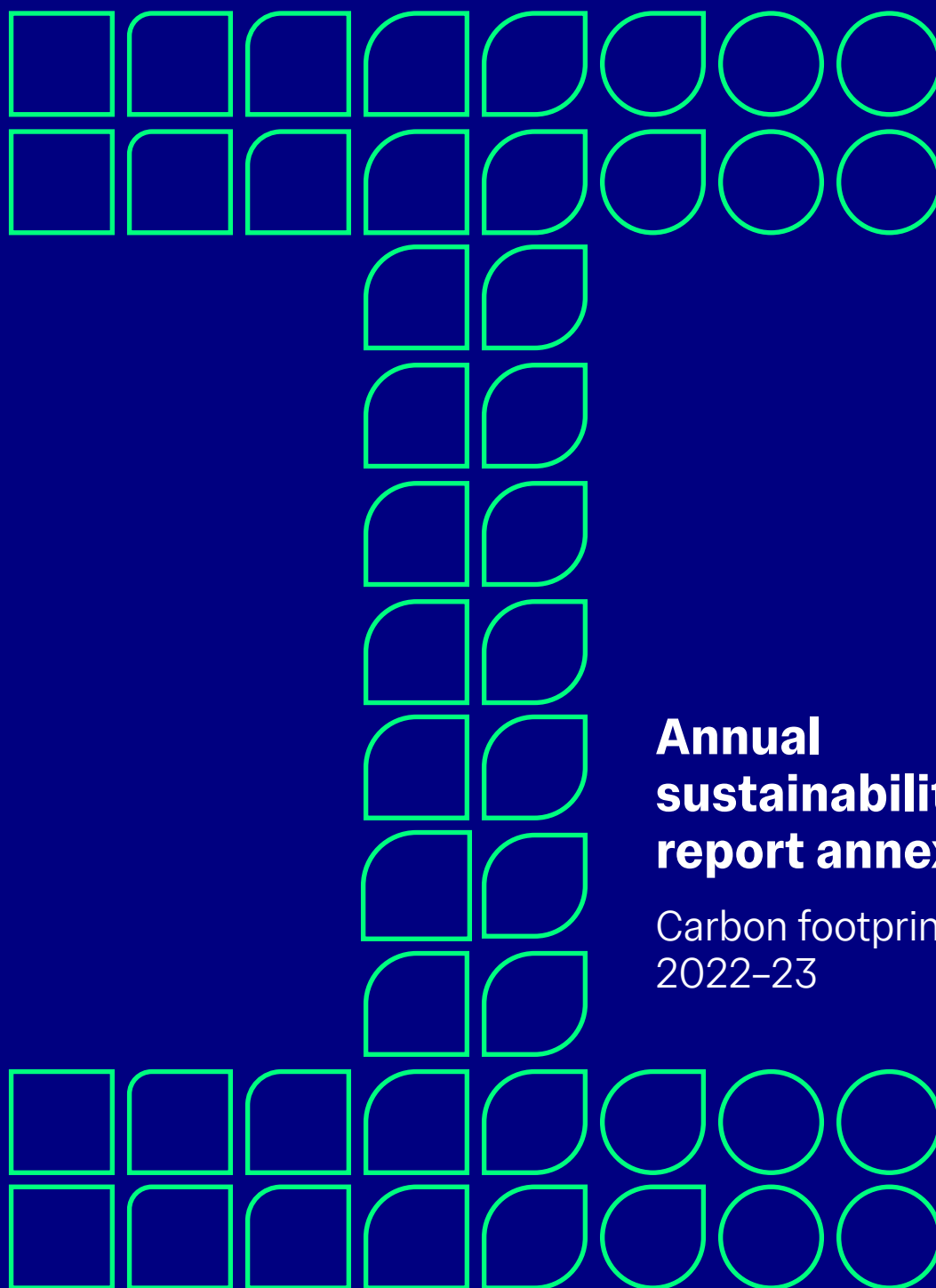# IMPERIAL

Sustainable Imperial

**Annual
sustainability
report annex**

Carbon footprint
2022–23

Executive summary

We are driven by a bold mission to achieve net zero by 2040.
This ambitious goal encompasses all Scope 1 and 2 emissions,
and we are committed to reducing Scope 3 emissions wherever
possible. For the academic year 2022–23, we began reporting our
carbon emissions using the new EAUC (Environmental Association for
Universities and Colleges) Standardised Carbon Emissions Framework
(SCEF) for the first time – wherever data availability permits.

The SCEF is based on the Greenhouse Gas Protocol and has been proposed as a new good
practice voluntary standard for the Higher and Further Education sectors to report emissions
from academic activities. It has broader coverage of Scope 3 than both the existing Higher
Education Statistics Agency (HESA) reporting required for the Higher Education Sector and
the Streamlined Energy and Carbon Reporting (SECR) reporting required for companies.
The carbon emissions published in the Imperial College London Annual Financial Report used
SECR and differ within Scope 1 and 2 from this report as SECR includes wider commercial
activities, while SCEF focuses on only academic activities in those Scopes.
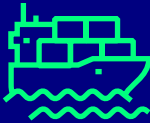
This report, compiled by the Imperial Zero Pollution (IZP): Our Campuses team, unveils a
fascinating landscape of our carbon footprint. Using the EAUC SCEF, we have expanded our
reporting to encompass previously unexplored areas, including staff homeworking and student
travel, to provide a more holistic and detailed summary of our total carbon emissions. We have
also revised our methodology for calculating emissions from spend data.

This report has been completed by the Imperial Zero Pollution (IZP): Our Campuses team with
thanks to colleagues in Property and Major Projects, Campus Operations, and Procurement.

Figure 1: EAUC SCEF categories and their current application to Imperial College London's carbon emissions report

Scope 1 Direct	Scope 2 Indirect	Scope 3 Indirect	Scope 3 Indirect
▪ Combustion of fuel in company facilities ▪ Company vehicles	▪ Purchased electricity for own use	▪ Employee and student commuting ▪ Employee homeworking ▪ Water ▪ Business travel ▪ Waste ▪ Purchased goods and services ▪ Fuel and energy related	▪ Student accommodation ▪ Transport and distribution of goods ▪ Investments ▪ Franchises
Imperial College London	**Upstream activities**		**Downstream activities**

Data currently unavailable

Land and livestock	Refrigerants and volatile organic compounds	Student residence	Transport and distribution of goods	Leased assets	Investments

Out of scope

Purchased heat and steam for own use	Franchises	End-of-life treatment of sold products	Processing and use of sold products

Figure 2: Imperial College London's total carbon emissions for 2022–23

Our total carbon emissions for 2022–23 were **Ca.240,000 tCO$_2$e**. This is a Ca.930 tCO$_2$e increase compared to 2021–22 using the new methodology. This is largely due to an increase in business travel emissions as business travel increases back to pre-pandemic levels.

Throughout the report, we have broken down the carbon emissions per section to illustrate where our biggest carbon impacts lie.

Intrigued to delve deeper? Dive into the full methodology detailed in the Annex of this report.

