

Carbon Management Plan 2005 - 2020

Estates and Facilities
Version: 6.8.2

Date: 13 June 2018

Version number: v6.8.2

Owner: Environmental and Sustainability Manager

Approval route: Project Sponsor (Director of Estates and Facilities)
Management Board

Approval status: Approved

Latest Revision v.6.8.2 (27.01.2020): Change references from Southampton Solent University to Solent University

Contents

| | |
|--|----|
| Foreword from the Vice Chancellor | 6 |
| Foreword from the Carbon Trust..... | 7 |
| Management Summary..... | 8 |
| Baseline and Targets | 9 |
| Projects..... | 10 |
| Summary..... | 11 |
| 1. Introduction | 12 |
| 1.1 Purpose of the Carbon Management Plan | 12 |
| 1.2 Background to the Carbon Management Programme | 12 |
| 2. Carbon Management Strategy..... | 13 |
| 2.1 Context | 13 |
| 2.2 Drivers | 15 |
| 2.2.1 Social Responsibility | 16 |
| 2.2. 2 Reputation | 16 |
| 2.2.4 Funding issues..... | 17 |
| 2.2.5 Legislation | 18 |
| 2.2.6 Building Regulations..... | 18 |
| 2.2.7 Energy Performance of Buildings Directive (EPBD) | 18 |
| 2.3 Our Low Carbon Vision..... | 21 |
| 2.4 Targets and Objectives | 21 |
| 2.5 Strategies..... | 22 |
| 3. Emissions Baseline and Projections..... | 24 |
| 3.1 Scope..... | 24 |
| 3.2 Baseline..... | 24 |
| 3.2.1 Compilation of Baseline Data..... | 24 |
| 3.2.2 Estimate of Emissions | 26 |

| | |
|---|----|
| 3.2.3 Building Emissions | 26 |
| 3.2.4 Waste and Water Related Emissions | 27 |
| 3.2.5 Fleet Vehicle Emissions | 28 |
| 3.2.6 Business Travel Emissions..... | 28 |
| 3.3 Business as Usual: Value at Stake Projections..... | 29 |
| 4. Carbon Management Projects..... | 32 |
| 4.1 Shortlisting of emission reduction opportunities | 32 |
| 4.2 Existing and Early Start Projects..... | 32 |
| 4.3 Planned Projects | 33 |
| 4.4 Near Term Projects..... | 34 |
| 4.5 Medium to Long Term Projects | 35 |
| 4.6 Projected Achievement Toward Target | 36 |
| 4.7 Additional opportunities for carbon reductions | 37 |
| 5. Implementation Plan financing | 38 |
| 5.1 Assumptions..... | 38 |
| 5.2 Financial Benefits..... | 39 |
| 5.3 Unquantified benefits..... | 39 |
| 5.4 Financial costs and sources of funding | 40 |
| 5.5 Financial Management | 40 |
| 6. Actions to Embed Carbon Management in the University | 41 |
| 6.1 Policy..... | 41 |
| 6.2 Responsibility | 42 |
| 6.3 Data Management | 42 |
| 6.4 Communication and training | 43 |
| 6.5 Policy Alignment | 44 |
| 6.5.1 Environmental Policy | 44 |
| 6.5.2 Energy Policy | 44 |
| 6.5.3 Travel and Transport Policy | 44 |
| 7. Management of the Programme | 46 |

| | |
|--|----|
| 7.1 Strategic ownership of the programme - the Low Carbon Group..... | 46 |
| 7.2 The Carbon Management Team - delivering the projects..... | 46 |
| 7.3 Student and Staff initiatives | 47 |
| 7.4 Succession planning for key roles | 47 |
| 7.5 Annual Progress review..... | 48 |
| 7.6 Ongoing stakeholder management | 48 |
| APPENDIX A - DEFINITION of PROJECTS | 50 |

Foreword from the Vice Chancellor



I am delighted to introduce the Carbon Management Plan for Solent University.

When this plan was conceived, it was recognised that there was a need to make progress with embedding carbon management into the workings of the University. I am pleased to report that we have achieved considerable success, reflected in the implementation of numerous carbon and waste reduction projects, and a range of behavioural change initiatives.

The University's community has shown increasing awareness of the importance of sustainability, and has enthusiastically engaged in many carbon-reducing activities, such as the Green Impact programme, Green Week, Blackout and Student Switch-Off.

A detailed Environmental and Sustainability Strategy now provides a route-map to our wider environmental performance goals, and a comprehensive Environmental Management System is in operation.

However, there is still much work to do. With an expanding Estate offering exciting new facilities and extended opening hours, achieving the ambitious target - a 33% reduction in carbon dioxide (CO₂) emissions by 2020 - remains a considerable challenge.

The University and its stakeholders will continue to play a vital role in its drive to reduce carbon emissions and work toward a sustainable future.

I hope you will do all you can to support this plan and ensure we achieve success.

A handwritten signature in black ink that reads 'Graham Baldwin'.

Professor Graham Baldwin

Vice-Chancellor

Foreword from the Carbon Trust

Cutting carbon emissions as part of the fight against climate change should be a key priority for Higher Education Institutions - it's all about getting your own house in order and leading by example. The UK government has identified the university sector as key to delivering carbon reduction across the UK inline with its Kyoto commitments and the Higher Education Carbon Management programme is designed in response to this. It assists universities 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.

Solent University was selected in 2008, amidst strong competition, to take part in this ambitious programme and partnered with the Carbon Trust in order to realise substantial carbon and cost savings. This Carbon Management Plan commits the University to a target of reducing CO₂ by 33% by 2020 in absolute terms from a baseline year of 2005/06.

If the University takes no action (business as usual or BAU) it will see an increase in emissions and so the reduction target relative to BAU is 39%. This underpins potential financial savings over BAU to the University of around £6.7 million by 2020.

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 Solent University in their ongoing implementation of carbon management.



Richard Rugg

Head of Public Sector, Carbon Trust



Management Summary

This Carbon Management Plan represents the culmination of the initial work undertaken by the University in collaboration with the Carbon Trust, as part of the *Higher Education Carbon Management Programme*.

By participating in the programme, the University will make significant strides towards reducing the impact that its activities have on the environment and contribute to local and national commitments to reduce emissions of carbon dioxide (CO₂).

The University's Low Carbon Vision:

Solent University is committed to being an environmentally responsible institution that uses energy efficiently minimises waste and works conscientiously to reduce year-on-year carbon emissions.

In addition to reducing carbon dioxide emissions, there are several **key drivers** that provide major incentives for the University to implement a comprehensive programme of carbon management and emission reduction:

- **Rising Energy Costs:** In the financial year 2008/09, the University spend on energy used in buildings was **£1,728,751**, having risen from £1,332,930 in 2005/06, almost a 30% increase. Energy costs in recent years have been volatile and the upward unit price trend will undoubtedly continue. There is an opportunity to achieve significant cost savings by reducing emissions.
- **HEFCE funding:** the University has been involved in recent HEFCE consultations on proposals for HE sector carbon management targets. It is now clear that HEIs will need to be fully committed to reducing carbon emissions and have Carbon Management Plans in place to meet stringent targets, or face funding penalties. In January 2010 the Higher Education Funding Council for England (HEFCE) published its Carbon Reduction Target and Strategy for Higher Education in England policy statement. A key requirement is for institutions to set their own targets for 2020 for scope 1 and 2 emissions¹ against a 2005 baseline. The strategy includes funding incentives - in particular HEFCE will link capital funding to performance against carbon management plans.
- **Legislation:** A raft of recent legislation has culminated in the government's Low Carbon Transition Plan (2009), which provides a route map for the UK to meet specific government targets - namely *a 34% cut in absolute emissions by 2020 and*

¹ The World Resource Institute developed a classification of emission sources around three 'scopes': 'scope 1' emissions are direct emissions that occur from sources owned or controlled by the organisation, for example emissions from combustion in owned or controlled boilers/furnaces/vehicles; 'scope 2' accounts for emissions from the generation of purchased electricity consumed by the organisation; 'scope 3' covers all other indirect emissions that are a consequence of the activities of the organisation, but occur from sources not owned or controlled by the organisation – for example, commuting and procurement.

80% by 2050 (against 1990 levels). The University needs to be mindful of these challenging reduction targets and able to make a significant contribution.

- **The CRC carbon trading scheme:** The University will be legally required to participate in the UK Carbon Trading scheme from April 2010. This will have significant financial implications.
- **Reputation:** the Higher Education sector is increasingly aware of the need to demonstrate positive environmental credentials. League tables indicating environmental and sustainability awareness are now published widely. CRC league tables will be published from 2011.
- **Social and community responsibilities:** By taking early positive action, Solent University has the potential to make a major contribution to improvements in the environment, both on campus and in the wider community.

This Carbon Management Plan sets out the University's approach to tackling its carbon emissions during the first 5 years of implementation, from 2009/10 to 2013/14.

The opportunities included in this initial plan are by no means exhaustive; as work progresses, some projects will be refined and more opportunities will undoubtedly be identified.

Opportunities relate not only to carbon emission reductions and financial savings. The plan could offer opportunities to extend the University's involvement with the wider community, to provide learning and teaching opportunities and to bring about a greater awareness of the challenges that are faced in the future.

This plan should be considered as a continuous work-in-progress, to be updated annually and as additionally required.

Baseline and Targets

The University's Carbon Reduction Target:

Solent University will set a target of reducing CO₂ emissions by 33% (below the 2005/06 baseline level) by the end of 2020.

The University's carbon baseline has been calculated using data from the 2005/06 financial year. **The baseline carbon footprint of the University in this period was 8,425 tonnes of CO₂.** The baseline figure includes emissions from electricity, geothermal, gas, water, fleet transport and waste collected and sent to landfill. Assumptions included in the calculation of this figure are discussed in the main body of the plan.

| EMISSIONS BY SOURCE | Mains Electricity | Geothermal | Gas | Waste Sent to Landfill | Water Usage | Fleet Transport | Total |
|---------------------------|----------------------|------------|-----|------------------------------|----------------|--------------------|-------|
|---------------------------|----------------------|------------|-----|------------------------------|----------------|--------------------|-------|

| | | | | | | | |
|--|-------|-------|------|------|------|------|--------------|
| Tonnes of CO₂ (tCO₂e) | 5,960 | 1,101 | 665 | 616 | 36 | 47 | 8,425 |
| % of emissions | 70.8% | 13.1% | 7.9% | 7.3% | 0.4% | 0.6% | 100% |

The largest source of emissions is from the use of energy in buildings, accounting for 92% of the University's carbon footprint. This will therefore provide the main focus for carbon reduction measures. Of the other contributory factors, waste sent to landfill is the largest component with a contribution of 7%. A small vehicle fleet and the emissions attributable to provision of water to the sites make up the remaining 1%.

Emissions will be dealt with by a series of carbon reduction projects which are discussed briefly below and in more detail later in this document.

Projects

Successful implementation of this Carbon Management Plan will produce both substantial financial savings and CO₂ reductions. At the core of the plan are the carbon reduction projects. They represent a sound investment for the University by lowering energy costs year-on-year, reducing the risks from volatile energy markets and by helping to protect the University's operating environment.

A number of the projects listed in this plan have already been initiated, or will be introduced soon, using funding resources already available. Medium and longer term projects have also been identified and the business case for these projects will be further tested, to ensure that those with the best potential are given priority.

It should be noted that many carbon-reducing projects will need to be undertaken in any event; for example, there is a need to replace obsolete air conditioning units, lighting and gas boilers. Bringing forward such projects will result in earlier savings on fuel costs. Projects include:

- Introducing automatic sub-metering of electricity, gas, water and geothermal
- Improving building thermal performance by insulation, lagging and draught-proofing
- Upgrading lighting and installing automatic sensors and controls
- Installing, improving and extending Building Management Systems
- Improving building utilisation to reduce unnecessary energy use
- Behavioural change and awareness raising activities amongst students and staff
- Reducing waste sent to landfill

Project lists appear in the main body of this plan and more detailed information for each project can be found in Appendix A

Estimated costs and savings of the projects already identified are shown in the table below:

| Carbon Management Plan Projects - Estimated Costs and Savings by year | | | | | |
|---|---------|---------|---------|---------|---------|
| | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 |
| Annual cost saving* (£) | 87,706 | 89,115 | 58,561 | 120,586 | 65,680 |
| Cumulative saving in year** (£) | 87,706 | 176,821 | 235,382 | 355,968 | 421,648 |
| Annual CO ₂ saving* (tonnes) | 403.4 | 543 | 299 | 528 | 361.4 |
| % of target achieved | 14.5 | 19.5 | 10.8 | 19.0 | 13.0 |
| Cumulative % of target achieved | 14.5 | 34.0 | 40.8 | 59.8 | 72.8 |

The potential cumulative saving from successfully implementing all projects by the end of 2020 is **£2,013,000**.

Summary

This plan sets an ambitious target, which will require a sustained collaborative effort to achieve. The plan has been revised to meet with HEFCE's requirements as detailed in the 'Carbon Reduction Target and Strategy for Higher Education in England' Statement of Policy. A key requirement is for institutions to set their own targets for 2020 for scope 1 and 2 emissions against a 2005 baseline. The Policy sets a Sector target of 50% emissions reduction by 2020 against 1990 - equivalent to 43% reduction against a 2005 baseline.

Solent University will continue to develop their Estates and other operational strategies and work towards meeting this HEI sector target. This revised plan raises the University's target from 25% for the 5 year period 2008/09 - 2013/14, to 33% by 2020, against a baseline of 2005.

The University is confident that, given adequate funding, projects introduced over the initial five year period of the plan can achieve 72% of this target by 2014 - a reduction against the baseline of 2170 tonnes of CO₂. It is hoped that this plan will not only result in the initiation of a range of projects for carbon reduction, but also begin the process of firmly embedding a low carbon culture throughout the University.

During the course of this plan, it is likely that there will be significant changes to the University Estate which may affect the longer term aspects of this plan. It should be borne in mind that major changes will also provide major opportunities to further embed principles of carbon management - and offer more opportunities for achieving carbon reductions and financial savings.

In any development plan, affordable funding should be provided when carbon savings can be demonstrated. Investment in carbon saving measures will be an investment in the future of the University.

1. Introduction

1.1 Purpose of the Carbon Management Plan

This plan is a key deliverable from Solent University's collaboration with the Carbon Trust in Phase 5 of the Higher Education Carbon Management Programme.

The plan introduces a systematic approach to reducing the University's carbon emissions over an initial five year period. It illustrates the carbon reductions and financial savings following from specific actions and provides a framework for carbon management across the University estate. Sources of carbon emissions are detailed and a baseline established against which progress can be measured.

The University's vision for carbon management is discussed and opportunities identified by which the University can significantly reduce emissions. Some measures can be initiated quickly; others will require more detailed consideration and funding commitment before progressing. By a process of applying regular updates, the plan will provide a rolling programme of actions reaching beyond the initial five year timescale.

Preparing and implementing this Carbon Management Plan will provide a fresh impetus for reducing emissions and establishing energy conservation as a routine activity amongst students and staff.

This Carbon Management Plan has been revised to meet The Higher Education Funding Council for England's (HEFCE) requirements detailed in the Carbon Reduction Target and Strategy for Higher Education in England (January 2010/01). A key requirement is for institutions to set their own targets for 2020 for scope 1 and 2 emissions² against a 2005 baseline. The strategy includes funding incentives - in particular HEFCE will link capital funding to performance against carbon management plans.

The University's original Carbon Management Plan was a 5 year plan using 2008/09 as a base year and was approved for implementation in 2010.

1.2 Background to the Carbon Management Programme

Solent University is fully committed to reducing the environmental impact of its activities and recognises the need to demonstrate this commitment by continuously improving environmental performance. In 2007 the University produced its first Environmental Policy incorporating targets for carbon reduction. At the same time, an assessment of opportunities for carbon reduction was undertaken with the Carbon Trust. In 2008 an Environmental and Sustainability Manager was appointed to assist in accelerating the University's carbon reduction and sustainability agenda. Soon afterwards, an application was made to join Phase 5 of the Carbon Trust Higher Education Carbon Management

² The World Resource Institute developed a classification of emission sources around three 'scopes': 'scope 1' emissions are direct emissions that occur from sources owned or controlled by the organisation, for example emissions from combustion in owned or controlled boilers/furnaces/vehicles; 'scope 2' accounts for emissions from the generation of purchased electricity consumed by the organisation; 'scope 3' covers all other indirect emissions that are a consequence of the activities of the organisation, but occur from sources not owned or controlled by the organisation – for example, commuting and procurement.

(HECM) programme; the University was accepted onto the programme commencing in April 2009.

The Carbon Trust is an independent government funded body, with extensive experience of assisting universities and public bodies to cut carbon emissions; it was considered that the Trust's expertise would be invaluable in guiding Solent University through the process of systematically reducing its "carbon footprint" - the amount of carbon dioxide (CO₂) produced from activities including energy use in buildings, transport, waste disposal and water supply.

The HECM programme has also provided ongoing opportunities for closer collaboration with colleagues both in and beyond the HE sector and facilitated the adoption of a structured approach to implementing a programme of carbon reduction projects.

2. Carbon Management Strategy

2.1 Context

Climate change is now acknowledged as a real and measurable threat - one of the greatest challenges for modern society. After decades of research, much is now established beyond reasonable doubt; the world is warming and this is substantially due to emissions of greenhouse gases (GHG), particularly carbon dioxide (CO₂).

