

Report

Title: Carbon Management Plan Annual Report 2018/19

From: Jodie Barker, Energy Manager / Jane Altounyan, Energy Analyst **Date:** 18 March 2020

1. Carbon Management Strategy and Targets

This annual report provides details on progress achieved and performance improvements made during the 2018/19 academic year against the University's target to reduce carbon emissions from gas and electricity by 20% by 2020 (compared to a 2005/06 baseline) and from water by 30% by 2020 (compared to a 2009/2010 baseline). So 2019/2020 is the final year of the programme

In 2010, the Higher Education Funding Council for England (HEFCE) published the carbon reduction target for the sector. The sector targets for carbon emission reductions in scopes 1 and 2 (mainly energy consumption) are 43% by 2020 and 83% by 2050, against a 2005 baseline.

The University's Carbon Management Plan (CMP) was signed off by the University Council in March 2011 with the aim of achieving the carbon emissions targets.

The University is committed to reducing its carbon emissions as part of meeting sector targets but also in recognition of the risks related to the physical impacts of climate change, the transition to a low-carbon economy, and the rising but uncertain future costs of energy.

2. Summary of Key Performance Indicators for 2018/2019

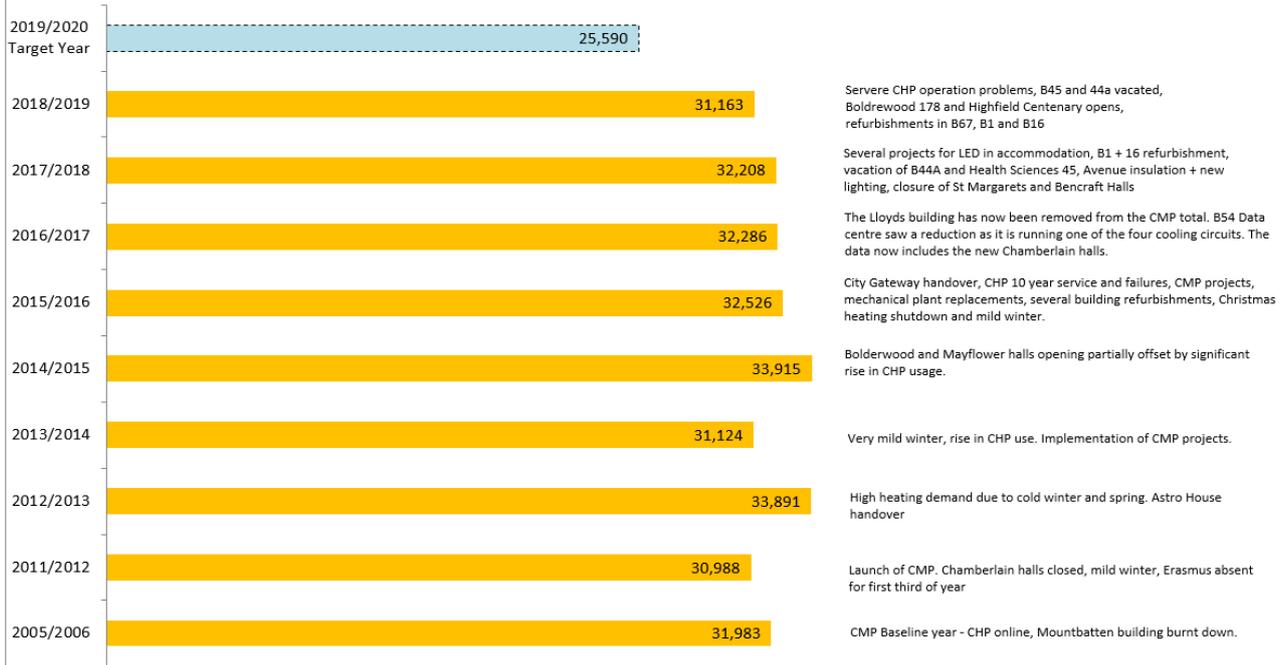
Table 1. Key Performance Indicators for Energy Management