6%

Scope 2

14,000 tCO$_2$e

15%

Scope 1

37,000 tCO$_2$e

79%

Scope 3

190,000 tCO$_2$e
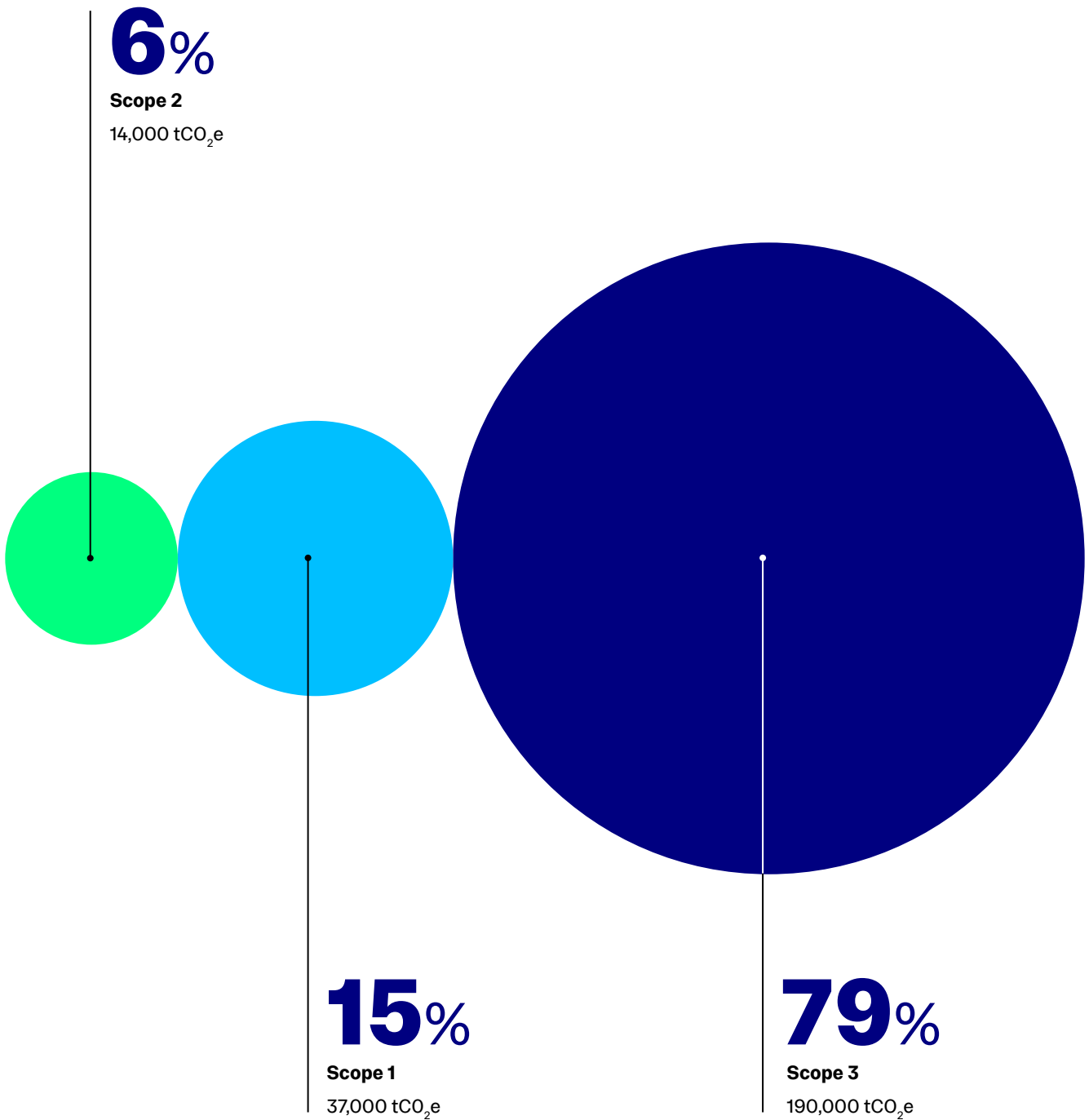
Introduction

This report outlines the full methodology used to calculate Imperial College London's 2022-23 carbon emissions. As shown below, the new methodology differs significantly from previous publications of Imperial College London's Carbon Management Report largely within Scope 3.

Figure 3: A comparison of Imperial's 2021-22 emissions using the old methodology as published in the Carbon Management Report and the new methodology.
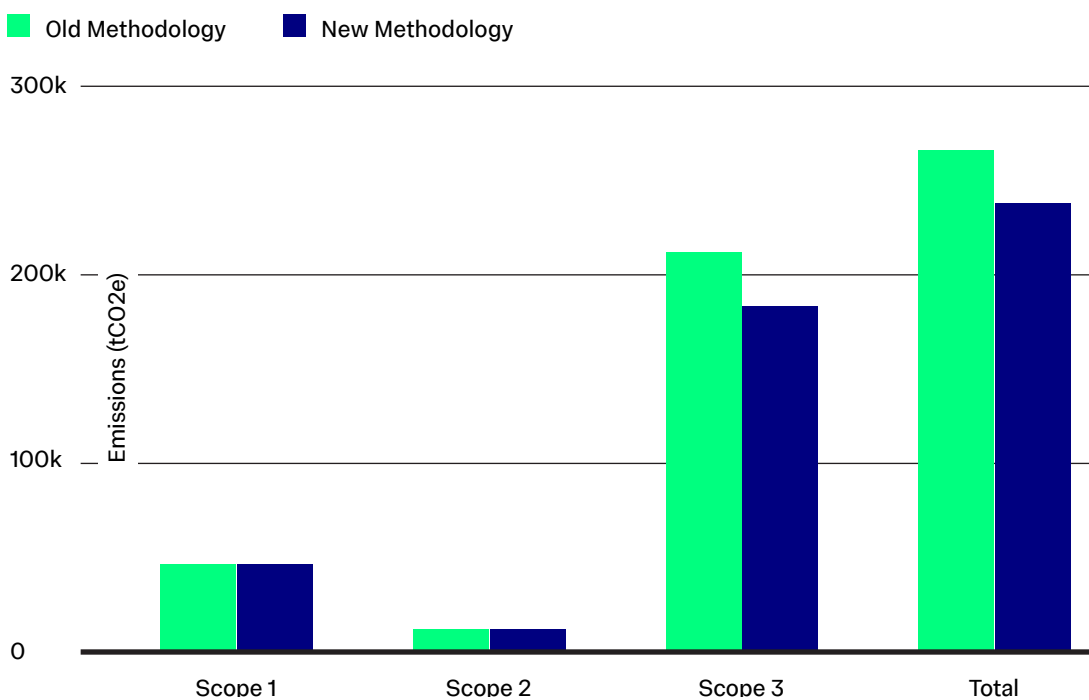
As shown above, the new methodology has resulted in a decrease in our calculated emissions for 2021-22. Below we've highlighted the key areas of change which lie within Scope 3. The addition of four new categories added Ca.62,000 tCO_2e to Imperial's emissions. However, our refined methodology for analysing emissions from procurement resulted in a decrease of Ca.30,000 tCO_2e; this methodology is outlined in Scope 3: Procurement and Supply Chain. We also saw a decrease of Ca.58,000 tCO_2e within Scope 3: Fuel and Energy for two reasons: while refining our methodology, we found we had previously been double reporting some Scope 1 and 2 emissions within Scope 3 in this section, and for 2022-23 we switched from a spend-based analysis to a more accurate consumption-based analysis outlined in Scope 3: Fuel and Energy.

Figure 4: Change in emissions within key Scope 3 areas for 2021-22 using the old methodology as published in the Carbon Management Report and the new methodology published in this report.

■ Change in emissions (tCO$_2$e)
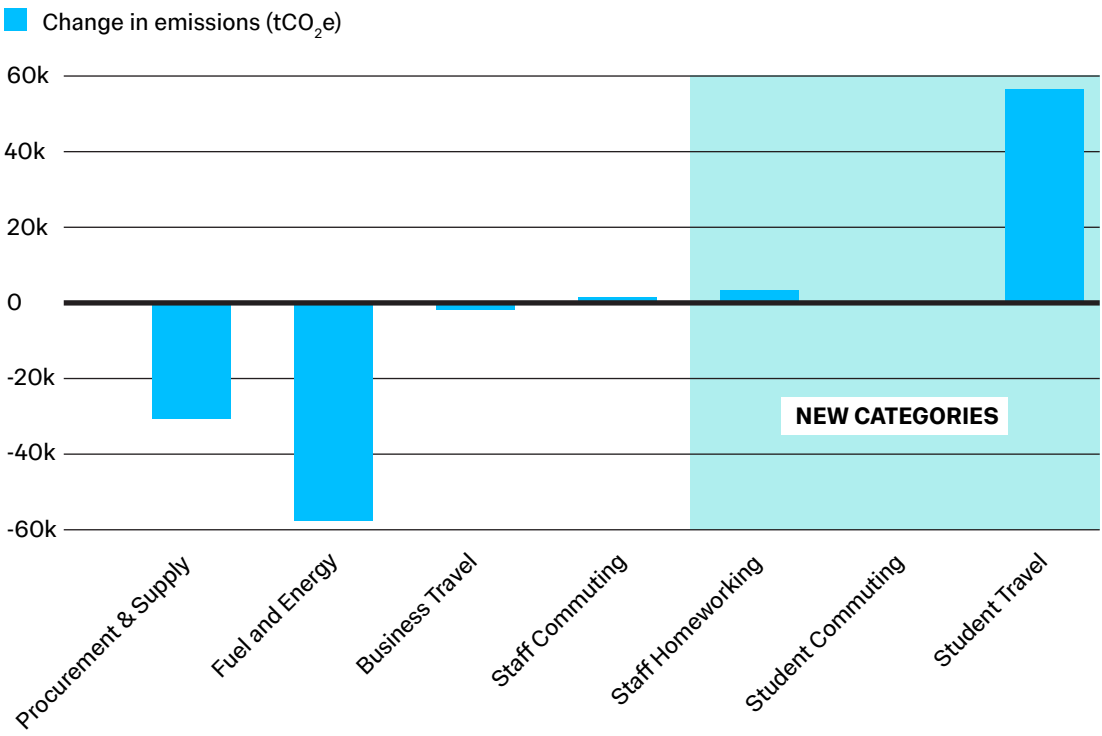
To evaluate our changes in emissions over the last academic year in full, we compared the 2021-22 and 2022-23 emissions using the new methodology on both datasets. Overall, we saw a slight increase in emissions compared to the previous year.

