PEMBROKE
COLLEGE OXFORD

Carbon Footprint for Pembroke College

Reporting Period: August 2021 – July 2022

Unverified Inventory

5th June 2023

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Contents

1 Summary

This carbon footprint inventory was prepared for Pembroke College, Oxford for the reporting period August 1st 2021 to July 31st 2022.

Organisation Background Name: Pembroke College, Oxford
Contact Person: Daisy Jowers
Area of Business: Academic Institution
Business Description: Part of a public research university, University of Oxford, Pembroke College provides college courses to undergraduate and postgraduate students.

Report Period August 1st 2021 - July 31st 2022

Organisational Boundary This measurement covers all operational sites of the college, including emissions occurred during student commute and business travel

Reporting Boundary Business Operations Scope 3 emissions resulting from:

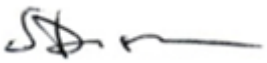
- Global Scope 3: Indirect Emissions
  - Purchased goods and services
  - Capital goods
  - Fuel- and energy related activities (not included in scope 1 or scope 2)
  - Waste generated in operations
  - Business travel
  - Employee commuting
  - Student Commute

Omissions

- Employee Wages

Emissions Total Scope 3 emissions = 2712.03t tCO2e

Report Prepared by:



Sara Dusza
Date: 5th June 2023

Approved by:

Stu Meades
Date: 5th June 2023

2 Background

This report is the first Scope 3 greenhouse gas (GHG) emissions inventory prepared for Pembroke College, Oxford. It was prepared in accordance with the requirements of ISO 14064-1 (ISO, 2018) and covers the period August 1st 2021 - July 31st 2022.

2.1 Communication and Dissemination

This inventory was prepared as a management tool for Pembroke College, Oxford to assist it in managing its response to climate change and its reduction of greenhouse gas emissions.
In addition to this the document is intended to be a communication tool that demonstrates to its stakeholders that it has identified its emissions profile and is taking the issues of climate change seriously.
The intended users of this report will include but are not limited to the staff and managers of Pembroke College, Oxford, their existing and potential students as well as members of the public.

2.2 Reporting Period

The inventory is for the reporting period August 1st 2021 - July 31st 2022, corresponding with the academic year at Pembroke College, Oxford. The reporting period August 1st 2021 - July 31st 2022 will be evaluated as a base year enabling future evaluation of carbon emissions in order to comprehensively and consistently track corporate GHG emissions across all Scope 3 categories in consequent reporting periods.

2.3 Data Included

Data included in this inventory is all Pembroke College, Oxford operations covering Scope 3 emissions which result from its use of:

Global Scope 3: Indirect Emissions

- Purchased goods and services and capital goods
  - Canteen purchases
  - Professional services
- Fuel- and energy related activities (not included in scope 1 or scope 2)
  - Electricity consumption
  - Gas consumption
  - Water consumption
  - Sewerage consumption
- Waste generated in operations
- Business travel
  - Land
  - Air
  - Hotel
  - Restaurants/catering
- Student commute
  - Emissions from students traveling to Oxford from origin location, including international and national travel

2.4 Preparation Accordance and Exclaimer

This inventory has been prepared in compliance with the International Standards for calculating and reporting an organisation's greenhouse gas emissions ISO:14064-1 (ISO, 2018) and covers the period

between August 1st 2021 to July 31st 2022. It should be noted that this measurement is an unverified inventory, but Greener Edge conducted a verification audit of the findings.

3 Scope 3 Reporting Boundary

This inventory includes five Scope 3 categories from identified emission sources (Figure 1). All following categories are included in the reporting boundary: purchased goods and services, waste disposal, business travel, fuel and energy related emissions (scope 3) and student commute. Greener Edge guidelines recommend inclusion of the staff commuting emissions in the scope 3 inventory, which were omitted due to unavailability of the data for the reporting year 2021-22. Reports for subsequent reporting periods are to include staff commute emissions.

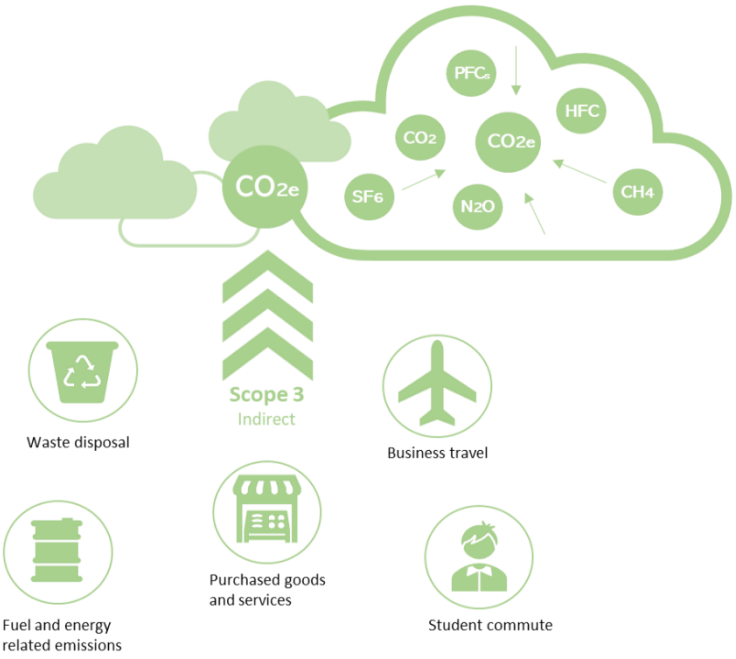


Figure 1. *Pembroke College, Oxford - emission sources.*

4 Greenhouse Gas Inventory

4.1 Methodology

The GHG inventory was prepared in compliance with the international standards for calculating GHG emissions as specified in "*ISO 14064-1 (2018) Specification with guidance at the organization level for quantification and reporting of GHG emissions and removals*" (ISO, 2018). Furthermore, the report adheres to the standards outlined in the Greenhouse Gas Protocol guidance, "*A Corporate Accounting and Reporting Standard The Greenhouse Gas Protocol*" (BEIS, 2021). In measuring this inventory, we followed the principles outlined in both ISO 14064-1 and The Greenhouse Gas Protocol reporting approach.