	Target	Baseline	2017/18	2018/19	2018/19 performance compared with 2017/18	2018/19 performance compared with baseline (and with target)
Absolute Carbon Emissions (scope 1 & 2, tonnes) Graph 1	To reduce carbon emissions from energy consumption by 20% by 2020 based on a 2005/06 baseline	32,000	32,208	31,163	-3%	-3% (22%)
Carbon per Staff and Student FTE (tonnes/FTE) Graph 2	To reduce carbon emissions from energy consumption per staff and student FTE by 20% by 2020 based on a 2005/06 baseline	1.37	1.11	1.14	3%	-17%

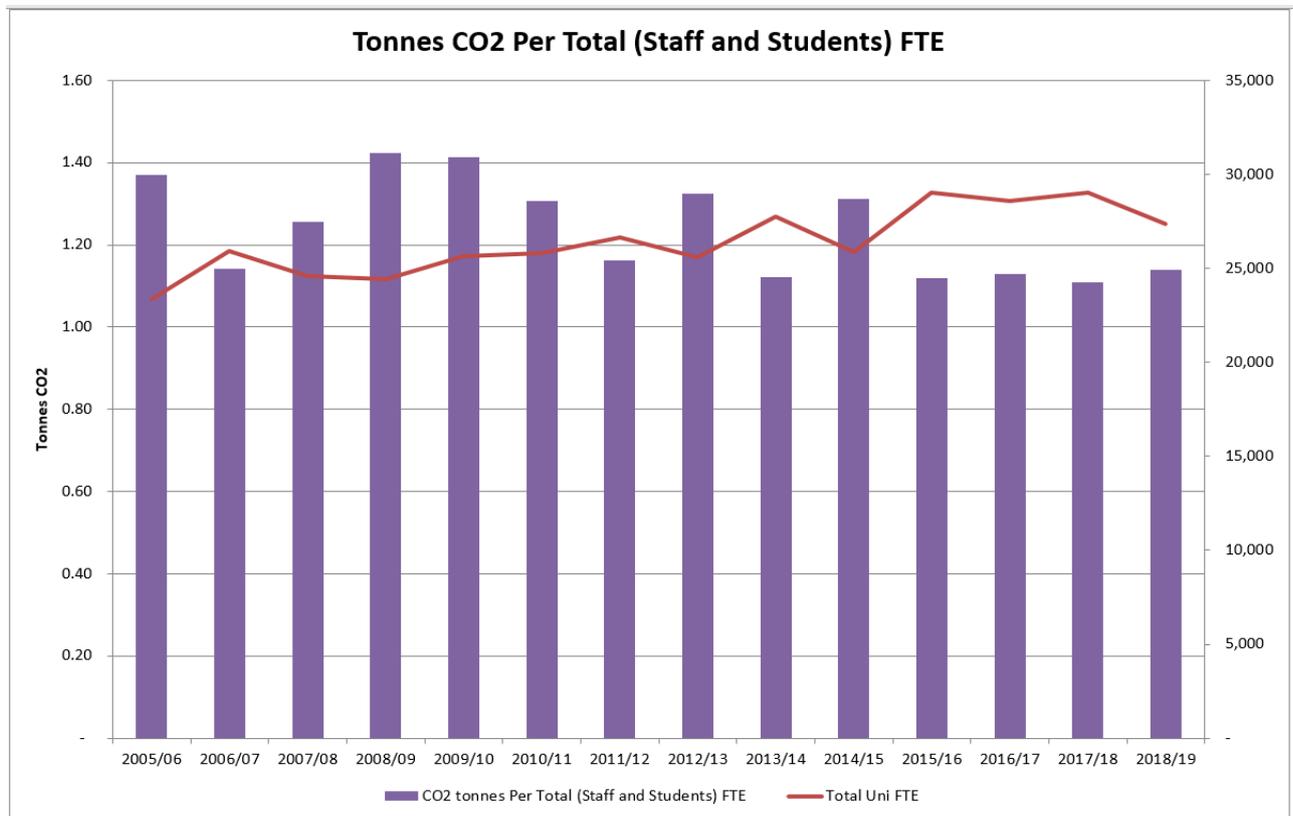
Table 1. Key Performance Indicators for Energy Management (cont'd)

