



Carbon Management Plan for the Exeter Campuses 2010-2020

Higher Education Carbon Management Programme

www.exeter.ac.uk/sustainability



Contents

1 Forewords

- 1.1 *Foreword from the Vice Chancellor*
- 1.2 *Foreword by the Carbon Trust*

2 Executive Summary

- 2.1 *Drivers*
- 2.2 *University Boundary, Scope and Targets - 2011*
- 2.3 *Progress Since 2007*
- 2.4 *Carbon Management Implementation Plan*
 - 2.4.1 *Emissions from Buildings and Equipment*
 - 2.4.2 *Preparing for Future Decarbonisation of Electricity.*
 - 2.4.3 *Communications Plan*
 - 2.4.4 *Carbon Management Policies and Processes*
- 2.5 *Forecast Carbon Reduction and Investment*

3 Introduction

- 3.1 *Purpose of the Carbon Management Plan*
- 3.2 *Overview of the University and Structure*
- 3.3 *The Need for Carbon Management*
- 3.4 *Present Context for Carbon Management in the University*
 - 3.4.1 *Global Drivers*
 - 3.4.2 *National Drivers - Legislation*
 - 3.4.3 *National Drivers – Government Strategy for Carbon Reduction*
 - 3.4.4 *National Drivers – Higher Education Funding Council*
 - 3.4.5 *National Drivers – League Tables and Awards*
 - 3.4.6 *Local Drivers*

4 Carbon Management Strategy

- 4.1 *Vision*
- 4.2 *University Strategic Plan*
- 4.3 *Environmental Sustainability Policy and Strategy*
- 4.4 *Carbon Management Plan Strategic Themes*

5 Emissions Boundaries and Baseline

- 5.1 *Scopes*
- 5.2 *Estate Boundary for Carbon Footprint - Options*
 - 5.2.1 *Recent Changes to University Buildings*
 - 5.2.2 *Boundary for Carbon Reduction Commitment*
 - 5.2.3 *Boundary for HEFCE and Capital Infrastructure Funding (CIF2)*
 - 5.2.4 *Estate Boundary Adopted – Scope 1 and Scope 2*
- 5.3 *Changes to Baseline since 2007*
- 5.4 *HEFCE Published Baselines for 2005/06*
- 5.5 *University Baseline for 2005/06*
- 5.6 *Scope 3 Emissions Baselines*

6 Projections and Targets

- 6.1 *The 'Business As Usual' Scenario*
- 6.2 *Emissions Reduction Target in 2007 Plan*
- 6.3 *Carbon and Cost Saving Initiatives in 2007 Plan*
 - 6.3.1 *Emissions Reduction Plan*
 - 6.3.2 *Carbon Emissions Reduction to 2010*
 - 6.3.3 *EMS Data Comparison to 2010*
 - 6.3.4 *Financial Case and Savings Outturn to 2010*
- 6.4 *Other Actions and Achievements Since 2007*

6.5 *Target Chosen*

7 Carbon Management Implementation Plan

7.1 *University Standards*

7.2 *Baselines for Colleges and Services*

7.3 *Corporate Services*

7.3.1 *Corporate Services – Carbon Management*

7.3.2 *Corporate Services – Facilities and Premises*

7.4 *Estate Development Services*

7.4.1 *EDS Carbon Management Responsibility*

7.4.2 *Buildings Projects*

7.4.3 *Alternative and Renewable Energy Sources*

7.4.4 *EDS Role in Carbon Management*

7.4.5 *Electrical, Mechanical and Structural Guidance, Standards and Specifications*

7.4.6 *EDS Premises*

7.5 *Campus Services Carbon Management Responsibilities*

7.5.1 *Campus Services Role in Carbon Management*

7.5.2 *Campus Services Residences and Facilities*

7.5.3 *University Vehicles*

7.5.4 *Waste Management and Recycling*

7.6 *Procurement and Sustainability Services*

7.6.1 *Sustainability Planning and Management*

7.6.2 *Waste Management Support*

7.6.3 *Sustainable Procurement Policy and Support*

7.6.4 *Sustainable Transport Planning*

7.6.5 *Summary of Energy and Carbon Management Actions*

7.6.6 *Building Energy Management System (BEMS)*

7.6.7 *Carbon Management Plan Ownership, Reporting and Coordination*

7.6.8 *Planning for Future Decarbonisation of Electricity*

7.6.9 *Procurement – Energy and Water Metering Strategy*

7.7 *Academic Services*

7.7.1 *Academic Services Carbon Management Responsibilities*

7.7.2 *Information and Computing Systems Division (ICSD)*

7.7.3 *Libraries and Research Support*

7.8 *Colleges – Responsibility for Carbon Management*

7.9 *Forecast of Scope 1 and Scope 2 Carbon Reductions*

8 Implementation Plan Financing

8.1 *Fuel and Electricity Unit Costs*

8.2 *Capital Cost and Savings from Planned Investment Strategy*

8.3 *Capital Cost and Savings from Higher Investment Strategy*

8.4 *Other Financial Benefits from Energy Efficiency Investment*

9 Stakeholder management and communications

9.1 *Recent Communication Actions and Campaigns*

9.2 *Communications Plan*

9.2.1 *Context*

9.2.2 *Objectives*

9.2.3 *Strengths Weaknesses Opportunities and Threats*

9.2.4 *Audiences*

9.2.5 *Stakeholder management*

9.2.6 *Key Messages*

9.2.7 *Delivery*

9.3 *Climate Change Education*

10 Carbon Management Plan Governance, Ownership and Management

- 10.1 *University Governance Structure*
- 10.2 *Sustainability Governance*
- 10.3 *Responsibility for Carbon Management*
- 10.4 *Risk Management*

11 Appendices

- 11.1 *Appendix A - Key Stakeholders*
- 11.2 *Appendix B – Programme of EDS Carbon Reduction Projects 2010 - 2012*
- 11.3 *Appendix C - Calculation of Carbon Emissions – 2004 to 2010*
- 11.4 *Appendix D - Glossary*
- 11.5 *Appendix E – Corporate Services Organisation Chart*
- 11.6 *Appendix F - CIF2 Requirements for a Carbon Management Plan*
- 11.7 *Appendix G - ICSD Sustainable IT - Electricity and Carbon Management*

1 Forewords

1.1 Foreword by the Carbon Trust

Cutting carbon emissions as part of the fight against climate change should be a key priority for universities – it's all about getting your own house in order and leading by example. The Higher Education Carbon Management programme has been designed to assist universities like University of Exeter in saving money on energy and putting it to good use in other areas, whilst making a positive contribution to the environment by lowering their carbon emissions.

University of Exeter was selected in 2006, amidst strong competition, to take part in this ambitious programme. As one of the most proactive HEIs in the UK in responding to the risks that climate change presents, the University joined 33 higher education institutions across the UK who have to date partnered with the Carbon Trust on this programme in order to realise vast carbon and cost savings.

This Carbon Management Strategy and Implementation Plan commits the university to a target of reducing CO₂ by 11% by 2010 and underpins potential financial savings to the University Council of £10 million.

There are those that can and those that do. Universities can contribute significantly to reducing CO₂ emissions. The Carbon Trust is very proud to support University of Exeter in their ongoing implementation of carbon management.



Richard Rugg - Carbon Trust

June 2007

2 Executive Summary

The University of Exeter is committed to minimising its carbon dioxide emissions by appropriate planning and investment, by involving staff, and by providing students with an education in sustainability relevant to a world threatened by climate change.

This document is a revision of the original Carbon Management Plan which was approved by Council in 2007. The plan set a baseline of 2004/05, excluding Tremough, and a target reduction of 2% per year. A reduction of around 3% per year has been achieved so far.

2.1 Drivers

The University is concerned about the future effects of climate change. The UN Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment of the impact of global warming concluded that warming of the climate system is unequivocal. It is very likely that the increased temperature is due to anthropogenic greenhouse gas emissions and that future changes will be larger than those observed so far.

University energy bills are the largest revenue expenditure after staff costs. Electricity bills doubled in 2008 following unprecedented increases in the price of oil. As North Sea gas declines, the UK has become a net importer, increasing the vulnerability to turbulence in world markets. The Carbon Reduction Commitment (CRC) will increase fuel bills by 10% in 2012.

HEFCE has adopted carbon reduction targets for the HE sector of 43% by 2020 and 83% by 2050, in line with the mandatory targets set by Government in the 2008 Climate Change Act. As part of the Capital Infrastructure Funding (CIF2), institutions are required to have carbon management plans that set a baseline of 05/06 and should set targets which are challenging and within the national framework.

The University Strategic Plan 2007 puts environmental concerns at the centre of what we do, to reduce our carbon footprint and to include a focus on climate change and sustainability in our academic endeavours.

2.2 University Boundary, Scope and Targets - 2011

Greenhouse gas emissions are measured by converting the quantity of energy delivered at the site boundary meters to carbon dioxide equivalent using the relevant conversion factors. Under the Greenhouse Gas Protocol, emissions are categorised as

- Scope 1 - emissions from fuel used for buildings and vehicles under University control
- Scope 2 - emissions from electricity
- Scope 3 - emissions not under our direct control such as travel, waste and procurement.

Emissions from Tremough are excluded because Tremough Campus is managed as a single entity for the University and for University College Falmouth. It has its own Carbon Management Plan. Emissions from residential halls sold to UPP in 2009 and new halls constructed by UPP are excluded from Scope 1 and 2 as they are not under University control.

The University Scope 1 and Scope 2 baseline for 2005/06 was 25,035 tonnes CO₂. Our target is to reduce our carbon dioxide emissions by at least 28% by 2020/21 from the 2005/06 baseline, equivalent to a reduction of 2% per year. The target is absolute, without adjustment for new buildings or increased student numbers. Emissions should be less than 18,000 tonnes by 2020/21.

HEFCE also committed to assess how to monitor and report Scope 3 emissions by 2013. The University has already put measurement of a large part of our Scope 3 emissions in place and is working to monitor and report on the more difficult items such as procurement.

2.3 Progress Since 2007

Thirty five energy and carbon saving ideas were identified in the 2007 plan and many of these have been implemented. The Duryard Halls were closed in 2006/07 contributing a big drop in electricity consumption and carbon emissions.

The University made a commitment to invest £1m in carbon reduction. We joined the Salix scheme, which is funded by the Carbon Trust, and received a revolving loan of £600,000. The 2007 Carbon Management Plan envisaged capital expenditure of £2.7m by 2009/10 to achieve utility cost savings of £2.2m. In practice, capital expenditure has been £1.9m and utility cost savings of £2.0m have been achieved.

By 2009/10, weather-corrected emissions had been reduced by 3,900 tonnes per year compared to 2005/6, a drop of 15% compared to a target reduction of 11% by 2010/11. The University has reduced emissions per FTE student from 2.2 tonnes per FTE in 2005/06 to 1.5 tonnes per FTE in 09/10 and now has the second lowest emissions per FTE in our Top Ten comparator group.

These achievements led to the University being awarded the Carbon Trust Standard in 2009 and being shortlisted for a Green Gown Award in 2010. The emissions reduction was a contributing factor in the University's rise from 64th place to 24th in the People and Planet Green League.

2.4 Carbon Management Implementation Plan

There are seven strategic themes for carbon management:

- Reduce emissions caused by energy usage in buildings and equipment
- Prepare for the anticipated decarbonisation of electricity
- Reduce emissions from waste disposal by the Waste and Resources Strategy
- Reduce emissions from procurement by the Sustainable Procurement Strategy
- Reduce emissions from transport by the Sustainable Travel Plan
- Communicate with stakeholders, staff and students
- Create policies and processes to keep carbon management at the core of our activities.

2.4.1 Emissions from Buildings and Equipment

Emissions from buildings and equipment is the responsibility of College Managers and Directors of Services. Procurement and Sustainability Services, Estate Development Services and Campus Services have major roles in supporting Colleges and Services to reduce their emissions. All Colleges and Services will be responsible for their own utility bills from August 2011 and additional smart meters are being installed to provide more detailed utility information to college and department managers.

The Estate Development Service (EDS) has produced a programme of carbon reduction projects for implementation by 2013 which could reduce emissions by 2,400 tonnes per year. EDS is also overseeing the construction programme which is likely to increase University emissions by 1,800 tonnes per year by 2013. EDS will ensure that carbon reduction is included in all projects and will advise Colleges and Services on further carbon reduction opportunities.

Campus Services residences and premises are responsible for a third of University emissions. A group has been formed to manage and reduce these emissions. Campus Services also have a key role in assisting Colleges and Services to reduce emissions and will devise a set of explicit criteria for prioritising carbon reduction projects.

Procurement and Sustainability Services are responsible for a range of sustainability planning, management and coordination activities covering waste, transport, procurement and energy management. The Energy Manager is responsible for reporting, coordinating and communicating carbon management activities. The Energy Manager is responsible for operation and maintenance of the Building Energy Management System which controls all University heating ventilation and cooling plant. This system offers further scope for making savings. The Energy Manager also operates the meter data collection and monitoring and targeting systems which provides data for internal billing and reporting.

2.4.2 Preparing for Future Decarbonisation of Electricity.

Consumption of electricity presently causes the emission of about three times as much carbon dioxide as the equivalent consumption of gas. The government are planning to reduce carbon emissions from electricity by 95% over the next 30 years through renewables, nuclear power and carbon capture and storage. Within ten years electricity is likely to become the fuel of choice for low carbon heating. The University needs a flexible strategy to take advantage of this change, involving long term planning for the way we heat our buildings. The Carbon Descent Plan¹ shows one such strategy which makes use of ground source heat pumps instead of gas fired boilers.

2.4.3 Communications Plan

A Communications Plan identifies key stakeholders, communications channels and responsibilities. It aims include:

- Promoting carbon management issues to all members of the University. Campaigns such as the Green Impact Campaign and Student Switch Off are key measures to encourage energy and carbon saving behaviour.
- Ensuring accurate information and guidance are provided at the right time to maintain carbon management as a core issue in all University activities.

2.4.4 Carbon Management Policies and Processes

The University Sustainability Policy (2009) provides a clear commitment to reduce the University's carbon dioxide emissions through the delivery of the Carbon Management Plan. The Policy is supported by strategies for sustainable management of waste, travel, procurement and biodiversity and for education for Environmental Sustainability.

The Deputy Vice Chancellor (External Affairs) is responsible for implementation of the Carbon Management Plan, achieving the targets and reporting to Council and the Vice Chancellor's Executive Group (VCEG) on plans and progress. The Energy Manager is the operational manager and co-ordinator of carbon affairs and the Carbon Management Plan on behalf of the DVC (External Affairs). The Carbon Management Board reports to and advises the DVC (External Affairs) and is attended by representatives of Colleges and Services.

The Carbon Management Plan includes processes aimed at keeping carbon management at the core of University activities. The Colleges and Services working together through the Common Action Teams are tasked with producing strategies for energy, water and carbon reduction. Carbon and energy related risks are to be considered by the Risk Management Group. Terms of Reference for significant University bodies should include carbon management where appropriate.

2.5 Forecast Carbon Reduction and Investment

Reducing carbon emissions requires capital investment and will produce savings in future utilities bills. Two proposed levels of investment are modelled, either of which should meet the reduction target of 28% by 2020:

¹ Published on the University intranet.

- 1) a 'Planned Investment' strategy, which funds projects already agreed, leading to carbon savings of about 30% by 2020;
- 2) an 'Optimum Measures' strategy, which lists cost-effective projects that would enhance the carbon reduction being made by the 'Planned Investment' strategy. The capital cost would be about £9.4m from Salix, LTM and Tranche 2 funding and would produce utility and carbon cost savings of about £16m by 2020. Carbon reduction could be about 50% by 2020 if all projects were possible and fundable.

3 Introduction

3.1 Purpose of the Carbon Management Plan

This document is the 2010 Revision of the Carbon Management Strategy and Implementation Plan of the University of Exeter. It follows the initial phase of work undertaken by the University Carbon Management group in collaboration with the Carbon Trust during 2006/07 which resulted in the Carbon Management Plan being approved by Council in 2007.

The purpose of the Plan is to inform and direct the actions taken by the University in understanding and reducing its carbon dioxide emissions over the next 10 years from 2010 to 2020 and to consider the potential for future carbon reductions up to 2050. The Plan illustrates the financial savings and carbon reductions arising from specific proposals and sets out the framework required to embed carbon management in future University activities.

The scope of the Plan covers all carbon emissions associated with the University estate and activities in Exeter and includes response to legislation and interaction with other bodies such as HEFCE, local authorities and strategic and commercial partners.