The Intergovernmental Panel on Climate Change (IPCC) suggests that human activity is substantially responsible: "most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic GHG concentrations". (http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf)

Climate change is already having measurable effects, including rising temperatures, higher sea levels and more frequent extreme weather events. The 1990s was the warmest decade in central England since records began in the seventeenth century and UK coastal waters have warmed by about 0.7 degrees Celsius over the past three decades. Average sea level around the UK is now about 10 cm higher than it was in 1900. Globally, the average temperature of the atmosphere near the earth's surface has risen by 0.74 degrees Celsius since 1900. Eleven of the twelve hottest years on record occurred between 1995 and 2006. The scientific consensus is that global temperatures could rise between 1.1 and 6.4 degrees above 1980-1999 levels by the end of the 21st century; the exact amount depends on the levels of future greenhouse gas emissions, as illustrated in Chart 1.

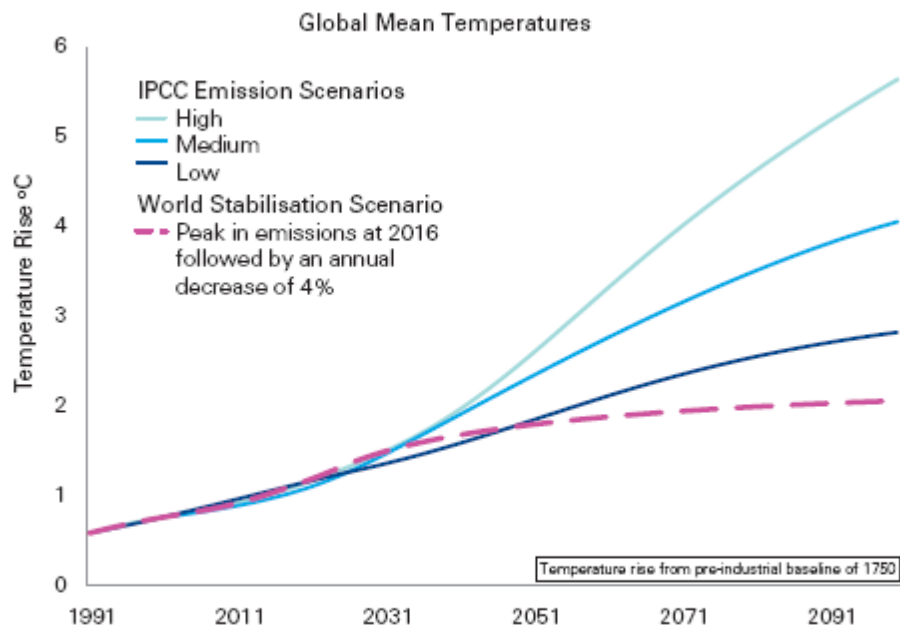
Global sea levels could rise up to 60 cm by the end of the century, with millions of people in low-lying areas at risk from flooding. Changes in rainfall and temperature will affect many animal and plant species around the world. If global temperatures rise by two degrees Celsius, 30% of all land-living species will be at increased risk of extinction.

The potential costs of climate change are huge, as the Stern Review on the economics of climate change indicates. Lack of effective early action could cost between 5% and 20% of global GDP year-on-year (now regarded by Stern as an underestimate); avoiding the worst

impacts of climate change by reducing emissions might be achieved for only 1% of global GDP each year.

Chart 1

Global mean temperature rise



Source: UKCP09 (2009) Temperature profiles for each of the emissions scenarios in chart 2. All non-mitigation scenario temperatures are rising in 2100 while the mitigated CCC scenario stabilises at around 2°C.

As temperatures increase and rainfall patterns change, crop yields are expected to drop significantly in Africa, the Middle East and India. Water availability for irrigation and drinking will be less predictable. Salt from rising sea levels may contaminate underground fresh water supplies in coastal areas and droughts are likely to be more frequent. Up to three billion people could suffer water shortages by 2080.

With rising temperatures, diseases will shift to different areas. For example, it is predicted that 290 million additional people could be exposed to malaria by the 2080s. Large areas of Brazilian and central African rainforest may be lost if climate change results in reduced rainfall; these forests absorb large amounts of carbon dioxide that would otherwise be released into the atmosphere.

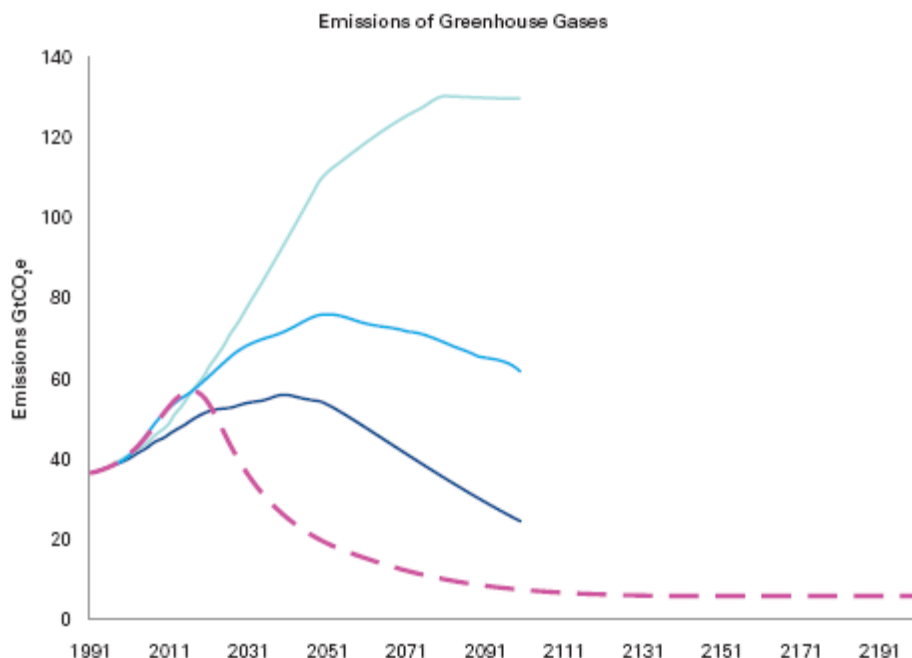
Many studies suggest that the disintegration of the polar ice sheets, which will raise sea levels by several metres, can only be avoided by a radical reduction of CO₂ emissions.

However, it is considered that early action can mitigate many of these effects; Charts 1 and 2 from the UK Low Carbon Transition Plan provide some illustration of the effect of emissions on global mean temperature. The IPCC also states that “there is high agreement and much evidence that all stabilisation levels assessed can be achieved by deployment of

a portfolio of technologies that are either currently available or expected to be commercialised in coming decades...”

Chart 2

Global emissions of greenhouse gases



Source: UKCP09 (2009) Emissions from the three non-mitigations scenarios used in UKCP09 (green, blue, navy) and a mitigation scenario from the CCC (dashed pink) aimed at limited global temperature change to around 2°C above pre-industrial levels

4 'The Stern Review of the Economics of Climate Change', 2006. Available at: http://www.hm-treasury.gov.uk/stern_review_report.htm

5 Comments made at the Copenhagen Climate Summit, March 2009.

6 These challenges are described in some detail in 'Carbon Valuation in the UK Policy Appraisal: A Revised Approach' DECC (July 2009), which sets out the Government's new approach to valuing carbon in policy appraisal. <http://www.decc.gov.uk>

With a direct annual spend of over £200M, the UK Higher Education sector is a significant user of energy and hence emitter of CO₂.

Climate change should be of immediate concern to any HEI. Due to the nature and influence of HEIs, action taken in the sector may also have much more widely ranging positive impacts. Many HEIs have already increased their focus on sustainable development and environmental management; drivers for this focus have included legislation, rising energy costs, increased stakeholder awareness and ethical and reputational considerations. These and other drivers are discussed in more detail below.

2.2 Drivers

A range of drivers has contributed to Solent University's decision to participate in the Higher Education Carbon Management Programme. As well as the overall impact the University has on the wider environment, there are also social, legislative, regulatory, financial and political drivers that affect the University.

2.2.1 Social Responsibility

The University's actions have an impact on campus and also on the wider community. It is important that the University recognises the need to raise awareness of 'good practice' in carbon management and encourage the associated behavioural change necessary to achieve this amongst its staff and students. Increased awareness and education in matters of energy usage will not only provide a direct reduction of the University's emissions, but will also have a significant effect on reducing the personal carbon footprint of staff and students.

2.2. 2 Reputation

There is an increasing public awareness of environmental issues. The development of a sound environmental reputation could have a significant impact on the University's future success in student and staff recruitment and retention. The reputation and standing of the University in the community will be enhanced by demonstrating an effective approach to environmental and sustainability issues.

Many league tables, awards and certificates for environmental performance are now subject to wide public scrutiny. The Carbon Reduction Commitment (discussed below) will include publicly available league tables of performance of all participants; the People and Planet Green League of environmental performance of UK Universities receives wide publicity and is published yearly by Times Higher Education. Display Energy Certificates indicating energy performance now have to be displayed in all larger publicly accessible buildings.

The University will undoubtedly find increasing pressure to develop and promote its environmental credentials; the Higher Education Carbon Management programme and implementation of the Carbon Management Plan will assist in this process.

2.2.3 Financial considerations

Volatile energy markets persist and the underlying trend is for costs to rise. The University's fuel bill is currently in excess of £1.7 million per annum and has been increasing year-on-year. With diminishing stocks of fossil fuels threatening both the price and stability of supply, it is essential to contain energy costs by ensuring that all energy is used as efficiently as possible; a programme of effective carbon management is therefore indispensable. In addition to the potential for rising fuel costs, there are other pressing financial reasons for the University to reduce energy use. The CRC Energy Efficiency scheme is the UK's mandatory climate change and energy saving scheme, due to start in April 2010. It is a carbon trading scheme, central to the UK's strategy for improving energy efficiency and reducing carbon dioxide emissions.

Solent University will participate in the scheme along with approximately 5000 other UK businesses, and will have to measure, record and report energy use and annual CO₂ emissions.

The University will have to purchase allowances for emissions - at an initial price expected to be £12/tonne of CO₂. We will be able to trade these allowances with other participants.

We must surrender allowances equivalent to our emissions to the Scheme Administrator at the end of the year.

A performance league table of all participants will be produced and the money raised from the sale of allowances will be redistributed dependent on the league table position. Each organisation will therefore receive a different amount than originally paid for their allowances, according to their performance during the year. **The costs to the University could be significant and directly linked to the success or otherwise of its energy saving/emission reducing measures.**

There will be an introductory phase of the CRC from April 2010, with fixed price sales of allowances from April 2011. From April 2013, there will be a sale of allowances each year via an auction. The government will limit (cap) the total number of allowances available each year to ensure that overall emissions fall.

2.2.4 Funding issues

The Higher Education Funding Council for England (HEFCE) is taking an increasingly active role in driving a low carbon and sustainability agenda in the HE sector.

The government has mandated HEFCE to promote sustainable development actively and to reflect this in its funding for Universities. The recent HEFCE consultation document states that *“Institutions will be required to have carbon management plans and performance against these plans will be a factor in capital allocations from 2011, as requested by the Secretary of State for Innovation, Universities and Skills in HEFCE’s 2009 grant letter.”*

The consultation document also states that Carbon Management Plans will include *“a carbon baseline and targets; an implementation plan with resources allocated; a commitment to monitor progress towards targets regularly and to report publicly annually; and for the plan to be signed off by the governing body”*.

An additional proposal is that the higher education sector *“commits to reducing ... emissions by 80 per cent by 2050 and by at least 34 per cent by 2020, against a 1990 baseline ... and aspires to reduce ... emissions by 50 per cent by 2020 and by 100 per cent by 2050, against 1990 levels”*

In January 2010 the Higher Education Funding Council for England (HEFCE) published its Carbon Reduction Target and Strategy for Higher Education in England Statement of policy. A key requirement is for institutions to set their own targets for 2020 for scope 1 and 2 emissions³ against a 2005 baseline. The strategy includes funding incentives - in particular HEFCE will link capital funding to performance against carbon management

³ The World Resource Institute developed a classification of emission sources around three ‘scopes’: ‘scope 1’ emissions are direct emissions that occur from sources owned or controlled by the organisation, for example emissions from combustion in owned or controlled boilers/furnaces/vehicles; ‘scope 2’ accounts for emissions from the generation of purchased electricity consumed by the organisation; ‘scope 3’ covers all other indirect emissions that are a consequence of the activities of the organisation, but occur from sources not owned or controlled by the organisation – for example, commuting and procurement.

plans. The University completed a submittal form under the Capital Investment Framework 2 (CIF2) in October 2010. Adoption of this revised Carbon Management Plan will allow the University to achieve a higher score for the Carbon Reduction element of the submission.

These proposals provide another strong driver for the University to adopt and implement an effective Carbon Management Plan.

2.2.5 Legislation

A legislative framework has been developed in recent years to effect a substantial reduction of Greenhouse Gas emissions by the UK. Recent bills with considerable importance for further emission reductions include the Energy Act 2008, the Climate Change Act 2008, the Planning Act 2008 and the Planning and Energy Act 2008; these have been supplemented this year by a further draft legislative programme. The financial implications of the mandatory Carbon Reduction Commitment trading scheme have already been mentioned.

The raft of policies and legislation has been drawn together by the UK government's **Low Carbon Transition Plan** of 2009, which provides a route map for the UK to meet the new government targets - namely **a 34% cut in emissions by 2020 and 80% by 2050** (against 1990 levels).

2.2.6 Building Regulations

Building Regulations are becoming increasingly stringent in respect of effective control of emissions by buildings and associated plant, both in new build and refurbishments. Proposals relating to Part L of the Building Regulations for 2010 include wide ranging changes aimed at reducing carbon emission levels and an increased focus on energy efficiency.

2.2.7 Energy Performance of Buildings Directive (EPBD)

The Energy Performance of Buildings Directive (EPBD) is legislation applicable in all EU member states, promoting the improvement of energy performance of buildings through cost effective measures. EPBD demands that all larger public buildings have a Display Energy Certificate (DEC) shown in a prominent position within the building; the certificate provides users with a simple visual indication of the energy efficiency of the building and must be renewed annually.

EPBD also specifies mandatory inspections to ensure that air conditioning systems are carefully managed and maintained in order that they do not consume excessive energy. Recent proposals suggest that EPBD requirements will become increasingly onerous.

2.2.8 Waste management

UK legislation is becoming increasingly stringent in the area of waste management, driven by European Directives. This will have a growing impact on the University. The Landfill Allowances Trading Scheme, the landfill tax escalator and obligations on producers in

relation to packaging and Waste Electrical and Electronic Equipment are designed to drive the management of waste up the “waste hierarchy”. The University needs to be prepared to meet growing regulatory challenges in waste management and actively investigate a wide range of options for reduction, reuse and recovery (recycling, composting, energy from waste), with disposal in landfill being the least preferred option.

| Carbon Management Drivers | | | |
|---------------------------|---|---|--|
| Driver Category | Example | Nature of Impact | Consequences/ opportunities/ issues for carbon management |
| Political | HEFCE consultations | Potential for funding cuts | Proposals to link HEFCE funding with sustainability criteria - financial implications are an incentive for improved environmental performance |
| Economic | Volatility of energy market | Increasing energy bills | Lower consumption and reduced reliance on fossil fuels lessens exposure to market volatility and brings financial benefits |
| Ethical and Aspirational | Corporate Social Responsibility, Environmental Credentials | Reputational - staff, students and community expectations | Success improves University reputation and status, failure may affect student/staff recruitment and retention and standing in the community |
| Legislative | CRC - UK Carbon trading scheme | Financial and reputational | Costs could be substantial unless reductions in energy use are achieved |
| Legislative | Energy Performance of Buildings Directive | University buildings >1000m ² require a Display Energy Certificate (DEC) | Carbon performance is calculated and displayed for building users; Air Conditioning Inspection required; opportunity to assess aspects of building performance |
| Legislative | Building Regulations | Stricter design controls for refurbishment & construction | Increased initial cost, requirements for compliance - incentives for life-cycle analysis of building energy performance and improved design and project planning |
| University Policies | Environmental Policy | Policy statements to be carried out | Energy reduction targets to be revised; actions to be determined |
| Reputational | People and Planet League Table; CRC league table | Environmental performance ranked in widely published league tables | Good performance in league tables provides evidence of University action and awareness and will have positive reputational benefits |
| Reputational | Perception of environmental performance by potential students & the community | Improved image can enhance recruitment | Increased awareness of climate change offers opportunities to provide leadership and enhance University reputation as a pro-active member of community |
| Reputational | Teaching and research | Improved image can enhance recruitment | Staff expertise used to integrate environmental awareness into courses, provide assignments and projects for students |

2.3 Our Low Carbon Vision

Solent University is committed to being an environmentally responsible institution that uses energy efficiently, minimises waste and works conscientiously to reduce year-on-year carbon emissions.

This vision will align with the University's Strategic Plan and Environmental Policy, and will be referenced in the future development of other relevant policies and plans. The vision will be achieved by implementation of projects outlined in this Carbon Management Plan, and by other measures that are identified as work on the plan progresses.

2.4 Targets and Objectives

The original Carbon Management Plan (April 2010) set a target to reduce CO₂ emissions by 25% by 2013/14 against the baseline of 2008/09.

This revised Carbon Management plan sets a target of a 33% reduction in CO₂ emissions by 2019/20 against the baseline of 2005/06, thereby meeting with the requirements of HEFCE set out in their Statement of Policy Carbon Reduction Target and Strategy for Higher Education in England.

This target builds on the original target adding a further 2% reduction per annum from 2014-17 and 1% per annum from 2018 - 2020 (and absorbs the small increase in emissions between 2005/06 and 2008/09). It is believed that these savings will be achieved through the implementation of conventional technological and behavioural measures subject to investment.

