

# University of Chichester

## Carbon Management Plan (CMP)

2014 – 2017



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## **Professor Clive Behagg, Vice-Chancellor, University of Chichester**

Dear Colleague

This is the University Carbon Management Plan (CMP). It is designed as one element of our commitment to environmental sustainability. Since the onset of the industrial revolution in the 18th Century, carbon dioxide levels in the earth's atmosphere are believed to have increased by 38 per cent. This is a problem created by the process of modernisation, such that global warming is now recognised as a major challenge to humanity. For this reason, we have made environmental sustainability one of University of Chichester's key strategic goals.

Our immediate target is to reduce our carbon emissions in absolute terms from our electricity, natural gas, oil, water and vehicle fuel use by 25pc relative to our 2007-08 baseline by 2014-15. We see this as an essential first step towards achieving a more ambitious target of a 43 per cent reduction in carbon emissions by 2020.

Since our first CMP in 2010 we have made significant progress, investing over £870,000 (as at Sept 2014) in energy efficiency projects across the University estate and are well on the way to achieving our initial target to reduce carbon emission by 25pc by 2015. However, we need to do more to reduce our carbon emissions if we are to achieve our 2020 target. The whole of the University has a part to play and we are actively engaging with staff and students to enlist their support to meet our environmental objectives. This may include changes in the way we work and study. We will need to adopt a wide range of energy efficient technologies and look for all the changes we can make on campus that will enable us to live and work more sustainably. Although this will require investment, with ever increasing energy costs, many of the actions within this plan will also deliver financial benefits to the University.

We have set ourselves challenging targets and these will require us to work together for their achievement. In doing so, we recognise our responsibility to global society and the heritage that our actions will create for subsequent generations.

Professor Clive Behagg

Vice-Chancellor

## Management Summary

This document provides the 2014 update to the University of Chichester's Carbon Management Plan (CMP), which sets out our strategy to achieve reductions in carbon emissions over the next two years and then onwards to 2020. The CMP was produced in line with the Good Practice Guidance provided by the Higher Education Funding Council for England (HEFCE).

The implementation of the CMP will **achieve a 25pc reduction** in the University's carbon emissions (expressed as tonnes CO<sub>2</sub> equivalent) from 2007-08 levels by the end of academic year 2014-15. This is an intermediate step in our move towards **achieving a 43pc reduction** in carbon emissions (relative to 2007-08) by 2020.

A carbon emissions baseline has been calculated using data from 2007-08 academic year, in line with HEFCE's best practice advice, and has been compared with the most recent data from the 2009-10, 2010-11, 2011-12 and 2012-13 academic years. Emissions factors were substantially revised by Defra/DECC in 2013 with the introduction of a new methodology for calculating emissions for electricity. The electricity emissions for previous years have therefore been re-calculated in this CMP update.

This updated plan identifies the projects necessary to achieve our 2014-15 emissions target, along with the organisational changes required to ensure that the necessary changes in policy, procedures and working practices are made.

In determining the University's carbon footprint we have included emissions resulting from our use of electricity, natural gas, heating oil, biomass, water and the fuel consumed by the vehicles that we operate (Scope 1 & 2 emissions). These emissions sources are compared with the emissions generated during the base year (2007-08). The calculated carbon footprints are as follows:

**3,634 tonnes CO<sub>2e</sub> in 2007-08**



**3,016 tonnes CO<sub>2e</sub> in 2012-13**

The carbon footprint for the academic year 2012-13 was 17.0pc below the 2007-08 baseline year, although there was a 1.0pc increase in emissions between 2011-12 and 2012-13. This increase can be attributed to the opening of the Sports Dome and the inclusion of emissions

generated from University managed off-campus student housing. In addition, electric heating, with its relatively higher carbon emissions compared to conventional gas heating, has been in use in temporary construction site huts and the music portacabins. Furthermore, there was an unusually prolonged period of cold weather during 2012/13 leading to increased heating requirements across the University. Degree Day analysis data shows a 13% heating demand increase from the previous year.

Achieving our interim target in 2014-15 will deliver reductions in carbon emissions of 908 tCO<sub>2e</sub>, with a cumulative value of £278,000 in savings by 2014/15.

Additional emissions data relating to waste management and staff and student commuting was collected for 2012-13, which was not included in the 2007-8 baseline data. These emissions are referred to as Scope 3 emissions and additional data for other Scope 3 emissions will be collected as the method of measurement and collection becomes available to the University. If the Scope 3 emissions sources that have been collected so far are included in the total emissions for the University the carbon footprint for the academic year 2012-13 was 5,343 tCO<sub>2e</sub>. The emissions from these sources, especially staff and student commuting, are not directly controlled by the University, they can only be influenced. This makes application of a separate reduction target from Scope 3 emissions a relevant consideration in future years.

The projects identified to deliver the carbon savings are defined within this CMP and summarised as:

- Emission savings generated from projects already completed
- Projects scheduled for implementation with estimated emission savings
- Projects identified in energy saving surveys but subject to further feasibility review and scheduling

Cumulatively, all projects completed to date have a projected capital implementation cost of approximately £873,800.

The delivery of the University's CMP is closely monitored by the Vice-Chancellor and Board of Governors, with the Deputy Vice-Chancellor responsible for reporting to them. Responsibility for the delivery of the CMP targets falls to the Director of Estate Management. Whilst the effective delivery of projects identified in the programme is essential, the need for continued funding approval is required. The development, adoption and implementation of the Carbon Management Plan demonstrates that the University takes seriously its corporate

and social responsibilities, and aims to reduce the impact of the University of Chichester's carbon emissions, thereby mitigating climate change.

## **1. Introduction**

### **1.1 Purpose of the update to the Carbon Management Plan (2014 – 2017)**

This update to the Carbon Management Plan (CMP) provides the details of the steps required to manage and reduce our carbon footprint to meet our strategic objectives.

The original plan identified the University's baseline carbon footprint (for the academic year 2005-06), and set targets for CO<sub>2e</sub> emissions reductions by 2014-15 and 2020/21. Since the preparation of the original plan the historic data on which the targets for carbon reduction were set has been re-examined. The data for 2005 is not considered to be robust and has therefore been excluded. In addition data for the years either side of this baseline year are also believed to be inaccurate. Measurement of carbon reduction performance is now based on the 2007-08 baseline year, which is considered to be reasonably robust and shows some consistency with data for subsequent years.

Progress in implementing the measures necessary to achieve the revised target reductions is described in this plan.

This updated revision of the CMP has been produced in line with the Good Practice Guidance provided by HEFCE in support of the requirements of their second Capital Investment Framework (CIF2).

### **1.2 Process of producing the original Carbon Management Plan**

The University worked through a process in producing the original carbon management plan comprising:

1. Mobilisation - cross-department co-operation has been established within the University to drive carbon reduction activities within their respective areas.
2. Carbon Footprint - a carbon footprint has been established which reflects the activities of the University.
3. Options to reduce carbon emissions - a programme of carbon reduction initiatives has been agreed covering all areas of the University's activities, providing a cost effective route to emissions reduction.

4. Carbon emission reduction targets were set, based on implementation of the reduction measures.
5. Carbon Management Plan - a carbon management plan has been produced to summarise the above steps and provide a record of our carbon reduction activities.

### **1.3 Past achievements**

The University has recently accelerated its activities to achieve efficient buildings and to improve the carbon efficiency of its operations. These activities have been underpinned by:

- The adoption of an Environmental and Sustainable Development Strategy (which is the foundation of this CMP)
- The University sought to support its Environmental and Sustainable Development Strategy through the establishment of a Green Campus Group and the appointment of an Energy Officer and an Environment Officer (appointments in 2008-9).
- The adoption of BREEAM 'Excellent' standards for new buildings and 'Very Good' for refurbishment projects.
- The acquisition of a £125,000 Revolving Fund from Salix to finance appropriate "spend to save" energy effecting projects (projects already implemented under the scheme include loft insulation and upgraded heating controls).
- The successful bid for funding totalling £500,000 in funding for LED lighting and controls, secured in 2013, from HEFCE's third round of the Revolving Green Fund (RGF3). The project is scheduled for completion in September 2014 and is estimated to save approximately 410 tonnes CO<sub>2e</sub> and £101,600 per annum.

## **2. Carbon Management strategy**

The University has developed this carbon management plan to respond to a range of drivers, both internal and external. These are outlined in this section and their significance discussed. Also outlined are our strategic themes, which explain the key areas in which we will respond to the drivers for carbon management. Finally, the target we will adopt for carbon reduction which quantifies our response is explained.

### **2.1 Context and drivers for Carbon Management**

The scientific evidence indicates that global average temperature is continuing to rise in a manner that is causally related to elevated atmospheric concentrations of “greenhouse” gases, most notably carbon dioxide, CO<sub>2</sub>. This threat to global climate posed by increasing CO<sub>2</sub> emissions is already defining new policy, regulation and legislation locally, nationally and internationally, a trend we can expect to accelerate.

Internationally, at the Copenhagen Climate Summit in December 2009, it was resolved that the world treaty on climate change will be delayed by up to a year. This should allow all countries to fully establish the level of emissions that they are able to commit to through legally binding reductions.

Nationally, the UK Government has set legally binding targets through the Committee on Climate Change for reductions in UK CO<sub>2</sub> emissions of 34pc by 2020 and 80pc by 2050 against a 1990 baseline. To achieve these further drivers have been introduced, these are:

- Building Regulations 2010 – Part L (update 2013)
  - These set out requirements for energy efficiency and the effective control of buildings and associated plant. These regulations apply to both new buildings and refurbishments.
- EU Energy Performance of Building Directive (EPBD)
  - There is a set methodology for calculating the energy performance of buildings, the introduction of regular inspections of cooling, heating and boiler installations, a set of performance standards applicable to both new and

existing buildings, and a certification scheme for both new and existing buildings.