3.2 Overview of the University and Structure

The University of Exeter is an internationally renowned, research-intensive university and a member of the 1994 Group of universities. In 2010, it is undergoing a period of rapid expansion of facilities and student numbers and was recently rated as one of the top 10 universities in the UK.

The University traces its origins to schools and colleges established in the middle of the nineteenth century. It moved to the present site in 1922 and received its charter in 1955. In 2008/09 there were about 14,166 students (13,305 FTE) and 2584 FTE staff. The estate in Exeter comprises two campuses which are close to Exeter city centre. Off campus, there are also two significant halls of residence and some smaller residential blocks. The largest site, the Streatham campus, is 94 hectares and the St Luke's campus is 5 hectares. The two Exeter campuses provide 159,000 m² (GIA 08/09) of purpose-built academic and support accommodation. Residential accommodation occupied 108,000 m² (GIA 08/09) and provided 3,800 bedspaces. A further 6,000 bed spaces are available in 1,400 private sector houses and flats in Exeter. About 2,200 students live at home.

A partnership with UPP has transferred a major part of the St Germans accommodation to their ownership and will lead to the construction on campus of new residential halls providing 2,500 bed spaces.

The University of Exeter has expanded student numbers significantly in recent years including a joint venture with INTO which has increased the number of international students at Exeter. This has required an increase of floor area of 15000 m² (9%) including 500 bed spaces, presently under

construction. A new Forum Building will provide 9000 m² of academic space and a new building for the Business School will provide 2,900 m² of academic space.

The University of Exeter in Cornwall shares a campus at Tremough with University College of Falmouth. The campus is 29 hectares and has about 20,000 m² of academic and support space, of which 19,000 m² is purpose-built, together with 500 student residential places. A further 5,000 m² of academic space and additional student residential spaces are currently under construction. Tremough Campus has its own Carbon Management Plan and is not included in this plan.

The University consists of 6 academic colleges together with a full range of professional and administration support services split into Academic Services and Corporate Services. Residential facilities owned by the University are managed by Campus Services, a division of Corporate Services – see Appendix E Corporate Services Structure.

3.3 The Need for Carbon Management

Climate change is emerging as one of the great challenges for modern society. Despite decades of research, some things remain uncertain, but much is now established beyond reasonable doubt. The basic mechanics of climate change are well understood; the world is warming, much of the warming is due to human emissions of greenhouse gases particularly carbon dioxide (CO₂), and the changes are set to accelerate in the future, bringing many and varied impacts around the world. For example, the most comprehensive study to date estimates that about a quarter of the world's known animals and plants, more than a million species, will eventually die out because of the warming projected to take place in the next fifty years.

The great majority of scientists believe that the most dramatic potential planetary impacts of climate change — like the collapse of the North Atlantic ocean current system or disintegration of major land-based polar ice sheets (which would raise sea levels by many metres) — can still be avoided. After a few more decades of unchecked emissions growth, that might simply no longer be possible.

Political uncertainty and the prospect of future shortages of fossil fuels have led to significantly increased energy costs and instability in energy markets. This has improved the financial payback on energy saving measures and energy efficient design. The Stern Review made it clear that the benefits of strong early action on climate change outweighed the costs.

In response to these issues, the Vice Chancellor approved the involvement of the University in the Carbon Trust sponsored Higher Education Carbon Management (HECM) programme in May 2006. The resulting Carbon Management Plan was approved by the University Council in June 2007.

3.4 Present Context for Carbon Management in the University

3.4.1 Global Drivers

The Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report, including contributions from scientists at the University of Exeter, was issued during 2007 and concluded that warming of the climate system is unequivocal, as is now evident from observations of increasing global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level. It is very likely that the increased temperature is due to anthropogenic greenhouse gas emissions and it is also very likely that future changes will be larger than those observed so far.

Future projections include

- continuing increase in sea level rise
- increase in droughts in already dry areas affecting hundreds of millions of people
- increased incidence of storms and flooding in high latitudes and coastal or low lying areas
- increasing temperature and acidification of oceans.

The European Union has been committed to tackling climate change both internally and internationally and has placed it high on the EU agenda, as reflected in European climate change policy. European legislation aimed at reducing emissions includes the Energy Performance of Buildings Directive and the EU Emissions Trading Scheme.

The University utilities bills, presently about £4m per year, are the second largest revenue cost to the University after staff costs. Following unprecedented turbulence in the price of oil in 2008, the price of electricity almost doubled in one year. Such turbulence in the markets is one of the predicted results of the onset of peak oil, when the demand for oil begins to exceed the supply. The University needs to adopt a strategy to minimise the risks both of price turbulence and the possible shortages. Carbon management offers a way to reduce fuel consumption and costs and to reduce the risks from price turbulence.

3.4.2 National Legislation

Since 2007, as the science surrounding climate change has become more certain, climate change has become a major policy driver for Government and a major concern for the public.

The Government passed the Climate Change Act in 2008 which makes it a legal requirement to achieve at least a 34% reduction of UK carbon emissions (compared to 1990 levels) by 2020 and a reduction of at least 80% by 2050. In 2009, the Government published the UK Low Carbon Transition Plan setting out a route map for the UK to meet these targets – see below. The Secretary of State (DIUS) has required HEFCE and the HE sector to achieve the same targets.

In compliance with European legislation, the Government has brought in legislation which

- tightened the Building Regulations considerably to make buildings more energy efficient
- required all larger publicly accessible buildings to have a Display Energy Certificate
- required air conditioning systems to be inspected and refrigerant losses to be controlled
- required larger organisations to purchase and trade in the EU Emissions Trading Scheme carbon emissions certificates
- commenced the CRC Energy Efficiency scheme.

The CRC Energy Efficiency Scheme (aka Carbon Reduction Commitment) requires 5000 medium sized and non-energy intensive organisations in the UK such as Universities to register for carbon emissions trading. Initially, certificates will be traded at a fixed cost but free market trading will commence in 2013 at which point the costs could increase. The CRC scheme will also rank organisations in a public league table according to carbon emissions reduction performance.

3.4.3 Government Strategy for Carbon Reduction

The Government published the UK Low Carbon Transition Plan in 2009. This set out the route map for the UK to reduce emissions by 80% by 2050 and contained a number of strategies which will have an impact on the University. The most significant impact will be the decarbonisation of electricity by 90% through renewables, nuclear and carbon capture and storage. This is expected to make electricity the low carbon fuel of choice from about 2025 and will have a major effect on the choices made by the University for heating buildings.

3.4.4 Higher Education Funding Council for England

In January 2010, the Higher Education Funding Council for England (HEFCE) issued a Statement of Policy – Carbon Reduction Target and Strategy for Higher Education in England - which adopted the sector targets as above and set these against a 2005/06 baseline. HEFCE confirmed in Oct 2010 that the sector targets for carbon emission reductions in scopes 1 and 2 are equivalent to a reduction of 43 per cent by 2020 and 83 per cent by 2050. The targets are absolute and are not adjusted to allow for an increase or decrease in the size of the institution.

The Statement asked institutions to develop plans and set targets that were challenging and were appropriate to their individual circumstances but within the national framework. HEFCE will collate these responses through the Capital Infrastructure Framework (CIF2) and if necessary, consider what additional policy levers could be used to achieve further reductions.

The CIF2 submission requires institutions to rate themselves from A to D on a set of questions relating to environmental sustainability. To achieve an A rating on Carbon Reduction requires the University to confirm that it is fully committed to reducing carbon emissions. It must:

- Be able to identify projects which will produce an absolute reduction in carbon emissions by 2020
- Be able to demonstrate an absolute or relative reduction in Scope 1 and Scope 2 emissions (definition below) from 2005 to 2008
- Have a carbon management plan which fully meets the requirements set out in Appendix F.

The University made a Grade A submission to HEFCE in relation to Carbon Reduction on the basis that the Carbon Management Plan 2007 fully complied with the requirements. The outcome will be known in January 2011.

Institutions which fail to comply with CIF2 by 31st March 2012 risk losing a proportion of up to 40% of their capital funding from HEFCE.

3.4.5 National League Tables and Awards

The University places a high value on achievement of a sector leading reputation in areas of sustainability and carbon management. The performance of the University in these areas is known to be a factor affecting recruitment of staff and students.

The University was awarded the Carbon Trust Standard in 2009, the tenth University in the country to achieve the award and wishes to continue to hold the Standard.

The University takes part in the People and Planet Green League in which we have risen from 64th to 24th position in the UK in three years, partly as a result of good performance in reducing carbon emissions. The University wishes to maintain a good position in the table.

3.4.6 Local Drivers

The Meteorological Office and the University have a strategic partnership which has led to three Met Office chairs and significant research activity. This relationship underpins the University Science Strategy of which a key theme is Climate Change and Sustainable Futures. Effective management of our own carbon emissions enhances the reputation of the University with our partners as well as providing a living laboratory for student research projects.

Exeter City Council and Devon County Council both have regional targets for carbon management set by Government and need to see how the University, as one of the largest carbon emitters in the South West, is going to meet stringent planning conditions in relation to carbon emissions from buildings and transport. The Carbon Management Plan is the main communication tool for informing them of the University's performance and aspirations.

Expansion plans - the University Estates Strategy anticipates a further increase in student numbers by 2016 with the potential for a corresponding increase in emissions.

Adaptation - There is a need for the University to consider how to adapt to the effects of climate change which are already under way. Current predictions for the UK are for an increase in long hot spells in summer which may make buildings uncomfortable, and an increase in the number and severity of winter storms with high rainfall and high winds.

4 Carbon Management Strategy

4.1 Vision

The University of Exeter is committed to minimising its carbon dioxide emissions by appropriate planning and investment, by involving staff, and by providing students with an education in sustainability relevant to a world threatened by climate change.

Our target is to reduce our carbon dioxide emissions by at least 28% by 2020 from a 2005/06 baseline. This is equivalent to an average reduction of 2% per year.

The University is fortunate to be located in a region and associated with a city of notably high environmental quality and quality of life. The Streatham campus, a registered botanical garden is, arguably, the best-landscaped University site in the UK. Our vision is to complement the high quality environment in which the University is located by being recognised by staff, students, peer organisations and the local community as an institution which has made a major effort to reduce global warming emissions and to achieve the emissions targets set for public institutions by Government.

Our vision is also to be a leading institution in the search for understanding the causes and effects of climate change and the measures needed to control it. The University has several colleges which take a leading role in climate change research. The University is collaborating with the Meteorological Office and the Hadley Centre, based in Exeter, in order to form a UK centre for research into global warming and climate change.

We also wish to demonstrate and publicise good practice in carbon management for the environmental and academic benefit of our students. We wish to incorporate an element of education for sustainability into all academic courses to a level appropriate to the course.

The University offers several courses for postgraduates and undergraduates which are directly related to sustainability and climate change. We recognise that all of our students will be directly affected by climate change and that many of them will play an active role in determining how other organisations and companies respond to climate change in the future. We believe that the formal and informal education we provide to our students in relation to climate change may be the greatest contribution that the University can make to reducing and mitigating the potential problems ahead.

4.2 University Strategic Plan

The University is committed to improving the environmental performance of the organisation. In the 2007 Strategic Plan, the University made a commitment "*To put environmental concerns at the centre of what we do*" with the following specific sustainability commitments:

- To develop Exeter's campuses, always aware of our environmental impact as well as cost conscious Our campuses will put people above cars, our buildings will work for the people who work in them, as well as being modern and design-led;
- We will reduce our carbon footprint within the period of this plan as part of a long-term initiative. The buildings and infrastructure will contribute by being environmentally friendly and anticipating tomorrow's climate, whilst also developing a unique learning environment with which to welcome our visitors. We will refurbish where possible, build new to high environmental standards where not.
- Our academic endeavours will include a focus on climate change and sustainability.

- We aim to maximise our wider influence in reducing global carbon emissions through our research, learning and teaching and in the wider debate and dissemination of evidence and information.

These key strategic aims have been used to guide the development of the Environmental Sustainability Policy and associated Strategies, including the revised Carbon Management Plan. The latter provides a mechanism for delivering the carbon element of these commitments.

4.3 Environmental Sustainability Policy and Strategy

The University conducted a review of the Environmental Policy in 2009. Following extensive consultation the revised Environmental Sustainability Policy was approved by the Vice Chancellors Executive Group on 13 July 2009.

http://www.exeter.ac.uk/sustainability/policies/documents/20090713_Sustainability_Policy_001.pdf

The policy outlines the university's environmental objectives and provides a clear commitment to comply with relevant environmental legislation, regulations and other requirements. Within the policy there is a specific commitment to reduce the University's carbon dioxide emissions through the delivery of the Carbon Management Plan. The Policy establishes the foundations and framework for the overarching sustainability strategy and the suite of thematic strategies, all of which inform, and are informed by each other.

The following diagram summarises the relationship between these documents.

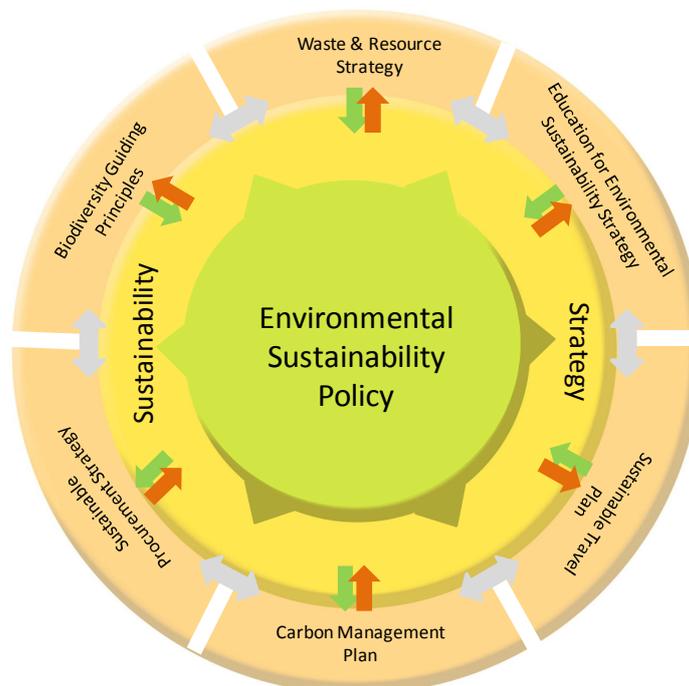


Figure 1 : Environmental Sustainability Policy and Strategy

4.4 Carbon Management Plan Strategic Themes

The Carbon Management Plan is part of the University Sustainability Strategy. The seven key strategic themes of the University Carbon Management Plan are:

1. Buildings and Equipment: to reduce emissions from energy usage in buildings and equipment by:
 - more efficient use of heating, cooling and ventilation systems
 - reducing heat loss from existing buildings
 - encouraging building occupants not to overheat buildings in winter or to overcool in summer
 - making sure all new buildings and building refurbishments incorporate cost effective energy measures and meet an agreed energy standard
 - improving energy efficiency of lighting and electrical equipment by replacing with more efficient alternatives
 - adopting energy efficient IT equipment and related cooling systems
 - encouraging users to keep electricity used by equipment to the minimum.
 - making use of alternative and renewable energy sources where cost effective.
2. Decarbonisation of Electricity: to prepare for a long term transition away from gas heating to electric heating in order to take advantage of the anticipated decarbonisation of electricity.
3. Waste Disposal: to reduce emissions from waste disposal by implementing the Waste and Resources Strategy.
4. Sustainable Procurement: to reduce emissions from procurement by implementing the Sustainable Procurement Strategy.
5. Sustainable Travel: to reduce emissions from transport and vehicles by implementing the Sustainable Travel Plan.
6. Communication and Awareness: to communicate with and involve key stakeholders, staff and students in order to develop and implement the Plan – see Section 9 Stakeholder Management and Communication.
7. Policies and Processes: to create policies and processes to keep carbon management at the core of all University activities – see Section 10 Carbon Management Plan, Governance and Ownership.

The strategic themes are developed further in Section 7 – Carbon Management Implementation Plan.

5 Emissions Boundaries and Baseline

5.1 Scopes

How Are Carbon Emissions Measured?

