

SUSTAINABILITY IMPLEMENTATION GROUP

University of Southampton Greenhouse Gas Emissions Report: 2021-2022

Technical Report

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Sustainability Implementation Group (SIG)

SIG TECHNICAL REPORT

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Our vision

Our vision is that by 2030, sustainability will be a part of everything the University of Southampton does: our individual behaviours, how we work together, and how we make decisions for the future. This is key to achieving our mission of changing the world for the better.

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Sustainability Implementation Group

This report forms part of the work of the University of Southampton's Sustainability Implementation Group (SIG), an independent group formulated to oversee the implementation of the University of Southampton's [Strategic Plan – Sustainability](#).

To give feedback on this report:

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Executive Summary

This report summarises trends in the University's Scope 1, 2 and 3 emissions up to and including academic year 2021-22. It also includes estimates of other emissions that the University chooses to report but which are not formally included in the Scope 1, 2 and 3 emissions as defined by the Greenhouse Gas Protocol.

Overall, the University's Scope 1, 2 and 3 emissions were estimated to be 140.3 kT CO₂e in 2021-22 with an additional 30.3 kT CO₂e under 'Other' reporting. Total emissions under Scope 1-3 increased by 12% from 2018-19 to 2021-22 due largely to increases in *Scope 1: Stationary Combustion* (gas use) and *Scope 3 Purchased Goods and Services*. This was partly balanced by decreases in *Scope 2: Purchased Electricity*, *Scope 3: Business Travel* and *Scope 3: Staff Commuting* emissions.

Scope 1 emissions (18.1 kT CO₂e) comprised 13% of total Scope 1, 2 and 3 emissions in 2021-22 having increased by 4% since 2015-16 (+35% since 2018-19). These emissions were dominated by emissions from the University's gas-fuelled combined heat and power plant (CHP) and other boilers. Although our estate size has grown, Scope 1 emissions have remained largely unchanged since 2015-16 with major fluctuation depending on the operational status of the CHP (see Figure 18) which also generates up to 50% of the electricity we use (see Figure 19).

Scope 2 emissions (1 kT CO₂e) comprised 1% of total Scope 1, 2 and 3 emissions in 2021-22 having declined by 93% since 2015-16 (-91% since 2018-19) due to grid decarbonisation, demand reduction due to energy efficiency projects (see Figure 19) and our switch to a renewable energy tariff at the end of 2020-21.

Scope 3 emissions (121.2 kT CO₂e) comprised 86% of total Scope 1, 2 and 3 emissions in 2021-22 having increased by 19% since 2018-19. These were dominated by ~108 kT CO₂e of supply chain emissions from *Scope 3: Purchased Goods and Services* which showed an increase of 32% from 2018-19 due to growth and post-COVID rebound. Emissions from *Scope 3: Staff Commuting* in 2021-22 (1.9 kT CO₂e) were estimated to have fallen by 71% since 2018-19 due to 'new normal' post-COVID working practices while *Scope 3: Business Travel* emissions (2.0 kT CO₂e) were still 76% below 2018-19 (pre-COVID) levels.

Additional 'other' emissions (30.3 kT CO₂e) increased by 59% from 2018-19 levels and were dominated by overseas student relocation (23.9 kT CO₂e) which increased by 78% from 2018-19.

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1 About this report

1.1 Circulation

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2 Introduction

The University of Southampton's Sustainability Strategic Plan² sets out six goals. These are:

1. **Goal 1: Reduce Scope 1 & 2 to net-zero by 2030**
2. **Goal 2: Measure our total emissions footprint and set targets for Scope 3 emissions reductions**
3. **Goal 3: Set a business travel emissions reduction target and implement through an appropriate action plan.**
4. **Goal 4: Ensure that sustainability is a part of every University education programme by 2025**
5. **Goal 5: Make sustainability a cornerstone of UoS' research and societal impact**
6. **Goal 6: Implement a sustainable and ethical investment policy**

The report provides a breakdown of Scope 1, 2 and 3 emissions as currently known or estimated. This includes analysis of trends where longer-term data is available. Where emissions are not known or uncertain, this is noted in the relevant sections.

This report therefore directly contributes to Goal 2 by updating the University of Southampton's GHG Protocol³ (WRI/WBCSD 2015b) emissions estimates for Scopes 1, 2 and 3 up to and including the Academic Year 2021-22.

This report does not repeat the full detail of the GHG Protocol methodology unless it is relevant to explaining the way in which emissions were calculated or estimated. Readers should refer to our earlier 2018-19 data update report (Anderson 2021) for full details of the method.

3 Emissions reporting

Goals 1-3 focus on emissions under the Greenhouse Gas (GHG) Reporting Protocol Scopes 1-3 as well as any reporting of other emissions that are not specified within the GHG Scope 1-3 standard (WRI/WBCSD 2015b) but which the University chooses to report. This includes 'other emissions from student relocation to come to Southampton and their commuting to campus. In future it could also include carbon sequestration due to the University estate's land-use.

GHG Protocol Scopes were discussed in some detail in the 2021 report (Anderson 2021) but in summary:

- **Scope 1** emissions are those produced by fuel combustion on site such as gas boilers, fleet vehicles; by physical or chemical processes and from fugitive emissions such as air-conditioning, refrigeration or pipework leaks.
- **Scope 2** emissions are those that are due to purchased or acquired electricity, steam, heat and cooling.
- **Scope 3** emissions are indirect emissions that derive from activities of the organisation from sources that they do not own or control. These are usually the greatest share of the carbon footprint, covering emissions associated with business travel, employee commuting, procurement (i.e. supply chain), leased assets, waste and water.
- **Other reporting:** emissions (or sequestration) that the University may choose to report, such as student commuting or travel due to annual student relocation.

Emissions are reported as CO₂_e – carbon dioxide equivalent units. This enables the reporting of emissions from non-CO₂ sources which have different warming potentials than CO₂. This is highly relevant to sectors which produce GHG emissions other than CO₂ such as agriculture (e.g., methane - CH₄) and industry but is generally of less relevance to non-specialist higher education institutions. In the University's case this

² <https://www.southampton.ac.uk/susdev/our-approach/sustainability-strategy.page>

³ <https://ghgprotocol.org/>

enables us to include fugitive emissions due to refrigerant leaks (F-gases) and also to methane and other Greenhouse Gas (GHG) emissions in upstream energy production and waste treatment services.

In general, the major components of the University's Scope 1 and 2 emissions have been reported annually to the Higher Education Statistics Agency (HESA) since 2004-5. Published versions of these submissions are available from HESA from 2015/16 onwards⁴ and we have therefore re-used the HESA submissions to give a 2015/16 baseline and recent trends for Scope 1 and 2 emissions. Where applicable we provide two emissions reduction calculations for Scope 1 and 2 – one based on change since 2015/16 and one based on change since the initial University's Strategic Plan – Sustainability baseline estimates for 2018/19.

Unfortunately, Scope 3 emissions saw little attention prior to 2018-19 when the University's Sustainability Strategic Plan was developed. Our updated emissions for 2018-19 (Anderson 2021) provided additional detail on Scope 3 emissions and this has now been further extended as documented in this report. Where applicable we therefore provide emissions reduction calculations for Scope 3 based on change since 2018/19.

Overall, we now have relatively complete emissions estimates for the major Scope 1, Scope 2 and applicable Scope 3 categories and the remainder of the report provides further detail on emissions under each of these scopes as well as 'Other reporting'. Categories that are considered inapplicable to the University's operations are noted, with reasons, below. The report concludes with an overall emissions reporting summary.

3.1 Scope 1

Scope 1 emissions comprise:

- **Stationary combustion:** combustion of fuels in stationary equipment such as boilers, furnaces, burners, turbines, heaters, incinerators, engines, flares, etc.
- **Mobile combustion:** combustion of fuels in transportation devices such as automobiles, trucks, buses, trains, airplanes, boats, ships, barges, vessels, etc.
- **Fugitive emissions:** intentional and unintentional releases such as equipment leaks from joints, seals, packing, gaskets, as well as fugitive emissions from coal piles, wastewater treatment, pits, cooling towers, gas processing facilities, etc.
- **Process emissions:** emissions from physical or chemical processes such as CO₂ from the calcination step in cement manufacturing, CO₂ from catalytic cracking in petrochemical processing, PFC emissions from aluminium smelting, etc.

In the case of the University this covers:

- Combustion of natural gas for heat and hot water, and for the on-site generation of electricity via the University's combined heat and power (CHP) plant
- Fleet vehicle fuel (including research vehicles and vessels)
- Fugitive emissions such as equipment leaks, HFC release and gas network leaks
- Physical or chemical processing (e.g in laboratories)

The following sections report results from each of the Scope 1 categories in more detail.

3.1.1 Scope 1: Stationary combustion

Stationary combustion principally comprises gas burnt in the University's Combined Heat and Power plant and in individual gas boilers on campus and in halls of residence. These emissions are calculated by the

⁴ <https://www.hesa.ac.uk/data-and-analysis/estates>

Estates Energy team as part of the HESA submission process using activity data (kWh purchased) and the appropriate UK GHG conversion factors (See Section 9.1)⁵.

Emissions from gas providing heat and hot water to the University's Science Park (USSP Ltd) is also reported under this category where data are available. These have been calculated in the same way.

Figure 1 shows *Scope 1: Stationary combustion* emissions over time while Table 1 reports the latest estimate and indicators of change where applicable.

Scope 1: Stationary Combustion

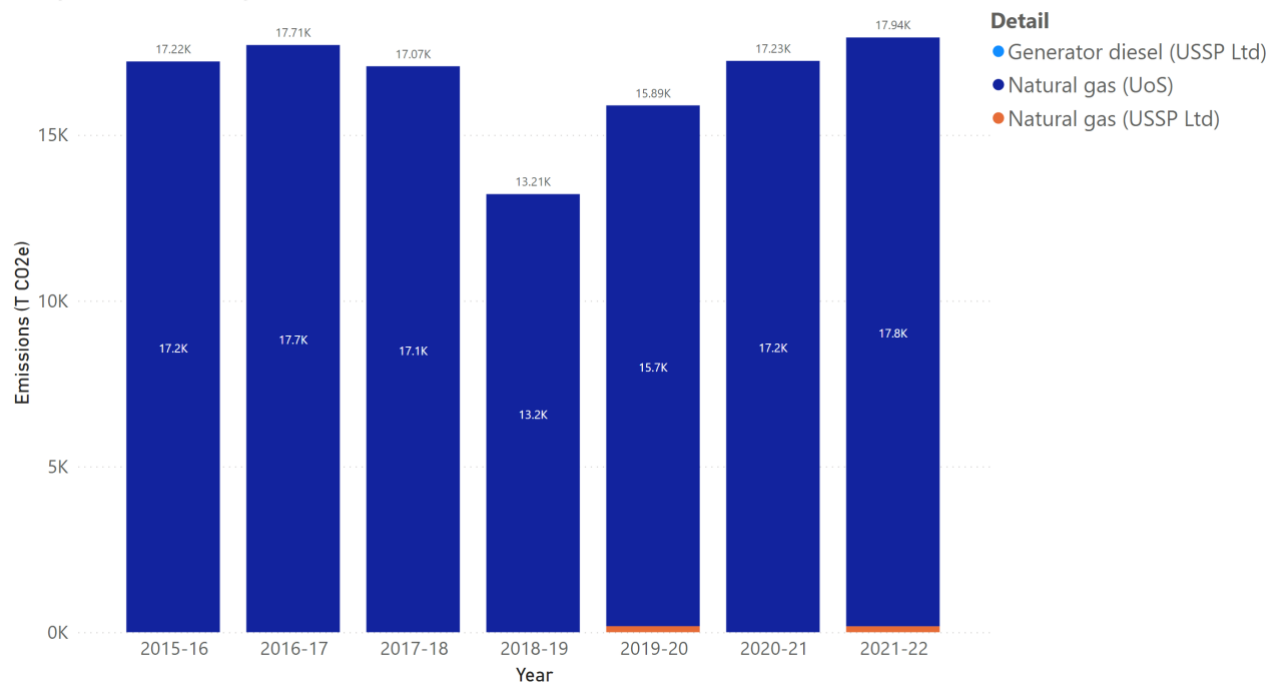


Figure 1: University of Southampton Scope 1: Stationary Combustion emissions

Table 1: University of Southampton Scope 1: Stationary Combustion emissions

Statistic	Value
Latest total (T CO ₂ e, 2021-22)	17,940
Change since 2015-16 (% difference)	4.2
Change since 2018-19 baseline (% difference)	35.8

Explanatory notes:

- Overall trends:
 - Stationary combustion emissions have remained roughly constant since 2015-16 even though overall estates size has increased. This is due to energy efficiency projects, higher efficiency new-builds and a small reduction in the emissions factor of natural gas.
- 2018-19:
 - Stationary emissions in the 2018-19 baseline year were notably lower than trend as the Highfield campus gas-powered combined heat and power plant was only partially operational (see Figure 18 and Figure 19). This means that we are likely to see a percentage increase from the baseline year until gas use starts to fall quite substantially as Goal 1 progresses.
- 2019-20:

⁵ <https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting>

- The CHP returned to normal use in 2019-20 and so gas use started to return to ‘normal’ levels but in the context of the covid-19 pandemic which required many of the university staff and students to work from home and buildings to close.
- USSP Ltd (University of Southampton Science Park Ltd) emissions were first available for 2019-20 and include stationary emissions from both USSP Ltd and its tenants. Tenant emissions are therefore **not** reported under *Scope 3: Downstream Leased Assets* to avoid double-counting.
- 2020-21:
 - This year saw a return to near ‘normal’ operations and as noted above, results in the somewhat anomalous percentage change since 2018-19 indicator.
 - USSP Ltd data was not available for this year.
- 2021-22
 - This year saw a return to full operations and returned gas use to pre-COVID levels with the CHP running consistently and all halls returning to normal occupancy (see Figure 18 in the Annex). As for 2020-21 the selection of 2018-19 as the baseline year again leads to the somewhat anomalous ‘percentage change since 2018-19 indicator’ value.

