University of Essex

# University of Essex

# Carbon Emissions Report 2022-23

## Introduction

1. This carbon report provides analysis of the greenhouse gas (GHG) emissions for the University of Essex, for financial years (FY) 2021-22 and 2022-23.
2. Emissions are categorised into three scopes:
   - **Scope 1:** Direct emissions from owned or controlled sources (e.g. gas used for hot water and heating, fuel used in vehicles).
   - **Scope 2:** Indirect emissions from the generation of purchased electricity.
   - **Scope 3:** All other indirect emissions that occur in the value chain of the institution as a wider measure of our environmental impact (including purchased goods and services, student and staff commuting, business travel and international student arrivals, waste and recycling treatment and leased assets).

## Summary

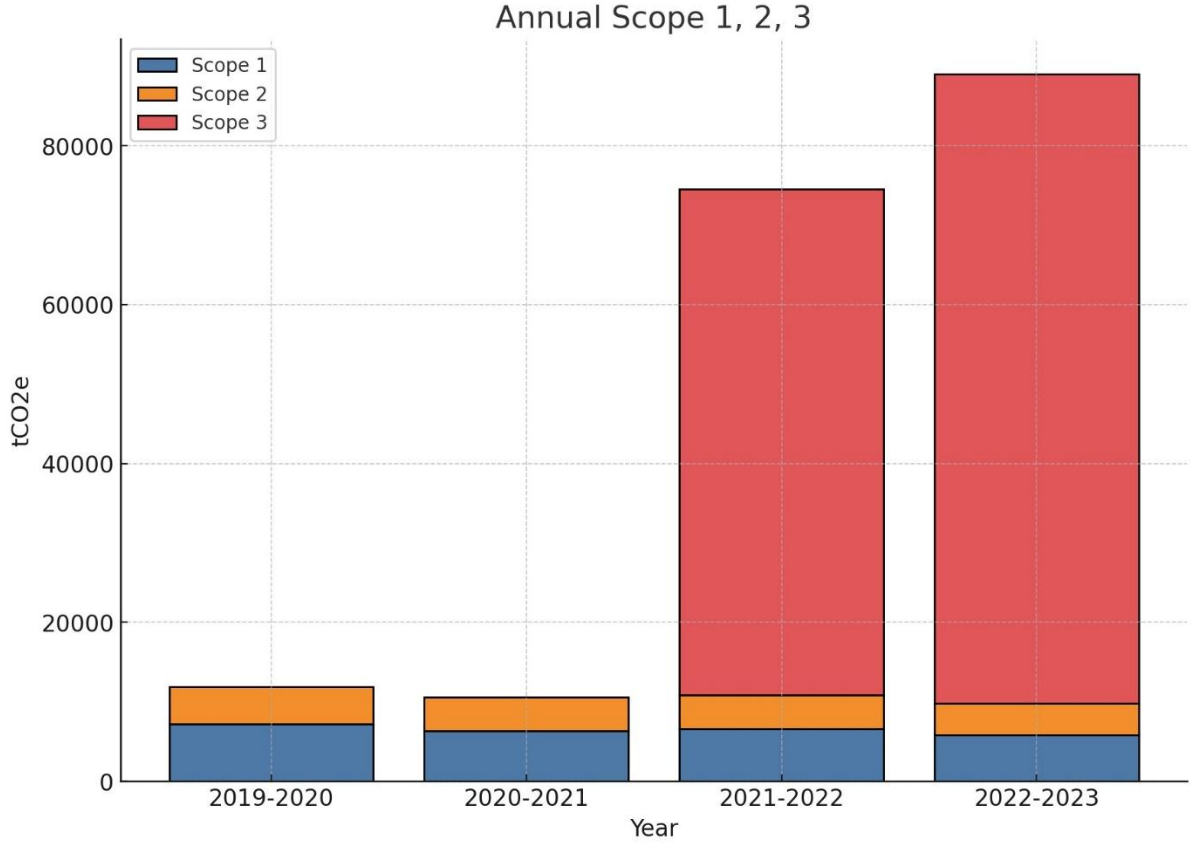

3. From the baseline year of 2019-20 through to 2022-23, the University has made noticeable progress in reducing direct and indirect emissions. Scope 1 emissions, which cover direct sources like natural gas and vehicle fuels, decreased by 19%, reflecting efforts to improve energy efficiency and reduce fossil fuel dependency. Scope 2 emissions, related to purchased electricity, also saw a 16% reduction, indicating a shift towards more efficient and sustainable energy use.
4. Figures for Scope 3 emissions were first measured for FY 2021-22. When comparing FY 2022-23, they have increased by 24%. This rise can be primarily associated with the resumption of stable operations post-COVID-19, with purchased goods and services (which is calculated based on spend) and downstream transportation and distribution—particularly related to student arrivals and travel—being major contributors.

5. While the University has successfully reduced its direct and electricity-related emissions, the increase in Scope 3 emissions underscores the complexity of managing the broader environmental impact associated with indirect activities across its value chain. Continued focus on sustainable procurement and travel will be essential in addressing these challenges. It should be noted that our Scope 3 emissions are typically the Scopes 1 and 2 of others (suppliers, etc.) and our direct ability to control these can be limited, depending on the source.
6. Calculating Scope 3 emissions is also a complex and imperfect process, often relying on assumptions for some categories, and data availability affecting accuracy. Consequently, figures should be seen more as estimates than for Scopes 1 and 2, and year-on-year comparison should be viewed as indicative rather than exact.

**Table 1:** By Scope over time in tonnes of carbon dioxide equivalent ($tCO_2e$)

| Scope | Activity | 2019-20 | 2020-21 | 2021-22 | 2022-23 |
|---|---|---|---|---|---|
| Scope 1 | Natural Gas | 7,023 | 6,166 | 6,380 | 5,618 |
| | Fugitive Emissions from Refrigerants | 139 | 139 | 139 | 139 |
| | Vehicles Fleet | 25 | 66 | 51 | 84 |
| | **Total** | **7,187** | **6,371** | **6,570** | **5,841** |
| Scope 2 | Purchased Electricity | 4,710 | 4,252 | 4,274 | 3,975 |
| | **Total** | **4,710** | **4,252** | **4,274** | **3,975** |
| Scope 3 | Purchased Goods and Services | | | 29,975 | 39,417 |
| | Business Travel | | | 769 | 1,943 |
| | Fuel and Energy Related Activities | | | 2,694 | 2,379 |
| | Waste Generated in Operations | | | 56 | 79 |
| | Employee commuting | | | 5,154 | 5,233 |
| | Downstream Transportation and Distribution | | | 23,521 | 30,478 |
| | Downstream leased assets | | | 1,532 | 2,071 |
| | **Total** | | | **63,701** | **81,600** |
| **Grand Total** | | **11,897** | **10,623** | **74,545** | **91,416** |

**Figure 1:** Annual Scope 1, 2, 3 in $tCO_2e$.




## Scope 1 Emissions

7. Scope 1 encompasses all direct emissions originating from sources that are owned or controlled by the University. The table below outlines all the sources of Scope 1 emissions for the University.

8. Scope 1 carbon emissions have fallen by 11% from 2021-22 to 2022-23 and by 19% from our 2019-20 baseline to 2022-23.

**Table 2:** Scope 1 breakdown and change over time.

| Activity | Description | 2019-20 | % Change | 2021-22 | % Change | 2022-23 |
|---|---|---|---|---|---|---|
| Heating | Natural gas | 7,023 | -9% | 6,380 | -12% | 5,618 |
| Vehicles Fleet | Diesel | 23 | 95% | 45 | 74% | 78 |
| Vehicles Fleet | Petrol | 2 | 249% | 6 | -1% | 6 |
| Fugitive Emissions from Refrigerants | F-gas | 139 | 0% | 139 | 0% | 139 |
| | **Total** | **7,186** | | **6,570** | | **5,841** |

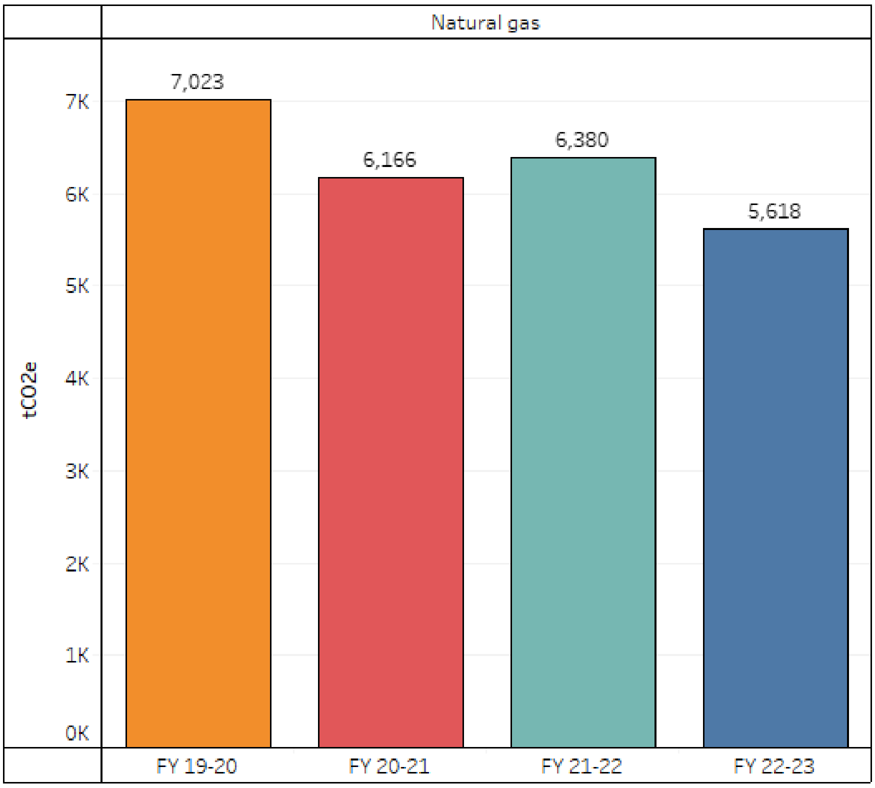
## Heating

9. Heating is the largest contributor to Scope 1 emissions at the University, primarily due to the extensive use of natural gas for heating campus buildings. Comparing FY 2021-22 and FY 2022-23, emissions from natural gas heating have decreased by 12%.