Carbon emissions is shorthand for carbon dioxide emissions equivalent. Carbon dioxide emissions are caused when any fuel is burned and are categorised under three headings or scopes by the World Resources Institute. Emissions of five other global warming gases such as methane and refrigerants are included using a conversion factor to give the equivalent global warming potential to carbon dioxide. (see Greenhouse Gas Protocol www.ghgprotocol.org for details)

Scope 1 includes any emissions under the direct control of the University including

- Gas used for heating buildings, cooking etc
- Oil used for heating buildings
- Fuel used in University owned vehicles
- Fugitive emissions of other global warming gases such as refrigerants lost in maintenance of air conditioning.

Scope 2 includes indirect emissions at power stations caused by use of electricity in University buildings.

Scope 3 includes emissions not under the direct control of the University but occurring as a consequence of University activities such as

- Business travel including hire cars, flights and public transport
- Staff and student commuting to the University
- Student travel from home
- Waste disposal
- Fuel and electricity supplied to non-University owned buildings
- Purchase of non-recycled paper
- Indirect emissions associated with procurement.

Carbon emissions from fuel use are calculated by applying the appropriate carbon conversion factor to the energy used as metered at the site boundary. The Gross Calorific Value conversion factors set by Defra and used by HEFCE, Carbon Trust Standard and for EMS data are:

- Electricity 0.539085 kg CO₂e per kilowatt hour (average 05/06 but varies yearly)
- Gas 0.18523 kg CO₂e per kilowatt hour
- Gas Oil 0.27533 kg CO₂e per kilowatt hour for gas oil (not burning oil)
-

Carbon emissions from Scope 3 activities are calculated from measurement of the activity, eg miles travelled, tonnes of waste sent to landfill, carbon footprint of items or services procured and applying the relevant carbon factor.

5.2 Estate Boundary for Carbon Footprint - Options

5.2.1 Recent Changes to University Buildings

The University estate is not static. Buildings are sold or refurbished and new buildings are built. In 2009/10, the University commenced a period of significant changes to the Estate with a £270m construction programme. This section considers how those changes affect carbon emissions

baselines and boundaries. A logical, consistent and transparent approach to determination of the University boundary for Scope 1 and Scope 2 emissions is required.

Guidance from HEFCE (Carbon Reduction Target and Strategy for HE Jan 10) makes it clear that the sector targets are absolute targets based on the fact that the capacity of the Earth to manage carbon emissions is finite. Changes to the estate will not change the targets. The boundary for Scopes 1 and 2 should include direct emissions from all sources which are owned and controlled by the Institution together with indirect emissions from electricity consumed by the Institution.

The changes which have taken place since 2005 include:

- Closure of Crossmead Conference Centre – Dec 2006
- Sale of off-campus properties such as Bonhay, Elizabethan and Kilmorie
- Sale of Lafrowda Halls of Residence to UPP (2009). A program of demolition and rebuilding is under way.
- Construction of Innovations Centre Phase 2 – Dec 2007 – owned and operated by the University

Further changes which are presently underway:

- Construction of Business School Phase 3 Building (2010).
- Construction of Forum Building (2011)
- Construction of Mood Disorders Centre (2011)
- Partnership with INTO resulting in construction of INTO Building and INTO Residences at Duryard (2011) – buildings owned by the University, utilities supplied by the University but buildings operated by INTO.
- Partnership with UPP resulting in construction of 7 halls of residence at Birks and replacement of halls at Lafrowda (2010/11) – buildings to be owned and operated by UPP but utilities to be supplied by the University.
- Major refurbishment of Geoffrey Pope Building including construction of aquarium facility (2011).

A paper from Estate Development Services (2010472) estimated that the University's annual carbon emissions will increase by 6,343 tonnes between 2009 and 2012 as a result of the above changes and that 6,400 tonnes per annum of carbon emissions will not be under the direct control of the University by 2012.

5.2.2 Boundary for Carbon Reduction Commitment

The University boundary as defined for CRC purposes is at the fiscal meters owned by the University. Thus the energy used and carbon emissions arising from all buildings supplied via those meters are considered to be the responsibility of the University even though some of that energy is sold on to UPP and INTO.

5.2.3 Boundary for HEFCE and Capital Infrastructure Funding (CIF2)

The boundary for Scope 1 and Scope 2 emissions as defined by HEFCE is based on direct emissions from sources that are owned or controlled by the University and emissions from the generation of purchased electricity used by the University. This definition is used for compliance with CIF2 and for the HEFCE Carbon Reduction Target and Strategy. It excludes emissions from sources that are not owned or controlled by the University such as the UPP Halls of Residence.

5.2.4 Estate Boundary Adopted – Scope 1 and Scope 2

At a meeting of the Carbon Management Board on 30th July 2010, it was agreed by the Deputy VC for External Affairs that different boundaries would be set for CRC and for Carbon Management.

For the purposes of the Carbon Reduction Commitment, the boundary would be at the fiscal meters and the University would take responsibility for emissions from fuel supplied to UPP and INTO.

The boundary for Scope 1 and 2 carbon management would include all direct university fuel and electricity use. Fuel and electricity supplied to UPP would be excluded since these buildings are not owned by the University and not under University control.

Key Action – exclude emissions from UPP buildings from University carbon boundary.

5.3 Changes to Baseline since 2007

The baseline year for the 2007 issue of the Carbon Management Plan was the academic year 2004/05. The baseline was 23,213 tonnes Scope 1 and 2 emissions plus 13,036 tonnes Scope 3 emissions caused by business travel, student travel, commuting, water and waste.

Since then, the carbon emissions factors have been changed by Government, notably increasing the electricity factor from 0.43 to about 0.54 kg/kWh. Gas and oil factors have also changed and DEFRA has recently confirmed (2010) that Gross Calorific Value factors should be used. The amount of electricity used by the University for calculating carbon emissions has also been reduced by about 4% as a result of moving from supply at Grid Supply Point to supply at site boundary.

The net effect of these changes was to increase the 2004 Scope 1 and Scope 2 emissions baseline by 6% percent to 24,674 tonnes CO₂e.

5.4 HEFCE Published Baselines for 2005/06

In August 2010, HEFCE published 2005/06 carbon baselines for individual HE institutions in England based on EMS data and using the latest carbon factors. The Scope 1 and 2 baseline given for UoE was 27,319 tonnes, however this included data for Tremough. It also applied the carbon factor for burning oil (0.2468 kg/kWh) whereas we use 35 Sec Gas Oil (0.27533 Kg/KWh). The University baseline below excludes Tremough and uses the Gas Oil carbon factor.

5.5 University Baseline for 2005/06

The University has adopted a 2005/06 baseline for Scope 1 and 2 emissions as recommended by HEFCE. The baseline is absolute, not weather corrected or adjusted for student numbers or floor area and uses the revised electricity usage and carbon factors.

The revised Scope 1 and Scope 2 baseline for 2005/06 is 25,034 tonnes CO₂e.

Figure 3 shows the baseline and subsequent carbon emissions outturn. A detailed table is included in Appendix C showing the calculation of the baseline and comparative consumption for subsequent years. Figure 2 shows a breakdown of UoE baseline emissions.

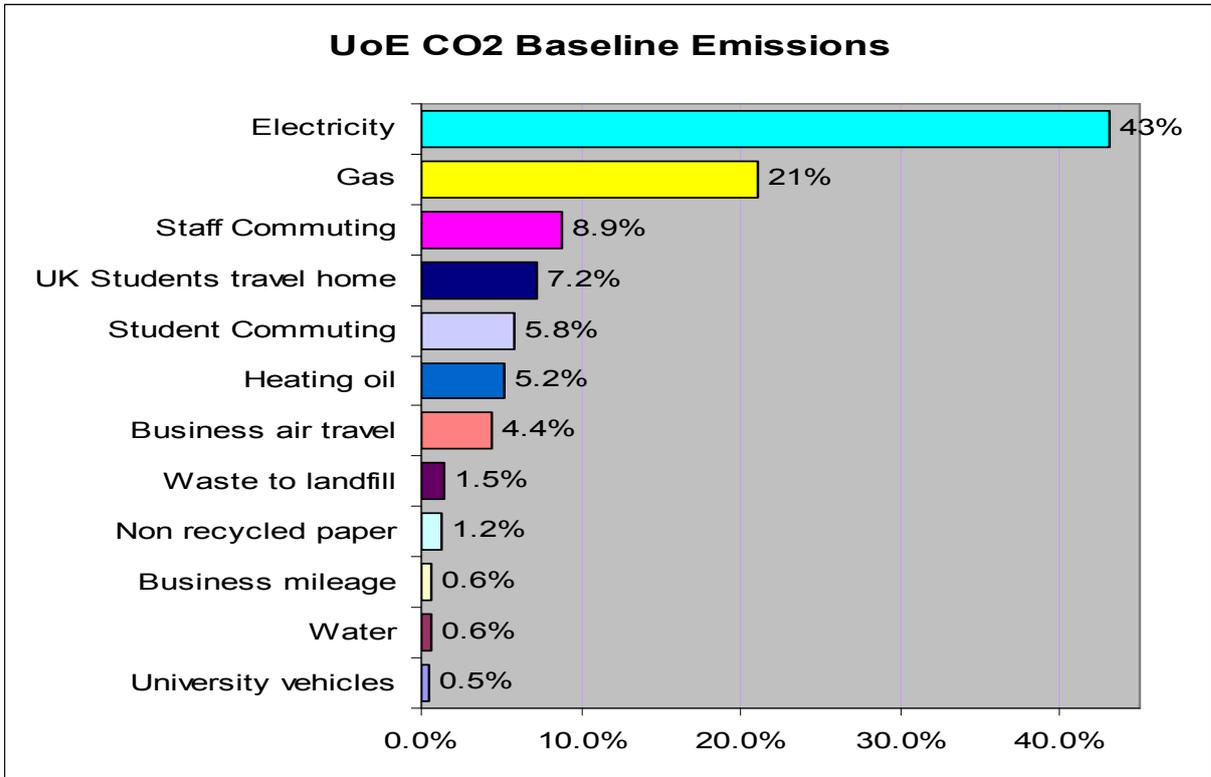


Figure 2: Breakdown of Scope 1, Scope 2 and some Scope 3 Emissions

5.6 Scope 3 Emissions Baselines

The Carbon Reduction Target and Strategy published by HEFCE included a commitment to undertake work to assess what was required to monitor and report Scope 3 emissions, including emissions from procurement by December 2012 and setting targets by December 2013.

An initial assessment of some Scope 3 emissions for the 2007 Carbon Management Plan suggested a figure of around 13,036 tonnes caused by business travel, commuting, water and waste. Audits of travel and waste have taken place since then which have suggested that the initial assessment was an underestimate. Interpolation of data from the surveys has produced the following baselines for Scope 3 emissions for 2005/06.

Scope 3 Emissions Baseline		05/06	
		kg/mile	Tonnes CO2e
Travel		miles	Tonnes CO2e
Business travel - cars	0.360	212,808	77
Business travel - flights	0.175	17,182,857	3007
Business - travel public transport	0.100	600,000	60
Staff Commute by Car	0.360	7,953,723	2,863
Staff Commute Public Transport	0.100	1,128,750	113
Student Commute by Car	0.360	10,263,743	3,695
Student Commute by Public Transport	0.100	3176400	318
UK Student travel home by car	0.360	12,991,502	4,497
UK Student travel home public transport	0.100	13,164,262	1,316
International student air travel	0.175	10,000,000	1750
Travel Total		76,674,044	17,695
Waste, water and recycled paper		tonnes	tonnes CO2e
Emissions from waste sent to landfill	450	1232	554
Purchase of non-recycled paper	2,000	200	400
Water	0.55	379,863	209
Total Scope 3 Emissions Baseline			18,859

Further work is continuing to refine the data for Scope 3 emissions such as Procurement. Targets will be set in future for reduction of Scope 3 emissions.

6 Projections and Targets

6.1 The 'Business As Usual' Scenario

Prior to 2005/06, University energy use and carbon emissions had been increasing steadily at about 1% per year. The Estate Strategy 2006 - 2016 anticipated an increase in student numbers at Exeter. It was planned that the extra students and associated staff could be accommodated by a 9% increase in academic and support floor area, equivalent to an increase of 1% per year. It was assumed that, without a concerted plan to reduce energy consumption, emissions would continue to increase at a rate of 1% per year for the Business as Usual scenario until 2016, driven by the increase in student numbers and in floor area. After that, it was assumed that improvements in energy efficiency in buildings as a result of rising Building Regulations standards would counteract the upward trend leading to no further increases in emissions.

6.2 Emissions Reduction Target in 2007 Plan

The University aimed to meet the Government target of a 60% reduction in emissions by 2050 requiring a rate of reduction of just over 2% per year from the baseline year of 2004/05. At a rate of 2% per year, the target cumulative saving in Scope 1 and 2 emissions up to 2009/10 was 7,200 tonnes CO₂. The actual cumulative reduction achieved by the University by 2009/10 was over 9,000 tonnes CO₂, significantly exceeding the target in spite of 30% growth in student numbers (FTE) and over 60% increase in turnover – see Fig 3 below.

HEFCE now requires the University to set a target for 2020/21 for reducing Scope 1 and 2 emissions against the 2005/06 baseline of 25,034 tonnes. The previous University target of 2% per year reduction to 2020/21 requires a reduction of annual emissions from 24,674 tonnes pa in 04/05 to 17,859 tonnes pa in 2020/21. To achieve the same outturn of 17,859 tonnes pa from a baseline of 25,034 tonnes in 2005/06 requires a reduction of 28 %. This is the 2007 University target restated in the terms required by HEFCE.

6.3 Carbon and Cost Saving Initiatives in 2007 Plan

6.3.1 Emissions Reduction Plan

Following an opportunities workshop in 2006, thirty five energy and carbon saving ideas were selected for inclusion in the plan. It was expected that these would reduce carbon emissions by 11,400 tonnes per year by 2015, sufficient to meet the 2% reduction target. Many of these projects have been implemented, some are in hand and a few have been cancelled. Real and substantial carbon reductions have been achieved as shown in Figure 3 below although a major part of this, perhaps 50% of the savings, arose from the closure of the electrically heated Duryard and Birks Halls.

No longer term measures beyond 2015 were included due to the difficulty of predicting technical and political developments over such long periods. However, it was envisaged that changes in carbon emissions from fuels would occur through developments such as underground coal gasification, carbon capture and storage and hydrogen generation and that further technical developments such as fuel cells, and cheaper solar electricity would provide future opportunities for reducing emissions to meet the long term target of a 60% reduction by 2050.

6.3.2 Carbon Emissions Reduction to 2010

The following chart shows that Scope 1 and 2 carbon emissions have reduced from 25,034 tonnes in 2005/06 to 22, 817 tonnes in 2009/10.

The building energy usage is influenced by weather conditions. Weather in 08/09 and 09/10 was significantly colder than average, shown by the green degree days line in the graph below. After correction for variations in weather, it can be seen that there has been a steady reduction in the carbon emissions since 05/06. The University has exceeded its target of reducing emissions by at least 2% per annum from 2004/05

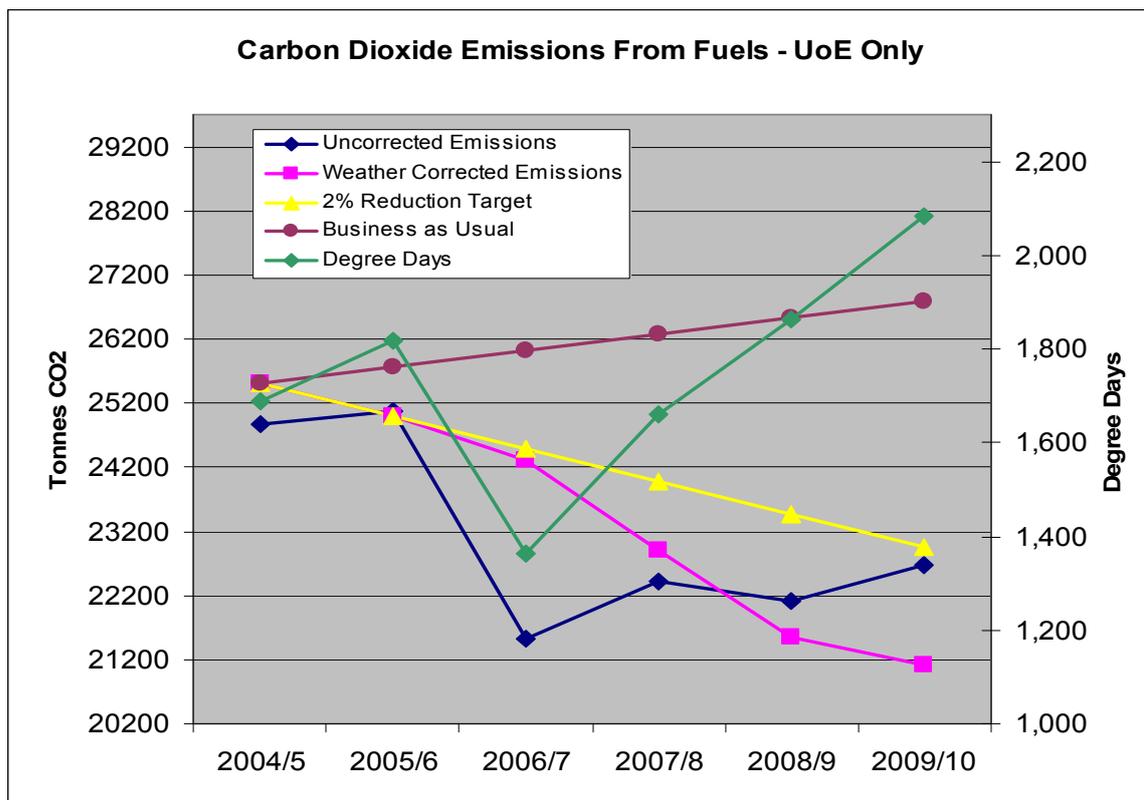


Figure 3: Actual and Weather Corrected CO2 Emissions, CO2 Targets and Degree Days

Emissions from energy supplied to University residences which were sold to UPP in 2009/10 have been included in the graph. If these emissions were excluded, the 2009/10 emissions outturn would be about 1,300 tonnes lower but would not be directly comparable with previous years.

