USW's Carbon Footprint Report 2024-25

A summary of the University's greenhouse gas emissions performance

Introduction

This report provides a summary of the University's Scope 1, 2 and 3 emissions for 2024-25 against the 2018-19 baseline contained in our Net Zero Strategy.

All data, graphs and analysis are produced in accordance with the internationally recognised Greenhouse Gas (GHG) Protocol emissions accounting method.

The report provides a summary performance for all three scopes contained in the GHG Protocol and where sources are not included, this is explained in the narrative.

The GHG Protocol Scopes are defined as follows:

→ Scope 1: direct emissions from owned or controlled sources, e.g. natural gas used in boilers. emissions produced by fuel combustion on site such as gas boilers, fleet vehicles; fugitive emissions such as air-conditioning, refrigeration or pipework leaks.

→ Scope 2: indirect emissions derived from the generation of purchased electricity consumed by the University

→ Scope 3: indirect emissions that derive from activities of the University from sources we do not own or control.

Scope 3 sources are not only the highest in number but also contribute the greatest share of the overall carbon footprint, covering emissions associated with business travel, staff and student commuting, procurement (i.e. purchased goods and services), leased assets, energy losses, waste, and water. They also represent those emissions sources that are the most challenging to capture and influence.

We have made major inroads into improving our understanding of our Scope 3 carbon impacts and in turn this has had a dramatic impact on our overall carbon footprint and our priorities for mitigating these impacts.

We pride ourselves on being fully open and transparent in how we report our data and tackling the more difficult emissions sources are paramount to achieving our net zero goals.

All emissions values in this document are reported as carbon dioxide equivalent (CO_2e) which enables the reporting of emissions from all 6 of the greenhouse gases contained in the Kyoto protocol which have different warming potentials compared to carbon dioxide.

Greenhouse Gas Emission sources

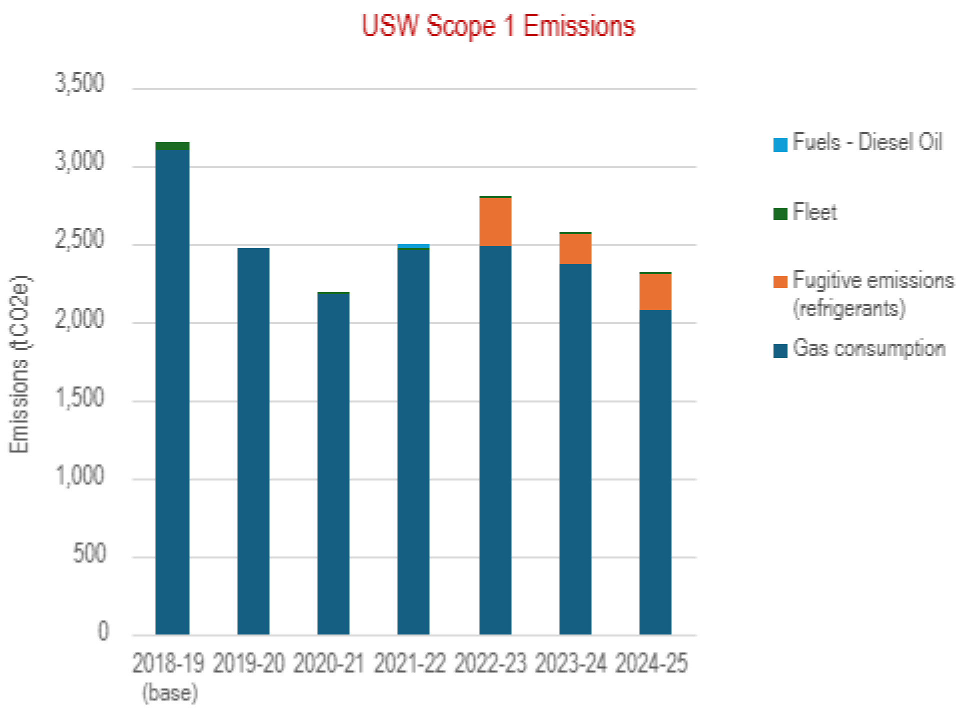
The following table represents the emission sources currently included within our carbon footprint report and the relevant scope they fall within. This year we have added an additional source to our Scope 3 calculations – Building & Construction to account for the emissions related to non-operational building works.

Scope 1 (direct emissions from owned or controlled sources)	**Scope 2** (indirect emissions from the generation of purchased energy)	**Scope 3** (all other indirect emissions that occur in a company's value chain)	**Out of Scope**
Natural Gas	Grid electricity	Business travel	Visitor Travel
Diesel Oil		Staff and student commuting	
USW vehicle fleet		Procurement and Supply Chain	
Land use		Student travel to and from home	
Refrigerant gases		Waste & recycling	
		Water & water treatment	
		Home working	
		Building & Construction	
		Energy losses	
		Hotel stays	
		Accommodation Nominations	

SCOPE 1: SUMMARY

Scope 1 emissions are produced by burning fuels on site and include the University's gas boilers, fleet vehicles; fugitive emissions such as air-conditioning, refrigeration and pipework leaks. Figure 1 illustrates USW's Scope 1 emissions over time compared to the 2018-19 baseline where applicable.

Figure 1: Scope 1 emissions



Direct emissions from our activities (tCO2e)	2018-19 (base)	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Gas consumption	3,093	2,468	2,171	2,458	2,490	2,363	2,068
Fugitive emissions (refrigerants)	0	0	0	0	298	199	240
Fleet	54	0	2	9	7	7	6
Fuels - Diesel Oil	0	0	0	24	0	0	0
Total	3,147	2,468	2,173	2,491	2,795	2,569	2,314
Change compared to baseline %		-22%	-31%	-21%	-11%	-18%	-26%

In 2024-25, Scope 1 emissions have reduced by 10% compared to the previous year and by 26% since 2018-19. They now comprise 2,314 tCO2e which makes up 5% of the total carbon footprint in 2024-25 having reduced steadily over the years. This is a result of targeted energy efficiency projects, investment in renewable energy technologies (eg heat pumps), further improvements and investment in the University's building management system, closer reviews of space usage and plant scheduling, modulation of boilers, improved controls strategies and plant replacement for newer more efficient alternatives.

Fleet emissions have dropped slightly from the previous year due to the replacement of two more diesel vehicles for electric. This brings the electrification of our fleet to around 70%. Remaining diesel vehicles will be targeted for replacement to electric as funds become available or through targeted Government grants.

