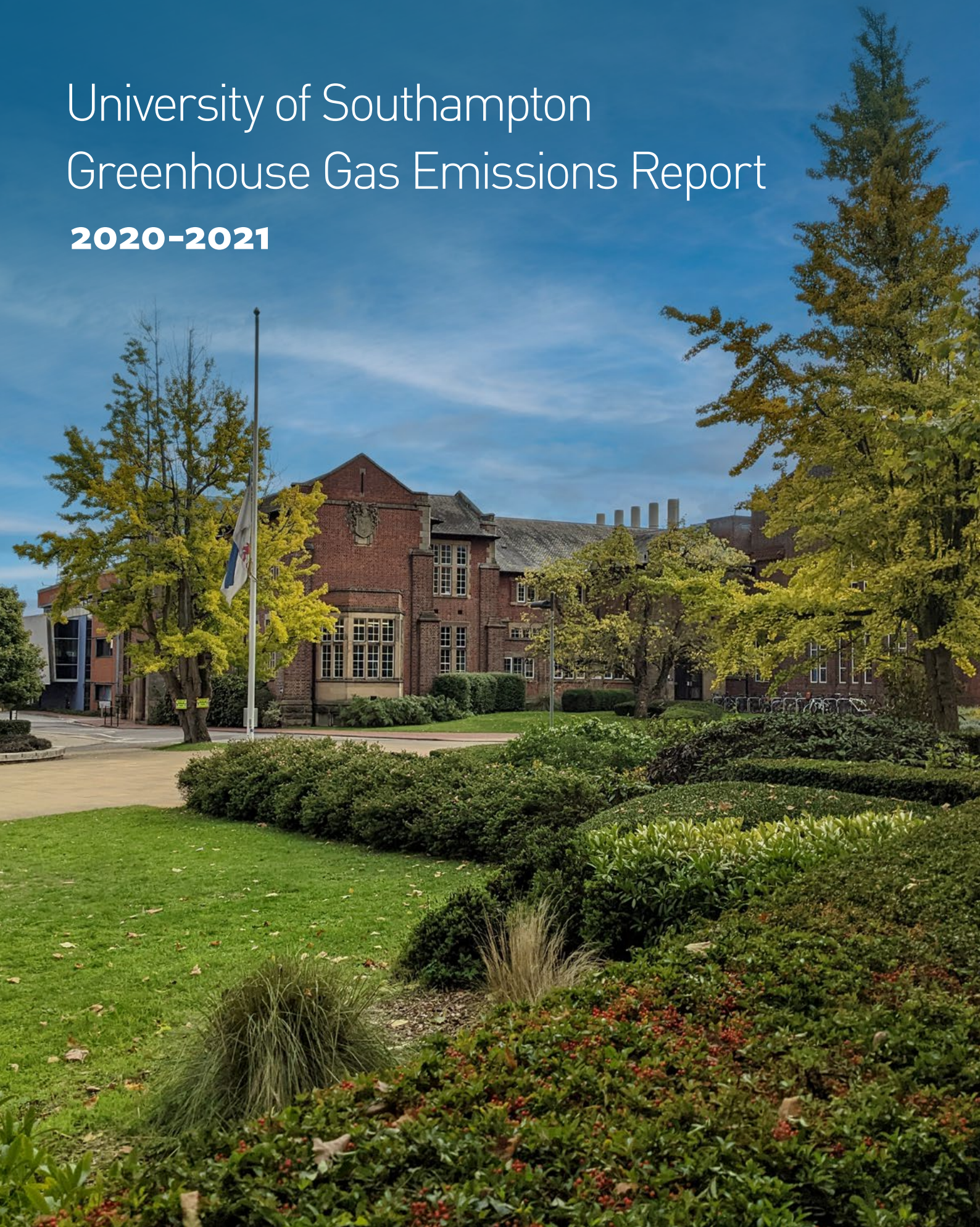
University of Southampton

University of Southampton Greenhouse Gas Emissions Report

2020-2021



FOREWORD

The University's Strategic Plan - Sustainability forms one of the pillars of the overall University Strategy and reducing our emissions is a critical part of that Plan. As a University, our overall goal is to achieve net zero emissions for Scopes 1 and 2 by 2030 and Scope 3 by 2045. I am therefore pleased to present the first 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 academic year 2020-21. 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.

I am proud to say that, thanks to the combined work of the Sustainability Implementation Group, staff and students, the University is in a strong position to deliver on the Goals embedded in the Strategic Plan – Sustainability. The University is also working with 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 115.4 kT CO2e in 2020-21 with a further 12.7 kT CO2e of other emissions. Total emissions under all Scopes reduced by 8% from 2018-19 to 2020-21 largely due to reductions in emissions from Scope 2 Purchased Electricity and COVID-19 affected Scope 3 Business Travel. The University is on track to achieve the goals set within the strategy and will be closely monitoring its milestones for all the goals as new post-COVID norms are established.

