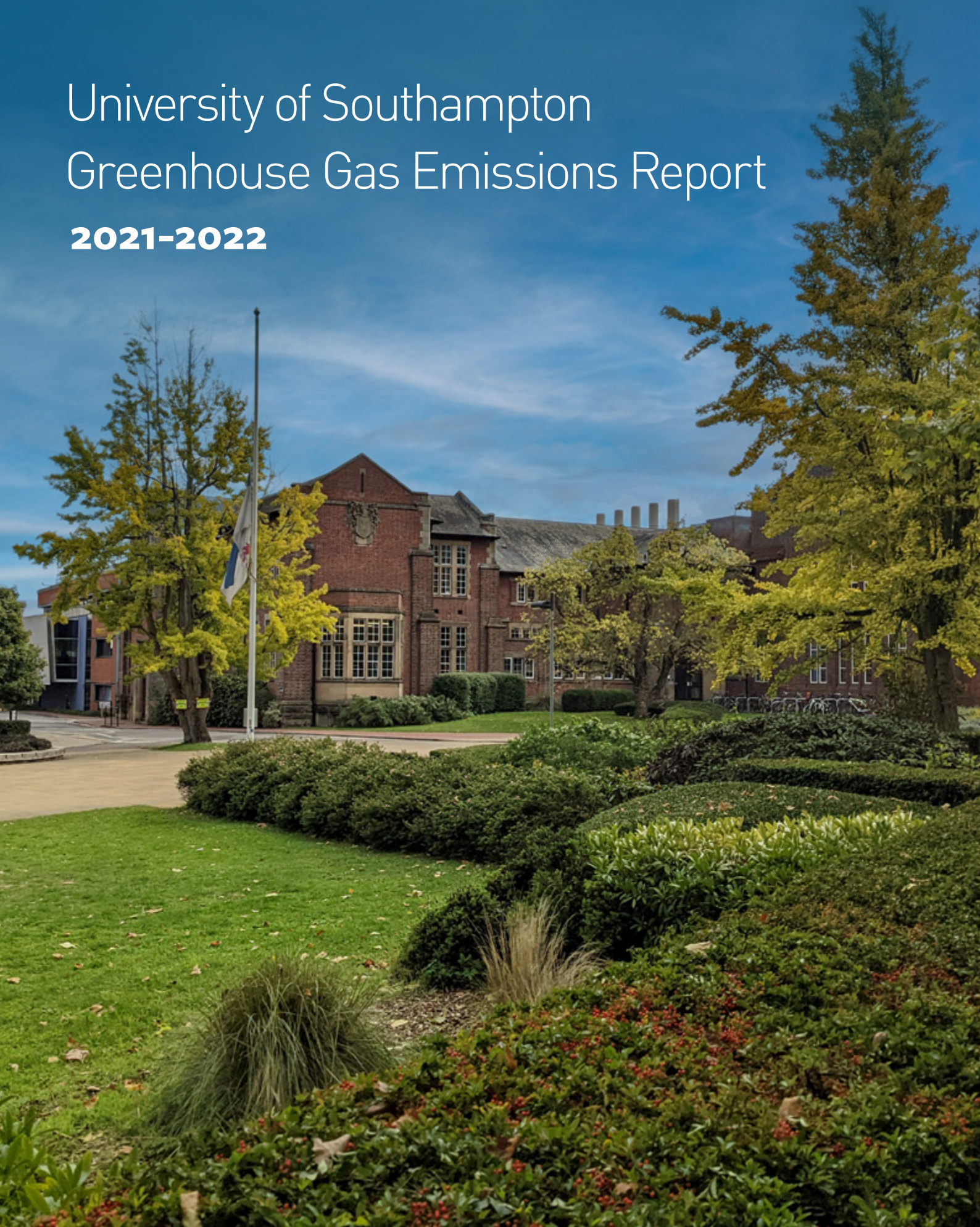
University of Southampton

University of Southampton Greenhouse Gas Emissions Report

2021-2022



FOREWORD

The University's Sustainability Strategic Plan is one of ten Plans which underpin and drive forward the overall University Strategy and reducing our emissions is a critical part of that Strategy. As a university, our overall goal is to achieve net zero emissions for Scopes 1 and 2 by 2030 and for Scope 3 by 2045. I am therefore pleased to present the second of our annual reports into the current status of our greenhouse gas emissions. This report summarises trends in the University's Scope 1, 2 and 3 emissions up to and including the 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.

As in 2020-21, thanks to the combined work of the Sustainability Implementation Group (SIG), staff and students, the University understands the challenges and, through its current planning and processes, remains in a strong position to deliver on the Goals embedded in the Sustainability Strategic Plan despite increases in some of our emissions. The University is also working with civic and other stakeholders in Southampton to link ambitions and knowledge sharing to address wider city net-zero aspirations.

The University's Scope 1, 2 and 3 emissions were estimated to be 140.3 kT CO_2e in 2021-22 with a further 30.3 kT CO_2e of other emissions. Total emissions under Scope 1-3 increased by 12% from 2018-19 to 2021-22 due largely to increases in Scope 1: Stationary Combustion and Scope 3: Purchased Goods and Services as post-COVID activity levels increased. This was partly balanced by substantial reductions in:

- → **Scope 2:** Purchased Electricity (-94% since 2018-19)
- → **Scope 3:** Business Travel (-76%)
- → **Scope 3:** Staff Commuting (-71%)

While Scope 2 emissions have fallen by 93% since 2015-16, Scope 1 emissions remain a significant challenge and the University will be closely monitoring its milestones for all Sustainability Strategic Plan goals as new post-COVID norms of business travel, commuting and space use are established.