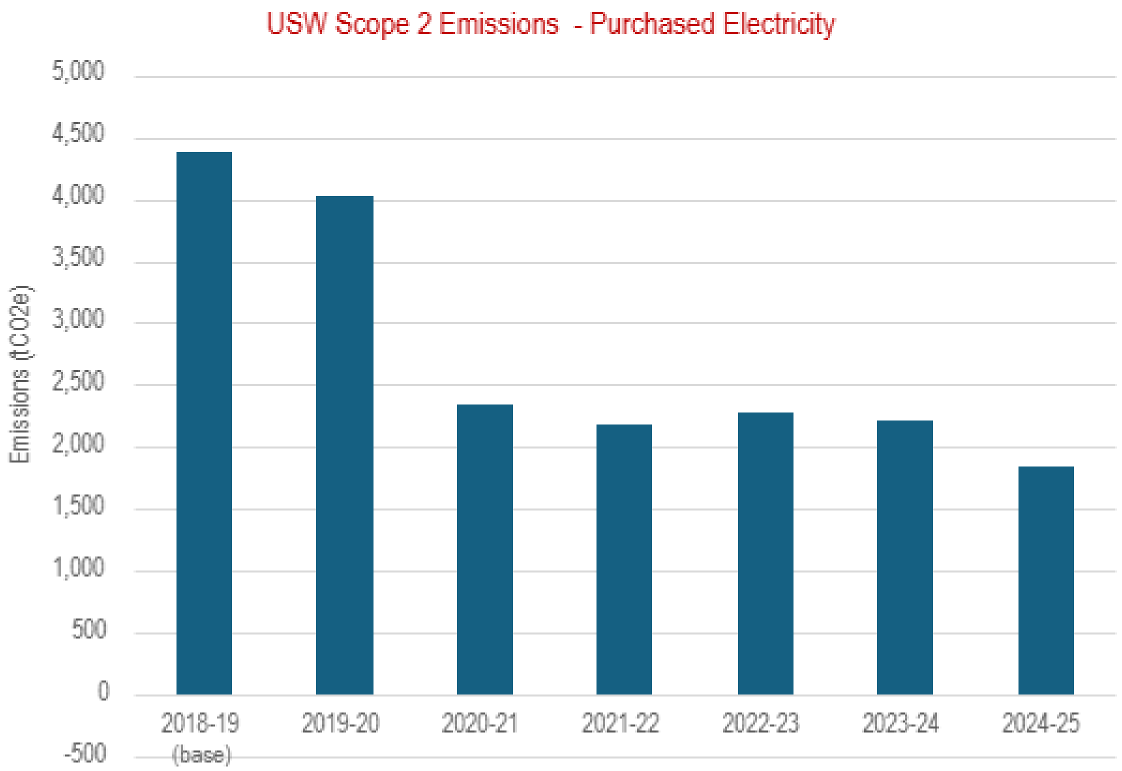
Capturing the full extent of fugitive emissions associated with refrigerant-gas leakage across our air conditioning and refrigerant equipment continues to be challenging to capture in full. We are working to improve this with our contractors to ensure we record a more comprehensive breakdown of emissions impacts aligned to the various gases consumed. Therefore, we expect this value to increase in future years, particularly as we transition to heat pumps for heating.

SCOPE 2: SUMMARY

Scope 2 emissions represent those produced from purchased electricity.

Figure 2 illustrates Scope 2 emissions over time while the supporting values below report the latest progress and indication of change since the 2018-19 baseline where applicable. Overall, Scope 2 emissions (1,838 tCO2e) comprised 4% of total Scope 1, 2 and 3 emissions in 2024-25 having reduced by 58% since 2018-19. This has been supported by the ongoing decarbonisation of the electricity grid over the last 10 years, reductions in electricity demand through energy efficiency projects and continued investment in renewable technologies such as heat pumps and solar PV.

Figure 2 – Scope 2 Carbon Emissions



Indirect emissions from our activities (tCO2e)	2018-19 (base)	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Purchased electricity	4,385	4,026	2,350	2,187	2,278	2,215	1,838
Change compared to baseline %		-8%	-46%	-50%	-48%	-49%	-58%

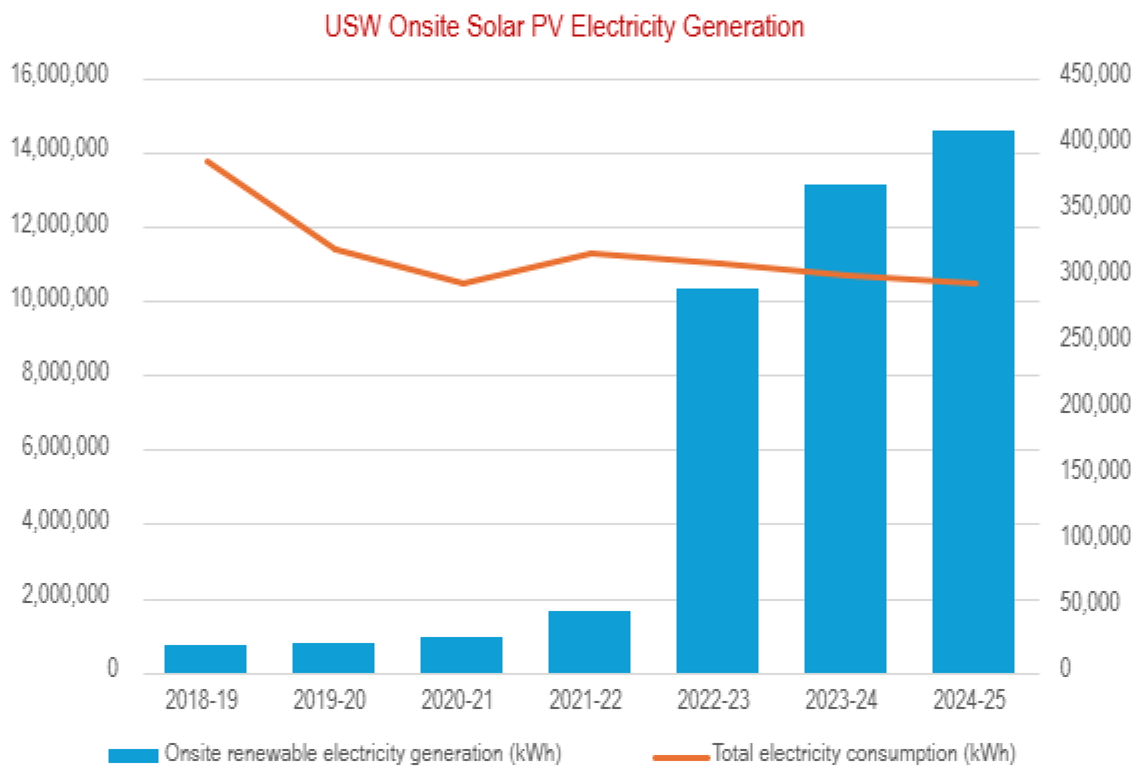
Electricity consumption continued to drop in 2024-25 with a 2% reduction on the previous year. This reduction in consumption, coupled with a decrease in the purchased electricity Carbon Factor has resulted in a 17% decrease in our Scope 2 emissions compared to 2023-24. This was due to a reduction in reliance on coal and an increase in the use of renewables, resulting in the purchased electricity carbon factor reducing by 15% compared to 2023-24. Grid decarbonisation has benefited us all in reducing our electricity emissions, however in recent years this impact has slowed and shows signs of increasing with the possible impact of grid infrastructure limitations and the delays in new wind and solar connections potentially having a future impact on the speed at which it continues to decarbonise.