3.1.2 Scope 1: Mobile combustion

Mobile combustion comprises combustion of fuels in transportation devices such as cars, trucks, buses, trains, airplanes, boats, ships, barges, vessels, etc. Currently fuel for research vehicles & vessels is reported under *Scope 3: Purchased Goods & Services*.

These emissions are calculated by the Estates Energy team as part of the HESA submission process using activity data (kWh purchased) and the appropriate UK GHG conversion factors.

Figure 2 shows Scope 1: Mobile combustion emissions over time while Table 2 reports the latest estimate and indicators of change where applicable.

Scope 1: Mobile Combustion

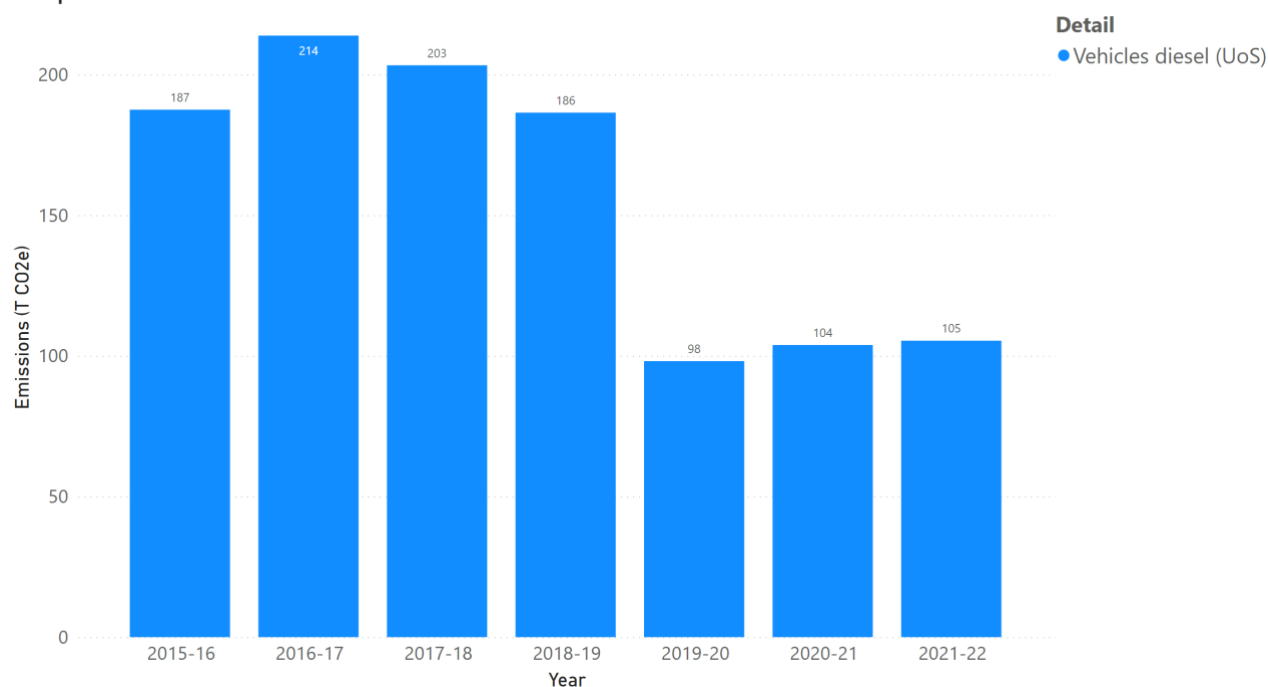


Figure 2: University of Southampton Scope 1: mobile combustion emissions

Table 2: University of Southampton Scope 1: mobile combustion emissions

Statistic	Value
Latest total (T CO ₂ e, 2021-22)	105

Change since 2015-16 (% difference)	-43.9
Change since 2018-19 baseline (% difference)	-43.5

Explanatory notes:

- pre 2018-19:
 - Mobile combustion emissions have been reducing since 2016-17.
- 2019-20 and 2020-21:
 - The COVID effect on university operations is clear with a slight rebound in 2020-21
- 2021-22
 - Emissions have remained low despite a return to normal operations

3.1.3 Scope 1: Fugitive emissions

Fugitive emissions cover intentional and unintentional releases such as equipment leaks from joints, seals, packing, gaskets, as well as fugitive emissions from coal piles, waste-water treatment, pits, cooling towers and gas processing facilities.

In the case of the University this is likely to be mainly refrigerant leaks and leaks from gas supply infrastructure.

Scope 1: Fugitive Emissions

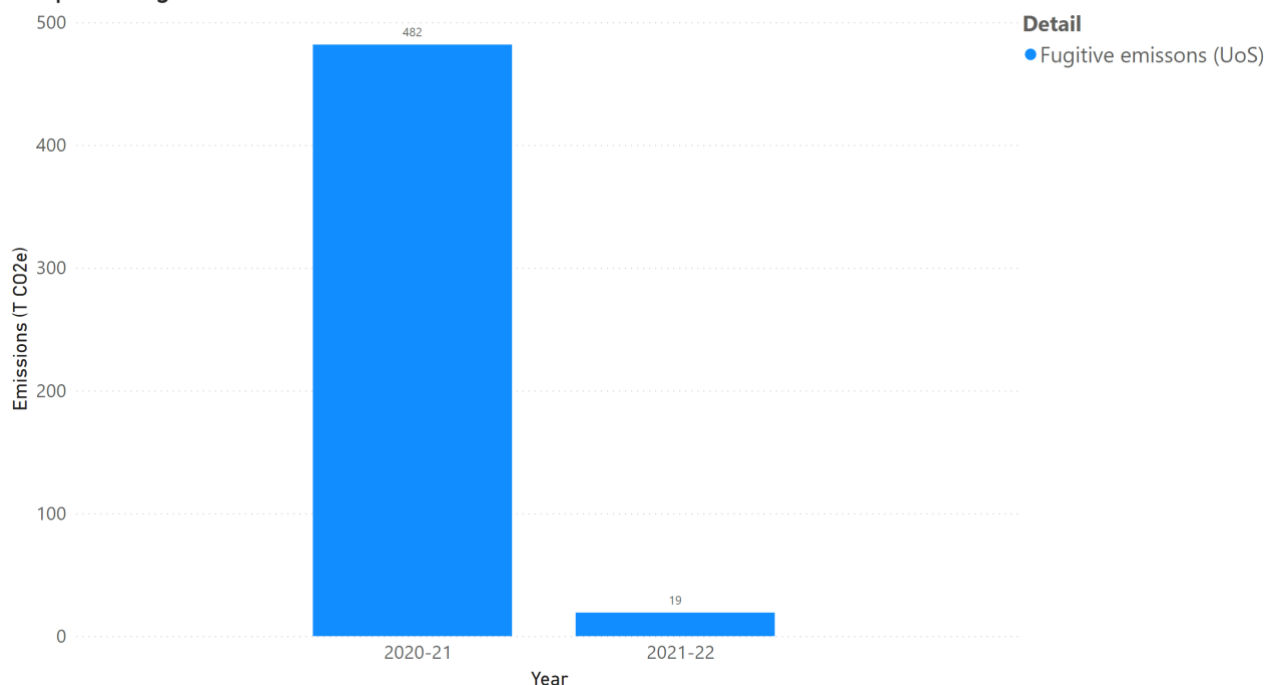


Figure 3: University of Southampton Scope 1: fugitive emissions estimates

Table 3: University of Southampton Scope 1: fugitive emissions estimates

Statistic	Value
Latest total (T CO2e, 2021-22)	19
Change since 2015-16 (% difference)	Not applicable
Change since 2018-19 baseline (% difference)	Not applicable

Explanatory notes:

- 2020-21:
 - Following a literature review of the likely scale of the various fugitive emissions components (Trewick & Anderson, 2022), fugitive emissions for refrigerants (only) were estimated using a record of centrally managed cooling systems and average leakage rates from the literature.

The estimates were known to be incomplete as they did not cover cooling systems that were locally managed within Departments or Laboratories.

- 2021-22:
 - Fugitive emissions were calculated using centralised records of refrigerant replacements due to leaks. This more accurate record shows much lower fugitive emissions due to refrigerants than were previously estimated. However, it is likely that these estimates remain incomplete as they do not cover cooling systems that are locally managed within Departments or Laboratories

3.1.4 Scope 1: Process emissions

We currently do not have estimates for process emissions. A literature review of Fugitive and Process emissions has recommended further work to establish the potential scale of the University's Process emissions (Trewick & Anderson, 2022). This is currently being progressed via a CMEE MSc project.

3.1.5 Scope 1: Summary

Overall, Scope 1 emissions (18.06 kT CO₂e) comprised 13% of Scope 1, 2 and 3 emissions in 2021-22 having remained roughly constant over time (4% increase since 2015-16) even though overall estate size has increased. This is due to energy efficiency projects, higher efficiency new-builds and a small reduction in the emissions factor of natural gas. Mobile combustion due to fleet vehicles and estimated fugitive emissions, first estimated in 2020-21, comprise a very small fraction of our emissions.

Figure 4 shows Scope 1 emissions over time while Table 4 reports the latest estimates and indicators of change where applicable.

Scope 1 emissions by category

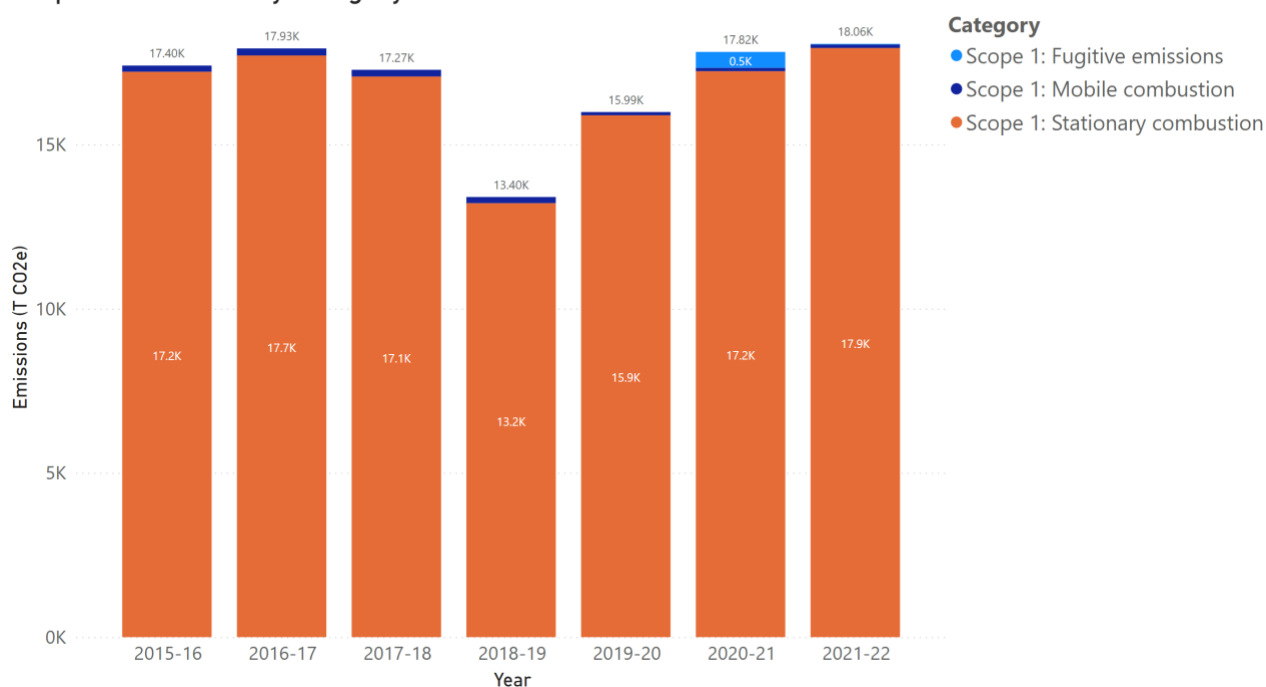


Figure 4: University of Southampton Scope 1 emissions estimates

Table 4: University of Southampton Scope 1 emissions

Indicator	Stationary Combustion	Mobile combustion	Fugitive emissions	Total
Latest total (T CO ₂ e, 2021-22)	17,940	105	19	18,064
Change since 2015-16 (% difference)	4.2	-43.9	N/A	3.8
Change since 2018-19 baseline (% difference)	35.8	-43.5	N/A	34.8

Stationary emissions in the 2018-19 baseline year were notably lower than trend as the Highfield campus gas-powered combined heat and power plant (CHP) was only partially operational. This means that we are

likely to see a percentage increase from the baseline year until gas use starts to fall substantially as Goal 1 progresses.

The CHP returned to normal use in 2019-20 and gas use started to return to 'normal' levels in the context of the COVID-19 pandemic which required many of the university staff and students to work from home and buildings to close.

2020-21 saw a return to near 'normal' operations and this was also the first year that we have been able to include an estimate of fugitive emissions due to F-gas leakage.

2021-22 saw a return to full operations and returned gas use to pre-COVID levels. The selection of 2018-19 as the baseline year again leads to the somewhat anomalous 'percentage change since 2018-19 indicator' value for stationary combustion (36% increase). Fugitive emissions are considerably lower as they are now based on records of refrigerants volumes that needed to be replaced rather than an estimate.

Future reporting will ensure that:

- Stationary combustion emissions for USSP Ltd are consistently reported in each year
- Process emissions are understood

3.2 Scope 2

Under the GHG Protocol Scope 2 guidance (WRI/WBCSD 2015a) Scope 2 emissions are:

- **Purchased electricity** - emissions from purchased or acquired electricity
- **Steam, heat, and cooling** - emissions from purchased heat, hot water, steam or cooling

In the case of the University this covers:

- Purchase of electricity from the grid
- Purchase of heat from the City of Southampton's heat network at some sites

The following sections discuss each of the Scope 2 categories in more detail.