The milestones to ensure the University achieves net zero emissions for Scopes 1 and 2 by 2030 include eliminating the use of gas, refurbishing buildings to reduce their energy demand and switching to renewable electricity supply which was completed in June 2021. The University's Sustainability Strategic Plan also has plans in place to reduce our Scope 3 emissions by carefully managing our service usage and procurement as well as working with our suppliers to reduce their own emissions.

We are confident that the Sustainability Strategic Plan will continue to help us to address the considerable challenge of decoupling emissions from growth as we seek to implement the University's wider strategic ambitions while progressing towards our 2030 and 2045 net zero emissions objectives.

Professor Phillip Wright
Senior Vice-President (Academic) and
University Executive Board Champion, Sustainability Strategic Plan

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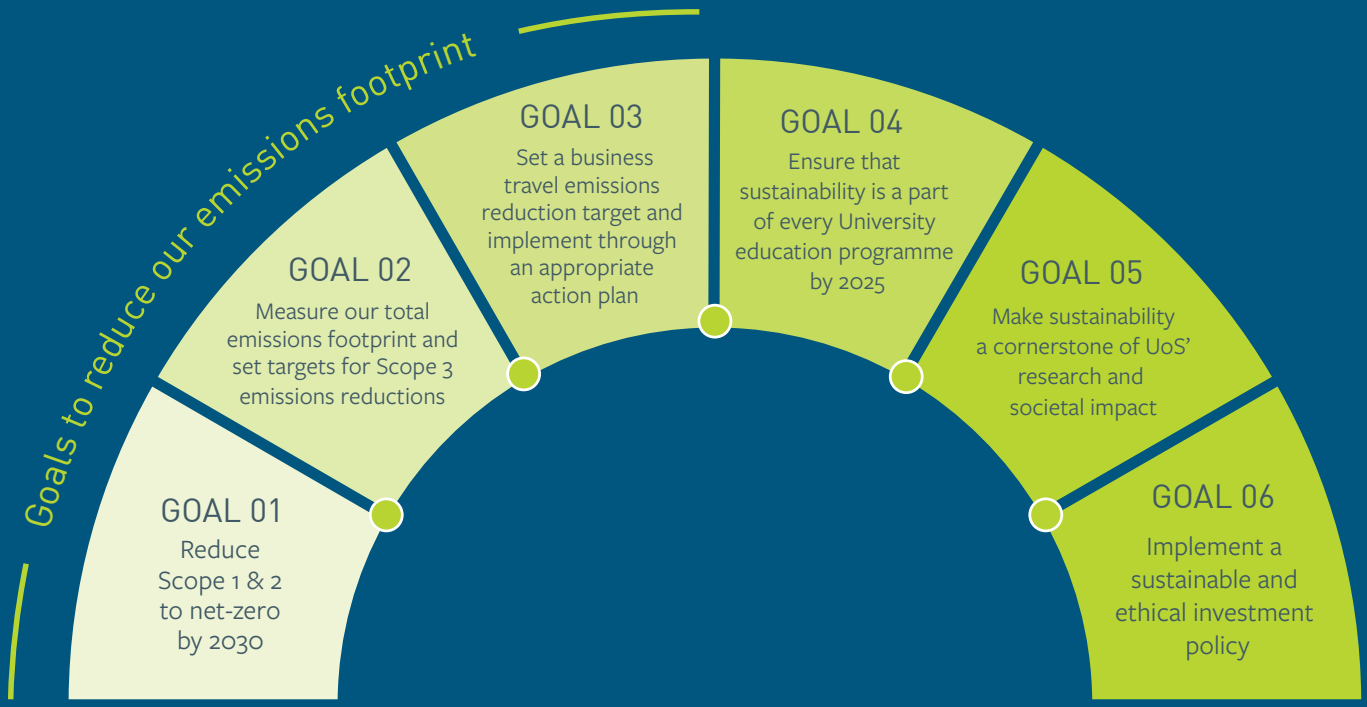
INTRODUCTION

This report provides an updated summary of the University's Scope 1, 2 and 3 emissions from 2015-16 to 2021-22 using the internationally recognised Greenhouse Gas (GHG) Protocol emissions accounting method. It builds on our initial report which updated the original Sustainability Strategic Plan estimates for 2018-19 using the same methodology.

The University of Southampton's Sustainability Strategic Plan[1] sets out six goals.



The report therefore contributes to Goal 1 (reduce Scope 1 and 2 emissions), Goal 2 (measure total emissions), Goal 3 (reduce business travel emissions) and Goal 6 (sustainable investments).

GHG Protocol Scopes are defined as:

- **Scope 1:** emissions 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 that are due to purchased or acquired electricity, steam, heat and cooling.
- **Scope 3:** 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 which are not included under Scope 1-3 but which the University may opt to report – such as student commuting and relocation.

Emissions are reported as CO_2e – carbon dioxide equivalent units. This enables the reporting of emissions from non-CO_2 sources which have different warming potentials than CO_2. The full methodology and more detailed emissions reporting can be found in our accompanying Technical Report[2].

In general, we now have relatively complete emissions estimates for the major Scope 1, Scope 2, and applicable Scope 3 categories as well as for the other emissions the University has opted to report.

