



UNIVERSITY  
of  
GREENWICH

# CARBON MANAGEMENT PLAN



Working with



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## Foreword from the Deputy Vice Chancellor, University of Greenwich

Taking our cue from the Prime Minister<sup>1</sup> who has declared that Britain's efforts to tackle climate change by pursuing a green economy must not be downgraded because of spending cuts and austerity the University of Greenwich is seizing the initiative and committing funding in order to staff and manage its own plan for carbon reduction.

We believe that this is essential to help arrest and reverse climate change and that by creating a regional centre of excellence in carbon reduction the university will benefit financially but will also broaden opportunities in research and in developing local businesses. This in turn will attract staff and students and will help us create a growing pool of expertise and influence to help secure the future. There can be no more important work for a university.

The team has set a challenging reduction of 30% by 2016, a milestone to achieving the target of 40% by 2020 from our current 2009/10 baseline. We mean to achieve both and will work toward improving on this target.



Professor Neil Garrod,  
Deputy Vice Chancellor

## Foreword from the Carbon Trust

Cutting carbon emissions as part of the fight against climate change should be a key priority for Universities and Colleges - it's all about getting your own house in order and leading by example. The UK government has identified the Higher Education sector as key to delivering carbon reduction across the UK in line with the Climate Change Act targets, and the HE Carbon Management programme is designed in response to this. It assists Higher Education institutions in saving money on energy and putting it to better use elsewhere, whilst making a positive contribution to the environment by lowering carbon emissions.

The University of Greenwich partnered with the Carbon Trust on this ambitious programme in 2010 in order to realise substantial carbon and cost savings. This Carbon Management Plan commits the University to a target of reducing CO<sub>2</sub> by 30% by 2016 and underpins potential financial savings to the institution of around £1 million per year by that date.

There are those that can and those that do. Universities can contribute significantly to reducing CO<sub>2</sub> emissions. The Carbon Trust is very proud to support the University of Greenwich in their ongoing implementation of carbon management.



Richard Rugg

Head of Public Sector, Carbon Trust



<sup>1</sup> Writing in the *Observer* on 28 November 2010 David Cameron said that Britain is prepared to act unilaterally against climate change, "setting a shining example domestically for other countries to follow". He went on to say that the coalition's ambition is to be the greenest government ever formed, arguing for politicians to make the economic case for action and pointing out that the low-carbon market is worth up to £3.2 trillion and forecast to grow by 4% annually.

## Management Summary

In addition to the environmental imperative, the commercial case for reducing carbon emissions and careful management of resources is now generally agreed. The HE sector has accepted the role of providing leadership and acting as an exemplar through its approach to carbon reduction, while pressure for universities to demonstrate good practice is also growing from both funders and students who will themselves be future leaders and ambassadors for change. These emissions are generated when we use gas (27%) and electricity (73%) for heating and lighting and to power laboratory equipment or our computer systems while the baseline also includes the costs of fuel for running our transport fleet. All of these are areas that we can look at for future savings by either improving efficiency or altering custom and practice. There is something everyone can contribute if they are encouraged to investigate improvements and empowered to deliver change.

The University's vision for sustainability is:

**The University of Greenwich will be a sector leader in sustainability, a beacon for research and innovative teaching and a leader and partner for local business and enterprise. The university will move to a low carbon estate through efficiency improvements, rationalisation of space, and innovation and changes in its working practices.**

**The investment opportunities for carbon saving will be regularly reviewed and the university will seek to generate its own energy as well as establishing new fields for research and work with local businesses in order to move toward a decentralised energy model. Staff, students and local stakeholders will be fully engaged in achieving this and carbon management will become part of everybody's life and work as a shared responsibility.**

The Plan sets out in detail our strategy for reducing carbon emissions over the next five years, detailing a range of measures and actions to reduce emissions across the university estate. These fall into two main categories; technical measures which require capital investment to achieve a direct reduction in emissions and; enabling measures which help embed carbon reduction and management in the operational processes of the university. The targets are absolute against the 2009/10 baseline and have had to take into account the additional emissions that will be produced by the new Stockwell Street Development in 2014. However, at this stage no allowance has been made for the planned disposal of the Mansion Site at Avery Hill and, once achieved, this should deliver further reductions in emissions and greater running cost savings.

There are inbuilt controls and reviews of progress and it is expected that the detail of the plan will evolve and change as new opportunities present themselves but we feel this plan offers an excellent framework for the next 5 years with a range of technical building projects and some non-building related ones. Initially it has been easier to calculate the costs and savings for building related projects but the number of non-building related projects will be increased over the period as more accurate expenditure and savings data becomes available.

The initial list of projects has been identified from a number of sources:

- Obvious energy losses e.g. lack of pipe and loft insulation and draughty single glazed windows etc.
- More technical saving methods e.g. Voltage optimisation, burner management controls etc.
- A high level energy survey carried out by Self Energy Ltd (a specialist consultancy)
- Surveys carried out by the Carbon Trust (3 years ago) e.g. Thermostatic Radiator Valves.
- The University's Sustainability department e.g. awareness and behaviour change.
- The University's Transport department
- The University's ICT department
- The advisory notices from Display Energy Certificate renewals.

Currently 115 opportunities for carbon reduction at a cost of £8 million have been identified and are planned to be implemented up to 2020. These have been entered into the carbon management plan register (CMPR) and provide the basis for the technical analysis within the Plan.

As part of this process the university has been working with the Carbon Trust to measure its carbon footprint; to set targets for reducing carbon emissions; and to formulate a plan to deliver the target. This

document sets out its strategy for reducing carbon emissions from a 2009/10 baseline of 13,735 tonnes by 30% in 2015/16. Our subsequent 2020 reduction target of 40% from the 2009/10 baseline translates into 43% of reduction from the 2005/6 emissions level, meeting sector targets.

**CMP Target:** The University of Greenwich will reduce the CO<sub>2</sub>e emissions from its scope 1 and 2 emissions by **30%** by the end of **2015/16** academic year and by **40%** by **2020** from a **2009/10 academic year baseline**.

**HEFCE Target:** The University of Greenwich will reduce the CO<sub>2</sub>e emissions from its scope 1 and 2 emissions by **43%** by the end of **2019/20** academic year from a **2005/6 academic year emissions level**.

The current (2010/11) budgeted expenditure for gas and electricity is £2.3 million and meeting the 2015/16 target of 30% offers potential annual running cost savings of around £1 million per annum at current rates, while any rises in fuel costs will result in larger savings. This plan also details the initial investment required to achieve this over the period.

The estimates summarised below demonstrate that investing in carbon reduction makes both economic and environmental sense. In achieving these targets the university will reduce its contribution to climate change, reduce costs, enhance its reputation and help develop a new generation who understand the issues being faced.

The direct costs of the programme and the projected returns on investment and emissions reductions up to 2016 are set out below.

	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	Total
<b>Annual capital cost</b>	£375,723	£1,508,974	£1,455,500	£723,600	£1,207,300	£725,800	<b>£5,996,897 cost</b>
<b>Annual energy savings (£)</b>		£86,634	£512,310	£723,600	£827,629	£996,399	<b>£3,146,572 saved</b>
<b>Annual Carbon Reduction (tCO<sub>2</sub>e)</b>		515 tonnes	3,012 tonnes	4,330 tonnes	4,938 tonnes	5,948 tonnes	<b>18,743 tonnes</b>

**Figure 1. Annual cost savings and emissions reductions arising from implementation of the Carbon Management Plan**

As investments these projects are extremely attractive. Collectively they have a payback period of less than 7 years. This is equivalent to a return in excess of c.15%, which compares very favourably with current investment returns for cash holdings.

The Carbon Management Plan is a working document, which will change over time. This will allow the plan to reflect the ever-changing environmental and economic climate but also allow us to keep abreast of advances in technology to deliver more carbon reduction projects as new initiatives emerge.

# 1 Introduction

The findings of the Inter-governmental Panel on Climate Change (IPCC) which reported on the causes of climate change, ways to reduce it, and the likely impact within the next 100 years, are largely accepted. The UK Government has acknowledged the probable benefits of early action to mitigate against climate change as set out by Sir Nicholas Stern in 2006 (The Stern Review) and has set targets for carbon reduction.

In the long term climate change driven by carbon emissions is acknowledged as a critical threat to the environment. In the more immediate future concerns over fossil fuel depletion, security of energy supplies and rising energy costs are focussing the attention of government on the need for energy conservation and carbon emission reduction. This has manifested itself in the introduction of the Climate Change Levy and the Carbon Reduction Commitment Energy Efficiency Scheme.

The commercial case for reducing carbon emissions and careful management of resources is also now generally accepted, while pressure for universities to demonstrate good practice is growing from funders and students. The sector also has an important role to play by providing leadership and by acting as an exemplar through its approach to carbon reduction.

Recent Government initiatives also point to an economic imperative for carbon reduction and a focus on providing sustainability skills for employability. This means the sector is being encouraged to promote and embed sustainable development skills and to manage resources effectively in order to bring about broader cultural change.

In response to these concerns the University of Greenwich is committed to reducing the environmental impacts of its activities and recognises that in order to engage staff and students in the drive to improve its environmental performance it must demonstrate its commitment. Carbon reduction has therefore been adopted as a core to all of its activities and the university will actively contribute to improving the environment, preserving natural resources and making an economic and social impact.

This means establishing a policy; creating a management structure; a long term action plan with identified resources; and formal recording and reporting of progress. Adopting these principles will place the university in a position to meet future "Sustainable" targets from funders and improve our standing with potential and existing students. The Sustainability Strategy will set out the University's approach to integrating the range of sustainability issues within its business model.

As part of this process the Higher Education Carbon Management (HECM) Programme has enabled the university to take a structured approach to calculating its carbon emissions baseline and to producing this Carbon Management Plan in partnership with the Carbon Trust.



The Carbon Management Plan sets out in detail its strategy for reducing carbon emissions over the next five years, detailing a range of measures and actions to reduce emissions across the university estate. These fall into two main categories; technical measures which require capital investment to achieve a direct reduction in emissions and; enabling measures which help embed carbon reduction and management in the operational processes of the university.

## 2 Carbon Management Strategy

### 2.1 Context and Drivers for Carbon Management

The university is the main regional provider for higher education in South East London and North West Kent. Over the past 20 years it has consolidated extensive landholdings down to a three-campus structure together with a number of satellite buildings. Two of the three campuses (Maritime Greenwich and Avery Hill) lie within the London Borough of Greenwich, and the third (Medway) lies 28 miles to the south east within the Medway urban area at Chatham. The heating and lighting of buildings uses large amounts of energy and the estate must therefore play a major part in improving efficiency through carbon reduction and in making improvements and modifications to infrastructure and facilities that meet the needs of students, staff and stakeholders, and support the university's reputation and strategy for carbon reduction.

With the Climate Change Bill 2008 the Government committed to an 80% reduction in CO<sub>2</sub> emissions by 2050 and a reduction in emissions of at least 34% by 2020 from a 1990 baseline. They also introduced a carbon budgeting system which caps emissions over five-year periods to help meet the 2050 target. The first three Carbon budgets will run from 2008-12, 2013-17 and 2018-22, and were set in May 2009. The Government must report to Parliament its policies and proposals to meet the budgets, and this was met by the UK Low Carbon Transition Plan.

The UK Government is putting increasing pressure on the whole public sector to lead by example in cost saving and climate change mitigation through energy efficiency and emissions reduction. Action by the public sector will be critical to the achievement of the Government's climate change objectives.

#### **Legislative and regulatory drivers**

Over coming years further legislation will be introduced to drive emissions down in support of government targets. Most notably the CRC Energy Efficiency Scheme (CRC EES) is a national carbon trading scheme which will include emissions from both gas and electricity. The CRC EES is a mandatory scheme aimed at improving energy efficiency and cutting emissions in the large organisations responsible for around 10% of the UK's emissions. The scheme includes an annual performance league table that ranks participants on energy efficiency performance. In addition to the reputational considerations, the scheme encourages organisations to develop energy management strategies that promote a better understanding of energy usage.

In October's Spending Review the Government announced that the CRC will be simplified to reduce the burden on businesses, with the first allowance sales for 2011/12 emissions now taking place in 2012 rather than 2011. Revenue from the sale of CRC allowances, totalling £1 billion a year by 2014/15, will be used to support the public finances, including spending on the environment, rather than recycled to participants. Carbon allowance payments are now a direct cost to the university and has been estimated to add approximately 10% to the annual electricity spend.

By making carbon management a key strategy the University will position itself to deal with the potentially negative financial impact of this and future legislation and by engaging with both staff and students now, its ability to adapt to future legislative change will be improved.

#### **Capital funding for Universities linked to carbon performance**

HEFCE's 2008 and 2009 grant letters from the Secretary of State demand the establishment of a link between performance on carbon reduction and future capital allocations. This has led to HEFCE requiring universities to set their own carbon reduction targets for 2020<sup>2</sup>, and to develop individual institutional carbon management plans for the second Capital Investment Framework (CIF2) submission.