6.3.3 EMS Data Comparison to 2010

Using 2008/09 EMS data, the University had the second lowest emissions per FTE student relative to our comparator group. The situation has steadily improved from 2005/06 when we were 5th in the group.

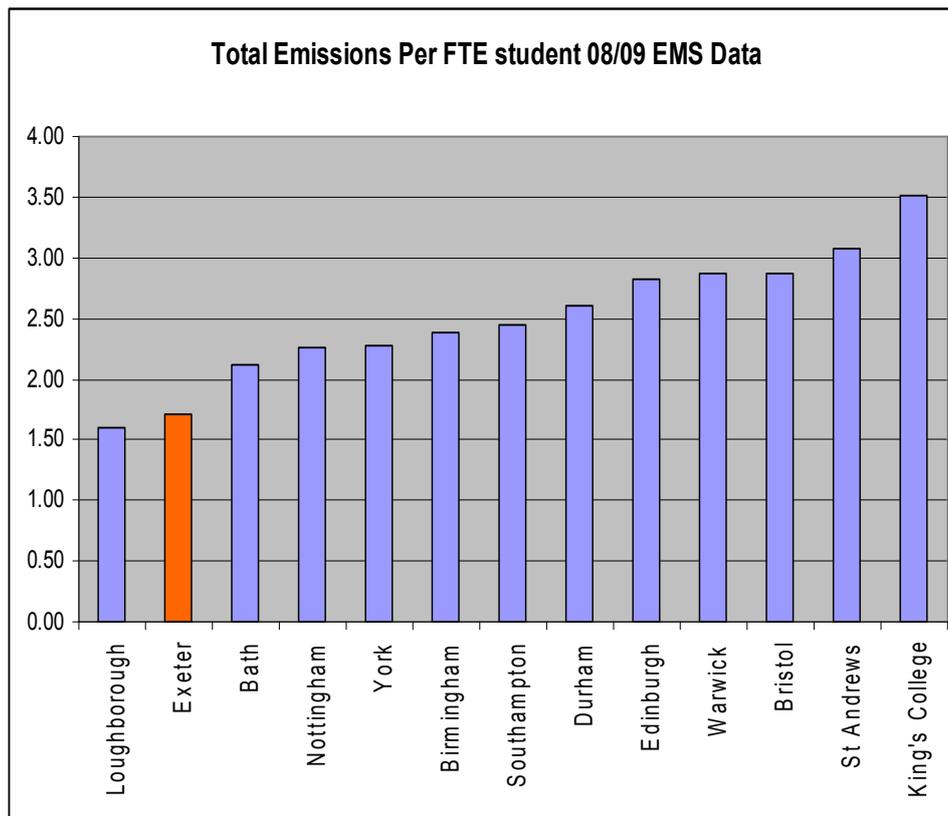


Figure 4: Total Carbon Emissions per FTE Student 08/09

Weather corrected emissions per FTE student have fallen from 2.2 tonnes per FTE in 05/06 to 1.49 tonnes per FTE in 09/10.

University of Exeter	05/06	06/07	07/08	08/09	09/10
FTE Students	11340	11435	12115	13305	14439
Total weather corrected emissions	24989	24322	23559	21894	21498
Emissions per FTE	2.20	2.13	1.94	1.65	1.49
Comparator Group Position	5th	5th	4th	2nd	tba

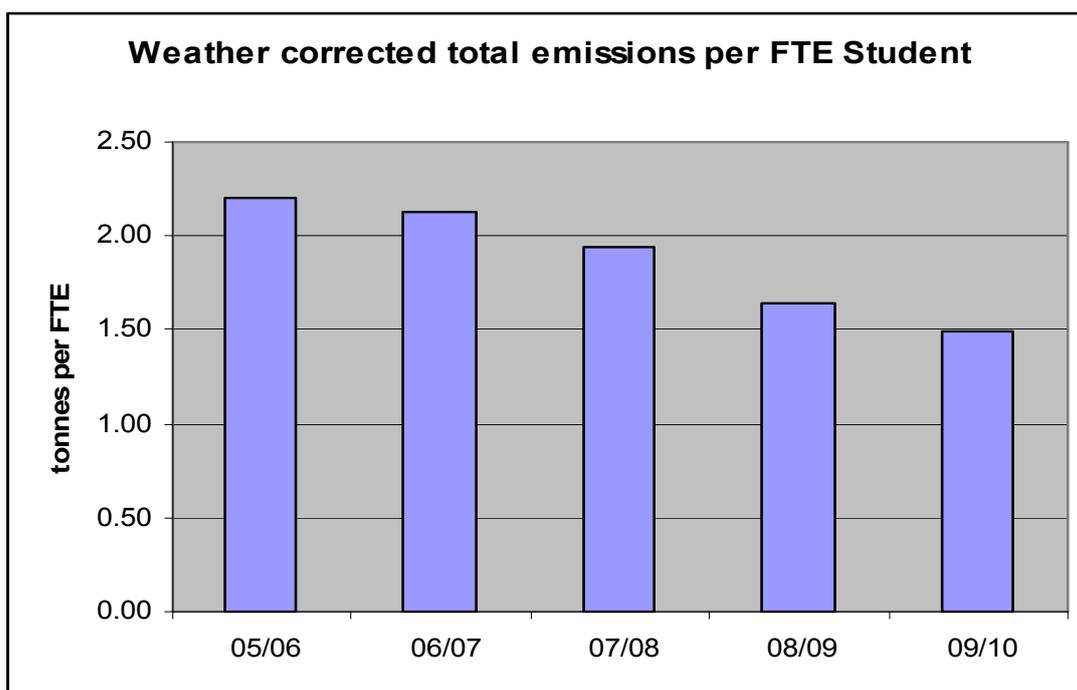


Figure 5: Weather Corrected Emissions per FTE Student 2005/06 to 2009/10

6.3.4 Financial Case and Savings Outturn to 2010

The financial case for implementation of the projects was based on the difference between the expected energy costs under the *Business as Usual* scenario (a 1% per annum increase in energy consumption) and the savings arising from a 2% per annum reduction in energy consumption under the Carbon Management Plan. Taking into account the DTi estimate that fuel unit costs would increase by 3.5% per year above inflation in future, the Plan identified a potential utilities saving of £11.2m by 2015/16 arising from an investment of £3.2m. The net saving of £8.0m was identified as the Value at Stake.

By the end of 2009/10, the plan envisaged capital expenditure of the order of £2.7m on energy projects and savings of the order of £2.2m compared to the Business as Usual projection.

Actual capital expenditure by the end of 09/10 was about £1.9 million. The cumulative energy savings from reduced electricity, gas and oil consumption relative to the Business as Usual case was more than £2.0m. Average electricity unit costs rose by more than 70% during the four years whereas gas and oil costs rose by about 21%.

Comparison of 2007 Plan and Out-turn	Capital Expenditure	Savings vs BaU case
2007 Carbon Management Plan Projection 2006/07 to 2009/10	£2.7m	£2.2m
Actual Expenditure and Savings 2006/07 to 2009/10	£1.9m	£2.0m

The following chart shows the total energy cost incurred in the years 2005/06 to 2009/10 (in blue). It also shows the cost which would have been incurred if the energy consumption had continued to increase at 1% per year as in the 'Business as Usual' (BaU) case beyond 2005/06 using the actual unit costs (blue + purple). The difference between the total energy cost and the BaU cost is the saving (purple) and this amounts to £2.0m in the four years since 05/06.

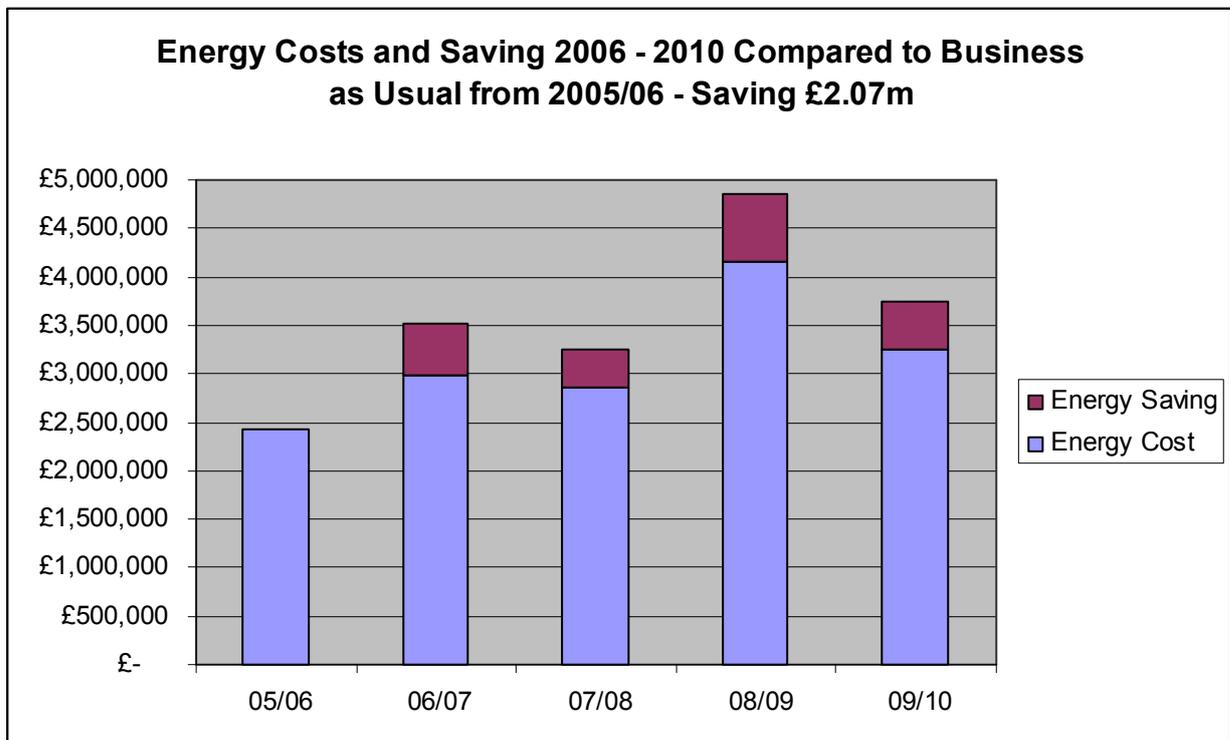


Figure 6: Energy Costs and Savings Relative to 2005/06 Baseline

6.4 Other Actions and Achievements Since 2007

- **Environmental Policy:** The University has revised its environmental policy and is preparing a five year Environmental Sustainability Strategy – see section 4.3.
- **Energy Management in Buildings:** Energy and water objectives and action plans have been included in the Sustainability Action Plan – see www.exeter.ac.uk/sustainability/policies/documents/08-09_University_Sustainability_Plan_Issue_1.3.pdf
- **Building Energy Management System:** A full time BEMS engineer has been employed. The Sigma BEMS has been extended since 2007 and now covers almost 100% of the Estate. All new buildings and major refurbishments have included extension and upgrading of the system.
- **Metering:** Gas, electricity and water meters have been installed in all remaining unmetered buildings on the Streatham Campus and St Lukes Campus. Heat meters remain to be installed. Half hour data loggers have been installed in some buildings and a project is under way to complete installation of data loggers to building intake meters by March 2011. Automatic meter reading equipment will be fitted to all significant gas water and electricity fiscal meters by the end of March 2011.

- Carbon Trust Standard: The University was awarded the Carbon Trust Standard in 2009 for its exceptional performance in reducing carbon emissions. This performance also led to the University being shortlisted for a Green Gown Award.
- Awareness Campaigns: The Sustainability team in Procurement has coordinated awareness activities throughout the University including the Green Impact project, Student Switch Off, established a network of Sustainability Coordinators and developed a partnership with the Student Guild on green initiatives.
- Student Action: The Student Guild has made further progress within the National Union of Students Green Impact Scheme achieving Silver accreditation.
- Sustainable Travel Plan: The University published a Sustainable Travel Plan in 2007. Most of the actions in the plan were accomplished by 2010 including calculation of carbon dioxide emissions from travel as an important input to the Carbon Management Plan. The revised Sustainable Travel Plan will be published in 2011 and will be renewed every 5 years.
- Parking Charges: Introduced car parking charges based on vehicle carbon emission rating.
- Cycle Parking: The number of cycle parking spaces available were more than doubled, and a further doubling is planned.
- Waste Disposal: A Waste and Resources strategy has been developed to manage waste.
- Training; Introduced sustainability and carbon reduction training for all new employees. This is now also being rolled out to existing employees.
- Energy Saving Week: An intensive Energy Saving Week used the dramatic Hard Rain Project display for the first time in the sector.
- Salix Fund: The University joined the Salix Fund in 2008 and received a loan of £600,000, supported by University matched funding of £150,000. Savings are recycled back into the fund for investment in further projects. So far, the fund has spent £200,000 on energy saving projects including energy efficient lighting upgrades, draughtsealing, an energy efficient chiller and feasibility studies for CHP and a biomass boiler. Projects in the pipeline for funding include replacement of oil fired burners at Geoffrey Pope, replacement boilers and insulation at Kay House and thermostatic radiator valves at St Lukes North Cloisters.

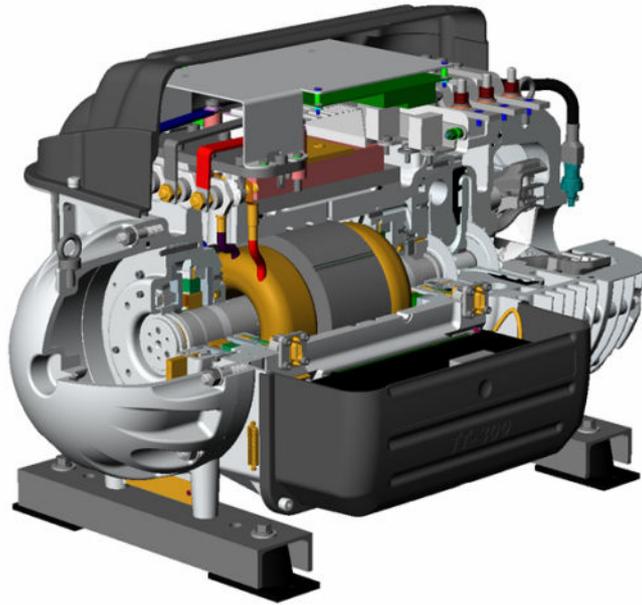


Figure 7: Turbocor Chiller – 43% more efficient than best available conventional chillers

6.5 Target Chosen

EDS presented a paper to the Carbon Management Board on 2nd Sept 2010 illustrating possible Scope 1 and Scope 2 emissions reduction targets for 2020/21. The Board adopted a target of 28% reduction by 2020/21 as being the most appropriate for the University's present circumstances. This is equivalent to a reduction of 2% per year. The selected target is shown in Fig 9. The carbon emissions outturn to 2009/10 and forecast emissions from 2010 to 2020 are also shown.