4.2 Data Collection

Data was obtained by Pembroke College, Oxford staff with support from Greener Edge when needed. Table 1 below, provides an overview of where data was collected for each emission source. Emissions were determined using carbon intensity factors obtained from "*Greenhouse Gas Reporting: Conversion Factors*" (BEIS, 2022) and "*Table 13 Indirect Emissions from the Supply Chain" (DEFRA, 1990-2019).* The calculation employed for determining EESG's greenhouse gas emissions inventory was by multiplying the emissions source activity data with the emissions factor, as indicated in the formula below:

$$\text{Tonnes } CO_2e = \sum \text{ghg activity} \times EF$$

Where $\sum$ghg activity equals the sum of greenhouse gas activity and EF equals the emissions factor for the greenhouse gas activity. Multiplying these gives the total quantity of greenhouse gas emissions per activity. For example, 4000 kilowatt hours (KWH) of electricity (the greenhouse gas activity) is multiplied by 0.000097 (the emission factor, tonne of CO_2e per kwh of electricity) to equal 0.388 tCO_2e.

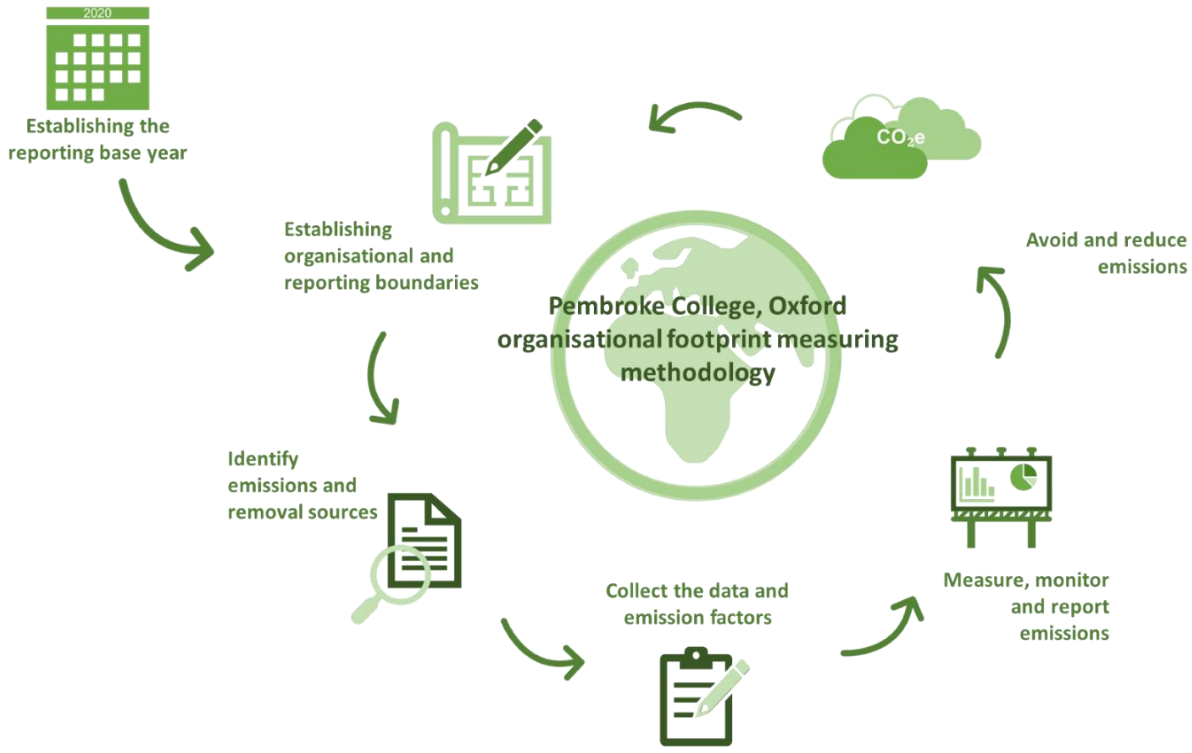


Figure 2. *Pembroke College, Oxford methodology for measuring Scope 3 the organisational footprint.*

Activity data for Oxford College, Pembroke was obtained from a range of sources, these sources are fully outlined in Table 1 below. Greenhouse gas emissions factors were generally sourced from GHG conversion factors (BEIS, 2022) and "*Table 13 Indirect Emissions from the Supply Chain"* (DEFRA, 1990-2019). A full list of the emissions factors used is shown in. Appendix 1: Emission Factors.

Table 1. *Details of data sources for Pembroke College emissions*

Emission Source	Unit	Data Source
Electricity	kWh	Internal logbook
Purchased goods and services	£	Invoices from suppliers and total amount spent
Capital goods	£	Invoices from suppliers and total amount spent
Fuels (burning gas)	kWh	Internal record keeping as provided by energy consultancy
Waste disposal	£	Invoices from waste operators
Water and sewerage	m^3	Invoices from Castle Water
Business travel	£	Invoices from suppliers and internal record keeping
Student Commute	km	Data sourced from a survey combined with internal data on number of students

5 Pembroke College, Oxford - Greenhouse Gas Scope 3 Profile

The total Scope 3 emissions for Pembroke College were 2712.03tCO_2e for the reporting period August 1st 2021 - July 31st 2022.