#### **Energy security and rising energy costs**

The current (2010/11) budgeted expenditure for gas and electricity is £2.3 million and meeting the target of 30% offers potential annual running cost savings of around £800k per annum. With increasing

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<sup>2</sup> Carbon reduction target and strategy for England, HEFCE, January 2010

volatility in energy markets, caused in part by concerns over security of supply, it is essential that consumption is managed by controlling demand and implementing energy conservation measures.

### Reputational Drivers

In addition to the financial and legislative drivers the following are also key drivers for developing a low carbon University:

- To **demonstrate regional leadership and engagement** on environmental issues and to ensure that our reputation in research on energy, environment and sustainability is matched by our approach to these issues.
- To **improve relations with stakeholders**, including sponsors, students and the general public, protecting and enhancing the reputation of the university.
- To enable the university to **demonstrate and market a responsible approach** to environmental issues to **current and prospective students** and to ensure that its alumni are 'good ambassadors' through their understanding of the need for sustainable development and conservation of resources.

## 2.2 Vision

The University of Greenwich will be a sector leader in sustainability, a beacon for research and innovative teaching and a leader and partner for local business and enterprise. The university will move to a low carbon estate through efficiency improvements, rationalisation of space, and innovation and changes in its working practices.

The investment opportunities for carbon saving will be regularly reviewed and the university will seek to generate its own energy as well as establishing new fields for research and work with local businesses in order to move toward a decentralised energy model. Staff, students and local stakeholders will be fully engaged in achieving this and carbon management will become part of everybody's life and work as a shared responsibility.

The combination of historic, listed and contemporary buildings in metropolitan and suburban London and industrial Kent provides a rich but more challenging environment than most. In achieving the vision the University, in turn, will be required to be more innovative than most. This is a challenge that it relishes and will turn to its advantage.

This approach will provide direct benefits:

- It will contribute to carbon reduction generally
- It will protect the university from rising energy and resource costs and the risks in the future security of energy supplies in the South East
- It will provide savings that can be reinvested in the core activities of the university
- It will establish and maintain our position as a progressive forward looking institution
- It will generate new fields for research and cooperation with local businesses

## 2.3 Strategy

The Carbon Management Plan sets out a five year strategy to build on the actions and achievements to date. To achieve the target there is a requirement to increase the resources available for carbon management, both capital for the implementation of technical measures, and personnel to develop the enabling measures. By making these resources available (and by attracting external investment) the university will achieve emissions reduction by:

1. Reducing energy usage associated with buildings and equipment through:
  - i. Investing in energy conservation measures in buildings encouraging the delivery of low and no cost projects first
  - ii. Monitoring the functional suitability of the estate, maximising use of space and rationalising buildings where possible

- iii. Using whole life costing in procurement of electrical equipment
  - iv. Energy awareness campaigns for staff and students including switch off campaign for lights and electrical equipment.
  - v. All new builds and refurbishments to be designed and built to the highest feasible energy efficiency standards
  - vi. Monitoring innovations in technology and best practice
2. Investing in renewable sources of energy generation and working with local organisations and businesses to look at local opportunities for alternative decentralised energy generation.
  3. Engaging staff and students in the Carbon Management Plan and reducing overall demand.
  4. Reviewing policies and plans to ensure that carbon management is fully embedded in all activities.
  5. Improving management and monitoring so that the impact of activities can be monitored.
  6. Seeking both internal and external funds for any schemes which demonstrate a good payback.
  7. Re-investing a minimum of 50% of energy savings in new initiatives.
  8. Implementing and meeting the targets stated in the University Travel Plan.
  9. Continuing to look for ways to monitor and manage carbon emissions from sources other than buildings and fleet vehicles.

## 2.4 Targets and objectives

The agreed target is an absolute emissions reduction of 30% on the baseline year (2009/10) by the end of the academic year 2015/16. Though challenging, particularly due to the addition of a new 16,000 m<sup>2</sup> campus building in Greenwich in 2014, the target is considered achievable if the actions detailed in the Carbon Management Plan are fully implemented.

**CMP Target:** The University of Greenwich will reduce the CO<sub>2</sub>e emissions from its scope 1 and 2 emissions by **30%** by the end of **2015/16** academic year and by **40% by 2020** from a **2009/10 academic year baseline**.

Achieving the target would set the University on a course for a 43% cut in absolute carbon emissions by 2020 from 2005/6 which supports the wider sector HEFCE target.

**HEFCE Target:** The University of Greenwich will reduce the CO<sub>2</sub>e emissions from its scope 1 and 2 emissions by **43%** by the end of **2019/20** academic year from a **2005/6 academic year emissions level**.

In order to achieve the targets above, the University also aims to achieve level 5 in all areas of the carbon management matrix (see next page).

# Carbon Management Matrix
















	POLICY	RESPONSIBILITY	DATA MANAGEMENT	COMMUNICATION & TRAINING	FINANCE & INVESTMENT	PROCUREMENT	MONITORING & EVALUATION
5 BEST 	<ul style="list-style-type: none"> <li>• SMART Targets signed off</li> <li>• Action Plan contains clear goals and regular progress reviews</li> <li>• Strategy launched internally and to community</li> </ul> 	<ul style="list-style-type: none"> <li>• Carbon management is full time responsibility of a few people</li> <li>• Carbon management integrated in responsibilities of senior managers</li> <li>• VC Support</li> <li>• Part of all job descriptions</li> </ul> 	<ul style="list-style-type: none"> <li>• Quarterly collation of CO<sub>2</sub> emissions for all sources</li> <li>• Data externally verified</li> <li>• M&amp;T in place for:                             <ul style="list-style-type: none"> <li>• Buildings</li> <li>• Waste</li> </ul> </li> </ul> 	<ul style="list-style-type: none"> <li>• All staff &amp; students given formal carbon management:                             <ul style="list-style-type: none"> <li>• Induction</li> <li>• Training Plan</li> <li>• Communications</li> </ul> </li> <li>• Carbon management matters regularly communicated to:                             <ul style="list-style-type: none"> <li>• External community</li> <li>• Key partners</li> </ul> </li> </ul> 	<ul style="list-style-type: none"> <li>• Granular &amp; effective financing mechanisms for carbon management projects</li> <li>• Finance representation on carbon management Team</li> <li>• Robust task management mechanism</li> <li>• Ring fenced fund for carbon reduction initiatives</li> </ul> 	<ul style="list-style-type: none"> <li>• Senior purchasers consult and adhere to ICLEI's Procura manual and principles</li> <li>• Sustainability comprehensively integrated in tendering criteria</li> <li>• Whole life costing</li> <li>• Area-wide procurement</li> </ul> 	<ul style="list-style-type: none"> <li>• Senior Management review carbon management progress</li> <li>• Core team regularly reviews carbon management progress</li> <li>• Published externally on website</li> <li>• Visible board level review</li> </ul> 
4	<ul style="list-style-type: none"> <li>• SMART Targets developed but not implemented</li> </ul>	<ul style="list-style-type: none"> <li>• Carbon management is full-time responsibility of an individual</li> <li>• carbon management integrated into responsibilities of departmental managers, not all staff</li> </ul>	<ul style="list-style-type: none"> <li>• Annual collation of CO<sub>2</sub> emissions for:                             <ul style="list-style-type: none"> <li>• Buildings</li> <li>• Transport</li> <li>• Waste</li> </ul> </li> <li>• Data internally reviewed</li> </ul>	<ul style="list-style-type: none"> <li>• All staff &amp; students given carbon management:                             <ul style="list-style-type: none"> <li>• Induction</li> <li>• Communications</li> </ul> </li> <li>• Carbon management communicated to:                             <ul style="list-style-type: none"> <li>• External community</li> <li>• Key Partners</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Regular financing for carbon management projects</li> <li>• Some external financing</li> <li>• Sufficient task management mechanism</li> </ul>	<ul style="list-style-type: none"> <li>• Environmental demands incorporated in tendering</li> <li>• Familiarity with Procura</li> <li>• Joint procuring between HEIs or with Las</li> </ul>	<ul style="list-style-type: none"> <li>• Core Team regularly reviews carbon management progress:                             <ul style="list-style-type: none"> <li>• Actions</li> <li>• Profile &amp; Targets</li> <li>• New opportunities quantification</li> </ul> </li> </ul>
3	 <ul style="list-style-type: none"> <li>• Draft policy</li> <li>• Climate change reference</li> </ul>	 <ul style="list-style-type: none"> <li>• Carbon management is part time responsibility of a few people</li> <li>• Carbon management is the responsibility of department champions</li> </ul>	 <ul style="list-style-type: none"> <li>• Collation of CO<sub>2</sub> emissions for limited scope i.e. buildings or transport</li> </ul>	<ul style="list-style-type: none"> <li>• Environmental energy group(s) give ad hoc:                             <ul style="list-style-type: none"> <li>• Training</li> <li>• Communications</li> </ul> </li> </ul>	 <ul style="list-style-type: none"> <li>• Ad hoc financing for carbon management projects</li> <li>• Limited task management</li> <li>• No allocated resource</li> </ul>	<ul style="list-style-type: none"> <li>• Whole life costing occasionally employed</li> <li>• Some pooling of environmental expertise</li> </ul>	<ul style="list-style-type: none"> <li>• Carbon management team review aspects including:                             <ul style="list-style-type: none"> <li>• Policies &amp; Strategies</li> <li>• Targets</li> <li>• Action Plans</li> </ul> </li> </ul>
2	<ul style="list-style-type: none"> <li>• No Policy</li> <li>• Climate Change aspiration</li> </ul>	<ul style="list-style-type: none"> <li>• Carbon management is part time responsibility of an individual</li> <li>• No departmental champions</li> </ul>	<ul style="list-style-type: none"> <li>• No CO<sub>2</sub> emissions data compiled</li> <li>• Energy data compiled on a regular basis</li> </ul>	 <ul style="list-style-type: none"> <li>• Regular poster / awareness campaigns</li> <li>• Staff given ad hoc carbon management communications</li> </ul>	<ul style="list-style-type: none"> <li>• Ad hoc financing for carbon management related projects</li> <li>• Limited task coordination of resources</li> </ul>	 <ul style="list-style-type: none"> <li>• Green criteria occasionally considered</li> <li>• Products considered in isolation</li> </ul>	 <ul style="list-style-type: none"> <li>• Ad hoc reviews of carbon management actions / progress</li> </ul>
1 WORST	<ul style="list-style-type: none"> <li>• No Policy</li> <li>• No Climate Change aspiration</li> </ul>	<ul style="list-style-type: none"> <li>• No individual responsibility for carbon management</li> </ul>	<ul style="list-style-type: none"> <li>• Not Compiled:                             <ul style="list-style-type: none"> <li>• Carbon emissions</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• No communication or training</li> </ul>	<ul style="list-style-type: none"> <li>• No internal financing or funding for carbon management related projects</li> </ul>	<ul style="list-style-type: none"> <li>• No green consideration</li> <li>• No life cycle costing</li> </ul>	<ul style="list-style-type: none"> <li>• No carbon management monitoring</li> </ul>

Figure 2. Carbon management matrix



## 3 Carbon Emissions: Baseline and Projections

### 3.1 Scope

A baseline carbon footprint has been calculated for the University of Greenwich academic year 2009/10. This covers all university activity at Medway, Greenwich, Avery Hill, Woolwich and Kings Hill.

The following activities have been included in the scope of the carbon footprint calculation:

- Energy use associated with university buildings (leased and university owned buildings where the university pays the energy bill)
- Fuel use in university owned fleet

It should be noted for clarity that the baseline data for university activity currently includes the following activities as these areas are managed and utility bills paid by the University of Greenwich:

- Emissions from buildings occupied by the Student Unions: Student Union University Greenwich (SUUG) and Universities of Medway Student Association (UMSA)
- Emissions from buildings shared at Medway with University of Kent and Canterbury Christ Church University.



The following activities have been excluded from this baseline carbon footprint calculation due to a lack of accurate data for the baseline year:

- Business Travel associated with university management, research and teaching
- Staff and student commuting
- Refrigerant gas emissions (data not available)

Although not included in the absolute reduction target, projects in the carbon management plan cover transport emissions and targets associated with these activities have also been set in the University Travel Plan, and they will be included when accurate data is available. Staff and student travel surveys are carried out biannually and data is available showing modes of transport for each campus. In addition, the staff survey findings have been used to estimate the carbon footprint associated with business travel and staff commuting.

Refrigerant gas data is currently not available but will be requested from contractors in future as standard by the Building Services Team. Data collection methods are being improved and these activities will be brought in when accurate data is available.

In addition the University will be reviewing the scope over time and would seek to understand the carbon emissions associated with the following activities:

- Procurement- Production, and delivery of goods consumed by the university
- Procurement- Delivery of services used by the university
- Treatment of Waste
- Visitor travel
- Student travel from non term time addresses
- Partner colleges and universities- emissions associated with teaching University of Greenwich courses at other institutions

Even though data is not available as part of the baseline for these additional activities, university policies can be used to influence and support carbon reduction in these areas.

## 3.2 Baseline

The University of Greenwich has chosen the baseline academic year of 2009/10 (1<sup>st</sup> August 2009- 31<sup>st</sup> July 2010) to use to measure performance against the reduction target. This is the period for which the most accurate data is available and can therefore be used to monitor absolute reductions achieved as a result of the carbon management activities.