The target requires that University Scope 1 and Scope 2 emissions should be less than 18,000 tonnes per year by 2020/21.

An interim milestone target is to achieve Scope 1 and Scope 2 emissions of less than 20,000 tonnes by 2015/16.

The University Scope 1 and Scope 2 target is to achieve a reduction of 28% by 2020/21, requiring annual emissions to be less than 18,000 tonnes carbon dioxide equivalent.

7 Carbon Management Implementation Plan

The seven key strategic themes for Carbon Management are set out in Section 4.4 above.

This section sets out the detailed activities which will be undertaken by the Colleges and Services of the University.

7.1 University Standards

- The University has a policy of heating buildings in winter to 21 degrees plus or minus one degree.
- A policy for summer cooling temperatures is to be developed and published.
- All new buildings, facilities and major refurbishments will exceed current Building Regulations requirements for energy efficiency and carbon emissions by at least 10%.
- All new facilities and major refurbishments will achieve BREEAM Very Good with an aspiration to achieve BREEAM Excellent where this can be shown to be cost-effective.

Key Action – New buildings, facilities and major refurbishments to achieve BREEAM Very Good and to exceed current Building Regulations carbon performance by at least 10%.

7.2 Baselines for Colleges and Services

Baselines have been calculated for the University's Colleges and Services for the year 2009/10.

University of Exeter 2009/10	Carbon Emissions by Source Fuel - tonnes CO2				
	Electric	Gas	Oil	Total	Percent
Academic Services inc IT centre	1,720	576	0	2,296	10.7%
Corporate Services exc Campus Services	754	535	9	1,298	6.1%
Centrally Bookable Space	1,008	515	109	1,632	7.6%
Non Recharged Space	533	317	6	856	4.0%
Campus Services	1,261	472	115	1,848	8.6%
Campus Services Residential Facilities	3,851	1,377	0	5,229	24.4%
College of Humanities	446	317	0	762	3.6%
College of Social Sciences and International Studies	241	296	0	537	2.5%
College of Engineering, Maths and Physical Sciences	1,000	43	648	1,692	7.9%
College of Life and Environmental Sciences	2,111	514	662	3,288	15.3%
University of Exeter Business School	134	38	0	172	0.8%
UPP	810	630	0	1,440	6.7%
PCMD	309	94	0	403	1.9%
Total	14,179	5,724	1,549	21,453	100.0%
Percent	66%	27%	7%		

7.3 Corporate Services

7.3.1 Corporate Services – Carbon Management

Corporate Services includes three key services which impact on sustainability and carbon management and provide support to the whole University in the drive to reduce emissions:

- Estate Development Services
- Campus Services
- Procurement and Sustainability Services

Corporate Services also own a range of facilities and premises which consume energy and cause emissions.

An organisation chart for Corporate Services is included as Appendix E.

7.3.2 Corporate Services – Facilities and Premises

Corporate Services occupy administrative and sports buildings. These teams are keen to reduce their carbon emissions through involvement in projects such as Green Impact – see below.

For these agreed areas, Corporate Services should undertake the following actions:

- develop a carbon reduction strategy
- commission an audit of consumption and emissions
- install efficient lighting
- good housekeeping measures including management of cooling and ventilation
- Awareness campaigns to involve staff eg Green Impact.

Key Action – Corporate Services to support and promote the Green Impact Campaign including development of carbon reduction strategies and carbon emissions audits.

7.4 Estate Development Services (EDS)

7.4.1 EDS Carbon Management Responsibility

The Estate Development Service (EDS) is a division of Corporate Services. The Director of Estates will be responsible for supporting Colleges and Services as they aim to deliver the building energy related targets for academic and residential buildings through identification and implementation of carbon reduction projects. The Director of Estates will report to the DVC External Affairs at the Environmental Sustainability Management Group and the Carbon Management Board.

7.4.2 Buildings Projects

The Estate Development Service, in consultation with the Energy Manager, has produced a programme of energy and carbon saving actions for implementation during the period 2010 to 2013. The programme also details the expected effect on carbon emissions of the construction projects taking place during 2010 to 2013.

A summary of the anticipated carbon increases and decreases shows that the approximate effect of the projects and construction by July 2013 will be a net reduction in carbon emissions of 564 tonnes per annum arising from:

- Reduction due to implementation of EDS projects: 2,372 tonnes CO₂ pa
- Increase due to construction of Forum, Geoffrey Pope etc.: 1,808 tonnes CO₂ pa

Carbon Effect of New Build by 2013	tonnes/a
Forum	233
Geoffrey Pope Refurbishment	405
Geoffrey Pope Aquarium	995

Business School Phase 3	139
Mood Disorders Centre	36
Total	1808

The detailed EDS programme of carbon reduction projects is included as Appendix B.

Key Action – EDS to plan, prioritise and implement programme of carbon reduction projects.

7.4.3 Alternative and Renewable Energy Sources

The University will seek to invest in on-site renewable energy projects where these are shown to be cost effective. Typical projects will include solar thermal, photovoltaics, wind turbines, biomass boilers and ground source heat pumps. EDS will manage a programme of projects agreed with the Energy Manager. Projects already in the pipeline include a biomass boiler, solar water heating, a wind turbine and ground source heat pumps. EDS will seek further opportunities for installation of on-site renewable energy projects.

7.4.4 EDS Role in Carbon Management

EDS has a major role in supporting Colleges and other Service departments in reducing their carbon emissions. Key areas of support are:

- Ensuring carbon emissions reduction is included in all projects undertaken by EDS
- Advising Colleges and Services of opportunities for cost effective investment in energy, water and carbon saving measures
- Working with the Energy Manager to find ways to initiate carbon reduction projects.

EDS is working with Colleges and other Services in the Common Action Teams (see Colleges below) to set out a process by which carbon reduction will play a central part in future projects. EDS will have a strategy for assisting Colleges and other Services. The strategy will be set out in a Common Action Plan which is due to be published shortly.

EDS has recently achieved ISO9001 certification. The EDS Mission Statement may be found at <http://admin.exeter.ac.uk/be/Documents/EDSMission.pdf>

7.4.5 Electrical, Mechanical and Structural Guidance, Standards and Specifications

EDS is the guardians of the electrical and mechanical standards which are applied to mechanical and electrical services and systems in the University. The electrical and mechanical standards are contained in design briefing documents which are issued to consultants for their design guidance. The latest version is available on the EDS website (insert link ??)

EDS will liaise with the Energy Manager to ensure that energy and water saving technology and techniques in the Electrical and Mechanical briefing documents are appropriate for the University approved BREEAM rating and for achieving the University requirement that new and refurbished buildings should have energy and carbon emissions at least 10% lower than current Building Regulations.

7.4.6 EDS Premises

EDS presently occupy Lafrowda House. It has commenced a project to make the building into a demonstration low-energy facility with the long term objective of making it zero-carbon. Since 2009, EDS has reduced electricity use by 55% and reduced carbon emissions by 43% in spite of the coldest winter (09/10) for 20 years.

7.5 Campus Services Carbon Management Responsibilities

Campus Services is the facilities management division of Corporate Services, managing all University owned residences, vehicles, catering and maintenance of buildings and grounds.

The Director of Campus Services is responsible for reducing carbon emissions from residences while maintaining suitable conditions for residents and achieving high student satisfaction scores.

The Director of Campus Services is responsible for monitoring and reducing emissions from Waste and Resources management, University vehicles and from all other premises occupied by Campus Services staff and activities.

The Director of Campus Services reports to the Environmental Sustainability Management Group and the Carbon Management Board on sustainability and carbon management.

7.5.1 Campus Services Role in Carbon Management

Campus Services have a key role in assisting colleges and other services to reduce their carbon emissions through maintenance of buildings and systems. A strategy is being devised including a set of explicit criteria for prioritising carbon reduction related projects.

Key Action – Campus Services to devise and publish a set of explicit criteria for prioritising carbon reduction projects.

7.5.2 Campus Services Residences and Facilities

Campus Services are also responsible for about a third of the University carbon emissions from the residences and other premises that they occupy. A carbon management group has been formed with representatives from most Campus Services facilities. The group will be responsible for managing and reducing emissions. One of the early actions will be to agree a carbon management policy and action plan. The plan will be available on the Campus Services website.

Key Action – Campus Services to devise a policy and plan for reducing carbon emissions from Residences and from Campus Services buildings and facilities.

7.5.3 University Vehicles

Campus Services Transport Division operate most vehicles owned by the University. Emissions are of the order of 130 tonnes CO₂ per year. Future plans are set out in the University Sustainable Transport plan.

7.5.4 Waste Management and Recycling

Campus Services are responsible for waste management. A Waste and Resources Strategy has been developed in consultation with the Sustainability Manager. The strategy includes an assessment of the carbon emissions and other greenhouse gas emissions arising from University waste. (Link to be inserted when available) Total emissions are of the order of 550 tonnes per year.

7.6 Procurement and Sustainability Services

Procurement and Sustainability Services is a division of Corporate Services. It is responsible for

- Sustainability Planning and Management
- Waste Management Support
- Sustainable Procurement Policy and Support
- Sustainable Transport Planning
- Energy and Carbon Management

These responsibilities are detailed below.

7.6.1 Sustainability Planning and Management

- League Tables and Awards
- Green Impact and Student Switch Off
- Coordination of Environmental Sustainability Management Group, Sustainability Advisory Group and Sustainability Dual Assurance
- Legislation Register

7.6.2 Waste Management Support

Liaison with and advice to Campus Services who are responsible for waste management. See 7.5.4 above.

7.6.3 Sustainable Procurement Policy and Support

The Sustainable Procurement Policy was approved by Dual Assurance in 2010. It sets out a process and strategy for identifying and measuring sustainability impacts of procurement and putting in place measures to limit those impacts. The policy is published on the University intranet.

The Sustainable Procurement Strategy aims to engage with its key suppliers & organisations using the public sector Flexible Framework in the following ways:

- Scope 1 & 2 emissions – Actively reduce the usage of energy from university owned appliances and vehicles by procuring the most energy efficient products where possible.
- Scope 3 emissions – Ensure that suppliers have adequate measures in place to report the CO₂ emissions created from the goods and services supplied to the university. The University will work with individual suppliers so they can reduce their own carbon footprint.

7.6.4 Sustainable Transport Planning

- Employ Transport Planning Coordinator
- Coordinating and facilitating the Sustainable Travel Plan
- Encourage and promote sustainable travel (Walking, cycling, public transport use and car sharing);
- Monitoring and evaluation of staff and student commuter and business travel; Calculate staff and student commuter business travel carbon emissions.
- Coordinate sustainable transport infrastructure , such as cycle parking facilities;
- Measuring carbon emissions resulting from business travel.

7.6.5 Summary of Energy and Carbon Management Actions

The following actions are part of the Energy Managers role. These actions support the key carbon reduction strategic themes.

- Building Energy Management System strategy and maintenance management – employment of BEMS Engineer.
- Automatic Meter Reading System management – employment of Data Manager
- Monitoring and Targeting using Systemslink
- Utilities procurement
- Utilities bill management
- Support for internal billing undertaken by Finance and Systems
- Supporting awareness campaigns such as Green Impact and Student Switch Off
- Maintaining Carbon Trust Standard
- Carbon Management Plan ownership, reporting and coordination
- Management of Energy Efficiency Budget
- Management of Salix Fund
- Management of Infrastructure Fund Capital Budget
- Management of Carbon Reduction Commitment
- Energy, Water and Carbon Saving Project identification and evaluation
- Liaison with EDS and Campus Services
- Data for Estate Management Statistics
- Long term strategic energy and carbon planning.

Some of these activities are further detailed below.

7.6.6 Building Energy Management System (BEMS)

The BEMS has been used to reduce emissions in recent years by eliminating un-necessary operation of heating and cooling plant and controlling temperatures to agreed levels. It is thought that there are further savings to be made in reducing energy usage and emissions, estimated to be about 3.5% of present energy usage by 2013/14. This is equivalent to a reduction of 800 tonnes of CO2 emissions per year.

The Energy Manager is responsible for direction and strategy. A full time BEMS Engineer has been operating the BEMS system for several years.

Key Action – Energy Manager and BEMS Engineer to fully optimise operation of Heating Ventilating and Air Conditioning plant.

7.6.7 Carbon Management Plan Ownership, Reporting and Coordination

The Energy Manager is the owner of the Carbon Management Plan and is responsible for co-ordinating all activities in the Plan. This includes reporting to Dual Assurance, Sustainability Advisory Group and Environmental Sustainability Management Group. The Energy Manager is responsible for co-ordinating the Carbon Management Board. The Energy Manager will liaise with Colleges and other Services to assist with the challenges of reducing carbon emissions.

Reports will be prepared at quarterly intervals or for presentation at the above meetings as required.

Key Action – Energy Manager to coordinate carbon management activities with Colleges, Services, Carbon Management Board and Dual Assurance.

7.6.8 Planning for Future Decarbonisation of Electricity

Procurement and Sustainability Services has a role in advising on strategy for future sustainable heating systems.

Electricity presently causes about three times more carbon emissions per kilowatt hour than gas. The Carbon Descent Plan² quoted Government plans to decarbonise electricity generation by more than 90% over the next 30 years through increased renewables, nuclear energy and carbon capture and storage. One of the key strategic carbon management themes (see 3.4.3) is to plan for the introduction of electrically powered heating systems over this period. It was also clear that it would not be possible to meet any reasonable target for emissions reduction if the University continued to use large amounts of fossil fuel for heating.

The most promising technology for electrically powered heating is the Ground Source Heat Pump (GSHP) which uses a compression cycle mechanism similar to a fridge to transfer low grade heat from the ground into higher grade heat inside a building. For each unit of electricity used, about four units of heat are transferred into the building but the heat is available at a relatively low temperature, around 40°C.

Procurement and Sustainability Services will work with Estate Development Services to draw up a detailed strategy and plan that consider the following draft principles:

1. *A programme of refurbishment of buildings and replacement of existing gas boilers should be drawn up which aims to replace all gas boilers with GSHP by 2040 or sooner.*
2. *All planned new buildings and major refurbishments should incorporate heat distribution systems which are compatible with GSHP. Typically, this would be low temperature underfloor heating which is also ideal for use with modern condensing gas boilers. This is necessary because the heat distribution systems are likely to have much longer life than the equipment such as boilers which supply the heat. Installation of the GSHP units is not essential at this point as condensing gas boilers are a suitable alternative low carbon technology and have significantly lower installation costs than GSHP at present.*
3. *Domestic hot water in new buildings should be provided by direct electric heating, using instantaneous water heaters as far as possible. This is already a lower cost, lower carbon technology than gas water heating and has health and safety benefits through provision of water at a useable temperature and avoidance of Legionella issues.*

Key Action – Energy Manager to work with EDS to develop a plan for taking advantage of the anticipated decarbonisation of electricity.

² Published on the intranet.

7.6.9 Procurement – Energy and Water Metering Strategy

Management of energy and water is unlikely to succeed without effective metering and reporting. Procurement and Sustainability Services are responsible for defining the metering and data collection strategy for the University.

Services to all University buildings will be metered at the building intake. Identified significant loads within buildings will also be metered.

The University will install data loggers to record half hourly profile data from all University owned building intake meters. The data will be automatically uploaded at least daily to the Energy Manager's computer.

The main campus supplies as well as the supplies to off-campus buildings are metered by the utility suppliers. The University will arrange for the installation of Automatic Meter Reading (AMR) systems to almost all of these meters except those where the supply value is below a threshold which makes automatic data collection not cost effective. The data will be transmitted to the Energy Managers computer on a daily basis. AMR is also one of the two Early Action Metrics for the Carbon Reduction Commitment so having these systems in place will improve the University's position in the CRC league table.

The data from University meters and from AMR meters will be automatically collected in the Monitoring and Targeting database. It will be used for calculation of internal billing, to identify energy and water saving projects and to demonstrate savings achieved. A project to install data loggers, validate data and produce outputs suitable for departmental billing and local energy and water management is due to be completed by March 2011.

The University will continue to read meters manually at least at yearly intervals in order to validate the automatically collected data.

Key Action – All significant buildings to have meters and AMR data loggers fitted. Profile data to be used for internal billing and for energy and water management reports to users.

7.7 Academic Services

7.7.1 Academic Services Carbon Management Responsibilities

The Director of Academic Services has overall responsibility for carbon emissions arising from AS activities. The Academic Services Business Manager has taken responsibility for an overview of all carbon impacts of the Service and will produce a carbon reduction strategy document. Carbon management targets and objectives have already been set as one of the KPIs for the Service.