**Table 3:** Natural gas consumption for heating buildings.

| Year | Natural Gas (tCO2e) | Year on Year % Change | % Change from Baseline |
|---|---|---|---|
| 2019-20 | 7,023 | - | - |
| 2020-21 | 6,166 | -12% | -12% |
| 2021-22 | 6,380 | 3% | -9% |
| 2022-23 | 5,618 | -12% | -20% |

**Figure 2:** Historical emissions from natural gas from 2019-20 to 2022-23.




## Vehicle Fleet

10. The emissions from the vehicle fleet are relatively low, although they have increased marginally as a result of increased fuel use (likely reflecting lower vehicle use during the COVID-19 pandemic). These emissions can be further

reduced by transitioning diesel and petrol vehicles to electric or hybrid vehicles. Implementing a more efficient vehicle management system could also contribute to emission reductions.

**Table 4:** Emissions from Vehicle Fleet fuel consumption.

| Year | Vehicles Fuel ($tCO_2e$) | Year on Year % Change | % Change from Baseline |
|---|---|---|---|
| 2019-20 | 25 | | |
| 2020-21 | 66 | 167% | 167% |
| 2021-22 | 51 | -23% | 106% |
| 2022-23 | 84 | 66% | 240% |

### Fugitive Emissions

11. Fugitive emissions from refrigerants are significant due to the high global warming potential of F-gases. Regular maintenance and adopting low Global Warming Potential (GWP) refrigerants can help mitigate these emissions. Since 2019-2020, our fugitive emissions from refrigerants have been consistent at 139 $tCO_2e$ annually. This stability is primarily because no new refrigeration or air conditioning units have been installed during this period.

## Scope 2 Emissions

12. Scope 2 emissions encompass indirect greenhouse gas emissions from the consumption of purchased electricity, steam, heating, and cooling. Scope 2 carbon emissions have fallen by 7.01% from 2021-22 to 2022-23 and by 15.60% from our 2019-20 baseline to 2022-23.

### Purchased Electricity from the grid

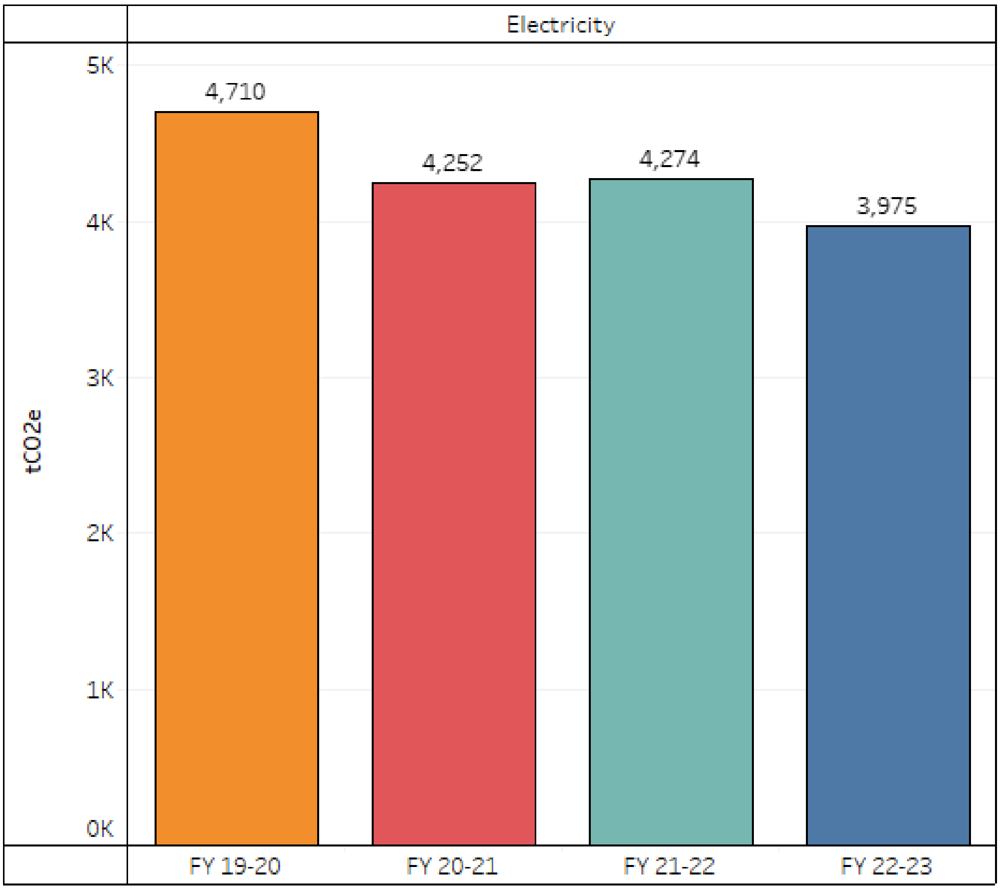
13. The University's electricity consumption is its only source of indirect emissions, categorised as Scope 2 emissions. In FY 2021-22, the University recorded 4,274 $tCO_2e$ in Scope 2 emissions from electricity, which decreased to 3,975 $tCO_2e$ in FY 2022-23. These emissions are significant because they are a direct result of the University's electricity use, despite the electricity being sourced from 100% certified renewable providers. However, since the national grid includes both renewable and non-renewable sources, the University does not claim zero

carbon emissions from its electricity consumption. As the electricity grid decarbonises further, this will see our Scope 2 emissions reduce.

**Table 5:** Emissions from purchased electricity from the grid.

| Year | Purchased Electricity (tCO2e) | Year on Year % Change | % Change from Base Line |
|---|---|---|---|
| 2019-20 | 4,710 | - | - |
| 2020-21 | 4,252 | -10% | -10% |
| 2021-22 | 4,274 | 1% | -9% |
| 2022-23 | 3,975 | -7% | -16% |

**Figure 3:** Historical emissions from electricity from 2019-20 to 2022-23.




14. To reduce Scope 2 emissions, the University is focusing on increasing the share of renewable energy in its electricity mix, switching to electric heating where possible and implementing energy efficiency measures. Enhancing on-site renewable energy generation, such as through the installation of photovoltaic (PV) solar panels, is currently a key strategy. The University plans to equip as

many viable roofs as possible with PV solar panels by 2027-28, reducing dependency on grid electricity (funding permitting).

15. Additionally, the University is implementing several energy efficiency projects, including upgrading to LED lighting and optimising heating and cooling systems. Improving building insulation and upgrading windows will further decrease energy needs and enhance overall energy efficiency, aligning with the University's goal of achieving net zero Scope 1 and 2 carbon emissions by 2035.

## Scope 3 Emissions

16. Scope 3 emissions comprise all indirect (incidental) greenhouse gas emissions that occur from the University's activities but originate from sources not owned or directly controlled by the University. This ultimately covers a vast array of activities.

17. Our Scope 3 emissions categories are defined based on the guidelines from the Greenhouse Gas (GHG) Protocol, a widely adopted framework for measuring and managing greenhouse gas emissions. The GHG Protocol provides a comprehensive standard for identifying and calculating emissions across an organisation's entire value chain. By using this framework, we ensure that our Scope 3 emissions reporting is consistent with global best practices, allowing for transparency and comparability with other institutions.

18. The following sections detail the data for each of the relevant Scope 3 categories that we measure, in line with the GHG Protocol:

    a. Purchased Goods and Services
    b. Capital Goods
    c. Fuel- and Energy-Related Activities Not Included in Scope 1 or Scope 2
    d. Waste Generated in Operations
    e. Business Travel
    f. Employee Commuting
    g. Downstream Transportation and Distribution
    h. Downstream Leased Assets

19. In FY 2022-23, Scope 3 emissions accounted for approximately 89% of the University's total carbon footprint, exceeding the combined total of Scope 1 and Scope 2 emissions.

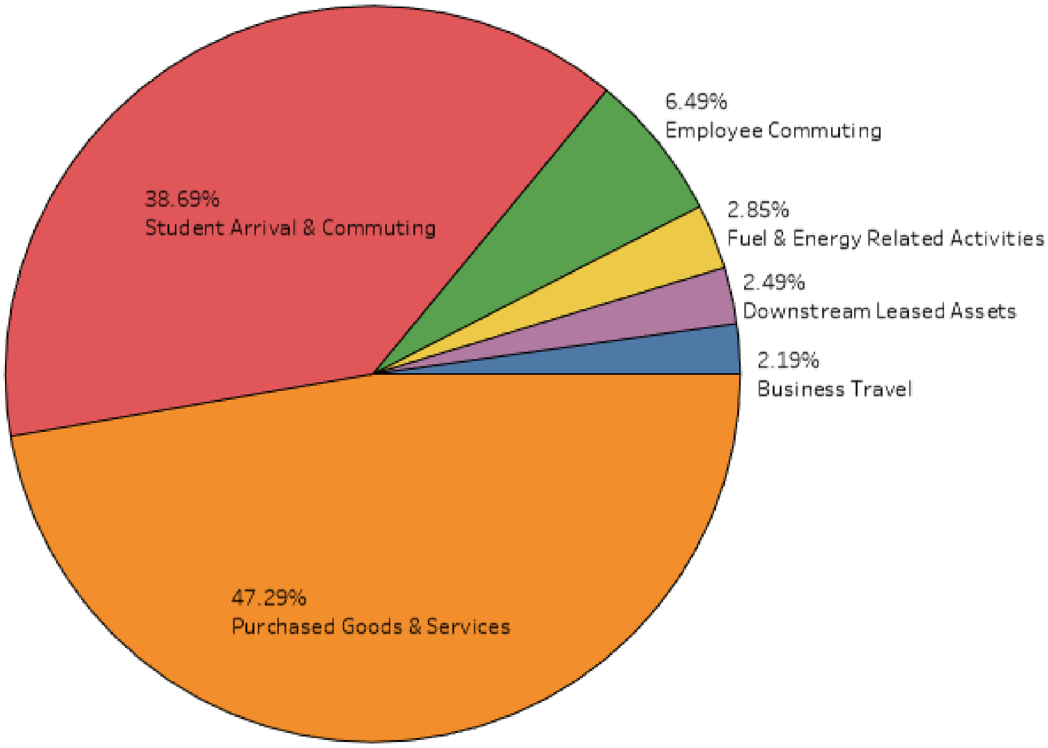
20. The figure we have calculated for Scope 3 carbon emissions has risen by 24% from 2021-22 to 2022-23. This increase in emissions is primarily due to the normalisation of university operations and onsite student numbers post-COVID-19 and some adjustments to the categories counted. The FY 2021-22 period had reduced activity and fewer students on campus due to various COVID-19 related impacts, which resulted in lower emissions, thus were not a complete reflection of typical activity.