All of our electricity is consumed from a Renewable Energy Guarantee of Origin (REGO) backed 100% renewable electricity tariff. Despite this, we continue to report the emissions from our electricity consumption on a 'location based approach' as it aligns with the methodology used in the baseline year. This method applies specific emission factors (BEIS for UK sites) to get the average emissions intensity of grids in which energy consumption occurs. We do not currently report electricity emissions under a 'market based' approach as we are not in possession of specific emission factors provided by our suppliers or energy attribute certificates reflecting the true emissions associated with the energy mix purchased. However, wherever possible, we maximise opportunities to generate zero carbon electricity onsite from renewable technologies to mitigate our demand for purchased electricity but any electricity we do buy is from certified green sources via our tariff.

SCOPE 2: AVOIDED ENERGY EMISSIONS SUMMARY

We currently have over 1,360 solar photovoltaic (PV) units installed across the estate amounting to 500KW of energy generation directly installed on the roofs of our buildings. This applies to both academic and residential buildings. The generation capacity of these panels ranges from 130W up to 450W per panel based on the installation date and the emergence of technological advancement in the construction of the solar PV panels in recent years. In terms of generation, in 2024-25 they generated a total of 412,298 kWh, an 11% increase compared to the previous year which equates to 4% of total grid electricity consumed in 2024-25. This equates to 47tCO2e in avoided energy emissions.

Figure 3 – Onsite Solar PV Generation



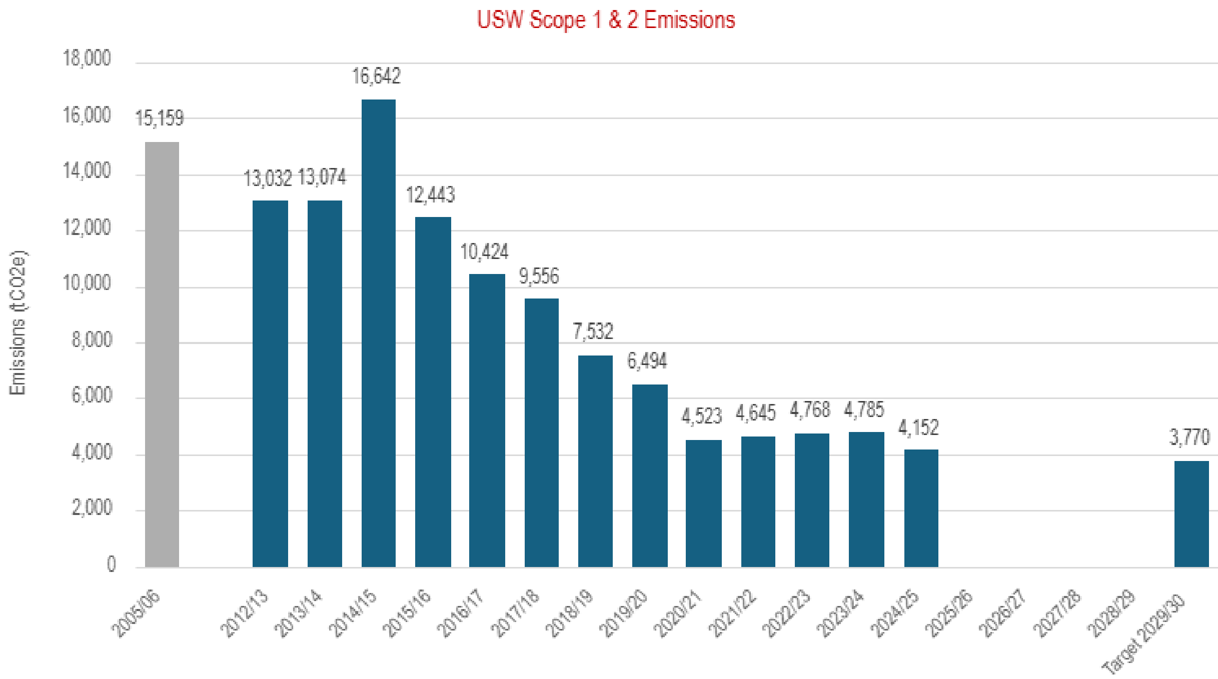
Total (tCO2e)	2018-19 (base)	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Total electricity consumption (GW)	13.75	11.42	10.45	11.30	11.00	10.69	10.51
Onsite renewable electricity generation (kWh)	20.835	21,712	26,801	46,549	290,563	369,022	410,228
Avoided carbon (tCo2e)	4	3	3	5	33	42	47

Looking ahead, we are investing in further solar PV installation on our Accommodation blocks, and the Treforest Campus library with a view to exploring smart energy system opportunities for battery storage. Recent feasibility studies have been helpful in identifying optimal remaining roof spaces we have across our campuses for solar PV installation however the integrity of the roofs are often key to the investment in these schemes and therefore may prevent shorter term integration of renewables. We will also review existing solar thermal installations to ensure this data is also captured from existing generation assets and as an offset to gas fired hot water systems.