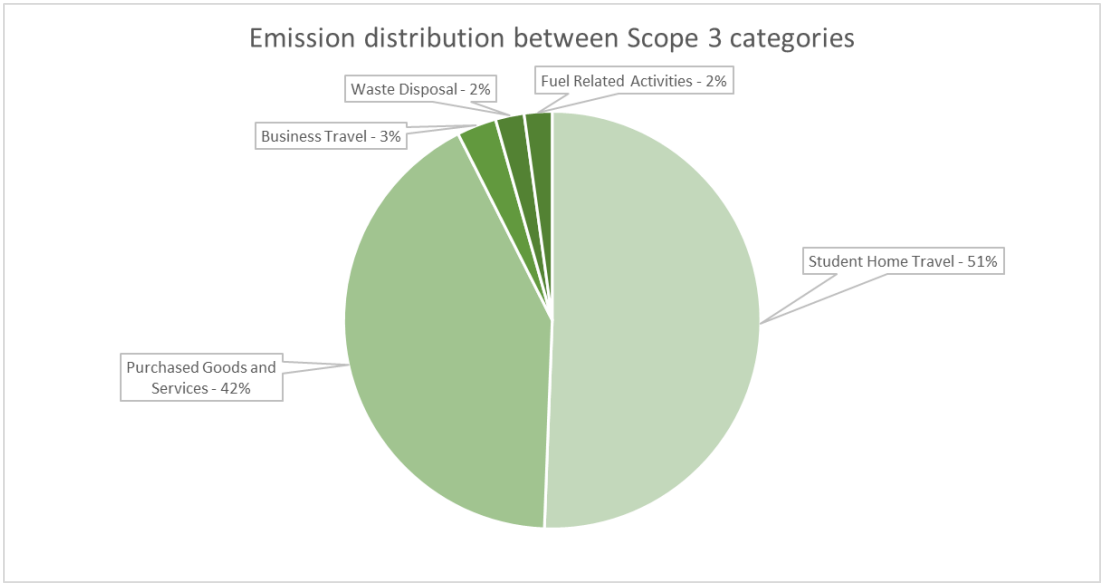


Figure 3*. Pembroke's College, Oxford Scope 3 emission distribution by categories*

Breaking the calculated Scope 3 emissions down by Scope 3 categories, Student Home Travel has the largest contribution of 51% followed by Purchased Good and Services with 42% and Business Travel at 3%. Waste Disposal and Fuel Related Activities that are not included in Scope 1 and 2 both accounted for 2% of total Scope 3 emissions each. This is represented in Figure 3 and the individual values can be seen in Table 2.

***Table 2**. Pembroke College, Oxford emission distribution by scope 3 categories*

Scope 3 categories	tCO2	%
Student Home Travel	**1372.2**	**51%**
Student Home Travel - International - UG	832.5	
Student Home Travel - International - PG	280.4	
Student Home Travel - International - Research	139.4	
Student Home Travel - International - Visiting	65.9	
Student Home Travel - National	54.1	
Purchased Goods and Services	**1137.5**	**42%**
Canteen Food	309.9	
All other purchased goods and services	827.7	
Business Travel	**83.2**	**3%**
Flights	65.8	
Other	17.4	
Waste Disposal	**60.4**	**2%**
Fuel - and energy related activities (not included in scope 1 or scope 2)	**58.7**	**2%**
Gas Consumption	50.3	
Water Consumption (m3)	3.0	
Sewerage Discharge (m3)	5.4	
Total	**2712.0**	**100%**

5.1 Emissions by Activity

Exploration of Scope 3 emissions by activity reveals that the top contributor of carbon emissions is International Student Home Travel made by undergraduate students (Figure 3 and Table 3), making up a total of 31% of all Scope 3 emissions. Food ingredients purchased in the canteen are second biggest contributor – accounting for 11% of all Scope 3 emission, partly due to high intensity of meat products. Student Home Travel made by postgraduate students contributed to 10%. The specific values and percentages of emissions for each activity can be seen in Table 3. Over half of all emissions (51%) can be contributed to international student travel between home destination and the college due to high emission intensity of travelling by plane. The remaining activities (Figure 4) are more equally distributed due to a variety of services offered by the college. A large proportion of Scope 3 emissions were emissions generated by purchased services, such as legal services, services to buildings or repair services. Scientific and research services are also in the top 5 contributors – 7% of all Scope 3 emissions.

Staff commute is likely to be among the top contributors of Scope 3 emissions however staff commute emissions were omitted from Scope 3 calculations due to lack of availability of data for reporting year 2021-2022. The carbon intensity metrics used in the metrics were sourced from GHG conversion factors (BEIS, 2022), SIC and COICOP conversion factors (DEFRA, 1990-2019).