To fulfil the HEFCE requirements a 2005/6 figure has also been stated which to the best of the University's knowledge represents its carbon dioxide equivalent (CO<sub>2</sub>e)<sup>3</sup> footprint for this period for buildings and fleet transport.

Emissions factors used are from the DECC 2010 Guidelines to Defra / DECC's GHG Conversion Factors for Company Reporting (published Aug 2010). See Figure 24 on p38 for more details.

	Buildings	Transport	Total
<b>2005/6</b> CO <sub>2</sub> emissions	14,531 tonnes	102 tonnes	<b>14,633</b> <b>tonnes</b>
<b>2009/10</b> Baseline CO <sub>2</sub> emissions	13,688 tonnes	47 tonnes	<b>13,735</b> <b>tonnes</b>

**Figure 3. University of Greenwich's annual CO<sub>2</sub>e emissions**

<sup>3</sup> **Carbon dioxide equivalent (CO<sub>2</sub>e).** A universal unit of measurement used to indicate the global warming potential of a greenhouse gas, expressed in terms of the global warming potential of one unit of carbon dioxide. It is used to evaluate the releasing (or avoiding releasing) of different greenhouse gases against a common basis.

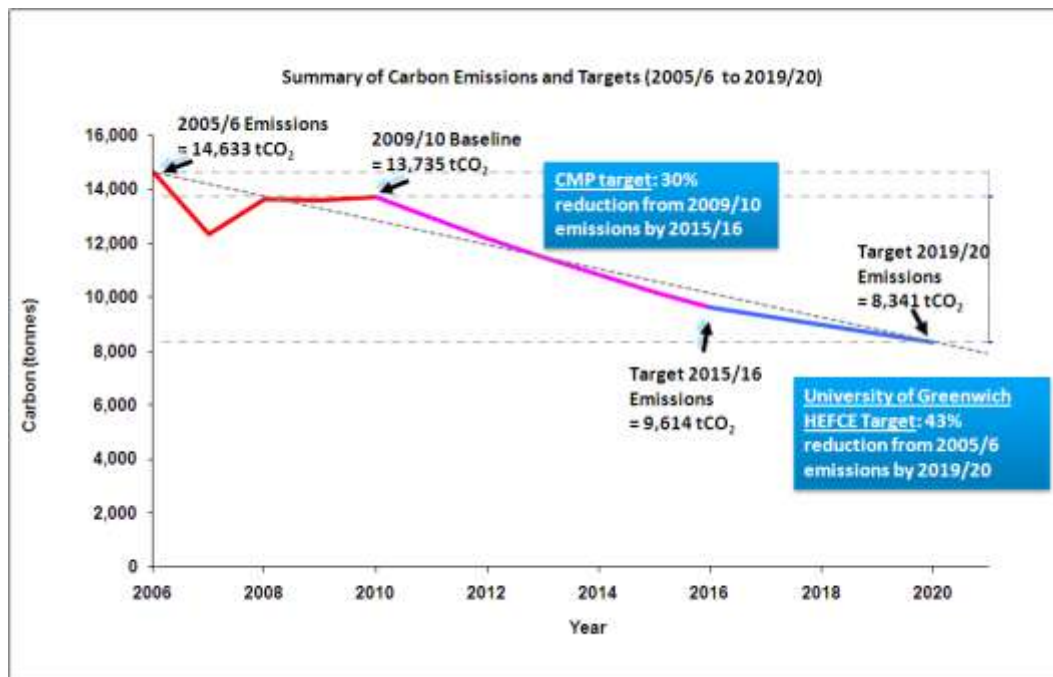


Figure 4. Summary of University of Greenwich's carbon emission targets

Figure 5 shows that emissions from the University's main three campuses account for nearly all of the University's carbon emissions, with only 0.3% from university owned fleet and 1% from Woolwich and Kings Hill conference centre (now closed). Medway campus accounts for nearly half (48%) of the University's carbon emissions, followed by Avery Hill (30%) and Greenwich (21%).

The analysis has also shown that the source of the carbon emissions from the buildings are split as follows:

- Electricity 73%
- Gas 27%

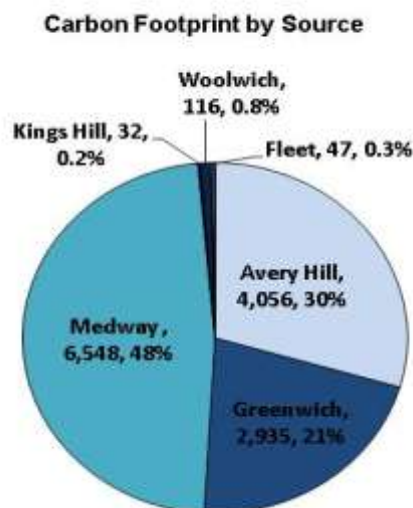
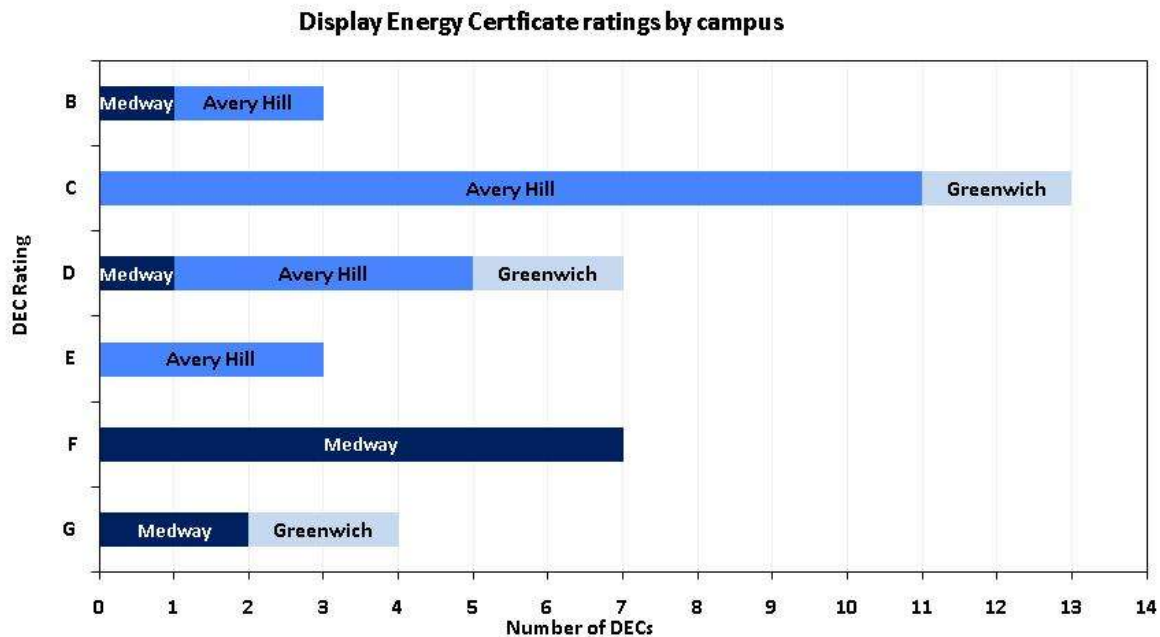


Figure 5. Chart showing carbon footprint broken down by source for baseline year 2009/10 (label shows: source of emission, CO<sub>2</sub>e figures in tonnes and % of total carbon footprint)

Since October 2008 public buildings in the UK over 1,000m<sup>2</sup> must display a Display Energy Certificate (DEC). The ratings are based upon actual energy usage of a building – it uses a scale for energy efficiency, from A to G with A being the most efficient and G the least. Figure 6 illustrates the current

DEC ratings for the university's buildings. The graph shows that in general the buildings at Avery Hill have higher DEC ratings and Medway has the lowest ratings. Currently the four buildings that are G rated are Queen Anne and Queen Mary buildings at Greenwich, and Hawke and Pembroke building at Medway. By achieving the carbon reduction targets, the DEC rating of the university's buildings will also improve overall.



**Figure 6. Graph showing the Display Energy Certificate (DEC) ratings of the university's buildings**

### 3.3 Projections and Value at Stake

Using the 2009/10 emissions data as the baseline, projections for the next six years on utility cost and energy consumption for two different scenarios have been calculated. The scenarios are:

1. 'Business as usual' (BAU) assumes that:
  - No action is taken to reduce the University's energy consumption and carbon emissions
  - Energy consumption rises by 0.7% per year<sup>4</sup>
  - Energy and fuel unit cost rise by 1.6% per year<sup>4</sup>
  - Carbon emission conversion factors remain constant
  - The effect of known changes in the Estate have also been added (see details below)
  
2. 'Meeting the Target' scenario assumes that:
  - Reduction in carbon emissions of 30% in next six years (a straight line reduction equating to an average of a 5.8% reduction in emissions per year)
  - Energy and fuel unit cost rise by 1.6% per year<sup>4</sup>
  - Carbon emission conversion factors remain constant

<sup>4</sup> <http://www.decc.gov.uk/assets/decc/Statistics/Projections/67-updated-emissions-projections-june-2010.pdf> Figures used as suggested by Carbon Trust HECM programme based on the DECC low global energy demand scenario. **Scenario 1 – Low global energy demand:** This scenario reflects a deep global recession continuing into 2011, followed by slow growth in global GDP growth. As a result, global demand for energy initially decreases, and then grows at a slower rate compared to previous trends.

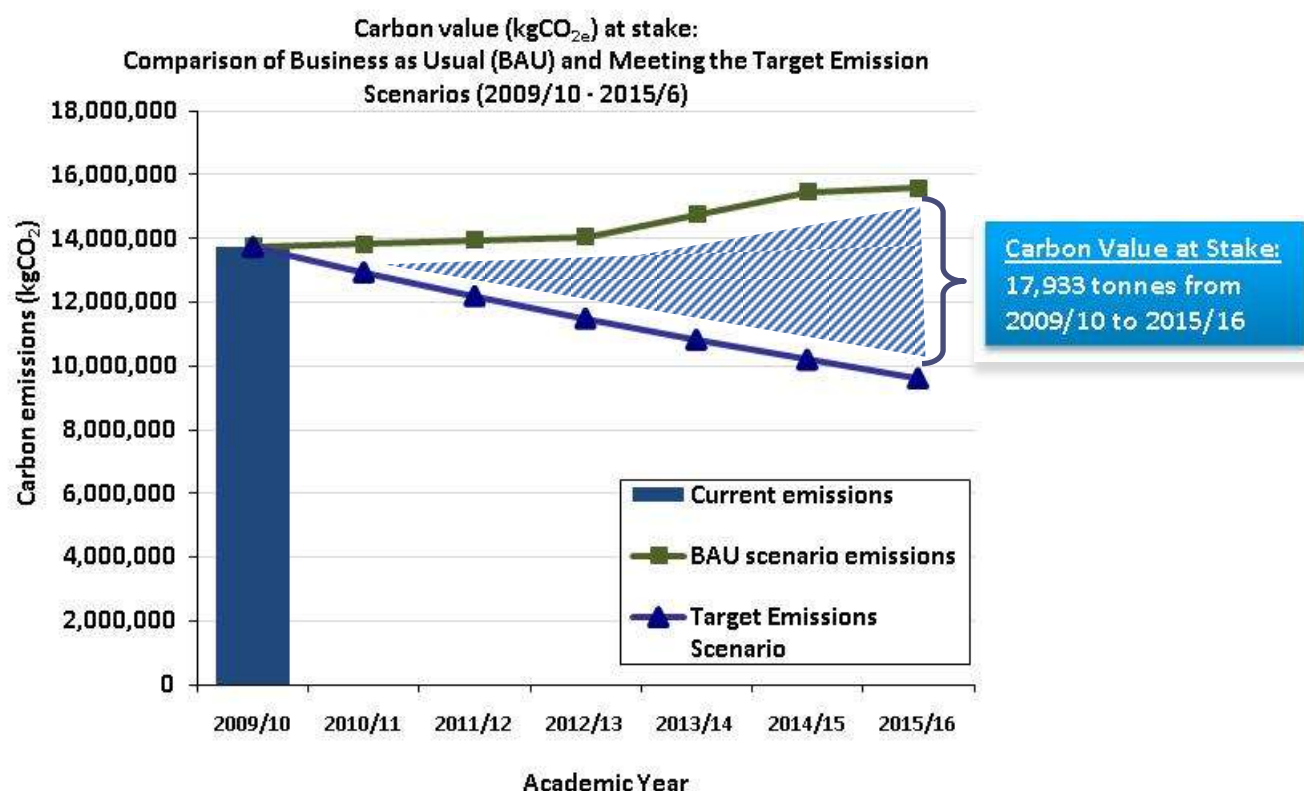
## Changes in the Estate

Following advice from the Carbon Trust Consultants the planned changes to the Estate are included within the Business as Usual Scenario but not the Meeting the Target scenario. The changes include:

- Closure of Kings Hill conference centre in March 2010. The energy usage from Aug 2009-March 2010 was calculated and the associated reduction in energy added to the 2010/11 figures.
- Leasing of new office space in Greenwich (640 m<sup>2</sup>) in early 2011. Energy usage has been estimated using the ECON19 benchmark for a naturally ventilated office building and the increase split over 2010/11 and 2011/12 academic years.
- Stockwell Street Development: a 16,000 m<sup>2</sup> new build project due to open late 2013. It will be home to the School of Architecture and Construction and house a new campus library. Predicted energy use has been calculated by Hoare Lea (Mechanical and Electrical Consulting Engineers for the Stockwell Street project) and the increase split over 2013/14 and 2014/15.

