

IMPERIAL

Carbon emissions from higher education institutes

Methodologies, mitigation and
moving forward

Jasmin Cooper

30/05/2024

Higher education and Net Zero

*Higher education
play a crucial role in
shaping future
generations through
education...*

Higher education and Net Zero

Students want action on climate and sustainability...

As a student, I'm striking for climate action. If you're worried or angry about the climate crisis, join us

Jeremy Phu Howard

I used to believe I had no real say in what our government did. But eventually I realised that that simply wasn't true



School Strike for Climate protesters in Sydney, March 2023. 'If the people in power can't burn our future due to incompetence, greed or both, then I'm going to do what I can to stop it.' Photograph: Richard Milnes/REX/Shutterstock

I'm 16 years old and today I will be striking from school because of the government's complete failure to combat a very real, and very dangerous threat to my future. I live in western Sydney and have lived here all my life. I enjoy school and take my education seriously. I take pride in my academic achievement. Despite this, I'm walking out of school to fight for my future.

Students occupy schools and universities across Europe in climate protest

Young people on first climate strikes since COP26

25 March 2022



EWAN BOOTMAN/REX/SHUTTERSTOCK

Hundreds of young climate activists gathered outside the Scottish Parliament

Young people in Scotland are taking part in climate strikes from schools, colleges and universities for the first time since COP26.

Higher education and Net Zero

Staff also care about the environmental impacts of their place of work

Support today's global climate strike



Staff and students from the University of Liverpool are being encouraged to take 30 minutes out of their working day to support today's global day of action on climate change.

In a **joint statement**, the University, campus unions and Guild of Students said, "We share deep concerns about the climate crisis and support the call for sustained and urgent action."

"The University is joining campus unions and the Guild of Students in encouraging staff and students to observe the 30-minute workday solidarity stoppage to coincide with the global school student strike on the 20th September."

Cambridge supports staff in Global Strike for Climate workday pause, but preferably 'at lunchtime'

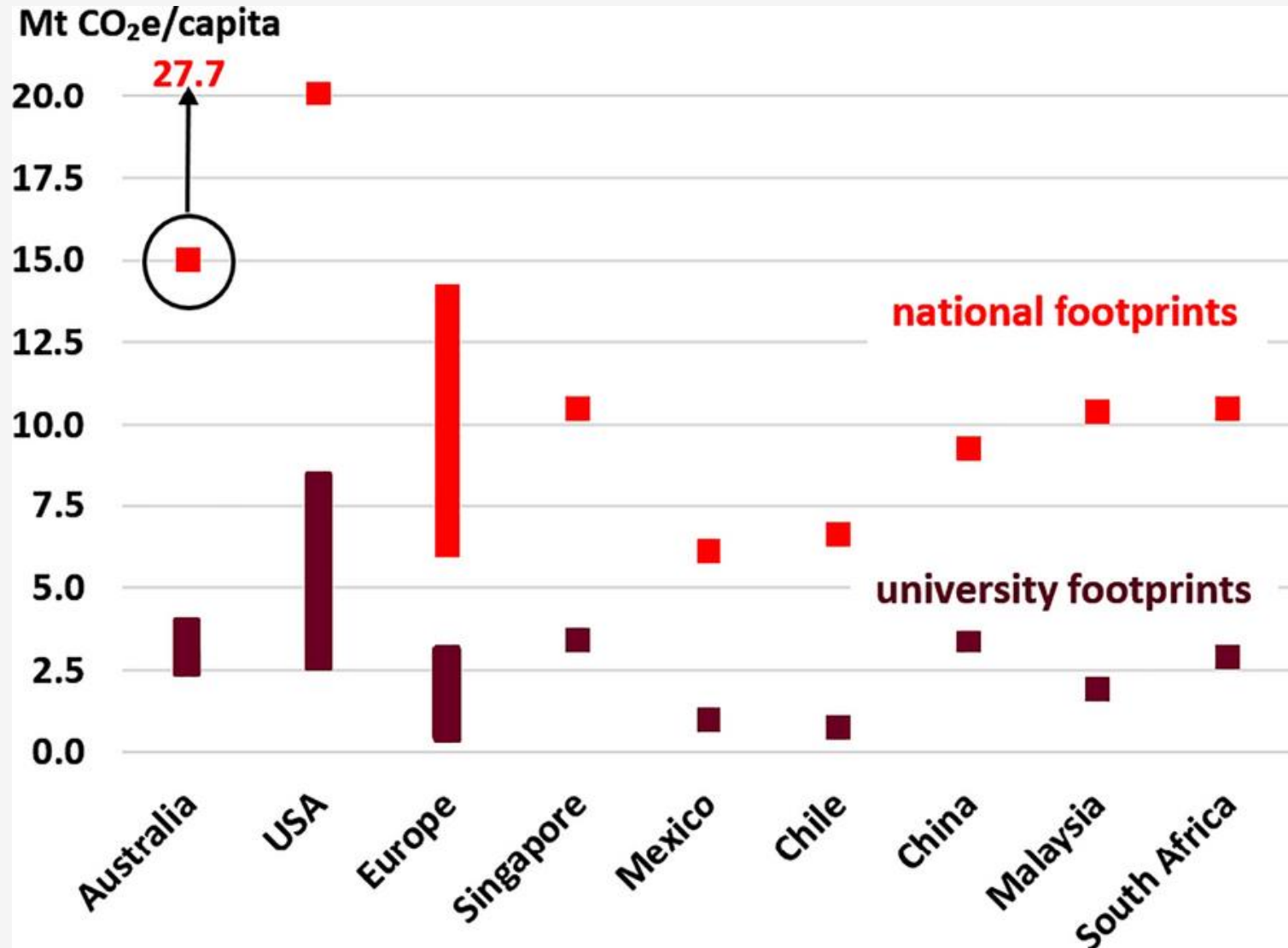
An open letter with over 500 signatures has called on the vice-chancellor to support the global strike



YouthStrike4Climate organised a similar school strike across the UK in February of this year
JIAWEI PENG

Cambridge will support all staff members participating in a 30-minute work stoppage on 20th September as part of the Global Strike for Climate, according to an email sent to Cambridge staff earlier this week by the University's Director of Human Resources, Emma Stone.