[1] www.southampton.ac.uk/susdev/our-approach/sustainability-strategy.page
[2] https://eprints.soton.ac.uk/477075/

SCOPE 1: SUMMARY

Scope 1 emissions are produced by fuel combustion on site such as gas boilers, fleet vehicles; from fugitive emissions such as air-conditioning, refrigeration or pipework leaks and from physical or chemical processes. We do not currently have an estimate of process emissions.

Figure 1 shows Scope 1 emissions over time while Table 1 reports the latest estimates and an indicator of change since the 2018-19 baseline where applicable.

Figure 1: *University of Southampton Scope 1 emissions estimates*

Table 1: *University of Southampton Scope 1 emissions*

Indicator	Stationary Combustion	Mobile combustion	Fugitive emissions	Total
Latest total (T CO_2e, 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

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

Overall, Scope 1 emissions (18.06 kT CO_2e) comprised 13% of Scope 1, 2 and 3 emissions in 2021-22 (See Table 8) having remained roughly constant over time (4% increase since 2015-16) even though overall estate size has increased. This is due to implemented 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 Scope 1 emissions.

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.

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

2021-22 saw a return to full operations and returned gas use to pre-COVID levels. Although Stationary Combustion appears to have increased by 36% since 2018-19 this is because gas use was much lower than usual in 2018-19. As Figure 1 shows, 2021-22 was in fact only marginally higher than 2015-16 despite having a larger estate.

Fugitive emissions in 2021-22 were considerably lower due to the use of accurate records of refrigerant volumes that needed to be replaced.

Scope 1 emissions reduction is currently being addressed through the University's Sustainability Strategic Plan Goal 1 to achieve net zero Scope 1 and 2 emissions by 2030 and the implementation of the Estates and Infrastructure Strategic Plan.

SCOPE 2: SUMMARY

Scope 2 emissions are due to purchased electricity, steam, heat, and cooling.

Figure 2 shows Scope 2 emissions over time while Table 2 reports the latest estimates and indication of change since the 2018-19 baseline where applicable. Overall, Scope 2 emissions (0.962 kT CO_2e) comprised 0.7% of total Scope 1, 2 and 3 emissions in 2021-22 having reduced by 93% since 2015-16. This was almost entirely driven by the ongoing decarbonisation of the electricity supply grid, reductions in electricity use through energy efficiency projects and the switch to a renewable electricity tariff in 2020-21[3].

Figure 2: *University of Southampton Scope 2 emissions*

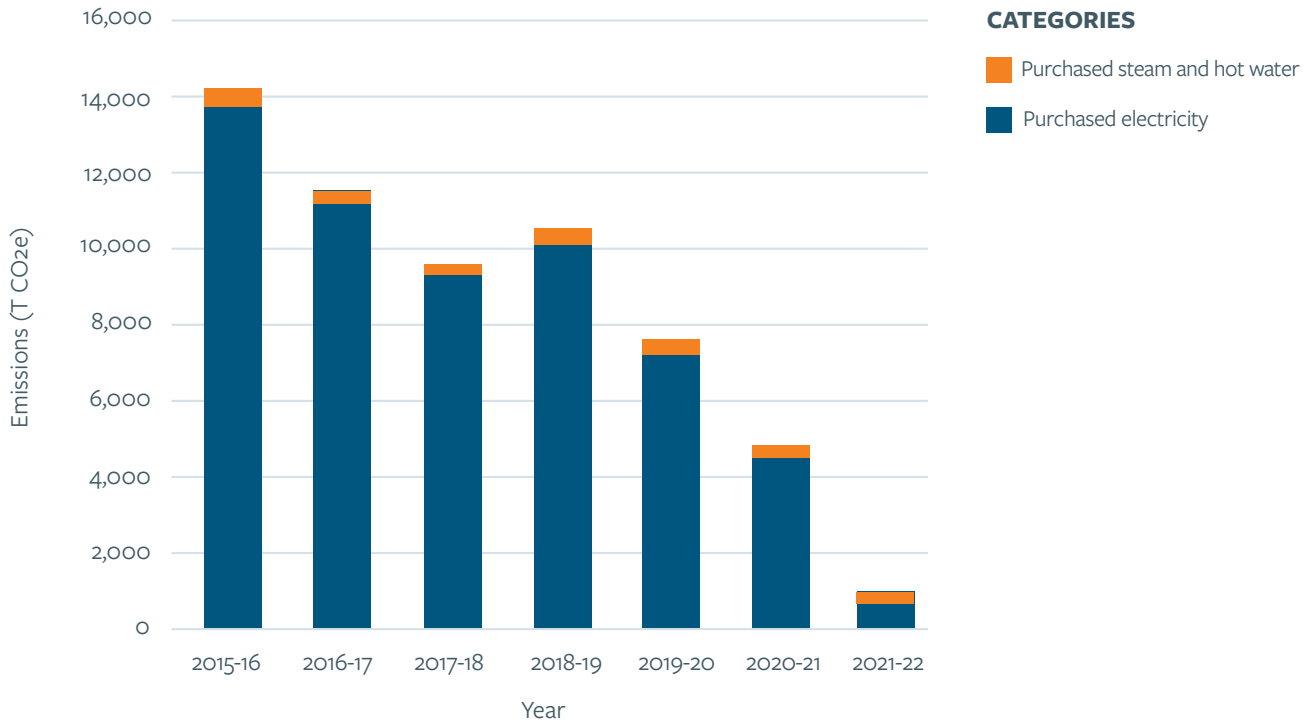


Table 2: *University of Southampton Scope 2 emissions*

Indicator	Purchased electricity	Purchased steam and hot water	Total
Latest total (T CO_2e, 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 up to 50% of the electricity used by the University, was only partially operational. The University therefore had to buy more electricity from the grid.