**Figure 7** and **Figure 8** both illustrate what the predicted emissions would be over the next five years and the associated increase in energy costs if the University were not to take any actions to reduce its carbon emissions. In summary:

- If the University were not to implement the carbon management projects outlined in this plan, the carbon emissions associated with energy use in buildings and fleet transport could increase by 13% over the next five years.
- If the University achieves the 30% carbon reduction target over the next six years, the University could save approximately £3.2 million cumulatively in energy costs over this period and 17,900 tonnes of carbon compared to if no action was taken.



**Figure 7. A graph of the carbon value at stake**

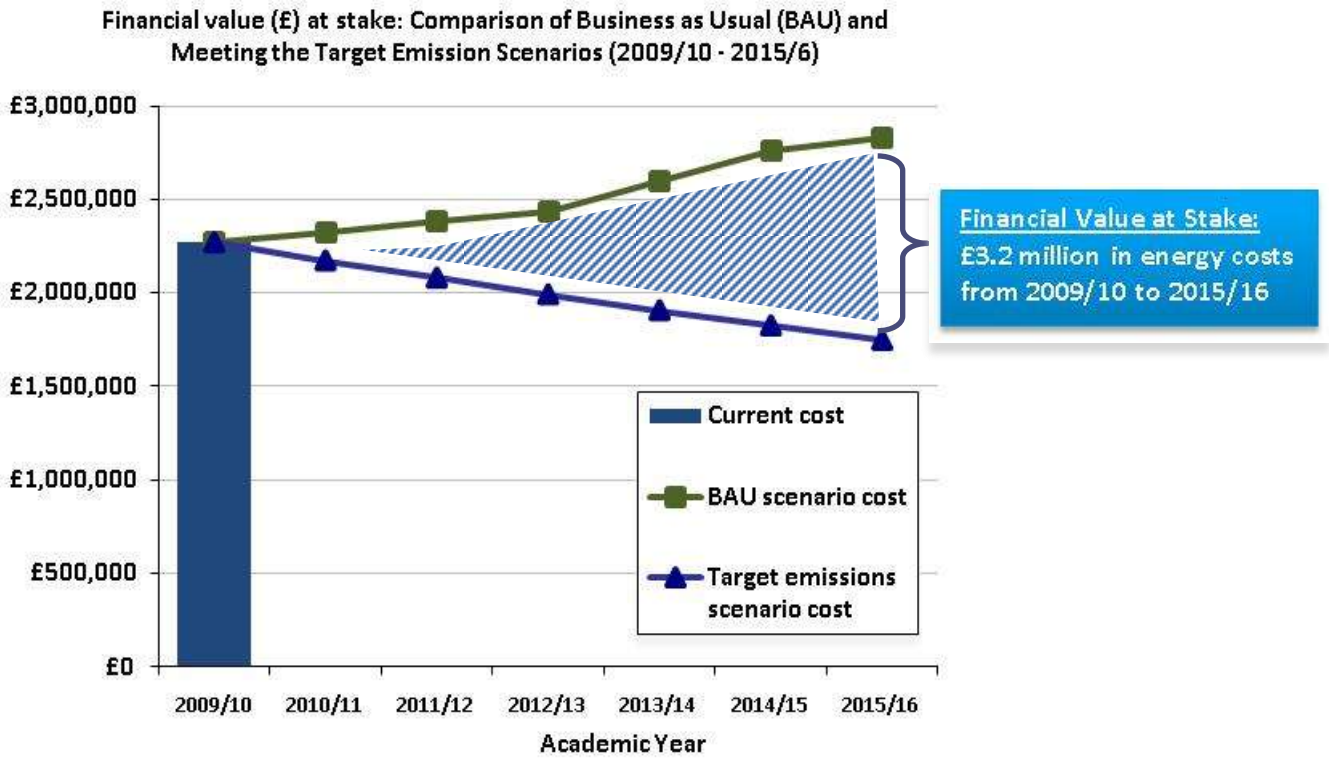


Figure 8. A graph of the financial value at stake

## 4 Carbon Management Projects

This section identifies the individual projects (or opportunities) and actions that will allow the University to meet its carbon management objectives. There is a wide variety of technical building projects and some that are non-building related. It is much easier to calculate the costs and savings for building related projects but the number of non-building related projects will be increased over the next year as more accurate expenditure and savings data becomes available.

The projects have been identified from a number of sources:

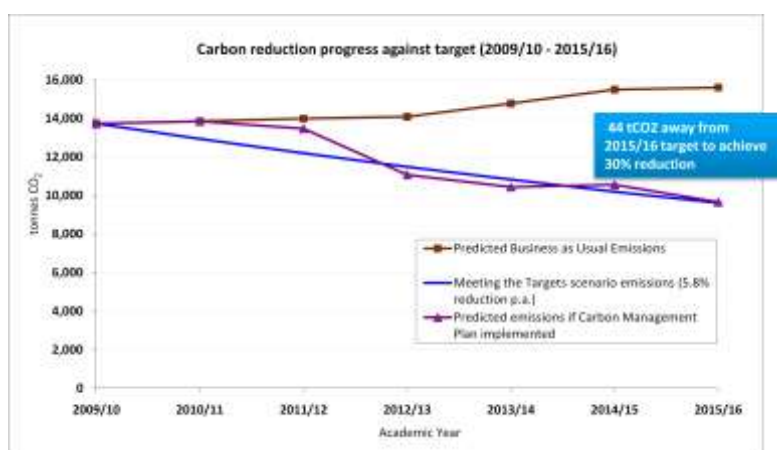
- The University's FM department staff recognising obvious energy losses e.g. the lack of pipe and loft insulation and draughty single glazed windows etc.
- The department's central technical department identifying more technical areas and the potential saving methods e.g. Voltage optimisation and burner management controls etc.
- A high level energy survey carried out by Self Energy Ltd (a specialist consultancy) which showed the potential for many different energy conservation methods.
- Surveys carried out by the Carbon Trust (3 years ago) e.g. Thermostatic Radiator Valves.
- The University's Sustainability department e.g. awareness and behaviour change.
- The University's Transport department
- The University's ICT department
- The advisory notices from DEC renewals.

Currently 115 opportunities for carbon reduction at a cost of £8 million have been identified and are planned to be implemented between 2010 and 2020. These have been entered into the university's carbon management project register (CMPR - a spreadsheet used for technical analysis of the projects).

Of these 115 projects:

- 11 projects (Projects 1 to 7, 13, 59, 60, and 70) have already been completed during the fourth quarter of 2010.
- 91 are building specific technical projects and 4 are for related consultancy fees.
- The remainder have been added under a general heading, per financial year, to cover projects yet to be identified.
  - Of these 5 are for awareness campaigns (to 2014-2015),
  - 6 are for IT related projects (to 2015-2016) and
  - 9 are for projects by Schools & Offices (to 2019-2020).

Over the next 5 years, to the end of July 2016, the total estimated cost of the projects identified is £6 million. As shown in Figure 9 this should achieve a reduction of 5,950 tonnes of carbon, which is actually one and a half times the absolute reduction target of 4,121 tonnes. However, due to changes in the estate, in particular the addition of a new building (containing the School of Architecture and Construction and the Library) to the Greenwich campus, a reduction of 5,950 tonnes is required to compensate for the additional emissions and achieve the 30% reduction by 2016.



**Figure 9. Graph showing the carbon reduction progress against target if the carbon management plan is implemented**

Many of the projects have a useful life well beyond this and they will continue to accrue savings e.g. the voltage optimisation units have a guaranteed life of 15 years but are expected to operate for 25 years. They will continue to provide energy savings throughout this time although it is recognised that, as other measures are implemented e.g. high frequency lighting and variable speed drives on motors, the level of savings will decrease. This combined effect is true for most of the projects and has been taken into account in the figures produced by the CMP register hence the cumulative total stated is approximately 85% of the arithmetic total listed in Figure 10 to 21.

The actions required for each of the projects (up to the end of the 2011-12 financial year) is shown in Appendix F (Definition of Projects) where each project has its own project template. The templates detail the projects' description, financial investment, cost savings, carbon savings, how they will be managed, when they will be achieved and how success will be proved.

Many energy management projects have been completed over the past two years (including the installation of extensive gas and electricity meters at the Avery Hill and Greenwich campuses).

Since July 2009 the number of meters across the University has been increased from 77 to 242. This has greatly improved the ability to analyse the consumption of energy by the buildings and will help us to identify the savings that the energy conservation measures will provide. However, at the Medway campus the upper site has a district heating main served by one central boiler house. The extent of gas metering is very poor such that the consumption of each of the five main buildings cannot be measured. It is planned to install individual gas meters on all boilers and heat flow meters on the heating and chilled water mains serving each building. The gas metering is being programmed to take place in the first quarter of 2011 and the heat meters in the second quarter. It is expected that we will be able to incorporate the meter output data into our dedicated Monitoring and Targeting (M&T) software system and into the Trend Building Management System, which will be very beneficial to the FM technical and energy management staff. It is further anticipated to extend the M&T system to allow extensive access to graphical displays for viewing by staff and students across the university.

## 4.1 Completed projects to the end of 2010

Figure 10 shows the projects that were completed by the end of 2010. Projects 1-7 were funded via an application to Salix Finance Ltd., in total a sum of £206,942. These projects consisted of pipe insulation, thermostatic radiator valves (TRV's) and voltage optimisation (VO) units. The savings data for each of these projects was suitably assessed by various consultants (Sustain Limited, Self Energy and the Carbon Trust) and, for the VO units, by the manufacturer as part of their guaranteed savings analysis. Other projects include the revision of light switching in the Drill Hall Library and the installation of extensive metering at the Greenwich Maritime campus. All cost values are inclusive of VAT at 17.5%.

Ref	Project	Owner	Capital Cost (£)	Annual Saving		% of Target	Year
				£	CO <sub>2</sub>		
1, 2, 3, 4, 5, 6, 7, 13, 59, 60, 70	Pipe insulation, TRV's, VO's, Metering and Drill Hall Lighting.	Building Services Team	£375,723	£86,634	516	8.7%	2010
<b>Totals</b>			<b>£375,723</b>	<b>£86,634</b>	<b>516 tonnes</b>	<b>8.7%</b>	<b>2010</b>

**Figure 10. Completed carbon reduction projects (to end of 2010)**

## 4.2 Planned projects for completion by 31<sup>st</sup> July 2011

Figure 11 shows the projects that are proposed to be completed during the period of January 2011 to the end of July 2011. These are projects that have very good payback times, good cost effectiveness ratios and/or are relatively easy to carry out in the time allowed. The Automated Meter Reading (AMR) projects are an exception because, in themselves, they do not have good paybacks but the data they will provide is essential for observing energy consumption and allowing comparisons to be made, confirming reductions as a result of completed opportunities and for informing future technical projects e.g. Combined Heat and Power plant etc.

The data for the projects listed on Figure 12 has been suitably assessed e.g. for the Voltage Optimisation unit by the manufacturer as part of their guaranteed savings analysis; by the FM central technical staff and by various consultants (Sustain Limited and Self Energy).

All cost values are inclusive of VAT at the 20% rate. Note: contingency sums have not been included.

Although the paybacks for photovoltaic (PV) panels are likely to be around 12 years, the University would like to have a renewable energy source as part of its portfolio. Consequently it is essential to install these before 31<sup>st</sup> March 2012 to obtain a guaranteed Feed-in-Tariff (FIT) from the Government. The FIT reduces each year thereby increasing the payback time. The FIT is currently being guaranteed for 25 years but may not be after March 2012. Project 61 is for a feasibility study to be carried out and a specification to be produced for tender purposes.