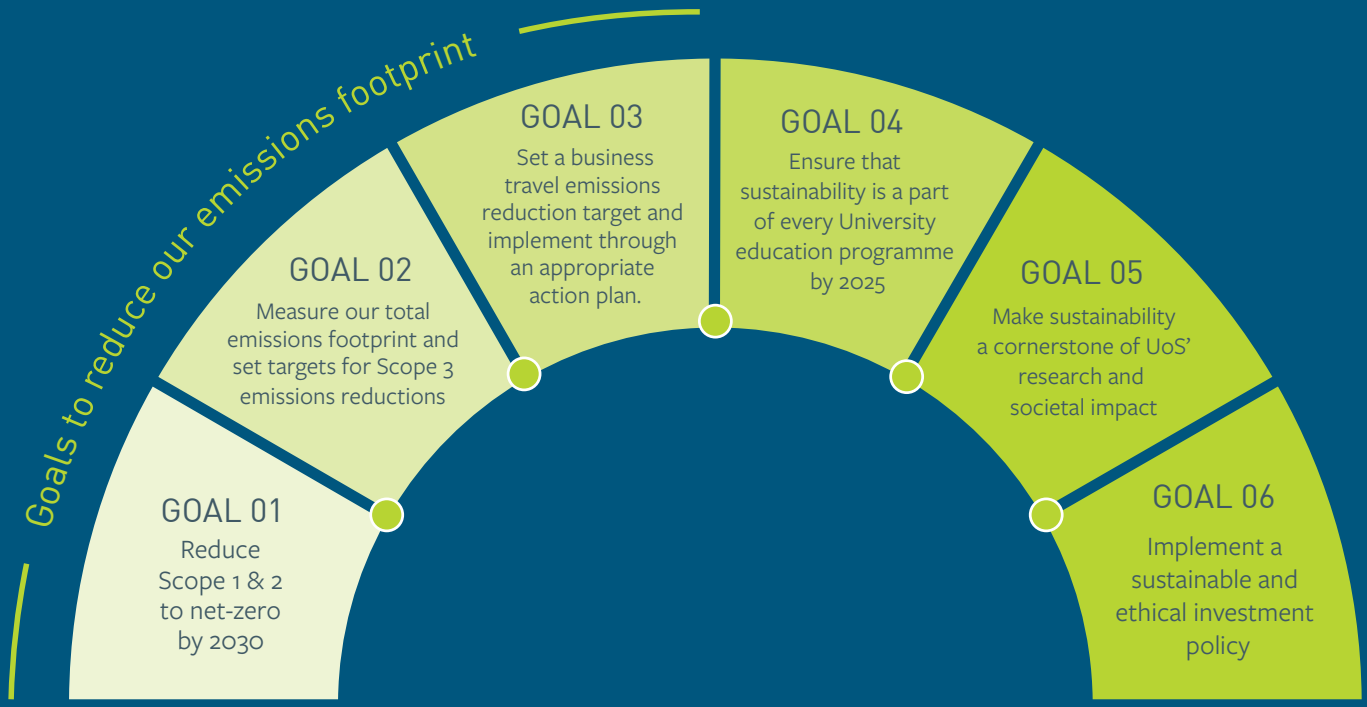
The milestones to ensure the University achieves net zero emissions for Scopes 1 and 2 by 2030 include eliminating the use of gas, refurbishing buildings to reduce their energy demand and switching to renewable electricity which was completed in June 2021. The University's Strategic Plan - Sustainability 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 Strategic Plan – Sustainability will help us to address the 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, Strategic Plan - Sustainability

INTRODUCTION

This report provides an updated summary of the University's Scope 1, 2 and 3 emissions from 2015-16 to 2020-21 using the internationally recognised Greenhouse Gas (GHG) Protocol emissions accounting method[1]. It builds on our initial report[2] which updated the original Strategic Plan - Sustainability estimates for 2018-19 using the same methodology.

The University of Southampton's Strategic Plan - Sustainability[3] 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[4].

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.

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[1] ghgprotocol.org/
[2] eprints.soton.ac.uk/457440/
[3] www.southampton.ac.uk/susdev/our-approach/sustainability-strategy.page
[4] eprints.soton.ac.uk/472919/