Figure 5: A comparison of Imperial College London's 2021-22 and 2022-23 emissions per scope using the new methodology for both years.

■ Old Methodology   ■ New Methodology
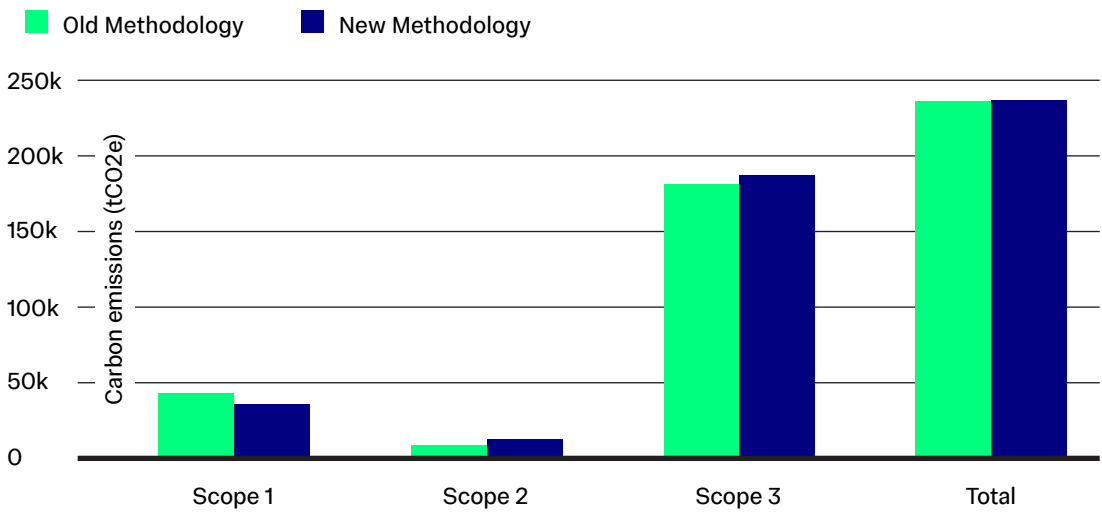
Between 2021-22 and 2022-23, we saw a decrease in emissions for Scope 1: Natural Gas and Scope 3: Procurement and Supply, while there was an increase in emissions for Scope 2: Purchased Electricity and Scope 3: Business Travel. Further discussion on why these changes have occurred can be found in their respective sections.

Figure 6: The change in carbon emissions for each category between 2021-22 and 2022-23 using the new methodology.
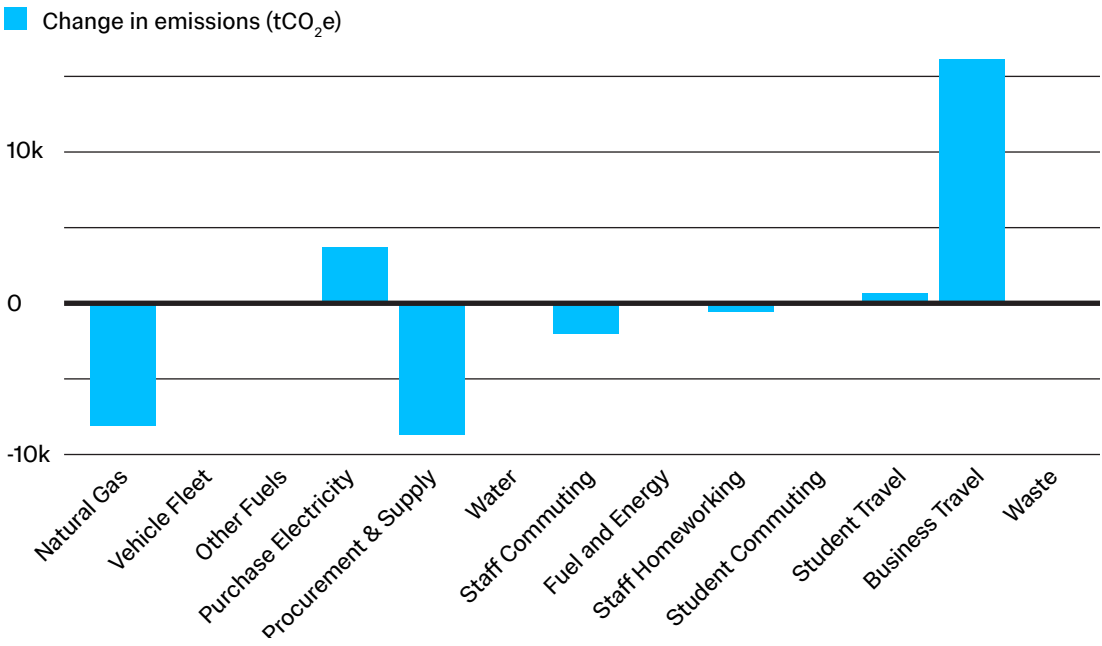
This report will discuss the methodology and results for each category within the SCEF used to calculate Imperial College London's 2022-23 carbon emissions. Unless stated specifically, conversion factors (CF) have come from the UK Government GHG Conversion Factors for Company Reporting, compiled by the Department for Energy Security and Net Zero and the Department for Environment, Food, and Rural Affairs (DEFRA). All values have been rounded to two significant figures.

List of Abbreviations

BEIS – Department for Business, Energy and Industrial Strategy

CHP – Combined heat and power unit

CF – Conversion Factor(s)

CO$_2$e – Carbon Dioxide Equivalent

DEFRA – Department for Environment, Food and Rural Affairs

EAUC – Environmental Association for Universities and Colleges

EMR – Estates Management Record

FTE – Full-time equivalent

GBP – Great British Pounds

GHG – Greenhouse Gases

HESA – Higher Education Statistics Agency

HESCET – Higher Education Supply Chain Emissions Tool

ICL – Imperial College London

IZP – Imperial Zero Pollution

REGO – Renewable Energy Guarantees of Origin

CEF – Standardised Carbon Emissions Framework

tCO$_2$e – Tonnes of Carbon Dioxide Equivalent

VOC – Volatile Organic Compounds

WTT – Well-to-tank

WTW – Well-to-wheel

Scope 1

Introduction

Scope 1 emissions are our direct emissions as a result of sources we own and control. This is combustion of fuel in owned and controlled premises and emissions from owned land and livestock.

Natural Gas

Scope and Boundaries

The combustion of natural gas in on-site boilers and CHP in buildings that we operationally control. Buildings that are leased out or have a commercial arrangement with utilities included are not included in the scope. These reporting boundaries align to the Estates Management Record (EMR) from the Higher Education Statistics Agency (HESA).

Methodology

Advanced
ICL obtains natural gas for the CHP and gas boilers from the gas grid. Emissions are calculated by multiplying the consumption obtained from invoices by the 2023 CF for natural gas.

Data Sources

1. Natural gas consumed in kWh.

2. 2023 CF for 'Natural Gas – Gross CV' (kWh).

Results

The analysis found that Ca.37,000 tCO$_2$e were emitted: Ca.19,000 from CHP, and Ca.17,000 from non-CHP.