3.2.1 Scope 2: Purchased electricity

These emissions can be calculated using one of two methods:

- **market-based** - the specific emissions factors reported by the contracted supplier
- **location-based** - the average grid carbon intensity for the region in which the University is located

In the following we use the **location-based** approach. These emissions are calculated by the Estates Energy team as part of the HESA submission process using activity data (kWh purchased) and the appropriate UK GHG conversion factors (see Section 9.1).

From 2021-22 onwards the majority of these emissions can be set to zero to reflect our switch to a REGO-backed renewable tariff in June 2021. Note that this will not affect our [Scope 3: Upstream fuel and energy](#) emissions.

Figure 5 shows Scope 2: Purchased electricity emissions over time while Table 5 reports the latest estimate and indicators of change where applicable.

Scope 2: Grid electricity

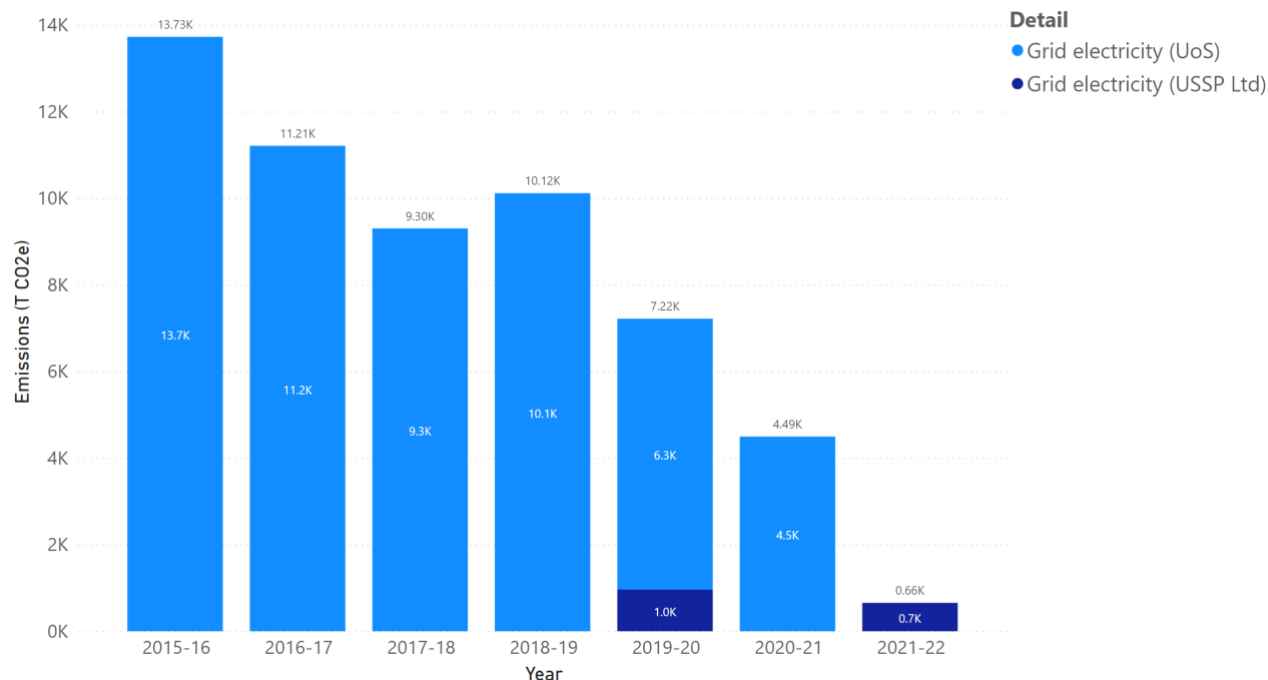


Figure 5: University of Southampton Scope 2: Purchased electricity emissions

Table 5: University of Southampton Scope 2: Purchased electricity emissions

Statistic	Value
Latest total (T CO ₂ e, 2021-22)	655
Change since 2015-16 (% difference)	-95.2
Change since 2018-19 baseline (% difference)	-93.5

Explanatory notes:

- Overall trends:
 - Figure 5 shows that purchased electricity emissions have fallen over time due to *both* the substantial and ongoing decarbonisation of the grid *and also* to reductions in electricity use through energy efficiency projects (see Figure 19 in the Annex).
- 2018-19:
 - Emissions in the 2018-19 baseline year were slightly higher than trend as the Highfield campus gas-powered combined heat and power plant was only partially operational so the University had to buy more electricity from the grid (see Figure 18 and Figure 19 in the Annex). This means that subsequent years will show a higher-than-expected percentage reduction from this 'high usage' baseline year.
- 2019-20:
 - The CHP returned to normal use resulting in a decline in purchased electricity but the substantial reduction from 2018-19 to 2019-20 is largely due to the covid-19 pandemic requiring many of the university staff and students to work from home and buildings to close.
 - USSP Ltd (University of Southampton Science Park Ltd) emissions were first available in this year and include emissions from both USSP Ltd and its tenants. Tenant emissions are therefore **not** reported under *Scope 3: Downstream Leased Assets* to avoid double-counting.
- 2020-21:
 - This year saw a return to near 'normal' operations as shown by Figure 19 in the Annex and, combined with the higher than trend 2018-19 baseline produces the higher-than-expected percentage reduction figure as anticipated. USSP Ltd data was not available for this year.

- 2021-22
 - This year saw increased post-COVID occupancy across all halls and sites. Overall electricity purchase from the grid was higher in 2021-22 (see Figure 19 in the Annex) although there was a substantial reduction in use at the Astro House data centre. However, the switch to a renewable electricity tariff took effect in June 2021⁶ and results in zero emissions due to electricity in 2021-22 for the main University estate.
 - The renewable electricity tariff does not include electricity use at USSP Ltd and so emissions from this source remain.

3.2.2 Scope 2: Purchased steam and hot water

These emissions are calculated by the Estates Energy team as part of the HESA submission process using activity data (kWh purchased) and the appropriate UK GHG conversion factors. Figure 6 shows *Scope 2: Purchased steam and hot water* emissions over time while Table 6 reports the latest estimate and indicators of change where applicable.

Scope 2: Steam & hot water

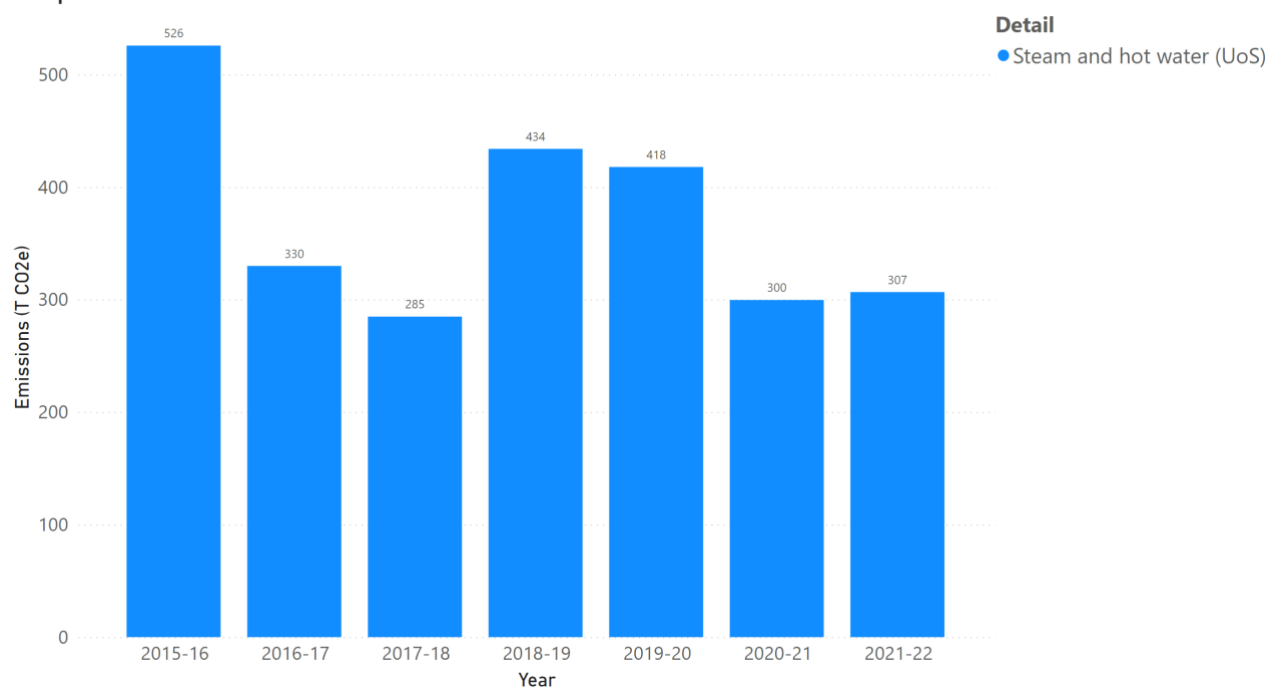


Figure 6: University of Southampton Scope 2: Purchased steam and hot water emissions

Table 6: University of Southampton Scope 2: Purchased steam and hot water emissions

Statistic	Value
Latest total (T CO2e, 2021-22)	307
Change since 2015-16 (% difference)	-41.6
Change since 2018-19 baseline (% difference)	-29.3

Explanatory notes:

- The steam and hot water figures relate to the Southampton city district heating for Mayflower (heat and hot water) and City Gateway (hot water) halls. The system was operating sub-optimally in 2016-17 and suffered a major split in the pipework during 2017-18 which resulted in loss of heat and the use of a back-up boiler.
- 2020-21
 - This year saw reduced usage due to COVID impacts

⁶ See <https://www.southampton.ac.uk/blog/sussed-news/2021/10/20/university-switches-to-renewable-energy-electricity-contract/>

- 2021-22
 - This year saw a slight increase in emissions due to increased use at City Gateway

3.2.3 Scope 2 summary

Overall, Scope 2 emissions (0.962 kT CO₂e) comprised 0.7% of total Scope 1, 2 and 3 emissions in 2021-22 having reduced by 93% since 2015-16 with some fluctuation in response to the operational status of the CHP which generates a significant proportion of the electricity we use.

Figure 7 shows Scope 2 emissions over time while Table 7 reports the latest estimates and an indicator of change since the 2018-19 baseline where applicable. They show that Scope 2 emissions reductions were almost entirely driven by reductions in emissions from purchased electricity. Emissions from this source have fallen substantially due to the ongoing decarbonisation of the grid, to reductions in electricity use through energy efficiency projects⁷ and to our switch to a renewable electricity tariff⁸.

Scope 2 emissions by category

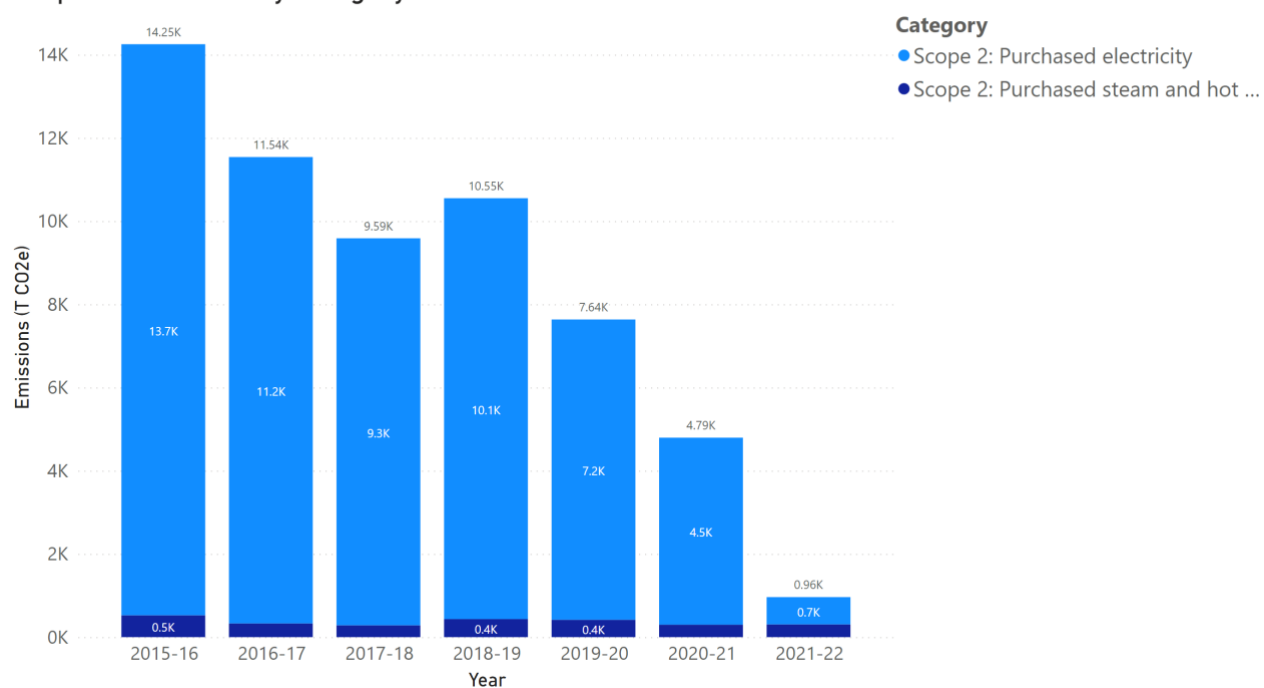


Figure 7: University of Southampton Scope 2 emissions

Table 7: University of Southampton Scope 2 emissions

Indicator	Purchased electricity	Purchased steam and hot water	Total
Latest total (T CO ₂ e, 2021-22)	655	307	962
Change since 2015-16 (% difference)	-95.2	-41.6	-93.3
Change since 2018-19 baseline (% difference)	-93.5	-29.3	-90.9

Emissions in the 2018-19 baseline year were slightly higher than trend as the Highfield CHP, which generates a significant proportion of the electricity used by the University, was only partially operational. The University therefore had to buy more electricity from the grid and as a result subsequent years will show a higher-than-expected percentage reduction from this 'high usage' baseline year.

