PACTEAM EUROPA SRL (PTEU)

Corporate Carbon Footprint Report

Year: 2023

Assessment Conducted by: RESPONSABILITAS CO.,LTD - Hong Kong SAR China (https://responsabilitas.com/)

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Executive Summary: PTEU's Corporate Carbon Footprint in 2023

This executive summary provides an overview of the Corporate Carbon Footprint (CCF) Assessment conducted for PACTEAM Europa (PTEU)'s office for the year 2023. The assessment aimed to quantify and analyze the greenhouse gas (GHG) emissions associated with the office's activities and operations.

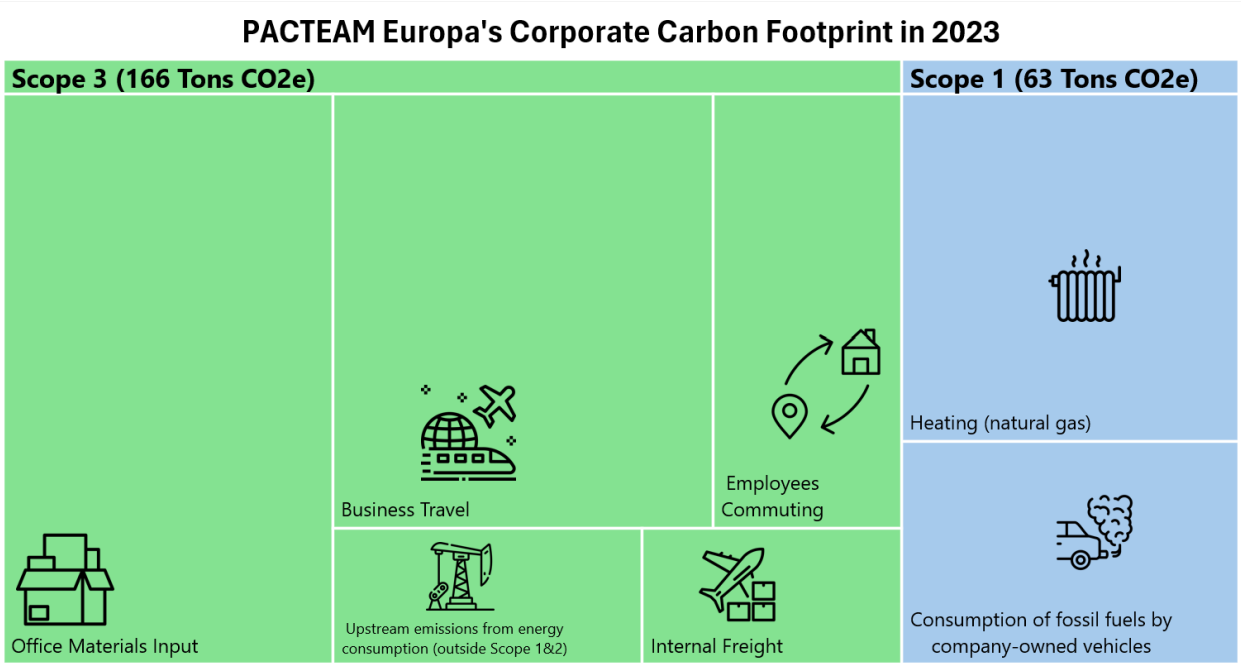

Figure 1: Tree map of PTEU's CCF in 2023

Methodology & Standards

In the CCF conducted for PTEU, adherence to the methodologies outlined in the Bilan Carbone® [1] and GHG Protocol [2] standards ensure a comprehensive and standardized evaluation of the company's greenhouse gas (GHG) emissions. The scope of the assessment

[1] The Bilan Carbone standard was developed by the French Agency for Ecological Transition (ADEME), previously known as the French Environment and Energy Management Agency (https://bilans-ges.ademe.fr/)

[2] The GHG Protocol Corporate Standard is a widely used international accounting tool developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD) to help companies measure and report their greenhouse gas emissions (https://ghgprotocol.org/corporate-standard)

encompasses the direct and indirect emissions associated with PTEU's activities, delineated into three distinct categories:

- **Scope 1 (Direct Emissions):** This category includes emissions from sources that are owned or controlled by PTEU. The assessment accounts for the consumption of fossil fuels by company-owned vehicles and for heating purposes, which contribute directly to the carbon footprint.
- **Scope 2 (Indirect Emissions from Electricity Consumption)**: These emissions result from the generation of purchased electricity consumed by PTEU. The assessment covers the electricity used for lighting, cooling, and powering equipment within the company's facilities.
- **Scope 3 (Other Indirect Emissions):** This category encompasses all other indirect emissions that occur in PTEU's value chain. The assessment considers the following Scope 3 activities:
    i. Internal freight: Emissions from the transportation of goods and materials within PTEU's operations.
    ii. Business travel: Emissions from air, rail, and road travel undertaken by employees for business purposes.
    iii. Office materials input: Emissions associated with purchasing office supplies and materials.
    iv. Commuting: Emissions from the transportation of employees between their homes and the workplace.
    v. Upstream emissions (not included in Scope 1) for fossil fuels consumed by PTEU

By including these activities in the CCF, the aim is to capture a holistic view of PTEU's impact on the environment. The boundaries of the assessment have been defined to encompass all relevant sources of GHG emissions within the company's operational control and influence, ensuring a thorough and accurate representation of the carbon footprint.

All emissions are estimated in CO_2 equivalents (CO_2e). This unit is a metric used to compare the emissions of various greenhouse gases based on their global warming potential (GWP). Since different greenhouse gases have different effects on global warming, CO_2 equivalent provides a way to express their impact in terms of the equivalent amount of carbon dioxide that would have the same warming effect over a specific time period, usually 100 years. By converting all greenhouse gas emissions to CO_2 equivalent, it becomes easier to compare their impact and to develop strategies for reducing overall greenhouse gas emissions.

Results

Table 1: PTEU's Corporate Carbon Footprint in 2023

GHG Protocol's Scopes	Activities	2023 GHG Emissions (Tons CO_2e)
Scope 1	Consumption of fossil fuels by company-owned vehicles	24.54
	Heating (natural gas)	38.02
Scope 2	Electricity consumption	0.00
Scope 3	Business Travel	53.70
	Internal Freight	11.50
	Employees Commuting	26.52
	Office Materials Input	61.25
	Upstream emissions from energy consumption (outside Scope 1&2)	13.73
-	**Total**	**229.27**

The Corporate Carbon Footprint Assessment for PTEU has yielded the following results for the year 2023:

- **Scope 1 Emissions:** The total direct emissions amounted to about **63 tons of CO2**, with company-owned vehicles contributing 25 tons and heating with natural gas accounting for 38 tons.
- **Scope 2 Emissions:** PTEU achieved **no emissions in this category**, due to the company's consumption of **100% renewable energy throughout the year**.
- **Scope 3 Emissions:** The total indirect emissions from other activities were about **166 tons of CO2**. This includes emissions from internal freight (11.5 tons), business travel (53.7 tons), commuting (26.5 tons), office materials input (61.2 tons), and upstream emissions for energy consumption not included in Scope 1-2 (13.73 tons).