In 2019-20 the CHP returned to normal use resulting in a decline in purchased electricity compounded by the COVID-19 pandemic.

2020-21 saw a return to near 'normal' operations while 2021-22 saw increased post-COVID occupancy across all halls and sites. As a result, overall electricity purchase from the grid was higher in 2021-22 than 2020-21 although there was a substantial reduction at the Astro House data centre.

However, the switch to a renewable electricity tariff took effect in June 2021 meaning there were zero emissions due to purchased electricity in 2021-22 for the main University estate. This tariff does not include the University of Southampton Science Park (USSP) so there are residual purchased electricity emissions from USSP Ltd.

[3] See https://www.southampton.ac.uk/blog/sussed-news/2021/10/20/university-switches-to-renewable-energy-electricity-contract/

SCOPE 3: SUMMARY

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 and cover the categories listed in Table 3. Not all of these categories are relevant to university operations and where this is the case they are not estimated or reported.

Table 3: *Scope 3 categories*

Upstream emissions		Downstream emissions	
3.1: Purchased goods and services	Estimated[4], does **not** include services reported in other categories such as Business Travel and Waste from Operations	3.9: Downstream transportation and distribution	considered not applicable
3.2: Capital goods	Estimated - included in purchased goods and service reporting	3.10: Processing of sold products	considered not applicable
3.3: Upstream fuel & energy (non-Scope 1 & 2)	Emissions released during the production and distribution of the energy use reported under Scope 1 & 2; calculated	3.11: Use of sold products	considered not applicable
3.4: Upstream transportation and distribution	Included in purchased goods and service reporting	3.12: End-of-life treatment of sold products	considered not applicable
3.5: Waste generated in operations	Calculated	3.13: Downstream leased assets (operation)	the University's Science Park is our only downstream leased asset and emissions are included in Scope 1 and 2 above
3.6: Business travel	Calculated	3.14: Franchises (operation)	considered not applicable
3.7: Employee commuting	Estimated	3.15: Investments (operation)	applicable but we do not yet have estimates that can be reported
3.8: Upstream leased assets	Estimated emissions due to usage of university space leased at/by UHS/SGH, NOCS and the Malaysian Campus		

Figure 3 shows Scope 3 emissions over time (where estimated) while Table 4 reports the latest estimates and an indicator of change since the 2018-19 baseline where applicable.

Note that Upstream transport & distribution are excluded as they are included in the Purchased Goods and Services expenditure-based estimates. Employee commuting for 2019-20 and 2020-21 was based on estimates from pre-COVID Travel Surveys with suitable COVID-year adjustments. In 2021-22 these estimates were based on the 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.

[4] Estimated via the expenditure-based HESCET tool https://www.sustainabilityexchange.ac.uk/hescet_tool.
Scope 3 emissions categories are reported rounded to the nearest 100 Tonnes CO_2e to avoid assumptions of over-precision.

SCOPE 3: SUMMARY (CONTINUED)