21. Calculating Scope 3 emissions is a complex process due to the vast quantities and variety of the data required. FY 2022-23 is the second year the University has undertaken this challenging task. The process involves extensive data collection, detailed modelling, and precise calculations, as well as assumptions-based estimates. Despite these complexities, understanding and addressing Scope 3 emissions is crucial for the University to achieve its comprehensive sustainability and net-zero carbon emission goals.

**Table 6:** Main Scope 3 emission categories ($tCO_2e$).

| Activity | 2021-22 | 2022-23 | % Change |
|---|---|---|---|
| Purchased Goods and Services | 29,975 | 39,417 | 32% |
| Business Travel | 769 | 1,943 | 153% |
| Fuel and Energy Related Activities | 2,694 | 2,379 | -12% |
| Waste Generated in Operations | 56 | 79 | 41% |
| Employee commuting | 5,154 | 5,233 | 2% |
| Downstream Transportation and Distribution | 23,521 | 30,478 | 30% |
| Downstream leased assets | 1,532 | 2,071 | 35% |
| **Total** | **63,700** | **81,600** | **28%** |

**Figure 4:** Showing major Scope 3 emission categories for 2022-23.




22. In our approach to calculating Scope 3 emissions, we adhere to a standardised methodology that ensures consistency and comparability year-on-year. Each year, as we refine our processes, we can capture more detailed data that previously might have been obscure or unavailable. Additionally, we aim to continuously integrate new data streams that were previously missing. Consequently, the level of detail in our Scope 3 data evolves, becoming increasingly comprehensive with each reporting cycle. The detailed breakdown of the standardised calculations and assumptions used in calculating Scope 3 emissions can be found in Appendix 1.

**Purchased Goods and Services**

23. Currently, emissions data for this category is provided by the Southern University Purchasing Consortium (SUPC) using the HESCET (Higher Education Supply Chain Emissions Tool). This tool is based on spend, meaning that the more money spent, the higher the calculated emissions. While this spend-based approach offers a broad estimate, it currently lacks nuance that masks spending on lower carbon products and services that may have a slightly higher cost.

Therefore, to enhance the accuracy and effectiveness of these calculations, we hope to adopt a hybrid approach to these calculations in future.

24. Purchased goods and services (i.e. everything we buy) is the largest contributor to Scope 3 emissions, showing the significant impact of the University's procurement and purchasing activities and highlighting the critical role of procurement in the University's overall carbon footprint. In FY 2022-23, the total emissions from this category were approximately 32% higher than FY 2021-22.

25. The increase in emissions from purchased goods and services in the FY 2022-23 is largely due to the normalisation of operations and onsite student numbers post-COVID-19. Significant spending increases in categories such as Business Services (71%), Medical and Precision Instruments (133%), and Food and Catering (256%) have particularly high carbon impacts. These changes reflect a return to 'normal' campus activities, contributing to the overall rise in emissions as the University resumes pre-pandemic operations.

26. In future years we intend to directly engage with our top 50 suppliers, who account for more than 50% of the emissions in this category. By obtaining Scope 1 and 2 data directly from these suppliers and apportioning it based on the University's share of purchases, we aim to achieve a more precise estimate of our Scope 3 emissions. For the remaining suppliers, we will continue to rely on data supplied by the SUPC. This dual strategy aims to improve the reliability of Scope 3 emissions data and while recognising that the calculation of Scope 3 emissions, and availability of data, is still an emerging area.

**Table 7:** Main Purchased Goods & Services emission categories ($tCO_2e$)**.**

| Purchased Goods and Services | 2021-22 | 2022-23 | % Change |
|---|---|---|---|
| Business Services | 9,468 | 16,172 | 71% |
| Paper Products | 191 | 136 | -29% |
| Other Manufactured Products | 1,373 | 1,170 | -15% |
| Manufactured Fuels, Chemicals and Gases | 102 | 150 | 47% |
| Food and Catering | 107 | 391 | 256% |
| Construction | 470 | 583 | 24% |
| Information and Communication Technologies | 8,290 | 8,308 | 0% |
| Water | 25 | 31 | 26% |
| Medical and Precision Instruments | 2,732 | 6,365 | 133% |
| Other Procurement | 3,757 | 2,695 | -28% |

| | | | |
|---|---|---|---|
| Unclassified | 3,460 | 3,415 | -1% |
| **Total** | **29,975** | **39,417** | **32%** |

**Capital Goods (e.g. buildings and machinery)**

27. Emissions associated with capital goods are substantial due to the embodied carbon in construction materials and machinery. These emissions can vary significantly from year to year, largely depending on the scale of infrastructure projects undertaken. For example, the emissions for FY 2022-23 were elevated due to major construction projects, such as the construction of the Pastures accommodation and Clingoe House. In contrast, FY 2021-22 saw no major infrastructure projects, resulting in lower emissions for that year. This variability highlights the uneven impact of this category over time.

28. To mitigate these emissions, we aim to adopt green building standards and utilising low-carbon materials in construction projects. Green building practices, such as using recycled or sustainably sourced materials, implementing energy-efficient designs, and incorporating renewable energy sources, can significantly reduce the carbon footprint of new constructions. We are developing design standards that will set out agreed approaches to building and refurbishment and focus on efficient use of our current infrastructure, rather than building new.

**Fuel and Energy-Related Activities**

29. Emissions from fuel and energy-related activities arise from the extraction, production, and transportation of fuels (including gas, electricity and fuels for vehicles). These upstream emissions are an important component of the University's carbon footprint. For FY 2022-23, these emissions represent a decrease of 12% from FY 2021-22. This reduction can be attributed to various factors, including changes in fuel consumption patterns and the efficiency of energy use.

30. To mitigate these emissions, the University will focus on reducing overall fuel consumption and opting for cleaner fuel alternatives. For example, we have increased the proportion of electric vehicles in our fleet to move away from petrol and diesel, and the Grounds Team has switched from petrol-powered hands tools to electric (battery powered) where practical.

31. Implementing energy efficiency measures, transitioning to renewable energy sources, and adopting low-carbon technologies are fundamental steps. For instance, we are reducing dependency on natural gas and increasing the use of electricity from renewable sources for heating where possible. Additionally, exploring biofuels and other sustainable fuel options for transportation and equipment can further reduce the carbon footprint.

**Table 8:** Main Fuel and Energy Related emission categories (t$CO_2$e).

| Emissions from Fuel and Energy Related Activities | 2021-22 | 2022-23 | % Change |
|---|---|---|---|
| Grid Transmission and Distribution Losses | 378 | 364 | -4% |
| Well-to-tank (WTT) electricity (generation) | 1,113 | 951 | -15% |
| Well-to-tank (WTT) electricity (T&D) | 98 | 87 | -12% |
| Well-to-tank (WTT) Natural gas | 1,092 | 957 | -12% |
| Well-to-tank (WTT) Diesel (average biofuel blend) | 11 | 19 | 74% |
| Well-to-tank (WTT) Petrol (average biofuel blend) | 2 | 2 | -3% |
| **Total** | **2,694** | **2,379** | **-12%** |

### Waste Generated in Operations

32. While waste management represents a smaller portion of the University's overall Scope 3 emissions, it can still have a substantial impact on the carbon footprint if waste is sent to landfill, rather than being incinerated for energy recovery or recycling (as currently happens to our waste). For FY 2022-23, emissions from waste generated in operations represents an increase of approximately 20% from FY 2021-22. As for many areas, this increase can be attributed to the resumption of operations and onsite student numbers post-COVID-19.

33. Effective waste management is crucial because improper handling can significantly increase emissions. Currently, the University mitigates these emissions by recycling metal, glass, plastic, food and paper/cardboard and sending the remaining waste to incinerators for energy generation, instead of landfill disposal. This approach ensures that the emissions remain relatively low, as waste sent to landfill would generate methane, a potent greenhouse gas.

34. Capturing as much recyclable waste at source is the best approach in ensuring the emissions impact of our waste is limited. We aim to increase the recycling rates for various materials, such as cardboard, paper, metal, and glass, to further

reduce the volume of waste sent to incinerators, thereby minimising the emissions associated with waste processing. For FY 2022-23, the University recycled 2.39 $tCO_2e$ worth of mixed recyclables, slightly up from 2.28 $tCO_2e$ in the previous year.

35. We use both broad and targeted approaches for encouraging our community to put their waste in the appropriate bins on campus, from signage and comms, to working with teams to address particular challenges, and updating and implementing policy. Our Single Use Plastic Policy will launch in 2025, aiming to phase out unnecessary packaging wherever possible.

36. Additionally, reducing waste generation at source by promoting sustainable practices among students and staff will significantly lower overall waste produced, such as good procurement and purchasing practices, and providing options for reuse and sharing.