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*

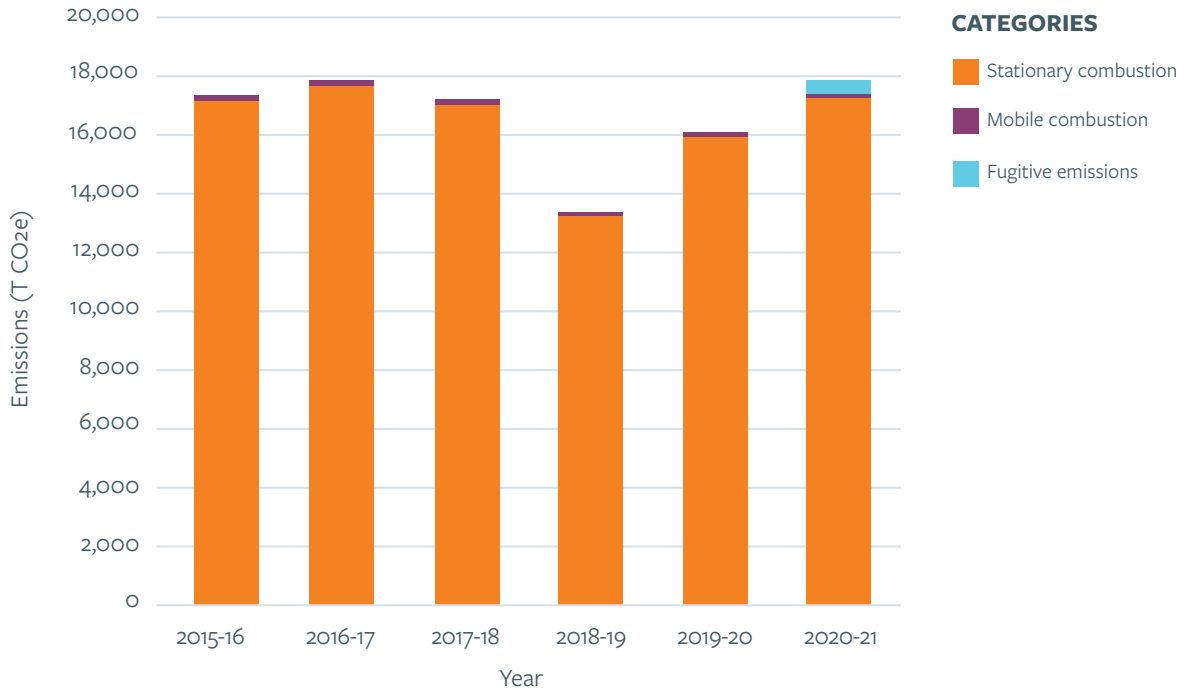


Table 1: *University of Southampton Scope 1 emissions*

Indicator	Stationary Combustion	Mobile combustion	Fugitive emissions
Latest total (T CO2e, 2020-21)	17,233	104	482
Change since 2015-16 (% difference)	0.1	-44.4	N/A*
Change since 2018-19 baseline (% difference)	30.4	-44.1	N/A

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

Overall, Scope 1 emissions have remained roughly constant over time even though 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.

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 which required many of the University staff and students to work from home and buildings to close.

Although Stationary Combustion appears to have increased by 30% since 2018-19, this is because gas use was much lower than usual in 2018-19. As the plot shows, 2020-21 was in fact comparable to 2017-18. This is also the first year that we have been able to include an estimate of fugitive emissions due to refrigerant leakage.

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

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 an indicator of change since the 2018-19 baseline where applicable. They show that Scope 2 emissions have declined by 67% since 2015-16. This was almost entirely driven by reductions in emissions from purchased electricity which have fallen substantially due to both the ongoing decarbonisation of the grid and to reductions in electricity use through energy efficiency projects[5].