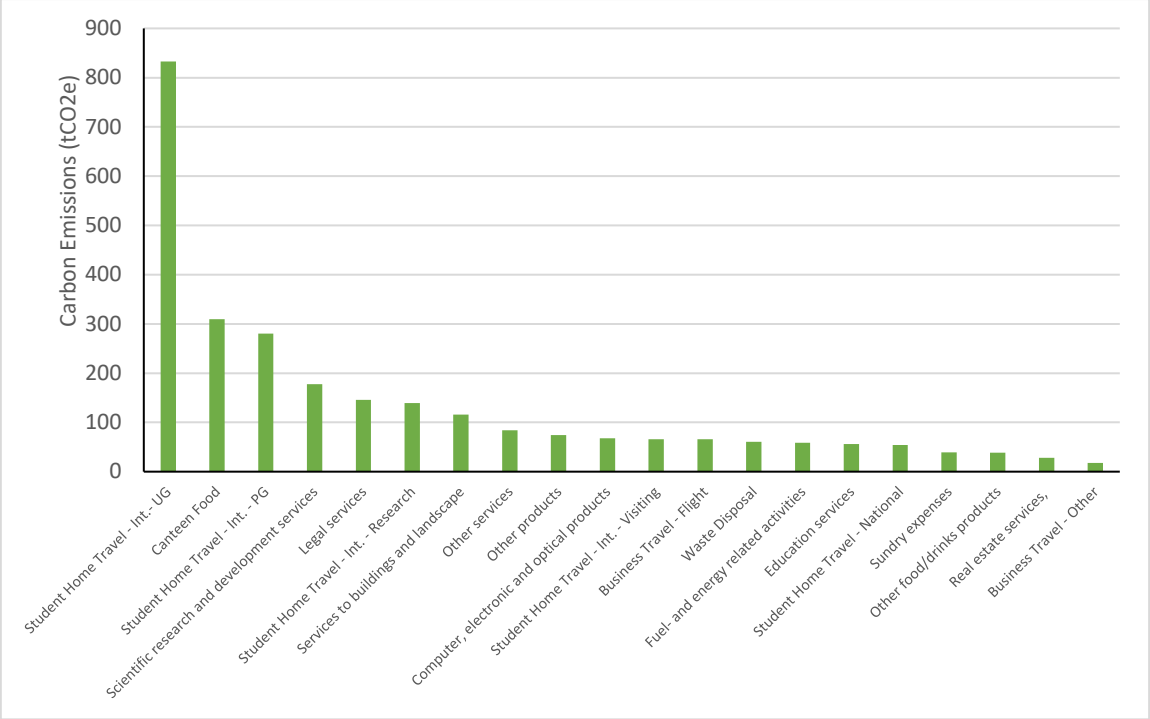


Figure 3. *Pembroke's College, Oxford emission distribution across scope 3*

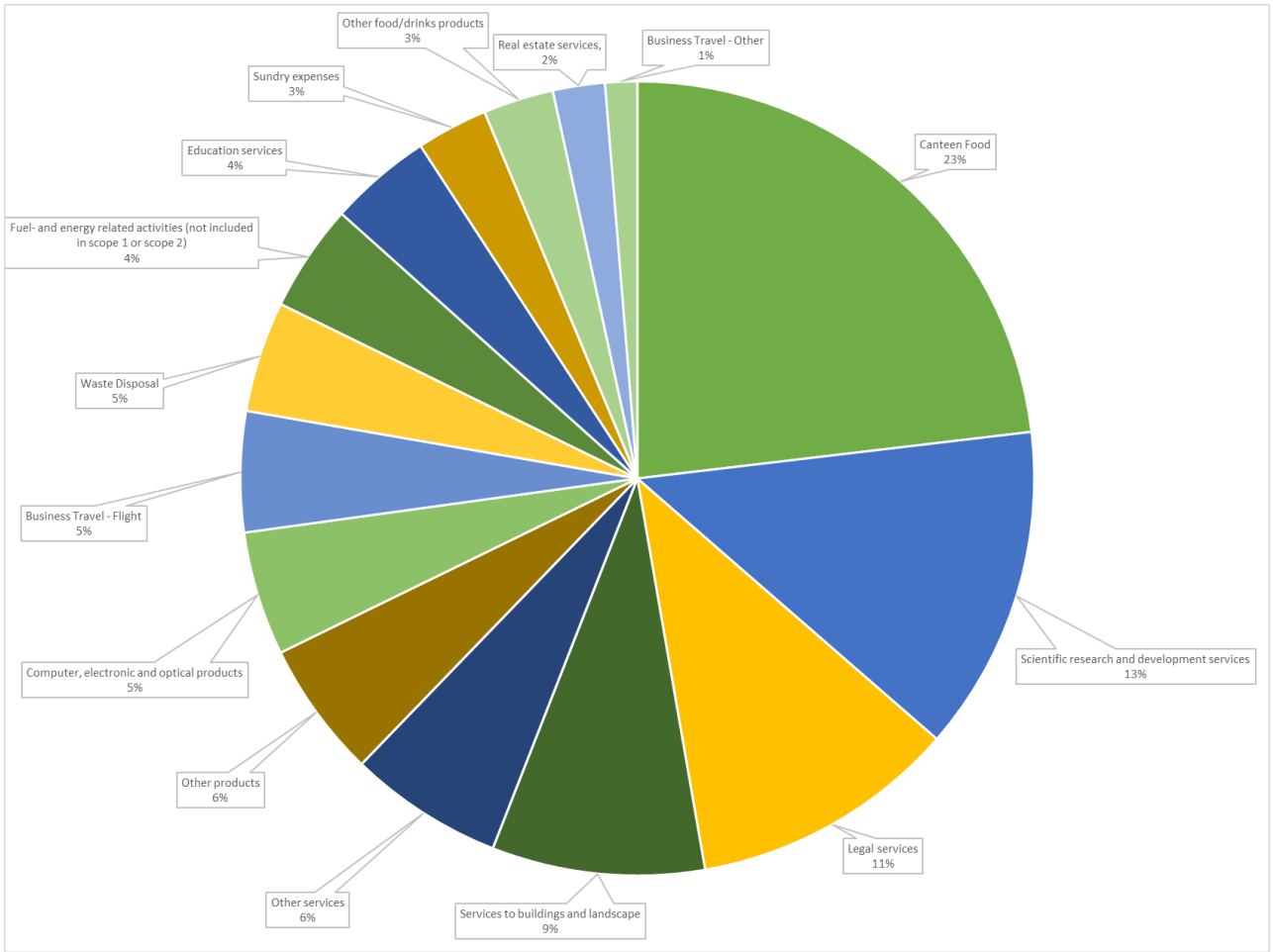


Figure 4*. Pembroke Colleges, Oxford Scope 3 emission distribution across all 15 activities excluding student home travel, equating to 49% of all Scope 3 emissions.*

Table 3. *Pembroke College, Oxford emissions distribution across scope 3 activities*

Activity	Scope 3 Category	Data source	Total emissions (tCOe2)	Percentage (%)
Student Home Travel - International - UG	Student Home Travel	DEFRA GHG Conversion Factors 21/22	832.5	31%
Canteen Food	Purchased Goods and Services	Detailed Spend - SIC	309.9	11%
Student Home Travel - International - PG	Student Home Travel	DEFRA GHG Conversion Factors 21/22	280.4	10%
Scientific research and development services	Purchased Goods and Services	Spend - COICOP	177.8	7%
Legal services	Purchased Goods and Services	Spend - COICOP	145.7	5%
Student Home Travel - International - Research	Student Home Travel	DEFRA GHG Conversion Factors 21/22	139.4	5%
Services to buildings and landscape	Purchased Goods and Services	Spend - COICOP	116.1	4%
Other services	Purchased Goods and Services	Spend - COICOP	84.3	3%
Other products	Purchased Goods and Services	Spend - COICOP	74.4	3%
Computer, electronic and optical products	Purchased Goods and Services	Spend - COICOP	67.6	2%
Student Home Travel - International - Visiting	Student Home Travel	DEFRA GHG Conversion Factors 21/22	65.9	2%
Business Travel - Flight	Business Travel	DEFRA GHG Conversion Factors 21/22	65.8	2%