- Energy performance certification (EPC) is required for all new buildings and when existing buildings are rented out or sold on. There is also a requirement for larger public buildings (over 500m<sup>2</sup>) to show a display energy certificate (DEC) in a prominent position within the building. This certificate must be renewed annually.
- HEFCE Funding
  - HEFCE has committed the Higher Education sector to Government targets in respect of Scope 1 and Scope 2 emissions. As many HEI's do not have robust carbon emissions data for 1990/91, HEFCE have converted the UK national targets to be equivalent to a 43% reduction relative to 2005/06 (reflecting the general increase in carbon emissions that had occurred in the HE Sector between 1990 and 2005). HEFCE also proposes that the HE sector commits to making reductions in Scope 3 emissions, with the intention of setting targets for these emissions when measurement technology permits (see Appendix A for the definitions of Scope 1, 2 and 3 emissions).
  - The then Department for Education mandated HEFCE to promote sustainable development actively and to reflect it in the capital funding allocation for Colleges and Universities. Accordingly, a requirement of CIF2 is that HEIs have an adequate Carbon Management Plan by the end of September 2010.
  - The HEFCE consultation on carbon reduction strategy (July 2009) regarded carbon management as part of the risk management process for an institution and HEFCE produced further best practice guidance on producing a carbon management plan.

There are in addition other significant drivers which impact upon the University:

- Value for money
  - As the public sector finances tighten, it is important that efficient use is made of public funds and that cost savings are realised wherever possible. Many carbon reduction measures correspond to efficiency improvements, yielding cost savings.

- Volatility of the energy markets
  - Over recent years the energy market has become increasingly volatile. Despite forecasts that energy markets will stabilise they have not and the underlying trend is for the costs to rise. In order to manage this risk, it is necessary to ensure that all energy is used as efficiently and effectively as possible.
- Reputation and Image
  - It is important that institutional reputation and appeal for future recruitment of both students and staff is considered. Further, our reputation to external stakeholders in taking action to reduce carbon emissions should, going forward, be promoted through effective communication of a coherent strategy.

## **2.2 Strategic themes**

The strategic themes in reducing our carbon emissions are:

- Integration of carbon reduction into existing University policies/procedures and development of new ones where required.
- Ensuring any new building or refurbishment projects are as low carbon as possible.
- Ensuring that our estate is fit for purpose, space efficient, well maintained and effectively managed to minimise carbon emissions.
- Raising awareness across the University so that everyone can play their part in reducing our emissions.
- Implementing cost effective 'spend to save' energy efficiency measures.
- Seeking opportunities to incorporate Low and Zero Carbon (LZC) technologies into our building stock.

## 2.3 Targets

Our immediate target is to reduce our carbon emissions in absolute and relative terms in accordance with HEFCE guidance as follows:

### **Absolute**

- a net reduction in carbon from the baseline year emissions.

### **Relative**

- the ratio of carbon emissions per student and staff FTE;
- the ratio of income to carbon emissions.

These targets shall be for our electricity, natural gas, oil, and vehicle fuel use in line with HEFCE CIF2 guidance. Water is not currently measured for carbon for EMR returns other than Steam/hot water. However, this plan includes targets for carbon reduction which includes water.

The overriding target is to reduce carbon emissions in absolute terms by 2020 to support HEFCE to deliver the UK national target of a 43% reduction relative to 2005/06. We have taken a two stage approach to targets by setting an interim target for 2014/15 and a longer term target for 2020:

- 25pc reduction in emissions levels from 2007-08 to 2014-15;
- Achieving guideline by 2020 (sector wide guideline of 43pc reduction relative to 2007-08 baseline).

Relative targets will be developed during 2014-15 to complement the University's overarching absolute carbon reduction target.

Over the forthcoming years this CMP will be revised and fresh opportunities sought to accelerate our progress towards the 2020 target. It is likely that achieving the 2020 target will require significant investment in advanced low and zero carbon technologies such as biomass boilers, combined heat and power (CHP) and photovoltaic cells.

### 3. Emissions baseline and projections

Data was collected to cover the emissions sources of the University and the corresponding carbon emissions calculated to produce our carbon footprint. The effect of reducing our emissions to meet our reduction target was then evaluated, providing an estimate of the value at stake to the University if the emissions could be reduced.

#### 3.1 Scope

The emissions sources currently included in our baseline carbon footprint are, by scope of emissions:

##### **3.1.1 Emission sources currently included in the carbon footprint**

Scope 1	Scope 2	Scope 3
Natural gas consumption Heating oil consumption Biomass consumption Owned/leased vehicle fuel use	Electricity consumption	Water consumption

*See Appendix A for the definitions of Scope 1, 2 and 3 emissions*

Over time, the number of emissions sources included in the carbon footprint will be expanded once data is collected by the University. It will cover:

##### **3.1.2 Emission sources to be included in the carbon footprint**

Scope 1	Scope 2	Scope 3
Fugitive emissions from refrigerant gases		Procurement Outsourced services (e.g. inter-campus bus service) Business travel

The measures to expand the emission source data are outlined in section 6.2. There is already information from HEFCE available to assist in addressing these areas and some Universities already have commenced reporting on wider scope 3 emissions sources.

### **3.2 Sources of data**

All data used to produce the baseline emissions footprint, and that of subsequent years was taken from Estates Management Returns (EMR), with the exception of electricity, biomass and water. In these cases the consumption figures reported in the EMR were used and then converted to emissions using the appropriate UK Government Conversion Factors for Company Reporting. The EMR data is based on actual reported usage. It should be noted that in 2012-13, for the first year, a deduction was made for gas and electricity used for commercial purposes from the University supplies as part of the EMR statistics. (This included portions of usage in the Dome, Business Incubator Centre and the kitchens on both campuses). This was estimated to account for about 13% of total emissions from gas and 17% of total emissions from electricity.

As the composition of the fuel used to supply the national grid varies annually, the carbon intensity of the emissions for each kWh of electricity used also varies. Therefore, in line with best practice, a time-series for the emissions factors, taken from the UK Government Conversion Factors for Company Reporting for electricity for the appropriate year has been used. These emissions factors were substantially revised by Defra/DECC in 2013 with a new methodology for electricity reporting being introduced. Therefore, the carbon footprints calculated previously for the original CMP are not directly comparable with the carbon footprints calculated in this report.

EMR data collection was not mandatory until 2011 therefore institutions were at liberty to provide some or all of the data. Data collection was originally driven by estate professionals, for estate professionals, in order to better manage the estate function. It relied on individual institutions committing appropriate resources to collate the data. Smaller institutions, with limited technical, professional and administrative resources, were at a disadvantage in being able to commit to data collection for a non-mandatory return.

The change to mandatory data collection and the use of the data by HEFCE and others for UK wide statistical and strategic planning purposes coupled with the use of the data to

measure individual institution's performance has meant that all institutions are investing in more accurate data collection.

An analysis of the historic data 2003 – 2007 shows missing data for carbon emissions for 2004/05 and an inconsistency in the measured floor area over the same period. The known floor area increase totalling 5,025 m<sup>2</sup>, which occurred in 2006/07 (based on building handover dates) would appear to be attributed to 2005/06. There is limited correlation between usage, emissions, floor area, student/staff numbers and income. The collection of data for the period 2003 – 2007 was undertaken by an individual and from 2007 onward at least two people were involved. A full-time Energy Officer was appointed in 2009 with responsibilities for co-ordination of the collected energy data.

Data from 2007-08 is considered to be sufficiently reliable to use as a baseline to enable performance targets to be set. The quality of the historic data used in the 2011 CMP, upon re-examination, was not sufficient for the purposes of producing subsequent CMPs. Therefore, measurement of carbon reduction performance is now based on the 2007-08 baseline which is considered to be reasonably robust and shows some consistency with data for subsequent years.

### 3.3 Baseline

- Scope 1 and 2 baseline carbon footprint for the academic year 2007-08 was 3,634 tonnes CO<sub>2e</sub>.
- Scope 1, 2, and 3 carbon footprint for the academic year 2012-13 was 5,343 tonnes CO<sub>2e</sub>, however, this is the first year that waste management (39 tonnes CO<sub>2e</sub>) and staff and student commuting emissions sources (2,288 tonnes CO<sub>2e</sub>) have been added to Scope 3 emissions. The emissions from these sources, especially staff and student commuting, are not directly controlled by the University, they can only be influenced.
- The comparable carbon footprint (Scope 1 and 2) for the academic year 2012-13, including the corresponding emissions sources to 2007-8 was 3,016 tonnes CO<sub>2e</sub>, representing a 17.0pc decrease from the 2007-08 baseline and a 1.0pc decrease from 2011-12 to 2012-13.

The following table, 3.3.1 illustrates the composition of the carbon footprint:

**3.3.1 Composition of the carbon footprint**

Emissions source		Emissions (tonnes CO <sub>2</sub> ) 2007/8	Percentage 2007/8	Emissions (tonnes CO <sub>2</sub> ) 2008/9	Percentage 2008/9	Emissions (tonnes CO <sub>2</sub> ) 2009/10	Percentage 2009/10	Emissions (tonnes CO <sub>2</sub> ) 2010/11	Percentage 2010/11	Emissions (tonnes CO <sub>2</sub> ) 2011/12	Percentage 2011/12	Emissions (tonnes CO <sub>2</sub> ) 2012/13	Percentage 2012/13
<b>Scope 1</b>	Gas	1,530	42.1	1,566	41.0	1,226	36.2	1,146	37.0	1,121	37.5	1,141	21.4
	Heating oil	81	2.2	89	2.3	63	1.9	47	1.5	57	1.9	75	1.4
	Biomass	-	-	-	-	-	-	-	-	5	0.2	2	0.04
	Owned/ leased	-	-	86	2.3	93	2.7	90	2.9	17	0.6	20	0.4
	Fugitive emissions	-	-	-	-	-	-	-	-	-	-	-	-
	<b>Sub-Total: (Scope 1)</b>	<b>1,611</b>	<b>44.3</b>	<b>1,655</b>	<b>43.3</b>	<b>1,289</b>	<b>38.1</b>	<b>1,193</b>	<b>38.6</b>	<b>1,183</b>	<b>39.6</b>	<b>1,218</b>	<b>22.8</b>
<b>Scope 2</b>	Electricity	1,971	54.2	2,030	53.1	1,956	57.8	1,756	56.8	1,730	57.9	1,724	32.3
<b>Sub-Total: (Scope 1 &amp; 2)</b>		<b>3,582</b>	<b>98.6</b>	<b>3,771</b>	<b>98.7</b>	<b>3,338</b>	<b>98.6</b>	<b>3,039</b>	<b>98.2</b>	<b>2,930</b>	<b>98.1</b>	<b>2,961</b>	<b>55.1</b>