⁷ See Figure 19: University of Southampton electricity use over time (Source: HESA <https://www.hesa.ac.uk/data-and-analysis/estates>).

⁸ See <https://www.southampton.ac.uk/blog/sussed-news/2021/10/20/university-switches-to-renewable-energy-electricity-contract/>

In 2019-20 the CHP returned to normal use resulting in a decline in purchased electricity compounded by the COVID-19 pandemic which required many university staff and students to work from home and buildings to close.

2020-21 saw a return to near 'normal' operations and this combined with the higher than trend 2018-19 baseline, produces the 55% reduction value.

2021-22 saw increased post-COVID occupancy across all halls and sites. Overall electricity purchase from the grid was higher in 2021-22 (see Figure 19 the Annex) although there was a substantial reduction in use at the Astro House data centre.

The switch to a renewable electricity tariff took effect in June 2021 and results in zero emissions due to electricity in 2021-22 for the main University estate. However, this tariff does not include the Science Park so there are residual purchased electricity emissions from USSP Ltd.

Future reporting will ensure that:

- Purchased electricity emissions for USSP Ltd are updated consistently.

3.3 Scope 3

Under the GHG Protocol Scope 3 guidance (WRI/WBCSD 2013) reporting Scope 3 emissions involves the identification of other indirect emissions from the University's upstream and downstream activities as well as emissions associated with outsourced/contract manufacturing, leases, or franchises not included in Scope 1 or Scope 2. The inclusion of Scope 3 emissions allows the University to expand its inventory boundary up and down the value chain to identify all relevant GHG emissions. This provides a broad overview of the University's business linkages and possible opportunities for significant GHG emission reductions that may exist upstream (or downstream) of our immediate operations.

Scope 3 emissions categories:

- Upstream
 - 3.1: **Purchased goods and services**
 - 3.2: **Capital goods** - we include these in purchased goods and service reporting
 - 3.3: **Upstream fuel & energy** (non-Scope 1 & 2)
 - 3.4: **Upstream transportation and distribution**
 - 3.5: **Waste generated in operations**
 - 3.6: **Business travel**
 - 3.7: **Employee commuting**
 - 3.8: **Upstream leased assets**
- Downstream
 - 3.9: **Downstream transportation and distribution** - considered not applicable and not included in this report
 - 3.10: **Processing of sold products** - considered not applicable and not included in this report
 - 3.11: **Use of sold products** - considered not applicable and not included in this report
 - 3.12: **End-of-life treatment of sold products** - considered not applicable and not included in this report
 - 3.13: **Downstream leased assets (operation)** - the University's Science Park is our only downstream leased asset and emissions are reported under Scope 1 and 2 above.
 - 3.14: **Franchises** (operation) - considered not applicable and not included in this report
 - 3.15: **Investments** (operation) - applicable but we do not yet have estimates that can be reported

Scope 3 emissions are therefore indirect emissions that derive from activities that the University does not own or control. These emissions are usually the greatest share of the emissions footprint, covering emissions associated with business travel, employee commuting, procurement (i.e., supply chain), leased assets, waste and water.

Most of the currently known values for Scope 3 emissions categories are estimates and so, where relevant, we report them rounded to the nearest 100 Tonnes CO₂e to avoid assumptions of over-precision.

The following sections discuss each of the Scope 3 categories in more detail.

3.3.1 Scope 3: Purchased Goods & Services (and Capital goods)

These emissions include all upstream (i.e., cradle-to-gate) emissions from the production of products purchased or acquired by the reporting company in the reporting year. Products include both goods (tangible products) and services (intangible products) but does **not** include services reported in other categories such as Business Travel and Waste from Operations. The minimum boundary is:

- All upstream (cradle-to-gate) emissions of purchased goods and services

These emissions may be estimated in four ways:

- **Supplier-specific method** – collects product-level cradle-to-gate GHG inventory data from goods or services suppliers.
- **Hybrid method** – uses a combination of supplier-specific activity data (where available) and secondary data to fill in the gaps.
- **Average-data method** – estimates emissions for goods and services by collecting data on the mass (e.g., kilograms), or other relevant units of goods or services purchased and multiplying by the relevant secondary emission factors (e.g., average emissions per unit of good or service).
- **Spend-based method** – estimates emissions for goods and services by collecting data on the economic value of goods and services purchased and multiplying it by relevant secondary (e.g., industry average) emission factors (e.g., average emissions per monetary value of goods).

In this section we use:

- the **spend-based method** via the Higher Education Supply Chain Emissions tool (HESCET)⁹ which uses University-supplied expenditure data mapped to BEIS/DEFRA emissions factors. The HESCET tool outputs (emissions) data is provided by the University's Procurement team.
- the **average-data method** for emissions from treatment of our supplied water using our metered water use and appropriate UK GHG conversion factors. This data forms part of our annual HESA return.

Note that emissions due to waste and waste-water services are included in *Scope 3: Waste from operations* below.

Figure 8 shows Scope 3: Purchased Goods and Services emissions over time while Table 8 reports the latest estimate and an indicator of change since the 2018-19 baseline. Note that this table excludes all other Scope 3 categories, including purchased business travel which are accounted separately (see above).

⁹ https://www.sustainabilityexchange.ac.uk/hescet_tool

Scope 3: Purchased Goods and Services emissions detail

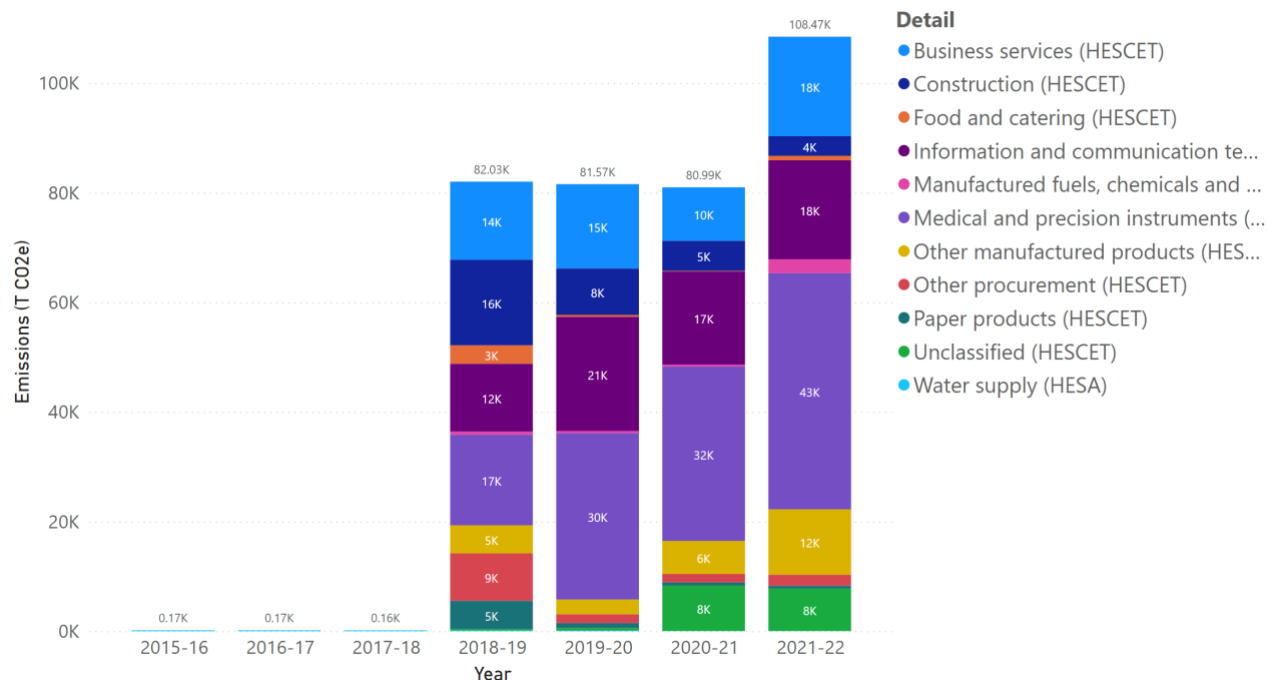


Figure 8: University of Southampton Scope 3: Purchased Goods & Services emissions

Table 8: University of Southampton Scope 3: Purchased Goods & Services emissions

Statistic	Value (rounded to nearest 100 T)
Latest total (to nearest 100 T CO ₂ e, 2021-22)	108,500
Change since 2015-16 (% difference)	Not applicable
Change since 2018-19 baseline (% difference)	32.3

Explanatory notes:

- For the HESCET data, the relationship between expenditures, emissions factors and actual upstream emissions is not necessarily that robust. These emissions estimates should therefore be viewed with caution and significant changes should be analysed in detail to ensure they are not artefacts of the estimation method.
- As these emissions are estimated using an expenditure-based approach and the underlying emissions factors for each good or service do not change annually, the emissions reported will fluctuate as expenditure on different goods and services fluctuates.

With these caveats in mind, it is nevertheless clear that expenditures classified as *Business services*, *Construction*, *ICT*, and *Medical and precision instruments* comprise the major components of these emissions. *Food and catering* and *Paper products*, which comprised 3 and 5 kT CO₂e respectively in 2018-19, were essentially absent in 2019-20 and 2020-21 largely due to COVID restrictions.

Return to 'normal' post-COVID operations and University growth in 2021-2022 is reflected by a large increase in estimated *Purchased Goods & Services* emissions. Increases were seen in most sub-categories, especially *Medical & precision implements* (+ 11 kT CO₂e since 2020-21), *Business Services* (+ 8 kT CO₂e since 2020-21), and *Other manufactured products* (+6 kT CO₂e since 2020-21).

Under the HESCET tool categorisation method:

- Information and Communication Technologies* includes both the purchase of software (and ongoing bespoke licences) as well as cloud services and computer/AV/telecommunications hardware purchasing and maintenance.
- Medical and precision instruments* include nearly all laboratory materials purchasing as well as specialist research or medical equipment such as Laboratory Capital Equipment, Laboratory Support Equipment, Medical Patient Diagnostic Services, and equipment for clinical trials.

- *Business services* includes all forms of purchased consultancy or fee-based services such as ICT consultancy, data information services, Building Related Professional Services, Temporary & Recruitment Employment Agencies, Building Repairs & Maintenance services, and Security services.

In future work we intend to develop supplier-specific emissions reporting but anticipate that it will be some years before all suppliers are able to provide this data. In the meantime, we will continue with the approach described above.

3.3.2 Scope 3: Upstream fuel and energy

This category is intended to capture our share of upstream (well-to-tank¹⁰) emissions related to the energy use reported under Scope 1 and 2. This covers:

- Upstream emissions of purchased fuels (in our case gas and diesel)
- Upstream emissions of purchased electricity
- Transmission and distribution (T&D) losses (in our case for electricity and steam)
- Generation of purchased electricity that is sold to end users (not applicable to the University)

Emissions are calculated using the kWh energy/steam or litre fuel use values provided by the Energy team for *Scope 1* and *Scope 2* reporting and the relevant UK Government published conversion factors. These emissions could be calculated prior to 2018-19 but this has not (yet) been done.

These emissions will fluctuate as energy use fluctuates and the electricity use component will not be affected by the switch to a renewable electricity tariff.

Figure 9 shows *Scope 3: Upstream fuel and energy emissions* over time while Table 9 reports the latest estimate and indicators of change where applicable.

Scope 3: Upstream fuel & energy

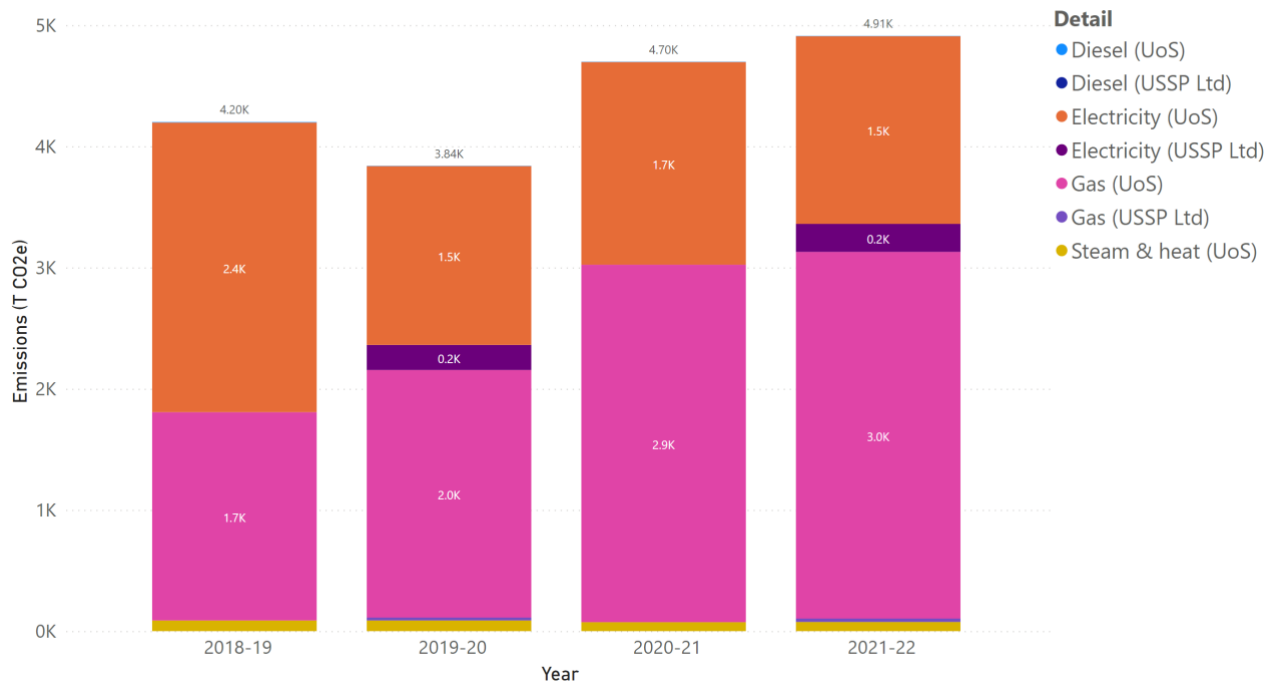


Figure 9: University of Southampton Scope 3: Upstream fuel and energy emissions

Table 9: University of Southampton Scope 3: Upstream fuel and energy emissions

Statistic	Value
Latest total (T CO2e, 2021-22)	4,912
Change since 2015-16 (% difference)	Not applicable

¹⁰ https://ghgprotocol.org/sites/default/files/standards_supporting/Chapter3.pdf

Change since 2018-19 baseline (% difference)	16.9
----------------------------------------------	------

Explanatory notes:

- 2018-19
 - Estimated from energy use data supplied by the Estates Energy Team
- 2019-20
 - As above but with the addition of USSP Ltd energy use data
- 2020-21
 - As above but USSP Ltd data not yet available. The increase in 2020-21 reflects the increased use of gas as reported in *Scope 1: Stationary combustion*.
- 2021-22
 - As above but with USSP Ltd data included. The increase also reflects post-COVID increases in energy use

3.3.3 Scope 3: Upstream transportation and distribution

Emissions under this category cover:

- transportation and distribution of products purchased in the reporting year, between our suppliers and our own operations in vehicles not owned or operated by the University
- Third-party transportation and distribution services purchased by the University, including inbound logistics, outbound logistics, and third-party transportation and distribution between a company's own facilities.