Figure 3: *University of Southampton Scope 3 emissions*

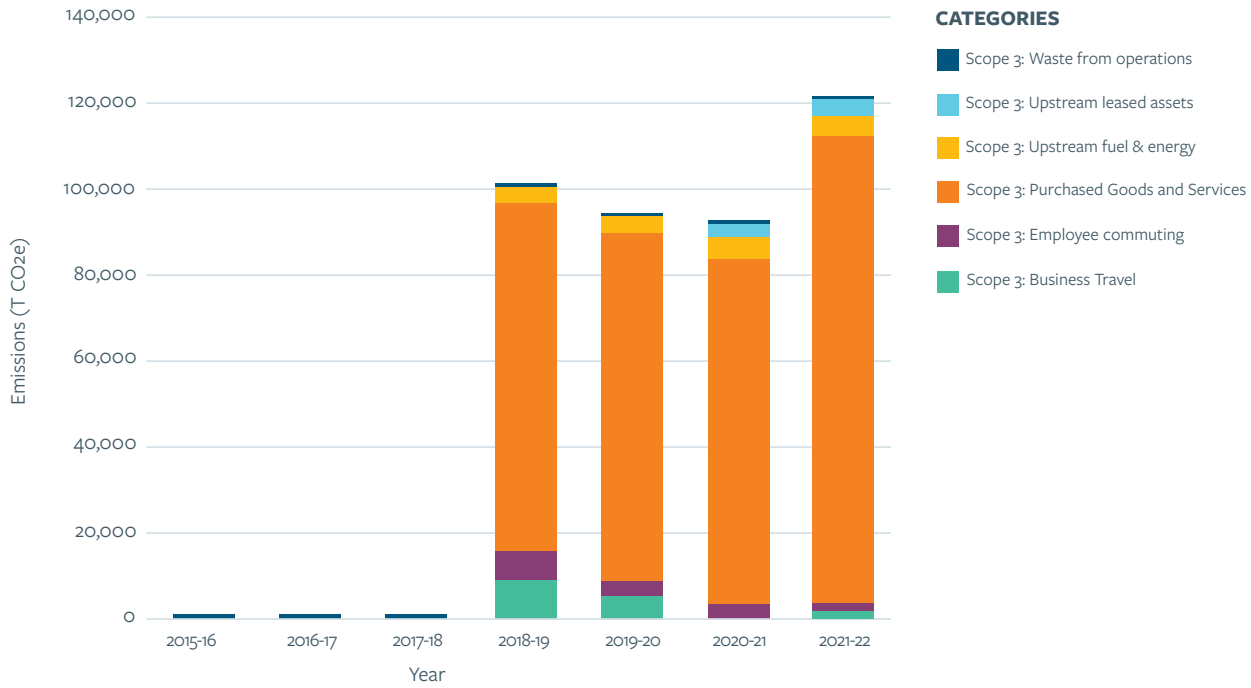


Table 4: *Selected University of Southampton Scope 3 emissions categories*

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_2e, 2021-22)	108,500	4,912	160	2,037	1,900	3,800	121,200
Change since 2015-16 (% difference)	N/A	N/A	-51.5	N/A	N/A	N/A	N/A
Change since 2018-19 baseline (% difference)	32.3	16.9	-55.6	-75.6	-71.2	N/A	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 CO_2e) have risen by 19% since 2018-19. The majority of this increase was due to an increase in estimated emissions from Purchased Goods & Services (+32% from baseline) despite substantial sustained reductions in emissions from Waste (-56%), Business Travel (-76%) and Employee Commuting (-71%). Analysis of the 2022 Travel Survey suggests that a significant proportion of staff are now more regularly working from home which has driven the large reduction in these commuting emissions.

Given the size of their contribution we report emissions from Purchased Goods and Services and Business Travel in detail in the next sections.

Scope 3 emissions reduction is currently being addressed through the University's Sustainability Strategic Plan Goal 2 with a target of net zero Scope 3 emissions by 2045 in line with Science Based Targets.

SCOPE 3: PURCHASED GOODS AND SERVICES

Supply chain emissions due to purchased goods and services are the largest contributor to Scope 3 and indeed the largest contributor to overall GHG emissions of the University (see Figure 7).

Figure 4 shows the breakdown of these emissions by sub-category. It is important to understand that these estimated emissions are based on a conversion from expenditure on these sub-categories to emissions using the HESCET tool. The mapping between procurement expenditures and conversion factors is based on academic and UK Government modelling. As a result, they are indicative rather than exact. The emissions estimates should therefore be viewed with caution and significant changes should be carefully checked to ensure they are not artefacts of the categorisation and conversion method.

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 CO_2e respectively in 2018-19, were essentially absent in 2019-20 and 2020-21 largely due to COVID restrictions.

Overall, Purchased Goods and Services emissions increased by around 32% between 2018-19 and 2021-22 driven by return to 'normal' post-COVID operations and University growth. Increases were seen in most sub-categories, especially Medical & precision implements (+ 11 kT CO_2e since 2020-21), Business Services (+ 8 kT CO_2e since 2020-21), and Other manufactured products (+6 kT CO_2e since 2020-21).

Figure 4: *University of Southampton Scope 3: Purchased Goods & Services emissions*

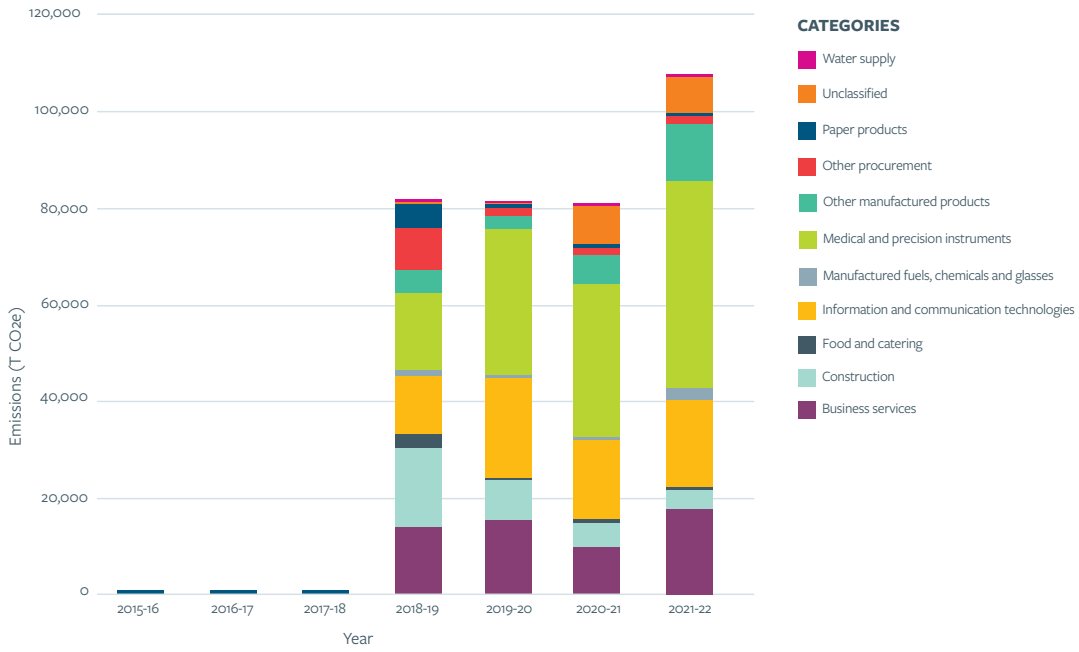


Table 5: *University of Southampton Scope 3: Purchased Goods & Services emissions*

Statistic	Value (rounded to nearest 100 T)
Latest total (to nearest 100 T CO_2e, 2021-22)	108,500
Change since 2015-16 (% difference)	Not applicable
Change since 2018-19 baseline (% difference)	32.3

In the future 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.

