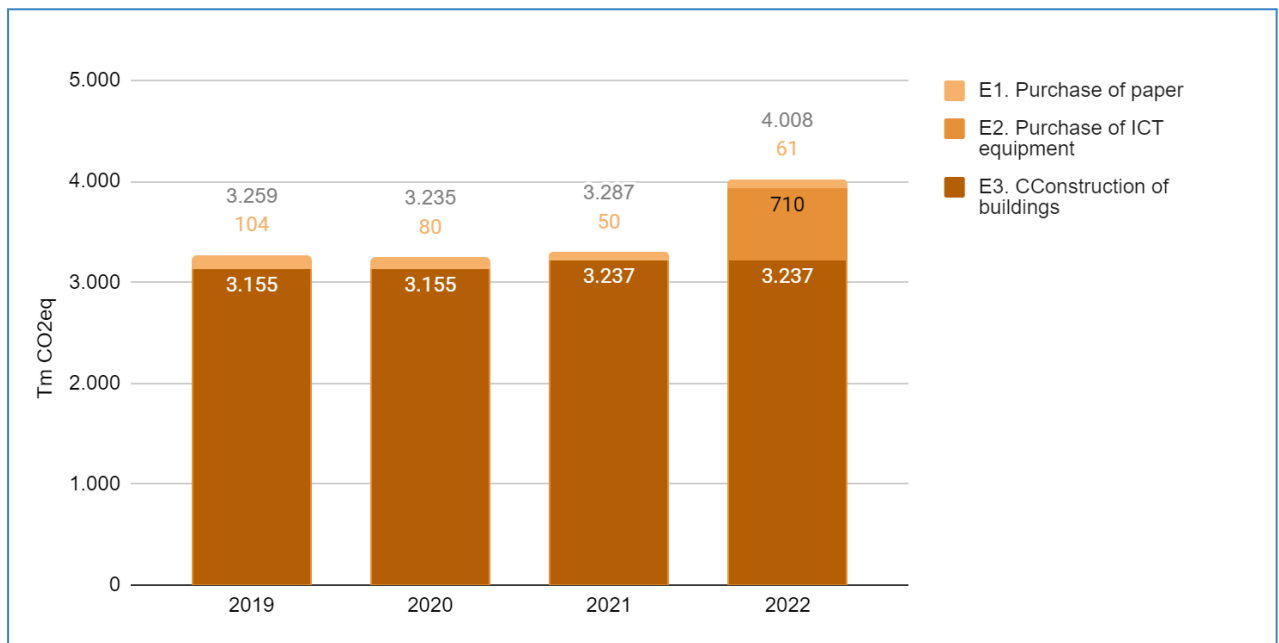


Image 7. Evolution of indirect emissions from purchased goods

The steps that have been taken over these years and the actions planned for 2023 to improve the inventory in this category are the following.

- 2019:** Obtaining data from all buildings with their year of construction. Incorporation of paper purchase data.
- 2020:** Estimation of building emission data, based on the MIES report.
- 2021:** Data collection and the procedure for purchasing ICT equipment.
- 2022:** Incorporation of emissions from the purchase of ICT equipment.
- 2023:** Request to the OCCC to publish the updated emission factor for buildings. Improvement in the inventory of ICT equipment, with a focus on withdrawal of equipment.

E1. Purchased goods: consumption of paper and copying services

Despite the process of digitalisation that is under way, the use of paper is still considerable at the UPC. In 2022, 2 million sheets of paper were purchased, and a further 2 million were used in copying and printing services with the contracted company. We take as a reference the OCCC information that the production of 1 kg of virgin paper generates 3 kg CO_{2eq} and 1.85 kg CO_{2eq}. The emissions from this source in 2022 were **61 MT of CO_{2eq}**.

Data origin and availability

The origin of the data is diverse. In any case, the contracted companies must provide information as the legislation is gradually implemented, as travel agents do today. Data on paper is collected from the purchases of the contracted supplier and from the copying and printing company.

E2. Purchased goods: ICT equipment

Each year, the UPC renews part of its ICT equipment through the ICT Plan. The suppliers are preestablished by the University Services Consortium of Catalonia (CSUC). The UPC can define some stricter criteria but the choice must be made from among the agreed suppliers (similar to the policy of contracting trips). At this time (September 2023), the tender does not specify data on life cycle emissions of products. This could be included in future tenders.

Data origin and availability

The data are provided annually by the ICT Service of the UPC.

E2. Purchased goods: construction of buildings

This section corresponds to the assignment of emissions to the construction of buildings. We take as an approximate reference that published by the [MIES report](#) of the UPC, which assigns a value of 500 kg CO_{2eq}/m² to construction materials in general. These data must be divided between the 50 years of life of a building to obtain a value for each year.