The minimum boundaries are:

- The scope 1 and scope 2 emissions of transportation and distribution providers that occur during use of vehicles and facilities (e.g., from energy use)
- Optional: The life cycle emissions associated with manufacturing vehicles, facilities, or infrastructure

These can be calculated via:

- **Site-specific** method, which involves site-specific fuel, electricity, and fugitive emissions data and applying the appropriate emission factors
- **Average-data** method, which involves estimating emissions for each distribution activity, based on average data (such as average emissions per pallet or cubic meter stored per day). Estimating upstream transportation and distribution emissions is extremely difficult.

Figure 10 shows *Scope 3: Upstream transportation and distribution emissions* over time while Table 10 reports the latest estimate and indicators of change where applicable.

Explanatory notes:

- 2018-19
 - In the absence of other data, we used an estimate for goods inwards deliveries for Highfield Campus for 2015-16 produced as part of a recent University PhD thesis (Robinson 2017)¹¹. This used the average data method.
- 2019-20
 - In the absence of other data, we re-used the 2018-19 data without adjustment
- 2020-21
 - In the absence of other data, we re-used the 2018-19 data without adjustment
- 2021-22

¹¹ <https://eprints.soton.ac.uk/438634/>

- These emissions have been set to zero as they are included in the HESCET Scope 3: Purchased Goods and Services estimates¹². This also means that they should be set to zero in previous years.

Table 10: University of Southampton Scope 3: Upstream transportation emissions

Statistic	Value
Latest total (nearest 100 T CO ₂ e, 2020-21)	0
Change since 2015-16 (% difference)	Not applicable
Change since 2018-19 baseline (% difference)	Not applicable

Scope 3: Upstream transportation

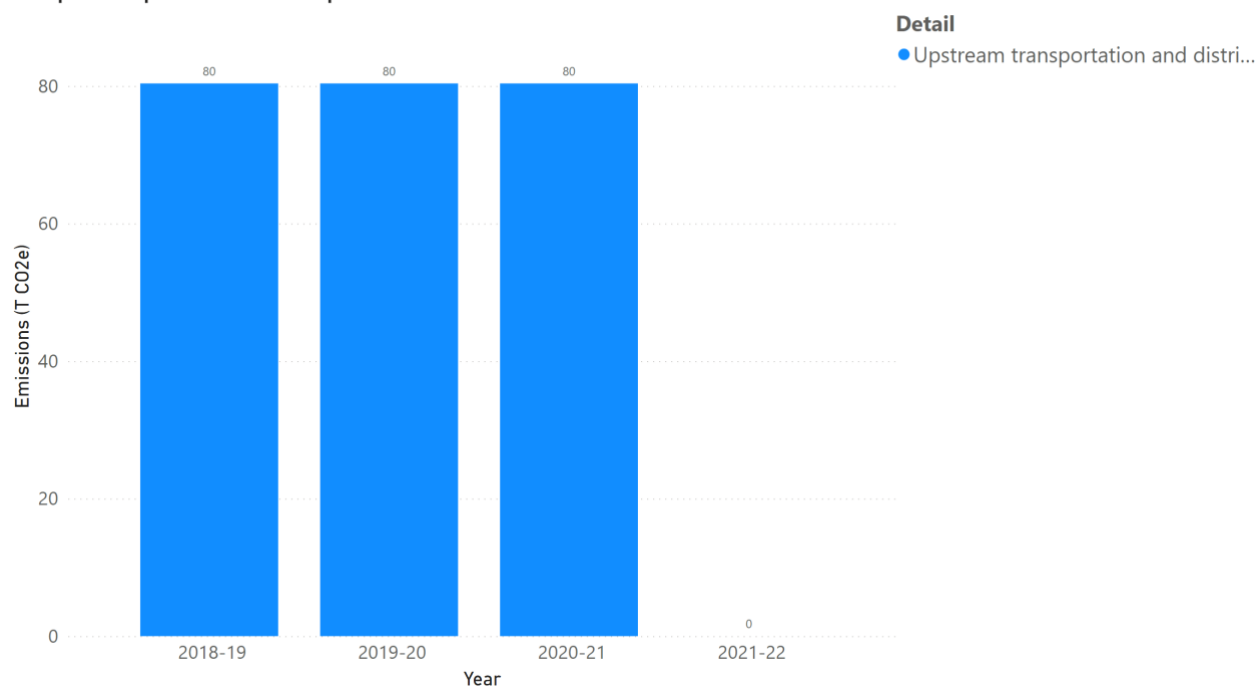


Figure 10: University of Southampton Scope 3: Upstream transportation emissions

Future work will seek to provide more robust estimates of this emissions category.

3.3.4 Scope 3: Waste from operations

These emissions cover those from third-party disposal and treatment of waste generated in the University’s owned or controlled operations. This category includes emissions from disposal of both solid waste and waste-water.

Only waste treatment in facilities owned or operated by third parties is included in *Scope 3*. *Waste treatment* at facilities owned or controlled by the University would be accounted for in *Scope 1* and *Scope 2*. Treatment of waste generated in operations is categorized as an upstream *Scope 3* category because waste management services are purchased by the University.

Minimum boundaries:

- The scope 1 and scope 2 emissions of waste management suppliers that occur during disposal or treatment
- *Optional*: Emissions from transportation of waste (waste transfers)

¹² See https://www.eauc.org.uk/file_uploads/standardised_carbon_emissions_reporting_-_methodology_guidance_-_version_3_0_-_01_12_22.pdf

Reports may use any one of the following methods to calculate emissions from waste generated in their operations, but managed by third parties:

- **Supplier-specific** method, which involves collecting waste-specific scope 1 and scope 2 emissions data directly from waste treatment companies (e.g., for incineration, recovery for recycling)
- **Waste-type-specific** method, which involves using emission factors for specific waste types and waste treatment methods
- **Average-data** method, which involves estimating emissions based on total waste going to each disposal method (e.g., landfill) and average emission factors for each disposal method.
- To optionally report emissions from the transportation of waste, refer to category 4 (Upstream transportation and distribution) for calculation methodologies.

Figure 11 shows *Scope 3: Waste from operations* emissions over time while Table 11 reports the latest estimate and indicators of change where applicable.

Scope 3: Waste from operations

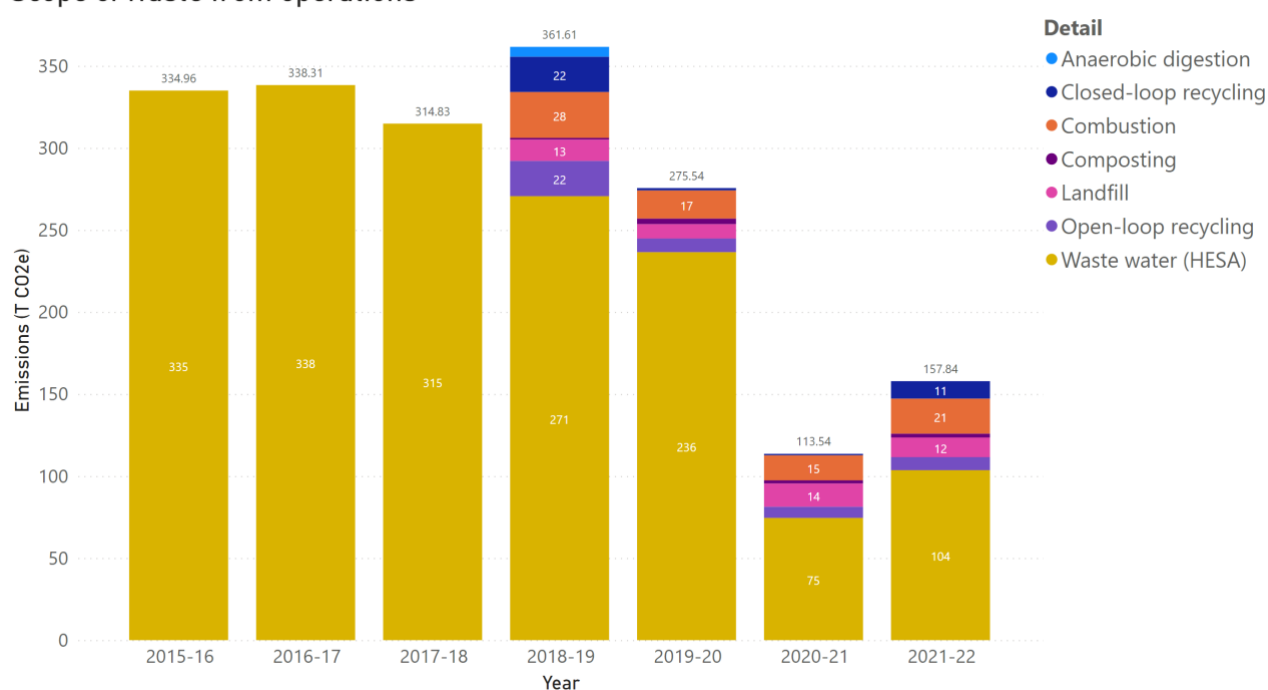


Figure 11: University of Southampton Scope 3: Waste from operations emissions

Table 11: University of Southampton Scope 3: Waste from operations emissions

Statistic	Value (rounded to nearest 10 T)
Latest total (to nearest 100 T CO2e, 2021-22)	160
Change since 2015-16 (% difference)	-51.5
Change since 2018-19 baseline (% difference)	-55.6

Explanatory notes:

- 2015-16 to 2017-18
 - These estimates include only emissions due to waste-water services as reported via HESA.
- 2018-19
 - These estimates use our HESA reported emissions due waste-water and our HESA reported waste mass and appropriate UK GHG conversion factors (**waste-type-specific** method). Due to a lack of detailed data, recycling has been equally split into open and closed-loop recycling. These estimates *do not* include waste transfers. Emissions from waste transfers

were previously estimated to be ~ 2,770 T CO₂e in 2015-16 by a University PhD project (Robinson 2017). This is an order of magnitude larger than emissions solely from waste.

- 2019-20
 - These estimates use our HESA reported emissions due to waste-water together with a new *Waste Emissions Calculator tool* developed in 2022 by a student project. This uses actual waste volume/tonnage returns from our contractors and converts them to emissions using appropriate UK GHG conversion factors (**waste-type-specific** method). These estimates *do not* include waste transfers. The relatively low values for 2019-20 compared to 2020-21 reflect the impact of COVID.
- 2020-21
 - These estimates use the same method as 2019-20 and, as before *do not* include waste transfers. The values for 2020-21 are unusually low due to substantial reductions in the use of water (and thus the production of waste-water) during the COVID-19 pandemic. Nevertheless, an ongoing decreasing trend in waste emissions in general is also evident.
- 2021-22
 - These estimates use the same method as above and reflect an increase in post-COVID on-campus activity, especially for waste water. However, waste emissions are still much lower than pre-COVID levels.

Future work will seek to provide robust estimates of waste transfers to include in the reporting for this emissions category.

3.3.5 Scope 3: Business Travel

Emissions from transportation in vehicles owned or controlled by the University are accounted for in either scope 1 (for fuel use), or in the case of electric vehicles, scope 2 (for electricity use). Emissions from leased vehicles operated by the University not included in scope 1 or scope 2 are accounted for in *Scope 3: Upstream leased assets*. Emissions from transportation of employees to and from work are accounted for in *Scope 3: Employee commuting*. All other business travel emissions are reported in this category.

Emissions from business travel may arise from:

- Air travel
- Rail travel
- Bus travel
- Car travel (e.g., business travel in rental cars or employee-owned vehicles other than employee commuting to and from work)
- Other modes of travel (taxi etc)

Minimum boundaries for these emissions are:

- The scope 1 and scope 2 emissions of transportation carriers that occur during use of vehicles (e.g., from energy use)

Optional:

- The life cycle emissions associated with manufacturing vehicles or infrastructure;
- Emissions from business travellers staying in hotels.

Allowable calculation methods:

- **Fuel-based** method, which involves determining the amount of fuel consumed during business travel (i.e., scope 1 and scope 2 emissions of transport providers) and applying the appropriate emission factor for that fuel
- **Distance-based** method, which involves determining the distance and mode of business trips, then applying the appropriate emission factor for the mode used
- **Spend-based** method, which involves determining the amount of money spent on each mode of business travel transport and applying secondary (EEIO) emission factors.