SCOPE 3: BUSINESS TRAVEL

Business travel emissions were estimated from the Clarity travel management system and are limited to flights, rail and hotel bookings made using the system. The emissions take account of type and class of flight as well as radiative forcing factors but do not yet include full well-to-tank factors.

All other forms of business travel, including where travel is re-imbursed via expenses is therefore currently excluded. The values reported are therefore likely to be under-estimates of total business travel emissions.

Figure 5: *University of Southampton Scope 3: Business Travel emissions*

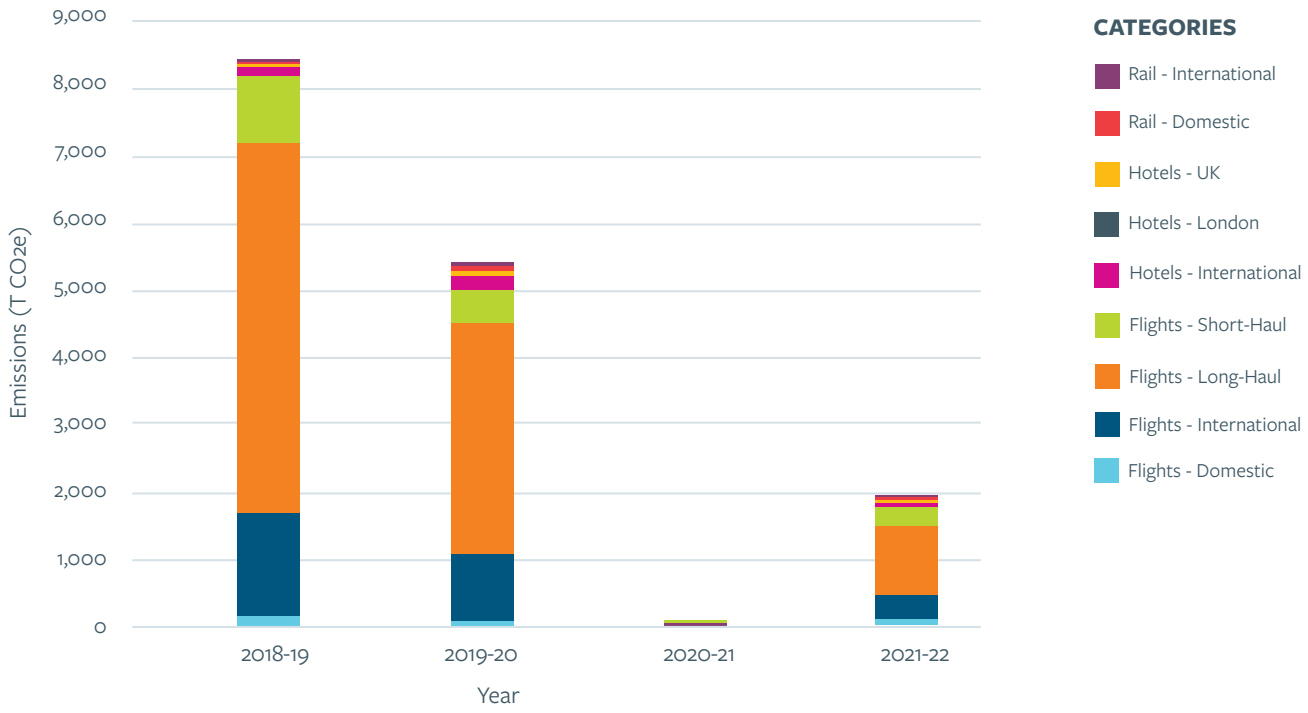


Table 6: *University of Southampton Scope 3: Business Travel emissions*

Statistic	Value
Latest total (T CO_2e, 2021-22)	2,037
Change since 2015-16 (% difference)	Not applicable
Change since 2018-19 baseline (% difference)	-75.6

Figure 5 shows how these emissions have changed over time. Clearly international (between non-UK destinations) and UK long-haul/short haul flights comprised the majority of the University's business travel emissions in 2018-19.

2019-20 was the first year to be impacted by COVID travel restrictions from March 2020 and the effect on flights in particular is clear. Business travel in 2020- 21 essentially stopped, at least from an emissions perspective, with business travel emissions falling by over 99% from 2018-19 to 2020-21.

2021-22 saw the re-emergence of post-COVID business travel but under 'new normal' work practices with substantially reduced international and long-haul flights. More detailed analysis suggests this is due to substantial reductions in long-distance travel for conferences. There have also been reductions in rail travel for UK business meetings, but this had relatively little impact on emissions. The extent to which the COVID-19 experience permanently shifts University business travel patterns will determine the future actions required to reduce ongoing emissions.

Scope 3 Business Travel emissions reduction is currently being addressed through the University's Sustainability Strategic Plan Goal 3 with a target of net zero Business Travel emissions by 2045 and a higher ambition of net zero by 2030.

OTHER REPORTING SUMMARY

This section reports on emissions that are outside the GHG Protocol Scopes but which the University has opted to report from 2018-19 onwards.