HEFCE's Statement of Policy sets a sector target of a 34% reduction by 2020 against a base year of 1990, equivalent to a 43% reduction against a base year of 2005. Solent University will continue to develop their Estates and other operational strategies and work towards meeting this HEI sector target.

Solent University will set a target of reducing CO₂ emissions by 33% (below the 2005/06 baseline level) by the end of 2020. The University recognises that to comply with the Government's 2020 target of 34% against 1990's level, the HE sector will need to achieve 43% savings against 2005 base year, using the revised HEFCE methodology. The University will continue to develop its strategies to work towards this 43% target.

The primary objectives in implementing the Carbon Management Plan are to:

- Reduce energy use and hence carbon emissions.
- Reduce expenditure on energy purchase.
- Promote energy awareness amongst staff and students, encouraging and enabling good environmental practice.
- Improve energy efficiency of buildings.

- Reduce water consumption.
- Reduce waste, increase recycling and reduce the volume of waste sent to landfill.
- Collaborate with the wider community on carbon reduction.
- Promote and enable environmentally sound transport and travel practices.
- Maximize the use of energy sources which cause least harm to the environment.
- Incorporate carbon management into procurement, development of new buildings and refurbishment projects

Secondary objectives will include:

- Improved and more detailed measurement, reporting and analysis of energy and water use.
- Identifying and implementing energy saving measures and practices and improving energy efficiency throughout all premises, plant and equipment where cost effective.
- Review the use of the existing Geothermal Energy District Heating Scheme system and renewable energy sources.
- Review and identify options for the improvement of the thermal efficiency of all buildings.
- Improving utilisation of buildings to decrease energy consumption, concentrating usage in more energy efficient buildings and taking into account operational times.
- Improving the environmental performance of existing buildings as part of refurbishment and maintenance programmes.
- Incorporating environmentally sensitive design features into both new and refurbished buildings.
- Improving energy efficiency in work practices.
- Consideration of sustainable procurement and sourcing of low carbon products as part of a Procurement Strategy.
- Investigation of emissions caused by business travel and commuting by students, staff and visitors, and adopting strategies for reduction.

2.5 Strategies

The University will employ a range of strategies to achieve the overall target - to reduce emissions by 33% by 2020 - of this Carbon Management Plan. These will include:

Reducing energy usage and emissions from buildings and equipment by:

- more efficient use and control of heating, cooling and ventilation systems
- reducing heat loss by improved insulation, lagging and similar measures
- reducing overheating of buildings in winter and overcooling in summer
- ensuring new developments and building refurbishments are undertaken to the best achievable energy standard
- improving efficacy of electrical equipment by utilising more energy efficient technologies (e.g. low energy lighting, variable speed drives)
- implementing voltage reduction or optimisation where appropriate
- implementing automatic power down of computing equipment where possible
- making use of renewable energy sources where cost effective
- educating and encouraging building users to conserve energy

- improving utilisation of space and energy, especially during periods of low occupancy

Reducing emissions associated with travel and transport by:

- reducing the need for travelling
- encouraging walking, cycling and the use of public transport
- reducing single occupancy car use through lift sharing and better planning
- making use of alternative fuels
- collaboration with other organisations over transport matters
- reviewing transport provision and use between sites
- improving collation of business travel data and producing a University Travel Plan
- Reducing the environmental impact of the University's vehicle fleet.
- Changing student behaviour to use less energy in residential accommodation.
- Maximizing the use of fuel types which cause least harm to the environment.
- Introducing energy and resource efficient computing and printing technologies and practices.

3. Emissions Baseline and Projections

Calculating an emissions baseline provides a better understanding of how the University's buildings and operations produce emissions and suggests areas where significant improvements might be made. Establishing this baseline "carbon footprint" also provides a measure against which future performance can be evaluated.

This section describes how the baseline was calculated and what areas are included. The emissions baseline was calculated using the calculation tool provided by the Carbon Trust.

3.1 Scope

The emissions included in these baseline calculations are "direct emissions" - those that are under the direct control of the University and for which the University is primarily responsible as the consumer of the energy. The data required to calculate these emissions can be readily acquired from sources such as utility invoices and metering information.

Indirect emissions also occur, from sources not directly controlled by the University, but which could be considered as due to our operations. For example, emissions created by the supply of goods and services to the University, emissions from students living in private rented accommodation, emissions from commuter travel to and from the University. With the exception of waste, it is currently impractical to quantify these indirect emissions; as part of the longer term process of Carbon Management Plan development, it is anticipated that it will be possible to build a clearer picture of indirect emissions, with a view to reduction.

Emission sources included in the emission baseline are therefore as follows:

- Utilities (gas, electric, geothermal, water) used in all University buildings
- Fleet Transport (University owned vehicles)
- Waste collected and sent to landfill

Reliable information on business travel, and staff and student commuting emissions, is not available without a further substantial amount of surveying, data collection and analysis. Whilst business travel emissions are small in the context of overall emissions, those from commuting are expected to be substantial. This area will be addressed in due course, as part of the process of producing a Green Travel Plan for the University.

3.2 Baseline

The baseline year has been revised to the University financial year 2005/06 in line with HFCEE requirements.

(The original base year used for the plan had been 2008/09 as it was the most recent complete year for which figures became available during the production of the plan).

3.2.1 Compilation of Baseline Data

The *Data Sources and Conversion Factors* table included below identifies the sources of data used to calculate the baseline, and includes the CO₂ conversion factors used in calculations, as supplied by the Carbon Trust.

CO₂ conversion factors can change year-on-year due to the makeup of energy procured; for the duration of this Carbon Management Programme, carbon emission calculations will use the same methods and conversion factors, to ensure consistency.

| Data Sources and Conversion Factors | | | |
|---|---|--|---|
| Data | Owner | Sources | CO ₂ Conversion Factors |
| Geothermal, electricity, mains gas, water and LPG | Estates and Facilities | Supplier Invoices supported by meter readings where possible. | Electricity 0.537 kgCO ₂ /kWh Gas 0.185 kgCO ₂ /kWh Geothermal 0.19 kgCO ₂ /kWh Water 0.404 kgCO ₂ /m ³ LPG 1.5 kgCO ₂ /litre |
| Fleet transport (University owned or leased vehicles) | Estates and Facilities | Estate Management Statistics and fuel purchase records | Diesel 2.63 kgCO ₂ /litre Petrol 2.30 kgCO ₂ /litre |
| Waste Management | Estates and Facilities, and Waste Contractors | Invoices Tonnage estimates for waste sent to landfill and recycling | Waste to Landfill 447kgCO ₂ e/tonne |

Note:

1. The emissions from waste sent to landfill account for the direct emissions given off by the waste as it decomposes but take no account of transport to disposal point.
2. For waste to landfill emissions, CO₂e is a unit into which greenhouse gases other than CO₂ are converted, so that they can be directly compared ('e' is for equivalent).
3. Recycled waste has been allocated zero emissions, although this does not represent the true environmental impact.

3.2.2 Estimate of Emissions

Using the conversion factors shown in *the Data Sources and Conversion Factors* table above, a baseline figure was calculated for the University's emissions in the 2005/06 financial year, for each emission source listed.

The University's CO₂ emissions baseline for 2005/06 was **8,425 tonnes of CO₂**. The breakdown from the various sources is shown in the table below.

| EMISSIONS BY SOURCE | Mains Electricity | Geothermal | Gas | Waste Sent to Landfill | Water Usage | Fleet Transport | Total |
|--|----------------------|------------|------|------------------------------|----------------|--------------------|-------|
| Tonnes of CO ₂ (tCO ₂ e) | 5,960 | 1,101 | 665 | 616 | 36 | 47 | 8,425 |
| % of emissions | 70.8% | 13.1% | 7.9% | 7.3% | 0.4% | 0.6% | 100% |

3.2.3 Building Emissions

Building emissions were calculated from utility information from the University's Estate Management Statistics reports. These figures are collated directly from utility invoices from the University's energy suppliers, which are validated against fiscal meter readings.

Solent University uses a variety of fuels at its two main sites, the City Campus (also known as East Park Terrace or EPT) and Warsash Campus.

The City Campus is unusual in that it is provided with most of its heating requirement from Southampton's Geothermal and combined heat and power (CHP) scheme, operated by Southampton Geothermal Heating Company. Hot water from a central Geothermal and CHP plant is circulated via underground pipes to the University and other City Centre customers. Due to the efficiencies inherent in combining heat and power generation, energy from the scheme has the benefit of a relatively low carbon emission factor. The University is supplied only with heat from the scheme; the bulk of the electrical power output from this scheme is used by the port of Southampton. The City Campus currently uses no mains gas, but has a substantial requirement for electrical power, used for lighting, computing, cooling (chilling), supplementary heating, ventilating, air conditioning and miscellaneous other purposes. The Halls of Residence are all electric.

The Warsash Campus uses electricity and gas (mains and some LPG) in its residential and non-residential buildings.

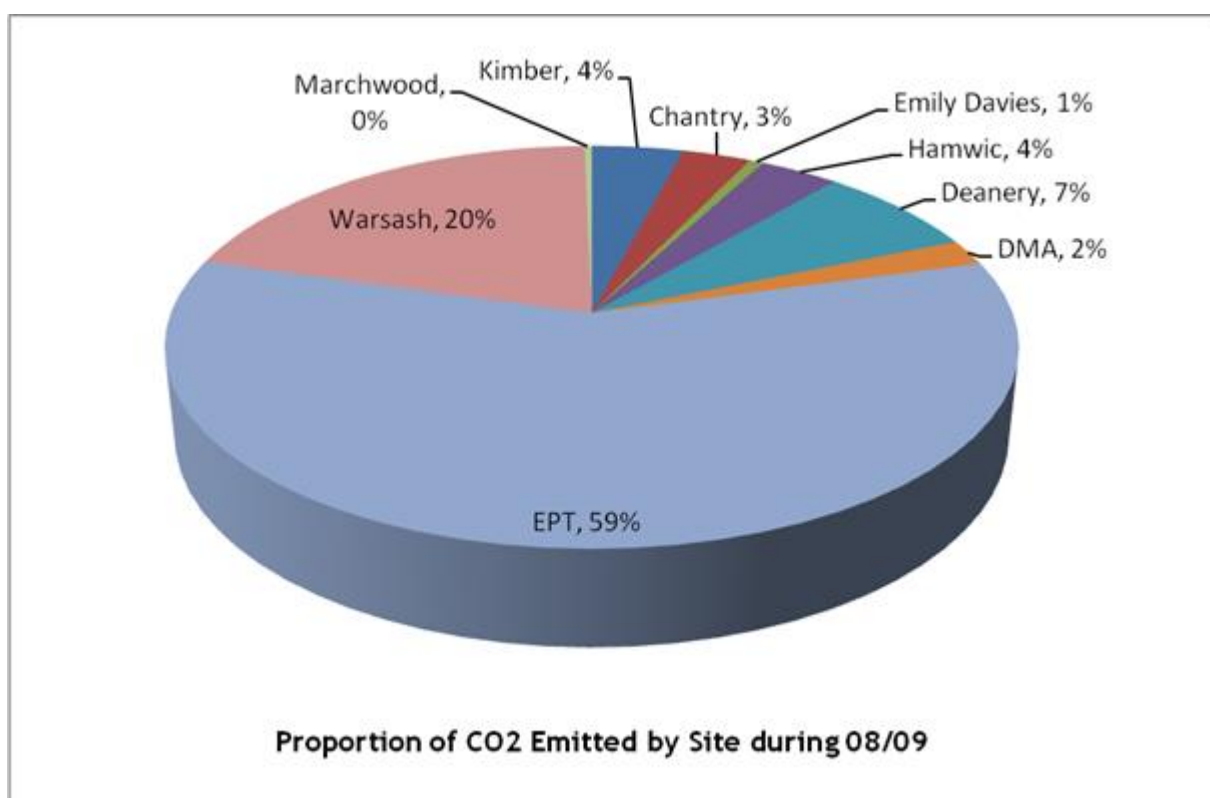
Where necessary for project calculations, due to limited sub-metering, individual building consumptions were calculated by apportioning utility data by floor area, across both the City and Warsash Campus. Assessment of energy use in individual buildings is hampered by the very limited number of meters in place. This situation is being gradually remedied,

with further sub-metering planned for electricity, gas and water. Existing Geothermal meter readings will be automated in the course of this plan.

All buildings are connected to mains water supplies. Water provision uses a significant amount of energy and has been included when calculating University carbon emissions.

The student Halls of Residence (City Campus) utilise only mains electricity for heating and lighting and are metered independently in most cases, providing more accurately attributable energy use. The exception to this is Emily Davies Hall, which has electricity measured by meters in the individual apartments; a substantial amount of work was required to calculate the total usage of this Hall of Residence.

Lucia Foster Welch Hall of Residence is not included in the emissions calculations, as the Hall is owned and managed by a third party company, so is considered an indirect emission in a similar way to other privately owned student accommodation.



3.2.4 Waste and Water Related Emissions

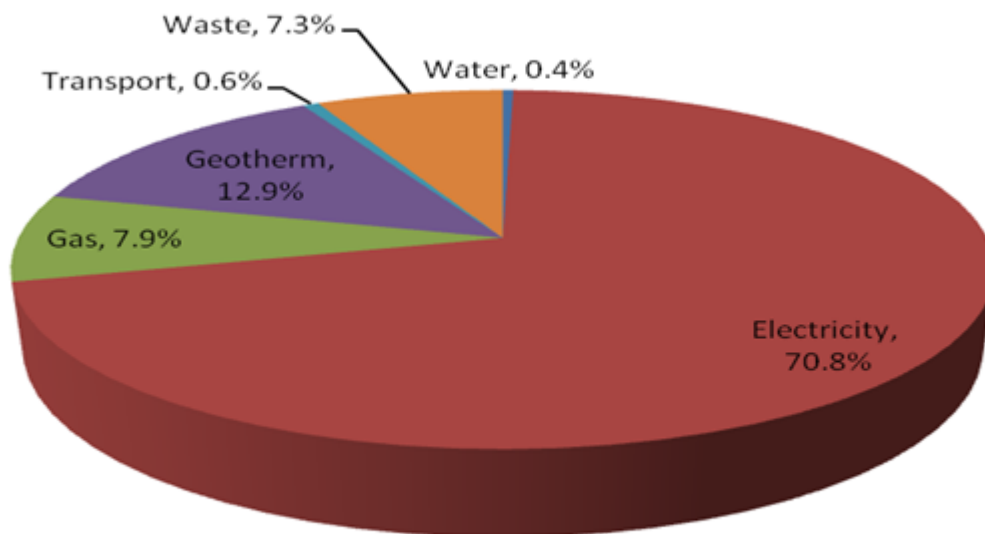
Accurate figures are available for 2008/9 water usage and are included in the calculations. Waste related emission figures for 2008/09 are taken from existing EMS data already collated; with the implementation of a new waste management contract in 2009, the data for waste related emissions is becoming more accurate. The waste and water data for the year 2008/09 have been used for this revised CMP - figures for 2005/06 were incomplete and the 2008/9 values are considered to be representative, based on a similar level of occupancy and activities.

3.2.5 Fleet Vehicle Emissions

The University currently has a small fleet of fifteen vehicles, which includes some grounds maintenance equipment. Some fuel is also used for outboard motors at the Warsash Campus. Records of annual mileages have not been kept accurately to date, so annual emissions from fleet use are calculated from Estate Management Statistics based on litres of fuels purchased from main suppliers. Emissions from the fleet source are very small when seen in the context of overall emissions. Efforts will be made to encourage improved recording of vehicle use with a view to establishing a more precise footprint.

3.2.6 Business Travel Emissions

Information relating to business travel mileage by car, air and rail was retrieved from staff mileage claim financial records for a 3 month period. While showing that business travel emissions are very small in the context of overall emissions, the data was considered insufficiently robust to enable a precise figure to be calculated for the baseline year. Efforts are now being made to record more precise information on business travel for inclusion in later revisions of this plan.