3.3.1 Composition of the carbon footprint (contd)

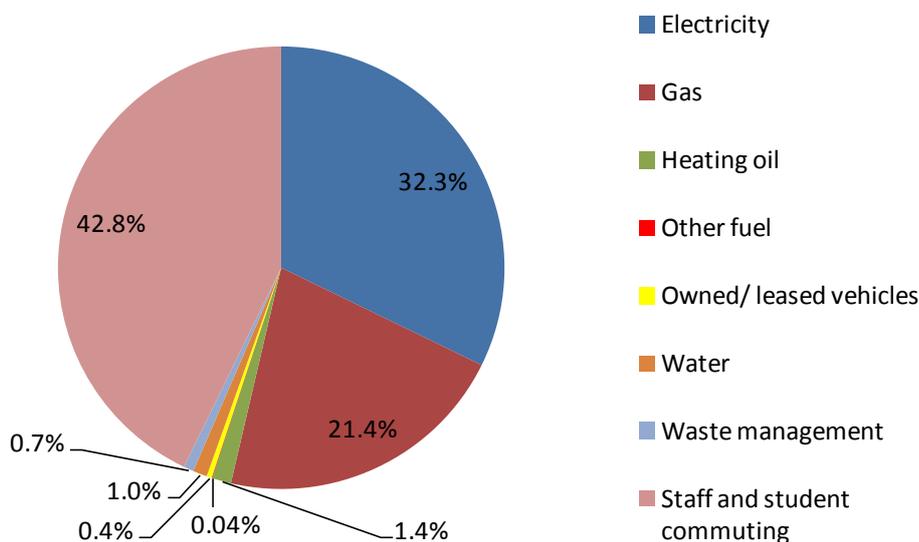
Emissions source	Emissions (tonnes CO <sub>2</sub> ) 2007/8	Percentage 2007/8	Emissions (tonnes CO <sub>2</sub> ) 2008/9	Percentage 2008/9	Emissions (tonnes CO <sub>2</sub> ) 2009/10	Percentage 2009/10	Emissions (tonnes CO <sub>2</sub> ) 2010/11	Percentage 2010/11	Emissions (tonnes CO <sub>2</sub> ) 2011/12	Percentage 2011/12	Emissions (tonnes CO <sub>2</sub> ) 2012/13	Percentage 2012/13
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<b>Scope 3</b>	Water	52	1.4	49	1.3	48	1.4	55	1.8	57	1.9	55	1.0
	Waste management	-	-	-	-	-	-	-	-	-	-	39	0.7
	Procurement	<i>Data from these emission sources to be acquired</i>											
	Outsourced services												
	Business travel												
Commuting (staff & students)	-	-	-	-	-	-	-	-	-	-	-	2,288	42.8
<b>Sub-Total: (Scope 3)</b>		52	1.4	49	1.3	48	1.4	55	1.8	57	1.9	2,382	44.6

<b>Grand Total: (Scope 1, 2 &amp; 3)</b>		3,634	100.0	3,820	100.0	3,386	100.0	3,094	100.0	2,987	100.0	5,343	100.0
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The majority of 2012-13 emissions relate to Scope 3, Staff and Student commuting as shown in the pie chart, 3.3.2:

### 3.3.2 Breakdown of emissions 2012-13



The University's Sustainable Travel Plan has strategic goals to reduce Staff and Student commuting.

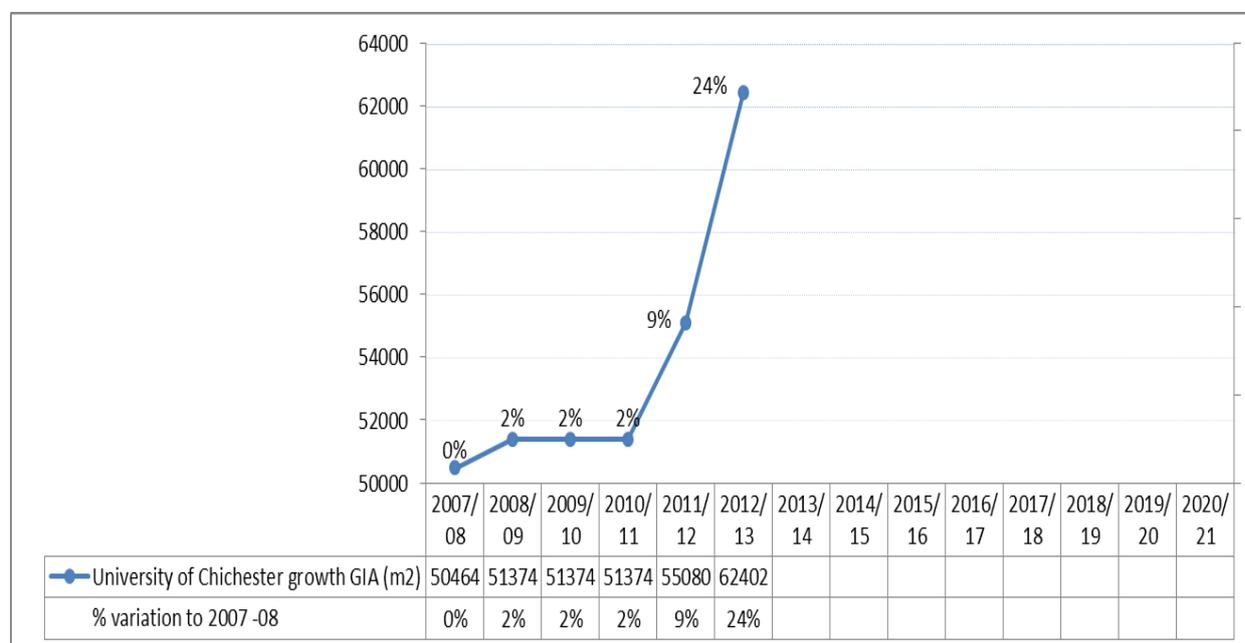
The University's estate has changed significantly between 2007-08 and 2012-13, increasing in area by 11,938 m<sup>2</sup>. A 2,000m<sup>2</sup> Learning Resource Centre opened at the Bognor campus in January 2012 and in addition, the refurbishment of the Dome, a Grade II listed building, was completed in spring 2011. With both these projects, the University committed to and achieved a BREEAM rating of "excellent" for the new LRC and are aiming to achieve a rating of "very good" for The Dome refurbishment. The latter was particularly ambitious given the strict planning controls the building is subject to. The opening of the new Learning and Resources Centre represented an estimated 66 tonnes increase in emissions. At the same time the Mead Centre and Science Block were demolished, estimated to reduce emissions by 30 tonnes CO<sub>2e</sub>.

The 2600 m<sup>2</sup> Sports Dome on the Bishop Otter campus was completed during 2012. It is estimated that its emissions will be about 285 tonnes CO<sub>2e</sub> due to fabric protection heating and lighting use. The University has leased houses off-campus, which it manages as student accommodation from September 2012. There is also a 1,000m<sup>2</sup> extension to the Tudor Hale Centre for Sport at Chichester which is expected to add a further 85 tonnes CO<sub>2e</sub> to the University's emissions. The John Parry Centre, Business Incubation Centre, Theatre at Bognor campus and LRC at Chichester campus have all been refurbished during summer 2012 incorporating energy saving measures which is expected to reduce emissions for these buildings in subsequent years.

The graph below, 3.3.3 shows a 24% Gross Internal Area growth of the University relative to the baseline year of 2007/08

(Source: HESA EMR)

### 3.3.3 University of Chichester's GIA Growth

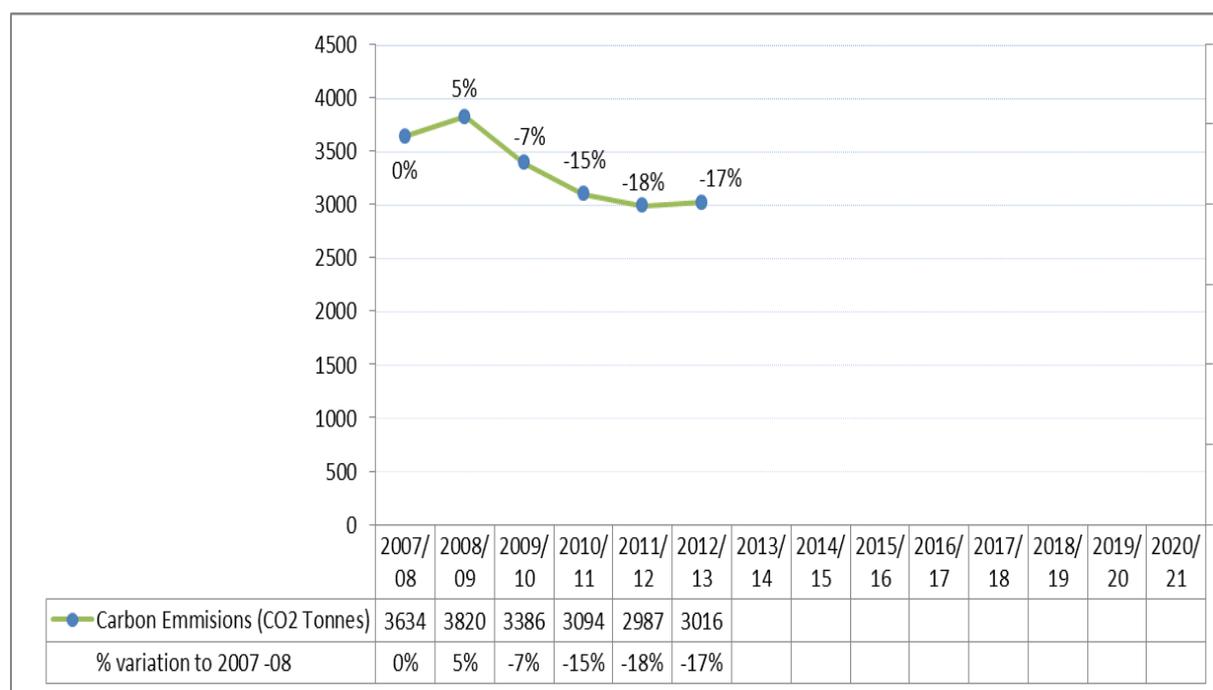


The small increase in CO<sub>2</sub> emissions between 2011-12 and 2012-13, as illustrated in Graph 3.3.4 below, can be attributed to the opening of the Sports Dome, the extension to the Tudor Hale Centre for Sport and the acquisition of University managed off-campus student

housing. In addition, electric heating, with its relatively higher carbon emissions compared to conventional gas heating, has been in use in temporary construction site huts and the music port-a-cabins. Furthermore, there was an unusually prolonged period of cold weather during 2012/13 leading to increased heating requirements across the University. Degree Day analysis data shows a 13% heating demand increase from the previous year..