These results highlight PTEU's commitment to sustainability, particularly demonstrated by the **elimination of Scope 2 emissions** through the use of renewable energy sources. However, the significant contributions to total emissions by various activities in Scope 1&3 suggest potential areas for further improvement in the company's carbon footprint reduction efforts.

It is important to note that the significant emissions related to purchasing office equipment were due to PTEU **renovating part of the office's premises in 2023**. It is expected that emissions from office materials & equipment will significantly decrease in future assessments.

Implementing measures such as promoting virtual meetings, utilizing video conferencing technology, and encouraging alternative modes of transportation can help reduce emissions from business travel, while maintaining business efficiency. To reduce emissions from

employees commuting, PTEU could evaluate **hybrid working schedule** (in office and remotely) or offer incentives to use public transportation for commuting to office.

The consumption of **natural gas for heating purposes (Scope 1)** was identified as another significant emission source. To address this, energy efficiency measures, such as improving insulation, optimizing heating systems, and exploring renewable energy alternatives, should be considered to mitigate emissions associated with space heating.

To effectively manage and reduce the office's carbon footprint, the following general key recommendations are proposed:

1. **Develop a comprehensive sustainability strategy:** Establish clear goals, targets, and action plans to guide emission reduction efforts across all scopes. Engage stakeholders, communicate the strategy, and foster a culture of sustainability within the office.
2. **Optimize business travel and internal freight**: Implement measures to reduce the environmental impact of internal freight and business travel, such as promoting telecommuting, using video conferencing, encouraging sustainable transportation modes, and optimizing supply chain logistics.
3. **Enhance energy efficiency**: Identify opportunities to improve energy efficiency within the office, especially in relation to heating systems.
4. **Monitor and report progress**: Implement a robust monitoring and reporting system to track emission reductions, evaluate the effectiveness of implemented measures, and demonstrate the office's commitment to sustainability.

By implementing these recommendations and actively addressing emission sources identified in this assessment, PTEU' can make significant progress toward reducing its carbon footprint, achieving sustainability goals, and contributing to the global effort to mitigate climate change.

Preliminary notes

This Corporate Carbon Footprint Assessment was conducted to estimate CO2 emissions associated with the business activities of PACTEAM Europa (PTEU) in the year 2022. Following a brief introduction of the concept of Corporate Carbon Footprint, the international standards followed, and the activities included during this Assessment.

Introduction Of PACTEAM Europa

PACTEAM Europa Srl (PTEU) is based in Nova Milanese (Italy) since 1999 and is part of PACTEAM's global business (PACTEAM Group). While PACTEAM's products include luxury packaging, display furniture and alike, PTEU is focused on creative design & product development, logistics & after sales in the European and Italian market.

Manufacturing of the designed products is carried out by other entities in PACTEAM Group. Therefore, as it pertains to the scope of this Assessment, PTEU 's activities are comparable to an office & warehouse setting. As of 2023, PTEU's premises include a 500 sqm office and a 2,000 sqm warehouse, with a total of 25 employees.

Introduction Of The Corporate Carbon Footprint Assessment

The concept of a Corporate Carbon Footprint Assessment refers to the task of estimating the CO2 emissions from a variety of activities undertaken by the entity subject to the analysis. Establishing and maintaining an inventory of emissions can serve several business goals, including:

- Managing emissions-related risks and identifying reduction opportunities
- Public reporting and participation in voluntary climate programs
- Participating in mandatory reporting programs
- Participating in Carbon Markets
- Disclosing climate-related information to clients and other stakeholders

Several CO2 accounting tools, standards and models are currently available on the market: this Assessment was undertaken following the Bilan Carbone®[3] methodology. At the same time, the obtained quantitative results are also in line with reporting under the ISO 14069 and GHG-Protocol[4] standards , dividing the accounted emissions in Scope 1, Scope 2 and

[3] The Bilan Carbone standard was developed by the French Agency for Ecological Transition (ADEME), previously known as the French Environment and Energy Management Agency (https://bilans-ges.ademe.fr/)

[4] The GHG Protocol Corporate Standard is a widely used international accounting tool developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD) to help companies measure and report their greenhouse gas emissions (https://ghgprotocol.org/corporate-standard)

Scope 3. To ensure the compatibility of the reported results with the most common carbon emissions disclosure programs, the Assessment results are reported directly under the GHG-Protocol standard and related Scopes. The perimeter of the Assessment was decided following the Operational Control approach, thus accounting for 100% of the emissions (direct and indirect) from the operation over which PTEU has operational control.