Figure 2: *University of Southampton Scope 2 emissions*

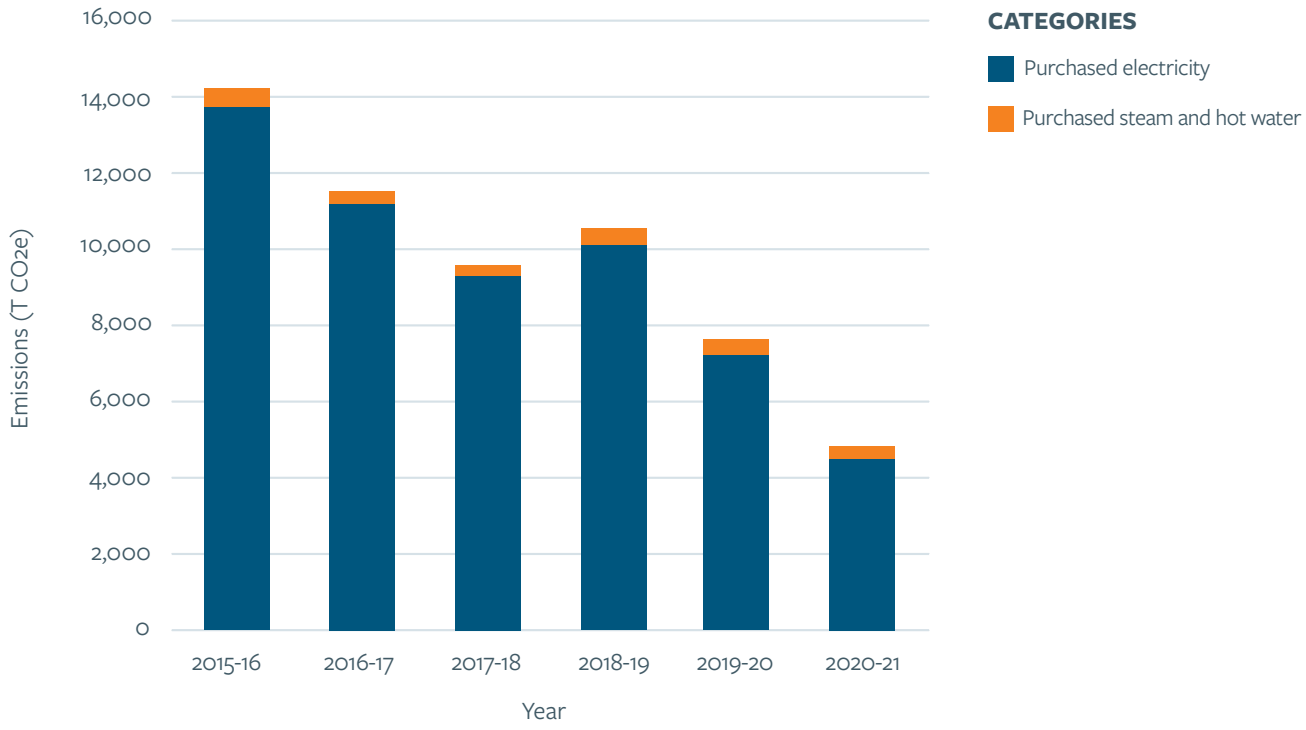


Table 2: *University of Southampton Scope 2 emissions*

Indicator	Purchased electricity	Purchased steam and hot water
Latest total (T CO2e, 2020-21)	4,495	300
Change since 2015-16 (% difference)	-67.3	-43
Change since 2018-19 baseline (% difference)	-55.6	-30.9

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.

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. Note that our switch to a renewable electricity tariff did not take effect until June 2021[6] and so will be accounted in the 2021-22 emissions reporting.

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

[5]See Annex in full technical report
[6]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[7] , 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	Emissions released in the delivery of goods estimated	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	emissions due to usage of University space leased at/by UHS/ SGH, NOCS and the Malaysian Campus, estimated		

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 from Table 4 as estimates are only available for 2017 and assumed to be constant. Employee commuting is based on estimates from the pre-COVID Travel Survey with suitable COVID-year adjustments[8]. 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.

[7]Estimated Scope 3 emissions categories are reported rounded to the nearest 100 Tonnes CO2e to avoid assumptions of over-precision.

SCOPE 3: SUMMARY (CONTINUED)