However, cumulatively the effect of estate changes and the carbon reduction projects implemented has been an overall reduction in emissions by 17% between 2007/8 and 2012/13, primarily due to reduced electricity and heating fuel consumption.

### 3.3.4 - Carbon emissions 2007/08 to date



The University’s emissions can be apportioned as being approximately 50% from residential areas and 50% from non-residential areas according to their respective floor areas. The precise contribution from these different aspects will be determined in more detail once additional building sub-metering has been installed and operated for a year – see section 4 for further details.

### 3.4 Emissions projections

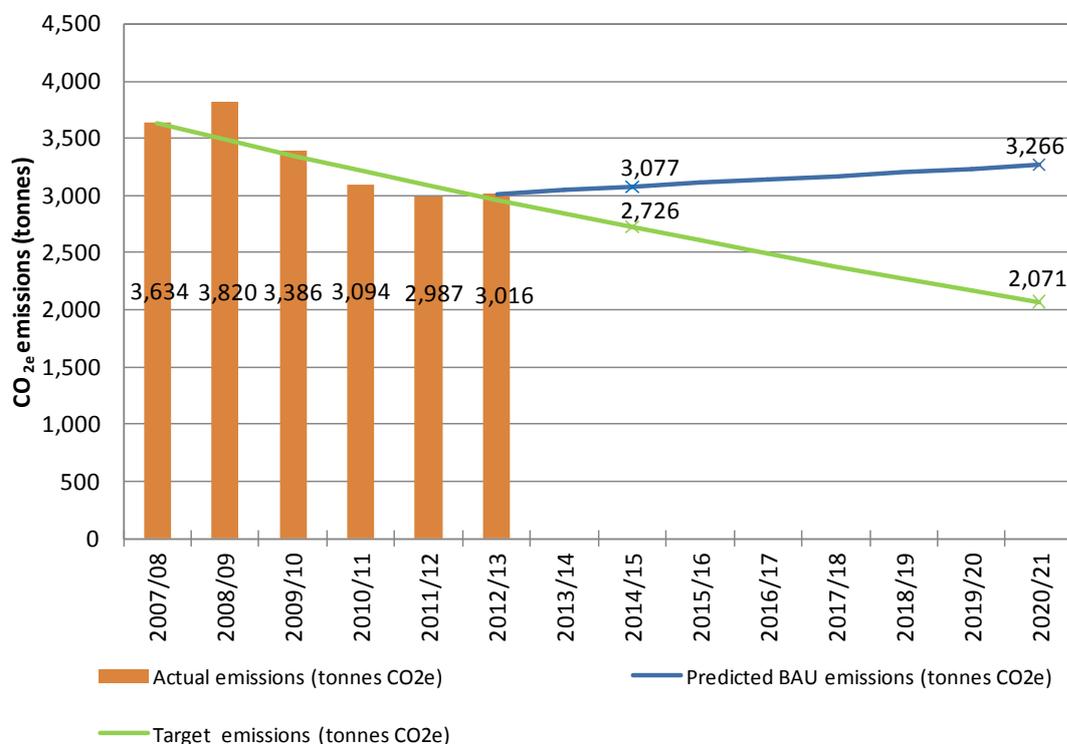
The projected carbon emissions for a 'business as usual' (BAU) scenario have been calculated and are shown in the following graph (3.4.1). Further developments to the University's estate may see an increase in the University's carbon emissions; this could include longer opening hours at some buildings. An allowance of 1% per year increase in emissions has been made to allow for future growth. The BAU scenario shows the 2007/08 base year, the carbon footprints for 2009/10, 2010/11, 2011/12, and 2012/13 and how the emissions will grow if no remedial actions are taken.

The HEFCE guideline of 43% for carbon reduction by 2020 for the HE sector as a whole is challenging for the University of Chichester. 22% of the buildings within the University's estate are listed. This is disproportionately higher than the sector medium of 9%. This presents major difficulties to the University's ability to reduce carbon emissions. The University is also subject to constraints as large parts of the estate are located within conservation areas. This places limitations on the University's ability to introduce some low carbon technologies such as photovoltaic cells and wind turbines. Despite this, the University is committed to reducing its carbon emissions and has agreed an aspirational target of 43% by 2020 compared to 2007/8 baseline. This target is ambitious and will require additional carbon reduction measures as yet to be identified. To do this, the University is planning a series of feasibility studies to evaluate the use of Combined Heat and Power, biomass boilers and other currently available technologies that will help deliver the 43pc projected reduction in carbon by 2020.

The graph 3.4.1 shows the Carbon footprints, projections for business as usual and achieving target reduction, and also shows the reduction in emissions required for the target scenario of:

- 25pc reduction in emissions levels from 2007-08 to 2014-15
- Achieving guideline by 2020 (sector wide guideline of 43pc reduction relative to 2007-8 baseline)

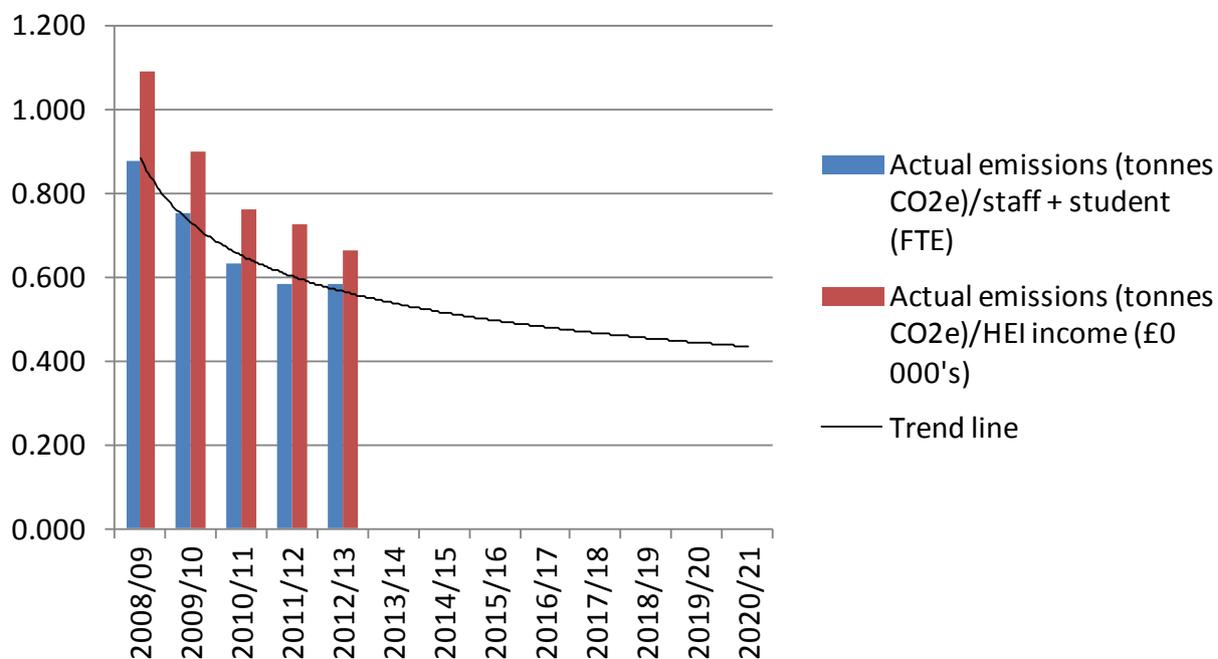
### 3.4.1 Carbon footprints and projections for business as usual and achieving target reduction



The graph 3.4.1 illustrates that to achieve the interim target reduction, total emissions will need to reduce by 351 tonnes by 2014-15 (relative to the BAU projection for that year).

The growth of the University can also be compared to the change in its emissions using growth metrics. For the University these are taken from the Estates Management Returns. They consist of staff and student numbers (measured using Full Time Equivalent) and HEI income. The staff and student numbers reflect the increased numbers of people regularly using the building whilst the HEI income can reflect other activities at the University such as conferencing which also impact on the University's emissions. When the University's actual emissions are compared to these growth metrics they show a continuous reduction, as illustrated in 3.4.2 below. They reduced by about 34pc relative to staff and student numbers and 39pc relative to HEI Income, between 2008-09 and 2012-13. A significant reduction in emissions has therefore already occurred relative to the University's growth. When the University's water emissions are similarly analysed (the only source which has increased in absolute terms over the period of the CMP) it shows that they have also shown a relative reduction when compared to staff and student numbers.