Academic Services have two large divisions which are responsible for a major part of their emissions. The divisions are:

- Information and Computing Systems Division (ICSD)
- Libraries and Research Support

Other divisions of Academic Services occupy space in buildings throughout the University. The teams occupying these areas are keen to reduce their emissions through projects such as Green Impact.

7.7.2 Information and Computing Systems Division (ICSD)

The Assistant Director – ICS will take responsibility for carbon emissions from University IT computing and infrastructure.

ICSD has successfully reduced carbon emission from their central facilities through a strategy of server virtualisation and cooling plant efficiency. A strategy has been prepared for further savings to be made through introduction of thin clients, low energy PCs, centralisation of High Performance Computing, automatic PC powerdown etc.

ICSD have produced a detailed analysis of their carbon emissions including establishing a boundary and identifying suitable targets. Electricity consumption in 2008/09 was about 5,800 MWh causing emissions of about 2,800 tonnes per year. Projects for reducing emissions have been identified which are expected to reduce emissions by about 37 % by 2020. The detailed ICSD analysis and plan is attached as Appendix G.

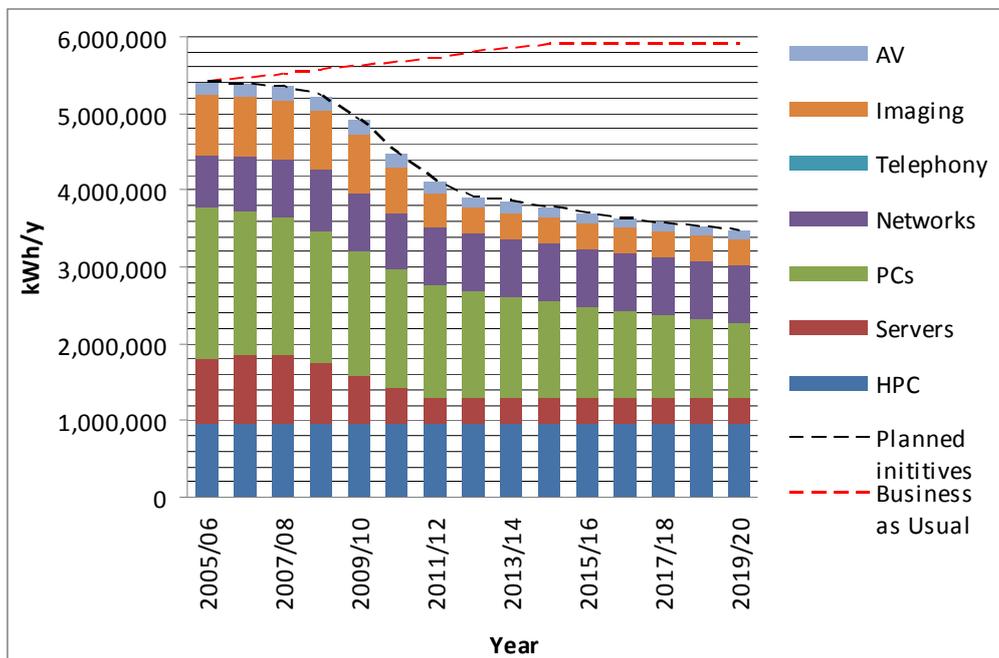


Figure 8: ICSD Carbon Reduction Plan

Key Action – ICSD to deliver further emission reductions through their carbon strategy including thin clients, low power PCs, server virtualisation and PC powerdown software.

7.7.3 Libraries and Research Support

The Assistant Director – Libraries and Research Support will take responsibility for carbon emissions from University libraries arising from their energy and water consumption.

7.8 Colleges – Responsibility for Carbon Management

The University academic departments have recently been restructured into six colleges:

- College of Humanities

- College of Life and Environmental Sciences
- College of Engineering Mathematics and Physical Sciences
- College of Social Sciences and International Studies
- The Business School
- Peninsular College of Medicine and Dentistry

The College Managers will take responsibility for the carbon emissions arising from their energy and water consumption. Each College will produce a Carbon Management Strategy incorporating objectives such as auditing of energy and emissions, awareness campaigns and setting targets.

Common Action Teams The Colleges and Services will work together in Common Actions Teams where there are shared objectives and strategies. The Infrastructure Common Action Team will consider how Colleges could respond to the challenge of reducing energy consumption and carbon emissions.

7.9 'Corporate Space'

The University has areas that are generally available to all staff and students. These include Bookable Space and Non-Recharged Space (e.g. the Great Hall and Student Guild areas). The responsibility for formal carbon management in these areas is not always clear. The 'Carbon owners' for these areas should be determined in 2011.

7.10 Forecast of Scope 1 and Scope 2 Carbon Reductions

Two forecasts are analysed, an Optimum Measures Forecast and a Planned Investment Forecast.

Both forecasts assume:

- Government decarbonisation of electricity proceeds as planned.
- Salix fund investment of £200k per year continues to deliver carbon savings around 300 tonnes per annum.
- Anticipated BEMS savings still occur as these are a low capital cost measure
- All UPP buildings are outside the University boundary from 2009
- Increased emissions arise due to construction of new buildings including INTO.

The Planned Investment Forecast assumes:

- No Tranche 2 or Long Term Maintenance funded projects take place.
- EDS project list does not go ahead other than the first year projects which are already committed.
- ICSD do not deliver any further carbon emissions reduction.
- No significant awareness campaigns take place.

Under this scenario, a reduction of emissions of about 30% would occur driven by the decarbonisation of electricity and exclusion of UPP buildings and to a lesser extent by BEMS savings and Salix funded projects. The Planned Investment Strategy should achieve the emissions target of 18,000 tonnes by 2020/21 but is unlikely to achieve the interim milestone of 20,000 tonnes by 2015/16.

The Optimum Measures Forecast includes:

- Engineering projects to be undertaken by EDS with investment from Salix, LTM and Tranche 2 of the order of £9.4m to achieve an energy cost saving of £16M by 2020. The projects list is

aspirational at this stage and is likely to change with availability of funding and with changes in technology.

- Awareness campaigns to be undertaken within Colleges and Services.
- IT efficiency measures planned by ICSD go ahead.

The Optimum Measures Forecast shows that a reduction of emissions (against the 2005/06 baseline) of the order of 50% by 2020/21 is feasible given sufficient funding and assuming 100% success.

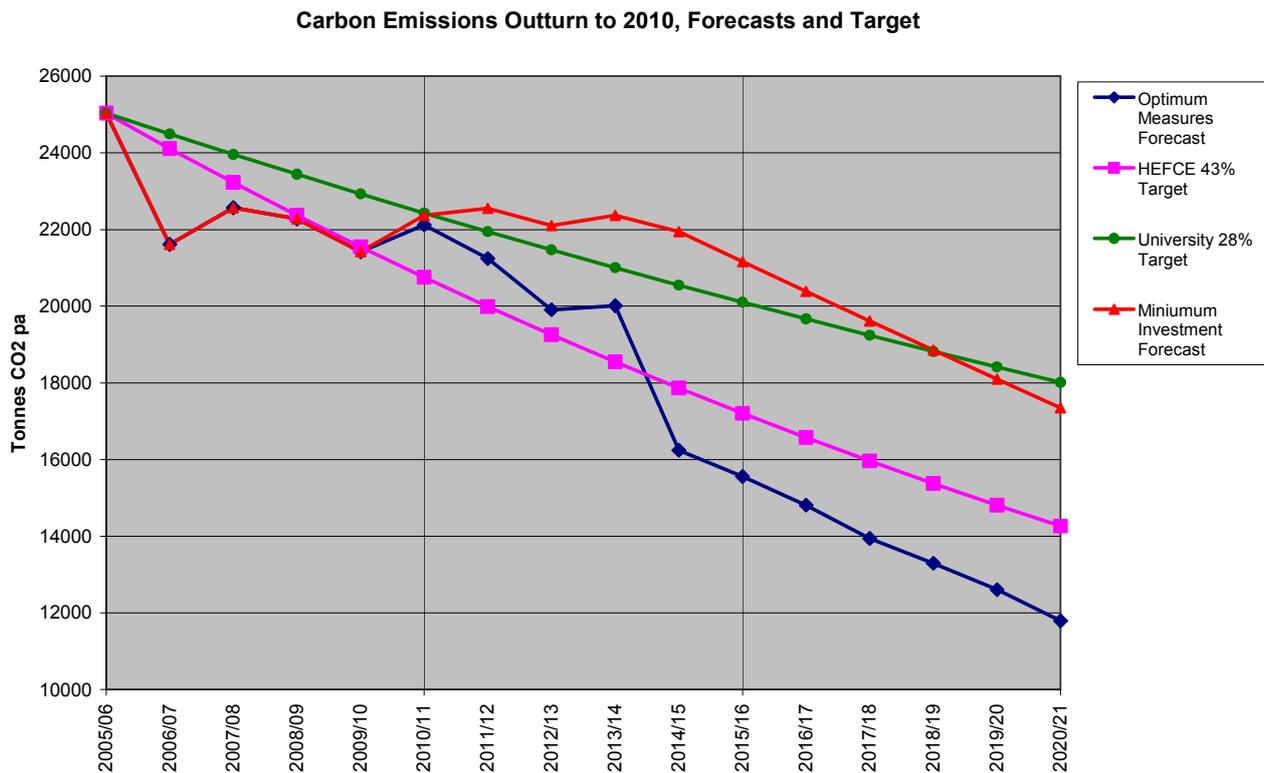


Figure 9: Carbon Emissions Outturn to 2010, Forecasts and Target

8 Implementation Plan Financing

The main financial benefit from reduced carbon emissions is a significant reduction in future electricity, fuel and carbon costs. The costs of two strategies are considered (see 7.8 for details of the strategies).

8.1 Fuel and Electricity Unit Costs

Unit costs increased steadily up to 2007 but in 2008 oil prices doubled and gas and electricity followed soon after. These increases lead to a near doubling of our energy bill from £2.4m in 2005/6 to over £4.2m in 2008/09. It fell back to £3.3m in 2009/10 but increased significantly during 2011 due to Middle East tensions and rebellions. One of the predicted effects of "Peak Oil" is a rise in turbulence in energy prices.

Latest estimates from DECC suggest that electricity unit costs will increase at between 2% and 3.3% per year above inflation up to 2030 while gas unit costs will increase at between 0.6% and 2.4% per year. These estimates suggest that the University energy bill will increase by 20% over the next ten years plus whatever increases arise from inflation and other market forces.

8.2 Capital Cost and Savings from Planned Investment Strategy

The capital cost of the Planned Investment Forecast strategy would be £2.2m spread over the 10 year period. The source of the funds would be the savings arising from Salix funded projects which have already been implemented. The University is committed to maintaining this funding stream unless we choose to repay the Salix loan. The value of the energy savings arising from the Salix funding over the ten year period would be about £3.0m.

8.3 Capital Cost and Savings from Higher Investment Strategy

The capital cost of the Higher Investment Strategy would be £9.4m broken down as follows:

Source of funds	£ x 1000
Tranche 2 funding	5,900
Salix funding reinvested	2,200
HEFCE Efficiency Fund	300
Long term maintenance budget	1,000
Total capital budget	9,400

Higher Measures Strategy - Projects to be implemented by 2020	Capital Cost	Annual Cost Saving	Carbon Saving	Payback
	£	£/a	tonnes/a	yrs
Convert oil boilers to gas - three boiler rooms	£355,000	£142,500	469	2
Energy Audits	£50,000	£15,000	128	3
Insulate valves, flanges, pipework in plant rooms	£85,000	£22,500	183	4
Draught sealing to ten buildings	£108,000	£27,500	224	4
IT Services efficiency measures	£200,000	£44,100	265	5

Higher Measures Strategy - Projects to be implemented by 2020	Capital Cost	Annual Cost Saving	Carbon Saving	Payback
	£	£/a	tonnes/a	yrs
Thermostatic radiator valves to two buildings	£40,000	£8,658	71	5
Replace lighting with LEDs	£600,000	£125,000	750	5
Automatic meter reading system	£300,000	£50,000	204	6
1.5 MW wind turbine with Feed-in Tariff	£3,000,000	£463,579	1,490	6
Lighting upgrades to three buildings	£282,000	£41,400	249	7
Roof Insulation to three buildings	£90,809	£10,984	76	8
Large Photovoltaic array 500m2 with Feed-in Tariff	£1,500,000	£170,100	243	9
CHP plant 400kW Geoffrey Pope	£950,000	£95,000	340	10
Solar water heating to catering, showers and pool	£276,000	£22,600	184	12
Convert electric space heating to gas - Kay House	£180,000	£10,070	103	18
Biomass boiler at Estate Services Centre	£140,000	£6,000	122	23
Boiler replacements in six buildings	£480,000	£20,550	21	23
Double glazing to three buildings	£553,620	£21,502	167	26
Ground source heat pump - Hatherly Labs	£250,000	£5,000	153	50
Totals	£9,440,429	£1,302,043	5,442	7

The anticipated energy cost savings generated by the strategy are £16.2m over the ten year period. This will be offset by an increase in energy costs of £7.5m to supply the new build projects such as the Aquarium, leaving a net saving of £8.7m. The anticipated capital cost and savings during the period are shown in the following chart.

Optimum Measures Forecast - Capital Cost and Energy Savings 2009 to 2020

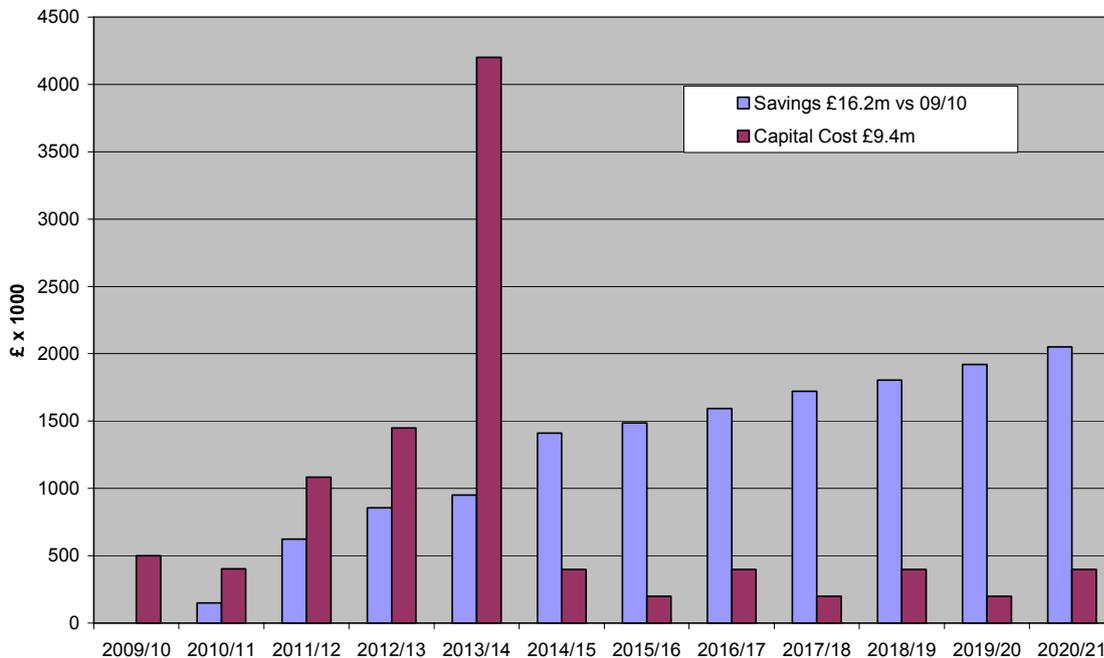


Figure 10: Capital Cost and Savings from the Higher Measures Forecast

8.4 Other Financial Benefits from Energy Efficiency Investment

- Reduced risk from energy price turbulence
- Reduced risk from unpredictable carbon markets

- Better financial planning

9 Stakeholder management and communications

9.1 Recent Communication Actions and Campaigns

One of the most significant ways the University can deliver a reduction in carbon dioxide emissions is through the implementation of high profile communication campaigns, promotion of good housekeeping and awareness raising activities.

In 2008, the University launched its first ever Energy Week. This major energy awareness campaign was centred on the internationally acclaimed Hard Rain exhibition, a heart stopping mix of photos linked to the text of Bob Dylan's iconic song. The programme of events provided staff, students and visitors with an overview of the issues relating to energy efficiency, the positive action that individuals can take to save energy as well as details of energy related research activities at the University.