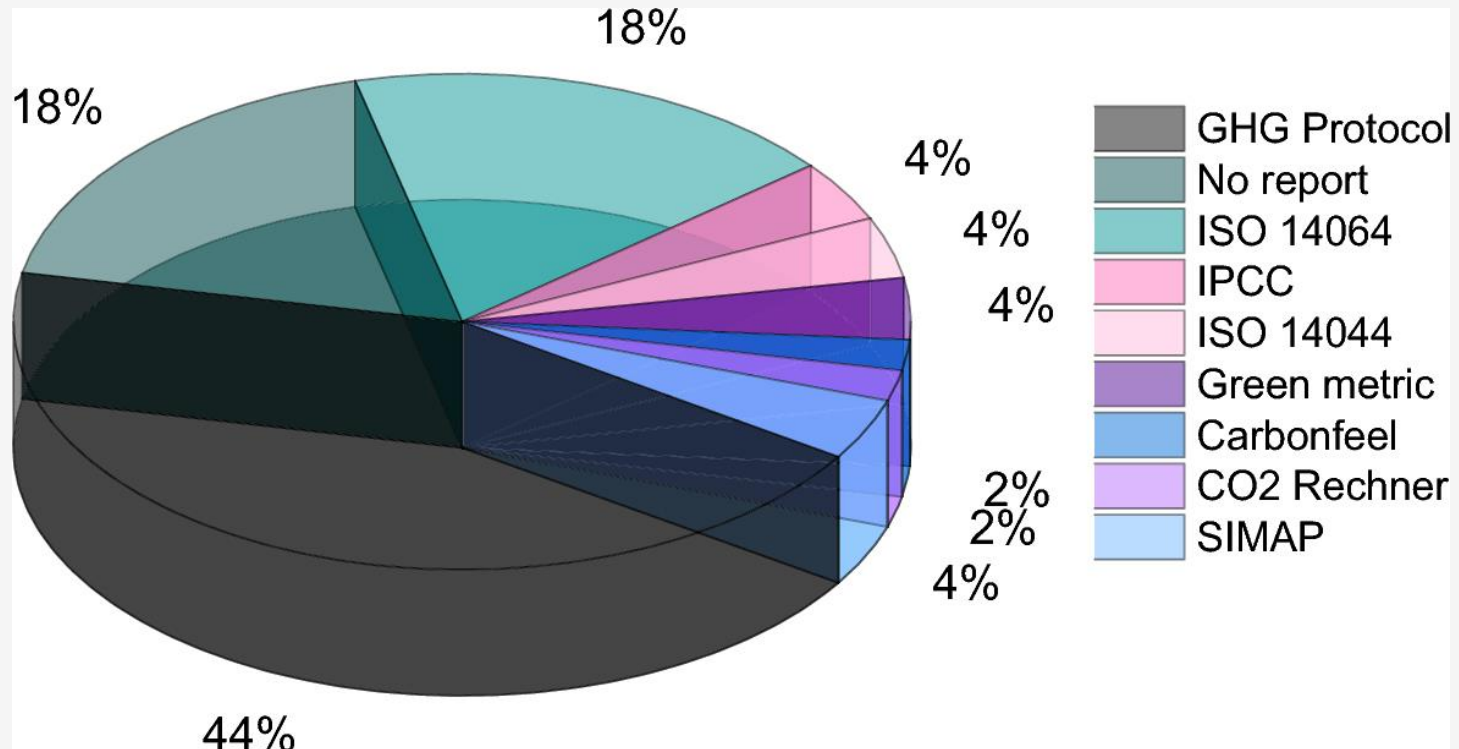
How much carbon is emitted by higher education?



Helmets E, Chang CC, Dauwels J. Carbon footprinting of universities worldwide: Part I—objective comparison by standardized metrics. Environmental Sciences Europe. 2021;33(1):30.

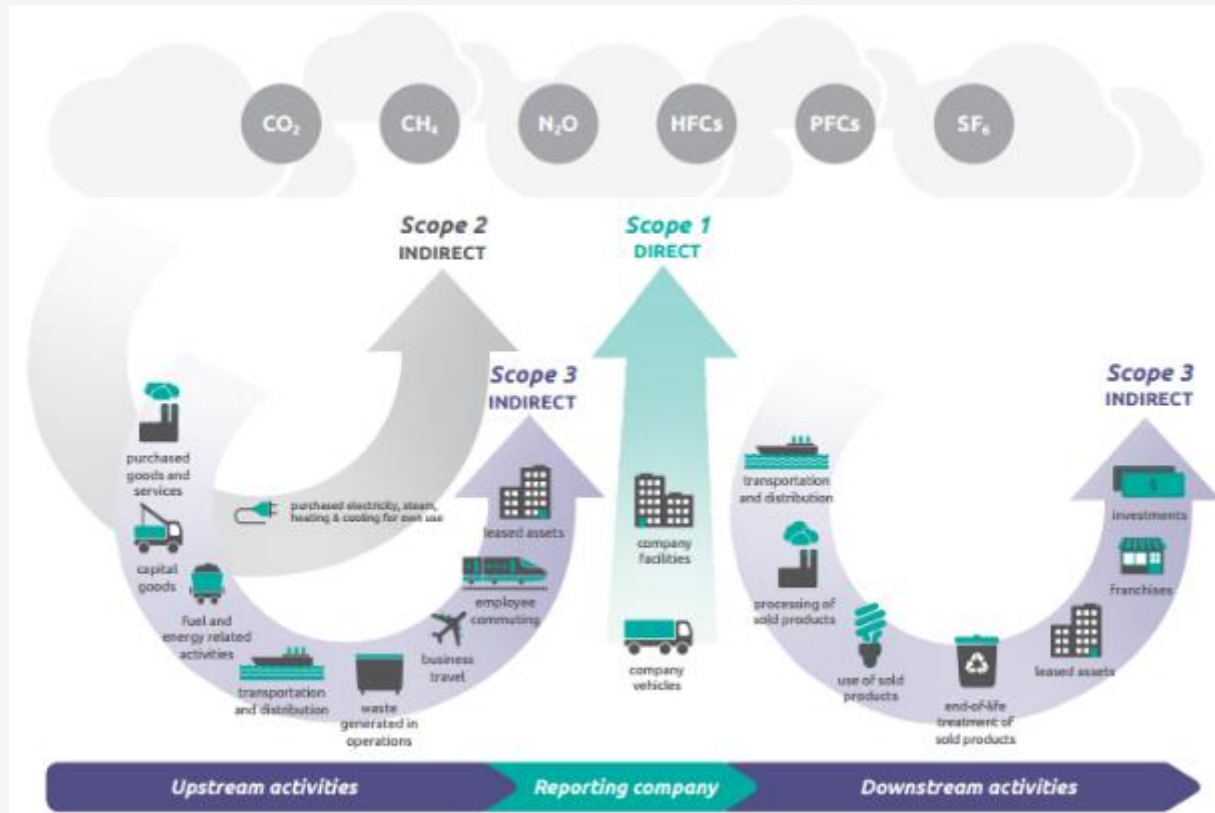
How are emissions calculated?

- Emission reported either through university sustainability/emissions reporting or in peer reviewed journal papers
- **No standardised framework**
 - University reporting used Greenhouse gas (GHG) Protocol
 - Peer reviewed literature uses variety of methods, including GHG Protocol, life cycle assessment, IPCC, emission factors e.g. DEFRA



Paredes-Canencio KN, Lasso A, Castrillon R, Vidal-Medina JR, Quispe EC. Carbon footprint of higher education institutions. Environment, Development and Sustainability. 2024.