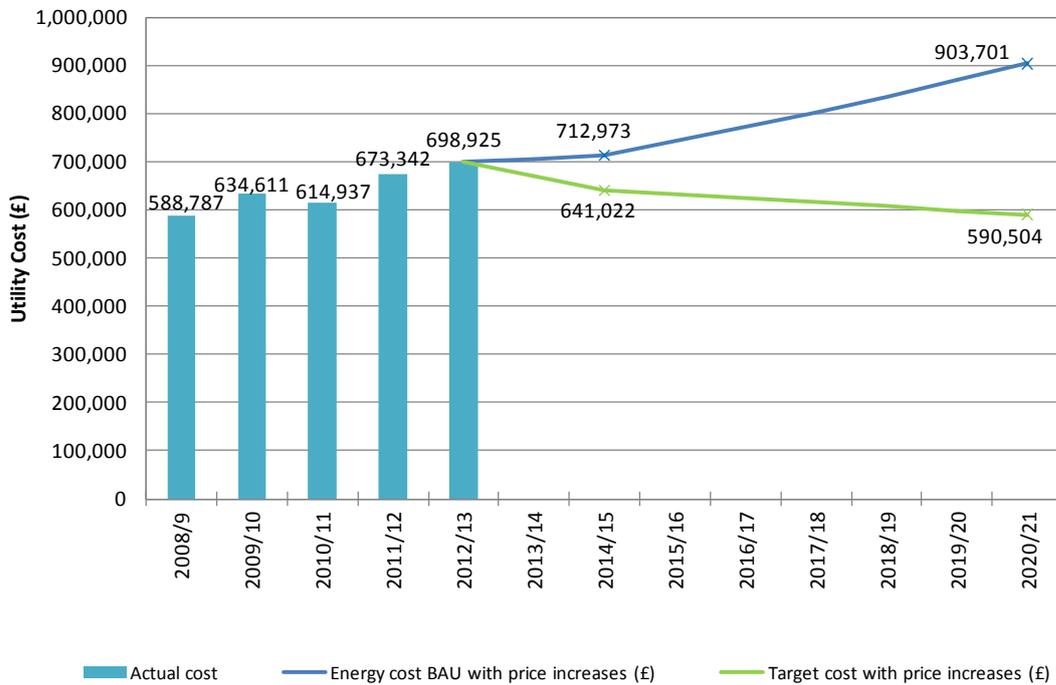
### 3.4.2 Comparison of the actual emissions to the University's growth metrics



### 3.5 Value at stake

The effect of these energy saving measures on utility costs has also been assessed. The following graph (3.5.1) illustrates the effect of increasing BAU consumption (as above), combined with projected increases in utility costs. The University's three year fixed price energy contracts commenced in September 2012. It is assumed that there will be a 3% year-on-year increase in utility costs thereafter (source: the Carbon Trust's HECM toolkit).

**3.5.1 Financial value at stake**



The graph 3.5.2 shows that if the target reduction can be achieved, then by 2014-15 utility costs would have been reduced by about £72,000 per year relative to BAU projections. Cumulatively, the savings achieved over the period to 2014-15 would equate to approximately £108,500.

## **4. Carbon Management Projects**

Current consumption data has been used to calculate the savings from implementing a range of projects. These are summarised and their estimated effect on the University's carbon footprint in future years is shown. An update on the progress in implementing projects over the last year is also provided.

### **4.1 Projects completed:**

Appendix B summarises the projects completed since the CMP commenced in 2010. Together their net annual effect was estimated as saving 558.3 tonnes CO<sub>2e</sub>, and £133,900 for a capital investment of £373,800. The emissions reduction associated with these projects has been assumed to take full effect in the year following the project's completion. This is equivalent of saving 15pc of 2007-8 carbon emissions.

### **4.2 Future carbon reduction projects:**

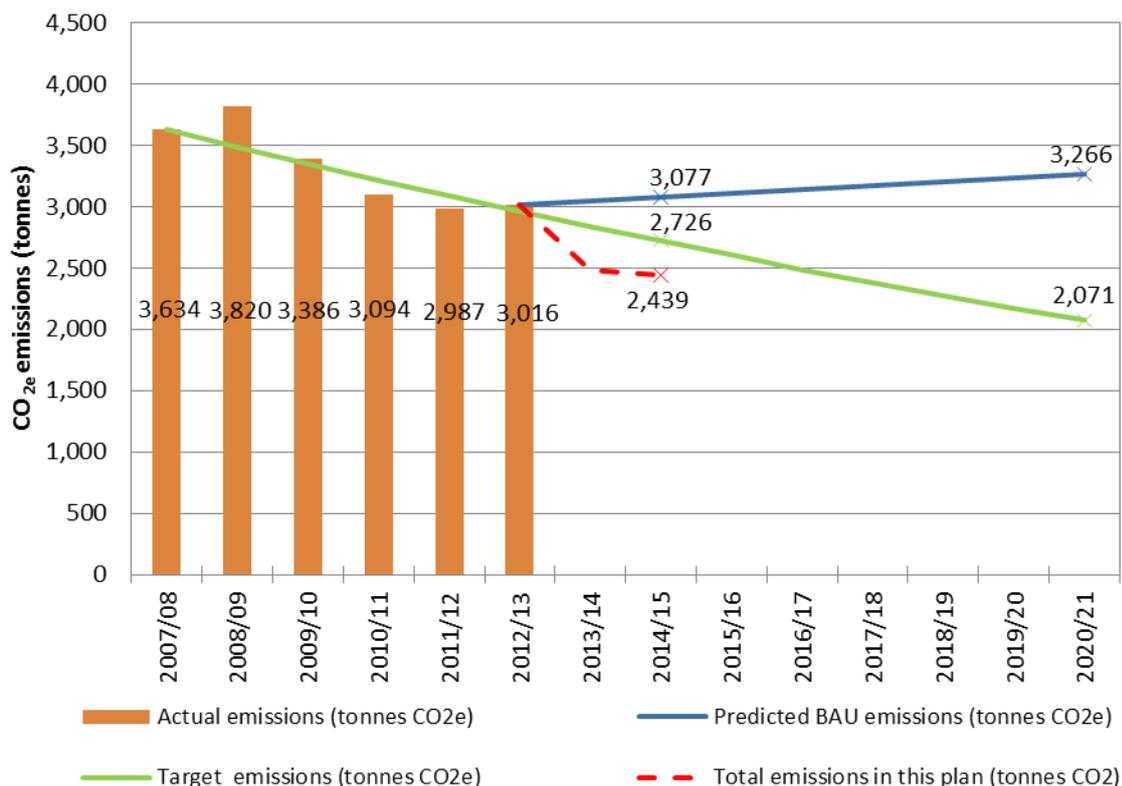
A series of carbon reduction projects are planned for implementation and are summarised in Appendix C. The largest project planned for completion within the next year is installation of LED lighting together with lighting controls funded by RGF3 which is estimated to save annually 411 tonnes CO<sub>2e</sub> and £101,600. Energy surveys of the University buildings have been conducted to identify further carbon reduction measures, the total savings are summarised in Appendix D. The implementation of the projects identified in the surveys and their scheduling has still to be determined. The IT related projects are summarised in appendix E, with estimates of savings where available. This list is not exclusive and further opportunities will be investigated.

### **4.3 Projected achievement towards emissions reduction target**

The following graph (4.3.1) illustrates the estimated effect of implementing the projects outlined in Appendices B, C and E on the University's carbon footprint. The emissions reduction associated with the projects listed has been assumed to take full effect in the year following the project's completion. It shows that by 2014-15 the University's emissions will

reduce by 638 tonnes CO<sub>2</sub> per year (to 2,439 tonnes CO<sub>2e</sub> per year) compared to business as usual. This predicts that emissions will exceed the 2014-15 target emissions of 2,726 by 287 tonnes CO<sub>2e</sub>. Currently a further 368 tonnes CO<sub>2e</sub> are required to be identified to achieve the 2020-21 target. However, not all projects outlined in sections 4.1 and 4.2 are fully quantified, therefore, it is possible that the 2020-21 target will be met if all the projects planned for future years are implemented. In addition, as part of planned maintenance and replacement of engineering plant (heating and hot water), there may be savings identified which will deliver carbon reduction benefits. The carbon reduction targets should therefore be achievable assuming that the University community also engages and plays its part in delivering carbon emissions reduction.

**4.3.1 Carbon emissions: impact of measures in this plan**



## 5. Implementation Plan financing

This plan will require further capital investment of over £1M to fully implement (with some projects still subject to further confirmation following surveys) and these together with the projects already implemented will provide annual energy cost savings of approximately £320,776. The payback period for the capital cost of the measures yet to be implemented is estimated to be five years. It is anticipated that the funding will be provided from a range of sources, including University, Salix and RGF funding.

### 5.1 Assumptions

The current gas and electricity utility costs are fixed for the next year but will then change over the remaining year of the five year plan, with energy costs likely to increase. This may have the effect of reducing the payback period for some measures as cost savings increase, assuming that implementation costs do not suffer a corresponding increase.

### 5.2 Benefits / savings – quantified and un-quantified

The following table 5.2.1 summarises the projected annual cost and emissions savings provided from the measures outlined in Section 4:

**5.2.1 Projected annual cost and emissions savings**

	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
<b>Total cost saving (£ pa)</b>	£121,274	£139,239	£303,007	£308,776	£308,776	£309,776	£320,776
<b>Total CO<sub>2e</sub> saving (tonnes pa)</b>	577	581	1,145	1,169	1,169	1,174	1,178

As well as the quantifiable financial and carbon reduction benefits there are additional non-financial benefits for the University:

- enhanced reputation;
- improved building comfort for staff and students

### 5.3 Additional resources

Many of the measures outlined in Section 4 involve staff resource to implement. In some cases this would be time that they would already be spending in implementing the measures (such as refurbishments) but others will require additional time to be spent investigating new opportunities for carbon reduction. This may add additional costs for some projects, which has not been quantified at this stage. Any significant additional staff costs will be assessed as the measures are approved.

### 5.4 Financial costs

The following table 5.4.1 summarises the projected capital costs as outlined in Appendix C

#### *5.4.1 Projected capital costs (£)*

	<b>2014/15</b>	<b>2015/16</b>	<b>2016/17</b>	<b>2017/18</b>
<b>Total capital cost</b>	£868,829*	£14,078*	£106,520*	£8,000*

\*Further quantification expected following energy survey analysis

## 6. Actions to Embed Carbon Management within the University

Appendix F contains a carbon management embedding matrix and the highlighted entries summarise the current status of University of Chichester for each area in relation to carbon management. This plan aims to improve the rating in each area as follows:

### *6.01 Progress against carbon management embedding matrix*

<b>Area</b>	<b>2013</b>	<b>Anticipated status by end of plan</b>	<b>Sections detailing how this is achieved</b>
Policy	4	5	6.3
Organisation	3	5	6.1, 6.4
Information and data	3	5	6.2
Communication and training	3	5	6.4
Finance	4	4	5
Monitoring and evaluation	3	5	6.4

### 6.1 Corporate Commitment

The University demonstrates its commitment to carbon reduction by making this plan publicly available on our website and linking it to our awareness raising activities. The University already has Environmental targets on energy use and carbon reduction within its strategic plan. As part of the review process for the corporate plan, annual targets will be established and all existing ones will be updated to ensure compatibility with the findings of the CMP.

All current and new University strategies are required to respond to the University's strategic plan and, therefore, the targets on energy and carbon reduction. In addition, in November 2013 the Board of Governors approved the University's second Environmental and Sustainable Development Strategy, which has efficient use of all resources and reduction of

the University's carbon footprint at its core. The aim is to embed environmental decision making within all the University's activities.