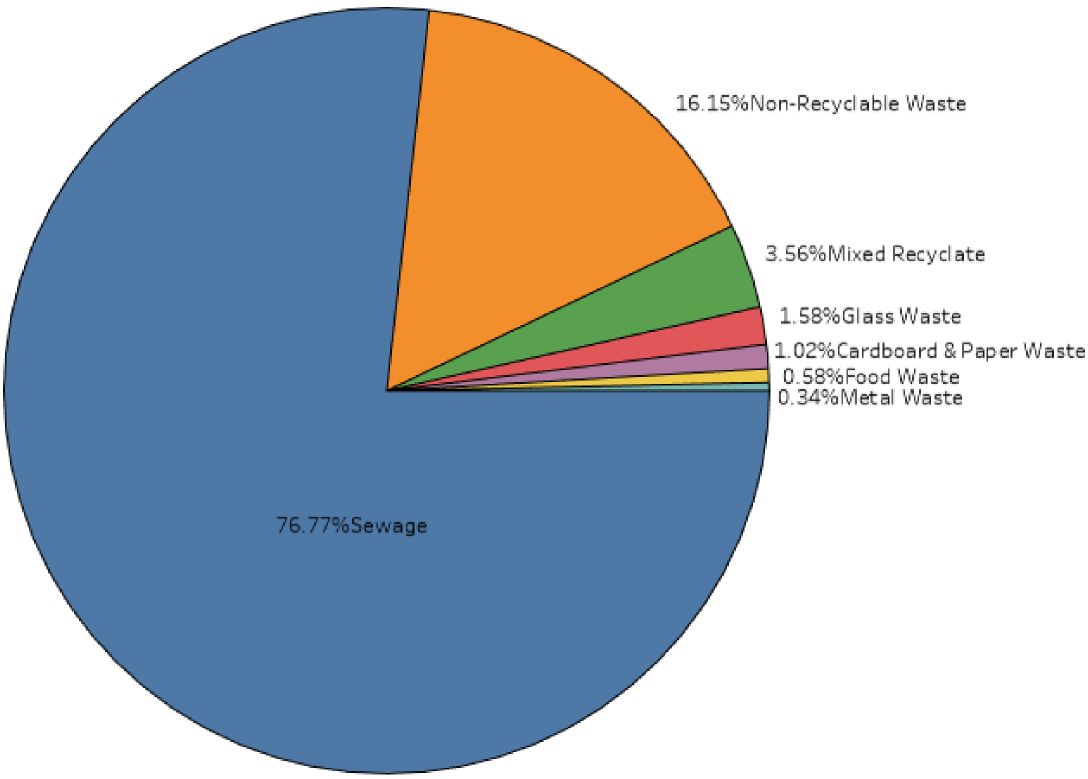
37. The treatment of wastewater (sewage) is the largest contributor to emissions within the waste category, accounting for 52 $tCO_2e$ in FY 2022-2023, just over 77% of the total share of waste emissions that year. These emissions are due to the energy-intensive processes involved in treating wastewater and the release of greenhouse gases (methane and nitrous oxide) during treatment.

38. We check for anomalies to avoid wasted water, and remind our community to turn off taps etc. Projects to lower water usage include installation of low flow show heads in accommodation and taps across our estate. Further work is being undertaken in 2025 to improve the efficiency of urinal flushing.

**Table 9:** Waste treatment and disposal

| Waste $tCO_2e$ by Category | 2021-22 | 2022-23 | % Change |
|---|---|---|---|
| Cardboard & Paper Waste | 0.65 | 1.92 | 195.38% |
| Food Waste | 0.37 | 0.37 | 0.00% |
| Glass Waste | 1.01 | 1.07 | 5.94% |
| Metal Waste | 0.22 | 0.81 | 268.18% |
| Mixed Recyclate | 2.28 | 2.90 | 27.19% |
| WEEE | Not available | 0.14 | n/a |
| Non-Recyclable Waste | 10.33 | 13.53 | 31.00% |
| Hazardous - Southend | Not available | 0.06 | n/a |
| Landfill Recyclate Southend | Not available | 3.23 | n/a |
| Construction | Not available | 2.93 | n/a |

**Figure 6.** Breakdown of emissions share for types of waste 2022-23.




**Business Travel**

39. For FY 2022-23, emissions from business travel represents a sharp rise of approximately 150% from FY 2021-22. This is primarily due to the normalisation of operations post-COVID-19, leading to increased travel activity, particularly air travel.

40. This increase in emissions is further exacerbated by Radiative Forcing (RF), a phenomenon that accounts for the additional warming effect of greenhouse gases when they are emitted at high altitudes. When planes release carbon dioxide and other pollutants high in the atmosphere, these gases have a more potent impact on global warming than they would if released at ground level. RF effectively multiplies the warming effect of these emissions, making the environmental impact of flights much greater than what might be assumed by just looking at the carbon dioxide released. As a result, air travel becomes an even more significant contributor to the University's overall carbon footprint, beyond what is typically considered for other forms of travel.

41. Online meetings and conferences (Zoom, Teams) have substantially reduced the need for travel. The COVID-19 pandemic demonstrated the effectiveness of remote communication tools, and their continued use will minimise the carbon footprint associated with business travel. Virtual meetings not only cut down on emissions but also save time and costs related to travel.

42. Hybrid working at Essex has also allowed people to work across a variety of spaces, and thus means that efficient travel choices allow colleagues to maximise trips that they make, and reduce the frequency of trips, alongside online communications.

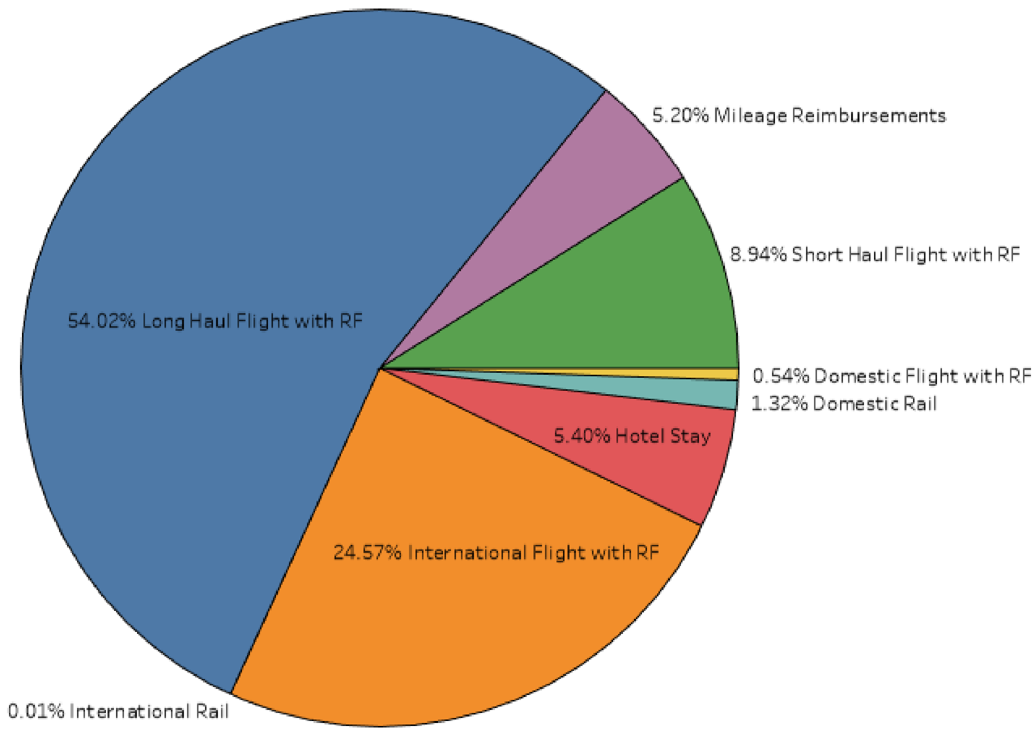
43. Promoting low-carbon travel options is essential. When travel is necessary, the University can prioritise train travel over flights, particularly for domestic or short-distance trips. Trains are generally a more environmentally friendly option, emitting significantly less $CO_2$ per passenger mile compared to planes.

44. A Business Travel Policy will launch in 2025 to support sustainable travel choices, and to encourage a pragmatic planning process to international trips. Wherever possible, for example, domestic flights will not be permitted. Other incentives for choosing low-carbon travel options include integrating sustainability criteria into travel planning and providing information on the carbon impact of different travel modes.