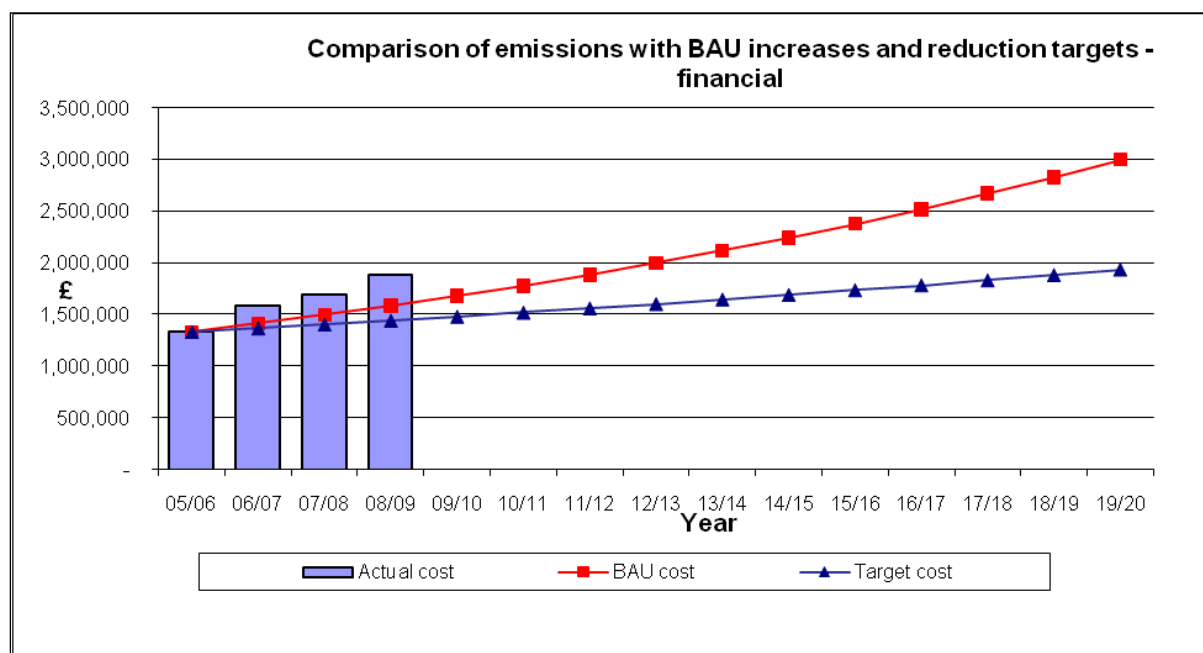
Source of Total University CO2 emissions for 2005/06

3.3 Business as Usual: Value at Stake Projections

Energy costs and emissions are likely to rise over time if no action is taken. The University's emissions baseline can be used to illustrate this Business As Usual (BAU) scenario - when no action is taken - or an alternative Reduced Emissions Scenario (RES), where a programme of carbon management is successfully adopted. The difference in energy costs between the Business As Usual and Reduced Emissions Scenario is termed the Value at Stake (VAS).

Proceeding from the Baseline Year, the graph below compares hypothetical financial scenarios for both the Business as Usual and Reduced Emissions Scenario, where a target of an overall 33% emission reduction by 2020 is achieved. This is also illustrated numerically on the table on page 31.

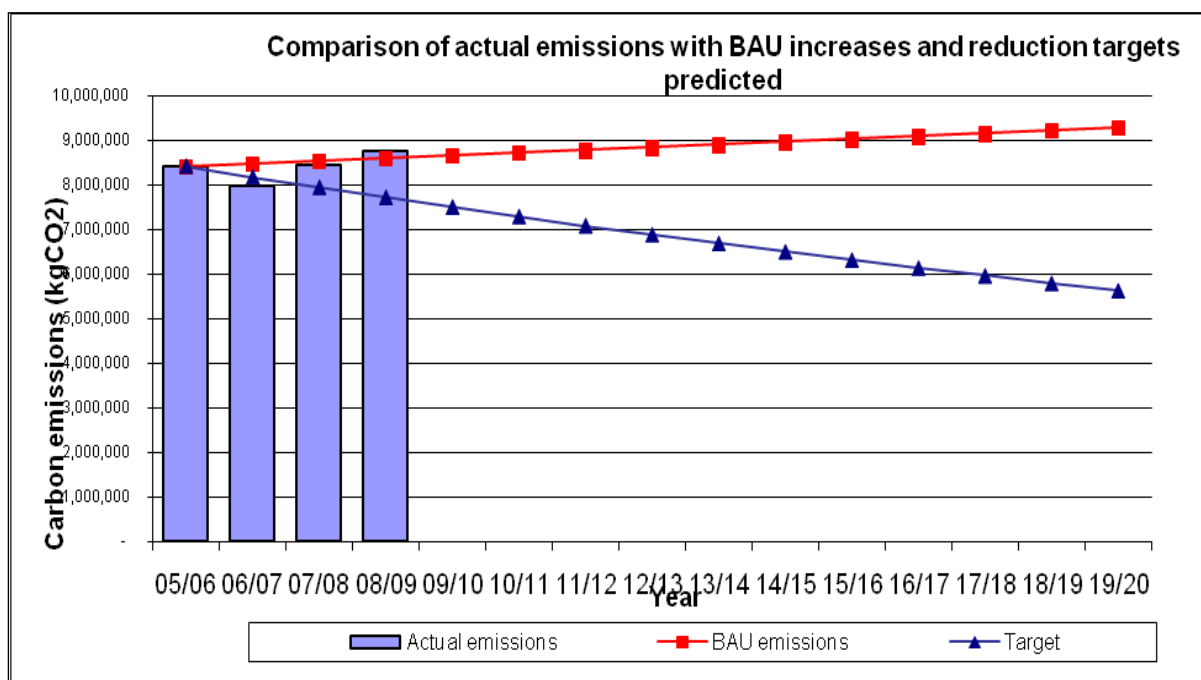
Each scenario assumes a year-on-year rise of 5.3% in energy costs and 0.7% demand increase, figures suggested by the Carbon Trust based on trends for the sector. The following table shows the increasing Value at Stake on a year by year basis and clearly illustrates the potential for savings from implementing a programme of Carbon Management to reduce fuel costs.



Moving on to Carbon Dioxide emission reductions, total emission of CO₂ in the 2005/06 baseline year was **8,425 tonnes**. Business As Usual will result in emissions of **9,290 tonnes** in 2020.

The projected absolute reduction of 33% will result in CO₂ emissions being reduced to **5,645 tonnes** in 2020.

The following table shows the potential for reduction in emissions over the period, assuming implementation of projects and a consistent rate of progress, against a BAU scenario.



Emissions of CO₂ year-on-year are illustrated in the table on page 31, showing the steadily increasing Value at Stake - the difference between BAU - or taking no action - and RES where a programme of carbon reduction measures is implemented.

The Value at Stake Analysis shows the total financial value at stake by implementing the CMP and reducing emissions by 33% by 2019/20 is estimated at £2,018,000 and 7,061 tCO₂.

| Annual | Business as Usual vs 33% Reduced Emissions Scenario Target - Financial | | | | | | | | | | | | | | |
|-------------------------|--|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Total | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 | 2015/16 | 2016/17 | 2017/18 | 2018/19 | 2019/20 |
| BAU (£'000s) | 1,333 | 1,412 | 1,497 | 1,586 | 1,680 | 1,781 | 1,887 | 1,999 | 2,119 | 2,245 | 2,379 | 2,521 | 2,671 | 2,831 | 3,000 |
| RES total (£'000s) | 1,333 | 1,368 | 1,404 | 1,441 | 1,480 | 1,519 | 1,560 | 1,601 | 1,644 | 1,689 | 1,735 | 1,782 | 1,830 | 1,880 | 1,932 |
| VAS (£'000s) | 0 | 44 | 93 | 145 | 201 | 262 | 327 | 398 | 474 | 556 | 645 | 739 | 841 | 951 | 1,068 |
| Cumulative VAS (£'000s) | 0 | 44 | 137 | 237 | 346 | 463 | 589 | 725 | 872 | 1,031 | 1,201 | 1,384 | 1,581 | 1,792 | 2,018 |

| Annual | Business as Usual vs 33% Reduced Emissions Scenario Target - CO ₂ Emissions | | | | | | | | | | | | | | |
|------------------------------------|--|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Total | 2005/06 | 2006/07 | 2007/08 | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 | 2015/16 | 2016/17 | 2017/18 | 2018/19 | 2019/20 |
| BAU (tCO ₂) | 8,425 | 8,484 | 8,544 | 8,604 | 8,664 | 8,724 | 8,785 | 8,847 | 8,909 | 8,971 | 9,034 | 9,097 | 9,161 | 9,225 | 9,290 |
| RES (tCO ₂) | 8,425 | 8,188 | 7,957 | 7,732 | 7,514 | 7,303 | 7,097 | 6,896 | 6,702 | 6,513 | 6,329 | 6,151 | 5,977 | 5,809 | 5,645 |
| VAS (tCO ₂) | 0 | 297 | 587 | 871 | 1,149 | 1,422 | 1,689 | 1,951 | 2,207 | 2,458 | 2,705 | 2,946 | 3,184 | 3,416 | 3,645 |
| Cumulative VAS (tCO ₂) | 0 | 297 | 883 | 1,458 | 2,020 | 2,571 | 3,111 | 3,639 | 4,157 | 4,665 | 5,163 | 5,651 | 6,130 | 6,600 | 7,061 |

4. Carbon Management Projects

4.1 Shortlisting of emission reduction opportunities

Since joining the Higher Education Carbon Management Programme in May 2009, the University has begun to identify and prioritise measures which could help conserve energy and reduce CO₂ emissions.

An Opportunities Workshop was organised in June 2009, attended by representatives from faculties, services and the student body. A number of measures were identified and prioritised according to cost, potential for emission reductions, practicality and ease of implementation.

Following on from the workshop, discussions with University staff, other institutions and Carbon Trust consultants provided further opportunities for investigation.

Recommendations provided by the Carbon Trust Energy Management Report, produced for the University in 2007, were also reviewed for further potential.

An Extended Carbon Survey was then commissioned from the Carbon Trust. A report from Stage 1 of this process, *An Assessment of Energy Saving Opportunities for Solent University*, was received in December 2009. Some of the opportunities identified in this report are included in the Project lists, along with projections of costs and carbon reductions.

The major opportunities for savings that are directly under the control of the University are from building emissions. The projects listed below relate to savings provided primarily from this source.

4.2 Existing and Early Start Projects

These are projects commenced after joining the HECM programme, or scheduled to commence shortly. Further details of all projects are covered in Appendix A. Funding has already been allocated for these projects.

| Ref | Project | Lead | Cost | | Estimated Annual Saving | | Pay back | % of Target | Year |
|-----|--|-------|---------|---------|-------------------------|-----------------|----------|-------------|------|
| | | | Capital | Revenue | Financial | CO ₂ | | | |
| E1 | BMS installation and improved controls at WMA | PG/TL | £23,000 | | £7,004 | 35.6 | 3.28 yrs | 1.64 | 2009 |
| E2 | Insulation of main risers, overhead pipework and flanges - EPT | MW | £10,000 | | £8,336 | 24 | 1.2yrs | 1.10 | 2009 |
| E3 | Draught proofing EPT corridors and external doors | KB | £14,400 | | £2014 | 5.8 | 7.15yr | 0.26 | 2009 |

| Ref | Project | Lead | Cost | | Estimated Annual Saving | | Pay back | % of Target | Year |
|-----|---|------------------------------|---------|---------------|-----------------------------|-----------------|----------|-------------|------|
| | | | Capital | Revenue | Financial | CO ₂ | | | |
| E4 | Staff awareness and "Green Impact" campaigns | MW and EAUC | N/A | £3,000 yearly | £4,000 | 20 | <1yr | 0.92 | 2010 |
| E5 | Student Halls Awareness Plan "Student Switch Off" | MW and campaign manager | N/A | £3,000 yearly | £8,000 | 41 | <1yr | 1.88 | 2009 |
| E6 | Extend electricity sub-metering of EPT and Warsash | MW | £32,000 | £4,000 yearly | £12,000 (see project notes) | 60 | 3yrs | 2.76 | 2010 |
| E7 | Install PIR control on lighting SJM and Warsash - initial phase | MW/ PG/ TL | £27,500 | | £8,752 | 42 | 3.1yrs | 1.93 | 2010 |
| E8 | Pilot projects - small power | MW | £15,000 | | £7,100 | 35 | 2.2yrs | 1.61 | 2010 |
| E9 | Good energy housekeeping by cleaners, caretakers, caterers etc. | MW/AM with team managers | N/A | | £2,000 | 10 | N/A | 0.46 | 2009 |
| E10 | Shutdown of non-essential services during vacation periods | PG/MW and building occupants | N/A | TBA | £5,000 | 25 | N/A | 1.15 | 2009 |

4.3 Planned Projects

These projects are planned for implementation commencing in 2010. Capital funding provided from financial year 2009/10 is already allocated where required.

| Ref | Project | Lead | Cost | | Estimated Annual Saving | | Pay back | % of Target | Year |
|-----|--|-----------------------------|---------|---------|-------------------------|-----------------|----------|-------------|------|
| | | | Capital | Revenue | Financial | CO ₂ | | | |
| P1 | Insulation - roof spaces , walls, pipework - small projects | MW / KB | £23,000 | | £5,500 | 16 | 4.1yrs | 0.73 | 2010 |
| P2 | Improved space utilisation and improved control of energy use outside core hours | Estates and Facilities team | N/A | | £5,000 | 25 | N/A | 1.15 | 2010 |

| Ref | Project | Lead | Cost | | Estimated Annual Saving | | Pay back | % of Target | Year |
|-----|---|-------|---------|---------|-------------------------|-------------------|-------------------|-------------|------|
| | | | Capital | Revenue | Financial | CO ₂ | | | |
| P3 | Voltage reduction by tap down of transformers - phase 1 | MW/PG | N/A | | £13,000 | 64 | N/A | 2.9 | 2010 |
| P4 | Automatic Metering of Water Supplies | MW/PG | £17,500 | | See project notes | See project notes | See project notes | | 2010 |

4.4 Near Term Projects

These are projects that are being planned, but for which funds have not yet been allocated. Guideline costings and potential savings have been provided by suppliers and CT consultants in many cases, but the full tendering process has not yet been undertaken.

| Ref | Project | Lead | Cost | | Estimated Annual Saving | | Pay back | % of Target | Year |
|-----|--|-----------------|---------|---------|-------------------------|-----------------|----------|-------------|---------|
| | | | Capital | Revenue | Financial | CO ₂ | | | |
| N1 | Low energy lighting in all corridors and stairwells of Deanery student accomodation | MW / Halls Team | £65,000 | | £15,035 | 74 | 4.5yrs | 3.41 | 2010-11 |
| N2 | Effective control of small power - PC power off | TBA | £20,000 | | £36,580 | Up to 180 | <1 year | Up to 8.29 | 2010-11 |
| N3 | Upgrade lighting in Mitchell and Collins | Estates Team | £85,000 | | £23,500 | 115 | 3.7yrs | 5.29 | 2010-11 |
| N4 | Install variable speed drives and link to BMS control systems | E states team | £50,000 | | £14,400 | 71 | 3.5yrs | 3.27 | 2011-12 |
| N5 | Upgrade, extend, recommission, BMS; provide control of heating, chillers, AHUs and VSDs across sites | PG / TL | £50,000 | £5,000 | £18,335 | 90 | 3yrs | 4.14 | 2011-12 |
| N6 | City - improve thermal performance by insulation, lagging and draught proofing - phase 2 | E states Team | £45,000 | | £9,000 | 50 | 5.0yrs | 2.34 | 2011-12 |

| Ref | Project | Lead | Cost | | Estimated Annual Saving | | Pay back | % of Target | Year |
|-----|--|--------------|---------|---------|-------------------------|-----------------|----------|-------------|---------|
| | | | Capital | Revenue | Financial | CO ₂ | | | |
| N7 | Warsash - improve thermal performance by insulation, lagging and draught proofing - phase 2 | Estates Team | £25,000 | | £6,000 | 33 | 4.2yrs | 1.52 | 2011-12 |
| N8 | Gas boiler replacement (Warsash Library/ Fire school) with modulating control condensing boilers | Estates Team | £21,000 | | £3,566 | 18 | 5.9yrs | 0.82 | 2011-12 |
| N9 | Warsash - Install AMR on Gas incomers in all relevant buildings | MW | £16,000 | £4,000 | £4,700 | 24 | 3.4yrs | 1.10 | 2010-11 |
| N10 | Install AMR on Geothermal supplies EPT/SJM and connect BMS | MW | £12,000 | £2,000 | £9,300 | 27 | 1.3yrs | 1.24 | 2010-11 |
| N11 | Reduce waste to landfill - reduce to 80% of baseline | E & F Team | TBA | | | 123 | | 5.66 | 2010-12 |
| N12 | Extend Warsash BMS across site and improve main boiler control | Estates Team | £30,000 | | £7,260 | 37 | 4.2yrs | 1.7 | 2011-12 |

4.5 Medium to Long Term Projects

These are longer term projects for which funds have not been allocated. Some of the projects are of substantial size and will realise significant savings. Costs and savings are based on outline information only from suppliers, consultants and previously commissioned energy reports; more detailed consultation will be required before full financial allocations are made. By carefully selecting key areas for improvements, the return on investment for the projects such as M4 and M5 may be significantly improved, and payback periods reduced. Further work will be undertaken with Carbon Trust consultants in this respect.

| Ref | Project | Lead | Cost | | Estimated Annual Saving | | Pay back | % of Target | Year |
|-----|--|--------------|----------|---------|-------------------------|-----------------|----------|-------------|-------------|
| | | | Capital | Revenue | Financial | CO ₂ | | | |
| M1 | Remedy district heating inefficiencies | MW / PG | £100,000 | | £31,130 | 89 | 3.2yrs | 4.10 | 2012-13 |
| M2 | Optimisation of supply voltage using VPO units | MW/PG | £35,000 | £3,500 | £9,800 | 48 | 3.6yrs | 2.21 | 2012-13 |
| M3 | Major upgrade of lighting types and controls - Halls, City Campus and WMA | Estates Team | £250,000 | | £79,656 | 391 | 3.1yrs | 18.0 | 2012-13 |
| M4 | Replace obsolete HVAC in Mountbatten Library, provide enhanced controls and recommission Library BMS | Estates Team | £250,000 | | £19,600 | 96 | 12.7yrs | 4.42 | 2013-14 |
| M5 | Building fabric upgrade across Campuses | Estates Team | £450,000 | £15000 | £42,550 | 148 | 10.5yrs | 6.82 | 2013-14 |
| M6 | Control of air conditioning units from BMS | Estates Team | £24,000 | | £3,830 | 19 | 6.2yrs | 0.87 | 2013-14 |
| M7 | Waste to Landfill - reduce to 60% of baseline | E & F team | | | | 98.4 | | 4.53 | 2012 - 2014 |

4.6 Projected Achievement Toward Target

If all projects identified above are successfully implemented, 72.8% of the target CO₂ reduction will be achieved over the first five years, from the initiation of the plan in 2009/10. It is anticipated that further projects will be identified in the course of the plan. It is also probable that with further investigation, some of the longer term projects will be refined to improve the savings and payback period.

| Progress Toward Target (CO ₂) | | | | | |
|---|---------|---------|---------|---------|---------|
| | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 |
| Annual CO ₂ saving* (tonnes) | 403.4 | 543 | 299 | 528 | 361.4 |
| % of target achieved | 14.5 | 19.5 | 10.8 | 19.0 | 13.0 |
| Cumulative % of target achieved | 14.5 | 34.0 | 40.8 | 59.8 | 72.8 |

4.7 Additional opportunities for carbon reductions

A number of projects have been identified which are not yet included in the plan as more detailed investigation is required to confirm costs, practicality or potential. A list of these additional opportunities is being produced as part of the programme.