Student relocation emissions were estimated using student numbers by country of domicile and assumed one return trip per year. Overseas 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. We do not know how many registered students actually travelled to Southampton during 2020-21 due to COVID so these emissions may be over-estimated. The substantial increase in overseas students' emissions in 2021-22 reflects post-COVID increases in overseas student registration.

Student commuting emissions in 2019-20 and 2020-21 were derived from the same source as the Employee commuting emissions. These were adjusted for COVID by assuming a similar reduction in student commuting. In 2021-22, student commuting emissions were estimated using the 2022 Student Travel Survey. This methodological change may have driven some of the discontinuity and apparent increase in estimated emissions.

Figure 6: *University of Southampton other emissions reporting over time*

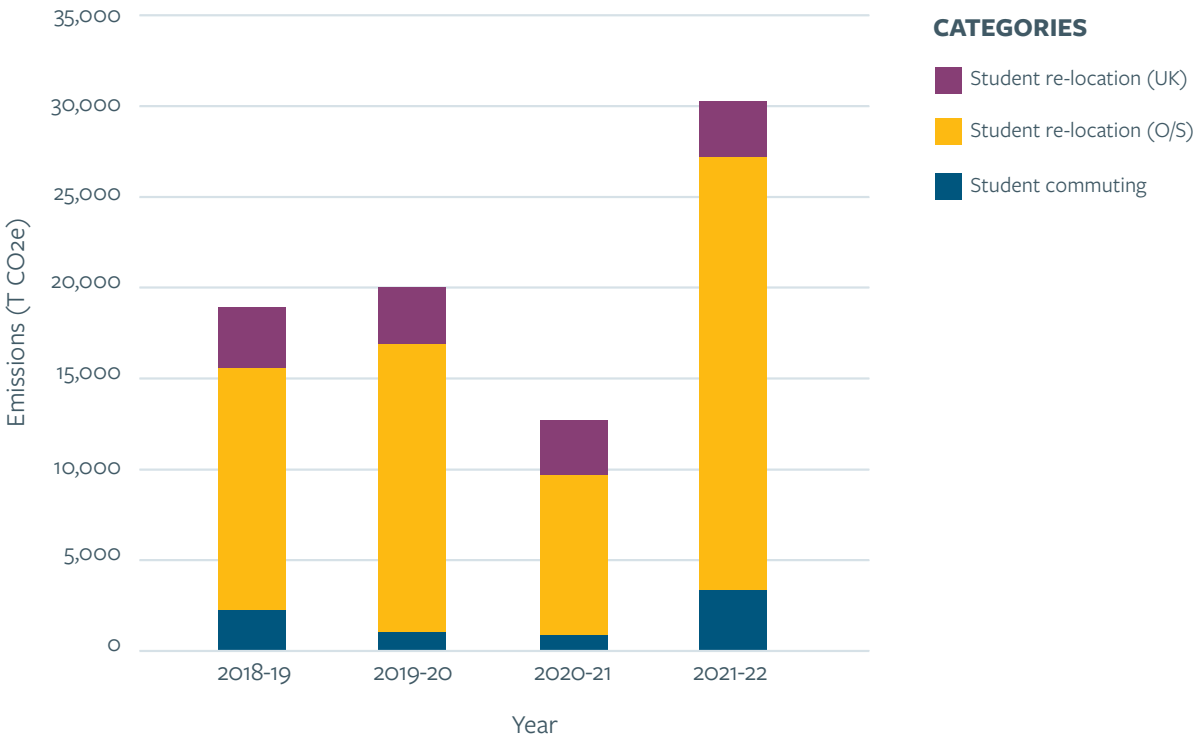


Table 7: *University of Southampton other emissions reporting*

Statistic	Student commuting	UK student relocation	O/S student relocation	Total
Latest total (to nearest 100 T CO_2e, 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%

ALL SCOPES EMISSIONS

Combining the data reported in each of the previous sections, Figure 7 reports overall emissions by Scope, excluding 'Other reporting'. Overall, the University's Scope 1, 2 and 3 emissions were estimated to be 140.3 kT CO_2e in 2021-22. Total emissions under Scope 1-3 increased by 12% from 2018-19 to 2021-22 due 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.