Waste Disposal	Waste Disposal	Spend - COICOP	60.4	2%
Fuel- and energy related activities (not included in scope 1 or scope 2)	Fuel- and energy related activities (not included in scope 1 or scope 2)	DEFRA GHG Conversion Factors 21/22	58.7	2%
Education services	Purchased Goods and Services	Spend - COICOP	56.1	2%
Student Home Travel - National	Student Home Travel	DEFRA GHG Conversion Factors 21/22	54.1	2%
Sundry expenses	Purchased Goods and Services	Spend - COICOP	39.0	1%
Other food/drinks products	Purchased Goods and Services	Spend - COICOP	38.4	1%
Real estate services, excluding on a fee or contract basis and imputed rent	Purchased Goods and Services	Spend - COICOP	28.4	1%
Business Travel - Other	Business Travel	DEFRA GHG Conversion Factors 21/22	17.4	1%
Total			**2712.1**	**100%**

5.2 Scope 3 emissions from Purchased Canteen Food

SIC conversion factors (DEFRA, 1990-2019) were used to analyse the carbon emissions from total spend on food in the canteen. A total of 309.85 tCO2e was generated from food. Meat was found to be the main contributor of emissions – equating to the 61% of total emissions generated from food. This is despite a relatively low spend on meat (15% of the annual budget). Second biggest contributor was found to be grouped together – milk, cheese and eggs, equating to 12% of total emissions (Table 4 and Figure 5). In comparison, 22% of the budget was used to purchase vegetables and fruit, which only contribute to 3% of emissions due to the low carbon intensity of plant-based produce.