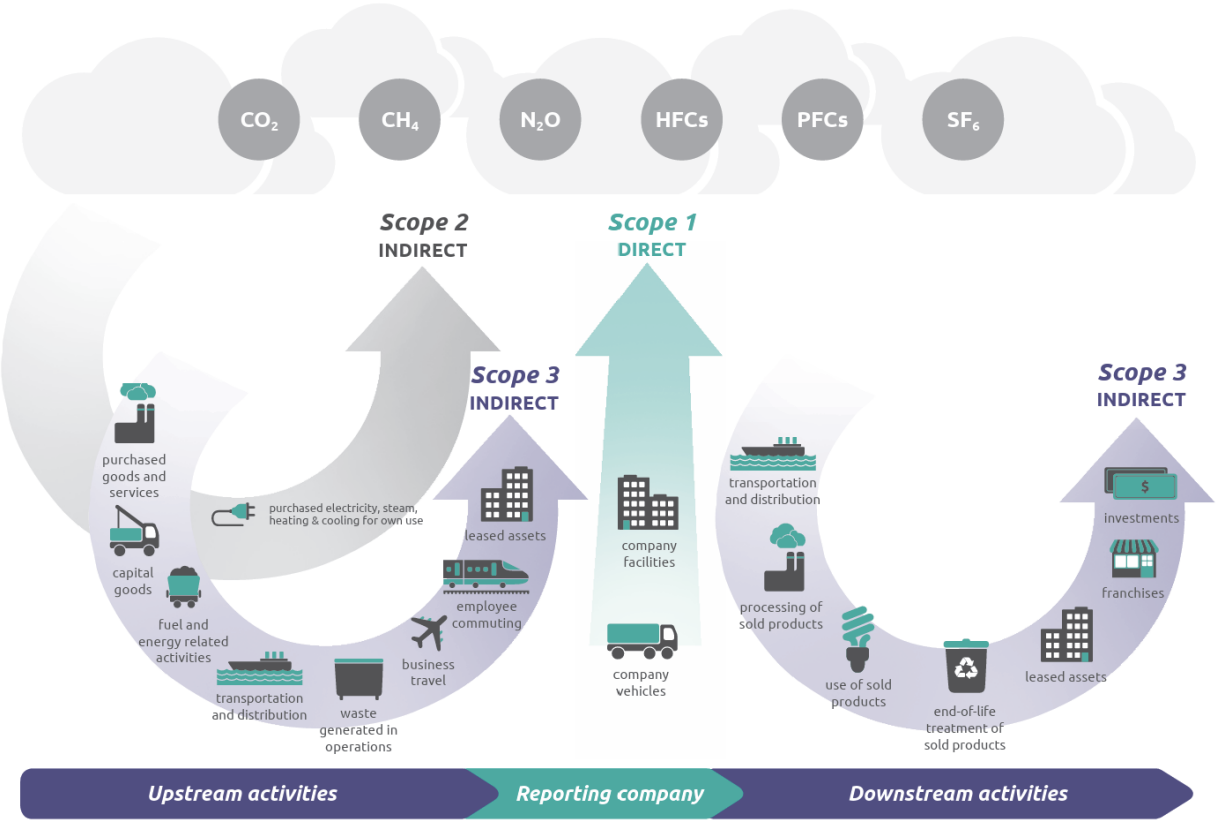

Figure 2: Overview of GHG Protocol Scopes and emissions across the value chain

Introduction Of Scope 1 Emissions

In general, Scope 1 GHG emissions for an office refer to the direct greenhouse gas (GHG) emissions that occur from sources owned or controlled by the office itself. These emissions are generated from activities or processes that take place within the office premises or are directly under the office's operational control. Some common sources of Scope 1 GHG emissions in an office setting include:

- Combustion of fossil fuels: This includes emissions from burning natural gas, diesel, gasoline, or other fossil fuels for activities like heating, cooling, and operating equipment within the office.

- On-site power generation: If the office has its own power generation system, such as a diesel generator or a combined heat and power (CHP) unit, the emissions resulting from the combustion of fuel to produce electricity or heat fall under Scope 1.
- Company-owned or controlled vehicles: If the office operates a fleet of vehicles for business purposes, such as delivery trucks or company cars, the emissions from these vehicles are considered Scope 1 emissions. This includes both the fuel combustion emissions and any fugitive emissions from the vehicles.
- Process emissions: Certain office activities or processes might release GHGs as byproducts. For example, if the office has refrigeration or air conditioning systems that use hydrofluorocarbons (HFCs), which are potent greenhouse gases, the emissions from leaks or venting of these gases would be considered Scope 1 emissions.

Scope 1 emissions are considered direct because they are produced from sources that are owned or controlled by the office itself. It is important for offices to measure and track their Scope 1 emissions as part of their overall greenhouse gas accounting and climate change mitigation efforts. By understanding and managing these emissions, offices can identify opportunities for reduction, improve energy efficiency, explore alternative energy sources, and contribute to mitigating climate change.

Introduction Of Scope 2 Emissions

Scope 2 GHG emissions for an office refer to the indirect greenhouse gas emissions that occur from the generation of purchased electricity, heat, or steam consumed by the office. These emissions are produced off-site at the facilities where the energy is generated but are associated with the office's energy consumption.

Key points about Scope 2 emissions:

- Electricity consumption: The most common source of Scope 2 emissions for an office is the electricity it consumes from the grid. When fossil fuels are burned at power plants to generate electricity, GHG emissions are released. These emissions are considered indirect because they occur outside the office's boundaries but are associated with its energy consumption.
- Heat and steam consumption: If an office relies on external sources for heating or steam, such as district heating systems, the emissions resulting from the production of that heat or steam would fall under Scope 2
- Emission factors: The calculation of Scope 2 emissions requires the use of emission factors provided by the electricity or energy supplier. These factors represent the average emissions intensity associated with the energy generated. Emission factors

can vary depending on the energy mix of the supplier, including the proportion of renewable and non-renewable sources.

- Renewable energy purchases: If an office procures renewable energy through power purchase agreements (PPAs) or renewable energy certificates (RECs), it can reduce its Scope 2 emissions. By offsetting its electricity consumption with renewable sources, the office effectively lowers its indirect emissions.
- Tracking and managing Scope 2 emissions allows an office to understand the environmental impact of its energy consumption. It also provides an opportunity to explore cleaner energy sources and actively support renewable energy projects. Offices can consider energy efficiency measures, on-site renewable energy generation, or the purchase of renewable energy credits to reduce their Scope 2 emissions and contribute to a more sustainable energy future.

Introduction Of Scope 3 Emissions

Scope 3 GHG emissions refer to all indirect greenhouse gas emissions that occur as a result of an office's activities but are not classified under Scope 1 or Scope 2 emissions. These emissions occur along the entire value chain of the office's operations, both upstream and downstream. Scope 3 emissions are often the largest and most challenging category to measure and mitigate, as they encompass a wide range of activities and involve multiple stakeholders.

Key aspects of Scope 3 emissions:

- *Supply chain emissions*: Scope 3 emissions include the emissions associated with the extraction, production, and transportation of goods and services purchased by the office. This involves considering the emissions generated by suppliers, contractors, and other business partners. It includes raw material extraction, manufacturing processes, transportation of goods, and disposal of waste.
- *Business travel*: Emissions from employee travel, both domestic and international, fall under Scope 3. This includes air travel, road transportation, and rail travel. The emissions are calculated based on distance traveled and the type of transportation used.
- *Employee commuting*: Emissions resulting from employees' daily commute to and from the office are also considered Scope 3 emissions. This includes emissions from personal vehicles, public transportation, or other modes of transportation used by employees.
- *Waste management*: The emissions associated with waste generated by the office, including its disposal and treatment, are considered Scope 3 emissions. This encompasses activities such as landfilling, incineration, and recycling.

- *Product use and end-of-life*: If the office's products or services have a significant impact on GHG emissions during their use or after they are discarded, those emissions fall under Scope 3. For example, if an office manufactures electronic devices, the emissions resulting from the energy consumption of those devices during their lifetime and their disposal would be included in Scope 3.

Tracking and addressing Scope 3 emissions requires collaboration with suppliers, customers, and other stakeholders throughout the value chain. While the office may have limited control over these emissions, understanding and managing them can help identify opportunities for sustainable procurement, efficient transportation, waste reduction, and product innovation. By taking action to reduce Scope 3 emissions, offices can enhance their sustainability performance and contribute to mitigating climate change across their entire operations.

Scopes And Activities Included In The CCF Of PTEU In 2023

Following a specific list of the activities included in the Carbon Footprint Assessment of PTEU, divided in different Scopes, as defined by international standards (GHG Protocol3):

1. **Scope 1 (Direct emissions):** Consumption of fossil fuels by company-owned vehicles, consumption of natural gas for heating purposes
2. **Scope 2 (Indirect emissions for electricity consumption):** Consumption of electricity (e.g., by office equipment, lighting). No heat/steam is purchased by PTEU.
3. **Scope 3 (Other indirect emissions):** Business travel, employees commuting, material inputs (i.e., office consumables and equipment), internal freight (transportation of prototypes and samples between PTEU and factories controlled by PACTEAM) and emissions related to fuels and energy (not included in Scope 1 and Scope 2).