This is a Ca.9,000 tCO$_2$e decrease compared to 2021-22. Gas consumption has decreased as a result of works ongoing related to the de-steaming project at South Kensington, which resulted in the CHP units and boilers in the South Kensington Energy Centre being turned off from April 2023 leading to a reduction in gas use but an increase in purchased electricity.

Discussion

As noted in the Annual Sustainability Report, there is ongoing work to reach net zero in three key stages: removing the steam network; retrofitting our buildings to improve their fabric; improve energy efficiency and replace gas use in our energy centre with heat-pumps. A 15-year plan is being developed with the consultancy Arup.

Vehicle Fleet

Scope and Boundaries

In 2022-23, the ICL fleet consisted of 30 vehicles operated by 15 departments, with five long-term leases and six electric vehicles. Scope 1 emissions from the fleet are determined using fuel records supplied by the finance team.

Methodology

Advanced
Emissions have been calculated using fuel card records from the year 2022-23, which provides the fuel type and quantity purchases in litres. Litres of fuel is the multiplied by the relevant 2023 CF.

Data Sources

1. Type of fuel consumed in litres.

2. 2023 CF for 'Diesel – average biofuel blend' (litres) and 'Petrol - average biofuel blend' (litres).

Results

The analysis found that Ca.17 tCO_2e were emitted.

Discussion

In order to achieve Net Zero 2040, IZP: Our Campuses aim to review our vehicle fleet in 2023-24 and create an action plan which will consider the procurement policy for Imperial's vehicles and infrastructure required to electrify the fleet.

Other Fuels

Scope and Boundaries

The combustion of diesel or oil in owned and controlled premises such as on-site boilers or generators. The scope covers temporary boilers in South Kensington and Harlington.

Methodology

Advanced
Emissions have been calculated using expense data of procured fuel, providing the fuel type and litres purchased.

Data Sources

1. Type of fuel purchased in litres.

2. 2023 CF for 'Biodiesel HVO' (litres).

Results

The analysis found that Ca.1.3 tCO_2e were emitted.

(Data Currently Unavailable)

Refrigerants

Data is being collected from 1 August 2023 for all Property and Major Projects operated properties and is set to be reported at an Advanced level for 2023-24 for anything captured by the F-gas regulations.

Volatile Organic Compounds (VOCs)

We are investigating the possibilities within our procurement system to easily tag and track the purchase of VOCs for reporting in the Annual Sustainability Report.

Land and Livestock

Silwood Park Campus is 88ha of land, of which 73ha are classified as Parkland. In order to estimate our emissions from this area, further data on the species biodiversity and land type of

Scope 2

Introduction

Scope 2 emissions are indirect emissions from the generation of grid-derived electricity and heat by utility providers. The University does not purchase heat or steam directly, so this is not included.

Purchased Electricity

Scope and Boundaries

Emissions as a result of generation of grid-derived electricity we consume.

Methodology

Advanced
Location-based approach
Metering data was obtained from our supplier in kWh and converted into tCO_2e using the 2023 CF.

Market-based approach
Certificates were obtained from our supplier to reflect the emissions associated with the energy mix purchased.

Data Sources

1. Electricity consumption in kWh.

2. 2023 CF for 'Electricity (UK)' (kWh).

3. REGO certification.

Results

The analysis found that Ca.14,000 tCO_2e were emitted on a location basis, a Ca.4,000 tCO_2e increase from 2021-22.

Our REGO certification certifies that the electricity purchased was from renewable sources between 1 October 2022 and 30 September 2025, and therefore emitted 0 tCO_2e on a market basis.

Discussion

There has been an increase in electricity consumption compared to 2021-22 due to the ongoing works related to the de-steaming project mentioned in Scope 1: Natural Gas. In addition to the work previously mentioned, IZP: Our Campuses are launching sustainability initiatives such as Green Impact and LEAF in 2023-24 to promote energy saving and demand reduction behavioural change on campus. More about this can be found in the Annual Sustainability Report.

We purchase electricity under the REGO Scheme (renewable energy guarantee of origin). For August and September 2022 that was from Npower and from October 2022 onwards from Drax. Drax operate biomass plant alongside hydropower, wind, and photovoltaic (solar power). We recognise that there are carbon dioxide emissions associated with biomass but, to date, none of our REGO certificates are from biomass.

Scope 3

Introduction

Scope 3 covers the widest range of emissions and accounts for 79% of Imperial College London's total carbon emissions – which is similar to the footprints of many other organisations. It includes all indirect emissions from up and down the value chain, ranging from water and waste to staff commuting and business travel.

Emission sources franchises and sold products are not applicable to Imperial and therefore have not been included in the report.

Procurement and Supply Chain

Scope and Boundaries

Procurement and Supply Chain includes all upstream emissions as a result of goods and services purchased. This has previously been based on the HESCET (Higher Education Supply Chain Emissions Tool), a scope 3 emissions tool for the education sector developed by HEPA (Higher Education Procurement Association). HESCET typically includes emissions for business travel, utilities, and waste; we have calculated these separately using a consumption-based methodology as opposed to a spend-based methodology, and they are reported in their respective sections within Scope 3.

Methodology

Basic

The standard HESCET approach maps Imperial's spend codes to the Procurement Higher Education (ProcHE) coding, which is then mapped to 311 standard categories set by Defra with known spend-based emissions factor. These 311 categories can be grouped in 12 high-level sectors. For this report, the HESCET mapping and categorisation was revised to ensure an accurate reporting of Scope 3 emissions. A full methodology can be found in Appendix 2, but the key changes implemented were:

- 21 new categories were created as two new high-level sectors 'Laboratory and research' and 'Professional and bought-in services' with new CF.
- An alternative calculation approach was used and integrated into the HESCET for categories such as water; electricity; and gas.
- Emissions were re-grouped according to the existing Imperial's organisation structure to ease data analysis, future monitoring, and decision making, referred to as 'Emissions per actionable group'.

Data Sources

1. Total expenditure in GBP.

2. HESCET tool and associated CF.

3. Revised CF from the UK Government GHG Emissions Conversion Factors; EPA GHG Emissions Factors; and EXIOBASE.

Results

The analysis found that Ca.91,000 tCO_2e were emitted, a decrease compared to 2021-22 despite total expenditure being similar. By actionable group, our highest priority areas for review sit within ICT; travel; and laboratory and research, as shown by the graph below.

Figure 7: 2022-23 procurement and supply chain emissions shown by actionable group.
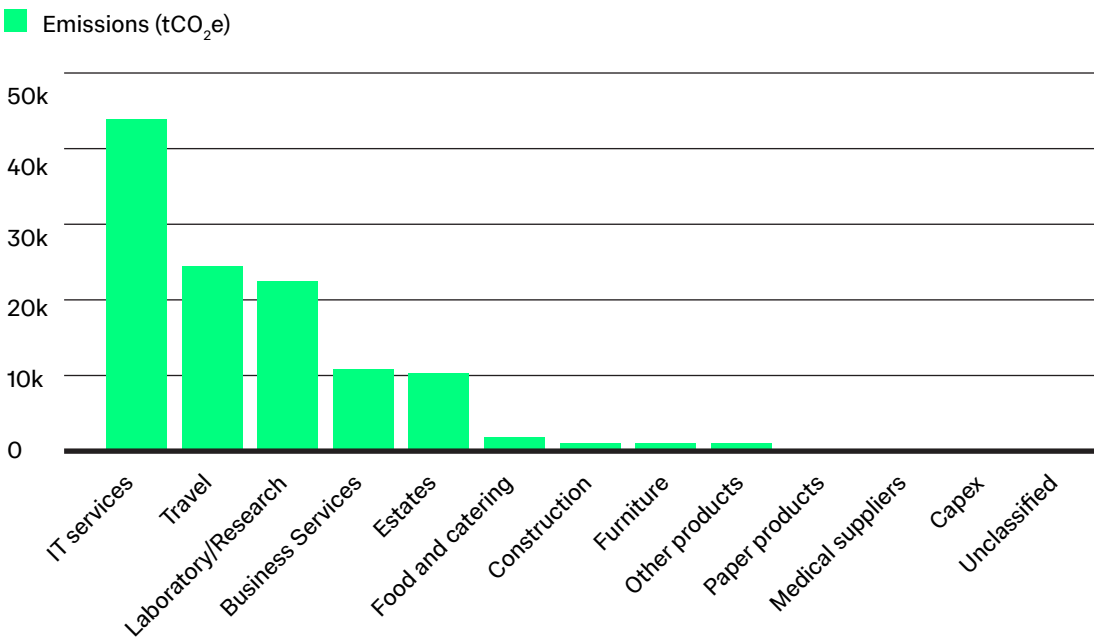
A further analysis of the 2021-22 and 2022-23 procurement data found that the changes in emissions was due to both changes in spending and refreshed CF from HESCET. In 2022-23, Imperial's spend on construction, capex, and travel significantly increased compared to 2021-2, while expenditure on medical supplies, paper products, and furniture decreased. This is expected to fluctuate within certain categories where spending is dependent on when major purchases are made, or contracts let.