Figure 7: *University of Southampton Scope 1-3 emissions by sub-category*

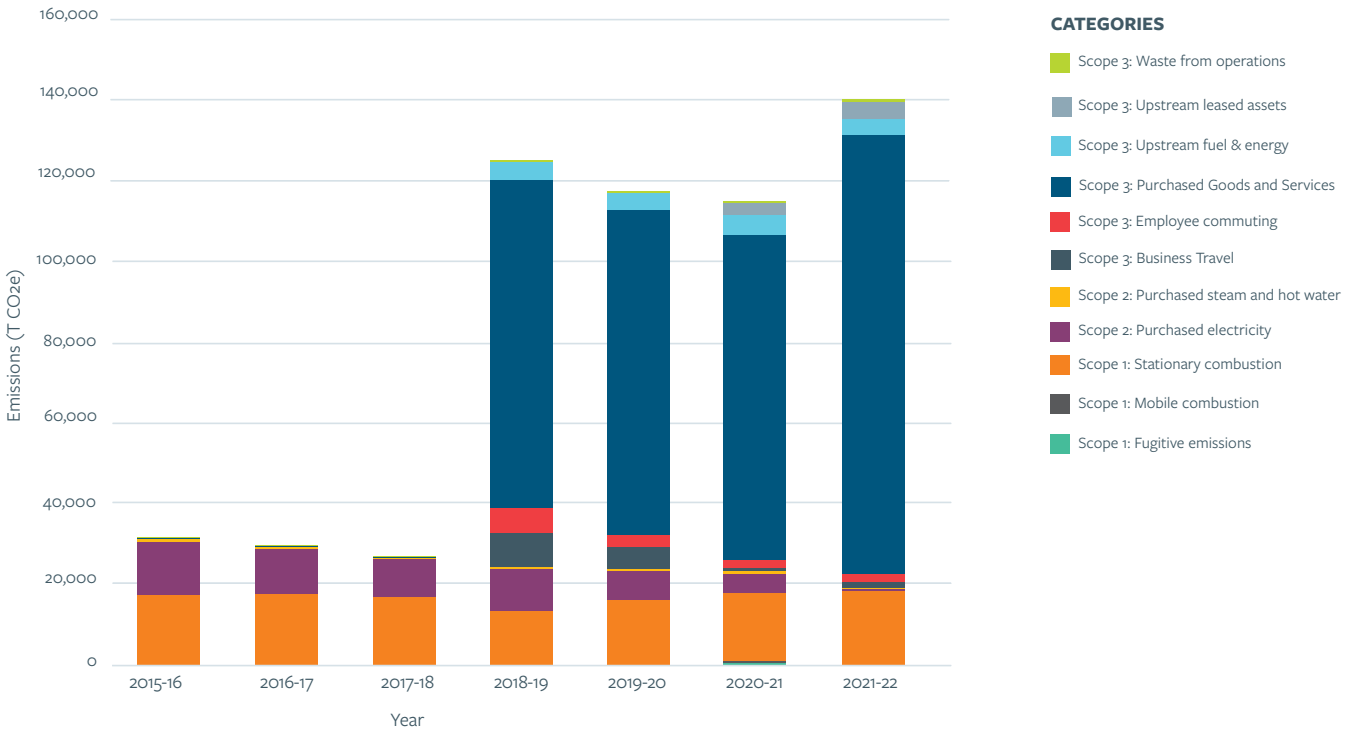


Table 8 summarises Scope 1 to 3 over time showing that Scope 3 generally contributes ~80% of total GHG Protocol emissions. Scope 1 and 2 comprise ~ 20% of emissions. As noted above the 35% rise in Scope 1 emissions since 2018-19 was driven by the return to full use of the gas CHP while the 91% reduction in Scope 2 emissions was driven by grid decarbonisation, reductions in energy use and the switch to a renewable electricity tariff.

If 'Other reporting' emissions are included, the total emissions of the University for 2021-22 were 170,600 T CO_2e, with 'Other reporting' comprising ~18% of this wider total.

Table 8: *University of Southampton Annual totals - GHG Protocol Scopes (to nearest 100 T CO_2e)*

	T CO_2e (nearest 100)				% of Total		
Year	**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*

SUMMARY

Scope 1 emissions (18.1 kT CO_2e) 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 fluctuations depending on the operational status of the CHP which also generates up to 50% of the electricity we use.

Scope 2 emissions (1 kT CO_2e) 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 and our switch to a renewable energy tariff at the end of 2020-21.

Scope 3 emissions (121.2 kT CO_2e) 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 CO_2e 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 CO_2e) 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 CO_2e) were still 76% below 2018-19 levels.

Additional 'other' emissions (30.3 kT CO_2e) increased by 59% from 2018-19 levels and were dominated by overseas student relocation (23.9 kT CO_2e) which increased by 78% from 2018-19.

The University's Sustainability Strategic Plan understands the challenges of achieving its six Goals and has established concrete milestones to ensure it achieves net zero emissions for Scopes 1 and 2 by 2030 and Scope 3 by 2045. These include eliminating the use of gas, refurbishing buildings to reduce their energy demand, switching to renewable electricity supply (which was completed in June 2021), carefully managing our procurement and service usage and working with our suppliers to reduce their own emissions.

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.

FEEDBACK

If you have any comments or feedback on this report, please contact us in confidence via **sustainability@soton.ac.uk**

If you are a member of our staff and student community, you are welcome to start a discussion via our yammer group[5].

Find out more:
Scan the QR code

GLOSSARY

Downstream

Lifecycle emissions from the distribution or use of a good or service sold by the University or from its investments. Downstream emissions are generally not applicable to the University.

HESCET

The Higher Education Supply Chain Emissions tool (HESCET) estimates Scope 3 emissions using expenditure against a set of expenditure codes, mapped to a defined list of DEFRA categories for which conversion factors – converting £ value to Kg CO_2e emissions - are allocated. For more information see https://www.sustainabilityexchange.ac.uk/hescet_tool

kT CO_2e

1000 tonnes carbon dioxide equivalent

Upstream

Lifecycle emissions from the production of a good or service purchased by the University. For example, Upstream fuel & energy emissions are emissions from the production or generation of the fuel before it reaches the University.

[5] web.yammer.com/main/groups/eyJfdHlwZSI6Ikdyb3VwIiwiaWQiOiI2ODMxNzI5ODY4OCJ9/all

Sustainability Implementation Group

The Sustainability Implementation Group was formulated as part of the Sustainability Strategic Plan. Its task is to oversee and co-ordinate the delivery of the University's six Sustainability Goals.

Authors:

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Find out more:

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Or visit: www.southampton.ac.uk/susdev/our-approach/sustainability-strategy.page