**Table 10:** Business travel ($tCO_2e$).

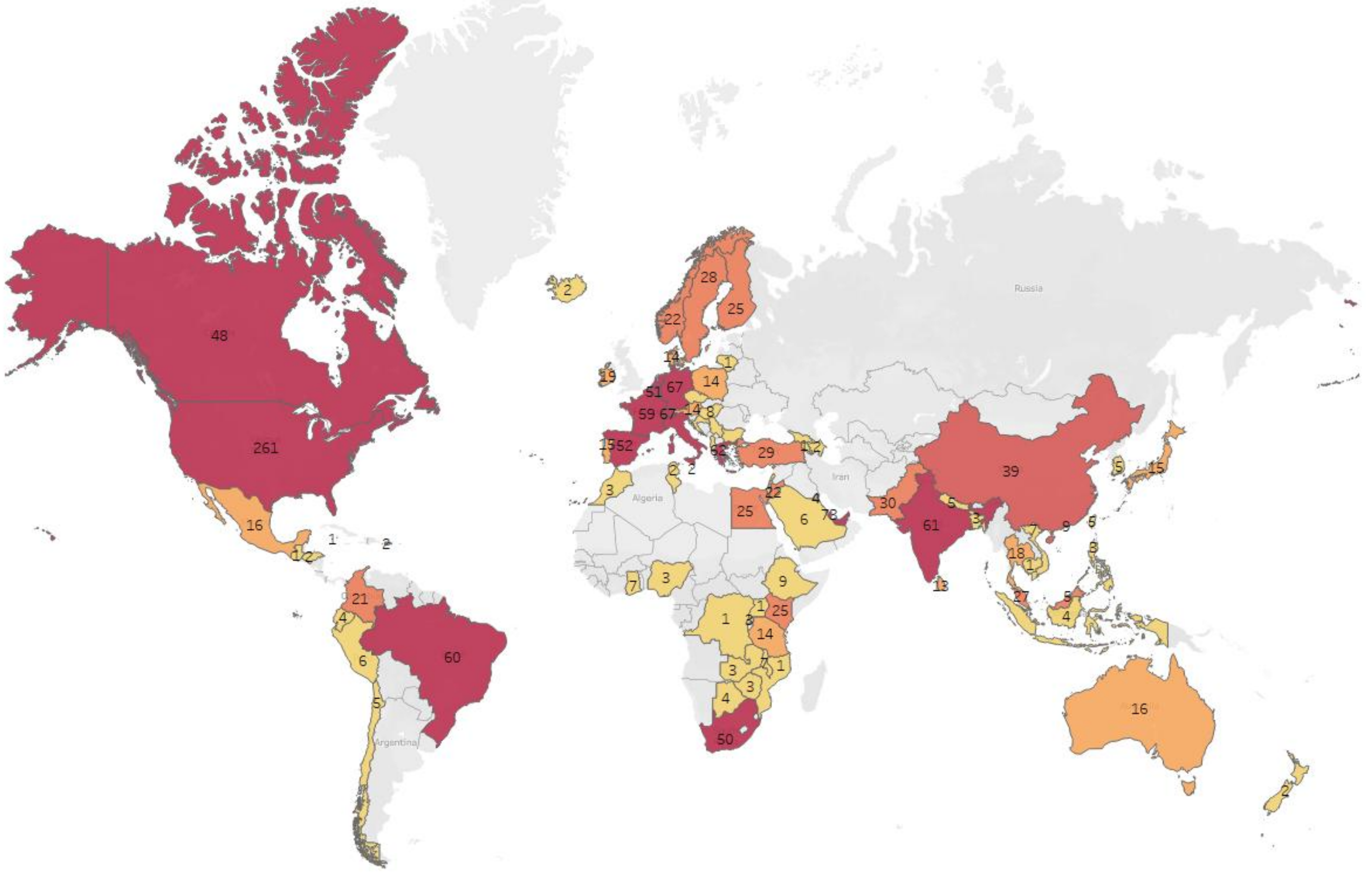
| Emissions from Business Travel | 2021-22 | 2022-23 | % Change |
|---|---|---|---|
| Domestic Flight with RF | 2 | 10 | 332% |
| International Flight with RF | 163 | 473 | 190% |
| Long Haul Flight with RF | 337 | 1,040 | 209% |
| Short Haul Flight with RF | 105 | 172 | 63% |
| Domestic Rail | 12 | 25 | 117% |
| International Rail | 0 | 0 | 0% |
| Mileage Reimbursements | 83 | 119 | 20% |
| Hotel Stay | 66 | 104 | 57% |
| **Total** | **769** | **1,943** | **153%** |

**Figure 7.** Breakdown of emissions share for business travel 2022-23.




45. Figure 8 shows the carbon footprint associated with staff air travel to countries around the world. Each number within a country represents the total $tCO_2e$ emissions generated by the travel to that specific country. The colour gradient on the map reflects the total carbon footprint of all trips to that country/region, with darker shades (reds) indicating higher emissions and lighter shades (yellows) representing lower emissions.

**Figure 8.** Map of international business trips by air 2022-23.




### Employee Commuting

46. The emissions from employee commuting are calculated using an estimated approach. Distances are mapped between the anonymised postcode of each non-casual University employee and their respective campus. This calculation is then adjusted based on data from the annual staff travel survey for each campus regarding mode of travel. The final step involves applying the DEFRA-provided conversion factor for the specific year to convert the estimated annual commuting distances into $tCO_2e$. This calculation assumes that employees work on campus an average of 3.5 days per week.

47. Emissions from employee commuting are an opportunity for the University to influence its Scope 3 emissions. For FY 2022-23, emissions from employee commuting totalled 5,233 $tCO_2e$, up from 5,154 $tCO_2e$ in FY 2021-22, representing an increase of 1.5%. This increase underscores the importance of implementing effective strategies to mitigate these emissions.

48. Supporting the use of public transport is a key approach that we take. Train commuting saw a positive increase of 28%, including a 28% rise in emissions from Train WTT, indicating growing adoption. However, bus commuting decreased by 13%, with an 8% drop in Bus WTT emissions. We work with local bus companies to be able to offer reduced cost annual bus passes to students and staff and will continue to promote this.

49. Car commuting remains the largest source of emissions, with a 66% increase in FY 2022-23. The location of the Colchester Campus means that for many, driving this the only option, and we recognise this. Where possible we encourage the use of sustainable or active alternatives for those who are able. To support low emissions commuting, we have EV chargers on campus.

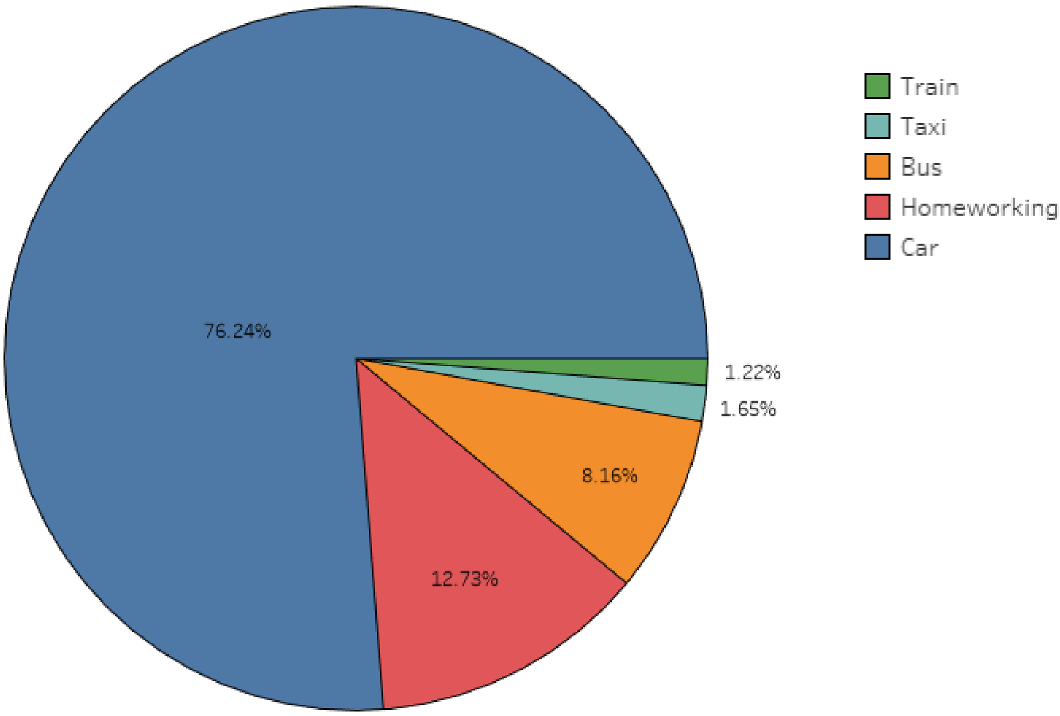
50. Encouraging active travel, such as cycling and walking, is beneficial both for reducing emissions and promoting employee health. Although not directly reflected in the emissions data, these zero-emission options should be emphasised. The University invests in infrastructure, such as secure bike parking and showers, to make cycling safer and easier for our community.

51. Maintaining flexible working options will support reductions in commuting emissions. The 16% decrease in homeworking emissions in FY 2022-23 demonstrates the impact of remote work on lowering our carbon footprint.

**Table 11:** Daily commuting by staff and faculty ($tCO_2e$).

| Employees Commuting | 2021-22 | 2022-23 | % Change |
|---|---|---|---|
| Car | 3,111 | 3,296 | 6% |
| Car WTT | 818 | 870 | 6% |
| Bus | 338 | 293 | -13% |
| Bus WTT | 82 | 76 | -8% |
| Train | 50 | 64 | 28% |
| Train WTT | 13 | 16 | 28% |
| Taxi | 69 | 51 | -26% |
| Taxi WTT | 16 | 12 | -22% |
| London Underground | | 1.53 | |
| London Underground WTT | | 0.40 | |
| Homeworking (office equipment + heating) | 656 | 553 | -16% |
| **Total** | **5,154** | **5,233** | **2%** |

**Figure 9.** Breakdown of emissions share for employee commuting 2022-23.




**Downstream Transportation and Distribution**

52. Downstream transportation and distribution emissions encompass those generated from the international and domestic arrival of students, as well as their daily commutes to the University, and are a significant proportion of Essex's Scope 3 emissions. In FY 2022-23, these emissions totalled 32,243 $tCO_2e$, marking an increase from the 23,521 $tCO_2e$ recorded in FY 2021-22. This significant rise of approximately 37% is likely attributable to the resumption of regular University operations and increased student mobility post-COVID-19.

53. For 2022-23, we expanded our emissions calculations to include those from summer school students, exchange students, and the Essex Study Abroad programme. These additions provide a more comprehensive overview of the University's transportation-related emissions, and therefore has added to the overall figure.

54. International student arrivals and departures are major contributors to our Scope 3 emissions. For instance, emissions from students travelling to and from Asia were the highest, at 16,219 $tCO_2e$, compared to 10,448 $tCO_2e$ in the previous year. Significant increases were also observed in emissions from other regions,

such as Africa (1,950 $tCO_2e$) and North America (803 $tCO_2e$), reflecting the University's strategy of expanding its recruitment from these continents.

55. Domestic transportation also plays a considerable role in the overall emissions profile. The daily commutes of students, predominantly by car, bus, and train, constitute a substantial portion of these emissions. In FY 2022-23, emissions from students commuting by car amounted to 4,541 $tCO_2e$, while bus commutes contributed 2,295 $tCO_2e$, and train commutes accounted for 407 $tCO_2e$.