Improved efficiency of electrical equipment - notably newer computing equipment, electric motors, cooling equipment and suchlike, should all contribute savings as yet unquantified. However, some of these savings may be offset by increased demands, which are sometimes unanticipated and difficult to predict.

It is anticipated that opportunities to employ renewables and emerging technologies will arise during the progress of this plan. The potential for student involvement with these types of project should be considered.

External sources of funding for additional carbon reductions may be available. These will be investigated.

5. Implementation Plan financing

The implementation of this Carbon Management Plan is expected to produce substantial benefits for the University both in financial terms and in CO₂ savings. The projects identified are prudent investments that will help the University reduce the risks arising from costs of energy procurement in a volatile market.

Over the first five years of the plan from implementation in 2009/10 the projected overall cost of the programme of projects from initiation to the end of 2014 will be **£1,690,400**.

Cumulative savings from successful implementation of all projects identified would be **£1,277,525** by the end of 2014, at current energy prices.

Projected Value At Stake (VAS) figures, which consider notional fuel cost and demand increases, are provided in Section 3 of this document. Note that these calculations are projected from the 2008/09 baseline year.

Early projects are already being funded via the University's Estates and Facilities capital budget allocation. Further details are provided in this section.

5.1 Assumptions

In calculating the estimated costs and savings to be achieved by this programme the following assumptions have been made:

- The Target reduction figure used in the calculations is 2,960 tonnes CO₂
- Project costs are estimated at 2009 prices
- Cost savings attributable are based on current energy prices
- Identified projects will be carried out by external contractors and the costs shown are inclusive, or as otherwise detailed in the project description sheets.
- Programme management costs are included in the staff establishment costs for the Estates and Facilities Department, or the department responsible for implementation.
- The University is able to provide the requisite capital funding for the listed projects

The nature or size of some projects is such that they will be implemented over an extended period, for example Campus-wide lighting upgrades. Savings will not necessarily be achieved until a project is fully completed.

Costs provided for Near Term and Medium Term Projects are estimates based on best available information at the time. In some cases, especially with the larger projects, extensive surveys will be required to confirm precise costing. No funds have yet been allocated for these projects.

Additional revenue costs, over and above those already being incurred, are only anticipated in a handful of projects (e.g. increased cost of maintaining additional sub-meters across the campus, provision of energy saving campaigns and associated materials and support). In the majority of cases, existing revenue budgets should be transferred to maintain replaced plant and equipment.

The level of CO₂ emitted per kWh varies depending on the type of fuel used. In calculating the CO₂ emissions, the conversion factors that have been used are as listed in section 3.2.1 "Compilation of Baseline Data". These factors should be used for the lifetime of this plan, to ensure consistency of calculations.

Several projects involve replacement of existing equipment. In some cases there will be an associated benefit of reduced maintenance or servicing costs, for example where new lighting technology provides substantially increased lamp life.

5.2 Financial Benefits

If all the identified projects are carried out, *on completion* it is estimated that the University will have cut its carbon emissions by approximately **2170 tonnes per annum** when compared to the 2005/06 baseline year. It is anticipated that further projects will be identified during the lifetime of this plan, and assuming funds are available to invest, additional savings will be achievable.

| Carbon Management Plan Projects - Estimated Costs and Savings by year | | | | | |
|---|---------|---------|---------|---------|---------|
| | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 |
| Annual cost saving* (£) | 87,706 | 89,115 | 58,561 | 120,586 | 65,680 |
| Cumulative saving in year** (£) | 87,706 | 176,821 | 235,382 | 355,968 | 421,648 |
| Annual CO ₂ saving* (tonnes) | 403.4 | 543 | 299 | 528 | 361.4 |
| % of target achieved | 14.5 | 19.5 | 10.8 | 19.0 | 13.0 |
| Cumulative % of target achieved | 14.5 | 34.0 | 40.8 | 59.8 | 72.8 |

* Annual cost saving is the saving attributable to projects *commencing* in the financial year stated. Actual savings may be achieved later.

** Cumulative saving in year is the rolling total of savings attributable to completed projects, **for that year only**. The Total Cumulative Saving at the end of 2014 is the sum of these annual savings figures, i.e. **£1,277,525**.

5.3 Unquantified benefits

- In addition to reducing energy consumption, many of the mechanical services projects will enhance the quality of the University's working and learning environment.
- Maintenance costs will be reduced by replacement of equipment (e.g. boilers) nearing end of useful life
- Maintenance costs will be reduced by greatly increased life of high frequency and LED lighting
- By raising awareness of progress in reducing energy consumption, a behavioural change in staff and students towards conserving energy is anticipated.
- Investment in innovative or sustainable technologies and carbon reduction initiatives will provide a valuable learning resource for students

- Improved data will be provided for Estate Management Statistics

5.4 Financial costs and sources of funding

Projects identified in 2009/10 will be funded from capital bids already approved, from a small "environmental initiatives" budget, or in some cases as part of the University's long-term maintenance programme.

Projects identified for 2010/11 onwards are subject to capital funding approval, which is agreed on an annual basis as part of the Capital Bids process. Revenue costs are mainly for ongoing data collection from sub-metering and awareness raising activities.

The proposed programme has been spread over the next five years in a way that is likely to be affordable. The figures in the following table relate to the Projects listed in Part 4 of this document.

| | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | Ongoing |
|--------------------------------|----------------|----------------|----------------|----------------|----------------|---------------|
| Annual Capital cost (£) | 162,400 | 198,000 | 221,000 | 385,000 | 724,000 | Nil |
| Revenue cost (£) | 6,000 | 16,000 | 21,000 | 19,500 | 31,000 | 16,000 |
| Total costs | 168,400 | 214,000 | 242,000 | 403,500 | 755,000 | 16,000 |
| Committed Capital | 162,400 | TBC | 0 | 0 | 0 | 0 |
| Committed Revenue | 6,000 | 10,000 | 0 | 0 | 0 | 0 |
| Total funded | 168,400 | 10,000 | 0 | 0 | 0 | 0 |

5.5 Financial Management

Responsibility for financial management of individual projects will be with the Project Managers, in line with the University's financial regulations.

The Environmental and Sustainability Manager will maintain details of the funding associated with projects in order to be able to report on the overall performance and will explore opportunities for additional project funding.

6. Actions to Embed Carbon Management in the University

This section discusses the steps that the University will take to ensure that carbon and energy management become a core consideration in the University's planning from strategic to operational levels.

At the outset of the HECM programme, the level to which Carbon Management was embedded into the University's operations and management was assessed by use of the Carbon Trust's matrix tool. A relatively low level of embedding was observed. This situation will be addressed by remedial actions included in the Carbon Management Plan.

Embedding carbon management into the culture of the University will play a significant role in reducing emissions if undertaken successfully.

6.1 Policy

Strong support for participation in the Higher Education Carbon Management programme and for the production of this Carbon Management Plan was indicated at the outset, both from the Vice-Chancellor's Office and from the Senior Management Team. The University has adopted a pro-active approach to Carbon Management which is embedded in its Environmental Policy statement:

Solent University believes that protection of the environment is an integral part of good institutional practice and that it has a duty to satisfy itself and others that all of its operations at its city centre sites, at Warsash and on the Solent are conducted with proper regard for the environment. The University is committed to maintaining and, wherever possible, improving the quality of the environment both for the people who live and work in the University, and for the wider community, now and in the future. The University seeks to make the most effective and efficient use of all resources, encouraging all members of the University community to develop an ecologically sound approach to their work.

The stated targets of the University's Environmental Policy are as follows:

- To have rigorous but achievable targets for water and energy consumption reduction whilst satisfying the University's needs.
- To publish environmental targets and benchmarks against which the University's performance can be measured.
- To reduce waste at least in line with the local communities and higher education standards.
- To improve staff training, student awareness and community knowledge in all aspects of environmental protection and sustainability.
- To integrate environmental and sustainable principles into the University's operational procedures, promoting best practice at every level.

The Environmental Policy and Carbon Management Plan have mutually compatible aims, principles and objectives and are further discussed in *Policy Alignment* (section 6.5) of this plan.

6.2 Responsibility

The **Operational Sponsor** of the Carbon Management Plan is the Pro-Vice Chancellor, External Development.

The **Project Sponsor**, responsible at senior management level for the implementation of this plan, is the Director of Estates and Facilities, working with the Low Carbon Group and Carbon Management Team.

The **Project Manager** for the plan is the Environmental and Sustainability Manager, who has operational responsibility for delivering the targets, working in conjunction with relevant Directors of Schools and Services, Energy champions and Student Representatives.

The Project Manager will be supported by the **Carbon Management Team** which, with the support of the Director of Estates and Facilities, has the responsibility for:

- Implementation of existing and planned carbon reduction projects
- Identification of further projects that will assist the University in reaching its carbon reduction target
- Assessing costs and securing financing (both internal and external) for projects
- Communication of the programme and progress to staff and students
- Associated publicity and awareness raising activities
- Data management related to the plan

The **Low Carbon Group** will ensure the progress of the Carbon Management Plan and provide strategic direction.

The group will agree and set overall targets for programme delivery, oversee the effectiveness of the project, build commitment and clear obstructions to progress.

The recently launched *Green Impact* initiative will provide an opportunity to begin establishing a network of energy champions with representation from Schools, Services and the Student Union. These energy champions will link with the Low Carbon Group, acting as environmental representatives for the Schools and departments, to raise the profile of energy conservation and carbon reduction. They will collaborate with departmental colleagues to identify and implement local opportunities and provide additional support for agreed projects and activities.

The specific roles, responsibilities and organisational arrangements for ensuring that the Carbon Management Programme is delivered, as a shared effort, are discussed further in Chapter 7.

6.3 Data Management

Collection and management of energy data is undertaken within Estates and Facilities, with the collaboration of the Finance Department. Provision of information on energy usage is well

established and has been reported via the Estate Management Statistics for several years, with data on energy consumption being derived primarily from utility invoices. However, the precision of the reporting has been limited by the number of meters installed. Improvements in metering will gradually allow closer monitoring of consumption, initially aiming to provide information at individual building level, with further refinement later.

The data will be analysed and interpreted to:

- improve control of energy use
- monitor the success of carbon saving projects
- identify new opportunities
- provide feedback to stakeholders, staff and students as appropriate

Improving energy efficiency and the reduction of carbon emissions is dependent on accurate recording of energy consumption. An ongoing programme of electrical sub-meter installation, along with closer monitoring, is already beginning to provide a better picture of energy use at City Campus and in the Halls of Residence. This metering information will facilitate a number of targeted actions to reduce consumption.

As part of the programme to measure energy usage more accurately, surveys are underway to establish the viability of providing smart metering on both geothermal and water supplies. As the installation of metering progresses, closer monitoring of the effects of changes to the Estate and new equipment installations will be possible.

Warsash Campus is currently served only by a single electricity meter and two gas meters. Installation of 15 electricity sub-meters will commence in March 2010. A survey of options for additional gas metering has just been commissioned.

It is intended to provide increased accessibility to information on energy usage for staff and students. This will allow greater visibility of the effect of energy saving projects and activities. The first initiative involving providing user feedback on energy usage is the *Student Switch Off* campaign, currently being run in the City Campus Halls of Residence.

6.4 Communication and training

The success of the Carbon Management Plan in achieving its objectives will depend on generating enthusiasm, participation and commitment from students and staff throughout the University.

A strategy will be required to ensure effective communication between all participants. The key objectives of the communication strategy will be to:

- Establish a shared understanding of the Programme's vision and goals
- Generate enthusiasm for carbon management and help secure the necessary resources
- Keep the programme in touch with the changing needs of the University
- Enable early recognition of risks and issues so that the programme plans can be adapted where appropriate
- Ensure information and guidance is provided
- Ensure that decisions are based on accurate or best available information

The following approaches will be adopted:

- The programme will use existing communication channels where possible, but will establish new approaches when necessary
- Feedback mechanisms will be incorporated to enable evaluation of progress

Challenges that need to be addressed include:

- Achieving and maintaining visibility of the programme
- Development of information and publicity materials
- Determining any additional funding requirement for communication and training
- Availability of key marketing and communication staff to adequately resource the communication requirements

Awareness campaigns, *Green Impact* and *Student Switch Off*, have recently been launched. Both campaigns will be run on a yearly basis to build experience and establish the success of the formats, with the student campaign being specifically targeted at the new student intake each October. These and future awareness campaigns will provide an opportunity to establish a network of Energy Champions across the University.

Training in carbon awareness may be required for specific groups of staff as work progresses. Caretaking and cleaning staff are already assisting by turning off lights and appliances during their activities and reporting any apparently wasteful use of energy via their supervisors.

6.5 Policy Alignment

The Carbon Management Plan will provide an opportunity to revise and update relevant existing policies and provide improvement in areas where policy is not yet fully defined.

6.5.1 Environmental Policy

The University Environmental Policy is reviewed annually to ensure it remains current. The aims and objectives of the existing Environmental Policy have been taken into account in the production of this Carbon Management Plan. The two documents will be brought further into alignment after the Carbon Management Plan is ratified.

6.5.2 Energy Policy

Energy Policy is referred to in the University's Environmental Policy but detailed guidance is not provided. Establishing clear estate-wide guidance on energy use is an important part of the Carbon Management Plan. The existing policy on energy use will therefore be reviewed as part of the Carbon Management Programme.

6.5.3 Travel and Transport Policy

The University Transport Policy is defined in the existing Environmental Policy. Work on an updated Travel Plan will be initiated and a travel survey of staff and students will be undertaken by Estates and Facilities.

In addition to the above, the University should consider working to create, extend or align policies in the following areas:

- Project Sustainability Plan - relating to new build and refurbishment work

- Estate Maintenance Policy
- Procurement Policy

Although significant work has taken place on the Estate in recent years, there is still scope to provide major improvements in conservation of energy, especially when refurbishment and new build opportunities arise.

If the University is to ensure compliance with current and future legislation, and maximise long term reductions in energy use, developments to the Estate need to ensure that sustainability, sustainable procurement and energy efficiency are all key drivers during the design process.

Delivery of the projects identified in section 4 needs to be aligned with the University's capital works and long term maintenance programmes to ensure that the requisite funding and project management capacity is available. It will be responsibility of the Director of Estates and Facilities, working with the Senior Management Team and the Carbon Management Team, to ensure that this happens.

7. Management of the Programme

The successful implementation of the Carbon Management Programme is dependent on clear ownership of the plan and the activities necessary to maintain progress.

7.1 Strategic ownership of the programme - the Low Carbon Group

At the time of joining the Higher Education Carbon Management Programme, there was limited involvement of staff and students in matters of energy conservation.

This was addressed by the formation of the **Low Carbon Group**, which was convened as a working group during the production of the Carbon Management Plan.

The group will be re-focused, and possibly renamed, to provide the strategic management and oversight for the Programme and will meet every 3-4 months.

It will be chaired by a representative of the **Vice Chancellor's Office**, who will champion the Carbon Management Programme and have ultimate responsibility for strategic direction. In the first instance this will be Dr Keith Johnson, the **Operational Sponsor** of the Programme.

The **Project Sponsor**, the Director of Estates and Facilities, will be responsible for co-opting Senior Management Team and other key stakeholders onto the Low Carbon Group.

The Group's membership already includes representation from Schools, Services and the student body. Membership will be reviewed as work progresses, to allow inclusion of representatives from other areas, such as departmental energy champions.

In addition to providing strategic direction, the role of the Group is to:

- provide a cross-campus forum for discussion of carbon reduction initiatives
- monitor progress of carbon reduction projects and initiate corrective action if required
- identify new carbon reduction opportunities for consideration and implementation by the Carbon Management Team
- agree and set overall targets for programme delivery
- build commitment and clear obstructions to progress
- aid with progress of the carbon plan and awareness raising activities
- work with local energy champions to identify School and department opportunities

The Group will receive advice and assistance from the Carbon Management Team as discussed in the next section.

7.2 The Carbon Management Team - delivering the projects

The Carbon Management Team will be responsible for delivering the projects. The role of the Carbon Management Team is to assess, develop and implement carbon management projects, ensuring milestones are met and objectives delivered. The team will also have important functions in communicating progress with the plan, raising awareness and encouraging participation and collaboration in the programme.

As the department with primary responsibility for estate project implementations, Estates and Facilities will provide the majority of the team members, recruiting additional assistance and expertise as required to take projects forward.