The above boundaries of the assessment were deciding according to data availability and after a preliminary estimation of the significance of the GHG emissions resulting from the activities commonly included in Scope 1, Scope 2 and Scope 3 for entities sharing similar business operations with PTEU.

Collected and estimated activity data was then coupled with the relative emission factor, provided by various sources outlined on pg. 21 (Sources of emission factors). An emission factor is a numerical value that represents the amount of greenhouse gas (GHG) emissions released per unit of activity or product. It provides a standardized measure of emissions associated with a specific process, fuel, or activity.

Emission factors are typically expressed as the amount of CO_2-equivalent emissions per unit of activity, such as kilograms or metric tons of CO_2-equivalent emissions per kilowatt-hour of electricity generated, per liter of fuel burned, or per km traveled.

Emission factors are used in GHG accounting and reporting to estimate emissions from various sources, including energy consumption, industrial processes, transportation, and waste management. They serve as a crucial component in calculating emissions inventories and assessing the environmental impact of specific activities. The values of emission factors are determined through scientific measurements, data analysis, and modeling techniques. They can vary depending on multiple factors, such as the type of fuel or energy source, the combustion efficiency, the technology used, and the geographical location.

Emission factors are often developed and updated by governmental agencies, international organizations, and research institutions based on the latest scientific knowledge and data. By applying emission factors to activity data (e.g., energy consumption or fuel usage), organizations can calculate the total emissions associated with their operations. These calculations enable them to track and report their GHG emissions, set reduction targets, and identify opportunities for emission mitigation strategies. It's important to note that emission factors are not fixed values and can vary over time as technologies improve, energy sources change, or more accurate data becomes available. Therefore, using up-to-date and region-specific emission factors is crucial for accurate and reliable emission calculations.

In this Assessment, as required by Bilan Carbone® and GHG-Protocol Standards, all emissions resulting by applying the chosen EF (page 21) were converted into CO_2e for the final reporting of the results. A breakdown of GHG gases is available upon request.

Scope 1 Emissions Breakdown

This chapter focuses on **Scope 1 emissions**, which are **direct** GHG emissions resulting from activities and sources owned or controlled by PTEU's office. The assessment identified two significant contributors to Scope 1 emissions: GHG emissions from company-owned diesel vehicles and GHG emissions from natural gas consumption for heating.

Table 2: Scope 1 emissions from PTEU's activities in 2023

Emission Sources	Activity Data's Quality	Unit	2023 GHG Emissions (Tons CO_2e)
Consumption of diesel by company-owned vehicles	Measured data	l/year	**28.54**
Heating (natural gas)	Measured data	kWh/year	**38.02**

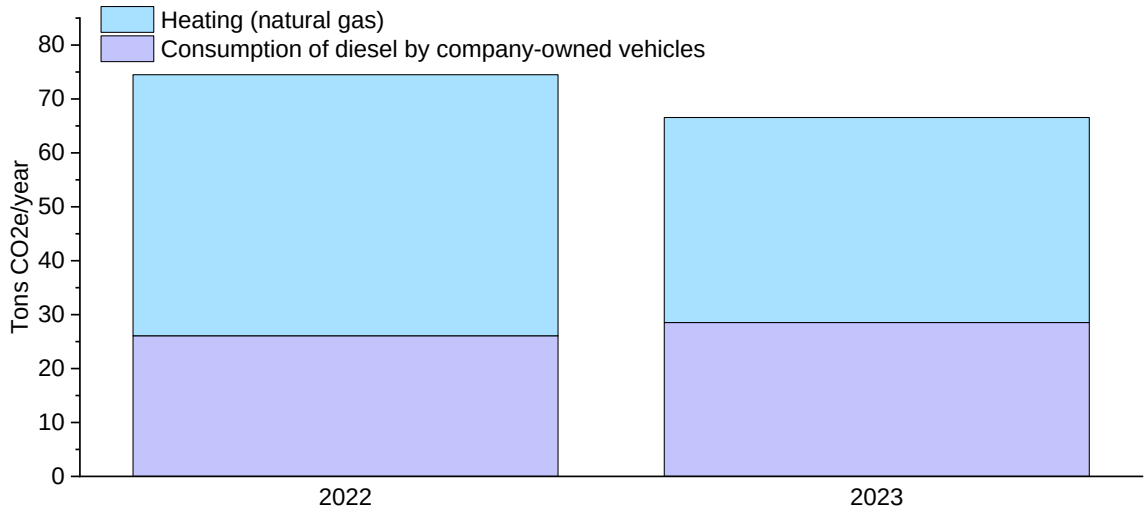

Figure 3: PTEU's Scope 1 emissions in 2023 and reference year 2022

GHG emissions from company-owned diesel vehicles were estimated to be **about 28 tons** of CO2e. These emissions are associated with the combustion of diesel fuel used for transportation purposes within the office's operations.

To address this emission source, PTEU should consider implementing the following measures:

▪ *Fleet optimization*: Evaluate the efficiency of the company-owned diesel vehicles and explore opportunities to optimize the fleet. This may involve replacing older vehicles with

more fuel-efficient models and encouraging the use of public transportation or electric vehicles where feasible.

▪ *Driver training and behavior*: Implement driver training programs focused on fuel-efficient driving techniques, such as reducing idling time, maintaining proper tire pressure, and practicing smooth acceleration and deceleration. Encourage drivers to adopt eco-friendly behaviors that can contribute to reducing emissions.

▪ *Alternative fuel options*: Investigate the feasibility of transitioning some or all of the company-owned diesel vehicles to alternative fuels with lower emissions, such as biodiesel or compressed natural gas (CNG). Evaluate the infrastructure requirements, cost-effectiveness, and environmental benefits of alternative fuel options before making any decisions.

Direct GHG emissions from natural gas consumption for heating were estimated to be **around 38 of CO2e**. These emissions result from the combustion of natural gas used to provide heating within the office premises. To address this emission source, PTEU should consider implementing the following measures:

Energy efficiency improvements: Conduct an energy audit to identify opportunities for energy efficiency improvements within the office. This may include optimizing insulation, sealing air leaks, upgrading heating systems to more efficient models, and installing programmable thermostats to better control heating.

▪ *Renewable energy integration*: Explore the feasibility of integrating renewable energy sources, such as solar thermal systems or geothermal heating, to supplement or replace natural gas for heating purposes. Investigate available incentives, financing options, and the long-term cost benefits of transitioning to renewable heating solutions.

▪ *Behavioral changes*: Promote energy-conscious behavior among employees, such as encouraging them to dress appropriately for the season, setting temperature guidelines to optimize comfort and energy savings, and educating them about the importance of energy conservation.