**Table 12:** Downstream Transportation and Distribution ($tCO_2e$).

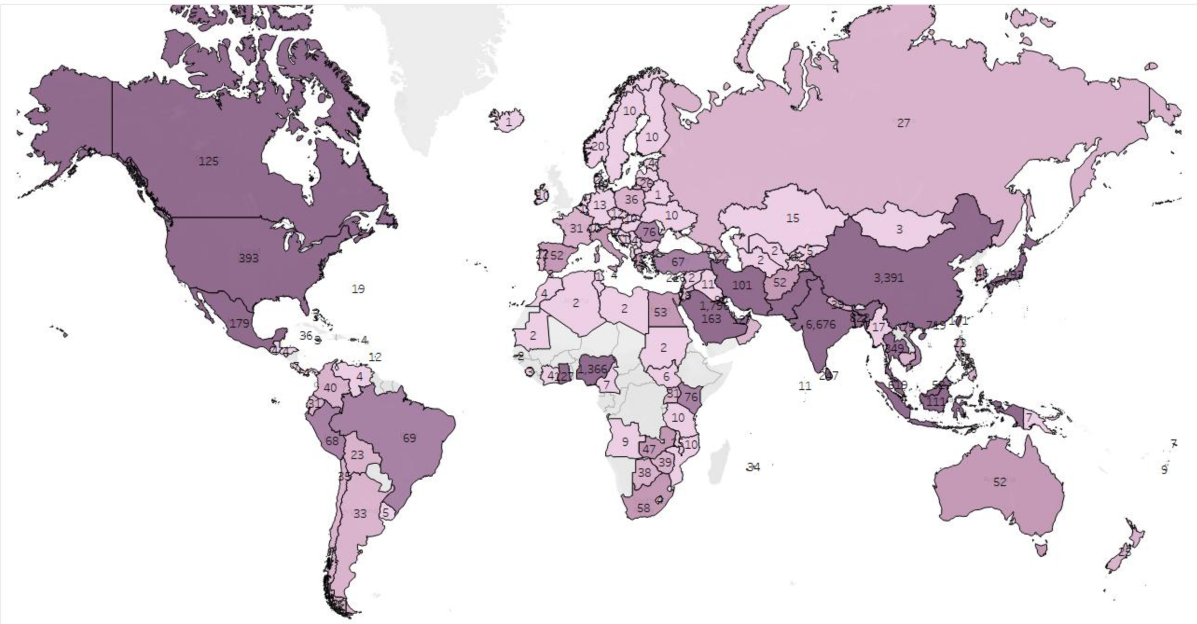
| Downstream Transportation and Distribution | 2021-22 | 2022-23 | % Change |
|---|---|---|---|
| International Students Arrival and Departure - EU | 841 | 683 | -19% |
| International Students Arrival and Departure - Europe excluding EU | 144 | 169 | 17% |
| International Students Arrival and Departure - Africa | 973 | 1,950 | 100% |
| International Students Arrival and Departure - Asia | 10,448 | 16,219 | 55% |
| International Students Arrival and Departure - Australasia | 78 | 100 | 28% |
| International Students Arrival and Departure - North America | 930 | 803 | -14% |
| International Students Arrival and Departure - South America | 254 | 308 | 21% |
| International Students Arrival and Departure - Airport to University | 330 | 479 | 45% |
| UK Students Arrival and Departure - Car | 409 | 388 | -5% |
| UK Students Arrival and Departure - Car WTT | 107 | 102 | -4% |
| Students Commuting Car | 4,325 | 3,792 | -12% |
| Students Commuting Car WTT | 1,137 | 1,002 | -12% |
| Students Commuting Bus | 2,185 | 1,668 | -24% |
| Students Commuting Bus WTT | 532 | 431 | -19% |
| Students Commuting Train | 388 | 350 | -10% |
| Students Commuting Train WTT | 98 | 88 | -10% |
| Students Commuting Taxi | 275 | 184 | -33% |
| Students Commuting Taxi WTT | 67 | 45 | -33% |
| Essex Study Abroad | N/A | 432 | N/A |
| Summer School Students | N/A | 1,285 | N/A |
| **Total** | **23,521** | **29,362** | **25%** |

56. Currently we can only monitor these emissions and review our methodology and assumptions – as the figures are heavily based on estimates – in order to get a clearer picture of the figures. An international student community is a crucial aspect of student recruitment and plays an important role in our success; the

associated emissions must be viewed as one measure of a range of impacts of international recruitment.

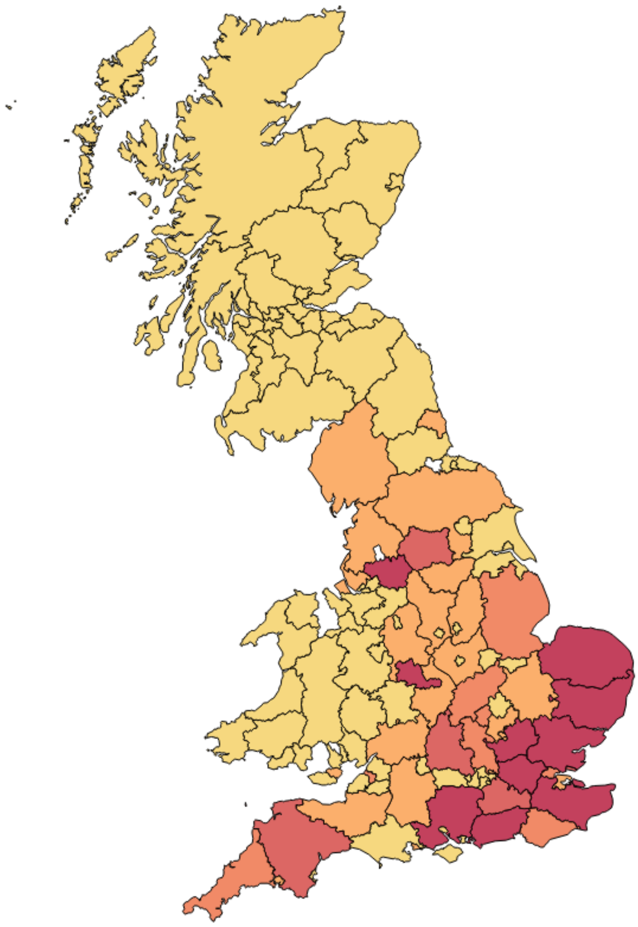
57. Figure 10 shows the carbon footprint associated with international student arrivals to the University of Essex from various countries around the world. Each number within a country represents the total $tCO_2e$ emissions generated by the travel of students from that specific country to the University. The colour gradient on the map reflects the total carbon footprint of students travels from that country/region, with darker shades indicating higher emissions and lighter shades representing lower emissions.

**Figure 10:** Map of international student arrivals by emissions 2022-23.



58. Figure 11 depicts the estimated carbon emissions ($tCO_2e$) associated with the arrival of domestic students traveling by car to the University from various regions within the UK. Each area is shaded according to a colour gradient that represents the level of carbon emissions, with darker colours indicating higher emissions and lighter colours showing lower emissions; this correlates with the proportions of students travelling from those regions.

**Figure 11:** Estimated Carbon Emissions by UK student arrivals 2022-23.



## Downstream Leased Assets

59. Downstream leased assets refer to University-owned properties that have been leased to external operators, such as accommodation providers and businesses. Notable examples include the Quays, Meadows, and Copse accommodations, as well as the Knowledge Gateway business park, which encompasses facilities like Block A1, B4, C, F, and G.

60. In FY 2022-23, emissions from downstream leased assets totalled 2,071 $tCO_2e$, up from 1,532 $tCO_2e$ in FY 2021-22. This represents a significant increase of approximately 35%, underscoring the need for effective emission management strategies. The increase in emissions highlights the importance of implementing energy-efficient practices and renewable energy solutions within these leased assets. While the organisations operating from these buildings are independent,

University of Essex

we have an opportunity as building owners to support our tenants to be energy and water efficient.

**Table 13:** Downstream Leased Assets.

| Leased Assets | 2021-22 | 2022-23 | % Change |
|---|---|---|---|
| Electricity Quays | 182 | 241 | 32% |
| Electricity Meadows | 111 | 188 | 69% |
| Electricity Copse | 117 | 149 | 27% |
| Electricity Block C | 10 | 9 | -7% |
| Electricity Landlords Supply | 3 | 4 | 5% |
| Electricity Block A1 | 2 | 5 | 193% |
| Electricity Block B4 | 1 | 1 | 10% |
| Electricity Block F | 7 | 7 | 9% |
| Electricity Block G | | 17 | |
| Gas Quays | 451 | 595 | 32% |
| Gas Meadows | 263 | 373 | 42% |
| Gas Copse | 355 | 445 | 25% |
| Water & Sewage Quays | 16 | 18 | 18% |
| Water & Sewage Meadows | 8 | 11 | 35% |
| Water & Sewage Copse | 7 | 10 | 48% |
| **Total** | **1,532** | **2,071** | **35%** |