We will ensure that our carbon reduction target is included in our Operating Statements which forms the University's Corporate Plan when it is next reviewed.

Similarly, when professional services or academic department strategic plans are reviewed we will ensure that carbon reduction is included with relevant areas for action outlined in each case. This will ensure that local commitment to action is achieved by finding specific relevant carbon reduction priorities and ensuring that it is appropriately resourced.

## **6.2 Data Management**

There are actions which we will take to improve data management:

- Electricity, gas and water data capture can be improved by the provision of Automatic Meter Reading and sub-metering which makes accessible meter readings every half-hour.
- Travel data capture procedures are to be put in place with our vehicle leasing company.
- The University has produced the Sustainable Travel Plan 2013-2016 update. This covers both commuting to sites and business travel. There is survey data on current commuting patterns but further work is planned to capture business travel.
- There is a target within the updated Environment and Sustainable Development Strategy to develop a system for recording the University carbon footprint for business travel by the end of December 2013 and staff and student commuting (including the intercampus bus) by the end of December 2014. The on-line expenses system, to be launched in September 2014, will include data collection for business travel.
- A target for developing a system to measure carbon emissions from waste generated and disposed of on campus by end of December 2014 will be added to the Environment and Sustainable Development Strategy when it is next updated. Waste Management emissions data has been captured. Waste and recycling data could also be improved by conducting a periodic audit of the composition of the waste.

A complete data set will be collected annually for use by the Environmental and Sustainable Development Steering Group, with Estate Management staff responsible for leading the data collection process. The data will be used to monitor carbon reduction projects and ensure that they remain on target to deliver the savings expected.

The data will be provided as required for use in awareness raising activities.

### **6.3 Policy Alignment**

It is important that all key policies for the University include carbon management so that it can be fully integrated as best practice in the University's day to day operations. There will be an on-going review of these policies by the Environmental and Sustainable Development Steering Group to ensure that they remain fit for purpose.

The University could adopt Operational Energy Standards. These would include a heating policy, a cooling policy, a controls policy and an energy efficient IT policy:

- A heating policy could cover: the suitable temperatures; how hard to heat areas will be managed, including use of portable heaters; and the times that areas will be heated. This could be extended to include how, in future years, use could be made of the existing card heating controls fitted to Bishop Story and Bishop Andrews halls at Chichester and all the accommodation at Bognor Regis. These controls would enable a base amount of heating to be covered in the rent with incentives for lower use and penalties for higher use, driving student behaviour towards efficient use of heating.
- A cooling policy could cover: appropriate use of cooling systems; temperature settings to avoid conflict with heating; time controls; appropriate use of office fans and installation of new comfort cooling systems.
- A controls policy could cover: the need for tamper proof controls; the use of thermostatic radiator valves; the use and setting of motion sensors for lighting; external lighting controls; and the use and setting of urinal controls.
- An energy efficient IT policy could cover: energy efficiency standards for all new IT purchases (such as PCs, thin clients, laptops, monitors, servers, printers, photocopiers, scanners and telephony systems); IT procurement routes; use of switch off software for out of hours and periods of daytime inactivity; use of timers to control IT peripherals out of hours.

It will be necessary to include a range of staff representatives such as maintenance staff, IT and Human Resources staff in the development of workable standards which can then be adopted by the University. Once the policy has been formally adopted it would also be advisable to change from a reactive response to building occupant issues to a structured response which informs building occupants of the University policy, measures the actual temperatures, and resolves genuine issues but avoids significant over heating or cooling. Logging all complaints would be advisable to locate persistent problem areas of buildings, as distinguished from persistent complainants and would allow maintenance and improvements to buildings to be targeted. This approach could also be enforced through a stricter policy for Building Management Systems (BMS) control changes, particularly as the scope of BMS control increases is currently planned.

University wide procurement guidance could be extended to deal with major energy consuming appliances such as sports therapy equipment and replacement IT equipment so that energy efficiency is considered as part of the procurement process. The cost of running the equipment needs to be considered over its expected life, as well as the initial capital costs when deciding which items to procure.

#### **6.4 The Environmental and Sustainable Development Steering Group**

It is critical that all staff and students engage in carbon reduction and it becomes the responsibility of every member of the University community to adopt 'sustainable' behaviours. The programme to reduce the University's carbon footprint will be taken forward by the Environmental and Sustainable Development Steering Group. This committee has the responsibility to monitor the University's environmental performance, establish task and finish groups on environmental impacts and ensure that the profile of environmental issues remains high amongst staff and students. Although many of the projects identified by the Carbon Management Plan will be implemented by different departments, the Environmental and Sustainable Development Steering Group will maintain an overview. The group will monitor the performance of the University to ensure it is on track to reduce carbon emissions in line with Government recommendations. The group will also oversee the implementation of the University's Sustainable Travel Plan thereby ensuring that all carbon reduction activities are coherent and co-ordinated across the University. Specifically, the group will:

- Be responsible for monitoring the University's performance regarding the implementation of the carbon reduction interventions identified in the CMP

#### Carbon Management Plan

- Review the University's carbon emissions to ensure targets are achieved and progress on carbon reduction is made
- Coordinate measures that embed the measuring of carbon emissions and the actions to reduce emissions across the University community
- Report to the Vice-Chancellor and Board of Governors on progress made by the University to reduce emissions

The Environmental and Sustainable Development Steering Group is chaired by the Deputy Vice-Chancellor and reports to the Chief Executives Team and the Board of Governors. The Group will meet quarterly and will undertake an annual review of the current progress of carbon reduction projects against planned level of achievement. The Group will assess any unforeseen events or significant risks to the plan to ensure that it remains on track to achieve its target emissions reduction. The results of the review will be reported by the Deputy Vice-Chancellor to the Board of Governors and University community.

### **6.5 University community engagement**

An engagement plan, to ensure that participation on carbon reduction from all internal stakeholders is achieved, has been compiled and is shown in the following table 6.5.1:

**6.5.1 Summary stakeholder engagement**

Stakeholder	Method of engagement	Frequency of communications	Person responsible for communications	Training required
<p>Staff (teaching and support) and Students</p>	<ul style="list-style-type: none"> <li>• CMP included in staff awareness training</li> <li>• Poster holders used to disseminate information</li> <li>• Intranet announcements</li> <li>• Environment email address as a central point of contact environment@chi.ac.uk</li> <li>• Green impact scheme</li> <li>• Posters in LRC setting out target</li> </ul>	<p>Monthly</p> <p>Changed monthly</p> <p>As required</p> <p>As required</p> <p>On-going</p> <p>On-going</p>	<p>Environment Officer</p>	<p>General awareness training</p> <p>Carbon champions will require more detailed training in engagement in carbon reduction</p>
<p>Teaching Staff</p>	<ul style="list-style-type: none"> <li>• Follow up workshops from Learning &amp; Teaching conference</li> </ul>	<p>Aiming for sustainability to become fully integrated throughout the curriculum</p>	<p>Teaching staff</p>	<p>Help and advice for teaching staff not currently engaged in sustainability issues to enable them to incorporate aspects into their teaching.</p>
<p>Contractors</p>	<ul style="list-style-type: none"> <li>• Reporting to Estates and opportunity for energy reduction.</li> <li>• Plan Preventative Maintenance to ensure plant optimisation.</li> <li>• Consideration and installation of energy</li> </ul>	<p>Weekly</p>	<p>Estates – have responsibility for contract implementation.</p>	<p>Detailed awareness training so that they understand the significance of their role in controlling</p>

Stakeholder	Method of engagement	Frequency of communications	Person responsible for communications	Training required
	efficient plant and equipment.			plant and switch off.
Conference Delegates	Travel information will be added to information sent to all conference delegates this summer and information on environmental best practice added to conference facility hirers from April 2013	As appropriate	Room bookings and end users	Provided by information

The success of this plan will be measured by the Environmental and Sustainable Development Steering Group in their annual review and changes will be made to ensure continued engagement of all stakeholders as required for the achievement of University of Chichester's carbon reduction target.

The following key performance indicators have been agreed:

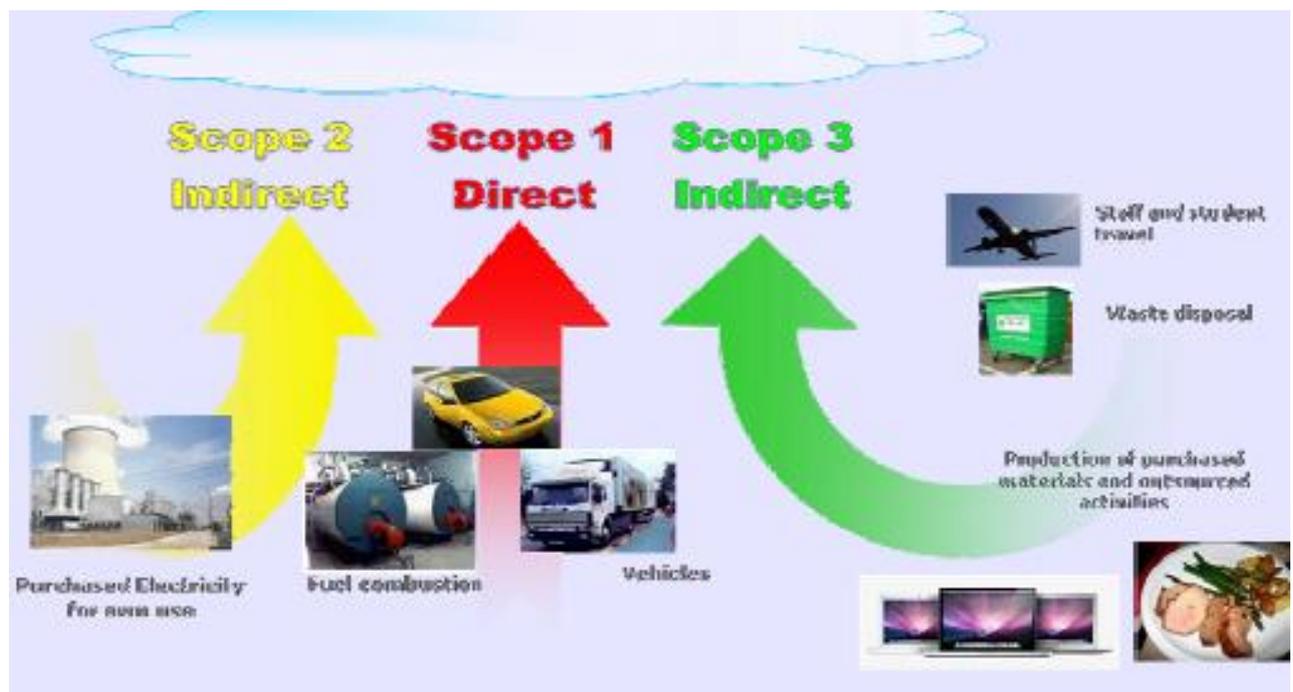
- Inclusion of the Student Union (SU) Environment Representative on the Group by end of October 2014
- Continue and develop the SU and University Green Impact schemes (or similar) year on year until 2016.
- Produce one form of communication on environment and sustainable development issues or activities each week.