Regular monitoring and tracking of Scope 1 emissions will allow PTEU to evaluate the effectiveness of implemented measures, identify areas for further improvement, and demonstrate the office's commitment to reducing its environmental impact. By addressing GHG emissions from company-owned diesel vehicles and natural gas consumption for heating, PTEU can make significant progress in mitigating its Scope 1 emissions and working towards a more sustainable future.

Scope 2 Emissions Breakdown

This chapter focuses on Scope 2 emissions, which represent indirect GHG emissions associated with the consumption of purchased electricity, heat, or steam by PTEU's office. Notably, **PTEU's electricity consumption does not lead to any CO_2e emissions** since the company sources its electricity from a **certified 100% renewable energy** mix[5]. The related certification can be made available upon request to PTEU.

Table 3: Scope 2 emissions from PTEU's activities in 2023

Emission Sources	Activity Data's Quality	Unit	2023 GHG Emissions (Tons CO_2e)
Electricity consumption – Generic office use	Measured data	kWh/year	**00.00**
Electricity consumption – Air conditioning	Measured data	kWh/year	**00.00**

The sourcing of electricity from renewable sources is a commendable achievement for PTEU. By relying entirely on renewable energy, the company has effectively eliminated the GHG emissions associated with its electricity consumption. This not only demonstrates a strong commitment to sustainability but also contributes to the reduction of carbon emissions and supports the transition to a clean energy future.

By choosing renewable energy sources, PTEU has helped to avoid the release of CO2 and other GHG emissions that would have occurred if electricity had been sourced from the Italian national grid without a commitment to 100% renewable energy mix. This action significantly reduces the overall carbon footprint of the office and showcases a positive environmental stewardship approach.

Maintaining zero Scope 2 emissions will require ongoing efforts to ensure that the company continues to procure electricity exclusively from renewable sources. PTEU should regularly verify and document its renewable energy sourcing, ensuring transparency and accuracy in reporting its carbon footprint. While the absence of Scope 2 emissions is an outstanding achievement, it is essential for PTEU to continually monitor the electricity supply and stay informed about any changes in the renewable energy certificates (RECs) or power purchase agreements (PPAs) to ensure ongoing compliance with renewable sourcing.

It is crucial to document and communicate the company's zero Scope 2 emissions to stakeholders, clients, and employees to showcase the office's dedication to sustainability

[5] The Assessment's boundaries do not include indirect emissions arising from the management of the national/European grid delivering the electricity to PTEU.

and encourage others to follow suit. This achievement should be highlighted in sustainability reports, company communications, and any relevant public platforms to inspire and promote sustainable practices within the industry and beyond.

Scope 3 Emissions Breakdown

Business travel and office materials input were identified as the primary sources of indirect Scope 3 emissions. Compared to 2022, the significance of internal freight (the transportation of prototypes and samples for PTEU's internal use and sales promotion) was reduced and replaced by a significant increase in long-distance business traveling.

A detailed breakdown of Scope 3 emissions sources is available below.

Table 4: Scope 3 emissions from PTEU's activities in 2023

Emission Sources	Activity Data's Quality	Unit	2023 GHG Emissions (Tons CO_2e)
Internal Freight	Measured data	Tons*km	**11.50**
Business Travel	Measured & estimated data	Passenger*km	**53.70**
Employees Commuting	Measured data	Passenger*km	**26.52**
Office Materials Input	Measured & estimated data	€	**61.25**
Upstream emissions from energy consumption (outside Scope 1&2)	Measured & estimated data	kWh	**13.73**

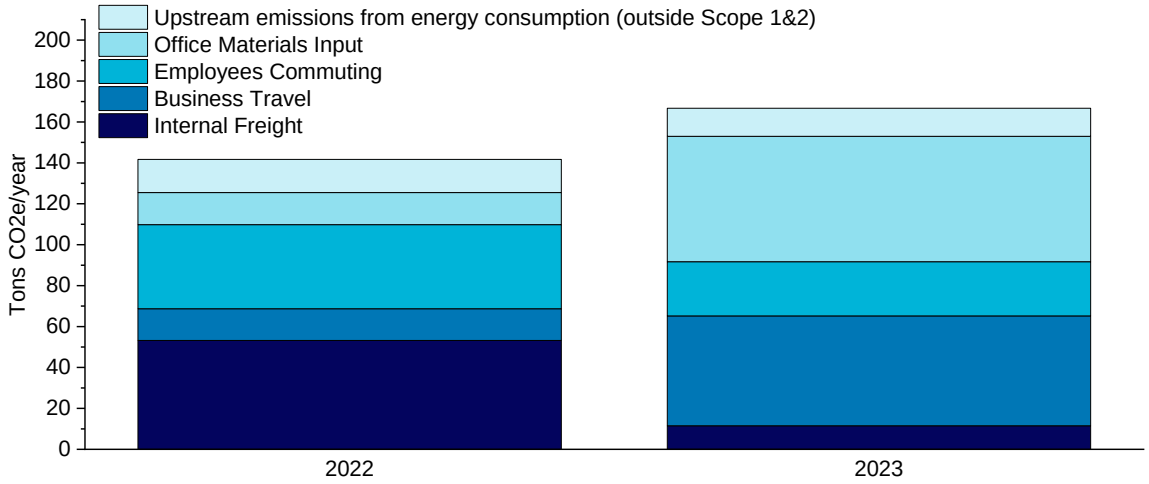

Figure 4: PTEU's Scope 3 emissions in 2023 and reference year 2022

Business Travel

PTEU's business travels in 2023 were carried out by plane, train and taxi/uber. The findings revealed a total of about **54** tons of CO2e associated with these travel practices. The largest and most significant contributor to emissions was flights, totaling about 53 metric tons. The extensive air travel conducted reached a total distance of about 490,000 km, compared to around 108,000 km in 2022. This large increase is to be expected, as 2023 marked the end of all Covid-19 travel restrictions in Asia, which reduced international travel by PTEU's staff in 2022. Transportation by train accounted for about 8,000 km (about half the distance covered in 2022), while travel by taxi and uber was only marginal in terms of total distance. No car rental was reported for 2023. These findings underscore the significant impact of air travel on the overall carbon footprint associated with PTEU's business operations.

These findings can be further analyzed by looking at average trip distance and corresponding emissions intensity. Business travels by plane were carried out with an average distance of 5,406 km (more than doubling the 2022 average), which highlights the appropriate usage of plane mostly for long-distance travel.