**Rishab Godara - Data Manager**

**Sustainability Section**

**December 2024**

University of Essex

**Appendix 1 - Breakdown of all scopes emissions categories data**

| Scope | Activity | Description | 2021-22 | 2022-23 |
|---|---|---|---|---|
| Scope 1 | Heating | Natural gas | 6,380.00 | 5,618.00 |
| | Vehicles Fleet | Diesel | 44.27 | 78.49 |
| | Vehicles Fleet | Petrol | 5.90 | 5.74 |
| | Fugitive Emissions from Refrigerants | F-gas | 139.00 | 139.00 |
| Scope 2 | Purchased Electricity | Electricity | 4,274.16 | 3,975.00 |
| Scope 3 | Purchased Goods and Services | Business services | 9,468.00 | 16,171.91 |
| | | Paper products | 191.00 | 136.07 |
| | | Other manufactured products | 1,373.00 | 1,170.13 |
| | | Manufactured fuels, chemicals and gases | 102.00 | 149.93 |
| | | Food and catering | 107.00 | 391.44 |
| | | Construction | 470.00 | 583.31 |
| | | Information and communication technologies | 8,290.00 | 8,307.85 |
| | | Water | 24.89 | 31.38 |
| | | Medical and precision instruments | 2,732.00 | 6,364.80 |
| | | Other procurement | 3,757.00 | 2,695.46 |
| | | Unclassified | 3,460.00 | 3,414.69 |
| | Capital Goods | Pastures New Student Accommodation | | |
| | | Knowledge Gateway Expansion Project | | |
| | Fuel and Energy Related Activities | Grid Transmission and Distribution Losses | 378.24 | 363.62 |
| | | Well-to-tank (WTT) electricity (generation) | 1,112.98 | 950.67 |
| | | Well-to-tank (WTT) electricity (T&D) | 98.43 | 86.95 |
| | | Well-to-tank (WTT) Natural gas | 1,092.08 | 957.20 |
| | | Well-to-tank (WTT) Diesel (average biofuel blend) | 10.75 | 18.71 |
| | | Well-to-tank (WTT) Petrol (average biofuel blend) | 1.65 | 1.60 |
| | Upstream Transportation and Distribution | Not yet calculated | - | - |
| | Waste Generated in Operations | Cardboard & Paper Waste | 0.65 | 1.92 |
| | | Food Waste | 0.37 | 0.37 |
| | | Glass Waste | 1.01 | 1.07 |
| | | Metal Waste | 0.22 | 0.81 |
| | | Mixed Recyclate | 2.28 | 2.90 |
| | | WEEE | | 0.14 |
| | | Non-Recyclable Waste | 10.33 | 13.53 |
| | | Hazardous- Southend | | 0.06 |
| | | Landfill Recyclate Southend | | 3.23 |
| | | Construction | | 2.93 |
| | | Sewage | 40.89 | 51.56 |
| | Business Travel | Domestic Flight with RF | 2.42 | 10.47 |

| | | | | |
|---|---|---|---|---|
| | | International Flight with RF | 162.88 | 472.95 |
| | | Long Haul Flight with RF | 336.88 | 1,039.75 |
| | | Short Haul Flight with RF | 105.32 | 172.04 |
| | | Domestic Rail | 11.65 | 25.33 |
| | | International Rail | 0.18 | 0.18 |
| | | Mileage Reimbursements | 83.09 | 118.85 |
| | | Hotel Stay | 66.29 | 103.92 |
| | Employee commuting | Employees Commuting Car | 3,111.41 | 3,295.56 |
| | | Employees Commuting Car WTT | 817.95 | 870.47 |
| | | Employees Commuting Bus | 338.14 | 292.76 |
| | | Employees Commuting Bus WTT | 82.37 | 75.66 |
| | | Employees Commuting Train | 50.09 | 64.13 |
| | | Employees Commuting Train WTT | 12.59 | 16.12 |
| | | Employees Commuting Taxi | 69.15 | 51.08 |
| | | Employees Commuting Taxi WTT | 16.04 | 12.47 |
| | | Employees Commuting London Underground | | 1.53 |
| | | Employees Commuting London Underground WTT | | 0.40 |
| | | Homeworking (office equipment + heating) | 656.13 | 552.86 |
| | Downstream Transportation and Distribution | International Students Arrival and Departure - EU | 840.84 | 683.18 |
| | | International Students Arrival and Departure - Europe excluding EU | 144.02 | 169.10 |
| | | International Students Arrival and Departure - Africa | 973.00 | 1,950.44 |
| | | International Students Arrival and Departure - Asia | 10,447.67 | 16,219.44 |
| | | International Students Arrival and Departure - Australasia | 78.21 | 99.51 |
| | | International Students Arrival and Departure - North America | 929.66 | 803.48 |
| | | International Students Arrival and Departure - South America | 254.36 | 307.70 |
| | | International Students Arrival and Departure - Airport to University | 329.90 | 479.06 |
| | | UK Students Arrival and Departure - Car | 408.76 | 387.73 |
| | | UK Students Arrival and Departure - Car WTT | 107.46 | 102.41 |
| | | Students Commuting Car | 4,324.73 | 3,791.92 |
| | | Students Commuting Car WTT | 1,136.92 | 1,001.58 |
| | | Students Commuting Bus | 2,185.34 | 1,667.57 |
| | | Students Commuting Bus WTT | 532.32 | 430.98 |
| | | Students Commuting Train | 388.09 | 350.45 |
| | | Students Commuting Train WTT | 97.54 | 88.08 |
| | | Students Commuting Taxi | 274.83 | 183.62 |
| | | Students Commuting Taxi WTT | 67.11 | 44.83 |
| | | Essex Study Abroad | | 431.84 |

| | | | | |
|---|---|---|---|---|
| | | Summer School Students | | 1,284.92 |
| | Downstream leased assets | Electricity Quays | 181.88 | 240.61 |
| | | Electricity Meadows | 111.20 | 187.64 |
| | | Electricity Copse | 117.44 | 148.69 |
| | | Electricity Block C | 9.53 | 8.89 |
| | | Electricity Landlords Supply | 3.44 | 3.61 |
| | | Electricity Block A1 | 1.63 | 4.77 |
| | | Electricity Block B4 | 0.67 | 0.74 |
| | | Electricity Block F | 6.65 | 7.26 |
| | | Electricity Block G | | 16.86 |
| | | Gas Quays | 451.46 | 595.22 |
| | | Gas Meadows | 262.79 | 372.62 |
| | | Gas Copse | 354.91 | 444.63 |
| | | Water & Sewage Quays | 15.64 | 18.45 |
| | | Water & Sewage Meadows | 8.11 | 10.93 |
| | | Water & Sewage Copse | 7.00 | 10.38 |
| | Investments | Investments made by the University | | |
| Total | | | 74,543.79 | 91,416.14 |

## Appendix 2 - Methodology used for each Scope 3 category

### Purchased Goods and Services

1. **Expenditure Input for Emissions Calculation**: Total expenditure is input into the Higher Education Supply Chain Emissions Tool (HESCET) (Version 3.6), which uses DEFRA conversion factors to estimate emissions by category, based on supplier business sectors. More details on the tool are available here: HESCET Tool.
2. **Emission Calculation**: The Southern Universities Purchasing Consortium (SUPC) inputs the University's expenditures into HESCET to calculate Scope 3 emissions based on institutional spending.
3. **Water and Wastewater Emissions**: For the 2022-2023 period, emissions related to water and wastewater were excluded from the HESCET results as these were calculated more accurately using the DEFRA conversion factors in house.
4. **Data Availability**: The complete 2022-2023 spreadsheet, containing the detailed calculations, is available on Box: 2022-23 Spreadsheet.

### Fuel and Energy Related Activities

5. **Data Collection:** Data used for calculating emissions related to fuel and energy activities was sourced from utility invoices covering electricity, natural gas, petrol, and diesel consumption. This data was also applied in the calculation of Scope 1 and Scope 2 emissions.
6. **Emission Factors:** The 2022 DEFRA conversion factors were applied to calculate emissions from fuel and energy-related activities not included in Scope 1 and Scope 2.
7. **Emission Calculations:** Emissions related to fuel and energy activities outside of Scope 1 and Scope 2 were calculated using DEFRA 2022 conversion factors. The following sources were included:
    - **Grid Transmission and Distribution (T&D) Losses:** Emissions from electricity lost during transmission and distribution to the University.
    - Well-to-Tank (WTT) Emissions: Emissions from upstream activities in fuel production and transportation, covering the following:
        - *Electricity (generation)*: WTT emissions from the production of electricity.
        - *Electricity (T&D)*: WTT emissions from the transmission and distribution of electricity.

- *Natural Gas*: WTT emissions from the extraction and transportation of natural gas.
- *Diesel (average biofuel blend)*: WTT emissions from diesel used in the University fleet, based on biofuel blends.
- *Petrol (average biofuel blend)*: WTT emissions from petrol consumption in the University fleet, also based on biofuel blends.

8. **Data Processing:** Consumption data for electricity, natural gas, diesel, and petrol was extracted from the utility invoices provided. DEFRA 2022 conversion factors were then applied to calculate emissions from fuel and energy activities outside of Scopes 1 and 2.
9. **Assumptions:** The use of average biofuel blends for diesel and petrol follows DEFRA's 2022 guidelines.

### Waste Generated in Operations

10. **Waste Data Sources**: Waste data is collected from a combination of waste contractors, internal teams, and dashboards. The primary contractors include Veolia (Colchester) and Biffa (Southend and Loughton). Veolia provides waste data for general waste, dry mixed recycling, and glass, while Biffa covers the same categories at other campuses. Additional waste data is provided by the soft FM team, central stores, and IT services, specifically for waste streams such as cardboard bales, metal, IT WEEE, confidential paper waste, and batteries.
11. **Waste Collection Method**: The data collection process is still largely analog, with input from various teams and contractors. Major waste streams are collected through digital platforms such as Veolia's and Biffa's dashboards, which provide key data on waste volume and types for the majority of the campuses.
12. **Emission Factors**: The emissions from waste generated in operations are calculated using the DEFRA 2022 conversion factors, applied to different waste streams.
13. **Waste Stream Categories**: The waste categories include dry mixed recycling, general waste, glass, cardboard bales, metal, IT WEEE, confidential waste (paper), and hazardous waste.
14. **Recycling Assumption**: It is assumed that a significant portion of the waste is recycled to reduce the overall carbon impact. This includes metal, paper, and glass waste, which are diverted from incineration.

15. **General Waste Disposal**: Non-recyclable waste is sent to an incineration facility where it is converted into energy, further reducing the carbon footprint. The amount of waste sent to landfill is minimal, as the University prioritises recycling and energy recovery over landfill disposal.

16. **Wastewater Treatment**: Wastewater emissions are included in the waste management category. The emissions from wastewater treatment are calculated based on the energy required for processing and the methane and nitrous oxide released during treatment. The DEFRA 2022 conversion factors for wastewater treatment are applied to estimate emissions from this process.