## APPENDIX A: Emissions Scope

The World Resource Institute developed a classification of emission sources around three 'scopes':

- **Scope 1:** emissions are direct emissions that occur from sources owned or controlled by the organisation, for example emissions from combustion in owned or controlled boilers/ furnaces/ vehicles.
- **Scope 2:** accounts for emissions from the generation of purchased electricity consumed by the organisation.
- **Scope 3:** covers all other indirect emissions which are a consequence of the activities of the organisation, but occur from sources not owned or controlled by the organisation – for example, commuting and procurement





## APPENDIX B: Completed carbon reduction projects

The following table summarises the projects completed since the CMP was commenced. The savings from electricity related projects have been adjusted to reflect the latest emission factor methodology as outlined in section 3.2:

Funding Source	Sum of Cost (inc VAT)	Sum of Financial savings	Average of Payback in years	Sum of Annual kWh savings	Sum of tCO2 pa
<b>Salix</b>	<b>£228,237</b>	<b>£87,230</b>	<b>3.7</b>	<b>1,656,894</b>	<b>378.4</b>
<b>Electricity</b>	<b>£104,301</b>	<b>£29,863</b>	<b>4.4</b>	<b>269,501</b>	<b>120.1</b>
<b>2010/11</b>					
<i>Time switches</i>	£14,953	£3,554	4.2	30,906	13.8
<b>2011/12</b>					
<i>Compact Fluorescent including changing the fitting</i>	£1,229	£247	12.3	2,227	1.0
<i>Halogen to LED including changing the fitting</i>	£1,728	£527	4.9	4,762	2.1
<i>Heating pipework insulation (internal)</i>	£3,006	£908	3.3	8,198	3.7
<i>Hot Water - distribution improvements</i>	£468	£528	0.9	4,770	2.1
<i>Lighting - discrete controls</i>	£4,408	£981	4.5	8,863	3.9
<i>T5 lighting retrofit using adaptors</i>	£5,321	£2,221	2.8	20,060	8.9

<i>Time switches</i>	£6,123	£2,421	2.5	21,870	9.7
<b>2012/13</b>					
<i>Compact Fluorescent including changing the fitting</i>	£21,574	£6,878	3.7	62,136	27.7
<i>Flood lighting to LED including changing the fitting</i>	£1,400	£275	5.1	2,620	1.2
<i>T8 lighting including changing the fitting</i>	£5,777	£1,308	4.4	11,818	5.3
<b>2013/14</b>					
<i>Compact Fluorescent using same fitting</i>	£20,418	£4,266	4.7	39,641	17.7
<i>Incandescent to LED using same fitting</i>	£14,536	£4,781	3.1	43,061	19.2
<i>T12/T8 to LED including new fitting</i>	£3,360	£968	3.5	8,569	3.8
<b>Gas</b>	<b>£113,802</b>	<b>£52,867</b>	<b>2.3</b>	<b>1,340,022</b>	<b>246.6</b>
<b>2010/11</b>					
<i>BEMS - not remotely managed</i>	£4,686	£1,652	2.8	33,046	6.1
<i>Heating - discrete controls</i>	£2,000	£3,875	0.5	193,734	35.7
<i>Heating pipework insulation (internal)</i>	£7,998	£3,063	2.7	61,257	11.3
<i>Roof insulation</i>	£66,843	£31,793	2.1	635,868	117.0
<b>2011/12</b>					
<i>BEMS - remotely managed</i>	£9,108	£2,771	3.3	92,359	17.0

<i>Heating pipework insulation (internal)</i>	£5,125	£2,563	2.0	85,420	15.7
<b>2012/13</b>					
<i>Cavity wall insulation</i>	£15,402	£5,773	2.6	192,449	35.4
<i>Heating pipework insulation (internal)</i>	£2,640	£1,377	1.9	45,889	8.4
<b>Oil</b>	<b>£10,134</b>	<b>£4,500</b>	<b>2.3</b>	<b>47,371</b>	<b>11.7</b>
<b>2010/11</b>					
<i>Roof insulation</i>	£10,134	£4,500	2.3	47,371	11.7
<b>Split fund</b>	<b>£26,980</b>	<b>£4,868</b>	<b>5.0</b>	<b>98,382</b>	<b>20.2</b>
<b>Electricity</b>	<b>£2,150</b>	<b>£825</b>	<b>2.6</b>	<b>7,854</b>	<b>3.5</b>
<b>2013/14</b>					
<i>BEMS - remotely managed</i>	£2,150	£825	2.6	7,854	3.5
<b>Gas</b>	<b>£24,830</b>	<b>£4,043</b>	<b>6.2</b>	<b>90,528</b>	<b>16.7</b>
<b>2010/11</b>					
<i>Roof insulation</i>	£11,930	£2,109	5.7	42,171	7.8
<b>2013/14</b>					
<i>BEMS - remotely managed</i>	£12,900	£1,934	6.7	48,357	8.9
<b>University own Fund</b>	<b>£118,636</b>	<b>£41,808</b>	<b>3.6</b>	<b>541,984</b>	<b>159.7</b>
<b>Electricity</b>	<b>£94,587</b>	<b>£26,181</b>	<b>4.1</b>	<b>229,445</b>	<b>102.2</b>

<b>2010/11</b>					
<i>Compact Fluorescent using same fitting</i>	£248	£29	8.7	258	0.1
<i>Lighting - discrete controls</i>	£1,519	£149	10.2	1,349	0.6
<i>Voltage reduction equipment</i>	£83,769	£22,447	3.7	195,187	87.0
<b>2011/12</b>					
<i>Halogen to LED using same fitting</i>	£603	£344	1.7	3,109	1.4
<i>T5 lighting retrofit using adaptors</i>	£3,534	£2,139	2.1	19,324	8.6
<b>2012/13</b>					
<i>Flood lighting to LED including changing the fitting</i>	£4,914	£1,073	4.6	10,218	4.6
<b>Gas</b>	<b>£24,049</b>	<b>£15,627</b>	<b>1.6</b>	<b>312,539</b>	<b>57.5</b>
<b>2010/11</b>					
<i>Heating pipework insulation (internal)</i>	£24,049	£15,627	1.6	312,539	57.5
<b>Grand Total</b>	<b>£373,853</b>	<b>£133,905</b>	<b>3.7</b>	<b>2,297,260</b>	<b>558.3</b>

## Superseded projects

The following table summarises the completed projects which have been superseded by boiler replacements or major refurbishments have been removed to avoid double counting savings.

Funding Source	Sum of Cost (inc VAT)	Sum of Financial savings	Average of Payback in years	Sum of Annual kWh savings	Sum of tCO2 pa
<b>Salix</b>	<b>£16,283</b>	<b>£7,858</b>	<b>1.8</b>	<b>87,779</b>	<b>31.1</b>
Electricity	£13,930	£6,327	2.0	57,156	25.5
<b>2010/11</b>					
<i>T5 lighting retrofit using adaptors</i>	£10,977	£4,622	2.4	41,753	18.6
<b>2011/12</b>					
<i>T5 lighting retrofit using adaptors</i>	£2,953	£1,705	1.8	15,403	6.9
Gas	£2,353	£1,531	1.4	30,623	5.6
<b>2010/11</b>					

<i>Heating pipework insulation (internal)</i>	£2,353	£1,531	1.4	30,623	5.6
<b>University own Fund</b>	<b>£27,644</b>	<b>£11,294</b>	<b>2.1</b>	<b>110,556</b>	<b>45.2</b>
Electricity	£26,725	£10,516	2.2	94,996	42.3
<b>2010/11</b>					
<i>T5 lighting retrofit using adaptors</i>	£23,644	£9,411	2.6	85,017	37.9
<b>2011/12</b>					
<i>Compact Fluorescent including changing the fitting</i>	£449	£389	1.2	3,518	1.6
<i>T5 lighting retrofit using adaptors</i>	£2,632	£715	3.7	6,461	2.9
Gas	£919	£778	1.2	15,560	2.9
<b>2010/11</b>					
<i>Heating pipework insulation (internal)</i>	£919	£778	1.2	15,560	2.9
<b>Grand Total</b>	<b>£43,927</b>	<b>£19,152</b>	<b>1.9</b>	<b>198,335</b>	<b>76.3</b>

## APPENDIX C: Future carbon reduction projects planned

The following table summarises the further projects planned for implementation over the next five years. The savings from electricity related projects have been adjusted to reflect the latest emission factor methodology as outlined in section 3.2:

Funding Source	Sum of Cost (inc VAT)	Sum of Financial savings	Average of Payback in years	Sum of Annual kWh savings	Sum of tCO2 pa
<b>Salix</b>	<b>£13,300</b>	<b>£1,069.00</b>	<b>42.4</b>	<b>25,600</b>	<b>4.9</b>
2014/15					
<b>Electricity</b>	<b>£5,300</b>	<b>£69.00</b>	<b>76.8</b>	<b>600</b>	<b>0.3</b>
<i>Lighting - discrete controls</i>	<b>£5,300</b>	<b>£69.00</b>	<b>76.8</b>	<b>600</b>	<b>0.3</b>
<b>Gas</b>	<b>£8,000</b>	<b>£1,000.00</b>	<b>8.0</b>	<b>25,000</b>	<b>4.6</b>
<i>Heating - TRVs</i>	<b>£8,000</b>	<b>£1,000.00</b>	<b>8.0</b>	<b>25,000</b>	<b>4.6</b>
<b>University own Fund</b>	<b>£484,127</b>	<b>£78,866.28</b>	<b>7.5</b>	<b>903,002</b>	<b>242.8</b>
2014/15					
<b>Electricity</b>	<b>£83,333</b>	<b>£22,847.28</b>	<b>3.6</b>	<b>198,672</b>	<b>88.4</b>
<i>Automatic Monitoring &amp; Targeting (aM&amp;T) figs based on 5% reduction of baseline year</i>	<b>£83,333</b>	<b>£22,847.28</b>	<b>3.6</b>	<b>198,672</b>	<b>88.4</b>
<b>Gas</b>	<b>£173,333</b>	<b>£25,350.24</b>	<b>7.1</b>	<b>633,756</b>	<b>116.6</b>
<i>Boilers - replacement modular</i>	<b>£90,000</b>	<b>£10,491.36</b>	<b>8.6</b>	<b>262,284</b>	<b>48.3</b>

<i>Automatic Monitoring &amp; Targeting (aM&amp;T) figs based on 5% reduction of baseline year</i>	£83,333	£14,858.88	5.6	371,472	68.4
<i>Boilers - replacement Combination</i>	-*-	-*-	-*-	-*-	-*-
<b>Water</b>	<b>£98,863</b>	<b>£12,900.00</b>	<b>7.0</b>	<b>4,588</b>	<b>4.8</b>
<i>Automatic Monitoring &amp; Targeting (aM&amp;T) figs based on 5% reduction of baseline year</i>	£83,333	£7,400.00	11.3	2,690	2.8
<i>Rain Water Harvesting (RWH)</i>	£15,530	£5,500.00	2.8	1,898	2.0
2016/17					
<b>Electricity</b>	<b>£101,520</b>	<b>£5,280.00</b>	<b>16.0</b>	<b>24,673</b>	<b>21.8</b>
<i>PV - Barbara Smith Halls</i>	£101,520	£5,280.00	16.0	24,673	21.8
<b>Gas</b>	<b>£5,000</b>	<b>£488.76</b>	<b>10.2</b>	<b>12,219</b>	<b>2.2</b>
<i>BEMS - remotely managed</i>	£5,000	£488.76	10.2	12,219	2.2
2018/19					
<b>Electricity</b>	<b>-*-</b>	<b>-*-</b>		<b>-*-</b>	<b>0.0</b>
<i>Self generation: Wind Turbines</i>	-*-	-*-		-*-	0.0
<b>Gas</b>	<b>-*-</b>	<b>-*-</b>	<b>-*-</b>	<b>-*-</b>	<b>0.0</b>
<b>Gas, Diesel, gasoil engine CHP</b>	<b>-*-</b>	<b>-*-</b>	<b>-*-</b>	<b>-*-</b>	<b>0.0</b>
2017/18					
<b>Gas</b>	<b>£8,000</b>	<b>£1,000.00</b>	<b>8.0</b>	<b>25,000</b>	<b>4.6</b>
<i>Heating - TRVs</i>	£8,000	£1,000.00	8.0	25,000	4.6

<i>Heating - distribution improvements</i>	-*-	-*-		-*-	0.0
2015/16					
<b>Gas</b>	-*-	-*-	-*-	-*-	-*-
<i>BEMS - remotely managed</i>	-*-	-*-	-*-	-*-	-*-
<i>Boilers - replacement modular</i>	-*-	-*-	-*-	-*-	-*-
<b>Water</b>	<b>£14,078</b>	<b>£11,000.00</b>	<b>1.3</b>	<b>4,094</b>	<b>4.3</b>
<i>Grey Water Harvesting (GWH) - Bore Hole Extraction</i>	£14,078	£11,000.00	1.3	4,094	4.3
<i>Grey Water Harvesting (GWH) - Water Recycling</i>	-*-	-*-	-*-	-*-	-*-
<b>RGF3</b>	<b>£500,000</b>	<b>£101,602.00</b>	<b>4.9</b>	<b>784,449</b>	<b>349.5</b>
2014/15					
Electricity	£500,000	£101,602.00	4.9	784,449	349.5
<b>Compact Fluorescent to LED including new fitting</b>	<b>£500,000</b>	<b>£101,602.00</b>	<b>4.9</b>	<b>784,449</b>	<b>349.5</b>
<b>Joint Community Partnership</b>	-*-	-*-	-*-	-*-	-*-
2015/16					
<b>Electricity</b>	-*-	-*-	-*-	-*-	-*-
<i>PV - BOC LRC</i>	-*-	-*-	-*-	-*-	-*-
<i>PV - BRC LRC</i>	-*-	-*-	-*-	-*-	-*-

<b>Grand Total</b>	<b>£997,427</b>	<b>£181,537.28</b>	<b>13.1</b>	<b>1,713,051</b>	<b>597.2</b>
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-\*- Further quantification of some opportunities is expected pending analysis of the Energy Reduction Surveys.

## APPENDIX D: Summary of Energy Reduction Survey Findings

An energy reduction survey has been carried out during 2013/14 identifies small scale projects.

The findings require further feasibility assessment and scheduling before detailing in this plan.

However, the results are summarised below:

<b>Campus</b>	<b>Electricity savings (kWh pa)</b>	<b>Gas savings (kWh pa)</b>	<b>CO<sub>2e</sub> savings (tonnes pa)</b>	<b>Financial savings (£ pa)</b>	<b>Capital cost (£)</b>	<b>Payback period (years)</b>
Bishop Otter Campus	109,780	351,745	122.2	23,840	134,655	5.6
Bognor Regis Campus	29,650	166,405	46.2	8,928	42,145	4.7
<b>Grand Total</b>	<b>139,430</b>	<b>518,150</b>	<b>168.4</b>	<b>32,768</b>	<b>176,800</b>	<b>5.4</b>

## APPENDIX E: IT carbon reduction projects

The following table summarises the IT projects that generate a carbon reduction:

Funding Source	Sum of Cost (inc VAT)	Sum of Financial savings	Average of Payback in years	Sum of Annual kWh savings	Sum of tCO2 pa
<b>University own Fund</b>	<b>£223,824</b>	<b>£2,213</b>	<b>n/a</b>	<b>19,536</b>	<b>8.7</b>
Electricity	£223,824	£2,213	n/a	19,536	8.7
2013/14					
<i>IT: Computer replacement<sup>*1</sup></i>	£223,824	£2,213	n/a	19,536	8.7
<b>Grand Total</b>	<b>£223,824</b>	<b>£2,213</b>	<b>n/a</b>	<b>19,536</b>	<b>8.7</b>

<sup>\*1</sup> The on-going programme of refreshing computer desktop equipment is designed to ensure University users can benefit from the latest technologies. As the funding for this project relates to enhancing IT provision and has not been specifically provided to introduce a carbon reduction initiative, the pay back years is not applicable. The positive carbon reduction outcome is, however, a consequence of utilising modern and more energy efficient technology.

## APPENDIX F: Carbon Management Matrix – Embedding.

Current status of the University is highlighted below.

	POLICY	ORGANISATION	INFORMATION AND DATA	COMMUNICATION AND TRAINING	FINANCE	MONITORING & EVALUATION
5	Specific sustainability / climate change policy with targets signed off and implemented.  Action plan with clear goals and regular reviews to confirm actions undertaken and targets achieved/being progressed.	Accountabilities for sustainability /climate change defined at senior level, e.g. senior  Sustainability / climate change responsibilities integrated into responsibilities of relevant people in different departments, e.g. Teaching, Finance, Estates	CO <sub>2</sub> emissions compiled for all main HEI sources for a baseline year and regular collation of annual emissions data.  Data externally verified.	Formalised communication and training plan for all staff on carbon and energy related matters, including integration in induction and other normal training processes.  Communication on carbon and energy related matters with the academic and student body and other key business partners	Use of innovative external funding mechanisms for carbon related projects.  Development of internal financing mechanisms, e.g. self sustaining fund, specifically for carbon related projects	Management Review of carbon management process by senior management.  Regular reviews by core team on progress with carbon management.
4	Specific sustainability / climate change policy with targets developed and signed off, but not implemented	Sustainability / climate change responsibilities integrated into responsibilities of relevant people in different departments, e.g. Teaching, Finance, Estates	CO <sub>2</sub> emissions compiled for all main HEI sources for a baseline year (i.e. buildings, transport and commuting, etc).  Data internally reviewed.	Formalised communication and training plan for all staff on carbon and energy related matters, including integration in induction and other training, and awareness raising	Strategic plan for developing internal financing mechanisms and obtaining funds from external sources	Regular reviews on progress with carbon management (e.g. review of actions, check against emissions profile and targets, addition of new opportunities etc.)
3	Sustainability / Climate change included in wider policy documents	Sustainability / climate change/ carbon management is part-time responsibility of moderate ranking personnel, e.g. Energy Manager, Sustainability/Environment Officer	CO <sub>2</sub> emissions data compiled for some sources for a baseline year (e.g. buildings) and source data available for other sources (e.g. transport)	Ad hoc communication and training delivered to all staff/students on carbon and energy related matters	Some internal financing on an ad hoc basis for carbon and/or energy efficiency related projects  Review conducted on applicable external funding sources	Ad hoc assessment of all aspects of carbon/energy policies/strategies, targets and action plans
2	Sustainability / Climate change as an aspiration in non-policy	Sustainability / climate change/carbon management is part-time responsibility of low	No CO <sub>2</sub> emissions data compiled for any sources but energy data compiled on a	Communication and training to specific groups in the HEI (e.g. environment team) on	Some internal financing on an ad hoc basis for carbon and/or energy efficiency	Ad hoc reviews of specific aspects of carbon/energy policies/strategies, targets and action

	documents	ranking personnel	regular basis	carbon/energy related matters	related projects	plans
1	No sustainability / climate change policy or strategy and no mention of climate change in policy/strategy documents	No individual with responsibility for sustainability / climate change issues	No CO <sub>2</sub> emissions data compiled for any sources and energy data not compiled on a regular basis	No communication or training to staff/students on carbon or energy related matters	No internal financing or funding for carbon and/or energy efficiency related projects	No monitoring of carbon/energy policies/strategies, targets and action plans