Discussion

While it is the standard approach in the sector, using a spend-based methodology comes with several limitations. The coding of expense data to the correct categories has risk of human error, and the CF are generic to each category, failing to recognise nuances between e.g. first class and economy air travel. The HESCET CF are also updated every few years as opposed to annually like the UK Government GHG Emissions Conversion Factors. To proceed to Intermediate or Advanced reporting as set out in the EAUC SCEF, Imperial would need to work directly with suppliers to obtain product and service-based emissions as opposed to spend-based, which is unrealistic to achieve in the short-term as this would be labour-intensive and many suppliers do not have this data available.

In 2023-24, the Procurement team at Imperial aim to develop a Sustainable Procurement Policy and Action Plan with support from the consultancy Action Sustainability. This will improve supplier engagement to reduce emissions, as well as ensuring sustainability is a priority in all future procurement decisions.

Water

Scope and Boundaries

This includes the upstream emissions associated with all purchased water Imperial consumed. Buildings that are leased out or have a commercial arrangement with utilities included are not included in the scope. These reporting boundaries align to the EMR guidelines from HESA.

Methodology

Intermediate
Water data was obtained from the supplier in m3 and multiplied by the 2023 CF.

Data Sources

1. Water consumption in m³.

2. 2023 CF for 'Water supply' (cubic metres).

Results

The analysis found that Ca.88 tCO_2e were emitted.

Discussion

To proceed to Advanced reporting per the EAUC SCEF, local or regional CF should be used, which currently are not published by the UK Government. Water resource and demand varies across the UK, with the Southeast region having the highest projected water supply demand deficit, resulting in varied emissions. Water UK, the trade association for the water industry, published in their 2021-22 Annual Report that Thames water had a greenhouse gas intensity of Ca.150 $kgCO_2e$ per Ml for water supply and Ca.180 $kgCO_2e$ per Ml for water treatment.

Fuel and Energy

Scope and Boundaries

This includes the upstream emissions as a result of fuel and energy consumption within Scope 1 and 2, such as transmission and transportation of fuel to the point of use.

Methodology

Advanced
Electricity and gas data obtained for Scope 1 and 2 were converted into tCO_2e using 2023 CF. For electricity, transmission, and distribution (T&D) CF are used which consider the emissions associated with grid losses. For fuels, which includes natural gas, well-to-tank (WTT) CF are used which calculates the emissions associated with extracting, refining, and transporting the raw fuel sources to our site.

Data Sources

1. Gas consumption data in kWh obtained from supplier invoices.

2. Electricity consumption data in kWh obtained from supplier invoices.

3. 2023 CF for 'Transmission and Distribution – UK Electricity' (kWh) and WTT 'Natural Gas – Gross CV' (kWh).

Results

The analysis found that Ca.8,000 tCO_2e were emitted: Ca.1,400 tCO_2e from electricity and Ca.6,700 tCO_2e from gas.

Waste Disposal and Treatment

Scope and Boundaries

The upstream emissions from disposing and treating waste, recycling, and wastewater.

Methodology

Waste and Recycling
Advanced
Imperial obtains tonnage data from our supplier which includes tonnage by material and treatment. Emissions are then calculated using CF which are both material and treatment specific.

Wastewater
Basic
Volume of water supplied was converted into tCO_2e by assuming 95% of total water supplied was disposed of and treated and applying the national 2023 CF.

Data Sources

1. Waste data in tonnes, split by material and treatment.

2. 2023 CF from WRAP and the UK Government Environment Agency.

3. Water consumption data in m3.

4. 2023 CF for 'Water treatment' (cubic metres).

Results

The analysis found that Ca.100 tCO_2e were emitted from waste and recycling. In addition, Ca.94 tCO_2e were emitted as a result of wastewater disposal and treatment, emitting a total of Ca.200 tCO_2e.

Discussion

While our emissions from waste and recycling have increased compared to 2021-22, we have been moving up the waste hierarchy steadily since 2019-20. In 2022-23, 45% of our total waste was recycled, an increase from 2021-22.

To proceed to Intermediate reporting per the EAUC SCEF, local or regional CF would need to be used for wastewater as discussed in Scope 3: Water.

Business Travel

Scope and Boundaries

The upstream emissions as a result of all travel undertaken by staff, students, and guests for business purposes.

Methodology

Air Travel and Rail Travel
Advanced

The majority of ICL's air travel purchases are through our external supplier Egencia, who calculate emissions considering mileage, fuel consumptions, and class of travel. For the remaining emissions which are expensed, we only have expense data. Instead of using conversion factors provided by HESCET, we calculated a conversion factor based off the total spend and total tCO_2e emissions from Egencia to project total tCO_2e from all air travel expenditure.

Taxi and Coaches
Basic

This includes taxis, coaches and vehicles with a hired driver. Expenditure in GBP was converted to tCO_2e using the spend-based CF provided by the HESCET tool.

Hotels and Subsistence
Basic

This includes all meals expensed for business trips within our travel and expenses policies, as well as hotel stays. Expenditure in GBP was converted to tCO_2e using the spend-based CF provided by the HESCET tool.

Car Hire
Basic

This includes all costs associated with car hire and leases. Expenditure in GBP was converted to tCO_2e using the spend-based CF provided by the HESCET tool.

Grey Fleet
Basic

Grey fleet refers to all costs from vehicles owned and driven by employees for business purposes. It is recorded by mileage reclaimed. Expenditure in GBP was converted to tCO_2e using the spend-based CF provided by the HESCET tool.
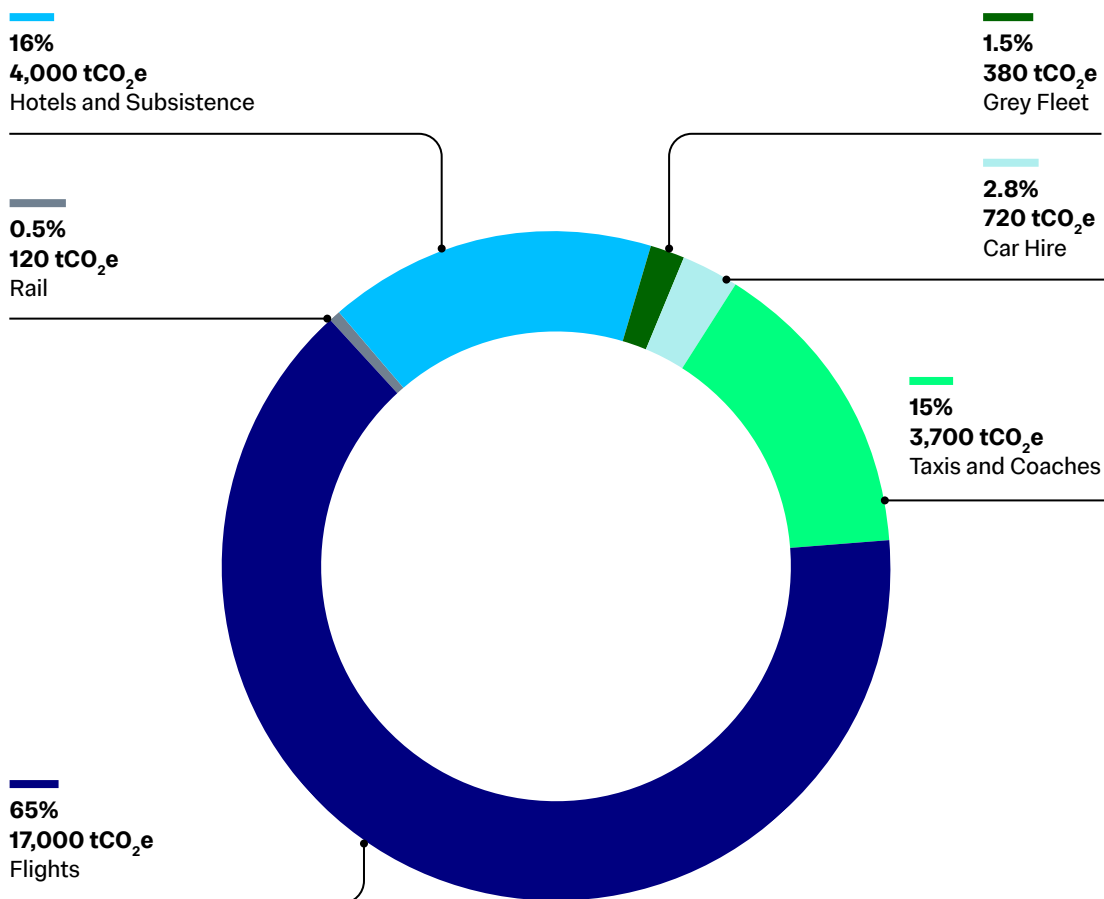
Data Sources