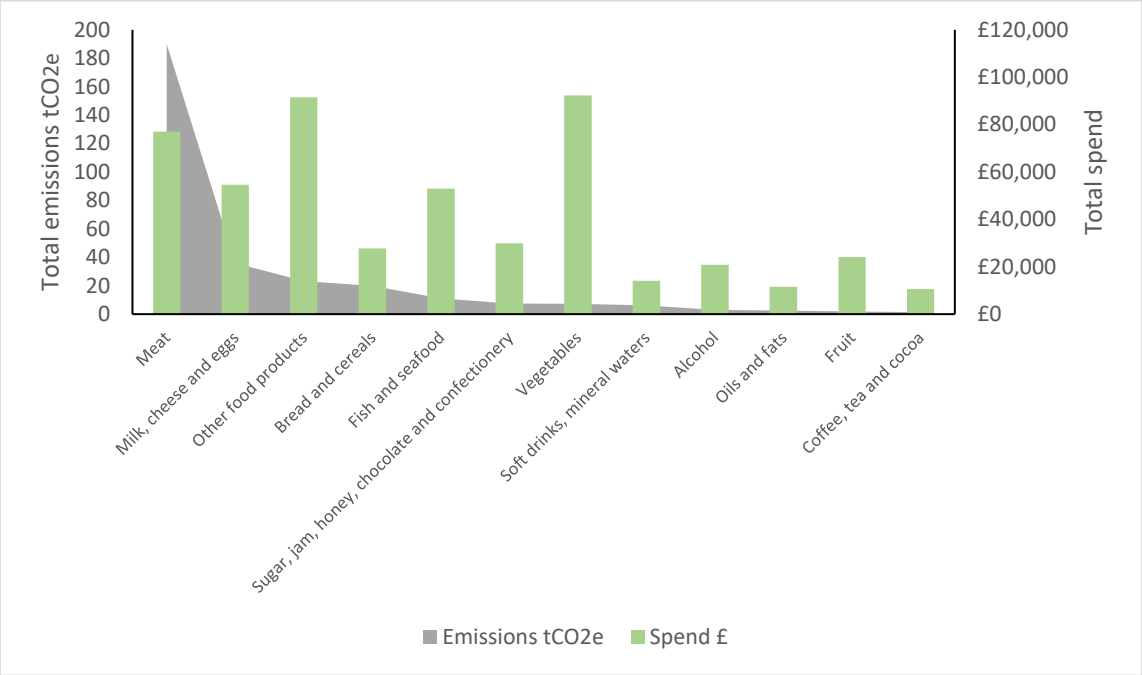


***Figure 5**. Total food emissions by each food category*

***Table 4.** Total food emissions by category*

Emission category	Emissions tCO2e	% of emissions	Spend	% of spend
Meat	189.92	61%	£77,079.16	15%
Milk, cheese and eggs	35.86	12%	£54,670.89	11%
Other food products*	23.15	7%	£91,473.42	18%
Bread and cereals	19.94	6%	£27,703.87	5%
Fish and seafood	11.11	4%	£53,051.49	10%
Sugar, jam, honey, chocolate and confectionery	7.58	2%	£29,934.93	6%
Vegetables	7.25	2%	£92,350.86	18%
Soft drinks, mineral waters	6.17	2%	£14,147.42	3%
Alcohol**	3.08	1%	£20,839.61	4%
Oils and fats	2.45	1%	£11,539.61	2%
Fruit	1.89	1%	£24,127.82	5%
Coffee, tea and cocoa	1.45	0%	£10,548.07	2%
	309.85	**100%**	**£ 507,467.15**	**100%**

*Other food products include spices, sauces, ready foods, mixed ingredients, and other foods with descriptions that cannot be assigned to any other category
**Alcohol data was adjusted based on discussions with Pembroke College – Alcohol category includes beer, spirits, cooking wine, cider and small portion of spend on wine, ~£25k spend on wine was excluded from 'Purchased Canteen Food' and included in 'Purchased Goods and Service' due to college investing in wine used for evening services

5.3 Uncertainty and data quality

To ensure that a comprehensive footprint measurement is completed, it is appropriate to estimate activities should accurate data not be available. Such estimates must be based on scientifically derived estimation to ensure accuracy. In the case of Pembroke College, Oxford's carbon footprint measurement, there are areas of uncertainty which are as follows:

Business Travel: Covid measures in late 2021 were likely still affecting business travel. Current internal reporting system of travel expense tracking partly used to calculate emissions from business travel may be underreporting, as reported by Pembroke College, Oxford. Emissions from business travel associated with the conference business to attend external business is not currently held by Pembroke College and hence could not be included in the scope 3 calculations. The system used to calculate emissions records the date of reimbursement, not the date of travel. Due to this there are concerns over data quality and uncertainty of data.

Student Commute:

- **National Student Commute**: was calculated based on the survey filled out by 121 students and extrapolated to 481 students. A sample of 121 students gives an estimate of all travel, but the accuracy is uncertain due to a varied behaviour of students. The survey was filled out by undergraduate students only, which behaviour likely differs from postgraduate and research students. Based on information provided by Pembroke College in an email exchange, it assumed that undergraduate students make 3 round journeys, postgraduate students make 2.5 round journeys and research students make 1 journey home. Based on survey responses, it was taken under account that 15.7% of students were planning to stay in college accommodation.
- **International Student Commute**: Due to poor quality of the survey responses related to international travel, it was decided by Greener Edge to use internal statistics on home destination of students and calculate emissions based on a total amount of international students. It was assumed that students would travel to most populated cities or capitals of destination countries from London Heathrow Airport, which is the most local international airport to Oxford. The survey responses of international students were used to estimate that 20% of students would stay in college accommodation and not travel. Based on information provided by Pembroke College in an email exchange, it was assumed that the number of round journeys made by undergraduate/postgraduate/research students was the same as national students. In line with the Oxford University Saiid Business School and Oxford University Estates Services report (2022), it was assumed that international students travel by flight only and all emissions of travel to and from the airport were omitted. Although flight emissions are expected to be the main source of international student travel, Greener Edge recommends to include emissions of travel to and from airports following the improvements made to the student travel survey.

Waste disposal: Due to low quality of data of quantities of waste collected, waste emissions were calculated from spend. Analysis of emissions by quantities of waste is a preferred, more accurate method and is recommended in the future.

5.4 Baseline year 2021/22

The evaluation of the 1st August 2021 – 31st July 2022 period has been conducted as a baseline exercise, in mind for reviewing feasibility to commit to Net Zero of direct and indirect carbon emissions, as well as setting goals for Scope 3 emissions, as part of the planned Pembroke College's, Oxford Sustainability Strategy 2023. The baseline emissions for reporting year 2021/22 have been

calculated to track the corporate GHG emissions comprehensively and consistently across Scope 3 emissions (Purchased Goods and Services, Fuel and energy related activities (not included in Scope 1 or 2), Business Travel, Waste Disposal, and Student Commute and future progress towards established goals. Staff Commute has been omitted due to lack of data for the reporting period.