Figure 3: *University of Southampton Scope 3 emissions*

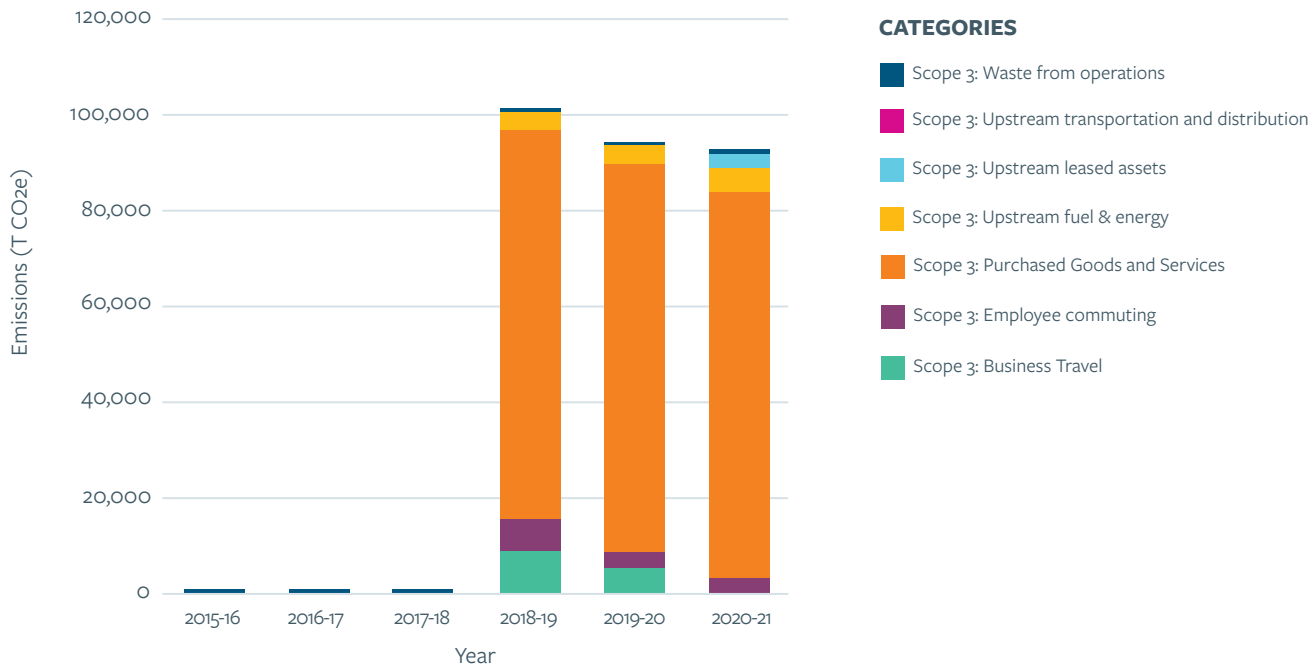


Table 4: *Selected University of Southampton Scope 3 emissions categories*

Indicator	Purchased goods and services	Upstream fuel & energy	Waste from operations	Business travel	Employee commuting	Upstream leased assets
Latest total (T CO2e, 2020-21)	81,000	4,698	100	58	3,200	3,700
Change since 2015-16 (% difference)	N/A*	N/A	N/A	N/A	N/A	N/A
Change since 2018-19 baseline (% difference)	-1.2	11.8	-75	-99.3	-51.5	N/A

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

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 have fallen by 9% since 2018-19 with a notable ongoing decrease in emissions due to waste. The increase in upstream fuel and energy emissions was due to the increased use of gas.

However, the majority of the 9% decrease was due to the effects of COVID-19 on measured Business Travel and estimated Employee Commuting. Neither of these are likely to be wholly sustained reductions even if 'new normal' operations establish, especially given the strategic focus on growth.

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 Strategic Plan – Sustainability Goal 2 with an aspiration to achieve net zero Scope 3 emissions by 2045.

[8]See the technical report for further detail.

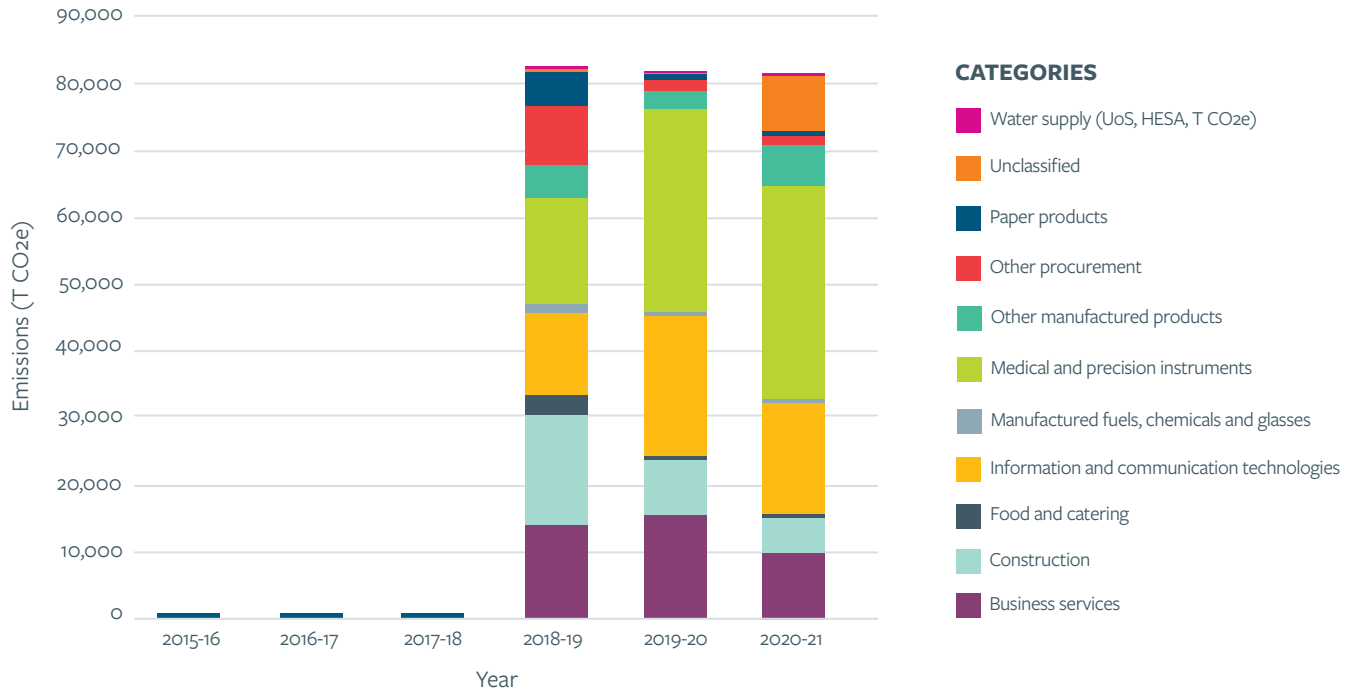
SCOPE 3: PURCHASED GOODS AND SERVICES

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 (see Figure 7). These emissions fell by around 1% between 2018-19 and 2020-21.