GHG Protocol



Scope 1 and 2 emissions



Power generation



Vehicles



Refrigerants



Grid electricity



Other direct emissions

Scope 3 emissions

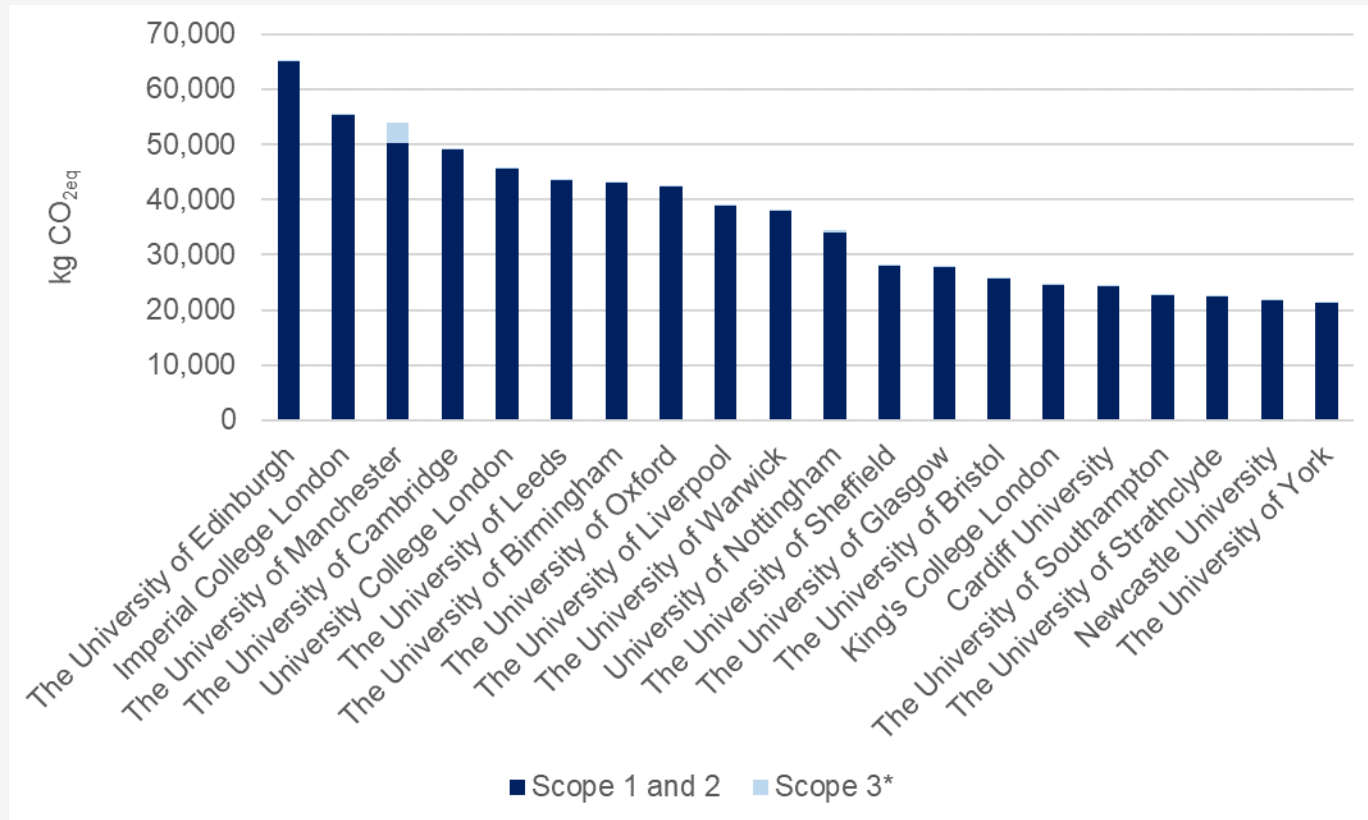
- What is included varies by university
- Commuting, business travel, water and waste are common activities included
- Procurement, catering and business services can also be included

Table [1.1] Corporate-level GHG Protocol reporting options

Reporting Option	Scope 1	Scope 2	Scope 3
Report in conformance with the <i>GHG Protocol Corporate Standard</i>	Required	Required	Optional: Companies may report any scope 3 emissions the company chooses
Report in conformance with the <i>GHG Protocol Corporate Standard</i> and the <i>GHG Protocol Scope 3 Standard</i>	Required	Required	Required: Companies shall report scope 3 emissions following the requirements of the <i>Scope 3 Standard</i>

GHG Protocol. Corporate Value Chain (Scope 3) Standard. Washington D.C., USA: World Resources Institute (WRI), World Business Council For Sustainable Development (WBCSD); 2011.