Ref	Project	Lead	Capital Cost (£)	Annual Saving £ tCO <sub>2</sub>		Product Life (yr)	Pay back (yr)	Net Present Value (£)	% of Target	Year
15	Loft insulation Avery Hill	S Edwards	20000	4640	27	25	4.3	56474	0.5%	2011
21	Consultancy	All	10000	1281	8	10	7.8	2623	0.1%	2011
34	Pipe insulation Avery Hill	G Tilney	9900	5024	29	20	2.0	61503	0.5%	2011
35	Thermostatic Radiator Valves Greenwich Queen Anne	G Bildstein	48000	16640	96	10	2.9	90388	1.6%	2011
36	Boiler control - Dynamic Burner Management Units (DBMU) x5 Avery Hill	G Bildstein	9000	11520	66	10	0.8	86807	1.1%	2011
37	Boiler control - (DBMU) x 15 Medway	G Bildstein	27000	60512	348	10	0.4	476254	5.8%	2011
38	Boiler control - (DBMU) x 19 Greenwich	G Bildstein	34000	14272	82	10	2.4	84695	1.4%	2011
41	Voltage Power Optimisation Central Services Medway	J Hudson	80000	20070	123	25	4.0	250776	2.1%	2011
51	Occupation detection BMS interlock to plant J106,J206,P129,130,134,227 PK008,PK011, H020,H030, B028.	D Blackman	10722	2108	12	10	5.1	6805	0.2%	2011
52	TRV's Jellicoe + VT Circ pump	G Bildstein	11000	4006	23	10	2.7	22320	0.4%	2011
54	AMR Medway - Electricity, Gas and Heat 2010-2011	J Hudson	95000	11780	71	20	8.1	72422	1.2%	2011
55	BMS Analysis & alterations in Central Service/Grenville building, Medway	D Blackman	11332	3872	23	10	2.9	52484	0.4%	2011
57	TRV's Drill Hall – Medway	G Bildstein	30000	12000	69	10	2.5	69799	1.2%	2011
58	Air compressor with inverter drive Medway	D Blackman	9840	1780	11	20	5.5	15458	0.2%	2011

Ref	Project	Lead	Capital Cost (£)	Annual Saving		Product Life (yr)	Pay back (yr)	Net Present Value (£)	% of Target	Year
				£	tCO <sub>2</sub>					
61	PV Feasibility Study & Specification, Avery Hill	N Heugh	5280	454	3	25	11.6	2201	0.1%	2011
64	Transport initiatives Phase 1	S Earp	10000	2260	5	10	4.4	8799	0.1%	2011
65	Lecture Theatres, Vent & electric heating controls, Greenwich	D Blackman	24000	4180	25	20	5.7	35408	0.4%	2011
66	Awareness campaign 2010 -2011	K Thorne	20000	20040	122	2	1.0	18070	2.1%	2011
68	Lighting Hawke H020 phase 1	D Blackman	15000	4115	19	20	3.6	43484	0.3%	2011
72	AMR at Avery Hill, further electricity meters 2010-2011	J Hudson	10000	1826	29	20	5.5	13952	0.5%	2011
73	TRV's Stairwells Medway	G Bildstein	15000	6080	35	20	2.5	35565	0.6%	2011
<b>Totals for Projects</b>			<b>£505,074</b>	<b>£208,460</b>	<b>1,236 tonnes</b>			<b>£1,506,287</b>	<b>20.8%</b>	
<b>Contingency</b>		<b>N Heugh</b>	<b>£50,500</b>							
<b>Salix loan repayment No. 1</b>		<b>Finance</b>	<b>£25,850</b>							
<b>Total expenditure 2010/11 (excluding Figure 10)</b>			<b>£581,424</b>							

Figure 11. Planned and funded carbon reduction projects (Jan 2011 to end of July 2011)

### 4.3 Planned projects for completion during 2011 – 2012

Figure 12 shows the projects that have been identified for completion during the financial year from 1<sup>st</sup> August 2011 to 31<sup>st</sup> July 2012. These are projects that have good payback times and/or are relatively easy to carry out. The data for these projects has been suitably assessed e.g. for the Photo Voltaic panels and burner controls by specialist installers; by the FM central technical staff and by consultants (Sustain Limited and Self Energy).

If photovoltaic arrays are approved it is essential to install these before 31<sup>st</sup> March 2012 to obtain the guaranteed Feed-in-Tariff from the Government. The projects for variable speed drives show a very good payback but further detailed analysis is necessary to determine if it is more cost effective to replace old motors with new high efficiency ones. All cost values are inclusive of VAT at 20%.

Ref	Project	Lead	Capital Cost (£)	Annual Saving		Product Life (yr)	Pay back (yr)	Net Present Value (£)	% of Target	Year
				£	tCO <sub>2</sub>					
8	Variable Speed Drives / new motors Phase 1	D Blackman	30000	9335	57	20	3.2	102676	1.0%	2012
11	PV arrays Southwood Site Avery Hill	N Heugh	210000	15289	10	20	13.7	41892	0.2%	2012
14	Draught proofing Greenwich	S Edwards	23000	5426	31	20	4.2	54121	0.5%	2012
21	Consultancy fees	N Heugh	30000	3844	23	10	7.8	2623	0.4%	2012

Ref	Project	Lead	Capital Cost (£)	Annual Saving		Product Life (yr)	Pay back (yr)	Net Present Value (£)	% of Target	Year
24	Lighting replacement Medway	J Hudson	61000	17364	106	15	3.5	138992	1.8%	2012
25	Lighting sensors/controls - Avery Hill phase 1	J Hudson D Blackman	16000	2492	15	15	6.4	12701	0.3%	2012
27	Lighting sensors/control - Medway phase 1	J Hudson D Blackman	88500	13439	82	15	6.6	66282	1.4%	2012
53	AMR Software upgrade for remote viewing - all areas	J Hudson D Blackman	4000	2100	13	10	1.9	13465	0.2%	2012
56	BMS Analysis & alterations Phase 2 Medway	D Blackman	35000	13310	80	10	2.6	75694	1.3%	2012
63	Lighting external Avery Hill	J Hudson D Blackman	50000	6272	26	25	8.0	53372	0.4%	2012
71	Transport initiatives Phase 2	S Earp	50000	8477	18	20	5.9	70472	0.3%	2012
75	Pipe insulation Medway	D Blackman	10000	5210	29	20	2.0	62768	0.5%	2012
79	Awareness campaign	K Thorne	20000	20040	122	1	1	18070	2.1%	2012
91	BEMS New/additional controls Avery Hill	D Blackman	12000	1600	9	10	7.5	1307	0.2%	2012
101	IT Projects	M Castens	100000	16020	98	10	6.2	33232	1.6%	2012
106	Projects By Schools/Offices TBC	N Heugh	250000	10680	65	10	9.4	50437	1.1%	2012
115	PC Power down management software	N Elliot	14400	54583	352	5	0.3	245590	5.9%	2012
<b>Totals for Projects</b>			<b>£1,003,900</b>	<b>£205,481</b>	<b>1136 Tonnes</b>			<b>£1,024,986</b>	<b>19.1%</b>	
<b>Salix loan repayments No.2 &amp; 3</b>		<b>Finance Dept.</b>	<b>£51,700</b>							
<b>Total expenditure for 2011-12 FY</b>			<b>£1,055,600</b>							

Figure 12. Planned carbon reduction projects to be completed August 2011 to July 2012

#### 4.4 Planned projects for completion during 2012 – 2013

Figure 13 shows the projects that have been identified for completion during the financial year from 1<sup>st</sup> August 2012 to 31<sup>st</sup> July 2013. It is expected that data will become available from the metering project carried out in 2011 to allow accurate sizing of a potential CHP unit for the Medway upper site (see project 33).

Ref	Project	Lead	Capital Cost (£)	Annual Saving		Product Life (yr)	Pay back (yr)	Net Present Value (£)	% of Target	Year
				£	tCO <sub>2</sub>					
9	Variable Speed Drives / new motors Phase 2	D Blackman	27500	10468	64	20	2.6	121270	1.1%	2013
16	Loft insulation Greenwich	S Edwards	4000	989	6	25	4.0	12295	0.1%	2013
17	Draught proofing Medway	S Edwards	43000	10336	59	20	4.2	103899	1.0%	2013
20	BMS Analysis & alterations Avery H	D Blackman	29000	5319	31	10	5.5	15237	0.5%	2013
23	Lighting Greenwich	J Hudson	28000	7733	41	15	3.6	61065	0.7%	2013
26	Sensors/control - lighting Greenwich phase 1	D Blackman	90000	13234	81	15	6.8	62425	1.4%	2013
32	Fussey Lecture Theatre - CO2 monitor + speed control Avery Hill	D Blackman	3000	312	2	15	9.6	588	0.0%	2013
33	Combined Heat & Power Medway	N Heugh	528000	78820	503	20	6.7	592222	8.5%	2013
39	Voltage Power Optimisation (VPO) Anne, Mary, and East Lodge Greenwich	J Hudson	48000	11481	70	25	4.2	141224	1.2%	2013
42	VPO Dreadnought	J Hudson	36000	15664	96	25	2.3	222166	1.6%	2013
47	VPO Upper site Medway	J Hudson	55000	10146	62	25	5.4	112221	1.0%	2013
48	Consultancy fees	N Heugh	40000	5125	31	10	7.8	2623	0.5%	2013
69	Glazed suspended ceiling North Hall Avery Hill	S Edwards	30000	3200	18	25	9.4	22741	0.3%	2013
76	Secondary Glazing Medway phase 1	S Edwards	70000	8000	46	10	8.8	-3467	0.8%	2013
80	Awareness campaign	K Thorne	20000	20040	122	1	1	-628	2.1%	2013
92	BEMS controls & valves Greenwich	D Blackman	24000	3200	18	10	7.5	2613	0.3%	2013
94	AMR Water meters	J Hudson	50000	6400	37	25	7.8	55482	0.6%	2013
102	IT Projects	M Castens	100000	13350	82	10	7.5	11027	1.4%	2013
107	Projects by Schools/Offices	TBC	230000	30875	186	10	7.4	26775	3.1%	2013
<b>Totals for Projects</b>			<b>£1,455,500</b>	<b>£254,692</b>	<b>1555 tonnes</b>			<b>£1,561,778</b>	<b>26.1%</b>	
<b>Salix loan repayments No. 4 &amp; 5</b>		<b>Finance Dept</b>	<b>£51,700</b>							
<b>Total expenditure for 2012-13 FY</b>			<b>£1,507,200</b>							

Figure 13. Planned carbon reduction projects to be completed 1<sup>st</sup> August 2012 to 31<sup>st</sup> July 2013.

## 4.5 Planned projects for completion during 2013 – 2014

Figure 12 shows the projects that have been identified for completion during the financial year from 1<sup>st</sup> August 2013 to 31<sup>st</sup> July 2014. The project at Medway, for PV arrays, is dependent on the Feed-in-Tariff in force at the time. The overall cost for this year has been kept at a lower value because of the need to fund the fitting out of the new building on Stockwell Street.

Ref	Project	Lead	Capital Cost (£)	Annual Saving		Product Life (yr)	Pay back (yr)	Net Present Value (£)	% of Target	Year
				£	CO <sub>2</sub>					
10	Variable Speed Drives & replacement motors Phase 3	D Blackman	55000	21442	131	20	2.6	249742	2.2%	2014
12	Photo Voltaic arrays Medway	N Heugh	105000	7644	5	25	13.7	20991	0.1%	2014
19	BMS Analysis & alterations Greenwich	D Blackman	17000	3798	22	10	4.5	14586	0.4%	2014
22	Lighting Avery Hill	J Hudson	60600	13592	83	15	4.5	95942	1.4%	2014
30	Boiler burner Medway Central Services	D Blackman	10000	1280	7	15	7.8	4742	0.1%	2014
40	Voltage Power Optimisation King William Greenwich	J Hudson	20000	5207	32	25	3.8	65811	0.5%	2014
43	Voltage Power Optimisation Upper Pembroke TX1 Medway	J Hudson	30000	5073	31	25	5.9	53611	0.5%	2014
62	External lighting Medway	J Hudson	50000	6272	26	25	8.0	53372	0.4%	2014
77	Secondary Glazing Medway phase 2	S Edwards	70000	8000	46	10	8.8	-3467	0.8%	2014
81	Awareness campaign	K Thorne	20000	20040	122	1	1	-638	2.1%	2014
93	BEMS New/additional controls Medway	D Blackman	36000	4800	37	10	7.5	3920	0.6%	2014
97	Sensors/controls - lighting Avery Hill phase 2	J Hudson D Blackman	50000	7120	44	15	70	32004	0.7%	2014
98	Consultancy fees	N Heugh	40000	5125	31	10	7.8	2623	0.5%	2014
103	IT Projects	M Castens	100000	12460	76	10	8.0	3625	1.3%	2014
108	Projects by Schools/Offices TBC	TBC	60000	7705	46	10	78	4079	0.8%	2014
<b>Totals for Projects</b>			<b>£723,600</b>	<b>£129,558</b>	<b>739 tonnes</b>			<b>£600,943</b>	<b>12.4%</b>	
<b>Salix loan repayments No. 6 &amp; 7</b>		<b>Finance Dept.</b>	<b>£51,700</b>							
<b>Total expenditure for 2013-14 FY</b>			<b>£775,300</b>							

Figure 14. Planned carbon reduction projects to be completed 1<sup>st</sup> August 2013 to 31<sup>st</sup> July 2014.

## 4.6 Planned projects for completion during 2014 – 2015

Figure 15 shows the projects that have been identified for completion during the financial year from 1<sup>st</sup> August 2014 to 31<sup>st</sup> July 2015.