	Target	Baseline	2017/18	2018/19	2018/19 performance compared with 2017/18	2018/19 performance compared with baseline
Carbon per £ turnover (kgCO ₂ /£'000) Graph 3.	To reduce carbon emissions from energy consumption per £ turnover by 20% by 2020 based on a 2005/06 baseline (Turnover at 05/06 prices)	103.67	78.97	78.79	-2.7%	-23%
Electricity (kWh)	To achieve a 20% reduction in electricity use by 2020 based on a 2005/06 baseline	35,868,000	33,228,981	39,361,736	18.5%	10%
Gas (kWh)	To reduce gas consumption by 20% by 2020 based on a 2005/06 baseline	86,838,000	93,736,722	75,010,595	-20%	-14%
Carbon per student occupancy halls (tonnes CO ₂ /student occupancy) Graph 4	To reduce carbon emissions from energy consumption per student occupancy in halls by 20% by 2020 based on a 2005/06 baseline	2.02	1.34	1.26	-5.7%	-38%
Water (m³)	To reduce water consumption by 30% by 2020 from a 2009/10 baseline	567,000	432,107	428,971	-1%	-25%
Water (tonnes carbon)	To reduce carbon emissions from water consumption and disposal by 30% by 2020 based on 2009/10 baseline	552	419	416	-1%	-25%

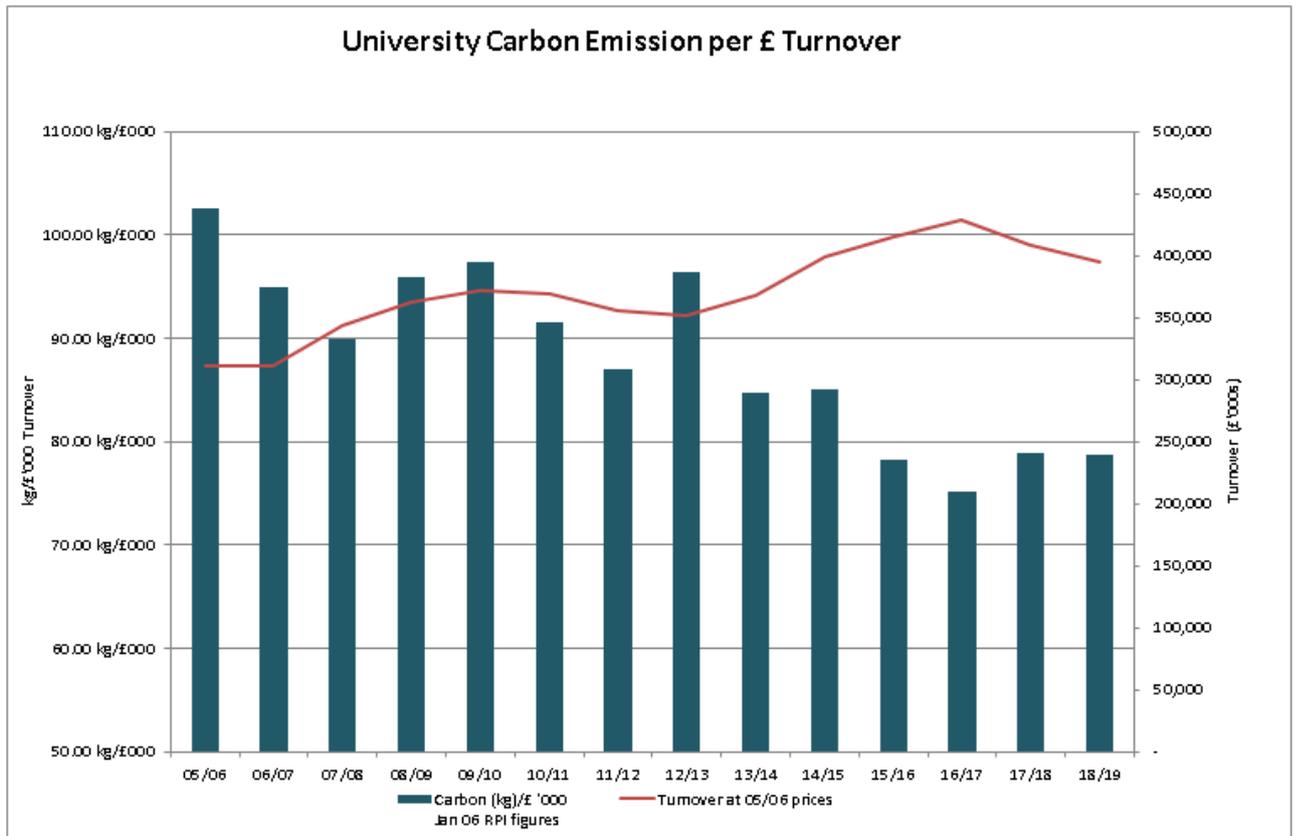
CMP Scope Total Carbon (tonnes) from Electricity and Gas (Excludes, SGH, NOC, Chilworth)