SCOPE 1 AND 2 COMBINED: SUMMARY

Reducing energy demand and improving the efficiency of our buildings will remain central to reducing carbon emissions on our journey towards Net Zero by 2040. We are embarking on the more significant transition we need to make across out estate through the decarbonisation of our gas heating systems with heat pumps being integrated into one of our Accommodation blocks in 2024-25 and more planned installations in subsequent academic years, and through our Estates Strategy we are continuing to install low carbon solutions into all refurbishments and new buildings. We are also working actively with project managers and external contractors to ensure new build projects, such as Calon and the New Welsh Chiropractic Institute feature as many energy saving and generation technologies as is feasible.

Figure 4 – Scope 1 and 2 Carbon Emissions



Total (tCO2e)	2018-19 (base)	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Scope 1	3,147	2,468	2,173	2,491	2,795	2,570	2,314
Scope 2	4,385	4,026	2,350	2,187	2,278	2,215	1,838
Total Scope 1 and 2	7,532	6,494	4,522	4,679	5,073	4,785	4,152
Change		-14%	-40%	-38%	-33%	-36%	-45%

Our 2024-25 Scope 1 and 2 emissions are 4,152 tCO2e, amounting to a 45% reduction against the 2018/19 baseline emissions of 7,532tCO2e and a 73% decrease from 15,159 tCO2e in 2005/06.

Combined, they contribute 9% towards our total carbon footprint which is now increasingly dominated by Scope 3 activities.

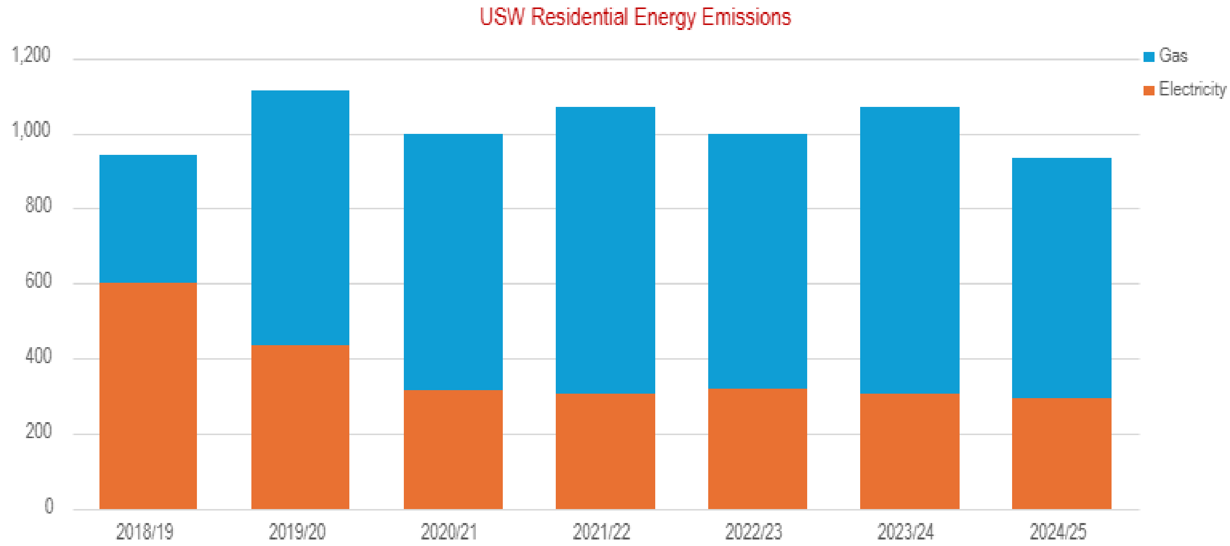
Our carbon strategy challenges us to reduce our Scope 1 and 2 carbon emissions by 50% by 2030 to 3,770tCO2e and we remain on target to achieve this goal although we appreciate it will become more challenging in the coming years.

SCOPE 1 AND 2 – RESIDENTIAL EMISSIONS SUMMARY

Energy emissions from our accommodation blocks in Treforest amount to 933tCO2e in 2024-25. This is a 13% decrease on the previous year and overall a 1% decrease compared to the 2018-19 baseline year. This is attributable to works to reduce our on-campus consumption whilst increasing our provision of solar photo-voltaic and beginning our journey away from gas by installing out first air-sourced heat pumps. This has been complimented by ongoing BMS improvements, new internal temperature sensors and other tighter controls. Much like the rest of the estate, electricity emissions have continued to demonstrate a downward trend dropping by 51% since 2018/19 and 4% compared to 2023-24.

Accommodation energy emissions contribute to 24% of total University energy emissions and a targeted focus for reducing this overall carbon impact value is underway.

Figure 5 – USW Residential Emissions

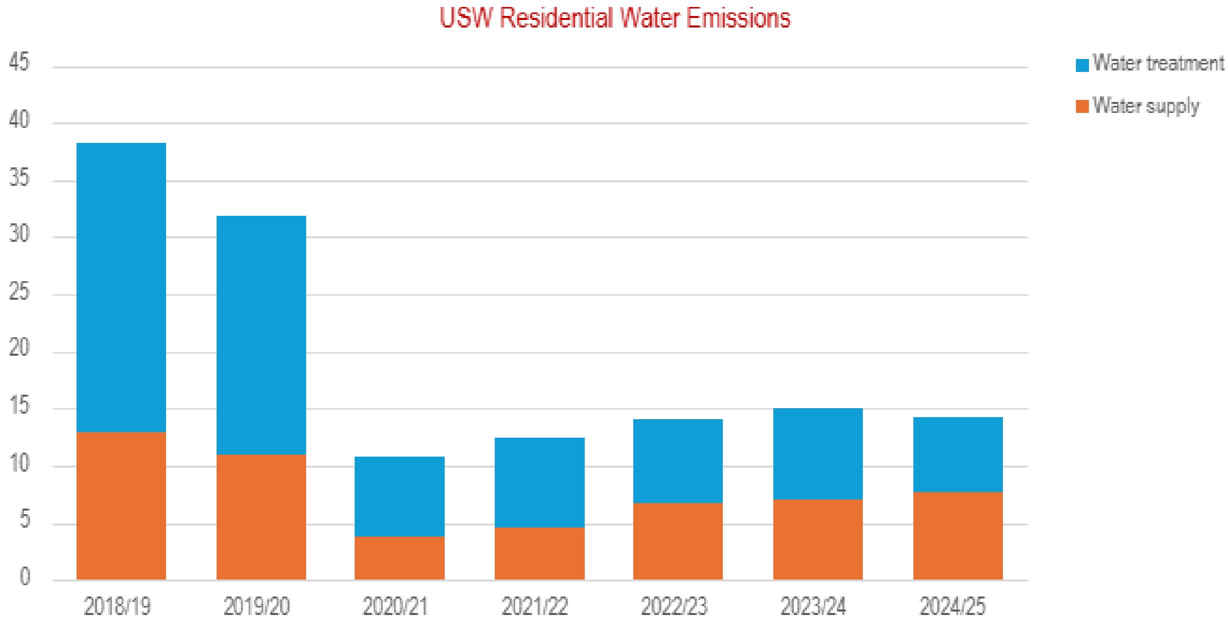


Residential Energy emissions (tCO2e)	2018-19 (base)	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Purchased electricity	603	434	315	307	321	306	295
Gas	340	681	684	764	675	764	638
Total Energy emissions	903	1,115	999	1,071	996	1,070	933
Change compared to baseline %		18%	6%	14%	6%	13%	-1%

