Title:	**Carbon Management Plan Annual Report 2016/17**	
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1. Executive summary

This annual report provides details on progress achieved and performance improvements made 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)

A small reduction in carbon emissions in absolute terms has been made this year compared with last, however we are unlikely to be meet the absolute target. The main reason for this is the continued growth of the Estate and increased building occupancy. Investing more money now in energy efficient technologies during the build of a new property or a refurbishment of an old will provide significant energy, cost and carbon savings throughout the life of the building. The University does have the opportunity to positively improve its own sustainability by working together and embedding energy efficiency into University policies and procedures.

If we take into account the expansion of the estate by looking at other metrics such as CO_2 per £ turnover we have made a 27% reduction compared with our baseline. It should be noted that the turnover figure used to calculate the percentage and provided by Finance includes the turnover from parts of the University that are out of CMP scope.

The amount of CO_2 per student in halls has reduced by only 1% compared with last year due to the new Chamberlain halls. However, compared against baseline CO_2 per student in halls is 41% less, reducing from approximately 2.02 tonnes of CO_2 per student in halls to 1.19 tonnes of CO_2. This is due to an increase in student numbers, completion of numerous CMP LED replacement projects and new more efficient halls.

What is clear from the results is that the efforts of the CMP Steering Group, the Energy Management Team and many others across the Estate have been effective in containing the increase in carbon emissions in absolute terms and, even though it is now unlikely that the target reduction will be achieved because of other factors outside their control, there is good reason for the University to continue to support this work.

2. Introduction

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. The aim is to make a 20% reduction in carbon emissions from energy consumption by 2020 compared to a 2005/06 baseline and a 30% reduction in carbon emissions from water consumption by 2020 compared to a 2009/10 baseline.

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 and the transition to a low-carbon economy.

3. Managing our carbon emissions

The University's carbon emissions are largely the result of:

- Heating, cooling and ventilating buildings;
- Lighting buildings and external areas;
- Energy consumed by activity e.g. research and equipment including ICT.

The University is working to deliver carbon savings in three ways:

- **Improving technology**
  - Energy efficiency improvements in planned maintenance.
  - Adjusting Building Management System (BMS) settings to reduce energy use (through shorter operating periods and/or changing temperature set-points).
  - Through the design of new buildings and refurbishment of existing buildings.
  - Investing in energy and water efficient equipment.
- **Improving systems and data collection**
  - Monitoring electricity, gas and water consumption to identify patterns of potential wastage (this may result in a maintenance fix, BMS adjustment or planning a longer term maintenance project to correct the issue).
  - Measurement and verification of savings.
- **Culture of the organisation and behaviour of staff**
  - The organisations has committed funding for carbon reduction projects through the CMP Steering Group.
  - Regular internal communications share the success of projects and highlight the importance and benefits of reducing carbon emissions.
  - Engaging and communicating with staff and students to explain environmental impacts and how they can help reduce them.
  - Using the University's carbon data as a resource for education and research.

The culture of the organisation and behaviour of staff is fundamental. With success in this area comes the implementation of improved technology, systems and data collection.

3.1 Carbon Management Plan Projects

During the reporting period 7 CMP projects were completed as shown in Table 1. Table 2 outlines projects planned for 2017/18 - 2019/20.

Table 1: CMP projects completed in 2016/17

Project type	**Project** Number & title	**Cost**	**Annual CO_2e Saving (tonnes)**	**Payback (yrs)**	**Year implemented**
Technology	CMP070 B29 Improved fume cupboards ventilation system	£60K	29	8.1	2017
	CMP195 South Hills replace 2D lighting with LED in corridors	£34K	23	6.4	2017
	CMP239 Hartley Grove C LED lighting in common areas	£25K	13	7.3	2017
	CMP240 Monte block E LED lighting in common areas	£14K	9	5.1	2017
	CMP242 B18 pump set replacement	£9K	44	1.1	2017
	CMP243 LED lighting Monte blocks C, D, F, G&H	£68K	38	5.6	2017
	CMP247 Monte VWX LED lighting in common areas	£40K	25	5.1	2017
Systems & data collection	Automatic Metering project				
Culture & behaviour	Carbon intern				

Table 2. CMP projects planned for 2017/18-2019/20

Project type	**Project** Title & description	**Cost**	**Saving**	**Payback**	**% of CO_2 target**	**Year implemented**
Technical	CMP249 B85 LED lighting in greenhouse and plant growth rooms	Project under investigation.				
	CMP251 B36 AHU6 belt driven fan replacement with plug fan	£23K	9	8.3		2018
	CMP254 B29, B30, B85 SGH replacement of dry ovens	£50K	37	7.2		2018
	CMP255 Wide Lane recycling jet wash	Project under investigation.				
	CMP256 B63A Free cooling to server room	£12K	Further information currently not available.			
Systems & data collection	Installation of building level water meters	Project under investigation.				
Culture & behaviour	No projects planned at this time.					