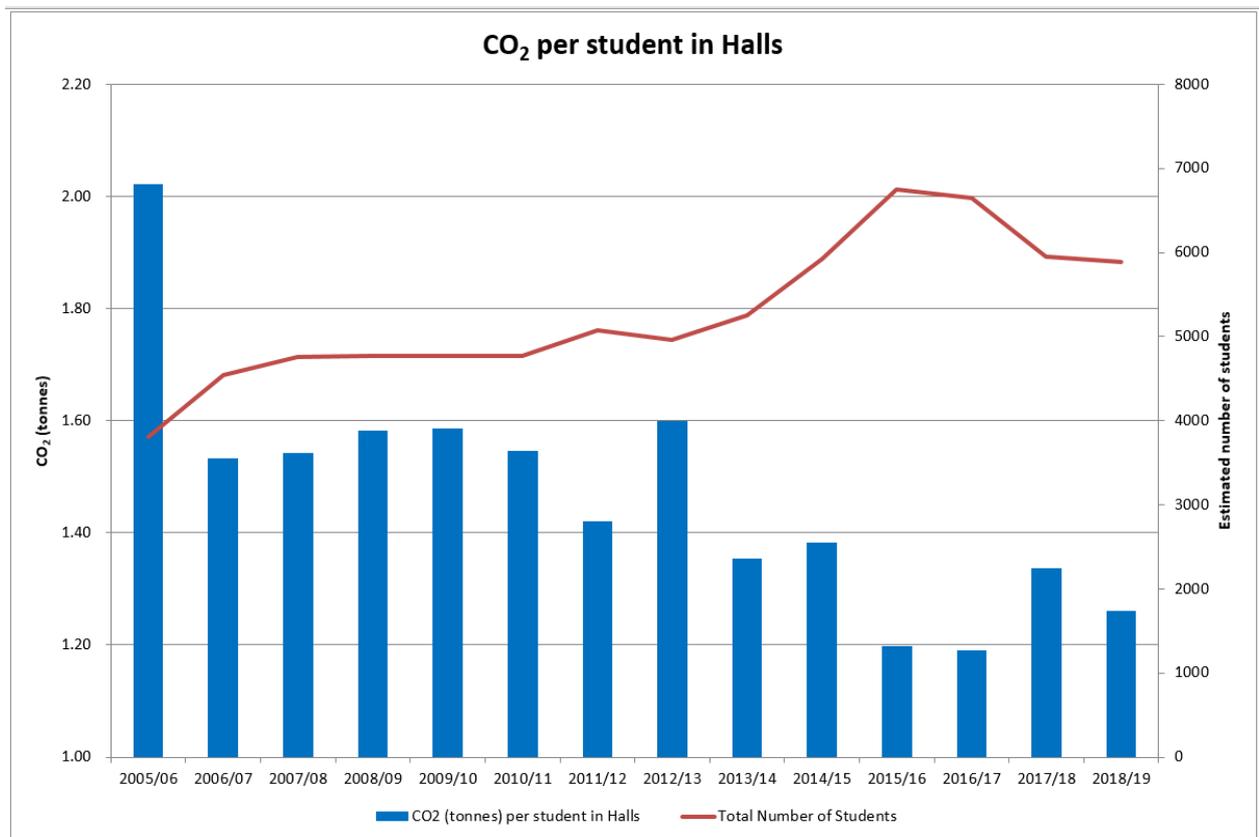
Graph 1. CO₂e tonnes from electricity & gas: Baseline and years 2011/2012 to 2018/2019