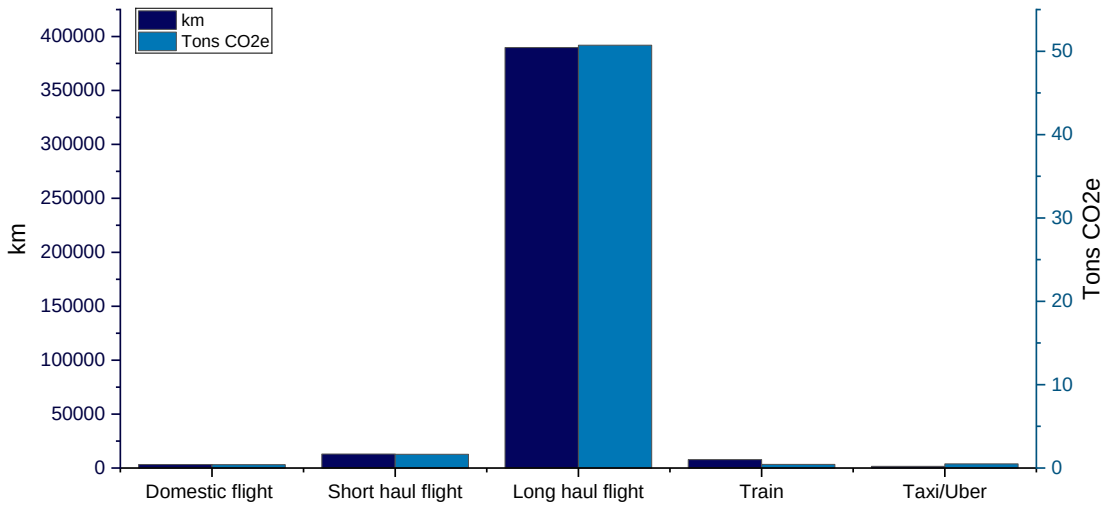

Figure 5: Scope 3 emissions from business travel by various means of transportation. Long haul flights are clearly identified as the first source of indirect emissions for PTEU

Taxi or uber rides were limited to extremely short trips on average (about 26 km distance). It is relevant to note that the activity data (km*vehicle) for business travel by taxi/uber was estimated from the monetary expenditure for each trip, as direct data on trips length was not available for the Assessment. As such, the cost of each trip was used to estimate the corresponding travelled distance according to a set of sources available online

(Taxifarefinder.com, Numbeo.com, Taxihowmuch.com). Such estimation carries a significant amount of uncertainty, but it is not believed to affect the overall results of this Assessment, as emissions from this type of activity are low among other Scope 3 emissions sources. However, total emissions from this type of activity were not significant when compared to other activities in Scope 3.

Employees Commuting

The predominant mode of transportation chosen by PTEU's employees was their private car, with only one worker daily commuting to work by bicycle and another one using a scooter.

The GHG emissions from employees commuting at PTEU in 2023 were about **26** tons CO2e, **95% of which is caused by diesel/petrol fuel-powered cars**.

Average yearly commuting distance was **4,807** km and total commuting distance was about **130,000** km, most of which was covered by diesel/gasoline-powered cars. Only 3 workers drove cars powered by LPG/methane, which are considerably less GHG intensive (see EF sources). In 2023, **2 workers started to use plug-in hybrid electric vehicles to commute**: to calculate the emissions of such vehicles, the covered distance (km) was divided with a 70% electric/ 30% gasoline engine split.

Internal Freight

Emissions from transporting prototypes and samples, mostly between PTEU's offices and PACTEAM Group's production center in Donggugan (China), were significantly lower in 2023 compared to 2022. Total transported weight amounted to just over 2 tons, mostly delivered by air transport mixed with short connecting transfer via road.

Accordingly, the total emissions for PTEU's internal freight (operated by third party) are calculated at **11.5 tons** CO2e, 7% of PTEU's total GHG emissions in 2023 (down from about 38% in 2023).

Materials Input

To calculate the emissions arising from materials inputs (office consumables and equipment), the use of monetary ratios instead of detailed data on purchased materials was chosen. This is to simplify the assessment and it was decided after a preliminary estimation of the overall significance of such activities in the overall PTEU's carbon footprint.

Thus, the total expenditure in 2023 on such materials was calculated and coupled with the appropriate EF as suggested by ADEME Bilan Carbone® methodology (see Sources of emission factors). By applying the appropriate EF, PTEU's Scope 3 emissions from the input of office consumables (paper, pens, printing consumables etc....) and equipment

(computers, printers, furniture etc....) were estimated at **3 tons** CO2e and **58 tons** CO2e respectively. It is important to note that the chosen method to calculate such emissions contains a significant amount of uncertainty (50% uncertainty on the EF as outlined by ADEME Bilan Carbone®).

PTEU's indirect GHG emissions from purchasing office materials and equipment were significantly higher in 2023 compared to the reference year 2022. The increase is due to a **significant investment in partially renovating PTEU's office premises**, with the purchase of **new office equipment and furniture**. As such, the significant emissions in this category in 2023 are likely to be **an outlier** when compared to past and future assessments.

Sources of Emission Factors

Emission Sources	Emission Factor	Unit	Reference
Consumption of diesel by company-owned vehicles	2.511	Kg CO2e/l	[1]
Heating (natural gas)	0.205	Kg CO2e/kWh	[1]
Electricity consumption - Italian Grid	0.416	Kg CO2e/kWh	[2]
Electricity consumption – 100% renewable energy	0.000	Kg CO2e/kWh	[3]
Business Travel – Air – Domestic flight (<500km)	0.129	Kg CO2e/psg*km	[4]
Business Travel – Air – Short flight (500-1200km)	0.080	Kg CO2e/psg*km	[4]
Business Travel – Air – Long flight (>1200km)	0.102	Kg CO2e/psg*km	[4]
Business Travel - Train	0.031	Kg CO2e/psg*km	[1]
Business Travel – Taxi/Uber	0.325	Kg CO2e/km	[1]
Employees Commuting – Diesel/Gasoline car	0.214	Kg CO2e/km	[1]
Employees Commuting – LPG/Methane car	1.86	Kg CO2e/l	[1]
Employees Commuting – Scooter	0.167	Kg CO2e/km	[1]
Employees Commuting – Plug-in Hybrid	0.121	Kg CO2e/km	[5]
Office Materials Input - Consumables	0.367	Kg CO2e/€	[1]
Office Materials Input – Office equipment & furniture	0.917	Kg CO2e/€	[1]
Upstream emissions from Diesel supply chain (not in Scope 1-2)	0.665	Kg CO2e/l	[1]
Upstream emissions from Ngas supply chain (not in Scope 1-2)	0.039	Kg CO2e/kWh	[1]

Reference No.	Source
[1]	ADEME Base Carbone® V11.2 – Clim'Foot Tool (EU)
[2]	Calculated from https://www.irena.org/-/media/Files/IRENA/Agency/Statistics/Statistical_Profiles/Europe/Italy_Europe_RE_SP.pdf
[3]	2006 IPCC Guidelines for National Greenhouse Gas Inventories
[4]	US EPA- https://www.epa.gov/climateleadership/ghg-emission-factors-hub
[5]	Calculated by Responsabilitas, based on [2] and [3]

Recommendations for Emissions Mitigation

PTEU's corporate carbon footprint can be reduced by applying a range of key performance indicators (KPIs) to the main emission sources (heating, business travel and internal freight) and plan emission mitigation strategies accordingly for the short, medium, and long-term.