Ref	Project	Lead	Capital Cost (£)	Annual Saving		Product Life (yr)	Pay back (yr)	Net Present Value (£)	% of Target	Year
				£	CO <sub>2</sub>					
18	Loft insulation Medway	S Edwards	108000	21166	122	25	5.1	408856	2.1%	2015
28	Boilers Avery Hill replacement Honeycomb + Mansion	N Heugh	55000	5568	32	25	9.9	36769	0.5%	2015
31	Combined Heat & Power Avery Hill	N Heugh	275000	33841	216	20	8.1	205962	3.6%	2015
44	Voltage Power Optimisation Upper Pembroke TX2 Medway	J Hudson	48000	8099	50	25	5.9	85484	0.8%	2015
67	Boiler burner Central Services Medway	D Blackman	11000	1280	7	15	8.6	3742	0.1%	2015
74	TRV's Avery Hill phase 2	D Blackman	50000	14400	83	10	3.5	69759	1.4%	2015
78	Secondary Glazing Medway phase 3	S Edwards	70000	8000	46	10	8.8	-3467	0.8%	2015
82	Awareness campaign	K Thorne	20000	20040	122	1	1	-638	2.1%	2015
83	Replacement motors and Variable Speed Drives phase 4	D Blackman	30300	7120	44	15	4.3	51704	0.7%	2015
85	Heating system modifications Mansion	N Heugh	250000	32000	184	25	7.8	277408	3.1%	2015
95	Sensors/control - lighting Greenwich phase 2	D Blackman	90000	13234	81	15	6.8	62425	1.4%	2015
99	Consultancy fees	N Heugh	40000	5125	31	10	7.8	2623	0.5%	2015
104	IT Projects	M Castens	100000	11570	71	10	8.6	-3777	1.2%	2015
109	Projects by Schools/Offices TBC	TBC	60000	7367	44	10	8.1	1268	0.7%	2015
Totals for Projects			£1,207,300	£188,810	1,133 tonnes			£1,198,118	19.0%	

Figure 15. Planned carbon reduction projects to be completed 1<sup>st</sup> August 2014 to 31<sup>st</sup> July 2015

## 4.7 Planned projects for completion during 2015 – 2016

Figure 16 shows the projects that have been identified for completion during the financial year from 1<sup>st</sup> August 2015 to 31<sup>st</sup> July 2016.

Ref	Project	Lead	Capital Cost (£)	Annual Saving		Product Life (yr)	Pay back (yr)	Net Present Value (£)	% of Target	Year
				£	CO <sub>2</sub>					
29	Boilers replacement Greenwich phase 1	N Heugh	54000	5472	31	25	9.9	36187	0.5%	2016
45	Voltage Power Optimisation Upper Pembroke TX3 Medway	J Hudson	30000	5073	31	25	5.9	53611	0.5%	2016
84	Replacement motors and Variable Speed Drives phase 5	D Blackman	33300	8188	50	15	4.1	61005	0.8%	2016
86	Heating system modifications Southwood site phase 1	N Heugh	260000	32000	184	25	8.1	267408	3.1%	2016
96	Sensors/control - lighting Medway phase 2	D Blackman	88500	13439	82	15	6.6	66282	1.4%	2016
100	Consultancy fees	N Heugh	40000	5125	31	10	7.8	2623	0.5%	2016
105	IT Projects	M Castens	100000	10680	65	10	9.4	-11179	1.1%	2016
110	Projects by Schools/Offices TBC	TBC	120000	15020	91	10	8.0	4915	1.5%	2016
<b>Totals</b>			<b>£725,800</b>	<b>£94,997</b>	<b>565 tonnes</b>			<b>£480,852</b>	<b>9.5%</b>	

Figure 16. Planned carbon reduction projects to be completed 1<sup>st</sup> August 2015 to 31<sup>st</sup> July 2016

## 4.8 Planned projects for completion during 2016 – 2020

The planned projects for completion from August 2016 to July 2020 can be found listed in Appendix B, page 37.

## 5 Carbon Management Plan Financing

The modelling is based on the following assumptions:

- Energy prices are illustrated at current levels (March 2011)
- Project cost and investment, etc. are also estimated at current levels.

The energy and carbon analysis has identified a range of projects that will provide a reduction in carbon emissions close to the 30% target set for 2015/16. The capital investment for these projects is in the region of £6m and will generate an annual saving in running costs of approximately £1m.

As investments these projects are extremely attractive. Collectively they have a payback period of less than 7 years. This is equivalent to a return in excess of about 15%, which compares very favourably with current investment returns for cash holdings. The Court of the University have therefore agreed to commit to the initial capital funding level of £6m to 2015/16 and these sums are built into long range budgets.

### 5.1 Financial costs and sources of funding

	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
<b>Annual costs:</b>						
<b>Total annual capital cost</b>	£375,723	£1,508,974	£1,455,500	£723,600	£1,207,300	£725,800
<b>Total annual operational cost</b>	£0	£0	-£16,620	-£16,620	-£25,430	-£25,430
<b>Total costs</b>	£375,723	£1,508,974	£1,438,880	£706,980	£1,181,870	£700,370
<b>Committed funding:</b>						
<b>Committed annual capital</b>	£375,723	£1,422,340	£943,190	£0	£379,671	£0
<b>Committed annual revenue</b>		£86,634	£512,310	£723,600	£827,629	£725,800
<b>Total funded</b>	£375,723	£1,508,974	£1,455,500	£723,600	£1,207,300	£725,800

Figure 17. Annual capital and operational costs and committed funding 2010 to 2016

### 5.2 Savings

	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
<b>Annual cost saving</b>	£0	£0	£86,634	£512,310	£726,921	£827,629	£996,399
<b>Annual CO<sub>2</sub> saving</b>	-	-	515 tonnes	3,012 tonnes	4,330 tonnes	4,938 tonnes	5,948 tonnes

Figure 18. Annual cost and carbon savings resulting from implementation of carbon management plan

The plan also highlights the importance of reinvestment in further carbon reduction projects from investment savings. The University will therefore reinvest 50% of the cost savings resulting from these investments in further carbon reduction activity from 2016/17 in order to meet the 2020 target. This will be a sum of £500,000, increasing annually as additional savings are made by new initiatives.

## 6 Actions to Embed Carbon Management

This section sets out the action plan for how the University will use the Carbon Management Matrix as a framework to ensure that carbon management is embedded into the University's policies, procedures, objectives and targets. The University is aiming to achieve level 5 in each area of the matrix; Figure 2 (page 10) indicates what level the University is at in each of the areas prior to implementing the carbon management plan.

### 6.1 Policy – embedding CO<sub>2</sub> saving across the organisation



#### Policy Level 5 Requirements:

- SMART Targets signed off
- Action Plan contains clear goals and regular progress reviews
- Strategy launched internally and to community

ACTION	WHEN	OWNER
<ul style="list-style-type: none"> <li>• Sustainability including carbon management to be included in 3 year business plans for all Schools and Offices</li> </ul>	2011/12	DVC (resources)
<ul style="list-style-type: none"> <li>• Sustainability to be included in university risk register</li> </ul>	2011	John Wallace/ Kat Thorne
<ul style="list-style-type: none"> <li>• Carbon management and sustainability is to be integral in the following policies, strategy and standard documents:               <ul style="list-style-type: none"> <li>○ Procurement policy</li> <li>○ Travel policy</li> <li>○ Estates Strategy</li> <li>○ University Corporate Plan</li> <li>○ Teaching and Learning Strategy</li> <li>○ Workplace temperature policy</li> <li>○ HR Strategy</li> <li>○ Information Strategy to include Green IT strategy</li> <li>○ Sustainability policy</li> </ul> </li> </ul>	2011	Director of Procurement and Business Services Management
	2011	Transport and Green Travel Manager
	2012	Head of Estates
	2011/12	DVC (resources)
	2011	Head of University Educational Development Team
	2011	Building Services Manager
	2012	Head of Personnel
	2012	Head of ILS
	achieved	Sustainable Development Manager
<ul style="list-style-type: none"> <li>• Carbon management included in Court KPIs and regularly reviewed</li> </ul>	achieved	Head of Planning and Statistics
<ul style="list-style-type: none"> <li>• Carbon management plan launched as key university event and made publicly available via website.</li> </ul>	2011	Head of Marketing/ Head of Public Relations/ Sustainability Team
<ul style="list-style-type: none"> <li>• Action plan updated annually with clear goals and progress reported and reviewed by Resources Sub Committee, Vice Chancellors Group and University Court</li> </ul>	ongoing	Sustainable Development Manager

## 6.2 Responsibility – making it clear that saving CO<sub>2</sub> is everyone’s job

### Responsibility Level 5 requirements:



- Carbon management is full time responsibility of a few people
- Carbon management integrated in responsibilities of senior managers
- Vice Chancellor Support
- Part of all job descriptions

ACTION	WHEN	OWNER(S)
<ul style="list-style-type: none"> <li>• Ensure clear governance for carbon management at the University:               <ul style="list-style-type: none"> <li>○ New Vice Chancellor to be briefed clearly on carbon management plan and role understood</li> </ul> </li> </ul>	2011	DVC (resources)/ Sustainable Development Manager
<ul style="list-style-type: none"> <li>○ Carbon Management Board chaired by Deputy Vice Chancellor (Resources) reports regularly to Resources Sub Committee who has responsibility to maintain progress of carbon management plan and report to Vice Chancellor’s Group and University Court twice a year.</li> </ul>	achieved	DVC (resources)
<ul style="list-style-type: none"> <li>○ Carbon management integrated into responsibilities of all Resource Sub Committee members and responsibilities made clear</li> </ul>	2012	DVC (resources)/ Sustainable Development Manager
<ul style="list-style-type: none"> <li>• Carbon Management and good environmental practice written into all new and updated job descriptions by Personnel</li> </ul>	2012	Head of Personnel/ Training and Development Manager
<ul style="list-style-type: none"> <li>• All new senior manager posts job descriptions to include carbon management</li> </ul>	2011	Head of Personnel/ Training and Development Manager
<ul style="list-style-type: none"> <li>• Look at feasibility of integrating Sustainability including carbon management into senior manager’s reviews</li> </ul>	2012	Head of Personnel/Sustainable Development Manager
<ul style="list-style-type: none"> <li>• Staff Sustainability Champions network – Champion for each school and office supported by Sustainability team. Carbon management built into the Champion’s Green Impact workbook.</li> </ul>	ongoing	Sustainable Development Manager

## 6.3 Data Management – measuring the difference, measuring the benefit

### Data Management Level 5 requirements:



- Quarterly collation of CO<sub>2</sub> emissions for all sources
- Data externally verified
- M&T in place for:
  - Buildings
  - Waste

ACTION	WHEN	OWNER(S)
<ul style="list-style-type: none"> <li>• Automatic Metering installation programme to be completed across all areas of the campus. Any new buildings to have automatic meters installed linked to M&amp;T system.</li> </ul>	ongoing	Building Services Manager
<ul style="list-style-type: none"> <li>• Water to be included in automatic metering system</li> </ul>	2012	Building Services Manager
<ul style="list-style-type: none"> <li>• Reporting system set up for minimum quarterly reporting to carbon management team and planning and statistics:               <ul style="list-style-type: none"> <li>○ Building services team report energy and water data to planning and statistics</li> </ul> </li> </ul>	2011	Building Services Manager
<ul style="list-style-type: none"> <li>○ Transport and Green travel manager reports fuel usage in university owned vehicles</li> </ul>	ongoing	Transport and Green Travel Manager

○ Transport and Green travel manager reports fuel usage in university leased vehicles	2011	Transport and Green Travel Manager
○ Biannual Staff and biannual Student travel survey conducted and data collated and reported	ongoing	Transport and Green Travel Manager
○ Staff and biannual Student travel survey conducted	ongoing	Transport and Green Travel Manager
○ Staff travel data from travel booked through centralised university travel providers reported annually to Transport and Green Travel Manager	2011	Finance/ Procurement
○ Finance to adapt expenses form to ensure collection of scope 3 transport emissions associated with business internal and external travel data reported from expenses	2011	Finance
○ Waste data reported by providers to Head of Campus Services, data checked and collated and reported to Planning and Statistics	2011	Head of Campus Services and Sustainable Development Manager
○ Head of Campus Services to ensure all new contractors for waste can provide waste data in suitable format	ongoing	Head of Campus Services
○ Procurement to ensure all new travel providers can provide carbon emission data for university travel booked through them	ongoing	Head of Procurement and Business Services
• Data reported at every University Court meeting	ongoing	Head of Planning and Statistics
• Data available to all staff through Court minutes but carbon management progress will also be communicated annually via all staff communication channels	2011	Sustainable Development Manager
• Up to date energy consumption data made available to all staff via a weblink for those interested in energy data for their area of building and for schools/ offices to calculate footprints for area they occupy.	2012	Building Services Manager and Sustainable Development Manager
• Monitor HEFCE Scope 3 carbon emission reporting requirements and identify actions to ensure requirements are met within any specified deadline	2011/12	Sustainable Development Manager
○ Investigate options for external verification of carbon emissions data	2013	Sustainable Development Manager

## 6.4 Communication and Training – ensuring everyone is ready, willing and able

### Communication Level 5 requirements:



- **All staff & students given formal carbon management:**
  - Induction
  - Training Plan
  - Communications

- **Carbon management matters regularly communicated to:**
  - External community
  - Key partners

ACTION	WHEN	OWNER(S)
• Staff sustainability induction session includes carbon management	2011	Sustainable Development Manager
• First day school/ office Induction process- include carbon management as related to the office	2011	Personnel: Training and Development Manager