Graph 2. CO₂e tonnes per FTE staff and students



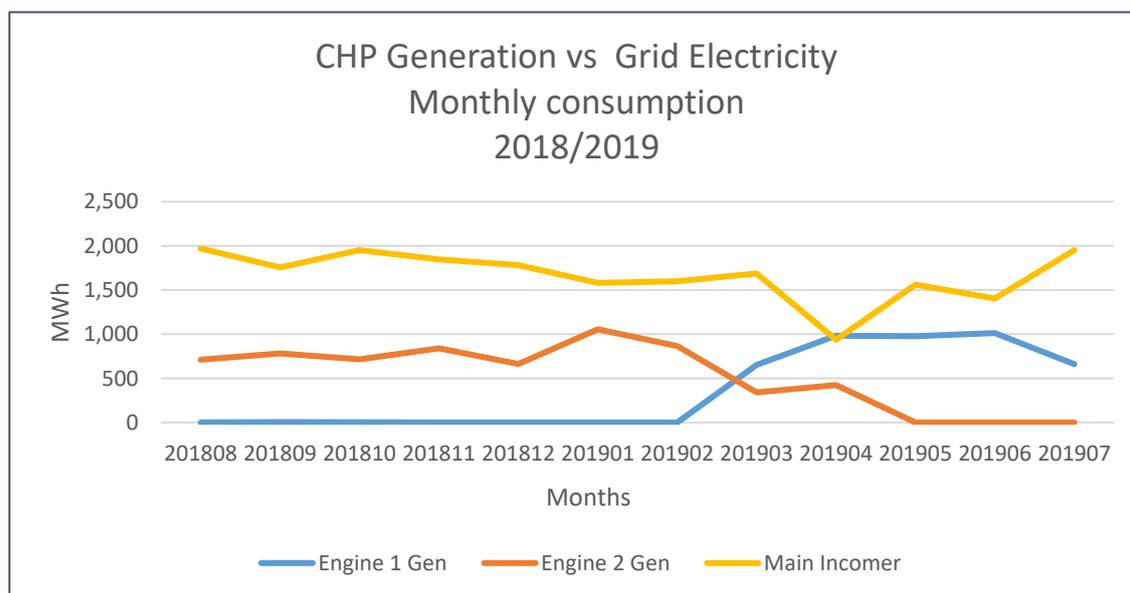
Graph 3. CO₂e tonnes per £000 turnover



Graph 4. CO₂e tonnes per student in UoS student halls

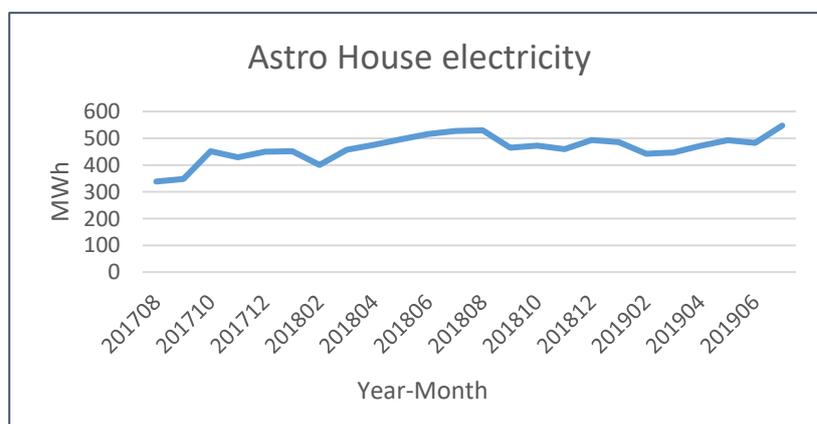
3. Factors affecting carbon emissions for the academic year

- (a) The largest impact on our carbon emissions during 2018/19 was from the operational issues of the CHP. This resulted in a reduction in electricity generation of about 44% or 8.6m kWh. This was offset by the reduction in gas consumption through the main gas meter of 18m kWh. The cost impact in loss of generation including savings on gas consumption is a loss of about £565k.