1. Expenditure in GBP for business travel expenses.

2. Spend-based CF from HESCET.

3. Expenditure in GBP and emissions in tCO_2e from Egencia.

Results

The analysis found a total of Ca.25,000 tCO_2e were emitted.

Figure 8: 2022-23 business travel emissions per mode of travel.

16%
4,000 tCO$_2$e
Hotels and Subsistence

1.5%
380 tCO$_2$e
Grey Fleet

0.5%
120 tCO$_2$e
Rail

2.8%
720 tCO$_2$e
Car Hire

15%
3,700 tCO$_2$e
Taxis and Coaches

65%
17,000 tCO$_2$e
Flights

This is an increase of Ca.16,000 tCO$_2$e or 170% compared to 2021-22. It is important to note that business travel dipped significantly from Spring 2020 due to the pandemic and has been steadily increasing from Autumn 2021 back to pre-pandemic levels. For 2022-23, there have also been significant revisions to the CFs for business travel. The UK Government increased air travel CF by up to 35% due to reduced load factors as an ongoing consequence of the pandemic. The newly released HESCET tool saw significant increases to CF for grey fleet; air travel; and rail travel, while CF for taxis, coaches, and leased vehicles decreased by up to 74%.

Discussion

To proceed to Intermediate or Advanced reporting per the EAUC SCEF, all categories of business travel should be calculated using a process-based emissions reporting using actual mileage and well-to-wheel (WTW) CF. Furthermore, an analysis of air and rail travel expenses that are not processed through Egencia should be carried out regularly to improve the accuracy of our estimation.

In 2022-23, the Travel Working Group was established to initially focus on developing a policy for sustainable business travel. Looking forward to 2023-24, the plan is to finalise and implement the policy of taking climate conscious travel decisions: using virtual collaboration and rail wherever possible; focusing on quality not quantity of travel; and only using higher classes of flights where exceptional reasons apply.

Staff Commuting

Scope and Boundaries

The upstream emissions from employees travelling to and from work.

Methodology

Advanced

Results from a 2014-15 staff commuting survey were used which supplied mode of transport and distance travelled. 623 individuals answer the survey, or 7.5% of the staff population at the time. To this, we applied our 2022-23 On Site full-time equivalent (FTE) for staff and 2023 WTW CF.

Assumptions:

- Distances provided in the survey were for a round-trip.

- Survey results were applicable across the whole staff population in 2022-23.

- A standard 44-week work year, considering 3 weeks of university closure and 5 weeks of annual leave.

Data Sources

1. 2014-15 staff survey results.

2. 2022-23 staff statistics.

3. 2023 CF for 'WTW – Passenger Vehicles and Travel by Land'.

Results

The analysis found that Ca.1900 tCO_2e were emitted.

Discussion

To improve our analysis, a fresh staff commuting survey would be needed to assess how commuting may have changed over the last ten years and following the pandemic. Looking toward 2024, the Sustainable Travel Working Group is looking to develop an Active Travel Action Plan which will hopefully increase the number of employees and students choosing low or no emitting modes of commuting.

Staff Homeworking

Scope and Boundaries

The upstream emissions from employees working from home during their contractual hours.

Methodology

Intermediate

Homeworking emissions were calculated using the basic methodology from the Homeworking Emissions Whitepaper produced by ecoact in partnership with Lloyds Banking Group and NatWest Group. This converts FTE into kWh, considering office equipment and heating energy. 2023 CF were then used to calculate tCO_2e.

Homeworking FTE values were provided by HR using the 2022-23 staff survey results and omitting staff from the Student Union.

Data Sources

1. 2022-23 staff statistics.

2. 2023 CF for 'UK Electricity' (kWh).

Results

The analysis found that Ca.2800 tCO_2e were emitted.

Discussion

The data required to proceed to Advanced reporting per the EAUC SCEF are noted below.

- Internal records for standard issued equipment and typical power consumption when in use.
- Confirmation from staff that typical workstation, lighting, and heating is used when working from home.
- Staff survey to confirm proportion of employees purchasing green energy at home.
- Information from staff on typical home energy use and shared occupancies.

Most of these are unfortunately unrealistic to achieve in a short-term, and when we consider materiality, Staff Homeworking accounts for just 1.2% of Imperial's total emissions. For now, we are focusing our efforts to improve our methodologies on the more material categories. Imperial is however keen to improve our understanding of power consumption and emissions of standard ICT equipment and software, with projects in 2023-24 beginning to scope this area.

Student Commuting

Scope and Boundaries

The upstream emissions from students commuting to and from the university as required by the university.

Methodology

Intermediate

Results from the 2018-19 Student Experience Survey were used, which provides mode of transport; number of days travelled on to campus per week; and length of journey in minutes. From this, the distance of journeys could be estimated. 4876 students (3799 undergraduate and 1077 postgraduate) answered these questions, or 25% of the student population at the time. The survey was not open for final year undergraduate students who instead participate in the National Student Survey.

Several assumptions were made for the calculations:

- Undergraduates have a 31-week year with the summer, Christmas, and Easter holidays excluded.
- Taught postgraduates have a 44-week year with the Christmas and easter holidays excluded.
- Research postgraduates have a 47-week year with 5-weeks of annual leave.
- Student commuting habits have not significantly changed since 2018-19 and post-pandemic.

Data Sources

1. 2018-19 Student Experience Survey results.

2. 2022-23 student statistics.

3. 2023 CF for 'WTW – Passenger Vehicles and Travel by Land'.

Results

The analysis found that Ca.580 tCO$_2$e were emitted.

This is a third of staff commuting emissions, despite the student population at Imperial being three times larger than the staff population. This is largely because students have a significantly smaller commuting average commuting distance compared to staff and are also more likely to use modes of transport such as cycling and walking which do not result in any carbon emissions.

Discussion

The Student Experience Survey runs annually, and we hope to continue implementing questions relating to student commuting. To improve to Advanced level of reporting per the EAUC SCEF, the questionnaire should also consider multiple legs of commuting journeys.

Student Travel

Scope and Boundaries

The upstream emissions from students travelling between university and their family home annually.

Methodology

Intermediate
Data was taken from a 2022-23 departmental student survey which collected the number of trips people took home annually; the mode(s) of transport; and country of their destination. The survey received 122 responses, split between 75 undergraduates and 47 postgraduates. We focused solely on air and rail travel to calculate the emissions and placed an upper limit of five roundtrips annually.

Domestic Students
As destinations were collected as countries as opposed to postcodes, we assumed an average distance to the population centre of mass of the UK, which is Snarestone, Leicestershire. The frequency of trips was based on the survey results and extrapolated to the total 2022-23 domestic student population.

EU and Overseas Students
The air-line distance was mapped to the centre of each country from London as opposed to flight or rail routes. The distances were then used to calculate an average short-haul and average long-haul travel distance and applied to the 2022-23 EU and Overseas student population respectively. Mode and frequency of trips was based on the survey results.

Data Sources

1. 2022-23 departmental student travel survey.

2. 2022-23 student statistics.

3. 2023 CF for 'WTT - Flights' and 'WTT - Rail' (km).