4. Results

Our performance against our targets are shown in Table 3. Our absolute carbon emissions decreased by 1% compared with last year (Figure 1.), this equates to approximately 240 tonnes CO_2.

Overall our electricity consumption decreased compared with the previous year, by approximately 1,139 MWh. The main reason for this was the removal of an out of scope building (the Lloyds building) from the total carbon emissions for the University. It was possible to do this after improvements and verification of the metering. Other reasons for the reduction include: the decommissioning of building 54 data centre; incorporating energy saving technologies in maintenance and refurbishment projects, for example, the installation of LED and replacing old AHU belt driven fans with plug fans; working with Faculties to improve their energy efficiency and shutting down heating and mechanical plant over the Christmas period.

The reduction made in our electricity use was offset by an increase in gas consumption compared with the previous year - predominately due to the addition of the new Chamberlain halls.

Table 3. 2016/17 performance against target and previous year

	Target	Baseline	2015/16	2016/17	2016/17 performance compared with baseline
Absolute Carbon Emissions (scope 1 & 2, tonnes)	To reduce carbon emissions from energy consumption by 20% by 2020 based on a 2005/06 baseline	32,000	32,500*	32,300	1%
Carbon (tonnes) per Staff and Student FTE	To reduce carbon emissions from energy consumption per staff and student FTE (tonnes/FTE) by 20% by 2020 based on a 2005/06 baseline	1.37	1.12	1.13	-18%
Carbon (kg) per £ turnover	To reduce carbon emissions from energy consumption per £ turnover (kg/£) by 20% by 2020 based on a 2005/06 baseline	0.103	0.058	0.055	-27%
Electricity (kWh)	To achieve a 20% reduction in electricity use by 2020 based on a 2005/06 baseline	35,868,000	32,841,000	31,702,000	-12%
Gas (kWh)	To reduce gas consumption by 20% by 2020 based on a 2005/06 baseline	86,838,000	96,221,000	97,462,100	12%
Carbon (tonnes) per student occupancy halls	To reduce carbon emissions from energy consumption per student occupancy in halls by 20% by 2020 based on a 2005/06 baseline	2.02	1.20	1.19	-41%
Water (m^3)	To reduce water consumption by 30% by 2020 from a 2009/10 baseline	567,000	496,000	497,000	-13%
Water (tonnes carbon)	To reduce carbon emissions from water consumption and disposal by 30% by 2020 based on 2009/10 baseline	552	481	482	-13%

* 2015/16 data includes estimated adjustment of Boldrewood's electricity consumption to account for inaccurate meter, CMP data has been corrected back to the date the meter was installed, January 2012.