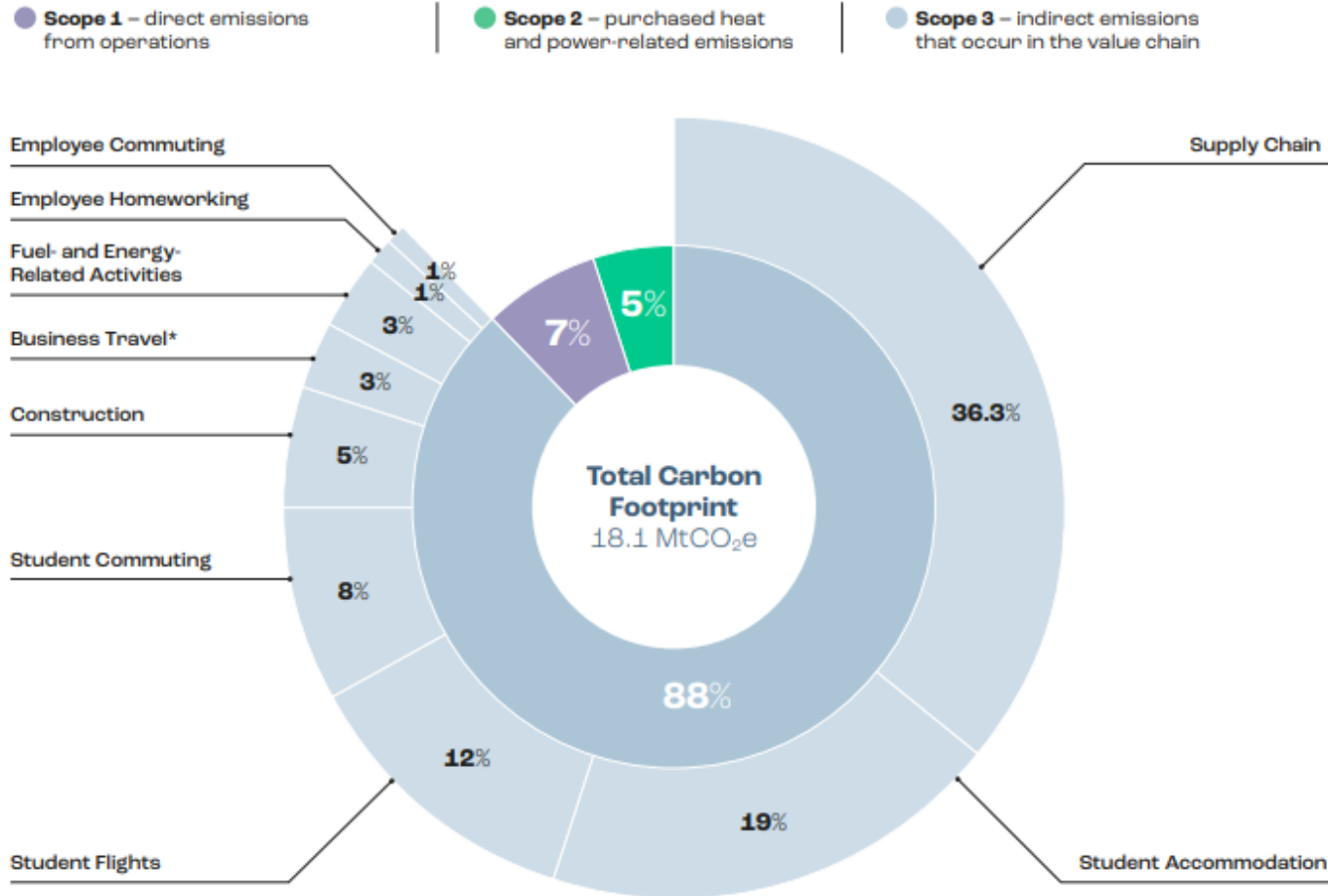
Emissions in UK institutes



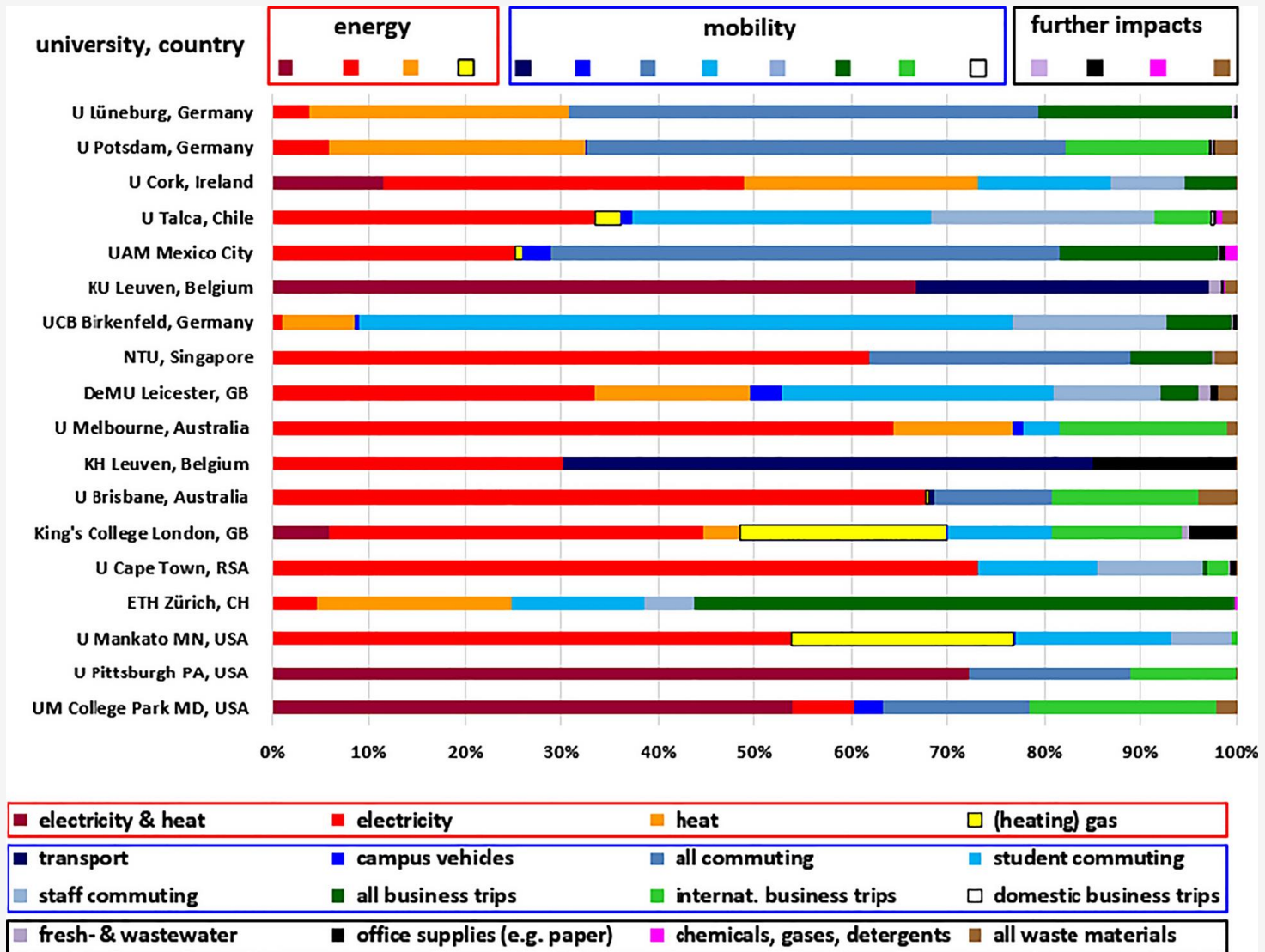
**waste, water and wastewater only*

Breakdown of UK emissions

Chart 1: A breakdown of 2020-21 sector-wide emissions across Scope 1, 2, and 3 in MtCO₂e, excluding financed emissions

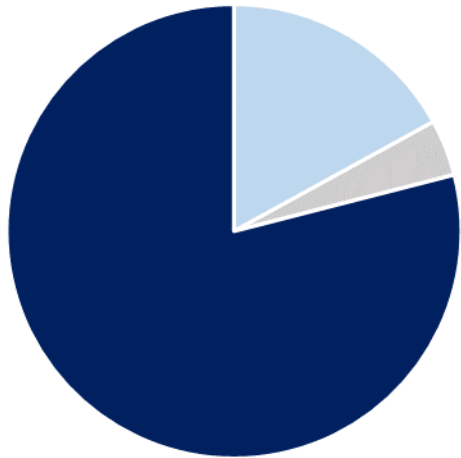


Emissions breakdown varies by methodology and scope



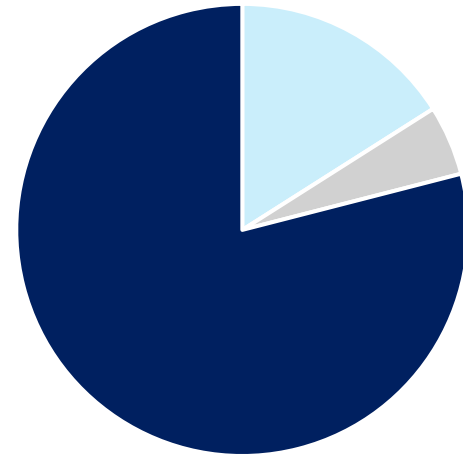
Helmets E, Chang CC, Dauwels J. Carbon footprinting of universities worldwide: Part I—objective comparison by standardized metrics. Environmental Sciences Europe. 2021;33(1):30.