### Business Travel

17. **Data Collection**: The data for business travel emissions was obtained from the University's authorised external travel service providers: Keys Travel and Diversity Travel. This data includes flight and rail bookings, as well as hotel reservations. Additionally, for mileage reimbursements, data was requested from the Financial Compliance team.
18. **Emission Calculations**: The 2022 DEFRA conversion factors were applied to calculate business travel emissions, incorporating both well-to-tank (WTT) emissions and radiative forcing (RF) for flights.

19. **Business Travel Emissions**: Emissions from business travel were calculated using the "Business Travel – Land" and "Business Travel – Air" tabs of the DEFRA 2022 conversion factors. This applied to all relevant modes of transport, including car, train, and flight. Hotel stay emissions were calculated using the data from the "Hotel Stay" tab, which provides carbon intensity figures for hotel stays in select countries based on a standardised methodology. However, the tab is not exhaustive and only includes a few countries. For any countries missing from the DEFRA tab, additional data was retrieved from the Hotel Footprinting Tool, developed by the International Tourism Partnership and Greenview, which is based on the Cornell Hotel Sustainability Benchmarking Index.

20. **Data Processing**: After obtaining the raw booking data for travel and hotel stays from the external travel service providers, all cancelled bookings were excluded. The raw data included distances for each flight and rail booking, which were categorised using DEFRA conversion factors as follows:

    - Flights: Domestic (flights between UK airports), Short Haul (up to 3,700 km), Long Haul (more than 3,700 km), and International (flights entirely outside the UK).

- Rail: Categorised into domestic and international travel.
- Car: For car mileage reimbursements, the distance was calculated by dividing the amount in GBP (£) by £0.45, resulting in the distance travelled in miles.

### Staff Commuting

21. **Postcode Data Source**: Anonymised staff postcode data by campus was provided by the Staff Data Information Management system and was used to calculate commuting distances.
22. **Emission Factors**: DEFRA 2022 conversion factors were applied to calculate the emissions for student commuting during term time, with well-to-tank (WTT) emissions included.
23. **Emission Calculations**: Emissions for term-time commuting were calculated using the 'Business Travel - Land' tab from the DEFRA 2022 conversion factors, for all applicable modes of transport listed (Car, Bus, Train, Taxi, Tube).
24. **Mode of Transport for Commuting**: Based on the 2022 Staff Travel Survey for each campus, the modes of transport included Walking, Car, Bus, Bicycle, Train, Taxi and London Underground (Tube). Emissions were calculated for the motorised apportioned transport modes (Car, Bus, Train, Taxi, Tube). For car travel, an average vehicle of unknown fuel type was assumed. Walking and cycling were treated as zero-emission modes and were excluded from emissions calculations.
25. **Campus Location for Distance**: All distances were consistently mapped and calculated between the staff home postcodes and their respective Campus – Colchester, Southend and Loughton.
26. **Total Working Days**: Between August 1, 2022, and July 31, 2023, there are 52 Saturdays and 52 Sundays, totalling 104 weekend days. Additionally, staff had 13 bank holidays, 6 sick days on average, and an annual leave allowance of 28 days for full-time employees. This results in a total of 151 non-working days, leaving 214 working days in the year.
27. **Staff Commute Distance Calculation**: Commuting distances were mapped using the Google Distance Matrix API, calculating the daily return distance from staff's home postcodes to their respective University campus.
28. **On-Campus and Remote Work**: It is assumed that staff, on average, work 3.5 days per week on campus and 1.5 days per week from home. Based on this assumption, of the 214 total working days, 150 days are allocated to working on campus and 64 days are attributed to working from home.

29. **Home Working Emissions**: For remote work, emissions were calculated using the DEFRA 2022 conversion factors for homeworking, which include energy consumption from office equipment and heating.

### Downstream Transportation and Distribution

### International Student Arrival

30. **Student Data Source**: Student data was extracted from the Tableau dashboard "Student Numbers (Demographics)" prepared by Zhi X Chung and will be used until HESA data for international students by country for the 2022-2023 academic year becomes available.
31. **Assumption on Travel**: It is assumed that each international student makes one round trip between the capital city of their home country and a London airport, serviced by direct flights from their home capital (i.e., Home Country Capital to London and back).
32. **Distance and Time Data**: The distance and travel time were calculated using the ICAO carbon emissions calculator, available at ICAO Carbon Offset Calculator.
33. **Emission Factors**: Emission calculations were based on the 2022 DEFRA conversion factors, incorporating radiative forcing (RF) to account for the full climate impact of air travel.
34. **Air Travel Data**: For air travel, the data used was sourced from the 'Business Travel - Air' tab in the DEFRA conversion factors.
35. **Flight Categories**: The distinction between short-haul and long-haul flights follows the DEFRA guidance, with short-haul defined as flights up to 3,700 km, and long-haul for distances exceeding 3,700 km.
36. **Flight Data Categories**: Both short-haul and long-haul flight categories are used, as these represent flights to and from the UK.
37. **Ground Travel to University**: For the airport-to-university journey, the distance used was calculated from the London airport to the Colchester Campus, applying the same distance for all students.
38. **Ground Travel Emission Data**: For emissions related to ground travel, the data was sourced from the 'Business Travel - Land' tab in the DEFRA conversion factors.

39. **Vehicle Assumption**: The emissions for ground travel (airport to university and return) were calculated assuming an average car of unknown fuel type, including well-to-tank (WTT) emissions for the car fuel used in the round trip.

### Domestic Student Arrival

40. **Postcode Data Source**: Anonymised student home postcode data was provided by Student Systems & Data Services upon request.
41. **Emission Factors**: DEFRA Conversion Factors 2022 were applied to calculate the emissions for domestic student travel.
42. **Ground Travel Emission Calculation**: Emissions were calculated using the 'Business Travel - Land' tab from the DEFRA conversion factors. An average car of unknown fuel type was assumed for the trip, and the emissions included well-to-tank (WTT) factors for the car's fuel.
43. **Campus Location for Distance**: The distance was consistently mapped and calculated between the students' home postcodes and the Colchester Campus for all postcodes.
44. **Travel Assumption**: It was assumed that each student would travel from their home postcode to the University at the beginning of the year and return home at the end of the academic year, resulting in one round trip per student.
45. **Domestic Student Distance Calculation**: Arrival distances were mapped using the Google Distance Matrix API, calculating the distance from their home postcode to the University. A total of 9,342 actual postcode-based distances were successfully mapped.
46. **Missing Postcode Data**: Distance calculations could not be performed for 123 postcodes due to missing data, unrecognised postcodes, or foreign postcodes that were incorrectly recorded.

### Term Time Commuting

47. **Postcode Data Source**: Anonymised student term-time postcode data was provided by Student Systems & Data Services upon request.
48. **Emission Factors**: DEFRA 2022 conversion factors were applied to calculate the emissions for student commuting during term time, with well-to-tank (WTT) emissions included.

49. **Emission Calculations**: Emissions for term-time commuting were calculated using the 'Business Travel - Land' tab from the DEFRA 2022 conversion factors, for all applicable modes of transport listed (Car, Bus, Train, Taxi).
50. **Campus Location for Distance**: All distances were consistently mapped and calculated between the students' term-time postcodes and the Colchester Campus, as the available data did not allow for campus-specific analysis.
51. **Mode of Transport for Commuting**: Based on the 2022 Student Travel Survey for the Colchester campus, the modes of transport were distributed as follows: Walking (49%), Car (18%), Bus (14%), Bicycle (10%), Train (8%), and Taxi (1%). Emissions were calculated for the motorised apportioned transport modes (Car, Bus, Train, Taxi). For car travel, an average vehicle of unknown fuel type was assumed. Walking and cycling were treated as zero-emission modes and were excluded from emissions calculations.
52. **Commuting Days**: The number of commuting days was based on the 2022-2023 academic calendar, comprising 31 weeks. It was assumed that commuting occurred 4 days per week, totalling 124 days. After subtracting 3 bank holidays, the final number of commuting days was 121.
53. **Term-Time Student Commute Distance Calculation**: Commuting distances were mapped using the Google Distance Matrix API, calculating the daily return distance from students' term-time postcodes to the University.
54. **Student Population**: According to HESA, the University had 18,780 students in 2022-2023. Of this, raw data was available for 16,029 students. Any student with a term-time postcode located more than 235 km from the University (one-way) was excluded, as it was likely they had incorrectly provided their home postcode instead of a local term-time address. After applying this distance filter, 15,672 students remained, and their daily commuting distances were used in the emissions calculations.
55. **Missing Postcode Data**: For the remaining 3,108 students, an average distance was calculated using postcodes that had two or more students. This average distance was determined to be 27.569 km (one-way).

### Downstream Leased Assets

56. **Leased Asset Categories**: There are two main categories of leased assets—Knowledge Gateway Park, where businesses lease office space, and student accommodations, which include the Quays, Meadows, and Copse.

57. **Data Source for Knowledge Gateway**: Emissions data for Knowledge Gateway Park were derived from utility invoices. The data covers only electricity consumption, as there is no natural gas used for heating in this area. Heating and cooling are provided by air conditioning units that run on electricity.
58. **Data Source for Leased Accommodations**: For the University's external leased accommodations, data on gas, water, and electricity consumption were provided by Derwent FM, the company responsible for maintaining and operating these facilities.
59. **Utility Consumption**: Knowledge Gateway Park uses electricity for all operations, including heating and cooling, while the student accommodations rely on a combination of electricity, gas, and water utilities.
60. **Emission Calculation Methodology**: The 2022 DEFRA conversion factors were applied to the utility consumption data for both Knowledge Gateway Park and the student accommodations. This ensured that the emissions calculations followed a standardized approach across all leased assets.
61. **Assumptions**: For Knowledge Gateway Park, only electricity usage was considered since there are no natural gas systems in place. In contrast, the leased accommodations included gas, electricity, and water data, offering a comprehensive picture of emissions from these assets.