6 Recommendations

6.1 Recommendations – data collection

To improve the quality of the future carbon emission reporting and enable more accurate tracking of the progress of prospective carbon reduction efforts, Greener Edge recommends the implementation of the following improvements in the data collection processes implemented by Pembroke College, Oxford:

- **Waste disposal** – it is recommended that Pembroke College, Oxfords starts recording a total volume of disposed waste by category type and treatment. Implementation of the reporting by each building will additionally improve clarity of the waste reduction strategies
- **Staff commute** – Greener Edge highly advises an implementation of a staff commuting reporting system. This can be done using internal human resource data of employees addresses or by carrying out a staff survey. Additionally, home working should be recorded so that emissions from home working can be counted.
- **Business travel** – implementation of the internal system tracking all business travel will improve the granularity of the data and ensure that the emissions are missed or double counted
- **Student commute** – the results of the student home travel survey carried out were inconclusive and contradictory in relation to international student travel and only conducted on an undergraduate cohort. Simplification of the survey and more wide application would improve quality of the data. As student home commute is one of the largest sources of emissions, Greener Edge recommends this category to be a focus of future reporting.
- **Canteen food data** – slight improvements to the quality of the dataset of canteen food purchases would enable more in-depth analysis of the carbon emissions from purchased ingredients. It is recommended that the quantities of types of food purchased are recorded by weight with improved accuracy

6.2 Recommendations – decarbonisation

Waste management – implementation of a waste hierarchy – **reduce, reuse, recycle** - should be at the heart of the waste management strategy. Conducting an in-depth waste audit can help identify the types and amount of waste generated by the Pembroke College and its sources. This will provide valuable insights to develop a waste reduction plan.
Another effective way to manage waste sustainably is by reducing waste at the source. This can be achieved by minimising the use of materials and resources, implementing efficient production processes, and avoiding single-use items. Emissions from waste can also be reduced if more waste is being recycled or composted. Intensity of emissions from general waste are much higher than if recycled or composted, especially in regard to the food and garden waste. Implementation of food collection service and garden waste composting would greatly reduce the carbon emissions from waste. Education of staff and students regarding the recycling is essential in ensuring implementation of the recycling/composting systems is successful. Supplier engagement activity

would also be recommended – ensuring suppliers provide goods sold on campus and ingredients used in the canteen in an easily recyclable or compostable materials.

Student commute – it is recommended that this emission category is a focus of carbon emission reduction efforts of the college as emissions from student home travel commute, especially international travel, were found to be the biggest contributor of Scope 3 emissions of Pembroke College. Those efforts could include discouraging students from travelling to their home destinations by providing on campus activities over inter term periods or encouraging the use of international rail by exploration of reimbursement systems. Another option to reduce student commute emissions is to offer a lift sharing scheme, which also benefits students in terms of financial savings and possibly contribute to the reduction of traffic. There are existing websites that offer lift sharing services, such as liftshare.com, or Pembroke College could consider implementation of a self-designed internal system.

Business travel – the main source of emissions from business travel are plane flights. Staff members should use flights only is necessary and economic class should always be used. Utilising video conferencing is a highly effective approach to diminish business travel and lower carbon emissions. With technological advancements, video conferencing has become a cost-effective and efficient means of holding meetings with colleagues, partners, and clients. This approach not only saves time and money but also reduces the carbon footprint linked to traveling. It is expected for academic staff to attend conferences – in recent years most conferences offer an option to attend 'remotely', which should be always a preferred method of conference attendance. In cases where travel is necessary, promoting sustainable modes of transportation such as buses or trains over driving can be encouraged. Trains generate less carbon emissions per passenger and can be more convenient for shorter journeys. For local meetings or events, carpooling or using public transportation is also a low carbon option.
Implementation of green travel policies that prioritise sustainable travel practices like walking, public transportation, carpooling, and bike sharing should be considered. Employees who adhere to these policies should be and rewarded, taking under consideration, e.g., additional time it takes to walk or take public transport to the meeting. It is important to understand if current system rewards high carbon practices – offering high expense rates for driving long miles, penalising staff for taking time to walk or taking public transport during work hours. Organisations culture around business travel should be changed to encourage carbon reduction practices.
Finally, we recommend providing training and education to the employees on sustainable travel practices and their benefits. This can raise awareness among employees and encourage them to adopt sustainable travel practices in their personal and professional lives. By implementing these incentives, businesses can encourage their employees to adopt more sustainable travel practices, reduce their carbon footprint, and contribute to a more sustainable future.

Purchased goods and services – procuring sustainably and reducing associated emissions is a crucial consideration for organisations aiming to operate in an environmentally conscious manner. Emissions from purchased goods and services are among the highest contributors to Scope 3 emissions of Pembroke College, so it should be an area of focus. Development of a detailed sustainable procurement policy and strategy would allow integration of sustainable practices and carbon reduction into the overall procurement strategy. Organisations should work with suppliers to decarbonise their supply chain by, for example, requiring suppliers to provide evidence of their environmental and social responsibility practices such as reducing emissions and waste and ensuring responsible sourcing of materials. It is also advisable to partner with sustainability-focused suppliers who have a proven track record of sustainable practices.

The following audit tool can be used to evaluate Pembroke College's sustainable procurement practices and identify areas for improvement.