Graph 5. Interplay of Highfield incoming grid electricity with CHP electricity generation.

- (b) The largest electricity reductions were seen in student accommodation due to a continuous replacement to LED lighting, a sharp rise in alternative private options and a milder winter. Ten main student accommodation sites saw reductions totalling about 600k kWh.
- (c) Complete refurbishment of boiler room at Aubrey House, completed September 2018, resulted in a reduction of about 20% of its gas consumption, about 113k kWh.
- (d) The vacation of Health Sciences B45, led to a reduction of 77k kWh or 32% over the period.
- (e) The vacation of Building 44A resulted in a 10% reduction in Shackleton electricity.
- (f) Following the transfer of IT servers to more efficient Astro House from B54 Astro House electricity has continued to rise throughout 2018/19. While this is only 8% above 2017/18, the intense consumption Astro House means this 8% represents nearly 448k kWh. The reduction in the Data Centre of Mathematics over the same period was 55k kWh. There is a much more intense use of computing power such as running complex digital scenarios and the “power usage effectiveness” (PUE) of the servers in Astro House over the old servers in Mathematics is about double.



Graph 6. Astro House electricity 2017/18 and 2018/19.

- (g) Refurbishment of B1 and B16 and change of use led to a much more intense use of computers for running scenarios. This has resulted in an approximate 35% increase (~78k kWh) in electricity use in both buildings.
- (h) New buildings at Boldrewood (B178) and Highfield (Centenary) were completed during the period. Boldrewood electricity increased by 4% (107k kWh) and gas by a significant 38% (312k kWh) over the whole site. Centenary was only handed over at the end of the academic year so the consumption resulting from the building of Centenary is not known.
- (i) Graham Hills Chemistry (building 29) underwent extensive refurbishment and teaching and research was replaced with building works in many areas. There was a reduction of 190k kWh (~23%) in electricity consumption 2018/19 over 2017/18.

4. Conclusion

This year's operational issues with the CHP plant have highlighted the impact that the plant has on the University's overall energy use, dominating changes in energy consumption over the previous year and resulting in a loss of over £500k. The issues arose in part due to the end of maintenance contract with Clarke Energy. The contract has now been re-issued and includes a provision for Clarke's to maintain responsibility for any disruption to operation.

Despite this there was an overall reduction in carbon emissions over the previous year of 3%: electricity consumption via the grid increased but the reduction in gas consumption more than compensated.

As in previous years, and now looking to the end of the ten year programme, the University has fallen well short of its carbon emissions target - in 2018/2019 carbon emissions were still 22% above the target level. However, the KPIs which are based on *relative* values, carbon per number of FTE/students, per £ turnover, and per student in our accommodation, express a more realistic picture of improved sustainability, with reductions of -17%, -23% and -38% respectively over the baseline figures.

There were few significant projects designed specifically to save energy during 2018/2019 because the Carbon Management Fund was closed. However a wide number of actions have led to savings, mainly through planned refurbishments, a wide spread programme of replacing lighting with LED when lamps burn out - in residences and other academic buildings, a fall in student numbers in residences, and from building management staff within faculties taking extra care to manage the energy in their buildings, particularly Mountbatten and Life Sciences,

The future energy performance of the University is expected to improve for a number of reasons.

- (a) The recent extensive and tragic consequences of the Covid 19 virus is resulting in a large number of staff working from home, students avoiding the campus, and buildings being closed.
- (b) The Energy Team were asked by the Energy and Sustainability Steering Group in autumn 2019 to put together a list of energy and water efficiency projects which it was proposed might draw on funding from the Ten Year Plan bond. The list includes such measures as widespread LED replacements, including the replacement of diesel generated pitch lighting at Wide Lane, insulation, server efficiency, and a variety of mechanical improvements. The University's Executive Board is currently considering the bid.
- (c) Adam Tewkesbury, the Associate Director of Environment and Sustainability, is producing a new and comprehensive energy strategy which will seek to significantly improve the University's overall energy efficiency and minimise carbon emissions. The intention is to act to improve the University's sustainability in a logical and coordinated way, ensuring that any disruption to staff and particularly students is kept to a minimum, while making significant progress towards a zero net carbon operation.