University level emissions calculations- Imperial College London



■ Scope 1 ■ Scope 2 ■ Scope 3

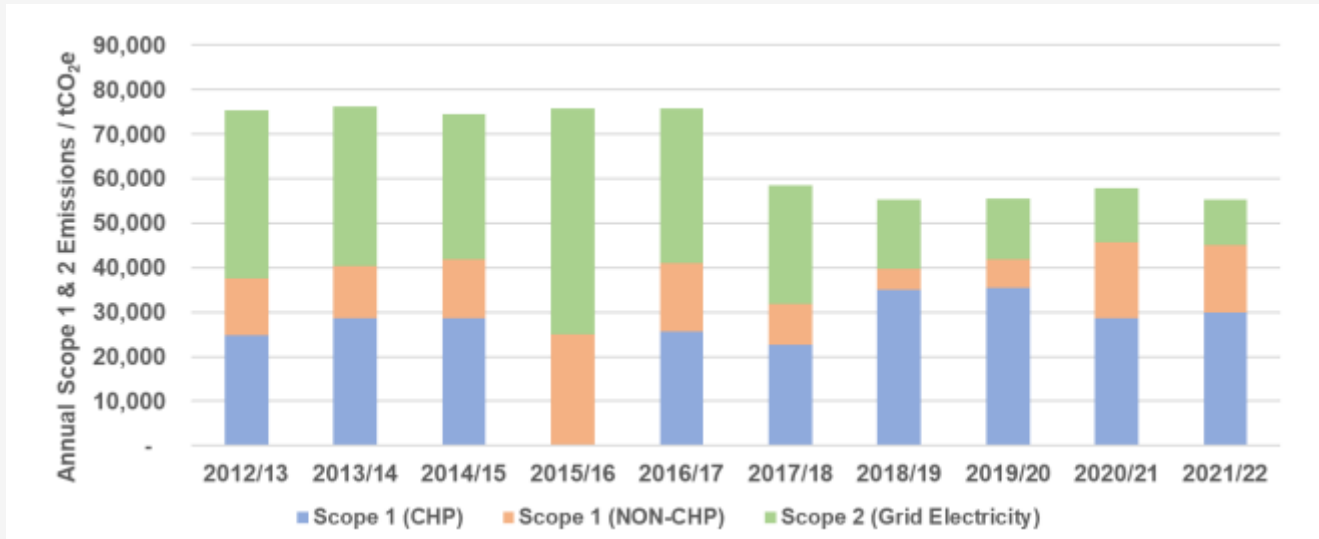
264 kt CO_{2eq} in 2021/22



■ Scope 1 ■ Scope 2 ■ Scope 3

240 kt CO_{2eq} in 2022/23

Scope 1 and 2



Scope 3



Activities included: procurement, business travel, student travel, commuting, food, water and wastewater, waste management



Procurement, business travel, student travel biggest sources of emissions

Business travel emissions

AMEX GBT

Egencia



Procurement emissions

sustainability exchange
The number one resource for sustainability in education
Delivered by the EAUC

Sustainability Exchange is sponsored by
TEC e ENERGY & EDUCATION CONNECTED
Interface®

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Sub programmes of Scope 3

- Supply Chain
- Construction
- Energy
- Food
- Furniture
- IT
- Laboratories
- Travel

Scope 3 – Supply Chain

Background - HESCET Tool

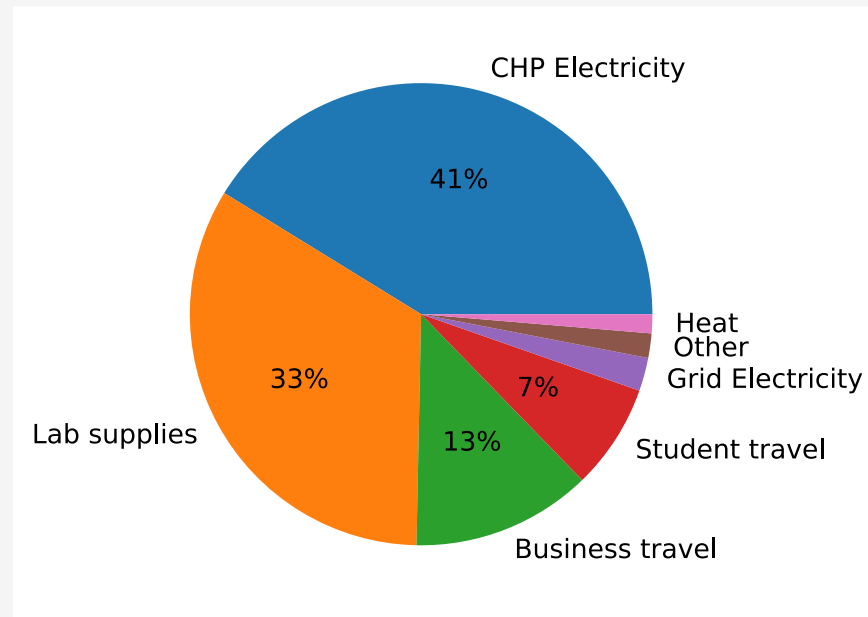
To calculate Scope 3 for monitoring and reporting purposes, spend against each Proc HE code is mapped to a defined list of DEFRA categories for which conversion factors - calculating value to carbon - are allocated. This data is then input to the Higher Education Supply Chain Emissions tool (HESCET) in order for a Scope 3 report to be produced. Some institutions undertake this process themselves using the HESCET tool and UK Universities Purchasing Consortia (UKUPC) has also been providing their membership with annual Scope 3 emission reports for a number of years.

Whilst the HESCET Tool was created initially for universities, EAUC members - both universities and colleges who are not part a purchasing consortia or a HEPA member can access the tool [here](#).

Universities and colleges can use the report in several ways and the content will be useful to procurement, estates, and sustainability teams.

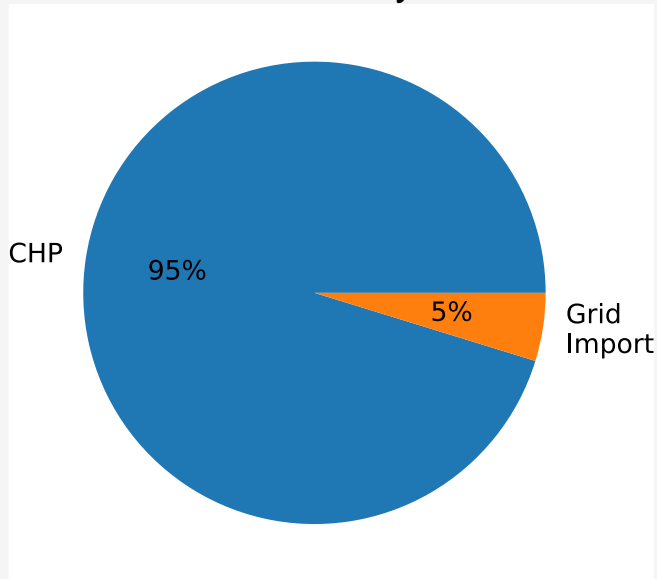
UK Purchasing Consortia Supply Chain GHG Emissions