- Policy and Strategy: Does Pembroke College have a sustainable procurement policy and strategy in place? Are sustainable procurement practices integrated into the overall procurement strategy?
- Stakeholder engagement: Does Pembroke College engage with suppliers and other stakeholders to understand and address their sustainable procurement requirements?
- Sustainable sourcing: Does the College actively seek out and purchase sustainable products and services? Are sustainable alternatives considered when making procurement decisions?
- Environmental impact: Does Pembroke College take into account the environmental impact of the products and services it procures? Are suppliers required to disclose information about the environmental impact of their products and services?
- Social impact: Does the College consider the social impact of the products and services it procures? Are suppliers required to disclose information about the social impact of their products and services?
- Performance measurement and reporting: Does Pembroke College measure and report on its sustainable procurement performance? Are sustainable procurement goals and targets included in Pembroke's overall sustainability goals and targets?
- Compliance and certification: Does the College ensure compliance with relevant sustainable procurement regulations and standards? Are suppliers required to hold relevant certifications, such as environmental or social certifications?
- Training and education: Does Pembroke College provide training and education for its procurement staff on sustainable procurement practices?
- Continuous improvement: Does the College have a process in place to continuously improve its sustainable procurement practices?

To further reduce emissions associated with procurement, the organisation should adopt sustainable procurement practices. For instance, by reducing the amount of paper used in the procurement process and minimising the number of trips taken by procurement personnel. Monitoring and measuring sustainability performance is necessary to ensure that sustainability goals are being met. This can involve tracking emissions associated with procurement and professional services, monitoring supplier sustainability performance, and keeping track of progress towards sustainability goals.

Organisation should also consider social value in their procurement strategy to account for wide impact of the purchased goods and services. Pembroke College could start measuring and evaluating social value internally or look into using one of the tools available on the market, such as UK Social Value Bank.

Purchased goods and services: canteen food purchased – a range of carbon reduction actions can be taken to reduce emissions from food and drinks:

- Meat was found to be the main contributor of emissions from canteen food purchases – reduction in use of meat in recipes is highly recommended. Non-meet alternatives generally have lower carbon intensity. Studies have shown that when vegan options outnumber non-vegan options, customers are more likely to choose plant-based meals. Taking inspiration from successful cases like Wagamama, it is a good practice to offer a substantial portion of the menu as vegan/plant based, ideally exceeding 50%.
- It is crucial for the organisation to place emphasis on working with local suppliers and selecting ethically sourced products. This approach not only supports the sustainability of the business but also contributes to the overall well-being of local communities and the environment.

- Creation of an onsite kitchen garden that includes allotments, apple trees, beehives, and a polytunnel could be considered. This initiative will enable the organisation to source a significant portion of its ingredients internally, reducing reliance on external suppliers. By doing so, the organisation can minimise food miles and greenhouse gas emissions associated with sourcing food from afar.
- Menu descriptions could start including carbon emissions of meal options, signage, and other communication channels to educate students and other customers about the environmental benefits of choosing low carbon options and supporting sustainable practices.
- Enhancing the consciousness regarding the carbon footprint associated with food among students, staff, and relevant stakeholders can be accomplished by establishing the carbon intensity of individual meals and portions. Implementing a traffic light system to indicate the carbon footprint of meal options, similar to existing indicators for salt, fat, and calories, would provide a useful framework for assessing and promoting awareness of the environmental impact associated with food choices.
- More in depth supply chain analysis of all suppliers would identify the primary contributors to greenhouse gas emissions within the organisation's food and drink products. By gaining insights into these areas, the organisation can explore opportunities to make supplier or ingredient changes that will effectively reduce its carbon footprint.

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8 Appendices

8.1 Appendix 1: Emission Factors

Appendix 1. *Emission conversion factors used in this report are UK Government's official carbon footprint statistics from the documents "Greenhouse gas reporting: conversion factors" (BEIS, 2022) and "Table 13 Indirect emissions from the supply chain" (DEFRA, 1990-2019).*

Scope 3 Category	Activity	Source	Conversion rate	Metric
Student Commute	Student Home Travel - International	GHG Conversion Factors 2022	Short-haul, average passenger - 0.15353, Long-haul – average passenger – 0.19309	kgCO2e/passenger.km
Student Commute	Student Home Travel - National	GHG Conversion Factors 2022	Average car – 0.170824, National rail – 0.03549	kgCO2e/km

Fuel and energy related activities	Water consumption	GHG Conversion Factors 2021/2022	0.149	kgCO2e/cubic meter
Fuel and energy related activities	Sewerage Discharge	GHG Conversion Factors 2021/2022	0.272	kgCO2e/cubic meter
Fuel and energy related activities	Gas Consumption	GHG Conversion Factors 2021/2022	WWT – Natural Gas – 0.03135/0.0311	kgCO2e/£
Fuel and energy related activities	Electricity consumption	GHG Conversion Factors 2021/2022	T&D – 0.01879/0.01769 WWT - 0.05529/0.04625 WWT -T&D - 0.00489/0.00423	kgCO2e/kWh
Waste disposal	Capital Goods - Card	Table 13 Indirect emissions from the supply chain	Refuse collection - 0.273642028192456	kgCO2e/£
Purchased Goods and Services	Canteen Food	Table 13 Indirect emissions from the supply chain – 2019 COICOP Conversion Factors	A range of conversion rates used – please refer to Table 13	kgCO2e/£
Purchased Goods and Services	All other spend	Table 13 Indirect emissions from the supply chain – 2019 CIC Conversion Factors	A range of conversion rates used – please refer to Table 13	kgCO2e/£
Business Travel	Business Travel - Flight	Table 13 Indirect emissions from the supply chain – 2019 CIC Conversion Factors	Air transport services – 0.1669	kgCO2e/£
Business Travel	Business Travel - Other	Table 13 Indirect emissions from the supply chain – 2019 CIC Conversion Factors	Rail transport services - 0.006217, Land transport services – 0.518, Accommodation services – 0.247336299957496, Water Transport Services - 1.672	kgCO2e/£