The purpose of implementing KPIs is to gain a better understanding of emission sources, monitoring them on monthly basis, and discovering new mitigation strategies to adopt. Mitigation strategies serve the goal of reducing PTEU's emissions: their impact should be monitored by repeating the corporate carbon footprint assessment on a year-to-year base, with this report serving as baseline.

The following is a list of recommendations, divided in the three scopes in which emissions fall into. **IMPORTANT DISCLAIMER:** the mitigation potentials (avoided emissions of GHGs) listed in the following pages are general estimates, which could dramatically vary depending on PTEU's setting. It is advised to consider such estimates as a screening to evaluate GHG mitigation measures to be further investigated with detailed analysis.

Scope 1:

KPI(s)

Emissions in Scope 1 for PTSA are limited to consumption of fuel for company vehicles (diesel) and heating (natural gas).

Suggested KPI(s) to implement and monitor:

1.A - Company vehicles:

i. Average fuel consumption for company vehicles (km/l)
ii. Number of separate trips per month
iii. Average length of trips (monthly)[6]
iv. % of EVs in company-owned fleet

1.B – Heating:

i. Consumption of energy for heating purposes, yearly (kWh/y)
ii. Annual energy consumption per person (kWh/(person*year))
iii. Annual energy consumption per floor area (kWh/(m2*year))

[6] Literature shows that short trips (<25km) in an urban environment have a higher environmental impact/km than longer trips

iv. Difference between temperature maintained in PTEU's premises (°C) and outside temperature (sampled 2 times per week, morning and afternoon), when heating system is on.

Possible mitigation measures

Emissions from company-owned vehicles:

- ✓ Switching diesel-powered company-owned fleet to LPG or electricity-powered vehicles (EVs). LPG vehicles emit 30-40% CO2/km[7] compared to diesel-powered vehicles, while electric vehicles' emissions depend on local energy grid's composition. Should PTEU set up charging stations on its premises for its vehicles and use the 100% renewable energy mix that supplies its office and warehouse, emissions from company-owned vehicles would be nullified (potentially removing about 11% of total GHGs emissions).

Emissions from heating:

- ✓ *Improve Energy Efficiency*: Enhance the insulation of the building to minimize heat loss and improve energy efficiency. This can include insulating walls, ceilings, and floors, as well as sealing any gaps or leaks.
- ✓ *Upgrade Heating System*: Install a more efficient natural gas heating system. Consider replacing an older, less efficient boiler with a newer condensing boiler, which can significantly reduce fuel consumption and emissions.
- ✓ *Smart Heating Controls*: Utilize smart thermostats and heating controls to optimize the heating system's operation. These devices can adjust temperature settings based on occupancy patterns, ensuring that heating is only provided when needed.
- ✓ *Zoning and Timers*: Divide the office into zones and utilize timers or programmable thermostats to control heating in different areas separately. This way, you can avoid heating unoccupied spaces or keeping the temperature too high during off-peak hours.
- ✓ *Renewable Energy Integration*: Explore the possibility of integrating renewable energy sources into your heating system. For example, you could consider installing solar thermal panels to supplement the natural gas heating during sunny periods.
- ✓ *Heat Recovery*: Implement heat recovery systems to capture and reuse waste heat from various processes or equipment in the office. This could involve heat recovery ventilation, which preheats incoming fresh air using the waste heat from exhaust air.
- ✓ *Employee Awareness and Behavior*: Raise awareness among employees about the importance of energy conservation and encourage them to adopt energy saving

[7] GHG Protocol https://ghgprotocol.org/corporate-standard

practices. This includes reminding them to turn off the heating when leaving for the day and encouraging them to dress appropriately for the season.

- ✓ *Regular Maintenance and Inspections*: Ensure that the heating system receives regular maintenance and inspections to keep it operating at peak efficiency. This includes cleaning and servicing the boiler, checking for leaks, and optimizing its performance.
- ✓ *Consider Alternative Heating Options*: Evaluate alternative heating options that have lower emissions, such as district heating systems or heat pumps powered by renewable electricity. These options may require initial investments but can significantly reduce or eliminate natural gas usage.

The range of reduction in Scope 1 emissions can vary depending on several factors, including the efficiency of the existing natural gas boiler, the energy consumption of the office, and the implementation of energy-saving measures. However, here are some general estimates of potential emission reductions compared to a baseline of heating with a conventional natural gas boiler:

1. *Efficiency Improvements*: By upgrading to a more efficient natural gas boiler, such as a condensing boiler, it is possible to achieve energy savings of around **10% to 30**%. This improvement in efficiency would result in corresponding reductions in emissions.
2. *Building Insulation*: Enhancing the insulation of the office building can lead to energy savings of approximately **10% to 20**%. The reduced energy demand would result in lower emissions from the natural gas boiler.
3. *Smart Heating Controls*: Implementing smart heating controls and zoning strategies can help achieve energy savings of around **10% to 20**%. By optimizing heating patterns and avoiding unnecessary heating in unoccupied areas, emissions can be reduced.
4. *Renewable Energy Integration*: Integrating renewable energy sources into the heating system, such as solar thermal panels, can significantly reduce natural gas consumption. Depending on the size of the installation and solar resources, emission reductions of **20% to 50**% or more may be possible.
5. *Heat Recovery Systems*: Implementing heat recovery systems can capture waste heat and reuse it for heating purposes, leading to energy savings of approximately **5% to 15**%. This would result in emissions reductions from the natural gas boiler.

It's important to note that these estimates are approximate and can vary depending on specific circumstances and the extent of implementation. It's recommended to conduct a

detailed energy audit and consult with energy experts to assess the potential for emissions reduction in PTEU's particular setting.

Scope 2:

PTEU's has already adopted a best practice to mitigate Scope 2 emissions, as it sources its electricity from a certified 100% renewable sources mix. Therefore, at this stage it is **suggested to prioritize the other Scopes when planning procedures to mitigate GHGs** emissions from the company's operations.

Scope 3 – Business travel and employees commuting:

It is suggested to maintain a KPIs database related to business travel and commuting, so that the frequency and intensity of such activities can be properly monitored and planned, to effectively mitigate the resulting GHGs emissions when appropriate. Following the suggested KPIs:

KPIs

3.A –Business travel:

i. % of trips done using emission-intensive transportation means (plane, car) over total number of trips, yearly
ii. % of trips in the 300km-1000km distance interval for which train was used over plane, car
iii. Number of international long-haul flights (>4000km), yearly
iv. Total number of business trips, detailed by means of transportation, number of participants and total km

Note: depending on company policy, both 3.A-i and 3.A-ii KPIs could be also calculated on an employee basis and shared yearly, for intrinsic motivation by peer comparison

3.B – Employee commuting:

i. % of employees regularly using public transport for commuting ii.
ii. % of employees using EVs for commuting
iii. Average employee commuting distance (km/year)

Possible mitigation measures

✓ One applicable mitigation measure would be to **encourage the use of remote meetings** over long-distance flights, thus reducing the number of 4000km + plane trips. For example, a 60% reduction in such flights would translate in a 55% reduction in PTEU's overall Scope 3-business travel emissions.