The University is currently participating in a flagship greener lifestyles programme called 'Degrees Cooler – Greening universities and beyond through behaviour change'. The project seeks to help 90,000 students and staff across 20 English universities measurably change their everyday behaviours: save energy, recycle more, fly less and procure more sustainable local food. All of these changes will contribute directly to the delivery of the carbon management plan through reduced carbon dioxide emissions.

The Degrees Cooler programme comprises the following initiatives:

- **Green Impact:** An accreditation scheme with an awards element aimed at greening departments through individuals managed by Environmental Association for Universities and Colleges (EAUC) and delivered locally by the University of Exeter.
- **Student Switch Off:** An energy-saving competition between Halls of Residences. This is run in partnership with National Union of Students (NUS) and in association with the WWF.
- **Going Greener:** A student-led grassroots behaviour change campaign coordinated by People & Planet.

University sustainability practitioners work closely with the Students Guild to support the implementation of their Green Impact programme.

In addition to the Degrees Cooler campaign, the University has also implemented the following ongoing awareness programmes:

- Development of a Sustainability Website with information about all areas of sustainability including energy efficiency and transport;
- Inclusion of carbon management in all new Corporate Services and Academic Services staff induction;
- Organisation of events to highlight sustainable transport options e.g. Devon Car Free Day and Love Your Bike Day;
- Integration of climate change issues and practical carbon reduction strategies in the University's Environmental Sustainability in the Workplace Course, which is available to all staff at the University and mandatory for all Corporate Services staff.

9.2 Communications Plan

9.2.1 Context

This Communications Plan defines the communications needs for the implementation of the Carbon Management Plan, discusses messages, and outlines channels of communication. Delivery of the Communications Plan is the responsibility of the Energy Manager.

9.2.2 Objectives

The objectives of the Communications Strategy are to:

- Establish a clear shared understanding of the Plan's vision and goals
- To promote carbon management issues to all members of the University
- Generate enthusiasm for carbon management
- Improve readiness for change amongst staff that may be impacted by the carbon management programme, through changes to working practice etc.
- Enable early recognition of risks and issues so that Plan can be adapted where appropriate.
- Ensure accurate information and guidance are provided at the right time to maintain carbon management as a core issue in all University activities.

9.2.3 Strengths, Weaknesses, Opportunities and Threats

<p>Strengths Low carbon energy technologies and energy efficiency are subjects of research. Complements teaching activities on Exeter and Cornwall campuses. Ties in with the University environment policy. Complements work done by the Institute for Energy Research and Policy. Simple energy efficiency measures can make a difference. The campuses are attractive – there is a shared desire to retain that</p>	<p>Weaknesses Limited extra budget available to produce print etc to publicise carbon cutting initiatives. Limited staff time available for implementation. Not all staff have access to PCs and email Restricted by term times</p>
<p>Opportunities Staff and students often motivated by environmental issues Existing communications channels will be used where possible, but new specific channels will be established if necessary, budget allowing. Regular email newsletter issued to staff. Regular meetings are held for different groups of staff.</p>	<p>Threats Could get swallowed up in raft of initiatives being communicated to staff – liP etc. Staff and students not inclined to want to 'save money' for the University.</p>

9.2.4 Audiences

- **Stakeholders** – Key staff, Carbon Trust, Exeter City Council, energy providers
- **Staff and students** - At all levels
- **Other interested parties** - Other universities who are taking part in HECMP, HEFCE
- **Local Community** – expresses concerns about energy wastage at the University

9.2.5 Stakeholder management

A schedule of key stakeholders was identified early in the project and has been refined for the 2010 issue of the Plan – see Appendix A. A series of one to one meetings are under way with stakeholders to identify their needs and their potential involvement in carbon reduction. This has proved to be the most effective way to engage with stakeholders and has yielded beneficial results such as identification of energy champions and starting preparation of departmental energy/carbon management strategies.

Stakeholders have proved to be very supportive of the need to reduce emissions and of the carbon management plan. It has also proved beneficial for the stakeholders to understand the implications of the plan and policies such as the intention to charge departments for fuel used. The Energy Manager will continue to be responsible for meeting key stakeholders to explain the plan.

9.2.6 Key Messages

- All staff and students can make a difference to reducing carbon emissions.
- Reducing carbon emissions as part of the fight against climate change should be a key priority for universities as publicly funded bodies, both to set an example and to provide the solutions.
- This activity ties in with the Kyoto agreement and the University environmental sustainability policy.
- There is a considerable cost savings potential for the University.
- The University is among other top twenty Universities participating in this scheme, thus enhancing top twenty status.
- Messages need to be added as the campaign develops in terms of precise actions that staff and stakeholders can take, e.g. a call for action, or minimising the impact of transport.

9.2.7 Delivery

Communication will be face to face where possible, particularly for critical messages and where stakeholders are highly impacted or where their seniority makes their involvement crucial.

Channel	Mechanism	Target audience	Departments & Contacts to liaise with
News in Brief email newsletter	Fortnightly during term time, monthly in vacations 1) Launch project 2) Communicate base emissions findings 3) Communicate opportunities assessment 4) Carbon-saving tips – one per issue 5) Competition – energy saving initiative	Staff	Communications and Marketing
Other University newsletters Includes HS Bright Ideas	Speak to Service and College Managers to identify people producing and distributing newsletters. Provide copy and pictures.	Staff	Communications and Marketing

Channel	Mechanism	Target audience	Departments & Contacts to liaise with
University News magazine	Twice yearly Launch project and update on progress, interview Godfrey Whitehouse.	Staff, postgraduate students, alumni, external stakeholders	Energy Manager
Press releases	<ol style="list-style-type: none"> 1. Launch project 2. find a news edge in University research inputting to plan 3. report on progress towards end of pilot 	General public of Exeter, stakeholders, via media	Communications and Marketing
Staff Training	Regular staff training sessions to raise awareness of issues, policies, strategies, individual responsibility and potential for action	Staff	Energy Manager
Induction of new staff	Induction to include awareness of University Carbon Management and sustainability objectives and strategies as well as personal responsibilities.	New staff	Energy Manager and Sustainability Manager
Exepose	Student newspaper, published fortnightly during term time.	Students	Redbrick news team
Expression FM	Student radio station, broadcasts to Streatham campus	Students	Expression team
Pay slips	Monthly messages can be added to slips – tips on energy saving?	All staff	Personnel
Electronic communication	University website, email, IT services start-up page, screen savers	Staff and students who have access to PCs, external audience, stakeholders	Director of Academic Services Web editor
Road show / event	Dedicated day to raise awareness – students on every building's entrance to hand out energy saving messages. Link to other environmental activities and Fair trade?	Staff and students	Energy Manager Guild, suppliers, Design to come up with a brand
Hall of residence campaign	How students can make a difference	Students	Accommodation manager
University Meetings	Council	Council members	Chair of Council
	Court	Court members who are often external stakeholders	Chancellor
	Vice Chancellor's Executive Group	Senior management	DVC (External Affairs)

9.3 Climate Change Education

Climate change is probably the greatest challenge presently facing mankind. It is an issue that will affect everyone and requires a response at all levels, from individuals to governments and businesses. There is a need for better understanding of the causes and implications as well as objective information and clear science communications.

The University wishes to take a lead in the Higher Education sector by offering all students a basic understanding of the science and issues of climate change, environmental sustainability and sustainable development as well as offering specialist programmes and world class research. It seeks to *“engage with the Higher Education Sector and the wider community to promote environmental best practice and seek collaborative opportunities in order to facilitate developments in this area.”* (Environmental Sustainability Policy, 2009).

The University is developing a high profile on climate change research through its association with the Meteorological Office and contributions to the influential IPCC reports. We anticipate that participation will attract students with an interest in climate change and sustainability.

Some courses already include elements of education for sustainability and others cover sustainability in depth. However, to maximise learning opportunities in this area, Deans and Associate Deans of Colleges with responsibility for Education will be asked to consider the following objectives and propose how they could be met through formal and informal learning opportunities:

- All students should be offered the opportunity to learn about the basic science of climate change.
- Students should be able to articulate the discourse around global warming and the potential consequences for the environment, economy and society at a local and global level.
- Students should be able to develop an understanding of attitudes and values regarding personal, local, national and global responsibilities for climate change.

The Carbon Management Plan aims to be an example to students of how any organisation or business could reduce their carbon footprint in a responsible manner and aims to inspire students to consider actions that can be taken as future employer or employee. Students will also have the opportunity to get involved on campus with practical sustainability activities such as energy auditing.

The University has employed a Sustainability Curriculum Development Manager whose role is to coordinate, embed and enhance Education for Sustainability in the formal and informal curriculum. An Education for Sustainability Strategy has been published and will be updated yearly to respond to the latest developments in the curriculum provision at the University.

10 Carbon Management Plan Governance, Ownership and Management

10.1 University Governance Structure

The Council is the University's governing body, with responsibility for institutional policies and financial, estates and legal matters. Council is supported by committees and Dual Assurance. Further details of University Governance may be found at www.exeter.ac.uk/about/organisation/governance

10.2 Sustainability Governance

The Deputy Vice Chancellor (External Affairs) is the Management Lead on Environmental Sustainability Dual Assurance and also sits on Vice Chancellor's Executive Group and Council.

The Deputy Vice Chancellor (External Affairs) chairs the Environmental Sustainability Management Group, the Sustainability Advisory Group and the Carbon Management Board. Further details on the structure and terms of reference of these groups can be found at www.exeter.ac.uk/sustainability/policies/index.shtml

10.3 Responsibility for Carbon Management

The Deputy Vice Chancellor (External Affairs) is responsible for implementation of the Carbon Management Plan, achieving the targets and reporting to Council and Vice Chancellors Executive Group on plans and progress.

The Energy Manager is responsible for the day-to-day co-ordination of carbon activities, including the implementation of the Carbon Management Plan, on behalf of the Deputy Vice Chancellor (External Affairs).

The Manager of each College and Director of each Service is responsible for reducing the Scope 1 and Scope 2 carbon emissions caused by the energy consumed by the College or Service. College Managers, Service Directors or their delegated representatives will report to the DVC – External Affairs at the Carbon Management Board on their strategies and plans and on progress in reducing emissions.

Progress on carbon management will be reviewed annually by the University Council. A typical annual progress report would include:

- What is the present carbon emissions inventory and is it robust?
- Is the carbon emission reduction on target?
- What capital expenditure has taken place on carbon management during the last year, compared to budget?
- What are the carbon emissions reduction targets for the next two years?
- Are adequate plans in place to ensure that the targets are met for the next two years?
- Are adequate resources in place to implement the plans, including staff resources and budgets?
- Has an effective energy/carbon awareness campaign taken place during the year? How was the effectiveness measured?
- What changes have there been in carbon emissions from staff commuting, business travel and student travel?
- What proportion of academic courses have included appropriate elements of education for sustainability?

- Have our plans and achievements been communicated to local community organisations and strategic partners?

The Carbon Management Plan will be fully reviewed every three years, but will be updated more frequently when appropriate to incorporate changes such as fuel prices, new technology, progress towards targets, urgency of action, organisation and governance.

10.4 Risk Management

The University has a Performance and Risk Management Group which will be asked to review risk management for the Carbon Management Plan. This will include:

- Identification of risk
- Analysis of risk
- Probability of issues and benefits arising
- Means of risk reduction
- The extent to which the University can tolerate risk.

Risk management will be reported annually to Sustainability Dual Assurance.

The Energy Manager, working with the Performance and Risk Management Group, will be responsible for preparing a report which will cover all the risks, issues and benefits from Carbon Management.

11 Appendices

11.1 Appendix A - Key Stakeholders

Registrar
Director of Finance and Corporate Services
Corporate Services Manager responsible for departmental energy and carbon management
Director of Academic Services
Academic Services managers responsible for Libraries and IT Services
Academic Services manager responsible for departmental energy and carbon management
College Managers and Assistant College Managers for the six Colleges
Director of Campus Services
Director of Estate Development Services
Head of Procurement
Sustainability Manager
Energy Manager
Director of Communication and Marketing Services
Deputy Vice Chancellor - Resources
Senior Deputy Vice-Chancellor (Education)
Lay Lead on Sustainability Dual Assurance Group
Lay Lead on Finance and Investment Dual Assurance

President of Student Guild

Carbon Trust – Client Development Officer
Salix Finance – Relationship Manager

11.2 Appendix B – Programme of EDS Carbon Reduction Projects 2010 - 2012

	Project	Location	Capital Cost Estimate	Annual Saving	Pay back years	Annual Carbon Saving tonne/yr	Install Year
			£	£/pa	years		
1	Cavity wall insulation	Kay House	£5,152	£1,095	4.7	7.6	2010
2	Overcladding	Kay House	£57,675	£6,719	8.6	46.6	2010
3	Roof insulation	Kay House	£52,809	£5,734	9.2	39.7	2010
4	Install TRV's	North Cloisters	£15,000	£3,658	4.1	29.8	2010
5	Replace windows with double glazing units	Kay House	£53,620	£6,502	8.2	45.1	2010
6	Replace electric heating with gas central heating	Kay House	£180,000	£10,070	17.9	102.7	2010
7	Solar water heating	New Business School	£40,000	£1,500	26.7	12.2	2010
8	Draught seal windows and doors	5 Buildings	£50,000	£12,500	4.0	101.9	2011
9	Survey & install lighting upgrades in academic buildings	Harrison Building	£80,000	£14,400	5.6	86.5	2011
10	Insulate unlagged heating and DHW pipe work	Streatham boiler houses	£60,000	£16,250	3.7	132.4	2011
11	Insulate unlagged heating and DHW pipe work	St Lukes Boiler houses	£25,000	£6,250	4.0	50.9	2011
12	Energy audits of academic buildings	Estate	£50,000	£15,000	3.3	128.5	2011
13	Install additional Biomass Boiler	Estate Service Centre	£140,000	£6,000	23.3	122.2	2011
14	Install automatic meter reading system to control energy costs	Whole estate	£300,000	£50,000	6.0	203.7	2011
15	Solar water heating	Streatham swimming pool	£40,000	£1,500	26.7	12.2	2011
16	Draught Proofing	Hatherly	£8,000	£2,500	3.2	20.4	2012
17	Draught seal windows and doors	Another 5 Buildings	£50,000	£12,500	4.0	101.9	2012
18	Roof insulation	Hatherly	£20,000	£3,750	5.3	30.6	2012
19	Survey & install lighting upgrades in academic buildings	Physics Building	£127,000	£18,000	7.1	108.1	2012
20	Survey & install lighting upgrades in academic buildings	Queens	£75,000	£9,000	8.3	54.1	2012
21	TRV installation	Northcote House	£25,000	£5,000	5.0	40.7	2012

22	Roof insulation	Physics tower	£18,000	£1,500	12.0	6.1	2012
23	Solar water heating for showers	Streatham Sports Hall	£98,000	£9,800	10.0	79.9	2012
24	Solar water heating for showers	St Lukes Sports Hall	£98,000	£9,800	10.0	79.9	2012
25	Install double glazing where windows are due to be replaced under Long Term Maintenance budgets	Various academic buildings	£500,000	£15,000	33.3	122.2	2012