<ul style="list-style-type: none"> <li>Staff Sustainability Champion network launched. Minimum of one representative from each School and Office.</li> </ul>	achieved-2010	Sustainable Development Manager
<ul style="list-style-type: none"> <li>Staff sustainability survey carried out to include carbon management awareness questions so awareness levels can be monitored annually</li> </ul>	2011	Sustainable Development Manager
<ul style="list-style-type: none"> <li>Annual student survey to include sustainability and carbon management awareness questions so awareness levels can be monitored annually</li> </ul>	2012	Head of Planning and Statistics and Sustainable Development Manager
<ul style="list-style-type: none"> <li>New Student forum to include a carbon management session on getting feedback into carbon management plan and developing a communication plan for students</li> </ul>	2011	Head of University Educational Development Team
<ul style="list-style-type: none"> <li>Student placements in sustainability team and building services team</li> </ul>	ongoing	Sustainable Development Manager
<ul style="list-style-type: none"> <li>Support academic related carbon projects by supplying university data/ experiences</li> </ul>	ongoing	As requested
<ul style="list-style-type: none"> <li>Develop focus groups for areas of high impact: Laboratory carbon reduction group</li> </ul>	2012	Sustainable Development Manager to develop. NRI/ Science/ Pharmacy representatives
<ul style="list-style-type: none"> <li>Develop focus groups for areas of high impact: Green IT</li> </ul>	2012	Sustainable Development Manager to develop with Head of ILS
<ul style="list-style-type: none"> <li>Communications plan developed and resource agreed for this area- if no internal resource available, external resource required</li> </ul>	2011	Sustainable Development Manager to develop with Head of Marketing
<ul style="list-style-type: none"> <li>Carbon management plan progress to be included in University Annual Review</li> </ul>	2011	DVC (Resources) and Head of Marketing
<ul style="list-style-type: none"> <li>Carbon management plan summary sent to all key partners</li> </ul>	2011	Head of Communication
<ul style="list-style-type: none"> <li>Carbon management plan made publicly available on front page of website when launched</li> </ul>	2011	Head of PR
<ul style="list-style-type: none"> <li>Student Induction process to include sustainability/ carbon management</li> </ul>	2012	Head of Recruitment and Admissions
<ul style="list-style-type: none"> <li>Support sustainability related University student societies e.g.IEEEGreen and UMSA Environmental Society and have a stand at Fresher's Fayre</li> </ul>	ongoing	Sustainable Development Manager

## 6.5 Finance and Investment



- Granular & effective financing mechanisms for carbon management projects
- Finance representation on carbon management team
- Robust task management mechanism
- Ring fenced fund for carbon reduction initiatives

<ul style="list-style-type: none"> <li>Court commitment to provide the initial invest of £6m to 2015/56</li> </ul>	2011	DVC (Resources)
<ul style="list-style-type: none"> <li>Court commitment to reinvest 50% of annual savings from 2016/17 in order to meet 2020 target.</li> </ul>	2011	DVC (Resources)
<ul style="list-style-type: none"> <li>Annual reporting of reduction of carbon emissions to Court as KPI</li> </ul>	2011	Head of Planning and Statistics and Sustainable Development Manager

## 6.6 Procurement – engaging suppliers



- Senior purchasers consult and adhere to ICLEI's Procurement manual and principles
- Sustainability comprehensively integrated in tendering criteria
- Whole life costing
- Area-wide procurement

ACTION	WHEN	OWNER(S)
<ul style="list-style-type: none"> <li>• Finalise the sustainable procurement strategy to include whole life costing, encouraging local suppliers, less deliveries, sourcing alternative goods with less environmental impact, and incorporating the Government's Buying Standards as standard into all tenders and engage current suppliers.</li> </ul>	2011	Head of Procurement and Business Services
<ul style="list-style-type: none"> <li>• Establish and action plan to ensure decentralised procurement in Schools and Offices is in line with sustainable procurement strategy</li> </ul>	2012	Head of Procurement and Business Services
<ul style="list-style-type: none"> <li>• Annually review sustainable procurement strategy and report progress against Flexible Procurement Framework to Resources Sub committee.</li> </ul>	2012	Head of Procurement and Business Services
<ul style="list-style-type: none"> <li>• Implement Sustainable Food policy as agreed in Feb 2011 which promotes local food sourcing, using higher welfare but less meat and improving vegetarian options. Targets as agreed in sustainable food policy.</li> </ul>	ongoing	Head of Catering and Conference Services
<ul style="list-style-type: none"> <li>• Develop sustainable construction checklist for all construction and refurbishment projects</li> </ul>	2012	Head of Campus services
<ul style="list-style-type: none"> <li>• Stockwell Street 17,000 m2 development: Achieve BREEAM Excellent and maximise energy efficiency</li> </ul>	ongoing	Head of Estates

## 6.7 Monitoring and Evaluation – keeping track of progress



- Senior Management review carbon management progress
- Core team regularly reviews carbon management progress
- Published externally on website
- Visible board level review

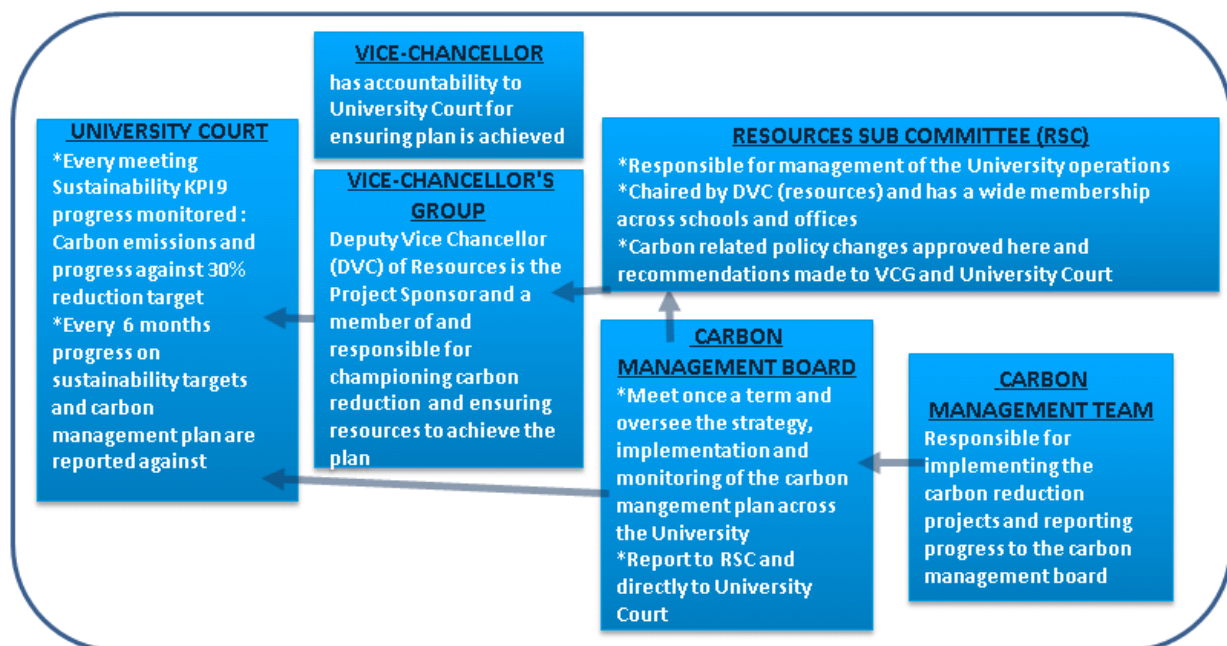
ACTION	WHEN	OWNER(S)
<ul style="list-style-type: none"> <li>• As in responsibility section 6.2 'Ensuring clear governance for carbon management at the University':               <ul style="list-style-type: none"> <li>o Carbon Board/ team meetings once a term to review progress against action plan and to annually refresh carbon management plan</li> </ul> </li> </ul>	ongoing	DVC (Resources)
<ul style="list-style-type: none"> <li>o Annual summary of progress against carbon management plan to be publicly available</li> </ul>	2012	Carbon Management Team

## 7 Programme Management

In order for the Carbon management plan to succeed the University recognises the need for good programme governance. This section describes how the implementation plan will be driven and managed using the Carbon Management Board and existing university committees to ensure that the programme is kept up to date and that the reduction targets are achieved.

### 7.1 Responsibility for action

The Vice-Chancellor is the Chief Executive of the university and has overall responsibility for the management of the institution and its direction. She is accountable to the University Court and is assisted in her role by a number of committees and groups, including the **Vice-Chancellor's Group**. The Deputy Vice-Chancellor (Resources) and the Director of Finance are both members of the Vice-Chancellor's Group. The Court receives a report on Sustainability every 6 months and progress against a number of agreed KPIs is reported on at every meeting and this will be extended to include progress against the Carbon Management Plan.



**Figure 19. Governance of Carbon Management at the University**

The **Resources Sub Committee**, chaired by the Deputy Vice Chancellor (Resources), has responsibility for management of the operations of the University and has a wider membership of senior staff including the Director of Finance, The Director of Personnel, and Head of Estates. The Sustainability Manager is also a member of this committee and reports on initiatives and progress at least twice a year.

In order to manage the carbon reduction programme the University has established a **Carbon Management Board**, again chaired by the Deputy Vice Chancellor (Resources). The terms of reference of the group are to:

- champion and provide leadership on carbon management
- set and review strategic direction and targets
- remove obstacles to successful completion of carbon management projects
- set the scope of the carbon management plan and prioritise carbon reduction projects
- monitor progress towards objectives and targets
- champion plans for financial provision of carbon management projects
- ensure there is a framework to co-ordinate projects in carbon management programme

The Carbon Management Board comprises of the following key people:

Name	Role and Department
Prof Neil Garrod (Chair)	Project Sponsor and Deputy Vice Chancellor (Resources)
Peter Fotheringham	Project Sponsor and FM: Head of Estates
Kat Thorne	Project Leader and FM: Sustainable Development Manager
Nigel Heugh	Project Deputy Leader and FM: Building Services Manager
Simon Walker	VC Office: Education
Lee Devlin	FM: Head of Campus Services
Dr Stuart Ashenden	School of Engineering
Prof Pat Harvey	School of Science
Maureen Castens	Head of Information and Library Services (ILS)
(tbc due to member of staff leaving - Neil Garrod represents Finance in their absence )	Finance Office

Membership reflects the breadth of activities of the University and includes the staff from both Schools and Offices and will meet three times a year.

The **Project Sponsor** is the Deputy Vice Chancellor (Resources) who is a member of the Vice Chancellor's Group and chairs the resources Sub Committee and is uniquely placed to promote and encourage carbon reduction across the University. He is supported by the Head of Estates, who has overall responsibility for the development and maintenance of the buildings, their plant and systems.

Individual responsibility for the delivery of the Carbon Management Plan (CMP) is held by a nominated **Project Manager**, the University's Sustainability Manager. She is the sustainable development champion for the University and has responsibility for promoting sustainable development, developing and implementing policies and management systems and co-ordinating activities across the University. She is supported in delivering the CMP by the Building Services Manager, who has direct responsibility for the development and maintenance of plant and systems and for the purchase and monitoring of utilities.

A broader group, the **Carbon Management Team** has also been established to bring together staff from all parts of the University to encourage them to look at activities within their individual spheres and suggest viable carbon reduction strategies. This group reports to the Carbon Management Board and is organised by the Sustainability Projects Officer, who reports to the Sustainability Manager. The work of this Team is underpinned by the University's Sustainability Champions network.

The projects identified under the plan will each be allocated an appropriate Project Manager. Each will report progress to the Carbon Management Board and a summary annual report will be included in reporting to the University's Court.

## 7.2 Risks and issues management

A number of key risks have been identified and are detailed below along with the ways in which this risk has been mitigated.

### Project Delivery:

At the project level, the individual project managers will manage risks and issues arising, and will report on the status of the projects prior to the Board meeting. The Carbon Management Board will review this using a traffic light system of red, amber and green allowing the Board to focus on those with issues.

### Key parts of the organisation do not actively participate in the programme:

To achieve the target, carbon management must become everyone's responsibility, this will take time to achieve fully but Heads of Schools and Offices must all show their support for the programme from the start. Engagement with Heads of Schools and Offices will be made via the Resources Sub Committee and where appropriate on an individual basis with the Project Sponsors and Project Leader. In addition all schools/ offices have their own Sustainability Champions and they are key to communicating the plan to the heart of their wider school/ office. Where Offices or Schools do not cooperate this will be highlighted in the review process and the Board will decide an appropriate route of action to ensure participation and support.

### Resources- Budget and Staff:

Ensuring that there is a sufficient resource i.e. finance and staff is crucial to the achievement of the plan. Both the University Finance Committee and the University Court have already approved the £6 million budget for the carbon management plan for the next five years as they recognise the strong business case for early investment in carbon management compared to the low interest rates that would otherwise be received at the moment on traditional investments. The plan's budget was put together to take into consideration the capital expenditure for the new building at Stockwell Street in 2014 so reducing the risk of capital not being available during that period.

With regards to sufficient staffing levels, it can be seen from the list of the projects that the Building Services Team in FM are responsible for the delivery of a large number of projects and this will also have implications on other members of FM staff. A new Building Services team member has been recruited and starts in March 2011 to support the implementation of these projects. Monitoring the progress against planned projects by the Carbon Management Board will highlight where there are concerns due to staffing level issues and these will be dealt with on a case by case basis.