- ✓ Emissions arising from employees commuting could be reduced by implementing a hybrid work schedule (remote and in-office) based on the commuting distance.
- ✓ Encourage employees to purchase EVs. This can be done by various measures such as company incentives and training to sensibilize the positive effects of EVs on the environment.

Scope 3 – Internal freight:

While its significance in 2023 was reduced compared to 2022, internal freight is still to be considered among the prime sources of GHGs arising from PTEU's activities, mostly due to the distance between PTEU's area of operations and the manufacturing point in China. While it is difficult to effectively tackle this issue, as PTEU does not operate nor control the shipping operator (international currier), PTEU should consider the following GHG mitigation KPIs and strategies:

KPIs:

3.C-Internal freight:

i. *Emissions Intensity per Unit*: Calculate emissions intensity by dividing the total emissions from internal freight by a relevant unit, such as revenue generated. This helps assess emissions efficiency relative to business metrics.
ii. *Modal Shift: Track the percentage of freight that has shifted to lower-emission transportation modes, such as rail or water transport, compared to the baseline.*
iii. *Packaging Optimization*: Measure the reduction in packaging material weight or volume to assess the effectiveness of efforts to optimize packaging and reduce emissions associated with freight transportation.

Potential mitigation measures:

- ✓ *Mode Shifting*: Shift transportation modes to those with lower emissions. Whenever feasible, PTEU should consider using rail or water transport instead of road/air transport, as they generally have lower emissions per ton-kilometer.
- ✓ *Sustainable Packaging*: Optimize packaging materials to reduce weight and volume, which can lead to more efficient transportation with fewer trips required. Use recyclable or biodegradable packaging materials to reduce environmental impact.
- ✓ *Measurement and Reporting*: Implement robust measurement and reporting systems to track and monitor your internal freight emissions. Regularly assess your progress, set reduction targets, and communicate your efforts transparently to stakeholders.

Since at the time of this Assessment there was no available data on packaging weight, an appropriate estimate of the mitigation potential of such measures should be calculated after the implementation of the KPI 3.C-iii.

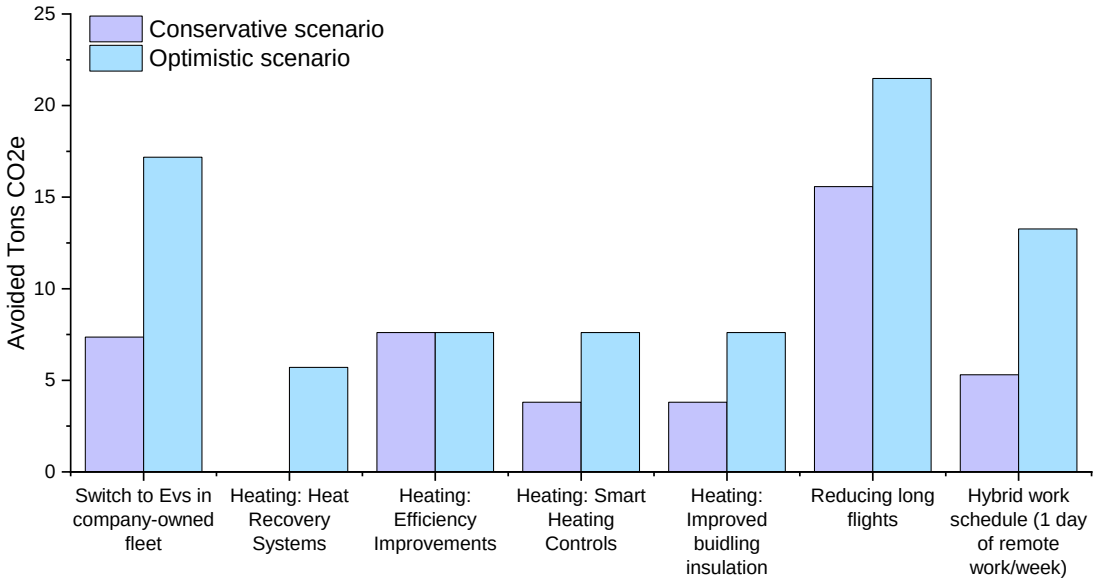

Figure 6: Simple mitigation scenarios for PTEU's emissions (avoided Tons of CO2e are calculated based on 2023's total emissions for each activity). Overall mitigation ranges between 20% to 35% of total emissions in 2023.

IMPORTANT DISCLAIMER: the mitigation potentials (avoided emissions of GHGs) listed in the previous pages and above are general estimates, which could dramatically vary depending on PTEU's setting. It is advised to consider such estimates only as a screening to evaluate GHG mitigation measures to be further investigated with detailed analysis (e.g., energy analysis on PTEU's premises, evaluation of heating system's improvements, installation of renewable energy systems etc..).

List of recommended KPIs

Note: KPIs already implemented by PTEU (or easily calculated with yearly collected data) are highlighted in **green**:

Scope	KPI No.	KPI Target	Units
1 – Company vehicles	1.A-i	Average fuel consumption for company vehicles	km/l
	1.A-ii	Number of separate trips per month	number
	1.A-iii	Average length of trips (monthly, yearly)	km
	1.A-iv	% of EVs in company-owned fleet	%
1 - Heating	1.B-i	**Consumption of energy for heating purposes, yearly**	**kWh/y**
	1.B-ii	Annual energy consumption per person	kWh/person
	1.B-iii	Annual energy consumption per floor area	kWh/m2
	1.B-iv	Difference between temperature maintained in PTEU's premises (°C) and outside temperature (sampled 2 times per week, morning and afternoon) when heating system is on	°C
3 – Business Travel	3.A-i	**% of trips done using emission-intensive transportation means (plane, car) over total number of trips, yearly**	**%**
	3.A-ii	**% of trips in the 300km-1000km distance interval by train over plane, car**	**%**
	3.A-iii	**Number of long-haul flights (>4000km), yearly**	**number**
	3.A-iv	**Total number of business trips, detailed by means of transportation, number of participants and total km**	**various**
3 – Commuting	3.B-i	**% of employees regularly using public transport for commuting**	**%**
	3.B-ii	**% of employees using EVs for commuting**	**%**
	3.B-iii	**Average employee commuting distance**	**km**
3 – Internal Freight	3.C-i	Average weight of packaging	kg
	3.C-ii	Emission intensity per package unit	Kg CO_2/unit
	3.C-iii	Percentage of deliveries done by using water/railway over total	%