The data used here are extracted from the University’s travel management system (go2book, supplied by Clarity). They include emissions from flights, hotels and rail travel booked via Clarity. The emissions are calculated (by Clarity) using the **distance-based** method and the factors used apply radiative forcing factors, type and class of flight but do not yet account for full well-to-tank emissions.

The data *excludes* any travel not booked via Clarity which may include light rail, bus or taxi transport paid for on the day and reclaimed via expenses. It also excludes any travel funded by external sources or paid for from personal sources. The values reported are therefore likely to be under-estimates of total business travel emissions (Ellie Harrison 2020).

Figure 12 shows *Scope 3: Business Travel* emissions over time while Table 12 reports the latest estimate and indicators of change where applicable.

Scope 3: Business travel emissions detail

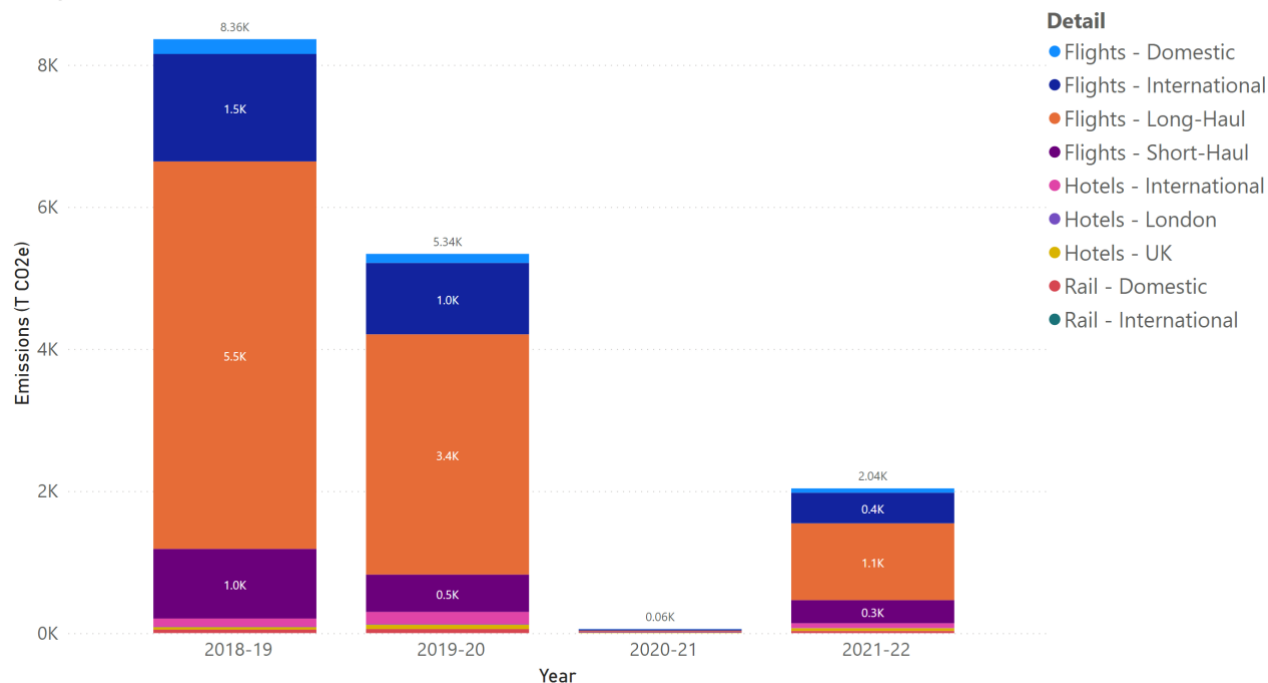


Figure 12: University of Southampton Scope 3: Business Travel emissions

Table 12: University of Southampton Scope 3: Business Travel emissions

Statistic	Value
Latest total (T CO2e, 2021-22)	2,037
Change since 2015-16 (% difference)	Not applicable
Change since 2018-19 baseline (% difference)	-75.6

Explanatory notes:

- 2018-19
 - This was the last pre-COVID year of ‘normal’ travel
- 2019-20
 - This year was the first to be impacted by COVID travel restrictions from March 2020
- 2020-21
 - This data is not an error. Business travel emissions fell by over 99% from 2018-19 to 2020-21. However, we should expect emissions to rebound in 2021/22 as business travel restarts.
- 2021-22
 - This year saw the re-emergence of business travel post-COVID but under ‘new normal’ work practices with substantially reduced international and long-haul flights. Other analysis conducted by SIG suggests this has been driven by substantial reductions in long-distance

travel for conferences. There have also been reductions in short-distance (especially UK rail) transport for business meetings, but this has relatively little impact on emissions.

Future work will explore the feasibility of extracting non-Clarity business travel emissions data from business expenses data.

3.3.6 Scope 3: Employee Commuting

This category includes emissions from the transportation of employees between their homes and their worksites. Emissions from employee commuting may arise from:

- Car travel
- Bus travel
- Rail travel
- Air travel

Other modes of transportation (e.g., subway, bicycling, walking).

Minimum boundaries (WRI/WBCSD, 2013) Table 1:

- The scope 1 and scope 2 emissions of employees and transportation providers that occur during use of vehicles (e.g., from energy use)
- *Optional:* Emissions from employee teleworking

Companies may use one of the following methods:

- **Fuel-based** method, which involves determining the amount of fuel consumed during commuting and applying the appropriate emission factor for that fuel
- **Distance-based** method, which involves collecting data from employees on commuting patterns (e.g., distance travelled, and mode used for commuting) and applying appropriate emission factors for the modes used
- **Average-data** method, which involves estimating emissions from employee commuting based on average (e.g., national) data on commuting patterns.

For compliance with the GHG Protocol we include only estimates of emissions due to employee commuting. Emissions due to student commuting is estimated under *Other reporting* below.

Figure 13 shows *Scope 3: Employee commuting* emissions over time while Table 13 reports the latest estimate and indicators of change where applicable.

Scope 3: Employee commuting

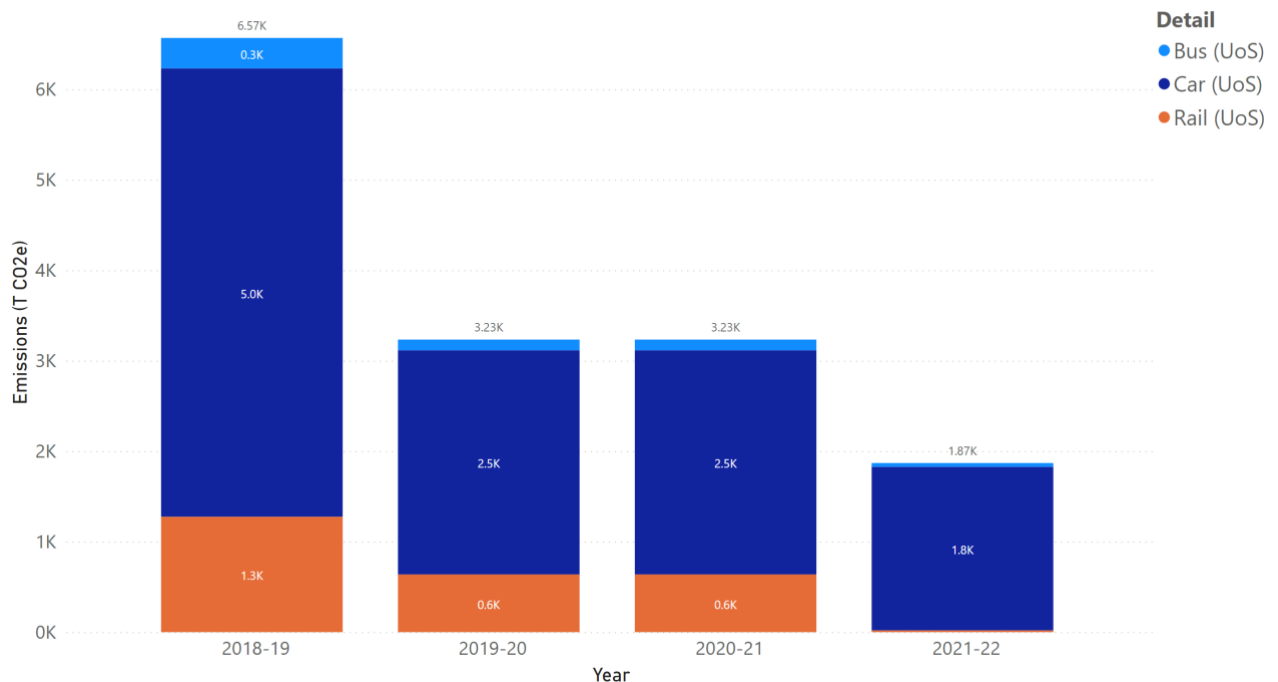


Figure 13: University of Southampton Scope 3: Employee Commuting emissions

Table 13: University of Southampton Scope 3: Employee Commuting emissions

Statistic	Value (rounded to nearest 100 T)
Latest total (to nearest 100 T CO ₂ e, 2021-22)	1,900
Change since 2015-16 (% difference)	Not applicable
Change since 2018-19 baseline (% difference)	-71.2

Explanatory notes:

- 2018-19
 - These estimates are based on the results of a 2017 PhD study (Robinson 2017) which used the 2015 University Travel Survey. These use the distance-based method and estimates of teleworking emissions are not included.
- 2019-20
 - These estimates use the same data but assumes a 65% reduction in bus travel and a 50% reduction in car and rail commuting took place in 2019-20 based on feedback from Estates & Facilities. This does not account for COVID-19 specific travel habits such as a move away from public transport, towards active travel and single-car occupancy.
- 2020-21
 - These estimates use the same data and make the same adjustments for 2020-21 again based on feedback from Estates. We would expect the % change since 2018-19 baseline figure to show a smaller change in future years as 'new normal' commuting patterns emerge.
- 2021-22
 - Emissions in this year were estimated using the 2022 University Staff Travel survey which may correct previous assumptions of commuting behaviour including the use of rail. However, additional SIG analysis of the Travel Survey suggests that a significant proportion of staff are now more regularly working from home which has driven the large reduction in these emissions.

Future work will produce estimates based on the latest (2022) and future University Travel Surveys.

3.3.7 Scope 3: Upstream leased assets

This category includes emissions from the operation of assets that are leased in the reporting year and not already included in the scope 1 or scope 2 inventories.

Minimum boundaries:

- The scope 1 and scope 2 emissions of lessors that occur during the operation of leased assets (e.g., from energy use)
- *Optional:* The life cycle emissions associated with manufacturing or constructing leased assets

Figure 14 shows Scope 3: Upstream leased assets emissions over time while Table 14 reports the latest estimate.

Scope 3: Upstream leased assets

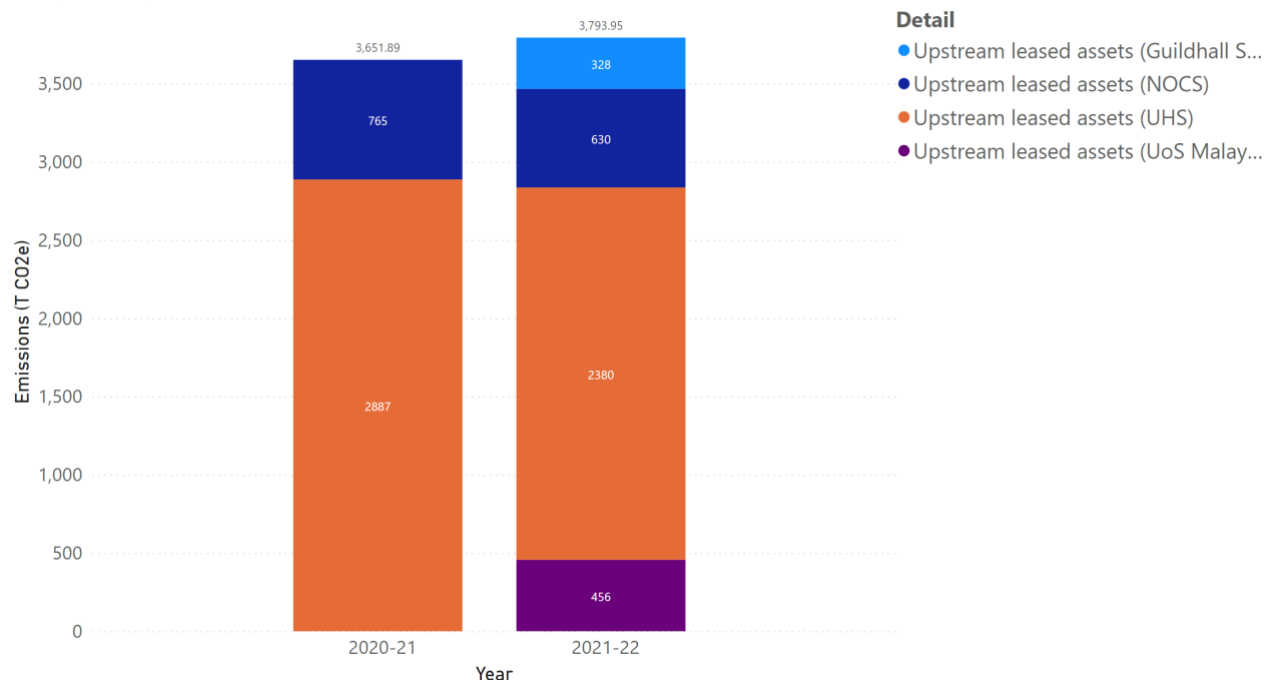


Figure 14: University of Southampton Scope 3: upstream leased assets emissions

Table 14: University of Southampton Scope 3: upstream leased assets emissions

Statistic	Value (rounded to nearest 100 T)
Latest total (to nearest 100 T CO ₂ e, 2021-22)	3,800
Change since 2015-16 (% difference)	Not applicable
Change since 2018-19 baseline (% difference)	Not applicable

Explanatory notes:

- 2018-19
 - Emissions not estimated
- 2019-20
 - Emissions not estimated
- 2020-21
 - The emissions from our leased space at the National Oceanography Centre (NOCs) and University Hospital Southampton (UHS/SGH) have been estimated for 2020-21 using the gross internal floor area of the lease and the mean Scope 1 and 2 emissions per m² for the Highfield Campus. They do not, therefore, take account of any Scope 1 or 2 emissions sources that are specific to the leased assets.
- 2021-22
 - This year's estimates use the same method as in 2020-21 (with the addition of Guildhall Square) but include measured emissions from the University's Malaysia campus which are largely driven by electricity for cooling.