Results

The analysis found that Ca.1300 tCO_2e were emitted from domestic student travel and Ca.56,000 tCO_2e from EU and Overseas student travel, contributing Ca.57,000 tCO_2e overall.

Discussion

To improve our analysis, more students would need to be surveyed to provide more reliable data. To improve to the Advanced level of reporting per the EAUC SCEF, the survey would also need to consider multiple legs of journeys and class of travel, especially for air travel.

Student travel to home is largely outside of Imperial's control; without changing our student or term model, we can expect our student population to travel home throughout the year. The EAUC SCEF recommends taking responsibility for a minimum of two return trips per year per student – in this analysis, we have assumed responsibility for up to five return trips per year per student.

(Data Currently Unavailable)

Capital Expenditure

Upstream emissions for capital expenditure have been included within Procurement and Supply Chain using spend-based CF, which is a Basic reporting level per the EAUC SCEF. However, for this report we have been unable to separate these emissions from the larger procurement emissions. To proceed to an Intermediate or Advanced reporting level per the EAUC SCEF, emissions would need to be estimated using either an extended input-output model to spend or by performing a whole-life carbon assessment for each project. Currently, payment for capital expenditure and therefore its emissions as well are reported at the point of payment as opposed to the point of construction.

Student Accommodation

Currently, the EAUC SCEF provides guidance on calculating downstream emissions from student accommodation that are on-site but owned or managed by an external organisation to a basic reporting level. ICL does have agreements with on-site external student accommodation providers such as GradPad.

Leased Buildings and Vehicles – Upstream

The guidance on calculating emissions from buildings where the institution is the lessee is currently limited and provided on a case-by-case basis. ICL is the lessee of several spaces in buildings, predominantly from the NHS Trust on the Hammersmith and Charing Cross campuses.

Leased Buildings and Vehicles – Downstream

The guidance on calculating emissions from buildings where the institution is the lessor is currently limited and provided on a case-by-case basis.

Imperial leases out several spaces in its buildings to external parties who, per the EMR guidelines provided by HESA, are excluded from reporting in Scope 1 and 2.

Investments

Guidance on calculating downstream emissions from investments is currently limited and provided on a case-by-case basis. Calculating emissions for investments will be investigated further once more guidance is available.

Appendix
Overview: Total Emissions

The total emissions per category for 2022-23 and 2021-22. Categories that have been added or revised as part of the new methodology are highlighted in green.

Scope	Source	2022-23 Emissions (tCO$_2$e)	Percentage of total emissions	2021-22 Emissions (tCO$_2$e)	Percentage increase / decrease
1	Natural Gas	36,774.41	15.41%	44,938.48	18% ↓
	Vehicle Fleet	16.95	0.0071%	14.00	21% ↑
	Other Fuels	1.34	0.00056%	0	NA
2	Purchased Electricity	14,192.46	5.95%	10,573.76	34% ↑
3	Procurement and Supply Chain	91,417.85	38.30%	100,095.33	8.7% ↓
	Water	87.51	0.037%	59.92	46% ↑
	Fuel and Energy	8,031.37	3.36%	10,117.40	21% ↓
	Waste	198.86	0.083%	193.76	2.6% ↑
	Business travel	25,468.44	10.67%	9,342.60	170% ↑
	Staff commuting	1,904.00	0.80%	1,884.39	1.0%
	Staff homeworking	2,784.94	1.17%	3,335.32	17% ↓
	Student commuting	584.40	0.24%	578.31	1.1%
	Student travel	57,244.80	23.98%	56,648.27	1.1%
Total		**240,000**		**240,000**	**2.2%** ↑

Procurement and Supply Chain: Full Methodology

The methodology below has been prepared by Yasmine Baghdadi with support from the IZP: Our Campuses team; Procurement department; and Energy, Engineering, and Environment department.

Methodology Basis

Scope 3 emissions encompass all indirect greenhouse gas emissions associated with activities outside the direct control and ownership of Imperial College London. Scope 3 emissions of goods and services were calculated based on the approach used in the Higher Education Supply Chain Emissions Tool (HESCET). Modifications have been implemented to the tool to make it more specific to Imperial as an academic institution and aid in categorising scope 3 emissions.

In general, the HESCET approach entails classifying procurement spent by Procurement Higher Education (ProcHE) coding. This coding is then mapped to 311 standard categories set by the Department of Environment Food and Rural Affairs (DEFRA) with known spend-based emission factors. Once mapped, an aggregated spend for each DEFRA category is calculated and multiplied by the respective emission factor to derive the carbon dioxide equivalent emission (CO_2e).

The 311 DEFRA categories could be grouped into 12 high-level sectors representing different areas of spend. A detailed breakdown of the sectors and their representation are summarised in Table 1.

Table 1: List of high-level grouping of DEFRA categories and a description of each.

Category	Inclusions
Food and non-alcoholic beverages	All food products ranging from fruits and vegetables to meats, spices, condiments, and confectionary. All non-alcoholic drinks such as tea, coffee, juices, soft drinks, and water.
Alcoholic beverages and tobacco	Alcoholic beverages and any tobacco products like cigars or cigarettes.
Clothing and footwear	Any purchased garments or footwear, personal protective clothing, clothing raw materials, and laundry services.
Housing	Broken down into expenditure on rentals, maintenance raw materials and services, regular charges, and utilities.
Furnishings and household	Includes all purchases of furniture, textiles, appliances, tools, and disposables.
Healthcare	Includes all healthcare products and services.
Transport	Includes all vehicle purchases, maintenance, and services. Accounts for all travel spend.

Category	Inclusions
Information and communication	Includes postal and mobile services, electronics purchases and internet subscriptions.
Recreation and culture	Includes any purchases of equipment or supplies used for audiovisual, recreation, or leisure activities such as student societies or clubs.
Education	All education-related spend such as trips and tutorial equipment.
Restaurants and accommodation	Includes all expenditure on external catering and business travel accommodation and expenses.
Personal care and accessories	Includes all personal purchases as well as insurance, financial, and legal services.
Others	Any miscellaneous purchases

Moreover, in our endeavour to refine the reporting process, it is worth noting that the HESCET utilises DEFRA emissions categories originally designed for households, rendering them somewhat incongruent when applied to the intricate landscape of large organisations like Imperial. Recognising this discrepancy, we have undertaken a meticulous review and restructuring of some emission categories within the tool. This strategic adaptation ensures that the categories now align more seamlessly with our specific areas of purchasing, enabling a more accurate and contextually relevant assessment of our procurement-related emissions. This tailored approach is instrumental in enhancing the tool's effectiveness for our organisational context, providing a nuanced understanding of our environmental impact associated with purchased goods and services.

Changes implemented to the HESCET tool

To ensure an accurate reporting of scope 3 emissions, the HESCET tool mapping and categorisation was revised:

1. Emission factors for all categories were revisited and updated (where needed).

2. The mapping of ProcHE codes to the 311 DEFRA categories was revised.

3. New categories were created (21 in total) based on the mapping revision and divided into two high-level emission sectors:

   - Laboratory and research: includes all purchase of lab materials, equipment, and supplies as well as scientific research and development services and chemical waste disposal.

   - Professional and bought-in services: Includes all technical, computer, insurance, financial, and educational services purchased externally.

The 21 new categories were adding on to the original HESCET tool and mapped accordingly with the relevant ProcHE codes. Mapping for these categories was internally revised to ensure the validity of the proposed changes. Emission factors for the new categories were gathered from different databases and are explained in detail in Section 5.

4. Where possible, a mass-based calculation approach was used and integrated into the HESCET tool. For example, to calculate transmission and distribution (T&D) emissions for electricity, the kWh spend of electricity was multiplied by the mass-based emission factor for T&D. A similar approach was used for water and gas emissions. The final utility emissions were added into the respective category in the results table.

5. A recategorisation of the emission sectors was implemented in such a way that the different categories matched with Imperial's procurement department category managers.

Emissions Recategorization

Imperial spend items were re-grouped according to the existing university organisation structure for ease of data analysis, future monitoring of emissions and decision making (Table 2). The categorisation process was quality checked by the personnel involved in the procurement and management of the respective items.

Table 2: List of categories used for emission grouping and a description of each.