Water emissions represent a very small contribution in carbon terms towards our overall footprint. However, as a natural resource it is still a priority for us to ensure we conserve and save water wherever possible. Our residential blocks represent a considerable demand on the natural water supply for kitchens, sinks, showers and toilets in each block. Over the past 7 years, water emissions have dropped by 63% compared to 2018-19, in part aided by a drop in the carbon conversions factor for water supply and treatment. In the last year, they have dropped marginally by 5.7% but in recent years consumption rates have been relatively consistent.

Residential water emissions contribute 48% of the Treforest Campus water use and 38% of the total water consumed across our estate respectively. However, it should be noted that we have a leak on the main water ring that adversely impacts these values which we are investigating.

Figure 6 – USW Residential Water Emissions



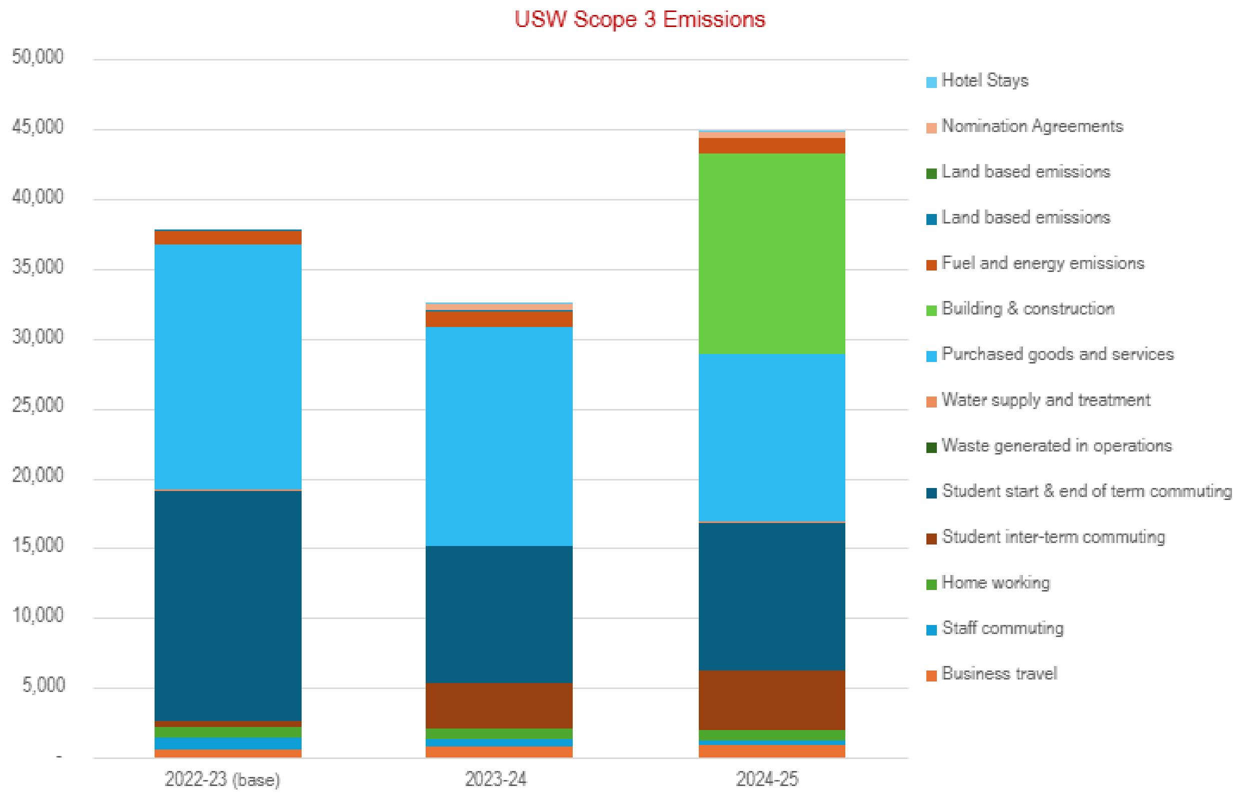
Water emissions (tCO2e)	2018-19 (base)	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Water supply	13	11	4	5	6.7	7	7.7
Water treatment	25	21	7	8	7.3	8	6.5
Total water emissions	38	32	11	12	14	15	14
Change compared to baseline %		-17%	-72%	-68%	-63%	-61%	-63%

SCOPE 3: SUMMARY

Our Scope 3 emissions are by far the largest contributor to our overall carbon footprint. They now comprise 91% of our total footprint and represent all the emissions sources we are indirectly responsible for such as business and commuting travel, emissions from the supply and treatment of water, the processing of waste and the purchased goods and services we consume across the University.

Unlike Scope 1 and 2, where we have primary source data, for example, direct consumption of gas and electricity measured in kWh, Scope 3 emissions are more difficult to capture and often rely on other data sources, such as financial spend which is not as accurate. One of the challenges in future years will be to improve how we measure, record and monitor our Scope 3 emissions and this will involve collaborating with our suppliers and other HE institutions. Due to improvements in our data collection process over the past few years, and confidence in the completeness of our data, we have re-baselined our scope 3 emissions to 2022-23.