3.3.8 Scope 3: Investments (operation)

These emissions are proportional Scope 1 and Scope 2 emissions from our equity investments.

We do not currently have an estimate of proportional Scope 1 and 2 emissions from our equity investments. However, in implementing the updated Ethical Investment Policy, the University has recently appointed new

portfolio fund managers who will be providing these estimates in future years for reporting both here and also in the 2022/23 financial statements.

3.3.9 Scope 3: Summary

Figure 15 shows Scope 3 emissions over time (where estimated) while Table 15 reports the latest estimates and an indicator of change since the 2018-19 baseline where applicable.

Note that *Upstream transport & distribution* are excluded from Figure 15 and Table 15 as estimates are included in the *Purchased Goods & Services* category (see *Scope 3: Upstream transportation and distribution* above). *Employee commuting* is based on estimates from the post-COVID 2022 Staff Travel Survey. *Upstream leased assets* are only included from 2020-21 and estimates of emissions from *Investments* are excluded as we do not yet have this data.

Scope 3 emissions by category

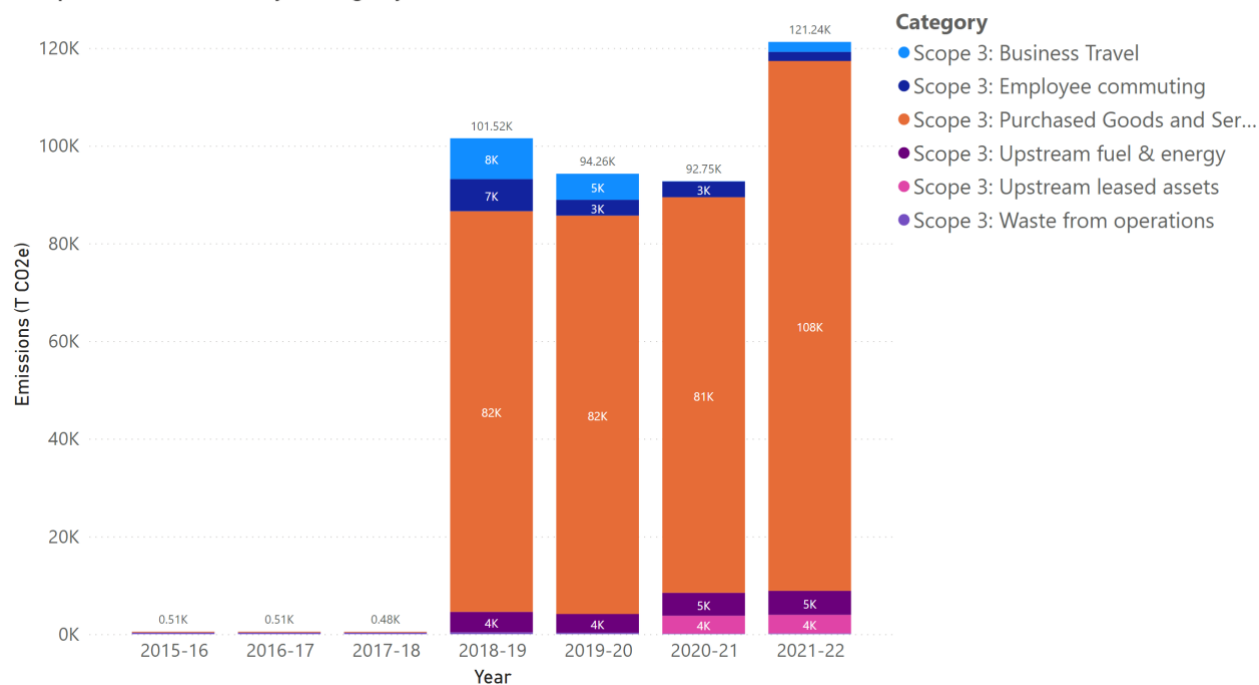


Figure 15: University of Southampton Scope 3 emissions

Table 15: University of Southampton Scope 3 emissions categories

Statistic	Purchased goods and services (nearest 100 T)	Upstream fuel & energy	Waste from operations (nearest 10 T)	Business travel	Employee commuting (nearest 100 T)	Upstream leased assets (nearest 100 T)	Total (nearest 100 T)
Latest total (T CO ₂ e, 2021-22)	108,500	4,912	160	2,037	1,900	3,800	121,200
Change since 2015-16 (% difference)	NA	NA	-51.5	NA	NA	NA	N/A
Change since 2018-19 baseline (% difference)	32.3	16.9	-55.6	-75.6	-71.2	NA	19%

Prior to 2018-19 Scope 3 emissions were only estimated for water treatment and waste-water services. These are now subsumed into *Purchased Goods & Services* and *Waste from operations* respectively.

Overall, Scope 3 emissions (121.2 kT CO₂e) have risen by 19% since 2018-19. The majority of this increase was due to a 32% increase in estimated emissions from *Purchased Goods & Services* (from baseline) despite

substantial sustained reductions in emissions from *Waste* (-56% from baseline), *Business Travel* (-76%) and *Employee Commuting* (-71%).

3.4 Other reporting

This section reports on emissions that are beyond the specific GHG Protocol categories but which the University has opted to report. Estimates for these other sources are only available from 2018-19 onwards. As Figure 16 shows, emissions in this category is dominated by overseas student relocation.

Other emissions reporting

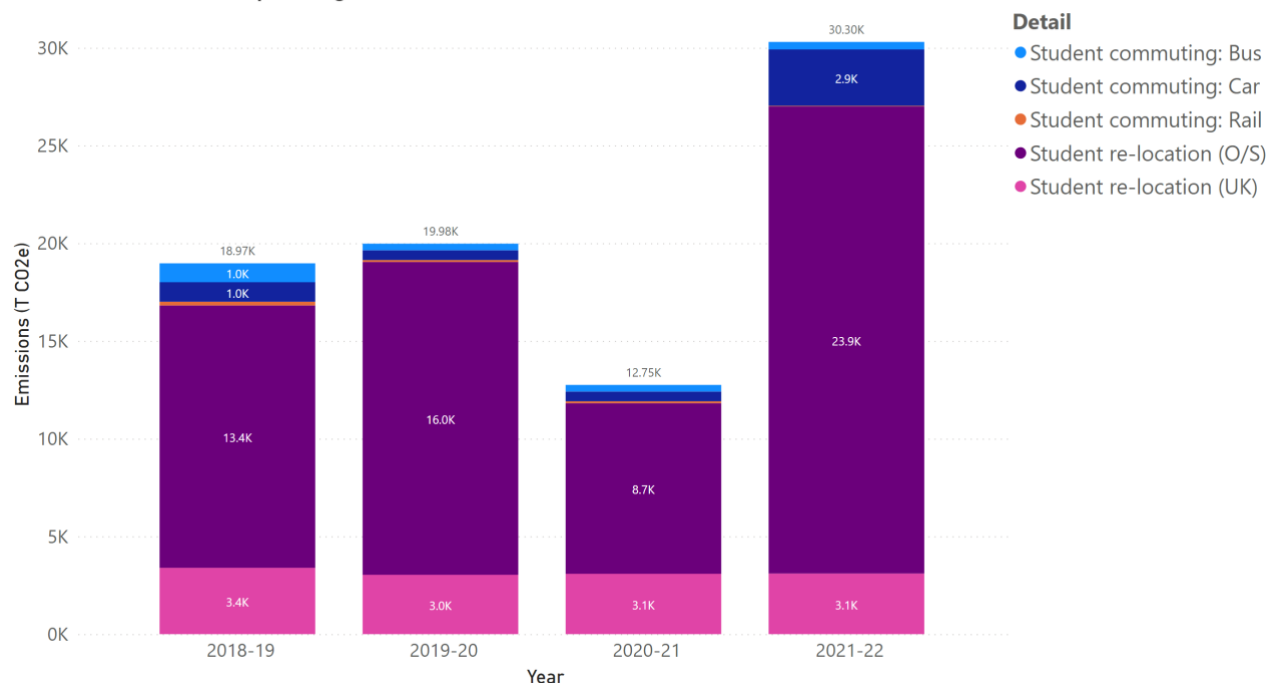


Figure 16: University of Southampton other emissions reporting over time

Table 16: University of Southampton other emissions reporting

Statistic	Student commuting	UK student relocation	O/S student relocation	Total
Latest total (to nearest 100 T CO ₂ e, 2021-22)	3,300	3,100	23,900	30,300
Change since 2015-16 (% difference)	Not applicable	Not applicable	Not applicable	Not applicable
Change since 2018-19 baseline (% difference)	50%	-8.8%	78.4%	59%

Notes

- Emissions/removals (sequestration) due to the University estate's land-use have not yet been estimated.
- 2018-19
 - Student commuting emissions derived from the same source as the *Scope 3: Employee Commuting* estimates.
 - Student relocation emissions estimated using student numbers by domicile supplied by the University's Data Analytics and Insight team. O/S students are assumed to fly from their capital city, UK students are assumed to travel by car unless they are from Northern Ireland in which case they are assumed to fly from Belfast.
- 2019-20
 - Student commuting emissions as for 2018-19 but adjusted for COVID using the same percentage by mode reductions as used above for staff commuting.
 - Student relocation emissions estimated using student numbers by domicile.
- 2020-21

- Student commuting emissions as for 2018-19 but adjusted as above.
- Student relocation emissions are estimated using student numbers by domicile. Note that the estimates are based on registered student numbers, we do not know how many students did not travel to Southampton at all during 2020-21 due to COVID.
- 2021-22
 - Student commuting was estimated using the results of the 2022 Student Travel Survey. This methodological change may have driven some of the discontinuity and apparent increase in estimated emissions.
 - Student relocation emissions were estimated in the same way as previous years. The substantial increase in overseas students' emissions reflects post-COVID increases in overseas student registration.

Note that both student commuting and relocation emissions are likely to increase as the number of students registered at the University grows in line with our growth ambitions.

4 Overall emissions reporting summary

Combining the data reported in each of the previous sections, Figure 17 shows overall emission by Scope, excluding other reporting.

All scope emissions by category

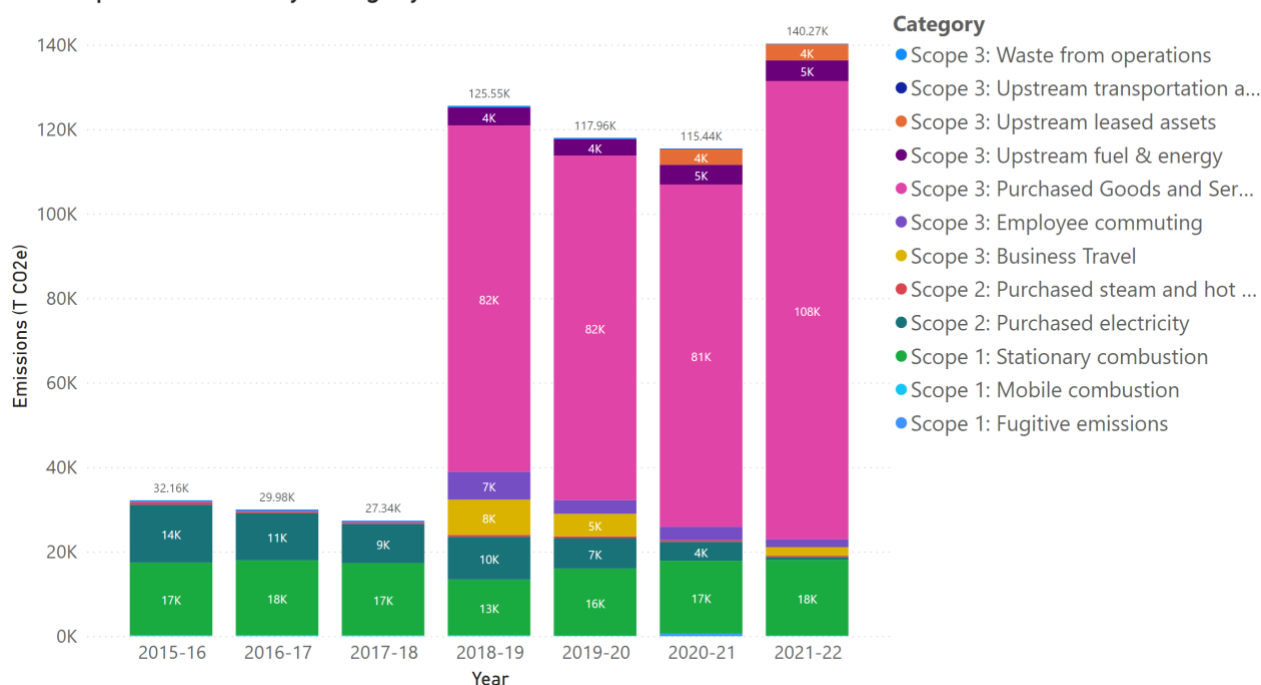


Figure 17: University of Southampton Scope 1-3 emissions by sub-category

Table 17 summarises GHG emissions by Scope (excluding 'Other reporting') for all years up to and including 2021-22. Note that change since 2015-16 has not been estimated for Scope 3 as emissions under this category were not adequately reported prior to 2018-19 and that due to rounding the values in the table may not exactly match the values in the figure.