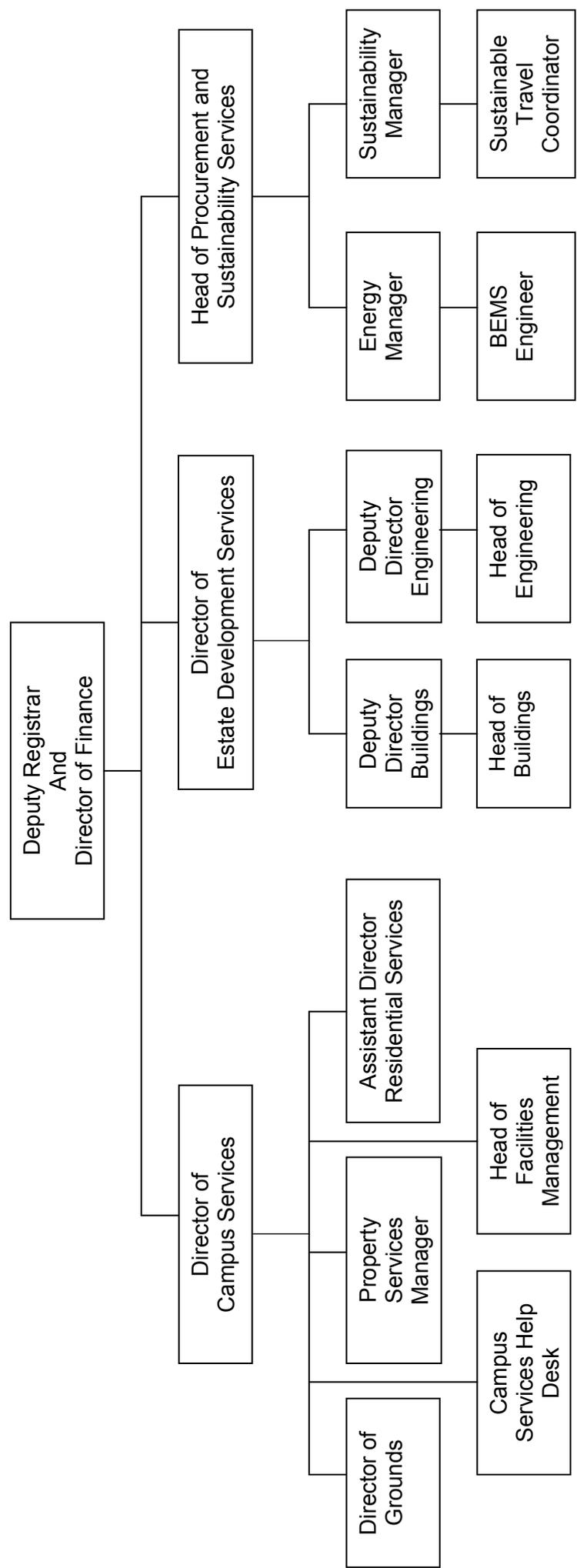
11.3 Appendix C - Calculation of Carbon Emissions – 2004 to 2010

University of Exeter Carbon Emissions							
Scope 1 and Scope 2		04/05	05/06	06/07	07/08	08/09	09/10
Buildings							
Electricity	MWh	29,672	29,872	26,297	26,871	26,618	27,910
Gas	MWh	36,137	38,164	31,529	32,833	32,481	32,733
Gas oil (35 sec)	MWh	6,883	6,214	4,872	6,132	5,806	5,035
Buildings Total	MWh	72,691	74,251	62,697	65,836	64,904	65,677
Electricity CO2 Factor	tonnes CO2e/MWh	0.537050	0.539085	0.54291	0.545155	0.54522	0.54522
Gas Factor	tonnes CO2e/MWh	0.18523	0.18523	0.18523	0.18523	0.18523	0.18523
Oil factor (gas oil)	tonnes CO2e/MWh	0.27533	0.27533	0.27533	0.27533	0.27533	0.27533
Electricity	tonnes CO2e	15,935	16,104	14,277	14,649	14,512	15,217
Gas	tonnes CO2e	6,694	7,069	5,840	6,082	6,016	6,063
Gas oil (35 sec)	tonnes CO2e	1,895	1,711	1,341	1,688	1,598	1,386
Buildings Total	tonnes CO2e	24,524	24,884	21,458	22,419	22,127	22,666
Other Scope 1 emissions							
University vehicles	miles	300,000				300,000	
miles CO2 factor	Kg CO2 per mile	0.500				0.500	
Mileage emissions	tonnes CO2e	150	150	150	150	150	150
Fugitive CFC emissions	kg	0	0	0	0	16.2	65.3
Fugitive emissions factor	kg/kg	20	20	20	20	20	20
Fugitive emissions CO2	tonnes CO2e	0	0	0	0	0.324	1.306
Total Scope 1 and 2	tonnes CO2e	24,674	25,034	21,608	22,569	22,278	22,817

11.4 Appendix D - Glossary

BAU	Business as Usual scenario in which the estate grows as planned and there is no concerted attempt to reduce CO ₂ emissions
CIF2	HEFCE Capital Infrastructure Funding – Round 2 Submission
HECM	Higher Education Carbon Management Programme
EDS	Estate Development Services
CaS	Campus Services
EMS	HEFCE Energy Management Statistics – annual return for all HE institutions
UPP	University Partnerships Programme Ltd. – building and operating Halls of Residence on campus
HEFCE	Higher Education Funding Council for England
BREEAM	Building Research Establishment Environmental Audit Method - a widely accepted means of measuring and comparing the environmental impact of buildings covering energy efficiency, location, construction, transport, recycling etc.
Carbon Trust	Government body charged with reducing CO ₂ emissions, funded by Climate Change Levy on bills.
Carbon	carbon dioxide emissions measured in tonnes of CO _{2e} per year.
CO ₂	carbon dioxide emissions excluding other global warming gases
CO _{2e}	carbon dioxide emissions equivalent of six global warming gases including carbon dioxide
BEMS	Building Energy Management System - central electronic system for controlling heating and ventilation
FTE	Full Time Equivalent number of students or staff
GIA	Gross Internal Area of buildings
INTO	INTO University Partnerships Ltd bringing international students to Exeter
94 Group	Group of comparable universities including University of Exeter.
VaS	Value at Stake
VfM	Value for Money
CMP	Carbon Management Plan – this document
CHP	Combined Heat and Power generator, typically a large engine running on gas which produces electricity for use on site and heat for use in adjacent buildings. Likely to be located in a boiler room.
UoE	University of Exeter

11.5 Appendix E – Corporate Services Organisation Chart



11.6 Appendix F - CIF2 Requirements for a Carbon Management Plan

Number	Question	A	B	C	D
3	Carbon reduction Is the institution fully committed to reducing carbon emissions? Does the institution have a carbon management plan which will reduce carbon emissions across the whole estate?	The institution has a carbon management plan which fully meets the requirements set out below. The institution can demonstrate an absolute or relative reduction in scope 1 and 2 carbon emissions in the period from either 1990 or 2005, to 2008. The institution can identify projects that will produce an absolute reduction in carbon emissions by 2020.	The institution will have a carbon management plan which fully meets the requirements set out below by 31 March 2011. The institution can demonstrate an absolute or relative reduction in scope 1 and 2 carbon emissions in the period from either 1990 or 2005, to 2008. The institution can identify projects that will produce an absolute reduction in carbon emissions by 2020.	The institution will have a carbon management plan which fully meets the requirements set out below by 31 March 2011. The institution cannot demonstrate an absolute or relative reduction in scope 1 and 2 carbon emissions from either 1990 or 2005 to 2008.	The institution is formulating a carbon management plan and cannot demonstrate an absolute or relative reduction in scope 1 and 2 carbon emissions from either 1990 or 2005 to 2008.
	Assessment (mark appropriate box)				

The requirements of a carbon management plan are:

- a. A carbon management policy or strategy – this could be part of a wider environmental/sustainability policy.
- b. A carbon baseline for 2005 which covers all scope 1 and 2 emissions. Institutions are encouraged to measure a baseline for scope 3 emissions, and in the longer term we would expect these to be included.
- c. Carbon reduction targets. These must:
 - cover scope 1 and 2 emissions, but institutions may choose to set additional targets for scope 3 emissions

- be SMART (specific, measurable, achievable, realistic and time-bound)
 - be set against a 2005 baseline. Institutions may chose to set their reductions in context by setting additional targets against an alternative baseline year
 - be set to 2020, because this is the timescale for interim government targets. Institutions may also set interim milestones
 - be publicly available.
- d. An implementation plan to achieve carbon emission reductions in scopes 1, 2 and 3 including timescales and resources. These should cover capital projects and actions to embed carbon management within the institution, for example, through corporate strategy, communication and training.
- e. Clear responsibilities for carbon management.
- f. A commitment to monitor progress towards targets regularly and to report publicly annually.

The carbon management plan, including targets, must be signed off by the governing body.

11.7 Appendix G - ICSD Sustainable IT - Electricity and Carbon Management

Executive Summary

The Sustainable IT carbon management plan provides an analysis and evaluation of current ICT energy usage, existing/potential energy saving initiatives & forecasts energy usage up to 2020. The IT carbon management plan pulls in information from a number of stakeholders, including:

- ICSD facilities (e.g. data center equipment, networking & telephony)
- Print Unit facilities (SSPC printers/MFD's)
- Academic / Professional Services usage. (Desktops, laptops & some research HPC facilities)

Current Estate (Aug 2010)³

- Approximately 5000 desktop/laptop computers.
- An advanced 'gigabit to the desktop' network with VOIP phones.
- Approximately 400 central servers.
- 1810 print/copier devices
- Many departmental high performance computing (HPC) systems supporting research

Category	Energy Use (kWh/y)	%	Energy Cost (£/y)	CO ₂ emissions (kg/y)	Notes
HPC	946,080	19.3%	113,530	508,064	HPC from Laver datacentre only ⁴
Servers	634,662	12.9%	76,159	340,826	Accurate reading based on meters
PCs	1,620,420	33.0%	194,450	870,198	Based on Network device count
Networks	748,980	15.3%	89,878	402,217	Based on network device count
Telephony	0	0.0%	0	0	N/A – modern phones run over Network instead
Imaging	791,402	16.1%	94,968	424,999	Based on audit numbers from SSPC project
AV	166,023	3.4%	19,923	89,157	Estimate based on AS Learning Spaces supported equipment.
TOTAL	4,907,567	100%	588,908	2,635,462	~306 kWh/y per student

³ Audit based on Suste IT Carbon foot printing tool http://www.susteit.org.uk/files/files/22-SusteIT_Energy_&Carbon_Footprinting_Tool_Aug_2009.xls

⁴ Figures for HPC & Servers are taken from sustainability tracking spread sheet.

These results compare well to our competitors. From the Suste IT audits - Sheffield use 8,680,806kWh/y (433kWh/y per student) and Loughborough use 3,567,959 kWh/y (319kWh/y per student).⁵

⁵ http://www.susteit.org.uk/files/files/27-ICT_Energy_Footprint_Tool_Results_Master_27.xls

Energy saving initiatives

In January 2009, JISC published a report into Sustainable ICT in Further & Higher Education⁶. Since then good progress has been made within the University towards adopting its recommendations.

Work completed	Description	kWh/y savings	Funding Source
Datacentre Consolidation/Virtualisation	Virtualisation of existing & new systems have provided significant sustainability savings & improved business continuity planning.	240,000	Central computing server maintenance/replacement budgets
Thin client computing trial	75 thin clients are in use as a trial.	12,500	AS PC replacement budget
Datacentre air-conditioning work	Variable speed controllers have been installed to reduce the power consumption of the air handling units	175,200	Salix funded project
Total		427,700	

On-going Initiatives	Saving	Risks	kWh/y savings	Funding Source
Thin client computing	~60 watts per desktop converted.	Not appropriate for all users. Difficult to provide a centrally managed desktop image.	175,200-350,400	PC replacement budget
Datacentre Consolidation/Virtualisation	Further 50% of Server power usage by consolidating some of the tier 1 applications (e.g. email, databases, web)	Some software vendors still slow to support server virtualisation.	240,000	Central computing server maintenance/replacement budgets
Staff Student Print & Copy projects	Reduction of printer devices from 1810 to ~ 300 MFD devices. Estimated 50% energy savings	Problems providing enough devices to provide print services across campus. User acceptance.	400,000	Zero cost project. Funded on a per-click basis.
Datacentre hot-cold aisle containment	Improved efficiency of air-conditioning	N/A	9000	Zero cost project.
Total			999,400	

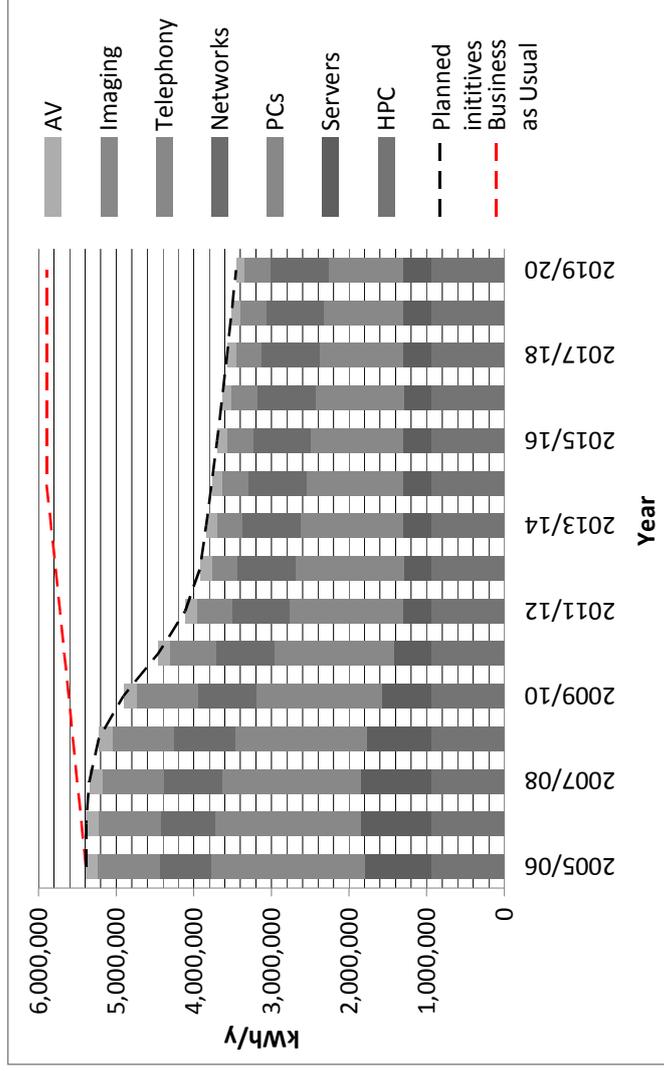
⁶ http://www.susteit.org.uk/uploads/DOCS/55-SustainableICTreport_final.pdf

Potential opportunities	Potential Saving	Risks	kWh/y savings	Funding Source
Initiative				
Use of standardised PC's with high efficiency parts	Typical Energy Star 5.0 PC's are ~ £10 per year cheaper to run than a 'standard' PC. ⁷	N/A	Already in place for AS – PC procurement to be looked at by IT CAT for university wide roll-out of standards. Difficult to quantify current numbers of non Energy Star 5 PC's	Standard PC replacement budget.
Provide HPC facilities as a university wide research resource	Energy savings can be made through the provision of efficient air-conditioning in a single location rather than the current ad-hoc cooling arrangements	HPC work typically needs to be located near to researchers due to the large quantities of data transferred during processing. Some researchers may still need processing power in their own buildings.	Approximately 200,000	Salix fund.
Adopt power-down savings on staff desktops	Currently unknown. Other institutions have claimed savings of ~£300K ⁸	May interfere with some research work. An opt-out system would need to be adopted. £300k seems optimistic.	210,000 per 250 desktops that are successfully turned off overnight.	Salix fund.
Desktop Video Conferencing (Office Communicator)	Minimise travel between the three campuses	Difficult to quantify savings.	CO2 savings from reduced travel rather than saved power.	Zero cost project (costs rolled into Microsoft Campus agreement.)
Low power PC's for LCD displays	Replacement of standard PC's with low power devices for driving LCD displays	Not suitable for all areas.	43,000 (based on 100 devices)	Salix fund

⁷ <http://www.dell.com/downloads/global/products/optix/en/dell-client-energy-calculator-en.pdf>
⁸ <http://www.datasynergy.co.uk/casestudies/pdfs/LiverpoolCaseStudyMay2009.pdf>

Projected Savings

While the university is still expanding, the market is already working to reduce the energy consumption of ICT devices. Adopting a business as-usual strategy, it is believed ICT energy consumption would stay roughly level. Adopting the current initiatives would produce a ~20% saving over the next 10 years. There may be further room for improvement as technology continues to evolve, but it is difficult to forecast beyond 3-5 years.



Assumptions:

- For the 'business as usual scenario' we have assumed a 1% growth per year until 2015, which then stabilises. (As per the University Carbon Management Plan)
- We have assumed HPC usage will remain at the current level. HPC usage is closely linked to the performance of sciences at Exeter and is difficult to forecast.
- We have assumed a 5% improvement per year for PC's due to more modern hardware.
- The network/ telephony power usage predictions are based on the completed Network Upgrade (NUP state, not the current mixed economy. This is likely to be refreshed in 2015-2017 but is difficult to forecast any improvements in power consumption then. Recent building works mean the

network size will increase by 40%, but it is hoped device rationalization will balance this out. A similar rationalization exercise in Plymouth University resulted in a 30% decrease in network switches.

- Figures for AV, imaging, networks & PC's; 2006-2009 are estimates only.

Sustainability audit results and Sustainability tracking spread sheet available from ICSD on request.