Departmental level estimate of emissions- Chemical Engineering Department

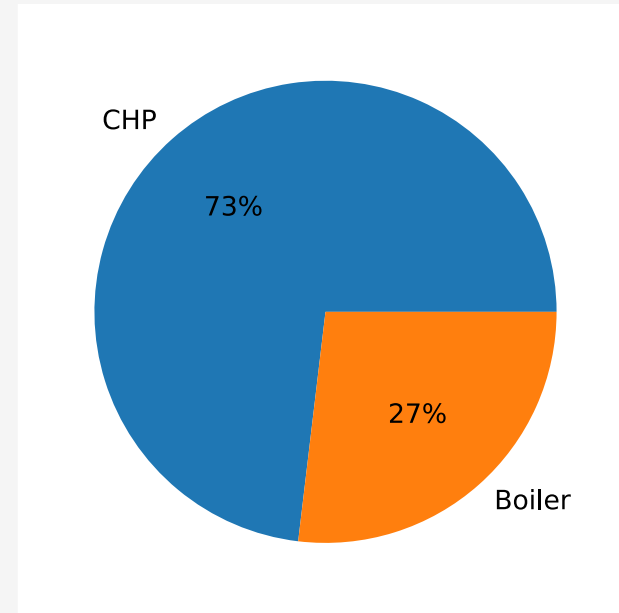


Energy usage

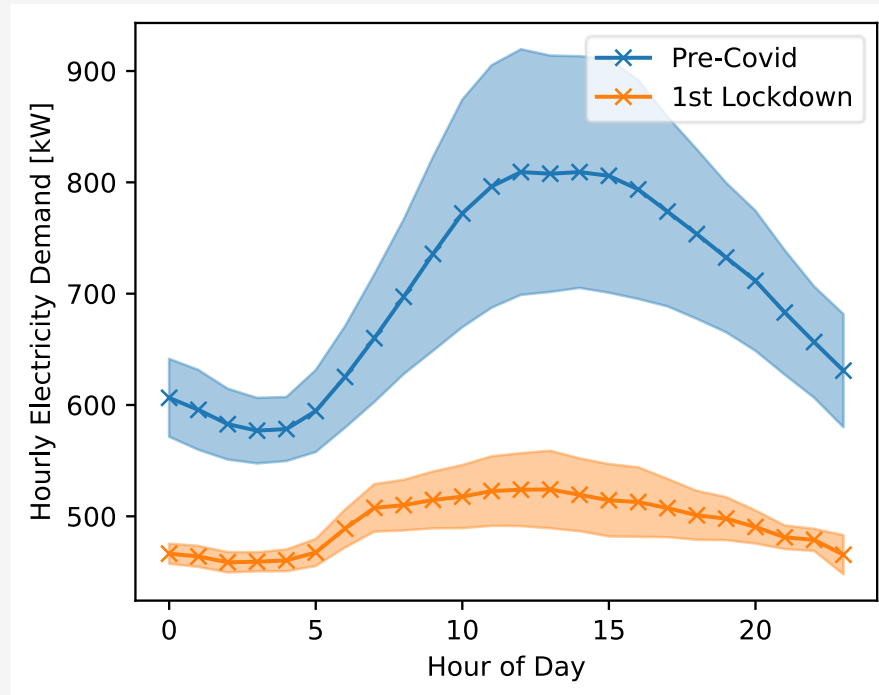
Electricity



Heat

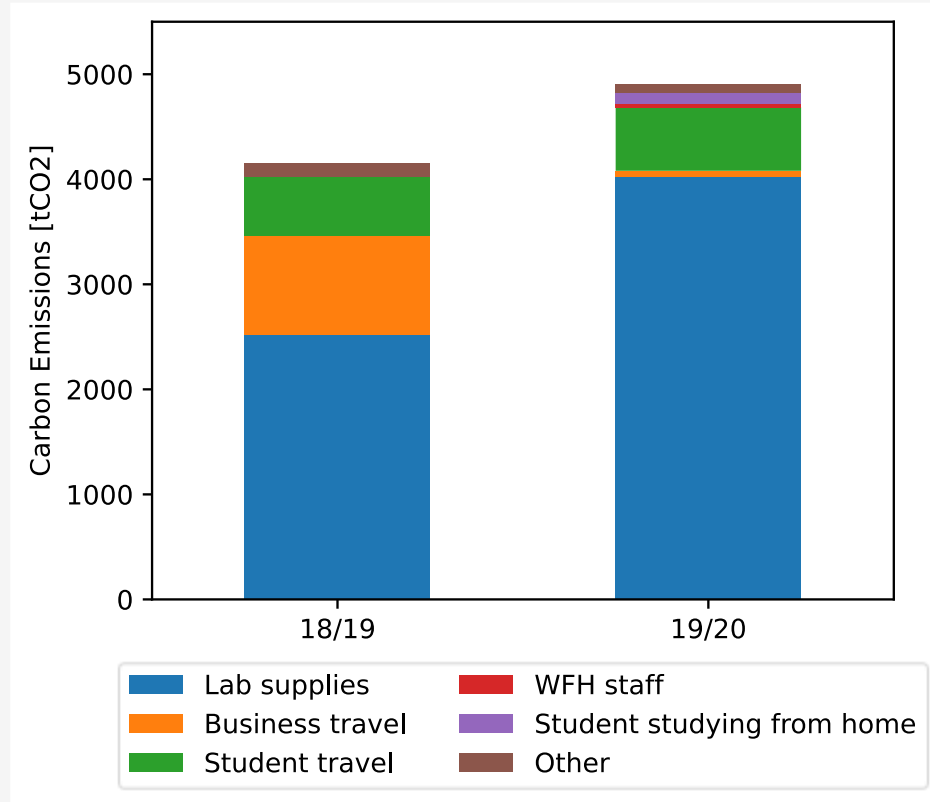


Energy demand profile



Cooper J, Bird M, Acha S, Amrit P, Chachuat B, Shah N, Matar O. The Carbon Footprint of a UK Chemical Engineering Department – The Case of Imperial College London. *Procedia CIRP*. 2023;116:444-9.

Scope 3



Cooper J, Bird M, Acha S, Amrit P, Chachuat B, Shah N, Matar O. The Carbon Footprint of a UK Chemical Engineering Department – The Case of Imperial College London. Procedia CIRP. 2023;116:444-9.

Other tools available

The screenshot displays the website for Labos 1point5, which focuses on reducing the carbon footprint of research activities. The page features a navigation menu at the top with links for 'Collectif', 'Publications', 'Médiathèque', 'Outils', 'Ressources', and 'Actualités'. The main heading is 'Réduire l'empreinte de nos activités de recherche sur l'environnement'. Below this, a descriptive paragraph states that Labos 1point5 is a collective of academic members from various disciplines, aiming to better understand and reduce the environmental impact of scientific research, particularly on climate. The page is divided into three main sections, each with a circular icon and a title:

- L'ÉQUIPE RÉFLEXION**: Represented by a lightbulb icon. The text explains that the reflection team is responsible for making research life and intellectual reflection thrive, as well as organizing debates within the collective and beyond. It provides a link to the 'équipe réflexion' page for more information and participation. The number of members is 553.
- LE GDR**: Represented by a circular icon with '1point5'. The text describes the GDR (Groupement de Recherche) as an objective to better understand and reduce the carbon footprint of research. It provides a link to the 'GDR' page for more information and participation. The number of members is 271.
- APPS 1POINTS**: Represented by a circular icon with a plug symbol. The text states that the GDR conducts scientific studies to evaluate the carbon footprint of public research in France and provides several accessible tools on a 'dedicated platform'. It lists two specific tools: 'GES 1point5' for analysis and 'Scénario 1point5' for action, and 'Transition 1point5' for networking. The number of carbon footprint assessments is 2412, and the number of laboratories is 1182.

Other tools available

Other tools available

Labras 15

Collectif Publications Médiathèque Outils Ressources Actualités

Réduire l'empreinte de nos activités de l'environnement

Le CO2règle une étude scientifique pour évaluer l'impact de nos activités de l'environnement

eauc The Alliance for Sustainability Leadership in Education

ABOUT JOIN ENGAGE CONTACT Login Pay

The Cost of Net Zero Report and Calculator

New: Calculator and

Posted on Jul 18, 2023

APPS 1POINTS

Login/Register English

WHAT IS YOUR University's Ecological Footprint?