Table 17: University of Southampton Annual totals - GHG Protocol Scopes (to nearest 100 T CO₂e)

Year	Emissions (nearest 100 T CO ₂ e)				% of Total		
	Scope 1	Scope 2	Scope 3*	Total	Scope 1	Scope 2	Scope 3
2015-16	17,400	14,300	500	32,200			
2016-17	17,900	11,500	500	29,900			
2017-18	17,300	9,600	500	27,400			

2018-19	13,400	10,600	101,600	125,600	11%	8%	81%
2019-20	16,000	7,600	94,300	117,900	14%	6%	80%
2020-21	17,800	4,800	92,800	115,400	15%	4%	80%
2021-22	18,100	1,000	121,200	140,300	13%	1%	86%
% change 2015-16 to 2021-22	4%	-93%	N/A*	N/A			
% change 2018-19 to 2021-22	35%	-91%	19%	12%			

Scope 3+ - not adequately estimated before 2018-19

N/A* Not calculated due to missing or non-comparable data

Table 18 repeats Table 17 but includes 'Other reporting' which accounted for around 18% of total emissions in 2021-22 if this wider definition is used.

Table 18: University of Southampton Scope 1-3 emissions totals (including other reporting)

	Emissions (nearest 100 T CO ₂ e)					% of total			
	Scope 1	Scope 2	Scope 3	Other	Total	Scope 1	Scope 2	Scope 3	Other
2015-16	17,400	14,300	500		32,200				
2016-17	17,900	11,500	500		29,900				
2017-18	17,300	9,600	500		27,400				
2018-19	13,400	10,600	101,600	19,000	144,600	9%	7%	70%	13%
2019-20	16,000	7,600	94,300	20,000	137,900	12%	6%	68%	15%
2020-21	17,800	4,800	92,800	12,800	128,200	14%	4%	72%	10%
2021-22	18,100	1,000	121,200	30,300	170,600	11%	1%	71%	18%
% change 2015-16 to 2021-22	4%	-93%	N/A*	N/A	N/A				
% change 2018-19 to 2021-22	35%	-91%	19%	59%	18%				

Scope 3+ - not adequately estimated before 2018-19

N/A* Not calculated due to missing or non-comparable data

Overall, the University's Scope 1, 2 and 3 emissions were estimated to be 140.3 kT CO₂e in 2021-22 with an additional 30.3 kT CO₂e under 'Other' reporting. Total emissions under Scope 1-3 increased by 12% from 2018-19 to 2021-22 due largely to increases in *Scope 1: Stationary Combustion* (gas use) and *Scope 3 Purchased Goods and Services*. This was partly balanced by decreases in *Scope 2: Purchased Electricity*, *Scope 3: Business Travel* and *Scope 3: Staff Commuting* emissions.

Scope 1 emissions (18.1 kT CO₂e) comprised 13% of total Scope 1, 2 and 3 emissions in 2021-22 having increased by 4% since 2015-16 (+35% since 2018-19). These emissions were dominated by emissions from the University's gas-fuelled combined heat and power plant (CHP) and other boilers. Although our estate size has grown, Scope 1 emissions have remained largely unchanged since 2015-16 with major fluctuation depending on the operational status of the CHP (see Figure 18) which also generates up to 50% of the electricity we use (see Figure 19).

Scope 2 emissions (1 kT CO₂e) comprised 1% of total Scope 1, 2 and 3 emissions in 2021-22 having declined by 93% since 2015-16 (-91% since 2018-19) due to grid decarbonisation, demand reduction due to energy efficiency projects (see Figure 19) and our switch to a renewable energy tariff at the end of 2020-21.

Scope 3 emissions (121.2 kT CO₂e) comprised 86% of total Scope 1, 2 and 3 emissions in 2021-22 having increased by 19% since 2018-19. These were dominated by ~108 kT CO₂e of supply chain emissions from *Scope 3: Purchased Goods and Services* which showed an increase of 32% from 2018-19 due to growth and post-COVID rebound. Emissions from *Scope 3: Staff Commuting* in 2021-22 (1.9 kT CO₂e) were estimated to have fallen by 71% since 2018-19 due to 'new normal' post-COVID working practices while *Scope 3: Business Travel* emissions (2.0 kT CO₂e) were still 76% below 2018-19 (pre-COVID) levels.

Additional 'other' emissions (30.3 kT CO₂e) increased by 59% from 2018-19 levels and were dominated by overseas student relocation (23.9 kT CO₂e) which increased by 78% from 2018-19.

5 Future reporting plans

We intend to update our emissions reporting in Q1 2024 to add estimates of emissions for the academic year 2022-23. This cycle of reporting will then be repeated on an annual basis. Future reporting is likely to take account of the EUAC's proposed Standardised Carbon Emissions Framework (SCEF¹³).

In addition, we have launched an [emissions reporting dashboard](#) which will be updated annually in line with this reporting cycle.

6 Feedback

If you have any comments or feedback on this report, please contact us:

- in confidence via sustainability@soton.ac.uk
- or if you are a member of our staff and student community you are welcome to start a discussion via our [yammer group](#)¹⁴

7 Code

This report was partly created using quarto and R in RStudio and the code used to produce it is available for inspection by registered users at https://git.soton.ac.uk/sig/goal_2/emissionsReporting/.

Packages used:

- quarto (Allaire 2022)
- data.table (Dowle et al. 2015)
- flextable (Gohel and Skintzos 2022)
- ggplot2 (Wickham 2009)
- here (Müller 2017)
- lubridate (Grolemund and Wickham 2011)

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¹³ <https://www.eauc.org.uk/scef>

¹⁴ <https://web.yammer.com/main/groups/eyJfdHlwZSI6Ikd5b3VwIiwiaWwWQjoiOiI2ODMxNzI1SODY4OCj9/dll>

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9 Annex

9.1 Emissions factors (2021/22)

The majority of the emissions factors used in the calculation of the 2021/22 emissions were sourced from the UK Government factors for 2022¹⁵. The factors for 2022 are used because the majority of the 2021/22 academic year falls in 2022 (as per Government guidance).

Notes:

- The calculation of emissions from Scope 3: Purchased Goods and Services was carried out by and is embedded within the HESCET tool. These provide emissions per unit for an extremely large number of different goods and services reflecting the heterogeneity of the supply chain.
- The calculation of emissions for Scope 3: Business Travel is embedded within the Clarity system and is provided pre-calculated to the University. Clarity use the same UK Government source for UK emissions factors include the effect of radiative forcing but do not yet include all upstream fuel (WTT) emissions.

9.2 Detailed emissions reporting

In the following tables NA represents missing (not calculated) or not applicable data.

9.2.1 Scope 1 detail

Table 20 shows Scope 1 emissions by category for all years.

Table 19: University of Southampton Scope 1 & 2 over time (to nearest 100 T CO₂e)

Year	Scope 1: Fugitive emissions	Scope 1: Mobile combustion	Scope 1: Process emissions	Scope 1: Stationary combustion	Total
2015-16	0	200	0	17200	17400
2016-17	0	200	0	17700	17900
2017-18	0	200	0	17100	17300
2018-19	0	200	0	13200	13400
2019-20	0	100	0	15900	16000
2020-21	500	100	0	17200	17800
2021-22	0	100	0	17900	18100

9.2.2 Scope 2 detail

Table 20 shows Scope 2 emissions only by category for all years.

Table 20: University of Southampton Scope 2 over time (to nearest 100 T CO₂e)

Year	Scope 2: Purchased electricity	Scope 2: Purchased steam and hot water	Total
2015-16	13700	500	14300
2016-17	11200	300	11500
2017-18	9300	300	9600
2018-19	10100	400	10600
2019-20	7200	400	7600
2020-21	4500	300	4800

¹⁵ <https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting>

2021-22	700	300	1000
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9.2.3 Scope 3 detail

Table 21 shows Scope 3 emissions by category for all years where available.

Table 21: University of Southampton Scope 3 emissions over time (to nearest 100 T CO₂e)

Year	Scope 3: Business Travel	Scope 3: Employee commuting	Scope 3: Purchased Goods and Services	Scope 3: Upstream fuel & energy	Scope 3: Upstream leased assets	Scope 3: Upstream transportation and distribution	Scope 3: Waste from operations	Total
2015-16	NA	NA	200	NA	NA	NA	300	500
2016-17	NA	NA	200	NA	NA	NA	300	500
2017-18	NA	NA	200	NA	NA	NA	300	500
2018-19	8300	6600	82000	4200	NA	100	400	101600
2019-20	5300	3200	81600	3800	NA	100	300	94300
2020-21	100	3200	81000	4700	3700	100	100	92800
2021-22	2000	1900	108500	4900	3800	0	200	121200

9.2.4 Other reporting detail

Table 22 shows 'Other reporting' emissions by category for all years where available.

Table 22: University of Southampton Other reporting emissions over time (to nearest 100 T CO₂e)

Year	Other reporting: Student commuting	Other reporting: Student relocation (O/S)	Other reporting: Student relocation (UK)	Total
2018-19	2200	13400	3400	19000
2019-20	900	16000	3000	19900
2020-21	900	8700	3100	12700
2021-22	3300	23900	3100	30300

9.3 Energy use over time

This section reports activity (energy use) data to provide context for the Scope 1 and Scope 2 emissions reporting sections in the main body of the report.

Figure 18 shows the University's use of gas since 2015/16 for all estate excluding the Science Park (USSP Ltd). The plot reflects the discussion of reductions in [Scope 1: Stationary combustion](#) emissions in 2018/19 due to maintenance and their subsequent suppression by COVID lockdowns in 2019/20.

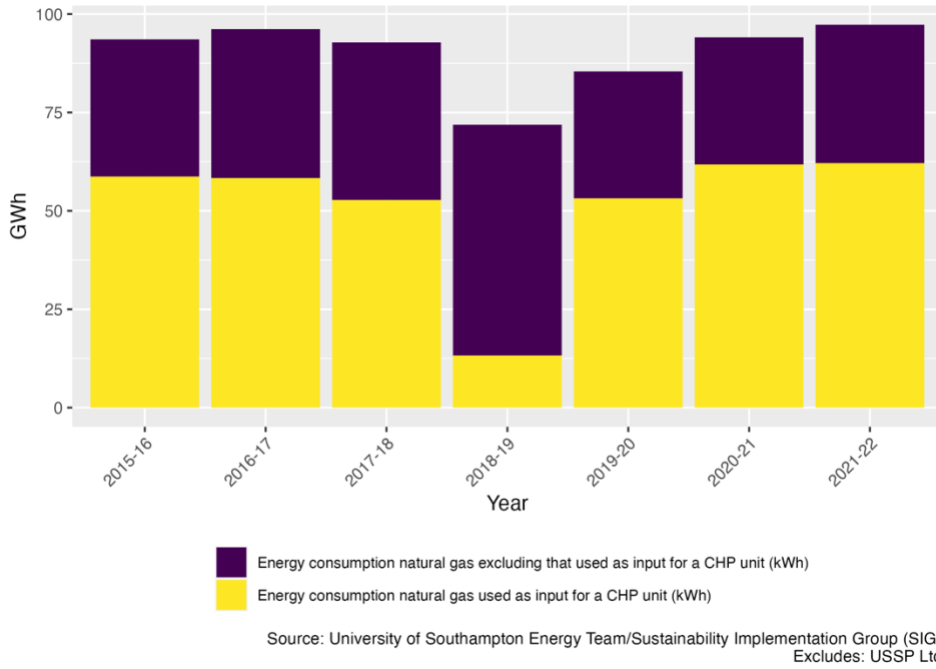


Figure 18: University of Southampton natural gas use over time (Source: HESA - <https://www.hesa.ac.uk/data-and-analysis/estates>)

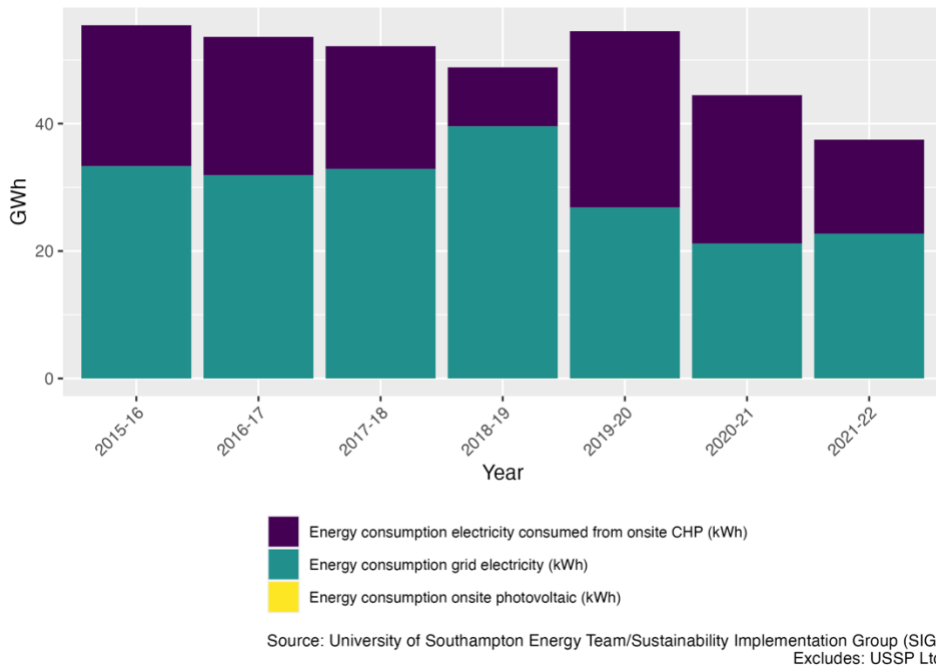


Figure 19: University of Southampton electricity use over time (Source: HESA <https://www.hesa.ac.uk/data-and-analysis/estates>)

Figure 19 shows the University’s use of electricity over time for all estate since 2015/16 excluding the Science Park (USSP Ltd). The plot reflects the discussion of trends in *Scope 2: Purchased electricity* emissions with respect to overall energy use reduction trends both before and also as a result of COVID. The exception was 2018/19 when the CHP was unable to provide as much onsite electricity generation due to maintenance.