Category	Inclusions
Capex	Major equipment and projects
Furniture	Furniture for offices, laboratories, and communal spaces
IT services	Software, hardware, IT Support and Data Centres, audio visual (equipment and refurbishment of facilities) and MFDs (photocopiers, printers spares and peripherals)
Medical supplies	Medical equipment and services
Laboratory and research	Laboratory chemicals, gases, consumables, and equipment
Business services	Professional and bought-in services, recruitment (temporary and permanent), recruitment advertising.
Construction	Estates, projects, minor works, and maintenance
Food and catering	Purchases of food and catering services
Travel	Business-related travel and expenses associated with it
Paper products	Stationary, printing, and other library services
Estates	Includes utilities, health, safety, security, and facilities operations
Other products	Miscellaneous purchases

To perform the calculations for the different categories in this methodology, reverse engineering of the HESCET mapping was implemented as follows:

1. New emission factors were calculated for each ProcHE code derived from the existing DEFRA emission factors. The new factor was assumed to be a weighted average of the factors used for the categories considered for each ProcHE code based on the mapping.

2. The new factor was multiplied by its relevant ProcHE code to calculated emissions.

3. Each ProcHe code was categorised based on the groups presented in Table 2.

The new system was referred to as "Emissions per actionable group".

Emission Factors

Two main methodologies were implemented to calculate scope 3 emissions of goods and services based on the type of available data.

1. A mass-based methodology was implemented for emissions from transmission and distribution of electricity and gas due to the availability of energy data per hour. Updated emission factors were found in the most recent greenhouse gas reporting publication released by the Department of Energy Security and Net Zero as well as the Department of Business, Energy, and Industrial Strategy (BEIS). [1]

2. A spend-based methodology was used to assess emissions from all remaining purchased goods and services since the data was provided by the procurement department in amount spent. Spend-based emission factors were gathered from a variety of sources. Priority was given to factors provided by BEIS. Where not found, emission factors from the United States Environmental Protection Agency (EPA)[2] or the European environmental Agency (EXIOBASE) [3].

Procurement and Supply Chain Emissions Analysis

In this results section, we delve into the findings of our scope 3 emissions analysis using the actionable groups categorisation outlined in the methodology section. This approach involved collaborating closely with Imperial's procurement team and their category managers. We have organized our results into practical groups that offer a clearer view of the environmental impact linked to our purchases. This tailored method not only ensures the accuracy of our findings but also paves the way for targeted sustainability efforts in areas where they can make the most difference.

The detailed breakdown of carbon emissions within specific subcategories provides a nuanced perspective on Imperial College London's environmental impact (Table 3)

Table 3: Ranked breakdown of procurement & supply chain categories and their respective CO$_2$ emissions.

| Rank	Category	Subcategory	Emissions (tonnes CO$_2$e)	Percentage of total procurement emissions
1	IT services	Audio Visual and Multimedia Supplies and Services	872.76	0.73%
		Library services	9072.15	7.59%
		Computer Supplies and Services	33933.67	28.40%
		Printing, Reprographics and Photocopying	24.22	0.02%
		Telecommunications	176.88	0.15%
		Stationery and Office Supplies	0.00	0.00
2	Travel		24845.60	21.04%
3	Laboratory/Research	Materials	775.42	0.65%
		Equipment	22007.25	19.58%
		Services	0.00	0.00
4	Business services	Library services	677.72	0.57%
		Technical services	8483.90	7.10%
		Insurance and legal services	450.67	0.38%
		Financial services	122.64	0.10%
		Education services	768.66	0.64%
		Miscellaneous services	860.30	0.72%
5	Estates	Utilities	1469.37	1.23%
		Health, safety, and security	500.96	0.42%
		Estates, and facilities operations	7242.08	6.08%
		Fees	1713.39	1.43%
6	Food and catering	Food	673.27	0.56%
		Beverages	42.05	0.04%
		Equipment and services	1663.89	1.39%
7	Construction		469.00	0.40%
8	Furniture		448.21	0.38%
9	Other products		411.11	0.35%
10	Paper products		284.94	0.24%
11	Medical supplies		43.81	0.04%
12	Capex		36.15	0.03%
13	Unclassified		0.00	0.00

Within IT services, significant contributors include computer supplies and services and library services, contributing 33,933.67 tonnes and 9,072.15 tonnes, respectively, making up a substantial share of the overall emissions. Notably, the emissions from computer supplies and services highlight the substantial environmental implications of digital infrastructure management.

In the Laboratory/Research category, emissions primarily stem from equipment and materials, accounting for 22,007.25 tonnes and 775.42 tonnes, respectively. this underscores the importance of sustainable practices in research-related activities. Food and catering emissions are notable in the equipment and services subcategory, contributing 1,663.89 tonnes, 70 % of the sector, emphasizing the need for sustainability considerations in food sourcing and catering operations which have been outlined in the Imperial College London Sustainable Food and Drink Policy.

Estates-related emissions span various subcategories, such as utilities, health, safety, and security, estates, facilities operations, and fees, revealing the diverse sources within the institution's physical infrastructure. Among the different subcategories, facilities operation emits around 66 % of the sectors CO_2e. Finally, business services showcase emissions from various service-oriented subcategories, including library services, technical services, insurance and legal services, financial services, and education services underscoring the varied impact of administrative and support functions on the carbon footprint.

The reported low construction emissions are due to an accounting practice where spending for construction projects is recorded when the contract is awarded and payment is made, not when the work is done. This approach results in a lumpy representation of construction-related emissions, reflecting financial transaction timing rather than real-time emissions from construction activities. Understanding this methodology is crucial for accurate interpretation, highlighting the importance of considering financial timelines in emissions reporting.

Figure 9: Co$_2$ emissions for procurement and supply chain categories
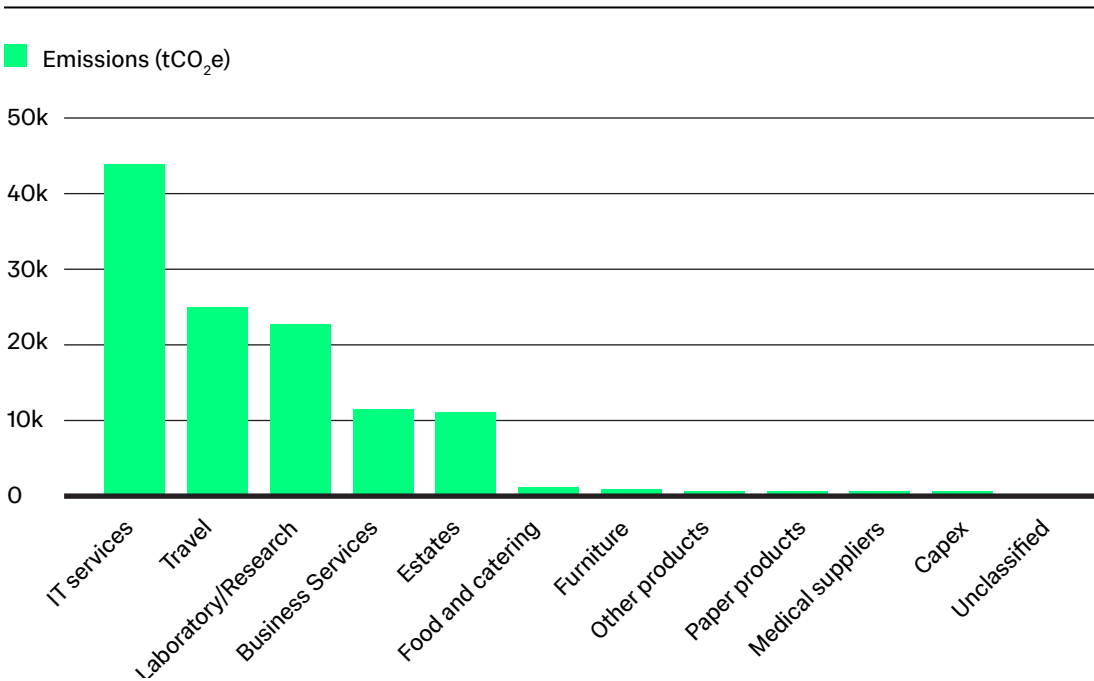
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Keep up to date with the latest sustainability news and events across Imperial with our Sustainability Bulletin newsletter.

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