EUSTEPs

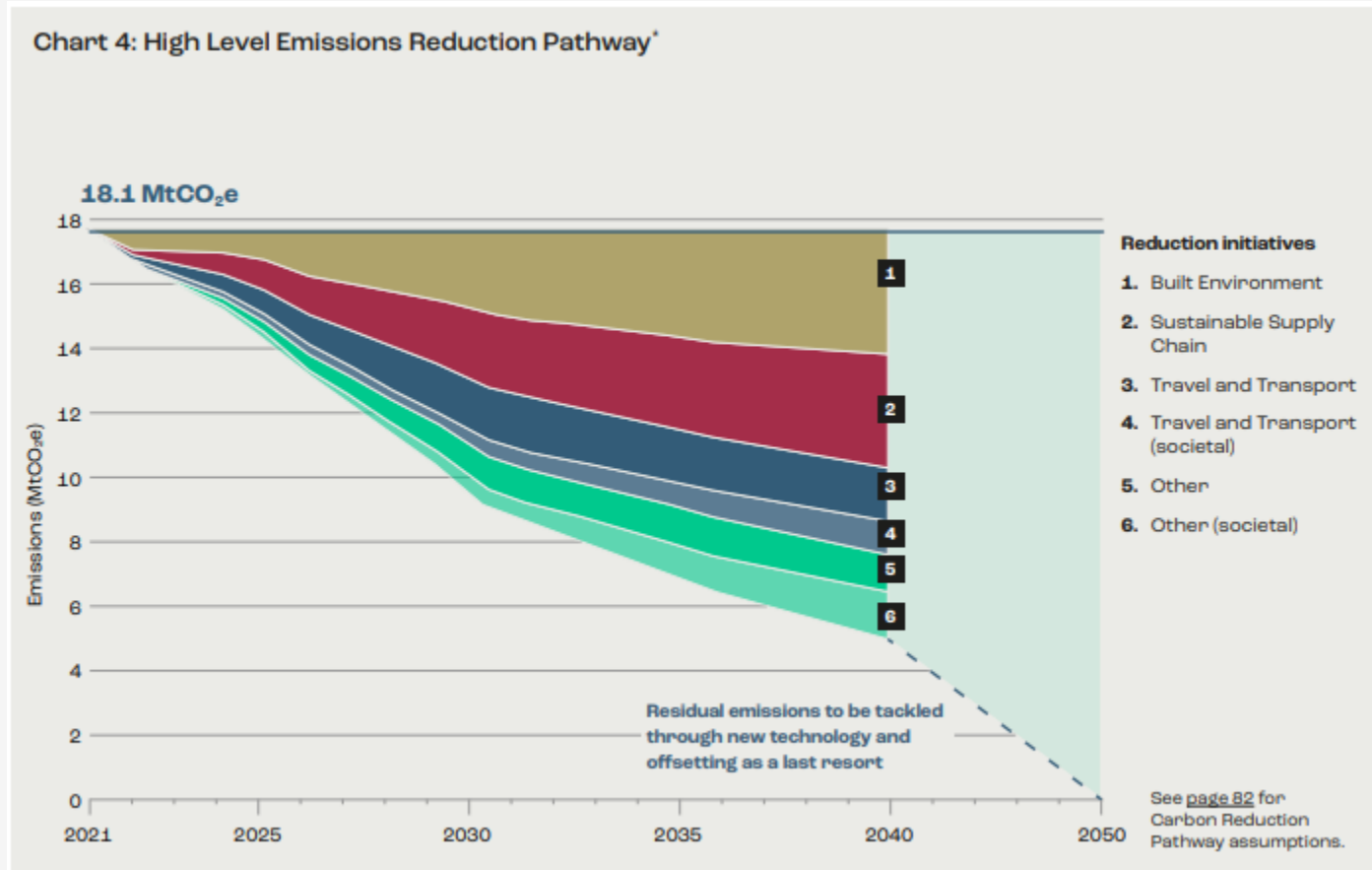
Let's Start

ARISTOTLE UNIVERSITY OF THESSALONIKI universidade de aveiro ABERTA UNIVERSITÀ DI SIENA 1240 Global Footprint Network

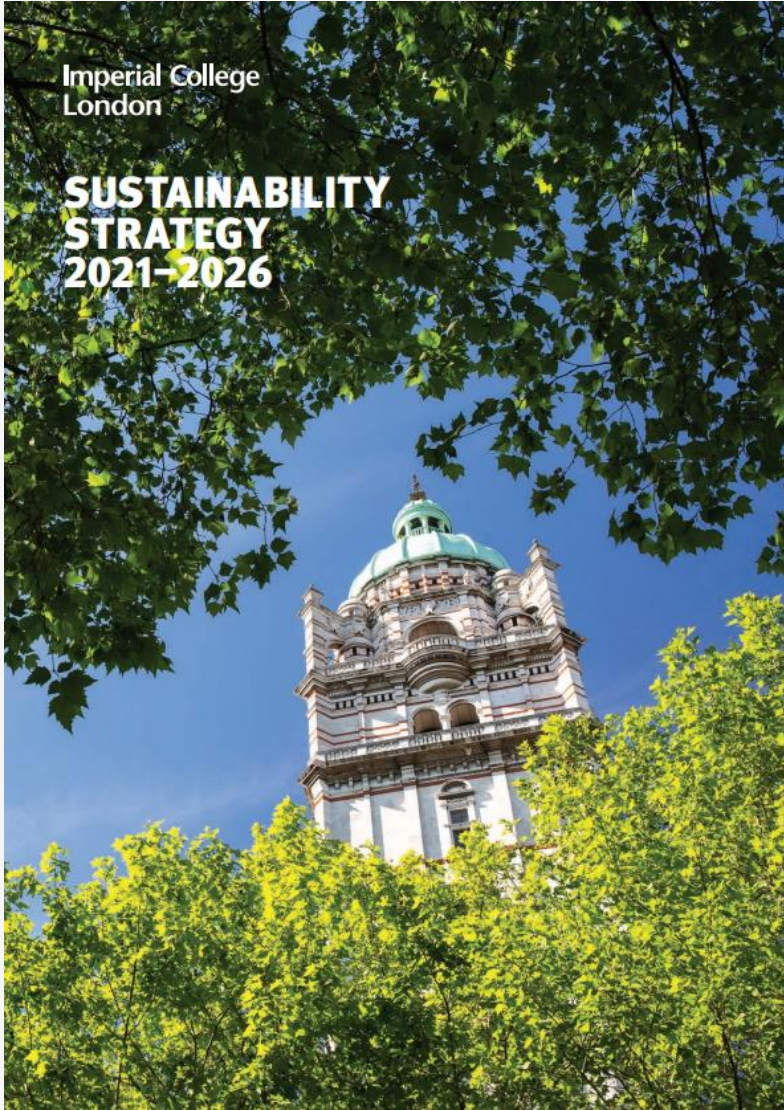
Higher/Tertiary Education member States), **BUFDG** (the British Universities Leadership in Education) have launched the **Cost of Net Zero**, which sets the consultancy supporting organisation expertise and tools) with additional

Higher Education Providers (HEPs), professional bodies, have grappled with the question: "What is the cost of going to net zero?"

What are higher education institutes doing to reduce their emission?



Sustainability strategies



Sustainability strategies



Environmental Sustainability Strategy



CURRICULUM | RESEARCH | CARBON | FLIGHTS | BIODIVERSITY | FOOD | INVESTMENT

Sustainability strategies



 HARVARD UNIVERSITY | Sustainability

Harvard University Sustainability Action Plan



Accelerating action to protect the climate and environment, advance a more equitable society, and promote the wellbeing of people.

ETH zürich

Office of the President



ETH Zurich strives for Net Zero by 2030

Climate change requires rapid and determined action.

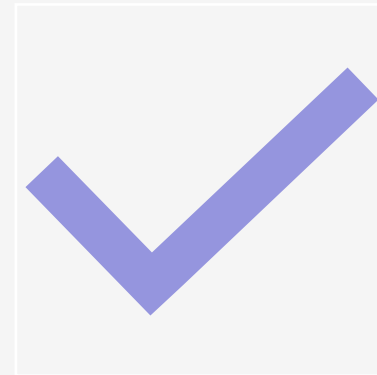
ETH Zurich set the goal to reduce its greenhouse gas emissions to Net Zero by 2030. This document lays out what climate neutrality means for the University and how it aims to achieve that goal. The ETH Community is invited to help determine the path and the speed of this task as a joint responsibility.