The UPC has around 500,000 m² divided between around a hundred buildings, some that are over 150 years old and others that are only 4 years old. By way of an example, the four buildings on the Diagonal-Besòs Campus with a surface area of 54,000 m² annually account for emissions (of the total prorated between 50 years) of around 540 MT of CO₂. The North Campus accounts for around 1,350 MT annually and the Nautical Campus only 8 MT, because the historical building is no longer counted. In total, buildings that were less than 50 years old in 2022 accounted for **3,237 MT CO_{2eq}**, a figure that is clearly significant.

Data origin and availability

The building data come from the Infrastructure Service and can be consulted at upc.edu/indicators.

F. INDIRECT EMISSIONS OF PRODUCTS THAT ARE SOLD

The last category of the inventory covers emissions relating to the sale of the University's products in a broad sense. Four sources are included in the methodology of the Catalan Office for Climate Change:

- **Emissions from assets leased downstream:** assets that belong to the organisation but are leased to other organisations. In this case, the UPC must calculate and eventually report these emissions, given that it has spaces rented to other institutions or companies such as spin-offs and affiliated schools.
- **Emissions that come from investments:** this refers mainly to the foreseen private and public financial institutions. They may be generated by four types of operations: social capital debt, investment debt, financing of projects, and others. The UPC participates with various legal forms in consortiums, associations, foundations and companies. Each one of these must report its emissions.
- **Emissions or removal from the use stage of the life cycle:** to calculate these values, scenarios of the use of products must be considered. In the same way that the UPC does not have a production process, it does not emit carbon from this source. We could consider UPC merchandising (folders, clothes, etc.) but the first estimates indicate that the contribution is not significant.
- **Emissions from the final stage in the product's life:** these tend to be emissions due to the management of the product when it becomes waste. As in the previous case, it is not incorporated into the inventory.

The actions carried out during 2022 and planned for the coming years in the inventory are the following.

- 2022.** Study of the protocol and identification of significant sources.
- 2023** Inventory of rented spaces, property and legal entities per campus.
- 2024** Calculation of the emissions generated by rented spaces, if applicable.
Direct emissions of entities in the UPC Group.
- 2025** Indirect emissions of entities in the UPC Group.
Direct emissions of affiliated entities and technology-based companies.
- 2026** Direct and indirect emissions of all the affiliated entities.

F1. Emissions from leased assets

This source covers emissions generated in leased spaces. The UPC manages approximately 500,000 m² directly, of which it leases 10,000 m², although some of the leases are through the UPC Group. Therefore, during 2023, work should be done to draw up an inventory of leased spaces, property and the various contractual modes, especially regarding the impact of consumption on the tenants, to avoid duplicating the accounting of emissions.

Data origin and availability

The data are obtained from the information provided by the Infrastructure Service.

F2. Emissions from investments

This source only covers emissions generated by participation in the shares, capital or patronage of entities, as the University does not fund projects or have investment debt. In any case, the figure is not significant, unlike universities in the English-speaking world. We can distinguish three groups of entities associated with the UPC:

Entities of the UPC Group such as the Fundació Politècnica de Catalunya and UPCnet. These are entities in which the UPC has direct or indirect majority shareholding in the capital or an endowment fund. The rector presides over the entities and their decision-making bodies. These entities have the obligation to render accounts under the same terms and conditions and according to the same procedure as the University. In September 2023, the entities in the UPC Group were: FPCAT-UPC Sustainable Mobility Campus (Martorell), CIM UPC, b_TEC Foundation, Innovation and Technology Centre Foundation (CIT UPC), Fundació Politècnica de Catalunya, Mediterranean Technology Park (PMT), UPCnet and IThinkUPC.

Associated entities such as the Barcelona Supercomputing Center (BSC-CNS) and the University Services Consortium of Catalonia (CSUC), entities in which the UPC has a minority shareholding and whose aim is to undertake academic tasks or support these entities.

Technology-based companies or spin-offs: entities promoted and, where appropriate, with minimum shares owned by the University, to financially benefit from the research, development and innovation results obtained in research projects.

In all these cases, the inventory should include emissions and shares in capital or decision making. Therefore, in the technology-based companies or spin-offs in the UPC Group, all the emissions should be incorporated into the UPC inventory. In the rest of these entities, only the proportional part of the emissions should be incorporated.

Data origin and availability

The shareholding data are obtained from the information published in [UPC Transparent](#) and by the [Innovation Management Service \(SGI\)](#) in the case of technology-based companies. The emission data are obtained from the entities or the inventory published in any of the records of the administration.