Report Authors:

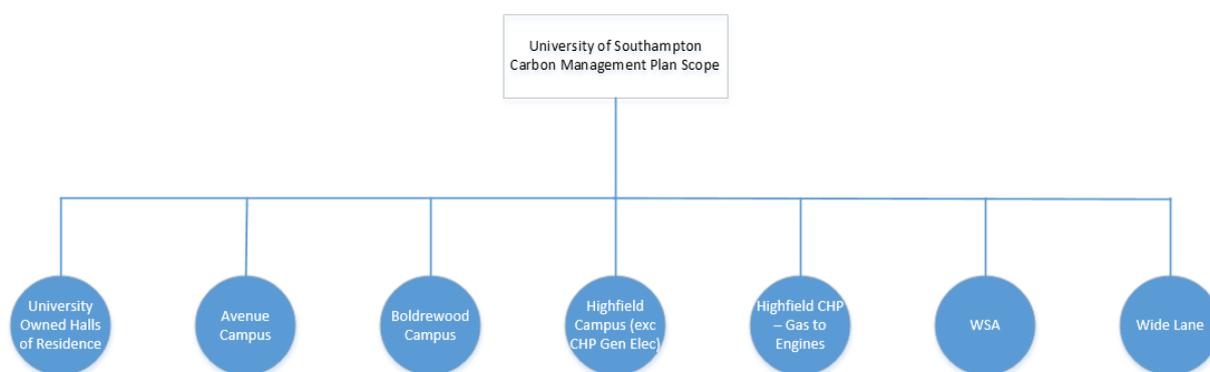
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Appendix 1.

We measure our emissions from activities according to the following scopes:

Scope 1 – direct emissions	Gas boilers Gas to power CHP providing electricity (approx. 50%) and heating for the University’s Highfield Campus. All of the electricity is used on site but not all of the heat generated is used with the remainder being dumped due to mechanical issues with the CHP or the inability to use all the available heat.
Scope 2 – indirect emissions	Purchased electricity
Scope 3 – other indirect	Water – consumption and wastewater are measured and included within this report. Waste and recycling generated by University activities are monitored and measured but not reported in terms of carbon emissions. Emissions generated from business travel and our supply chain are not measured. The University’s Travel Plan reports data on staff and student commuting.

For carbon reporting, emissions from across the University estate are included with the exception of the National Oceanography Centre, Southampton General Hospital and Chilworth Science Park.



Carbon management plan scope

Baseline Year	1 August 2005 – 31 July 2006
Reporting period	1 August 2018 to 31 July 2019
Student Staff FTE	Student Staff FTE is the total number of staff and students at the university expressed as the Full Time Equivalent (FTE). This data is obtained from Finance.
Turnover	The turnover figure includes turnover data which is out of scope. This figure has been used consistently over the reporting period.
Student Occupancy	Data is provided by the Residences team and is based on the number of students at intake. These figures do not take into account the occupancy of the halls during the summer by conferences or pre-sessional students.
Conversion Factors	Conversion factors are used to convert activity data – such as litres of fuel used – into greenhouse gas emissions. The University uses the figures provided by HESA in the 2005/06 EMR return. Electricity = 0.422 kg CO ₂ per kWh Gas = 0.194 kg CO ₂ per kWh It should be noted that if the current BEIS conversion factors were used in the report – more accurately reflecting current supply carbon content - our carbon emissions would be lower. Conversion factors 2018: Electricity = 0.30482 kg CO ₂ per kWh Gas = 0.18362 kg CO ₂ per kWh
CO ₂	The conversion factor used for our annual reporting is based on carbon dioxide, and does not account for the warming potential of other greenhouse gas emissions (expressed as CO ₂ e).
Accuracy & Verification	Data is managed by the Energy Management Team and is checked firstly by the team then by the Head of Engineering Design.