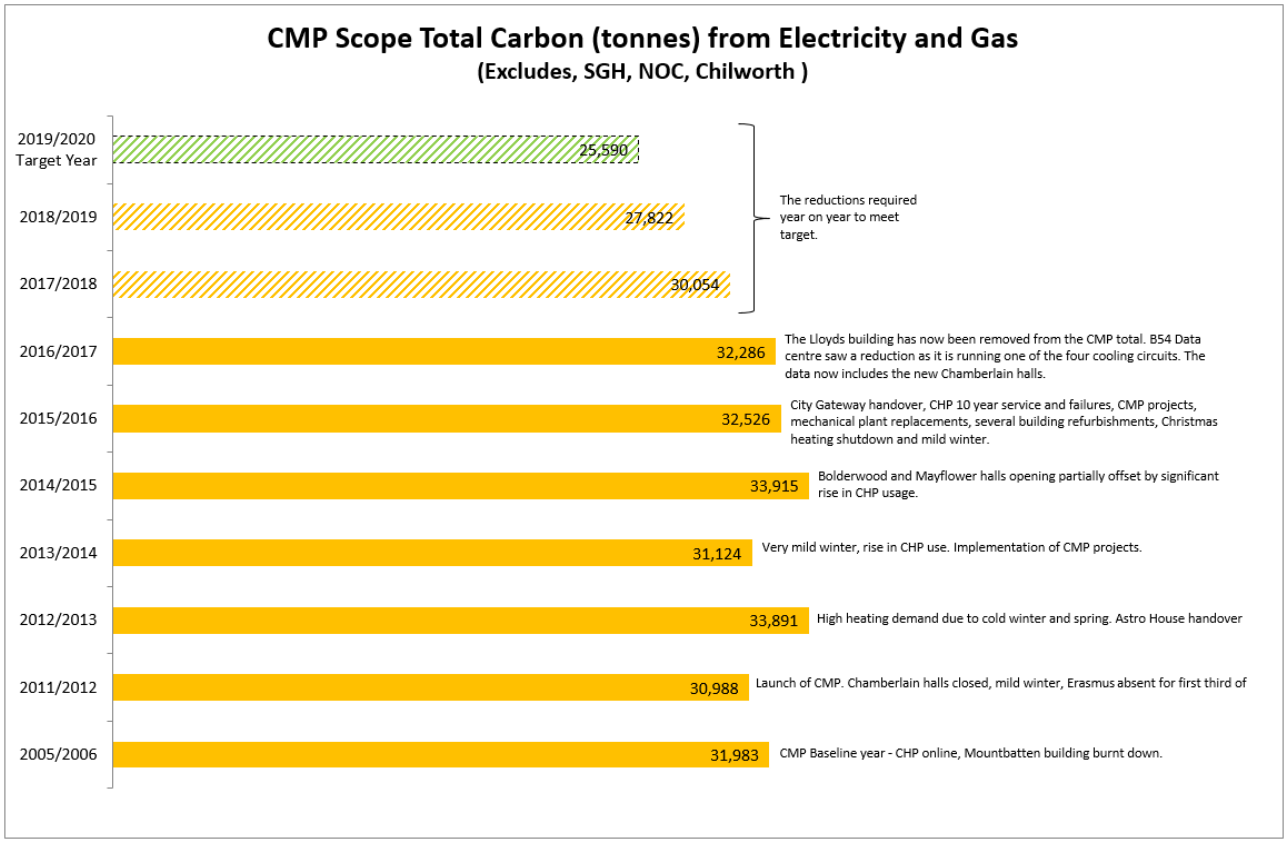

Figure 1. Absolute Carbon Emission annotated with key activities, events or changes that have impacted our performance.

5. Conclusion

In order to meet our 2020 target, the University will need to save in the region of 2,231 tonnes of CO_2 each year for the next three years.

Efforts to reduce our carbon emissions by improving technology, systems and data collection and engaging with staff and students to deliver carbon savings are being offset by the increased use of the estate as new, bigger buildings are being built and occupied, opening hours are extending and the number of people using our buildings is increasing.

Complex energy legislation means the University invests in dedicated resource to ensure compliance obligations are met. In addition maintaining and calibrating metering equipment takes a large amount of time, this detracts from the amount of time the Energy Management Team has to carry out work resulting in energy savings.

As the University nears the end of the current CMP the decision now needs to be made as to the direction of carbon management beyond 2020. What are the lessons from the current CMP and what direction does the University need to go to ensure carbon emissions continue to reduce?

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.

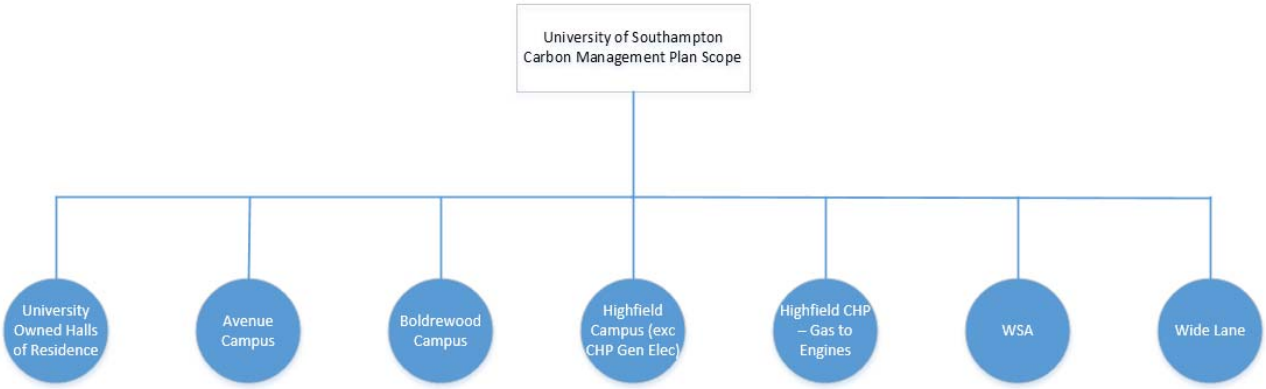

Figure1. Carbon management plan scope

Quantification and reporting

Baseline Year	1 August 2005 – 31 July 2006
Reporting period	1 August 2016 to 31 July 2017
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	This is the number of students staying at halls from the beginning of the autumn term to the end of the summer term. 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
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_2e).
Accuracy & Verification	Data is managed by the Energy Management Team and is checked firstly by the team then by the Head of Engineering Design and the Assistant Director Engineering.
CRC	The University qualifies to participate in the CRC Energy Efficiency Scheme (formally known as the Carbon Reduction Commitment) and purchases allowances each year. The scope of the CRC includes Chilworth Science Park (but excludes National Oceanography Centre and Southampton General Hospital).