### Lack of continuity in key roles:

This risk has been reduced by:

- Having a broad team involved, and not only one person responsible for completing all of the actions. In particular the technical projects in FM which make up the majority of the project plan are assigned to not just one individual but a team of people and these projects are being added into a wider FM annual schedule of works which has its own progress monitoring system.
- The carbon management plan has been built into the University's governance structure securing top level support from University Court and Vice Chancellors Group, including reporting on absolute carbon emissions and progress against the carbon reduction target as part of the University's strategic KPIs that are reported on every Court meeting.

## 7.3 Communication and Training

The Sustainable Development Manager is responsible for the ongoing stakeholder management and will work with others in the University such as those in the Communications team and to ensure promotion of the Carbon management plan. The table below shows the way in which key stakeholders will be informed of progress and how often carbon management will be communicated in this way.

Communication Method	Target Audience	Minimum Frequency
All staff email	Staff & Students	Annually
Intranet & Portal	Staff & Students	Every 6 months
University Website	Staff, Students, Public, Prospective Students	Every 6 months
Sustainability Blog	Staff, Students, Public	As required
Greenwich line	Staff	Annually
Sustainability Champion Meetings	Staff Champions	Monthly
Sustainability Champion Newsletter	Staff Champions	Quarterly
Resources Sub Committee	Senior Management	Every 6 months
University Court	Senior Management	Every 6 months
Vice Chancellor's Group	Senior Management	Every 6 months

Staff induction pack	New Staff	As required
Student induction	New Students	Annually
Fresher's Fayre	New Students	Annually
Green Week	Staff & Students	Annually
Greenwich Student Forum	Students	Annually
Annual Carbon Management Progress Report	Staff, Students, Public	Annually
Residential Assistant's induction	Students	Annually
Student survey	Students	Annually
Staff survey	Staff	Annually
Staff induction training sessions	Staff	As required
Curriculum including teaching, coursework and projects	Students	As required
Local media	Local Community	As required
National media	Public	As required
Twitter	Staff, Students, Public	As required
Poster Campaigns	Staff, Students, Visitors, Contactors	As required
Facebook	Students	As required
SUUG Website	Students	Annually
UMSA Website	Students	Annually
Departmental Meetings	Staff	Annually
Procurement tenders	Contractors/ Suppliers	As required
University Court KPIs: KPI9 includes carbon management	Senior Management, Staff, Students, Public	Monthly

## 7.4 Annual progress review

To ensure successful delivery and implementation of the carbon management plan, an annual progress review will be undertaken by the Carbon Management Board (led by the Sustainable Development Manager) to report on the previous year's progress against the plan and to make recommendations on any changes required to the scope.

The report will include:

- Carbon footprint:
  - Scope 1 and 2 carbon emissions data for buildings and transport.
  - Any scope 3 emission data available
  - Review carbon savings and progress against reduction target
- Progress being made on individual project implementation
- Update communications plan
- Financial report to review the cost and the benefits
- Recommendations to update the coming year's plan in particular the projects, finance and stakeholder management sections
- The identification of any less quantifiable benefits

The Carbon Management Board will submit the annual progress review report to the Resources Sub Committee, Vice Chancellors Group and the University Court.

The Carbon Management Plan is a working document, which will change over time. This will allow the plan to reflect the ever-changing environmental and economic climate but also allow us to keep abreast of advances in technology to deliver more carbon reduction projects as new initiatives emerge.

## Appendix A. Completed Energy Management projects 2008 - 10

### COMPLETED DURING 2008/09

#### EVERY HILL CAMPUS

**Bronte, Fry, Grey, Stud Groom Cottage and the Lodge loft lagging:** Insulation added to increase the thickness to the latest Building Regulations standards.

**Norbert Singer lecture theatre** – Installation of **variable speed drives** to the ventilation unit fans. A CO<sub>2</sub> monitor has been installed to control the speed of them. This reduces the speed to match the occupancy and therefore reduces energy consumption of the motors and of the heating and cooling requirements.

**Mansion site lecture theatre M240:** All of the windows replaced with sealed **double glazed** units.

**Southwood House:** Installation of **secondary glazing** to several dual aspect windows.

**Automatic Metering (AMR) Project Phase 1:** Installation of 32 advanced meters [electricity x 22 and gas x 10] and connection to the fiscal meters [x16] for the buildings on the Avery Hill campus. This includes the provision of centralised data collection (half hourly) and specialist Monitoring & Targeting software to manage the data and demonstrate areas of poor efficiency.

**Dome boiler house** - Alterations to **boiler settings and pump speeds** during the summer to reduce heat losses and electricity consumption.

Various areas: Installation of **water saving taps**.

Various **plant rooms:** Installation of valve **insulation** jackets and pipe insulation.

#### GREENWICH CAMPUS

**Queen Anne boiler room:** Replacement of large volume indirectly fired hot water calorifiers with high efficiency, low capacity gas-fired **water heaters**. Also allows the main heating boilers to be turned off.

Various **plant rooms:** Installation of **valve insulation blankets and pipe insulation**.

#### MEDWAY CAMPUS

For various refurbishment projects: Installation of **high efficiency lamps** and **light fittings**.

Upgrades of the **Building Management System (BMS)** to improve system controllability and reduce energy consumption.

### COMPLETED DURING 2009/10

#### EVERY HILL CAMPUS

**AMR Phase 2:** Installation of a further 28 additional advanced meters [electricity x 19, gas x 6 and heat x 3] for the buildings on the Avery Hill campus. This includes the provision of centralised data collection (half hourly) and specialist M&T software.

**Mansion library lighting:** complete replacement of light fittings with new energy efficient fittings to greatly improve the lighting conditions and reduce energy consumption.

**Winter Garden buildings:** Installation of a more efficient heating system for the East Wing. The planting type is being changed to allow a major reduction of internal temperature from 21°C to 6°C during Winter

#### MEDWAY CAMPUS

Installation of **pipe insulation blankets** on pipe fittings in various plant rooms

**Drill Hall lighting installation:** modification to wiring to allow areas to be switched off (previously 50% was lit 24 hours per day).

#### GREENWICH CAMPUS

**AMR Project Phase 3:** Installation of advanced electricity and gas meters for all buildings on the Greenwich campus. Value £115k.

**QA080 Lecture Theatre:** Replacement of both **air conditioning units** with more efficient types (originals obsolete and using R22 gas)

## Appendix B. Planned projects 2016 – 2020

Ref	Project	Lead	Capital Cost (£)	Annual Saving		Product Life (yr)	Pay back (yr)	Net Present Value	Year
				£	tCO <sub>2</sub>				
46	Voltage Power Optimisation Upper Pembroke TX4 Medway	J Hudson	30000	5073	31	25	5.9	53611	2017
49	Voltage Power Optimisation Gym Medway	J Hudson	12000	1202	7	25	10	7803	2017
50	Voltage Power Optimisation Jellicoe Medway	J Hudson	12000	1202	7	25	10	7803	2017
87	Heating system modifications Southwood phase 2	N Heugh	270000	32000	184	25	8.4	257408	2017
111	Projects by Schools/Offices	TBC	200000	22600	136	20	8.8	121200	2017
<b>Totals</b>			<b>£524,000</b>	<b>£62,077</b>	<b>365 tCO<sub>2</sub></b>			<b>£447,825</b>	

Figure 20. Planned carbon reduction projects to be completed 1<sup>st</sup> August 2016 to 31<sup>st</sup> July 2017

Ref	Project	Lead	Capital Cost (£)	Annual Saving		Product Life (yr)	Pay back (yr)	Net Present Value (£)	Year
				£	tCO <sub>2</sub>				
88	Heating system modifications Greenwich Phase 1	N Heugh	£280000	£32000	184	25	8.8	£247408	2018
112	Projects by Schools/Offices	TBC	£200000	£21390	129	20	9.4	£104003	2018
<b>Totals</b>			<b>£480,000</b>	<b>£53,390</b>	<b>313 tCO<sub>2</sub></b>			<b>£351,411</b>	

Figure 21. Planned carbon reduction projects to be completed 1<sup>st</sup> August 2017 to 31<sup>st</sup> July 2018

Ref	Project	Lead	Capital Cost (£)	Annual Saving		Product Life (yr)	Pay back (yr)	Net Present Value (£)	Year
				£	tCO <sub>2</sub>				
89	Heating system modifications Greenwich Phase 2	N Heugh	290000	32000	184	25	9.1	237408	2019
113	Projects by Schools/Offices	TBC	200000	20180	121	20	9.9	86806	2019
<b>Totals</b>			<b>£490,000</b>	<b>£52,180</b>	<b>305 tCO<sub>2</sub></b>			<b>£324,214</b>	

Figure 22. Planned carbon reduction projects to be completed 1<sup>st</sup> August 2018 to 31<sup>st</sup> July 2019

Ref	Project	Lead	Capital Cost (£)	Annual Saving		Product Life (yr)	Pay back (yr)	Net Present Value	Year
				£	CO <sub>2</sub>				
90	Heating system modifications Medway	N Heugh	300000	32000	184	25	9.4	227408	2020
114	Projects by Schools/Offices TBC	TBC	200000	18970	115	20	10.5	69609	2020
Totals			£500,000	£50,970	299 tCO <sub>2</sub>			£297,017	

Figure 23. Planned carbon reduction projects to be completed 1<sup>st</sup> August 2018 to 31<sup>st</sup> July 2019

## Appendix C. Conversion Factors

Energy source	Conversion factor used to convert fuel to kgCO <sub>2</sub> e	Reference
Electricity	0.54522/ kWh	Defra / DECC Aug 2010 Table 3c
Natural Gas	0.18523/ kWh	Defra / DECC Aug 2010 Table 1c (gross CV basis)
Gas Oil	0.27533/ kWh	Defra / DECC Aug 2010 Table 1c (gross CV basis)
Petrol	2.3220 / litre	Defra / DECC, 2010, Table 6a
Diesel	2.6720/ litre	Defra / DECC, 2010, Table 6a

Figure 24. Carbon conversion factors used in calculation of 2009/10 baseline. Emissions factors used are from the DECC 2010 Guidelines to Defra / DECC's GHG Conversion Factors for Company Reporting (published Aug 2010).

## Appendix D. Carbon Management Team

Richard Cottam	<i>FM: Medway</i>
John Bisbrown	<i>FM: Medway</i>
Kathleen Iles	<i>FM: Avery Hill</i>
Gerard Manning	<i>FM: Avery Hill</i>
Joseph Kasprowicz	<i>FM: Greenwich</i>
Caroline Churchill	<i>FM: Greenwich</i>
David Blackman	<i>FM: Building Services Engineering</i>
Jonathan Hudson	<i>FM: Building Services Engineering</i>
Gerhard Bildstein	<i>FM: Building Services Engineering</i>
Gerald Tilney	<i>FM: Avery Hill</i>
Vincent John	<i>Procurement</i>
Simon Walker	<i>VC Office: Education</i>
Simon Earp	<i>FM: Transport</i>
Jonathan Chandler	<i>FM: Student Accommodation</i>
Jenny Greenfield	<i>Greenwich Student Union</i>
Stewart Edwards	<i>FM: Central</i>
Adele Brooks	<i>FM: Central</i>
Nigel Heugh	<i>FM: Building Services Engineering</i>
Michael Hall	<i>FM: Greenwich building services</i>
Magdy Wahed/ Loraine Hudson	<i>Sodexo</i>
Barry Palmer	<i>FM: Catering and Events</i>
Mike Sutcliffe	<i>ABM Catering</i>
Kevin Behn	<i>Personnel</i>
Ian Cakebread	<i>School of Engineering</i>
Keith Jones	<i>School of Architecture and Construction</i>
Valerie Nelson	<i>NRI</i>
John Bailey	<i>FM: Sustainability</i>
Neil McKeown	<i>PR</i>
Catherine Churchill	<i>FM: Space Management</i>
Kirsty Sutton	<i>University Medway Students Association (UMSA)</i>
John Richardson	<i>FM: Finance</i>

## Appendix E. Abbreviations used

<b>AMR</b>	Automated meter reader
<b>BREEAM</b>	Building Research Establishment Environmental Assessment Method
<b>CHP</b>	Combined heat and power
<b>CO<sub>2</sub></b>	Carbon dioxide
<b>CO<sub>2</sub>e</b>	Carbon dioxide equivalent
<b>CRCEES</b>	Carbon Reduction Commitment Energy Efficiency Scheme
<b>DEFRA</b>	Department for the Environment, Food and Rural Affairs
<b>DECC</b>	Department of Energy and Climate Change
<b>GHG</b>	Greenhouse gas
<b>HE</b>	Higher education
<b>HECM</b>	Higher Education Carbon Management programme
<b>HEFCE</b>	Higher Education Funding Council for England
<b>KPI</b>	Key performance indicator
<b>MACC</b>	Marginal Abatement Cost Curve
<b>MWh</b>	Megawatt-hours
<b>PV</b>	Photovoltaic
<b>SUUG</b>	Students Union University of Greenwich
<b>tCO<sub>2</sub></b>	Tonnes of CO <sub>2</sub>
<b>tCO<sub>2</sub>e</b>	Tonnes of CO <sub>2</sub> equivalent
<b>UMSA</b>	Universities at Medway Students Association
<b>VO</b>	Voltage Optimisation
<b>VPO</b>	Voltage Power Optimisation

## Appendix F. Project Definitions (See separate document)