Figure 4 shows the breakdown of these emissions by sub-category. It is important to understand that these emissions estimates are based on a conversion from expenditure on these sub-categories to emissions using the HESCET tool[9]. 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 analysed in detail 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 CO2e respectively in 2018-19, were essentially absent in 2019-20 and 2020-21 largely due to COVID restrictions.

Figure 4: *Scope 3: Purchased goods and services detail*



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.

[9]www.sustainabilityexchange.ac.uk/hescet_tool

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: *Scope 3: Business travel*

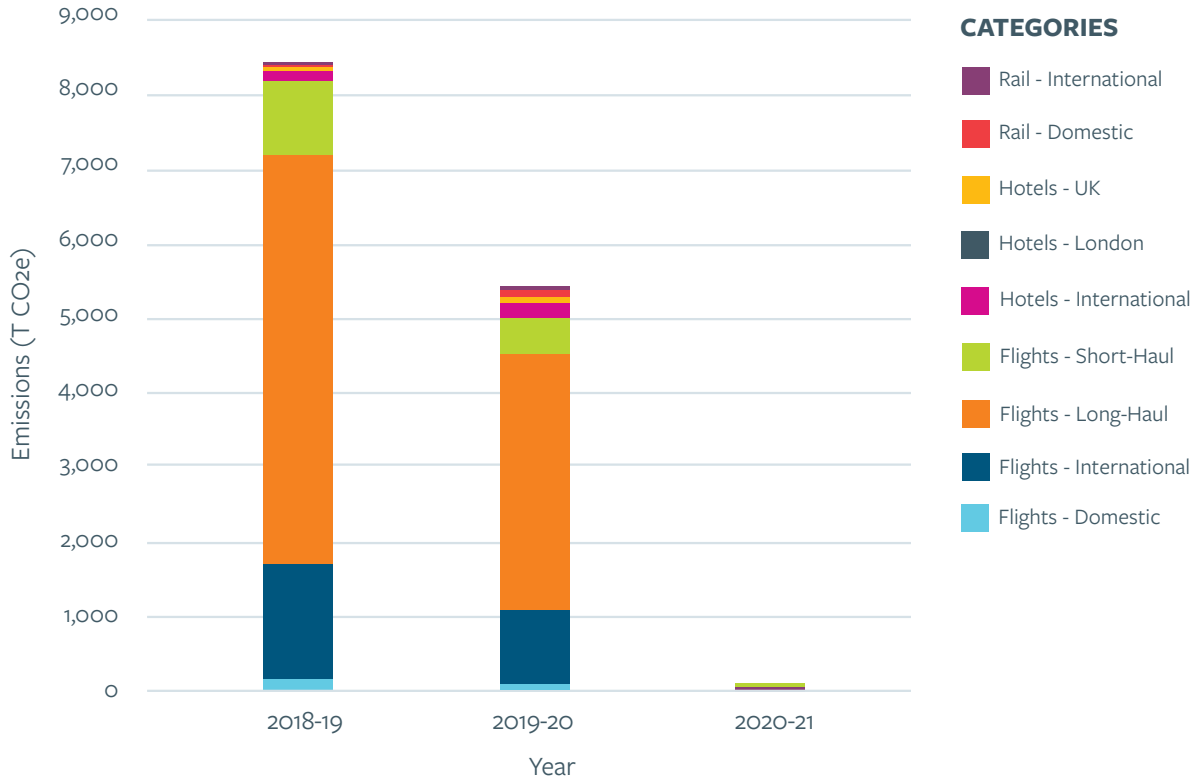


Figure 5 shows how the emissions were distributed across transport mode in 2018-19 and how they have changed over time. Clearly international (between non-UK destinations) and UK long-haul/ short haul flights comprised the majority of the University's business travel emissions in 2018-19, the last pre-COVID year of 'normal' travel, and shows the pre-COVID extent of University business flying from an emissions perspective. 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.

Overall, business travel emissions fell by over 99% from 2018-19 to 2020-21 as virtually all flight-based business travel ceased. However, we should expect emissions to rebound in 2021/22 as business travel restarts. The extent to which the COVID-19 experience permanently shifts University business travel patterns will determine the future actions required to reduce these emissions.