White Paper, September 2022

Carbon emissions



Carbon neutral or net zero in Scope 1 and 2 emissions by 2030-2050



Minimise as much as possible Scope 3 emissions

Decarbonising energy usage



Electrifying and energy efficiency



Renewable energy



Fossil fuel free buildings

Lab sustainability

Lab sustainability

LEAF - Laboratory Efficiency Assessment Framework

LEAF is a standard set by UCL to improve the sustainability and efficiency of laboratories. Join the 85 global institutions already taking part and help address the climate and ecological emergencies through your science.

What is LEAF?

Laboratory-based research is essential for advancing society but it is also extremely energy and resource intensive. It's estimated that laboratories are responsible for around 2% of global plastic waste and use 3-10 times more energy per meter squared than a typical office.

By joining the LEAF programme, laboratories reduce their carbon emissions and create an environment that supports research quality.

Laboratories are awarded either a Bronze, Silver, or Gold level depending on how many sustainability actions they take.

Login to LEAF

> [UCL use.](#)

> [Non-UCL users.](#)

The LEAF programme comprises four elements:

1. **The Framework:** An online tool that guides users through sustainability actions to save plastics, water, energy and other resources in their laboratory.
2. **Online calculators:** To help measure financial and carbon impact. You can estimate how sustainable your lab is now and track improvements.
3. **Toolkit and Resources:** From guides to sustainable lab equipment and consumables to induction and exit procedures.
4. **User Engagement & Training:** We offer each institution a tailored workshop to engage laboratory staff and students on sustainable science, and to introduce LEAF.

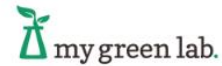
> Read about the [impact of LEAF.](#)

> Read [LEAF FAQs.](#)

Lab sustainability

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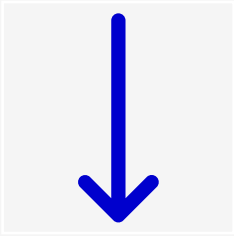
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Login to LEAF

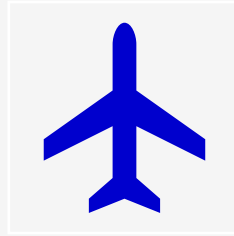
- > [UCL use.](#)
- > [Non-UCL users.](#)



Business travel



Downgrading



Fly less



Rail over plane

Air Travel Mitigation Fund



The University of California recognizes the challenges of climate change and has made commitments to reduce greenhouse gas emissions (GHG), including those from mobile sources such as business related air travel.

Procurement

1

Have influence on suppliers to provide more sustainable products

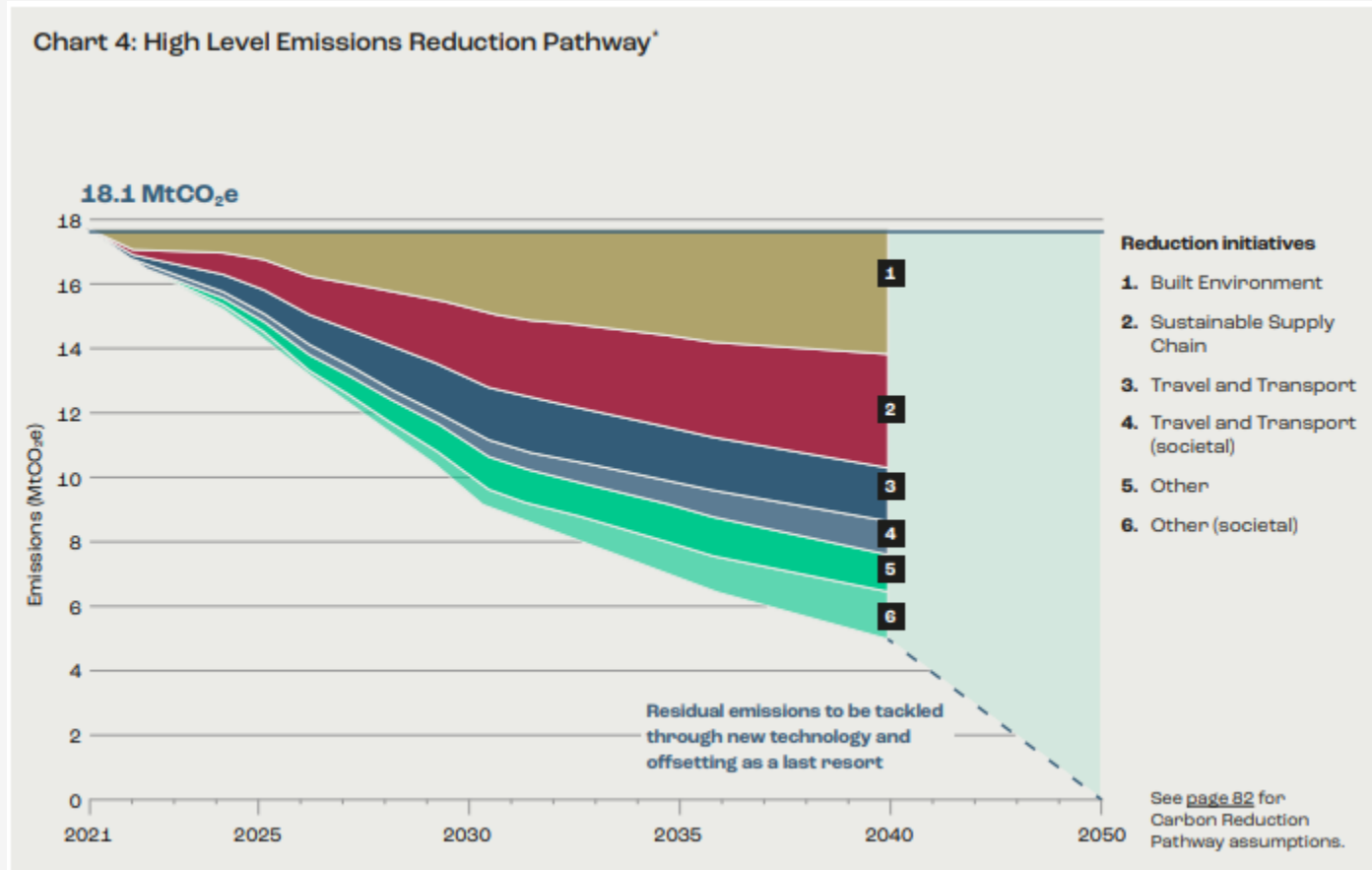
2

Reduce consumptions

3

Purchase goods and services which have circularity incorporated

Bringing down emissions...



Summary

- Higher education institutes have a role to play in meeting climate change targets through education and research, as well as the way they run their campuses
- Mts CO_{2eq} emitted per year by higher education institutes
- Various methods used to estimate emissions
 - GHG Protocol most common
 - Scope 1 and 2 well accounted for
 - Scope 3 varies
 - Scope 3 can be the most significant emission source
 - Variety of initiatives to reduce emissions of higher education institutes
 - Ambitious change needed for campuses to be net zero

IMPERIAL

Thanks for listening!

Questions?