The Carbon Management Team will meet regularly to:

- monitor progress with project implementations
- discuss and review new opportunities
- review energy reports and campus emissions
- discuss needs for increasing awareness internally and externally
- consider suggestions and recommendations from the Low Carbon Group
- review and update the Carbon Management Plan
- produce an annual progress report

The Carbon Management Team will be represented by key members at Low Carbon Group meetings, to:

- report on progress with project implementation
- provide advice on feasibility of project proposals from the Low Carbon Group and elsewhere
- recommend new projects and discuss potential opportunities

7.3 Student and Staff initiatives

A network of energy champions is now being established, via work being undertaken as part of the "Green Impact" initiative. The Project Leader will maintain regular contact with these energy champions to discuss energy usage and further opportunities for local initiatives, arranging group meetings where this may be beneficial. Representatives of the energy champions will be recruited to attend meetings of the Low Carbon Group.

It is anticipated that the energy champions will be provided with basic training in energy and carbon reduction when the network is better established.

Links with the Student Union are being consolidated and there has been close collaboration in areas such as the "Student Switch Off" and NUS "Sound Impact". Participation in the carbon management programme by student representatives will be strongly encouraged.

7.4 Succession planning for key roles

In the event of the Project Sponsor or Project Leader becoming unavailable, their responsibilities will pass to their respective deputies.

The Project Leader will collaborate closely with senior members of the Estates and Facilities team, to ensure that activities and projects can be taken forward without undue difficulties in the event of unavailability of key personnel at any time.

Succession planning for key roles will also be aided by maintaining the profile of carbon management across the University. Those deputising for, or working with, key post holders will need to understand the importance and relevance of actions to deliver the programme.

Delivery of the University's Carbon Management Programme should be incorporated into of the job descriptions of key personnel within the University. Through close collaboration and reporting of progress, knowledge of issues affecting the delivery of the programme will be widely shared.

7.5 Annual Progress review

Progress with the Carbon Management Plan will be reported and reviewed on an annual basis throughout the life of the plan. The first review will take place one year after adoption of the plan. Progress reports will typically discuss:

- Progress with projects and future plans
- Total reduction of emissions
- CO₂ savings against target
- Financial spend and savings
- Progress on embedding awareness, carbon management and behavioural change
- Student and community contacts, initiatives, benefits and activities

The report will be submitted to the Senior Management Team after approval by the Low Carbon Group. With assistance from the Carbon Management Team and the Project Leader, the Low Carbon Group will review performance of the programme and identify any actions required to maintain progress.

7.6 Ongoing stakeholder management

Stakeholders are defined as all those who may influence the programme's success. To ensure that stakeholders remain informed about the programme, a communication strategy will be developed.

Not all stakeholders will be champions of carbon management, but effective communication will help to ensure that everyone in the University has the opportunity to contribute to the programme.

A stakeholder communication matrix is included below:

| Carbon Management Plan - Communication and Awareness | | | | |
|--|-----------|--|--|---|
| Stakeholder | Influence | Key interests / concerns | Means of communication | Responsibility |
| Governing Body | High | Strategic support and oversight | Annual report of the Low Carbon Group | Senior Management Team, Low Carbon Group |
| Senior Management Team | High | Budgets and funding Strategic plans Reputation/profile of University | SMT meetings | Project Sponsor, Project Leader |
| Directors of Schools and Heads of Departments | High | Budgets Resources Space utilisation Staff involvement | Meetings, email, departmental communication | Project Leader, Carbon Management Team, Energy Champions |
| Finance | High | Costs Financial planning Procurement and contracts | Meetings, email | Project Sponsor, Low Carbon Group, Project Leader |
| Estates and Facilities | High | Estates Strategy Maintenance costs Capital implications Project planning New build Refurbishment | Meetings Portal, email Internal communications | Project Leader, Estates and Facilities Team |
| Staff | High | Comfortable working environment Travel and parking Participation in initiatives | Portal / web Campus link Email Departmental meetings, Energy champions | Project Leader, Low Carbon Group, Carbon Management Team, Energy Champions, Marketing and Communication Service |
| Students | Medium | Individual expectations Environmental awareness | Portal / web Printed materials Events Student Union | Student Union |
| Contractors & Suppliers | Medium | Contract retention Cost implications | Contract tenders / meetings | Project Managers |
| Media & Press | Low | Corporate image | Press releases, Meetings | Marketing and Communication Service |
| Local Community | Low | University's Effect on community and environment. Corporate image | Press releases, Meetings | Marketing and Communication Service |

APPENDIX A - DEFINITION of PROJECTS

| | |
|---------------------------|---|
| Project: | Building Management System installation - Warsash |
| Reference: | E1 |
| Ownership | PG |
| Department | Estates and Facilities |
| Description | <p>The Warsash Campus provides the majority of its space and water heating by means of gas boilers located at various points across the site.</p> <p>There is very limited control provided on the boilers and heat supplied to buildings. This is being addressed, as the first stage of the process, by the installation of a Priva BMS system. The system will provide remote monitoring and control and will be integrated with an upgraded BMS to be installed at the City Campus.</p> |
| Costs and Benefits | <ul style="list-style-type: none"> • Project cost: £23,000 • Financial savings: £7,004 p.a. • Payback period: 3.28 years • CO2 emissions reduction: 35.6 tonnes • Percentage of target 1.64% • Source of funding: Funded • Decision on funding: Approved <p>Reduced heating bills, reduced emissions and improved conditions for occupants.</p> |
| Ensuring Success | <p>System to be fully commissioned and all necessary controls to be installed.</p> <p>Risks: BMS limited to Warsash "top site" in the initial phase, further work required to extend to whole of campus. Lack of staff resource to provide ongoing management of the BMS.</p> |
| Measuring Success | <p>Ability to monitor and control Warsash settings from City Campus. Measurement of overall reduced energy usage of site, later via sub-meters to be installed. Positive comments from occupants. Saving of staff time and effort in visiting remote site to monitor and change settings and repair faults.</p> |
| Timing | From October 2009. The work is relatively non-disruptive so there is flexibility over the scheduling. |
| Notes | |

| | |
|---------------------------|--|
| Project: | Insulation/lagging of pipework, valves and flanges |
| Reference: | E2 |
| Ownership | Estates Team |
| Department | Estates and Facilities |
| Description | <p>Many areas have unlagged heating pipes. Approximately 800 metres of pipework including many large bore main risers and flanges were identified for insulation in the first phase of this project. Further opportunities are being identified and a survey of valves and flanges is scheduled at both Warsash and EPT sites (see also P1).</p> <p>Lagging of all uninsulated heating pipework should be undertaken wherever practicable.</p> |
| Costs and Benefits | <ul style="list-style-type: none"> • Project cost: £ 10,000 (first phase) • Financial savings: £8,336 • Payback period: 1.2 • CO₂ emissions reduction: 24 tonnes • Source of funding: Funded • Decision on funding: Approved |
| Ensuring Success | <ul style="list-style-type: none"> • Key success factors: Reduction in kWh energy used. Positive feedback from building users. • Risks: No significant risks identified |
| Measuring Success | <ul style="list-style-type: none"> • Metrics: Sub-metering • Inspection to ensure quality of work. |
| Timing | <p>From August 2009</p> <p>Insulation work ongoing throughout the Carbon Management Programme, subject to availability of funding.</p> |
| Notes | |

| | |
|---------------------------|--|
| Project: | Draught proofing - corridor and external doors |
| Reference: | E3 |
| Ownership | Estates Team |
| Department | Estates and Facilities |
| Description | <p>Corridor and external doors are sometimes kept wide open on tie-backs during opening hours, resulting in substantial heat losses. In key areas, the effect is greater than might be expected, with differential pressures on opposite sides of three adjoining buildings (Mitchell, Andrews and Cockerel) causing a "wind tunnel" effect, with cold air being drawn along the corridors and stairwells.</p> <p>A combination of good housekeeping, mechanical closers and draught proofing solutions is already having significant impact.</p> <p>Building occupants and Estates staff will identify further areas where action is necessary to reduce draughts and control heat loss via external doors.</p> |
| Costs and Benefits | <ul style="list-style-type: none"> • Project cost: £14,400 • Financial savings: £2014 per annum • Payback period: 7.15 • CO₂ emissions reduction: 0.3 tonnes • Source of funding: Funded from Projects Budget • Decision on funding: Approved <p>Reduced heating bills, reduced emissions and improved conditions for occupants.</p> |
| Ensuring Success | Installation by competent contractor in appropriate locations. |
| Measuring Success | Measurement of reduced energy usage via submeters. Positive comments from occupants. |
| Timing | From December 2009 |

| | |
|---------------------------|---|
| Project: | Awareness Campaigns including "Green Impact" and "Student Switch Off" |
| Reference: | E4 and E5 |
| Ownership | MW and External Providers |
| Department | Estates and Facilities |
| Description | <p>Raising awareness and a sense of responsibility for conserving energy is important amongst both staff and students. The University has had limited success in this area to date. The Green Impact and Student Switch Off campaigns have both had demonstrable success in University environments and will provide a base for future campaigns and activities. A network of Energy Champions needs to be established and supported to act as points of contact for driving energy initiatives across the Campuses; the Green Impact and Student Switch Off initiatives should assist in this process. As the University is just beginning the awareness raising process, it is anticipated that lower savings will be achieved initially, with increased benefits as awareness and participation grows. A 5% saving of energy in five halls would achieve 82 tons CO₂ reduction, or over 4% of target - figures for October and November 2009 indicated this was being exceeded, but weather conditions were mild.</p> |
| Costs and Benefits | <ul style="list-style-type: none"> • Project cost: £3000 each (annually to provide ongoing campaigns) • Financial savings: £12,000 per annum • Payback period: < 1 year • CO₂ emissions reduction: Initial estimate 61 tonnes - up to 80 tons per annum or 4% of target considered achievable |
| Funding | <ul style="list-style-type: none"> • Operational costs: Further requirements to be assessed, campaign funding may increase ROI • Source of funding: Environmental Initiatives budget |
| Resources | <ul style="list-style-type: none"> • Existing University staff and student time and resources • Student Switch Off campaign co-ordinator attending Campus meetings |
| Ensuring Success | <ul style="list-style-type: none"> • Key success factors: Well planned and branded awareness schemes with enough material/ideas to keep the project running. Sub-metering monitored and actions undertaken locally to reduce wastage • Risks: Lack of support or changes in key personnel / student union, problems with buy-in, not being able to recruit volunteers • Main means of risk mitigation: Develop a clear timetable. Maximise publicity, provide relevant information on progress and opportunities. |
| Measuring Success | <ul style="list-style-type: none"> • Halls performance assessed directly by sub-metering information. Achievements will be reported to participants. |
| Timing | <ul style="list-style-type: none"> • Start date: Students - Oct 2009, Staff Jan 2010 • On-going: monitoring of consumption and local awareness raising |

| | |
|--------------------|--|
| Notes | Low awareness and no established network of champions may mean lower savings in first years. |
| Project: | Sub-Metering of Electricity at East Park Terrace and Warsash |
| Reference: | E6 |
| Ownership | |
| Department | Estates and Facilities |
| Description | <p>Sub-meters connected to Monitoring & Targeting systems can provide data on utility consumption on a near real-time basis and can be used to help identify wasteful use of energy.</p> <p>Installation of individual building electricity sub-metering commenced in July 2009, with electricity sub-meters installed at EPT.</p> <p>This is the first stage of sub-metering, to build up a broad picture of usage patterns. Refinement via additional metering will be required, especially in areas of high usage, to maximise benefits.</p> |
| Costs and Benefits | <ul style="list-style-type: none"> • Project cost: £32,000 • Operational costs: £4,000 (annual maintenance/reports - first stage) • CO₂ emissions reduction: 60 tonnes. N.B. Emissions will not be reduced purely by the installation of the system, but case study evidence suggests that acting appropriately on information provided by the system can typically reduce overall consumption by 5-10%. • Financial savings: £12,000 p.a. estimated • Source of funding: Internal University capital. Funding committed for electricity Phase 1 and some further AMR work. • Payback period: 3 years. Variable, dependent on associated activities • With all areas of the estate covered by such a system, and working in conjunction with other control measures, annual emission reductions could be up to 200 tonnes CO₂ per annum |
| Funding | <ul style="list-style-type: none"> • Capital funding allocated |
| Resources | <ul style="list-style-type: none"> • Estates Project Team • Future additional resource: Carbon Trust consultant to analyse |
| Ensuring Success | <ul style="list-style-type: none"> • Key success factors: Delivery of accurate and detailed data on energy and water consumption. Reduction in kWh consumed due to targeted action on 'hot spots' and anomalies shown by sub-metering data. • Principal risks: Under-resourced for analysis and acting on data. Lack of opportunities discovered for energy saving. |
| Measuring Success | <ul style="list-style-type: none"> • Monthly, quarterly and annual consumption data produced for specific buildings and campus-wide energy and water consumption • Sub-metering data shows a reduction in kWh consumed due to action to remove 'hot spots' and anomalies |
| Timing | <ul style="list-style-type: none"> • Milestones / key dates: |

| | |
|--------------|---|
| | <ul style="list-style-type: none"> ○ start date: July 2009 ○ completion date: July 2011 for all main building utilities sub-meter installation; further refinement of system should then be undertaken. |
| Notes | IMServ's Energy Data Vision (EDV) will be the base monitoring system |

| | |
|---------------------------|---|
| Project: | Install lighting controls - Matthews Building and Warsash Campus |
| Reference: | E7 |
| Ownership | |
| Department | Estates and Facilities |
| Description | <p>None of the classrooms in the Matthews building are fitted with motion or presence detecting equipment and the lights are often left on when areas unoccupied. Offices, stairwells and washrooms will also have the potential for cost-justifiable savings from PIR installation. A similar situation exists in areas of the Warsash Campus. Other areas may be identified during this work and will be prioritised on a ROI basis where appropriate.</p> <p>Automatic controls will be retrofitted as the first phase of a longer-term campus wide programme.</p> |
| Costs and Benefits | <ul style="list-style-type: none"> • Project(s) Cost: £20,000 SJM / EPT / Halls and £7,500 Warsash • Financial savings: £8,752 • Payback period: 3.1 years • CO₂ emissions reduction: 42 tonnes p.a. |
| Ensuring Success | <p>Installation by competent contractors. Choice of appropriate equipment. Adjustment and setup of sensors to minimise waste.</p> <p>Risks: Increased occupancy of rooms would mean reduced savings. Inappropriate choice or setup of sensor equipment could result in malfunctions.</p> |
| Measuring Success | Sub-metering. Monitoring functionality of areas when fitted with sensors. User feedback. |
| Timing | To commence early 2010. Access to areas may be limited during normal opening hours - weekend install of pilot areas. Workaround lectures to avoid disruption. |
| Notes | <p>Different sensor requirements for classrooms and little-used stairwells.</p> <p>New Lutron PIR sensors will be considered for suitable areas as installation much easier.</p> |

| | |
|---------------------------|---|
| Project: | Pilot Projects - "Small Power" |
| Reference: | E8 |
| Ownership | |
| Department | Estates and Facilities |
| Description | <p>A number of small projects are listed under this heading. Either the individual contribution to energy savings has been assessed as being small; or the project is to be piloted first in a number of areas, using different types of controls or technologies; or rollout will be over an extended period.</p> <p>Most of these projects will give fast payback (approximately 2 years) on investment and provide significant savings overall when rolled out across the whole of the Estate.</p> <p>The projects included here are:</p> <ul style="list-style-type: none"> • LED lighting - replacement of halogen down lighters • LED lighting - corridor areas, pilot projects • LED lighting - external lighting pilot projects • Time switches on water heaters • Time switches on vending and similar machines • Occupancy lighting and fan controls in washrooms • Variable speed drive pilot in Library / Andrews • Monitor/optimize/replace fridges/freezers • Other small power projects to be confirmed |
| Costs and Benefits | <ul style="list-style-type: none"> • Project(s) cost: £15,000 (initially) • Financial savings: £7,100 per annum • Payback period: 2.2 years • CO₂ emissions reduction: 35 tonnes p.a. <p>A small budget has been allocated after which further funds will be sought for extending projects that show good return on investment.</p> <p>When aggregated together, these small power projects are expected to contribute up to 2% saving toward the target. LED lighting technology is improving rapidly and will offer major benefits in the medium term; additional projects are being planned.</p> |

| | |
|--------------------------|--|
| | |
| Ensuring Success | As appropriate for each project. |
| Measuring Success | Observe and measure savings by appropriate means |
| Timing | To commence January 2010 |
| Notes | These projects may well have "spin-offs", for example, use of fridges and freezers needs to be reviewed and energy use assessed. Many appliances encountered to date are inefficient, outdated and misused e.g. not defrosted. Possibility of replacement with A++ devices and sharing to be investigated. |

| | |
|---------------------------|--|
| Project: | Energy housekeeping by cleaners, caretakers, caterers etc. |
| Reference: | E9 |
| Ownership | |
| Department | Estates and Facilities |
| Description | <p>Caretaking and cleaning staff can assist greatly in monitoring and reducing the use of energy, especially if proactive in switching off lights, closing windows, and reporting overheated areas and equipment left on unnecessarily. Cleaning staff are now switching off lights when leaving rooms and being generally more vigilant of energy wastage. Caretakers ensure lights are switched off (except in stairwells) and windows closed at the end of the day. Catering staff have been instructed in energy saving opportunities. Involvement in the Green Impact campaign is anticipated by caretakers.</p> <p>Staff located at remote sites (such as Marchwood) need to be aware of the contribution they can make by good housekeeping, and have been contacted.</p> |
| Costs and Benefits | <ul style="list-style-type: none"> • Project cost: No costs identified • Financial savings: £2,000 per annum • Payback period: N/A • CO₂ emissions reduction: 10 tonnes <p>Resource: Time to meet and discuss opportunities and possibly some training activities.</p> |
| Ensuring Success | Feedback from cleaners, caretakers and their managers will be important. Regular informal contact will be maintained with caretakers, cleaners and catering staff by the Environmental and Sustainability Manager, supplemented by annual meetings with Facilities Manager and Cleaners Manager. |
| Measuring Success | Visible evidence of switch off after cleaners leave rooms in mornings and lights switched off overnight. |
| Timing | Cleaners began switching off at City Campus from April 2009 |
| Notes | A survey of practices at Warsash is required. |