Figure 7: Scope 3 Carbon Emissions



Source (tCO2e)	2018-19 (base)	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25

Business travel	321	304	101	378	611	759	859
Staff commuting	-	5	4	7	859	600	409
Home working	-	-	-	969	772	772	680
Student inter-term commuting	-	-	- -		407	3251	4330
Student start & end of term commuting	-	-	- -		16,468	9,743	10,525
Waste generated in operations	11	13	821	15	16	4	16
Water supply and treatment	109	101	64	35	40	44	34
Purchased goods and services	19,217	17,238	14,472	11,913	17,604	15,686	11,993
Building and Construction	-	-	-	-	-	-	14,424
Fuel and energy emissions	1,096	-	844	979	1,114	1,119	1058
Land based emissions				27	27	27	27
Land based emissions				-46	-46	-46	-46
Nominations Agreements						432	426
Hotel Stays						51	77
Total (including student start and end of term commute)	**20,754**	**17,661**	**16,306**	**14,277**	**37,650**	**32,442**	**44,812**
Change compared to baseline 2018-19		-15%	-21%	-31%	83%	56%	116%
Total (excluding student start and end of term commute)	**20,754**	**17,661**	**16,306**	**14,296**	**21,201**	**22,235**	**33,803**
Change compared to baseline 2018-19		-15%	-21%	-31%	2%	7%	63%

In 2024-25, we have made further inroads into sourcing, analysing and reporting our supply chain data and made the decision to separate out our operational procurement spend, from our capital projects following the commencement of the new CALON build. This additional category is “Building and Construction” and encompasses the demolition and construction work which commence d in the 2024-25 academic year. Subsequently this year, we have seen an increase in our Scope 3 emissions largely attributable to this capital spend. Spend on operational purchased goods and services has remained relatively consistent with previous years and represents another primary contributor to Scope 3 with Student start & end of term commuting contributing the third largest proportion of emissions. Total emissions (inclusive of student start and end of term travel) now amount to 44,812tCO2e. This is an increase of 38% compared to the previous year largely due to the aforementioned Building and Construction impact. The three categories previously noted contribute 82% of total Scope 3 emissions so naturally these are our three primary areas of focus for improvement. We have made significant headway into improving the data that supports our spend on products and services through moving to a product-level (tier 3) method of carbon footprint calculations for specific categories of IT spend, and plan to refine this year-on-year.

We have adopted the approach that where new category data provided is reliable, we will include these in the carbon footprint even if at the point of inclusion they are not comprehensive. In this way, we establish a baseline value on which we can build more consistent monitoring and recording of data whilst developing data capture processes with internal departments that can be replicated in future years.

This also supports our strategy for ensuring full transparency and inclusivity of the full gamut of carbon impacts associated with our operations as a University.

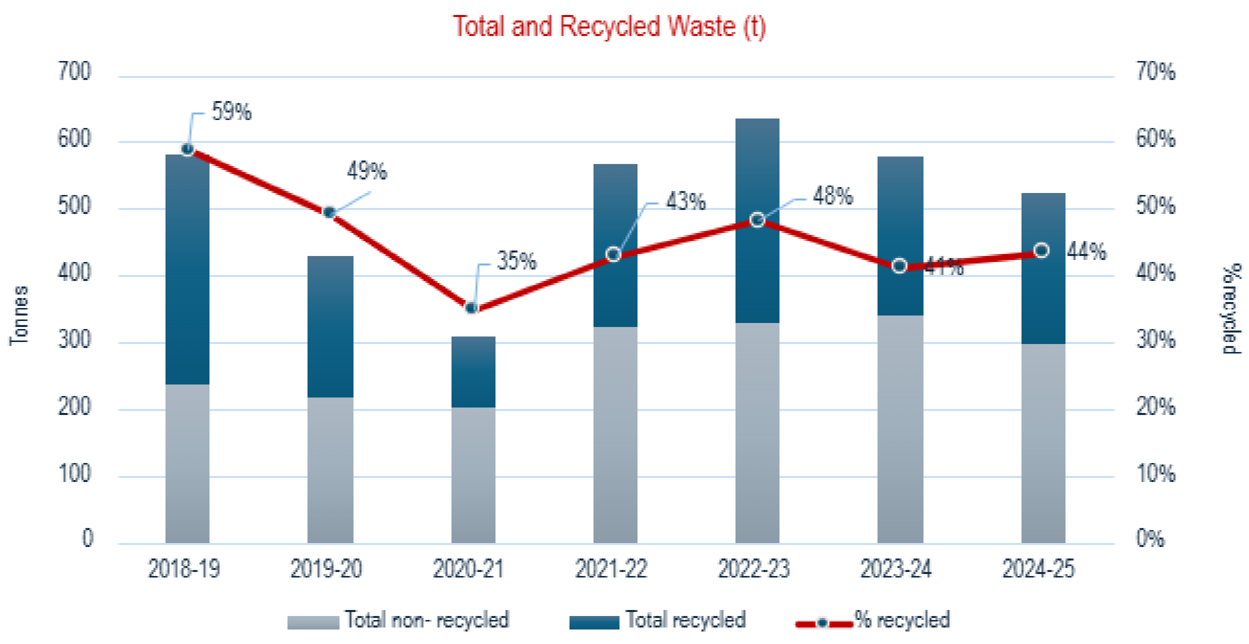
SCOPE 3: WASTE

Operational waste accounts for 0.03% of the University's total emissions – this is the waste generated by staff, students and visitors in their day to day activities across our campuses. The carbon conversion for our waste emissions comes from a combination of data from our main waste contractor and other supplier data.

In 2024/25, overall waste arising volumes have reduced to 525 tonnes, a reduction of 9% compared to last year. Overall recycling volumes have increased by 6% compared to last year with an overall recycling rate of 44% for municipal waste, up from 41% the previous year.

Waste mass generated per FTE staff and student (tonnes/FTE) has remained consistent at 0.03 t/FTE (30kg per person) in 2024/25 despite FTE increasing by nearly 1,000 staff and students.