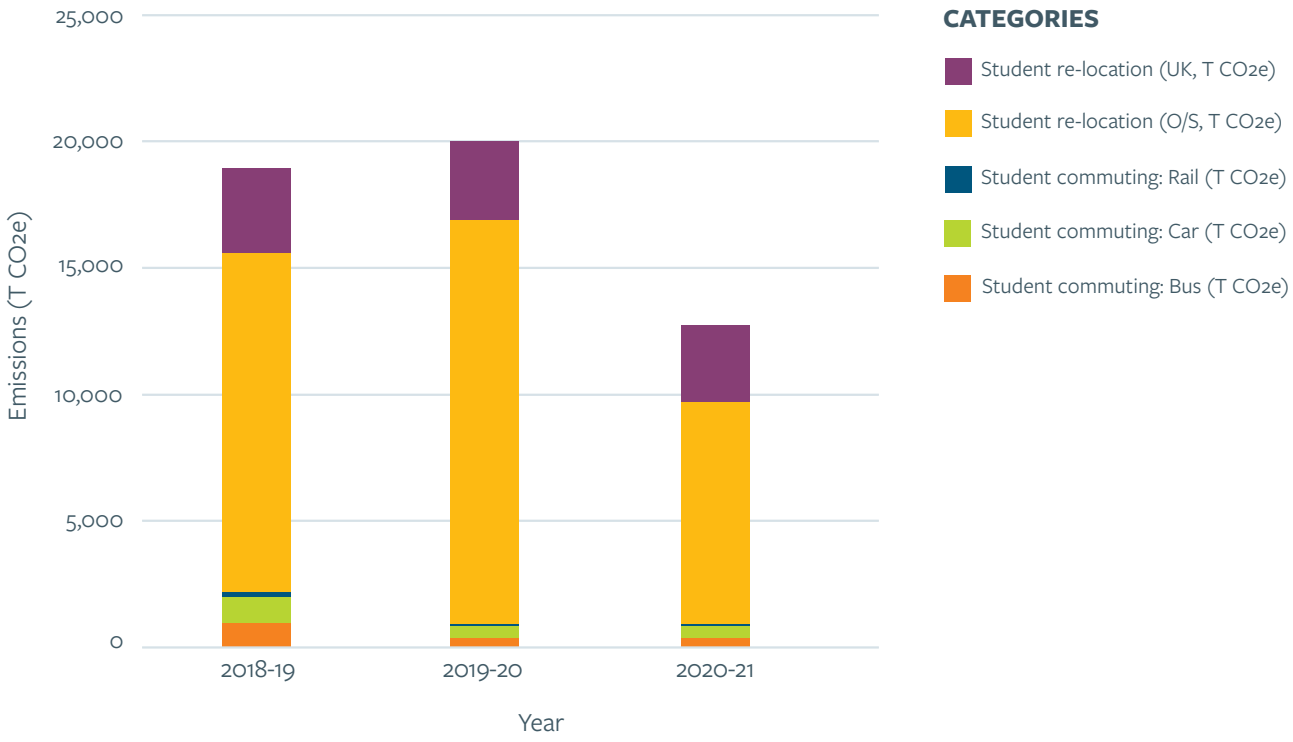
OTHER REPORTING SUMMARY

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 commuting emissions are derived from the same source as the Employee commuting emissions. In 2019-20 and 2020-21 student commuting emissions were adjusted for COVID by assuming a similar reduction in student commuting as was used for Employee commuting above.

Student relocation emissions are estimated using student numbers by country of domicile. 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 did not travel to Southampton at all during 2020-21 due to COVID. As a result these may be over-estimates.

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



ALL SCOPE SUMMARY

Combining the data reported in each of the previous sections, Figure 7 reports overall emission by Scope, excluding 'Other reporting'. Total emissions under Scope 1-3 reduced by 9% from 2018-19 to 2020-21 due largely to reductions in Scope 2 Purchased electricity and Scope 3 Business travel emissions. This has been partly offset by the inclusion of upstream leased assets in 2020-21.