| | |
|---------------------------|---|
| Project: | Shutdown of non-essential services during vacation periods |
| Reference: | E10 |
| Ownership | PG/TL/MW/Staff teams and local energy champions |
| Department | Estates and Facilities and building occupiers |
| Description | <p>There is a wide variation in energy requirements of different buildings at different times of the year. Energy use in most buildings over vacation periods should, however, be significantly lower than during term time. Buildings may be empty at times (e.g. over Christmas) or have a substantially reduced need for power due to reduced occupancy (e.g. over summer).</p> <p>A combination of better understanding of requirements, staff awareness, good housekeeping and improved controls will lead to significant savings. Lack of BMS functionality or controls on HVAC equipment in some areas prevents full shutdown being practical at present - for example, in winter, AHU's may need to be left on (at 100%) to avoid potential of frost damage when buildings are empty.</p> <p>Sub-metering will provide detailed information on energy use when installed. See also Project P2</p> |
| Costs and Benefits | <ul style="list-style-type: none"> • Project cost: Awareness campaigns - costs to be assessed. • Financial savings: up to £5,000 per annum • Payback period: N/A • CO₂ emissions reduction: up to 25 tonnes p.a. |
| Ensuring Success | <p>BMS and HVAC control improvements are fundamental to minimising energy consumption in unused areas. Key high usage areas such as IT Resource Centres, Labs, should be targeted</p> <p>Risks: Lack of buy-in from Schools and departments will impede progress.</p> |
| Measuring Success | Via sub-metering - comparisons of use over vacation periods |
| Timing | In progress |

| | |
|---------------------------|---|
| Project: | Wall, roof, pipework insulation - Phase 1 |
| Reference: | P1 |
| Ownership | Estates Team |
| Department | Estates and Facilities |
| Description | <p>The University has a variety of buildings of various constructions and ages. There is a wide range of opportunities to improve thermal insulation at City Campus, Warsash and possibly in the student halls. Initial surveys have been undertaken, as has some Library insulation work. More detailed surveys are required to establish the extent of the requirement. Some buildings with cavity walls may have no cavity insulation. Roof insulation has already been found to be minimal in the Library. The Millais building has many thin wall panels without either cavities or any form of insulation. Newer buildings may be found to have insulation falling short of current standards.</p> <p>A survey of boiler-room valves in Mitchell and Millais has also identified significant opportunities and Warsash survey is scheduled.</p> <p>(see also E2, N6/N7 Insulation and M5 - Building Fabric Upgrade)</p> |
| Costs and Benefits | <ul style="list-style-type: none"> • Project cost: £23,000 • Financial savings: £5,500 • Payback period: 4.1 years • CO2 emissions reduction: 16 tonnes p.a. <p>A small budget is in place and all these preliminary works will be undertaken up to the budget limit, targeting key areas. Subsequent works will require additional funding approval.</p> |
| Ensuring Success | <ul style="list-style-type: none"> • Key success factors: Reduction in kWh energy used. Positive feedback from building users. • Risks: No significant risks identified |
| Measuring Success | |
| Timing | EPT Mountbatten Library roof insulation completed. Cavity surveys to commence March 2010. EPT valve survey completed. Warsash valve survey planned Feb 2010. |
| Notes | |

| | |
|---------------------------|--|
| Project: | Improved space utilisation, control of energy use outside core hours |
| Reference: | P2 |
| Ownership | MW / MF / TL |
| Department | Estates and Facilities |
| Description | <p>Unoccupied buildings often have significant energy use and this is becoming easier to detect with the increasing provision of sub-metering.</p> <p>By improved planning and collaboration with building users over use and timetabling, it will be possible to make significant energy savings by avoiding the non-essential use of use of fuel, HVAC equipment and lighting.</p> |
| Costs and Benefits | <ul style="list-style-type: none"> • Project cost: No costs identified • Financial savings: £5,000 per annum • Payback period: N/A • CO2 emissions reduction: 25 tonnes p.a. <p>Resources: Staff time for planning</p> |
| Ensuring Success | <p>Building users must be made aware of the need to avoid unnecessary use of heating and lighting when areas are not in use.</p> <p>The limited functionality of the existing BMS systems must be addressed to provide increased automation of the control process.</p> <p>Risks: Reduced heating times need to be carefully monitored to ensure temperature levels are reached and maintained during occupied hours. Buy-in from building users will be needed to maximise effectiveness.</p> |
| Measuring Success | Sub-metering will provide data on energy use in specific buildings. |
| Timing | From 2010 - consideration required when planning new timetables |
| Notes | |

| | |
|---------------------------|---|
| Project: | Voltage Reduction at Transformers |
| Reference: | P3 |
| Ownership | MW and Estates Team |
| Department | Estates and Facilities |
| Description | <p>Incoming supply voltage is higher than required. Operating electrical devices at higher than optimum voltages leads to significantly higher energy consumption; mains frequency lighting and most motors consume more power at higher voltages.</p> <p>Two approaches can be used; in some locations, main incoming electricity transformers can safely be tapped down to reduce voltage. Elsewhere, Voltage Optimisation equipment can be installed. The programme will be phased, with tapping down undertaken first, where feasible. Surveys will be undertaken for suitable opportunities for installation of Voltage Optimisation equipment.</p> |
| Costs and Benefits | <p>Phase 1: Andrews, Millais and Library Buildings</p> <ul style="list-style-type: none"> • Financial savings: £13,000 per annum • Payback period: N/A (combine tap down with maintenance work) • CO₂ emissions reduction: 64 tonnes p.a. • Overall: Typically a 4% voltage reduction in affected buildings, giving at least that percentage savings on electricity consumption, based on available case study information. In the areas specified, this will provide 3% of the 25% target reduction. <p>Other benefits:</p> <ul style="list-style-type: none"> • Lowering of maintenance costs on motors, lighting and other electrical equipment • Extension of the life of electrical components by avoiding operation at higher voltages than necessary • Reduction in operating temperatures of motors and lighting |
| Ensuring Success | <ul style="list-style-type: none"> • Key success factors: • Principal risks: Projected annual power saving not achieved as dependent on variables such as equipment in use and power factor. Incompatibility of very old equipment with lower voltages. |
| Measuring Success | <ul style="list-style-type: none"> • Metrics for displaying performance: Monitoring via sub-metering to show consumption before installation vs. after. • How success will be measured: kWh reduction after changes |
| Timing | <ul style="list-style-type: none"> • Andrews - December 2009 • Millais - to coincide with works to be planned for 2010. |
| Notes | Consultation will be necessary with ICT to ensure no equipment exists that has been calibrated/linked to our existing supply voltage - possible with some types of Uninterruptible Power Supply (UPS) equipment. |

See voltage optimisation literature and CIBSE guides for more information on Voltage Reduction / European harmonisation of supply

| | |
|---------------------------|---|
| Project: | Installation of AMR on main incoming water supplies |
| Reference: | P4 |
| Ownership | MW and Estates Team |
| Department | Estates and Facilities |
| Description | Automatic Metering of Water Supply will aid in faster detection and location of leaks and waste water. |
| Costs and Benefits | <ul style="list-style-type: none"> • Project cost: £17,500 - first stage only. • Revenue: c. £600 per annum • Financial savings: Not accurately predictable - dependent on prevalence of leaks, but could be substantial. It is not currently possible to monitor water consumption of buildings overnight, when consumption should be minimal, so leaks can go undetected. • Funding: A small budget of £17,500 is in place and preliminary works will be undertaken up to this budget limit on priority supplies. Subsequent works will be subject to further funding availability. |
| Ensuring Success | <p>Two stages - pulsed meters need to be installed, followed by "banjo" units to transmit data to existing IMSERV Monitoring and Targeting system. (Note there is an annual charge for data collection.)</p> <p>Risks: Monitoring of equipment readings and detection of leaks will need a commitment of staff time. A service currently provided by ADSM includes analysis of data, monthly site visit to check and adjust equipment and read meters. This service will be required for the foreseeable future. It may not be possible to install meters in areas required due to inaccessibility of pipe runs.</p> |
| Measuring Success | Identification of inconsistencies in demand profiles and follow -up investigations will lead to detection of leaks and reduction in consumption. |
| Timing | Water supply will need to be interrupted to fit pulsed meters. Summer vacation is likely to be the preferred time for this work. Mitchell and Millais pulsed meters have already been installed, banjo units and data collection now required. |
| Notes | Liaison will be also be undertaken with Southern Water to establish if pulsed output can be provided from their equipment in some locations. This may be an alternative where metering cannot be fitted due to lack of space on incomers. |

| | |
|---------------------------|--|
| Project: | Lighting upgrade in Deanery Halls |
| Reference: | N1 |
| Ownership | Halls Team / MW |
| Department | Estates and Facilities |
| Description | The corridors and stairwells of the Deanery Halls of residence are continuously lit - i.e. 24 x 7. Automatic controls were installed some years ago in some areas, but removed when there were reliability issues due to lights failing more regularly. New lighting technology is now available to avoid this problem, by providing continuous low energy use with high light output. Installation would reduce energy costs in the Halls significantly and initial tests show improved light output. There are further opportunities in other Halls and stairwells around the University to use a variety of technologies (see Project M3) |
| Costs and Benefits | <ul style="list-style-type: none"> • Project Cost: £65,000 • Financial saving: £15,035 per annum • Payback: 4.5 years (conservatively: see note below) • CO₂ emissions reduction: 74 tonnes • Funding: To be approved |
| Ensuring Success | Equipment to be trialled and energy use / illumination levels measured in key areas. Halls managers have local knowledge of requirements and will be involved in decision making process and implementation. |
| Measuring Success | Sub-metering will indicate savings. Building occupants and managers to be consulted. |
| Timing | First trial in progress Feb 2010 - implementation date subject to funding approval. |
| Notes | Some quotations are indicating 2 year payback, especially when maintenance costs are taken into consideration. |

| | |
|---------------------------|--|
| Project: | Control of small power - automated computer shutdown |
| Reference: | N2 |
| Ownership | To be agreed |
| Department | LIS - ICT |
| Description | <p>Install network-based software system to automatically shut down unused networked computers, reducing power wasted by machines turned on but idle, including overnight.</p> <p>An increasing range of suppliers offer software that can be tailored to suit most environments and requirements. Software includes extensive monitoring information to indicate savings achieved or achievable.</p> <p>To be supplemented by good housekeeping measures, including avoiding unnecessary computer power up during off-peak and low usage periods in Resource centres, Libraries, Computer Labs etc.</p> <p>The integration of Carbon Management principles into IT strategy is a key issue: a wide range of opportunities exist for energy saving in this area.</p> |
| Costs and Benefits | <ul style="list-style-type: none"> • Project cost: £20,000 for software purchase • Operational costs: Support contract required for first year of operation should be included in purchase cost. Ongoing software support estimated at 15% of initial cost. Any ICT operational costs to be agreed. • Financial savings: £36,580 per annum • Payback period: less than 1 year • CO₂ emissions reduction: 180 tonnes per annum <p>Reduced heat gain from computers will also have the potential to reduce air conditioning costs in many areas.</p> |
| Ensuring Success | Funding to be secured by ICT or Estates. ICT will need to ensure full rollout, monitor user feedback and adjust software settings accordingly to suit any exceptional user requirements. Level of savings will depend on configuration of software and extent of rollout. |
| Measuring Success | <ul style="list-style-type: none"> • Software has built in monitoring and targeting which will indicate level of savings and further opportunities. • Sub-meter statistics should provide additional verification of savings |
| Timing | <p>start date: when software purchased</p> <p>end: when all suitable computers have software installed and software has been configured to maximise savings. This will be a gradual process.</p> |
| Notes | To be supplemented by good housekeeping measures, including avoiding unnecessary computer power up during off-peak and low usage periods in Resource centres, Libraries, Computer Labs etc. The integration of Carbon |

Management principles into IT strategy is a key issue: a wide range of opportunities exist for energy saving in this area. The British Computer Society (BCS) has a Low Carbon Group and can provide further advice.

Calculation based on 3,000 desktop computers in use across sites.

Note: Some Universities (including Liverpool) are beginning to offer their software on a free usage basis - if funds are an issue, this route could be investigated.

| | |
|--------------------------|--|
| Project: | Light Fitting Replacement - Mitchell and Collins buildings |
| Reference: | N3 |
| Ownership | MW and Estates Team |
| Department | Estates and Facilities |
| Description | <p>A detailed survey identified 549 inefficient light fittings in Mitchell Building and a further 330 in Collins. Replacing the light fittings and tubes with high frequency T5 tubes and ballasts will result in substantial savings on energy and maintenance.</p> <p>Although many areas of these buildings are fitted with PIR motion detectors, some control gear is not functioning. The opportunity will be taken to upgrade to newer technology if sufficient funds are available.</p> |
| Benefits | <ul style="list-style-type: none"> • Project cost: £85,000 • Financial savings: £23,500 p.a. • Payback period: 3.7 years • CO₂ emissions reduction: 115 tonnes per annum • Other benefits: Lower maintenance costs |
| Funding | <ul style="list-style-type: none"> • Operational costs: N/A • Source of funding: Internal capital • Decision on funding: To be advised |
| Resources | <ul style="list-style-type: none"> • Project Team & contractors; additional resources to be identified |
| Ensuring Success | <ul style="list-style-type: none"> • Key success factors: Reduction in kWh energy used. Positive feedback from building users. |
| Measuring Success | <ul style="list-style-type: none"> • Metrics: Sub-metering • When success will be measured / evaluated: pre and post installation |
| Timing | Commencing 2010 if funds approved |
| Notes | |

| | |
|---------------------------|--|
| Project: | Install Variable Speed Drives and link to BMS |
| Reference: | N4 |
| Ownership | MW / PG / TL |
| Department | Estates and Facilities |
| Description | <p>Variable Speed Drives are electronic controllers for large electric motors such as those used for building ventilation and heating system pumps. They reduce energy consumption by reducing motor speeds (frequency) at times when full output is not required, by matching motor speed to required load.</p> <p>A survey of City campus has already established potential for substantial energy savings, especially when linked into an upgraded Building Management System provided with suitable sensor apparatus (temperature/CO2 etc.)</p> <p>There are opportunities beyond this initial project for further use of this technology around the University. With full BMS integration of variable speed drives and suitable usage monitoring controls, savings over 200 tonnes CO2 may be achieved.</p> |
| Costs and Benefits | <ul style="list-style-type: none"> • Project cost: £50,000 • Financial savings: £14,400 p.a. • Payback period: 3.5 years • CO₂ emissions reduction: 71 tonnes per annum • Other benefits: Extended motor life. |
| Ensuring Success | VSD's work by adjusting motor speed to accurately match load requirements which will be determined by factors such as time of day, occupancy, external temperature etc. Services of a consultant/installer with experience of variable speed drives, careful commissioning, choice of suitable equipment and BMS integration where possible, will be required to maximise benefits. |
| Measuring Success | Calculate savings from each installation by metering before and after where possible. |
| Timing | Initial survey already undertaken and pilot project being planned (see E8) Full project subject to funding. |
| Notes | Library AHU / VSD work in progress. Millais film studios in progress. Andrews building AHU's under consideration. |

| | |
|---------------------------|---|
| Project: | Upgrade and extend BMS to control all HVAC related equipment |
| Reference: | N5 |
| Ownership | MW /PG/TL |
| Department | Estates and Facilities |
| Description | <p>The existing BMS systems have very limited functionality and do not provide requisite features to closely monitor, control and automatically adjust according to requirements, such as occupancy and weather conditions. Close control of heaters, chillers and air handling units is essential to avoid energy waste.</p> <p>There is limited BMS automation, with many AHUs controlled by simple time switches or dependent on manual setting. Full functionality of proposed energy saving measures such as variable speed drives will be dependent on automation and cross-campus integration of BMS control.</p> <p>Full control of plant during times of low occupancy can only be achieved by improving BMS functionality across the sites.</p> |
| Costs and Benefits | <ul style="list-style-type: none"> • Project cost: £50,000 • Financial savings: £18,335 per annum • Payback period: 3 years • CO2 emissions reduction: 90 tonnes p.a. <p>Major savings through identification and control of wastage, estimated 5% of target.</p> |
| Ensuring Success | Complexity of BMS installation and choice of equipment means that ability of installer is critical to functionality. Adequate staff resource - time and expertise - essential to provide ongoing management of the BMS. |
| Measuring Success | |
| Timing | Ongoing from 2011 |
| Notes | |