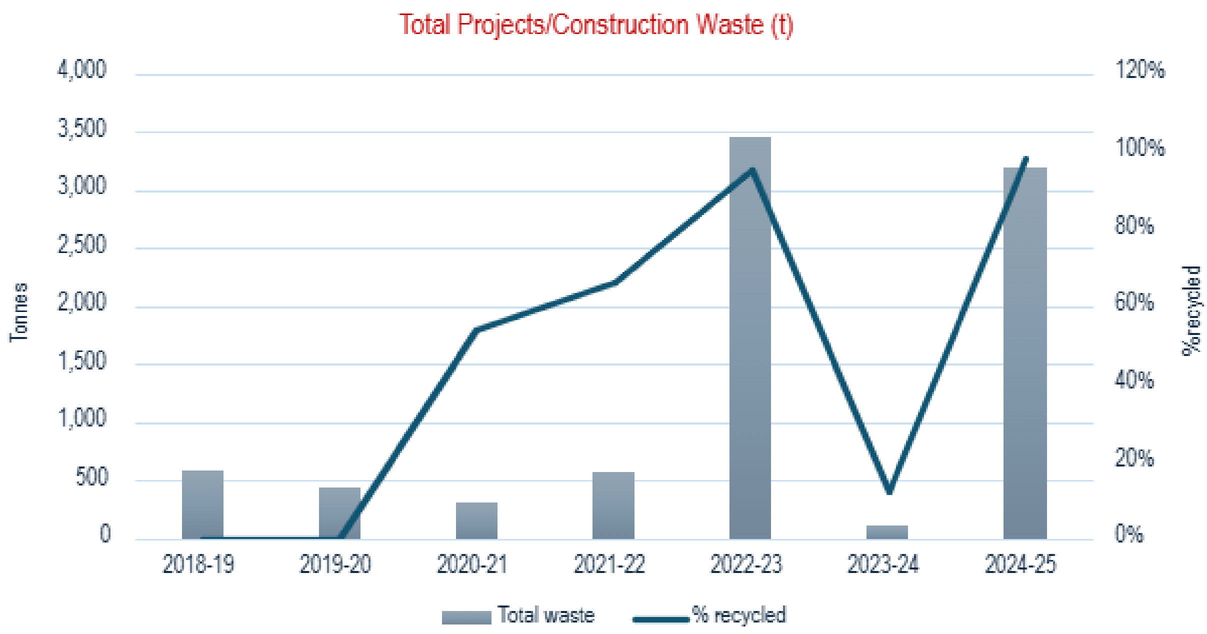
Figure 8 – Total waste arising



Total waste (tonnes)	2018-19 (base)	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Total waste	580	429	310	566	635	579	525
Total non recycled	238	217	202	322	328	340	296
Total recycled	342	212	108	244	307	239	229
% recycled	59%	49%	35%	43%	48%	41%	44%

Aligned to the Estates Strategy and the redevelopment of areas of the Treforest Campus, we carry out refurbishment projects to improve our buildings, improve the efficiency of equipment and align them to staff and student requirements. Over the course of 2024-25 there has been an increase in the volume of construction and projects undertaken over the year, including the demolition of the former Ferndale Block and a few individual refurbishment projects.

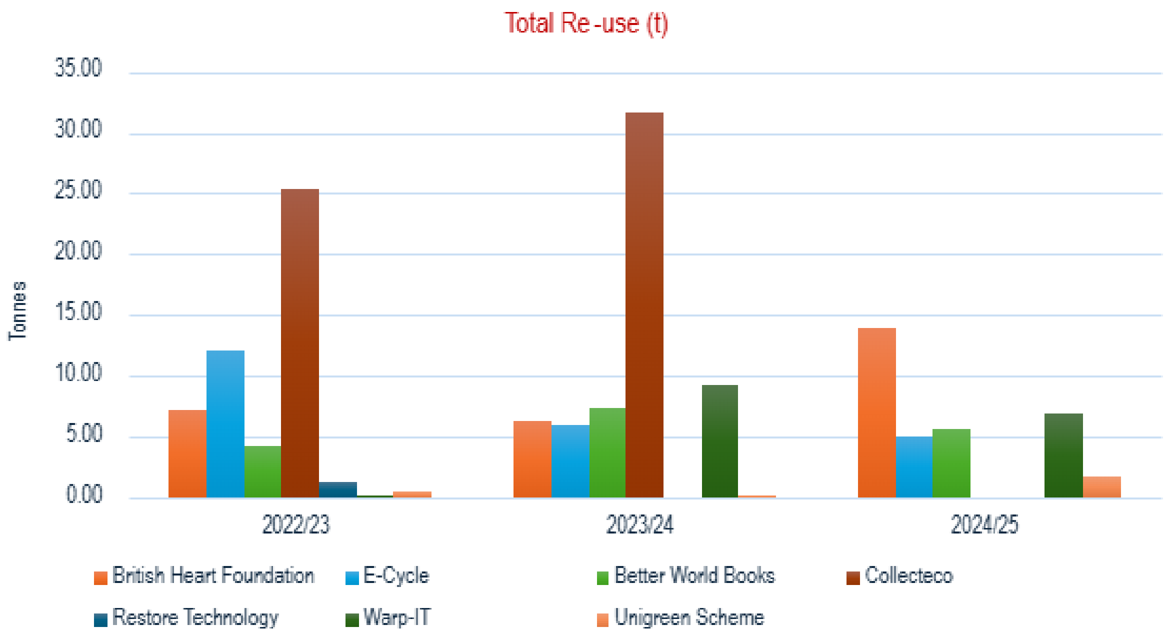
Figure 9 – Total projects/construction waste arising



Total waste (tonnes)	2018-19 (base)	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Total waste	580	429	310	566	3,452	101.41	3,196
% recycled	0	0	54%	66%	95%	12%	98%
% create energy	0	0	46%	34%	4%	88%	2%

Of the total projects waste produced in 2024/25, 98% was recycled and just over 2% was processed to create energy. This shift and increase in recycling is related to the types of projects undertaken and the waste produced from these which was suitable for recycling, as well as improved recycling practices by on-site staff and external contractors.

Figure 10 – Total re-use



The re-use of waste has been a particularly effective avenue for giving waste products a second life and also preventing valuable resources from being lost. These partnerships and initiatives continue to provide effective outlets for certain product types across USW as well as offering social value benefits and reducing our waste costs. Over the course of 2024/25, we re-used/re-distributed 33 tonnes of waste products via a range of different partners that USW works with. That represents a 44% decrease on the previous year; however this is largely due to us ending a partnership with Collecteco for our furniture donations, with a new focus on in-house re-use. Conversely, we saw a 123% increase in donations made via British Heart Foundation demonstrating the growing awareness and value of this scheme and along with these other partnerships, continues to both reduce our carbon footprint and have positive social impacts.