Figure 7: *Scope 1-3 emissions by category*

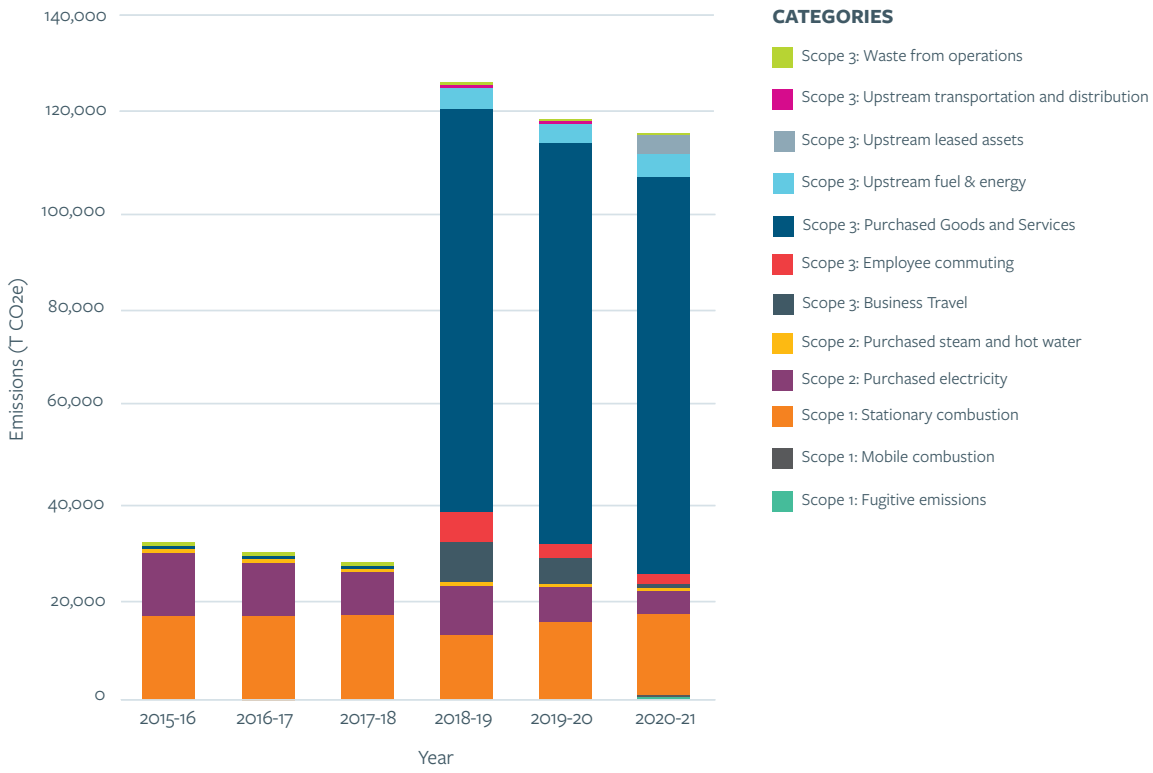


Table 5 summarises Scope 1 to 3 over time showing that Scope 3 generally contributes ~80% of total GHG Protocol emissions. Scope 1 and 2 comprise ~ 20% of emissions. As noted above the 33% rise in Scope 1 emissions since 2018-19 is driven by the return to full use of the gas CHP while the 55% reduction in Scope 2 emissions is driven by grid decarbonisation as well as reductions in energy use.

If 'Other reporting' is included, the total emissions for 2020-21 was 128,100 T CO2e with 'Other reporting' comprising ~ 10% of this wider total.

Table 5: *Scope 1-3 emissions totals*

	T CO2e (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%
% change 2015-16 to 2020-21	**2%**	**-66%**	**N/A***	**N/A**			
% change 2018-19 to 2020-21	**33%**	**-55%**	**-9%**	**-8%**			

Scope 3+ - not adequately estimated before 2018-19
N/A Not calculated due to missing or non-comparable data*


VALLEY

IN SUMMARY

Scope 1 emissions (17.8 kT CO2e) comprised 15% of total Scope 1, 2 and 3 emissions in 2020-21. These emissions are dominated by emissions from burning gas in the University's gas-fuelled combined heat and power plant (CHP) and other boilers. As a result, Scope 1 emissions have remained roughly constant since 2015-16 with some fluctuation depending on the operational status of the CHP. Addressing these emissions whilst the University grows is a key challenge for the Strategic Plan – Sustainability's Goal 1.

Scope 2 emissions (4.8 kT CO2e) comprised 4% of total Scope 1, 2 and 3 emissions in 2020-21 having declined substantially 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. These emissions are dominated by purchase of electricity from the grid (67% emissions reduction since 2015-16) and the overall reduction is due to our energy efficiency projects and the rapid decarbonisation of the UK electricity grid. From 2021-22 these emissions will fall to zero due to our switch to a renewable energy tariff in June 2021 (although this will not affect our Scope 3 Upstream fuel & energy emissions).

Scope 3 emissions (92.8 kT CO2e) comprised 80% of total Scope 1, 2 and 3 emissions in 2020-21. These were dominated by ~80 kT CO2e of supply chain emissions from Purchased Goods and Services which showed a slight (1%) reduction from 2018-19. Emissions from Staff Commuting in 2020-21 (3.2 kT CO2e) were estimated to have fallen substantially due to COVID while Business Travel emissions fell 99% to 0.05 kT CO2e from pre-COVID levels of ~ 8.3 kT CO2e in 2018-19. Neither of these reductions are likely to be wholly sustained even if 'new normal' operations establish, especially given the strategic focus on growth.

Additional non-Scope emissions that the University wishes to report (12.7 kT CO2e) are dominated by overseas student relocation but this was considerably lower in 2020-21 due to COVID-19. Both student commuting and relocation emissions are likely to increase as the number of students registered at the University grows in line with our ambitions.

The University's Strategic Plan - Sustainability has concrete milestones to ensure it achieves net zero emissions for Scopes 1 and 2 by 2030 and Scope 3 by 2045. Furthermore, the University is confident that the Strategic Plan – Sustainability will address the challenge of decoupling emissions from growth as it seeks to implement its wider strategic ambitions.

FUTURE REPORTING PLANS

We intend to update our emissions reporting in March 2023 to add estimates of emissions for the academic year 2021-22. We will also provide a goal-by-goal progress report during the scheduled Strategic Plan update in Q2 2023. 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[10].

Find out more:
Scan the QR code

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

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.

kT CO2e

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.

Sustainability Implementation Group

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

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Find out more:

Scan the QR code

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