| | |
|--------------------------|---|
| Project: | Improve thermal performance of buildings - insulation, draught proofing and lagging - year 2 bid allocation - City Campus |
| Reference: | N6 |
| Ownership | Estates Team |
| Department | Estates and Facilities |
| Description | The University has a variety of buildings of various constructions and ages. There is a wide range of opportunities to improve thermal insulation at City Campus, Warsash and possibly in the student halls. Initial surveys have been undertaken, as has some Library insulation work. More detailed surveys are required to establish the extent of the requirement. Some buildings with cavity walls may have no cavity insulation. Roof insulation has already been found to be minimal in some buildings. The Millais building has many thin wall panels without either cavities or any form of insulation; some areas of Collins are similar. Newer buildings may be found to have insulation falling short of current standards. |
| Cost and Benefits | <p>Funding - capital bid submitted for 2010/11. A small budget is in place and preliminary works will be undertaken up to the budget limit (see P1). These and any subsequent works will require further funding approval</p> <p>(See P1, N7 Insulation-Warsash and M5 - Building Fabric Upgrade)</p> <ul style="list-style-type: none"> • Project cost: £45,000 • Financial savings: £9,000 per annum • Payback period: 5 years • CO2 emissions reduction: 50 tonnes p.a. |
| Ensuring Success | <ul style="list-style-type: none"> • Key success factors: Reduction in kWh energy used. Positive feedback from building users. • Risks: No significant risks identified |
| Measuring Success | Reduced energy use as indicated by sub-meter information. Improved comfort of building users. |
| Timing | Subject to funding, work commencing late 2010 |
| Notes | |

| | |
|---------------------------|---|
| Project: | Improve thermal performance of buildings - insulation, draught proofing and lagging - year 2 bid allocation - Warsash |
| Reference: | N7 |
| Ownership | Estates Team |
| Department | Estates and Facilities |
| Description | The University has a variety of buildings of various constructions and ages. There is a wide range of opportunities to improve thermal insulation at Warsash. Surveys are required to establish the extent of the requirement. Some buildings with cavity walls may have no cavity insulation. Roof insulation has already been found to be minimal in some buildings |
| Costs and Benefits | <ul style="list-style-type: none"> • Project cost: £25,000 • Financial savings: £6,000 per annum • Payback period: 4.2 years • CO2 emissions reduction: 33 tonnes <p>Funding - capital bid submitted for 2010/11</p> <p>(see also N6 Insulation and M5 - Building Fabric Upgrade)</p> |
| Ensuring Success | <ul style="list-style-type: none"> • Key success factors: Reduction in kWh energy used. Positive feedback from building users. • Risks: No significant risks identified |
| Measuring Success | Sub-meter information. Improved comfort of building users. |
| Timing | Ongoing from August 2010 by arrangement with building users |
| Notes | |

| | |
|---------------------------|--|
| Project: | Replacement of small gas boilers - Warsash site |
| Reference: | N8 |
| Ownership | Estates Team |
| Department | Estates and Facilities |
| Description | <p>Warsash Mountbatten Library and the two Fire School gas boilers are old and inefficient, with minimal control. Maintenance costs will rise substantially if no action is taken to replace these boilers. A recent survey has indicated that significant savings could be made by replacing them with modulating control condensing boilers.</p> <p>The work will also incorporate improved monitoring and control systems linked to the BMS for enhanced savings.</p> |
| Costs and Benefits | <ul style="list-style-type: none"> • Project cost: £21,000 • Financial savings: £3566 per annum • Payback period: 5.9 • CO2 emissions reduction: 18 tonnes p.a. <p>Reduced energy consumption, improved functionality and comfort for building occupants. Reduced maintenance costs and increased reliability.</p> |
| Ensuring Success | Gas sub-metering to be fitted as soon as possible to provide precise measurement of existing use. This will ensure comparisons can be made before and after installation of new boilers and controls. |
| Measuring Success | Sub-meter information. Improved control should have beneficial effects on comfort and temperature stability for building users. |
| Timing | Preferably after gas submeter installation. To coincide with summer switch off of gas boilers or other maintenance work. By consultation with building occupants. |
| Notes | Lack of gas sub-metering makes precise calculation of energy use difficult at present; apportionment of usage by floor area is likely to provide an under-estimate due to nature of use of these buildings. The Library is heated using an underfloor heating system and without precise control, such systems can be very inefficient. Savings calculated may therefore be understated. |

| | |
|---------------------------|--|
| Project: | Install AMR on Gas and Geothermal incoming supplies |
| Reference: | N9 / N10 |
| Ownership | Estates Team |
| Department | Estates and Facilities |
| Description | <p>Warsash Campus - has two fiscal gas meters measuring all gas supply to the site. It is not possible to establish the gas usage of <i>any individual building</i> at present. Gas sub-meters (or heat meters where buildings are supplied from a central boiler house) are required for this purpose and will be connected to the existing IMServ monitoring system to provide accurate and accessible information. Additionally, AMR is required on the two Fiscal Meters and GDF have been contacted.</p> <p>City Campus - Four geothermal meters provide limited data, but no real-time or historical information for monitoring and targeting. Connection to the IMServ system will provide improved capability. If possible extra connections will be provided to link to BMS controls. Installation of AMR will greatly assist in identification of waste energy (especially if control faults arise) and will result in additional savings.</p> |
| Costs and Benefits | <ul style="list-style-type: none"> • Project cost: Subject to survey - budget cost £28,000 • Financial savings: £14,000 p.a. • Payback period: Subject to survey - typically less than 3 years • CO2 emissions reduction: 51 tonnes <p>Major savings through identification of wastage, estimated at up to 5% of target.</p> |
| Ensuring Success | Risk factors include ability to connect suitable pulsed output AMR meters for Gas and Geothermal - surveys have been commissioned. Utilicom agreement required for Geothermal meter connections. IMServ compatibility essential. |
| Measuring Success | Ability to monitor and act on data acquired to make savings after installation. |
| Timing | <p>Feasibility surveys have already been commissioned. Subject to favourable report and feedback, work will begin when funds are available.</p> <p>The gas installation will need to coincide with periods of low demand on gas supply, commence summer 2010 earliest.</p> |
| Notes | |

| | |
|---------------------------|---|
| Project: | Reduce waste to landfill - reduce to 80% of baseline |
| Reference: | N11 |
| Ownership | Estates and Facilities Teams |
| Department | Estates & Facilities |
| Description | As part of waste management programme |
| Costs and Benefits | <ul style="list-style-type: none"> Carbon saving : 123 tons (from baseline) |
| Ensuring Success | <ul style="list-style-type: none"> Ensure wider awareness via campaigns |
| Measuring Success | <ul style="list-style-type: none"> Monitoring returns from Waste contractor |
| Timing | Work is already in progress |
| Notes | Improved waste handling to be supplemented by a variety of awareness raising campaigns and information targeted at both students and staff throughout the course of the programme |

| | |
|---------------------------|---|
| Project: | Extend Warsash BMS across site and improve main boiler control |
| Reference: | N12 |
| Ownership | Team |
| Department | Estates |
| Description | An upgraded BMS has only recently been installed at Warsash and is initially being used to provide basic control over buildings on the top part of the site. This control needs to be gradually extended to encompass most buildings and improve the nature of the control, by installation of improved sensor equipment. Additionally, as part of this project, it is intended to provide more accurate control over firing of the three main (Moyana) boilers and on the flow/return temperatures of the various buildings. |
| Costs and Benefits | <ul style="list-style-type: none"> • Project cost: Subject to survey - budget cost £30,000 • Financial savings: £7,260 p.a. • Payback period: 4.2 yrs • CO2 emissions reduction: 37 tonnes |
| Ensuring Success | <p>System to be fully commissioned and all necessary controls to be installed.</p> <p>Risks: Complexity of BMS installation and choice of equipment means that ability of installer is critical to functionality. Adequate staff resource - time and expertise - essential to provide ongoing management of the BMS.</p> |
| Measuring Success | Ability to monitor and control Warsash settings across full site from City Campus. Measurement of overall reduced energy usage of site, later via sub-meters to be installed. Positive comments from occupants. Saving of staff time and effort in visiting remote site to monitor and change settings and repair faults. Faster diagnoses of faults. Automation of processes. |
| Timing | Ongoing from 2011 |
| Notes | Gas and Electric Submeter installation required for accurate measurement, especially of improved local controls on main boilers. With full sub-metering, measured trials of boiler control equipment will be feasible before final decision is made.. |

| | |
|---------------------------|---|
| Project: | Remedy District Heating (Geothermal) inefficiencies |
| Reference: | M1 |
| Ownership | |
| Department | Estates and Facilities |
| Description | The City Campus is supplied with much of its heating capacity from the Southampton district heating (geothermal) scheme. The heating distribution arrangements were adapted many years ago from a system initially devised for heating provided by gas boilers. Temperatures provided are often inadequate, as are controls regulating space temperatures around the site, leading to both under and overheating and wasted energy. A full review of control and supply arrangements, including Constant and Variable Temperature circuits is required, followed by appropriate action. |
| Costs and Benefits | <ul style="list-style-type: none"> • Project cost: £100,000 initially • Financial savings: £31,130 • Payback period: 3.2 years • CO₂ emissions reduction: 89 tonnes of per CO₂ per annum • Other benefits: Lower maintenance costs, improved consistency of temperatures and comfort for building users |
| Ensuring Success | <ul style="list-style-type: none"> • Key success factors: Reduction in kWh energy used. Positive feedback from building users. • Risks: Supply temperature is not under the control of the University. Close collaboration with the scheme providers will be required to ensure benefits are maximised. Further issues may be identified in the review process. Existing metering is inadequate for more refined monitoring of geothermal energy use. |
| Measuring Success | <ul style="list-style-type: none"> • Reduction of consumption will be monitored via existing metering, supplemented by connection of meters to IMServ system and extra metering where possible. |
| Timing | Work will require draining down of circuits, to be coincided with maintenance work where possible. Work to be carried out when minimum disruption will be caused; will require isolation of circuits or geothermal heating to be turned off. Faulty TRVs need to be detected in winter, plan to fit during summer months. |
| Notes | Figures for savings based on Carbon Trust surveys and known issues with systems. A detailed survey is required of all City Campus provision. Some areas may be more economically and efficiently served by installation of alternative forms of water or space heating. Many areas have no thermostatic controls. Full survey required - further opportunities are likely to be discovered as work progresses. |

| | |
|---------------------------|--|
| Project: | Voltage Optimisation using VPO units |
| Reference: | M2 |
| Ownership | Team |
| Department | Estates and Facilities |
| Description | Voltage reduction will provide significant energy savings. Due to transformer and distribution configurations, voltage reduction of some buildings is only possible by installing voltage optimising or “VPO” equipment. This will provide additional benefits over simple tapping down of voltage at the transformers. |
| Costs and Benefits | <ul style="list-style-type: none"> • Project cost: £35,000 • Financial savings: £9,800 per annum • Payback period: 3.6 years • CO₂ emissions reduction: 48 tonnes p.a. <p>Other benefits:</p> <ul style="list-style-type: none"> • Lowering of maintenance costs on motors, lighting and other electrical equipment • Extension of the life of electrical components by avoiding operation at higher voltages than necessary • Reduction in operating temperatures of motors and lighting • Improvement of power quality, further improving the operating efficiency of electrical equipment • Protection of electrical and electronic equipment from voltage transients and short-term power surges • Correction of phase voltage imbalance • Suppression of harmonics that can damage sensitive equipment. • Payback period: • CO₂ emissions reduction: per CO₂ per annum • Other benefits: Lower maintenance costs |
| Ensuring Success | <ul style="list-style-type: none"> • Key success factors: Reduction in kWh energy used. • Risks: potential for savings is dependent on nature of equipment and electrical load. |
| Measuring Success | <ul style="list-style-type: none"> • Metrics: Sub-metering • When success will be measured / evaluated: pre and post installation |
| Timing | Power Perfector have undertaken Voltage measurements at EPT and savings of over 8% are predicted where equipment is installed in appropriate locations. Detailed survey of opportunities to be arranged early 2010. |
| Notes | Subject to further survey of transformer distribution and pre-installation surveys of proposed locations for installation of VO units. |

| | |
|--------------------------|---|
| Project: | Lighting and Control Upgrades - Campus wide programme |
| Reference: | M3 |
| Ownership | Team |
| Department | Estates and Facilities |
| Description | <p>Much older lighting still exists with inefficient lamps and ballasts, and there is little automatic control. Lighting is frequently left on when rooms are empty and when there is adequate daylight.</p> <p>A programme is required to move in stages to high frequency control gear, T5 tubes, provide automated control and reduce the number of tubes - or fittings - where feasible. LED technology will be appropriate for some areas.</p> <p>Movement and/or daylight sensing PIR/microwave can be retrofitted to existing lighting in corridors, teaching rooms, offices, toilets, kitchens and other appropriate areas, including the student residences. Further works will be identified as the project progresses.</p> |
| Benefits | <ul style="list-style-type: none"> • Project cost: £250,000 • Financial savings: £79,656 per annum • Payback period: 3.1 years • CO₂ emissions reduction: 391 tonnes of per CO₂ per annum • Other benefits: Lower maintenance costs |
| Funding | <ul style="list-style-type: none"> • Operational costs: N/A • Source of funding: Internal capital • Decision on funding: |
| Resources | <ul style="list-style-type: none"> • Project Team & contractors; additional resources to be identified |
| Ensuring Success | <ul style="list-style-type: none"> • Key success factors: Reduction in kWh energy used. Positive feedback from building users. |
| Measuring Success | <ul style="list-style-type: none"> • Metrics: Sub-metering |
| Timing | Start date: Minor projects already funded will commence January 2010. Larger projects will commence when funds are available. |
| Notes | <p>Fastest return on investments will be achieved where lighting is on for longest periods and where alterations can be made without redesign of lighting grids and/or fittings. Work should be prioritised accordingly.</p> <p>Some areas can be upgraded with inexpensive solutions which provide fast payback but are less satisfactory in terms of appearance, such as "Save it Easy" fittings. Evaluation on a case by case basis will be necessary; location, nature of building use and future plans should all be considered when choosing the preferred solution.</p> |

| | |
|---------------------------|--|
| | LED technology is being considered where appropriate, savings potential is substantial. |
| Project: | Replace obsolete HVAC in City Campus Mountbatten Library |
| Project: | Building fabric upgrade across campuses |
| Reference: | Team |
| Ownership | Leases and Facilities |
| Department | Leases and Facilities |
| Description | <p>The University has a variety of buildings of various constructions and ages. There is a wide range of opportunities to improve thermal insulation at City Campus, Warrash and possibly in the student halls. Initial surveys have been undertaken, as has some Library insulation work. More detailed surveys are required to establish the extent of the requirement. Some buildings with areas of cavity walls have no cavity insulation. Roof insulation has already been found to be minimal in some buildings. The Millais building has many thin wall panels without either cavities or any form of insulation. Newer buildings may be found to have insulation falling short of current standards.</p> <ul style="list-style-type: none"> • Project cost: £250,000 • Financial savings: £19,600 • Payback period: 12.7 years • CO₂ emissions reduction: 96 tonnes per annum <p>Other benefits: Improved environment. Replacement of obsolete equipment will be undertaken to reduce maintenance. Subsequent compliance with FGD provisions.</p> <ul style="list-style-type: none"> • Operational costs: • Source of funding: |
| Costs and Benefits | <ul style="list-style-type: none"> • Project cost: £500,000 • Financial savings: £42,550 per annum • Payback period: 11.8 years • CO₂ emissions reduction: 148 tonnes per annum • Maintenance: existing equipment nearing end of useful life • Other benefits: • Operational costs: • Source of funding: TR4 • Key success factors: Reduction in kWh energy used. Positive feedback from building users. • Decision on funding: |
| Ensuring Success | <ul style="list-style-type: none"> • Key success factors: Reduction in kWh energy used. Positive feedback from building users. • When success will be measured / evaluated: pre and post installation |
| Measuring Success | <ul style="list-style-type: none"> • Metrics: Sub-metering • Milestones / key dates: • When success will be measured / evaluated: pre and post installation |
| Timing | Many days to be initiated in 2010. Work R12 refrigerant as funds are available. replacement of units is already overdue. |

| | |
|---------------------------|--|
| Notes | Based on preliminary figures from Carbon Trust Extended Carbon Survey. Further detailed surveys will be required to establish priority of work and calculate savings from individual building works. Opportunities will be prioritised and based on calculated returns on investments. |
| Project: | Control of air conditioning units from BMS |
| Reference: | M6 |
| Ownership | Team |
| Department | Estates Team |
| Description | Localised air conditioning and comfort cooling systems have, in most cases, very limited and local control. Some units are located near radiators and instances of cooling and heating from different sources operating simultaneously are not uncommon. This is primarily due to lack of centralised control. Many units could be adapted by installation of a module to connect to the Building Management System, providing control over operational hours and function. Where this is not possible, improved local management and information could avoid excessive use. |
| Costs and Benefits | <ul style="list-style-type: none"> • Project cost: £24,000 • Financial savings: £3,830 per annum • Payback period: 6.2 years • CO₂ emissions reduction: 19 tonnes per annum |
| Ensuring Success | <ul style="list-style-type: none"> • Key success factors: Reduction in kWh energy used. Positive feedback from building users. • Collaboration with local users will be necessary , especially where process cannot be fully automated |
| Measuring Success | <ul style="list-style-type: none"> • Metrics: Sub-metering • When success will be measured / evaluated: pre and post installation |
| Timing | |
| Notes | |

| | |
|---------------------------|---|
| Project: | Waste to Landfill - reduce to 60% of baseline |
| Reference: | M7 |
| Ownership | Team |
| Department | Estates & Facilities |
| Description | As part of waste management programme |
| Costs and Benefits | <ul style="list-style-type: none"> Carbon saving : 98.4 tons (from baseline) |
| Ensuring Success | <ul style="list-style-type: none"> Ensuring wider awareness via campaigns |
| Measuring Success | <ul style="list-style-type: none"> Monitoring returns from Waste contractor |
| Timing | Second stage of gradual reduction - 2012 onwards |
| Notes | |