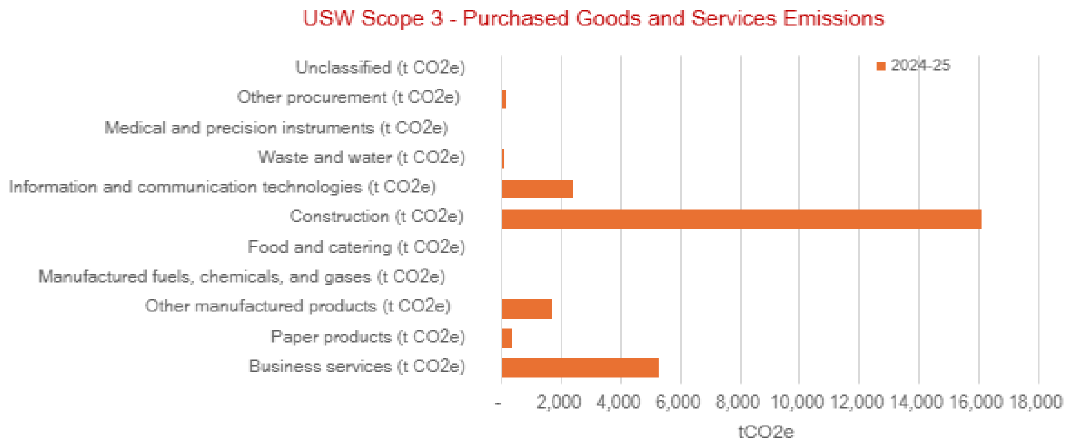
SCOPE 3: PURCHASED GOODS AND SERVICES

Alongside commuting, the procurement of purchased goods and services constitutes the majority of our emissions, with a 54% share of the total carbon footprint.

We currently use financial spend data to calculate the majority of these emissions in the absence of more accurate product or service level related emissions factors which comes with a degree of uncertainty and therefore the data provided here should be viewed with some caution. This is however a common approach across the higher education and Welsh public sector and currently represents the most accurate means of identifying those categories that represent the highest carbon risk where value of spend is the only data we have.

The total money spent against each of the HE procurement codes was mapped to a defined list of DEFRA categories for which conversion factors (unit: kgCO2e/£) are available and last updated in 2022.

Figure 11 – 2024-25 Purchased goods and services emissions



Emissions source (tCO2e)	2022-23	% of total	2023-24	% of total	2024-25	% of total
Business services	4,301	24%	7,340	46%	5,310	20%
Paper products	15	0%	384	2%	360	1%
Other manufactured products	1,279	7%	1,150	7%	1,688	6%
Manufactured fuels, chemicals, and gases	-	0%	-	0%	0	0%
Food and catering	394	2%	274	2%	42	0%
Construction	1,221	7%	1,342	8%	16,146	62%
Information and communication technologies	4,124	23%	5,131	32%	2,449	9%
Waste and water	296	2%	237	1%	106	0%
Medical and precision instruments	-	0%	-	0%	0	0%
Other procurement	102	1%	93	1%	146	1%
Unclassified	5,872	33%	7	0%	6	0%
Total	**17,604**	**100%**	**15,958**	**100%**	**26,253**	**100%**

It is clear that the primary emissions sources in 2024-25 are:

■ Construction (62%)

■ Business Services (20%)

■ Information and Communication Technologies (9%)

■Other Manufactured Products (6%)

Overall, Purchased Goods and Services emissions have increased by 65% compared to the previous year, however if Construction, which relates to the CALON project is removed, emissions have decreased by 39% from 2023-24 and 47% between 2018-19 and 2024-25.

The CALON project is a large-scale construction project that will factor into our scope 3 carbon emissions calculations across the 2024-25 and 2025-26 academic years. In our analysis, we have separated this from the bulk of our Purchased Goods and Services due to this project not being part of our regular operations.

Over the years, carbon conversion calculations have evolved, albeit not extensively but updates to Government conversion factors more recently have reduced the overall impact which is a positive development in this space.

This methodology is a blunt tool for calculating emissions and whilst it comes with a high degree of uncertainty, the GHG Protocol outlines a number of more accurate approaches to calculating carbon specific to our products and services and for those priority categories illustrated above, we will aim to address this with our suppliers in the first instance.

In previous years, there was an element of the university's procurement spend that wasn't included in our calculations as it could not be easily classified and therefore not been used in our calculations. For the 2024/25 data, we worked closely with the Finance Systems team to produce a complete procurement spend report, meaning the full spend from the 2024/25 academic year has been included giving us our most complete Purchased Goods and Services carbon footprint. This has also resulted in a change to some of the top emitting categories (illustrated above) which will now form part of our focus for future improvement.

Throughout 2024/25 we began working with one of our IT hardware suppliers to acquire product-level carbon data for 5 of our most purchased items. Due to this more accurate method of calculating emissions, £1,135,748 of spend was moved to the product-level method resulting in a reduction of 266 tCO2e when compared to using the government conversion factors.

As purchased goods and services represent such a large proportion of our total emissions, it is vital for us to continue improving and refining our calculations process.

OVERALL SUMMARY

Taking all of the above into account, the table below illustrates the total carbon emissions attributable to USW's operations and activities. Total emissions in 2024-25 totalled 48,964 tCO2e. This is a 73% increase compared to 2018-19 but includes a number of data sets not previously included that are explained above as well as the aforementioned Calon project. We are continuing to see healthy progress in the reduction of Scopes 1 and 2 emissions through targeted investment and energy reduction measures; and continued growth in scope 3 emissions data sources meaning they now contribute 91% of the total carbon footprint with Scopes 1 and 2 comprising 5% and 4% respectively.

We expect the total Scope 3 value to drop in future years once construction works conclude but it will remain as the primary carbon contributor. Scope 3 emissions are dominated by construction, purchased goods and services and commuting emissions whilst continued decarbonisation of the grid has helped reduce electricity emissions year on year alongside reductions in demand through improved energy efficiency and renewable energy generation.

As we transition away from gas/fossil fuels for central heating and hot water services to electric sources, we expect Scope 1 emissions to drop but in turn this will result in an increase in Scope 2 emissions accordingly. Although this will be gradual, it is expected that in future years, Scopes 2 and 3 will contribute the majority of USW's carbon footprint.

	Total emissions tCO2e				% of total		
Year	Scope 1	Scope 2	Scope 3	Total	Scope 1	Scope 2	Scope 3
2018-19 (baseline)	3,147	4,385	20,754	28,286	11%	16%	73%
2019-20	2,468	4,026	17,660	24,155	10%	17%	73%
2020-21	2,173	2,350	16,306	20,828	10%	11%	78%
2021-22	2,492	2,187	14,277	18,956	13%	12%	75%
2022/23	2,490	2,278	37,871	42,639	6%	5%	89%
2023-24	2,570	2,215	32,442	37,227	8%	6%	86%
2024-25	2,314	1,838	44,812	48,964	5%	4%	91%
% change 2018-19 to 2024-25	-26%	-58%	116%	73%			