

Carbon Management Plan

Executive summary

HEFCE has set the sector a carbon emissions target of reducing scope 1 and 2 emissions by 34% by 2020 against a baseline of 1990, which translates to a 48% reduction against a 2005/06 baseline. However, HEFCE recognised because of the diversity of the sector, institutions must develop their own carbon reduction targets based on their own, particular circumstances and ambitions.

The University of Southampton has invested resources in tackling carbon emissions for many years, completing the HE carbon management programme in 2005/06. Continuing investment in the Combined Heat and Power (CHP) and district heating system, Automatic Monitoring System and Building Energy Management System (BEMS) have all helped deliver carbon and financial savings over the past 5 years.

In 2005/06, the University's carbon emissions were 51,878 tonnes plus an estimated 31 tonnes from fleet vehicles. In trying to set a baseline it is important to note that the estate has changed markedly since 2005 as campuses have been sold or developed whilst, simultaneously student and staff numbers have grown alongside increasingly energy intensive, use of the estate.

Whilst recognising the ambition of the University's growth strategy, this document proposes both a policy and a plan to reduce by 20% absolute, all scope 1 and 2 carbon emissions by 2020 based on the 2005/06 baseline. This significant challenge will require a reduction in excess of 10,400 tonnes of carbon output, though further work will be needed to refine and verify the baseline. Although not yet legally required, it is recommended that the University also calculates scope 3 emissions and seek to reduce them. This document sets out an ambitious reduction target and asks that the risk of failing to achieve this objective be recognised.

This document also strongly endorses the proposal contained in the draft capital plan for the period to 2014/15 that the University will commit resources of £1m per annum to drive down carbon output and deliver financial savings. In order to meet the carbon reduction target, it is extremely likely that a similar level of spending will be required in the period to 2020 and beyond.

This document proposes that there be a Carbon Reduction Team established from existing resources supplemented by external consultancy or contract support staff, its purpose being to implement the delivery of the targets stated above.

Carbon Management Plan – The Overall Requirement.

1. Background - HEFCE requirements

Climate change is perceived to be one of the most urgent of world challenges and is recognised as such by the UK Government who has enacted the Climate Change Act of 2008. This act aims to improve carbon management and help the transition towards a low carbon economy in the UK. The Act sets, (against a 1990 baseline), the world's first legally binding reduction targets for greenhouse gas emissions of at least 34% by 2020 and of at least 80% by 2050. In HEI's the measurement baseline will be set at 2005 (for all direct "scope 1 or 2 emissions" e.g. directly burned fuel, vehicle and purchased energy emissions).

HEFCE, in publishing its Sustainability Strategy in 2009 (HEFCE, 2009/03) outlined how it expects all Higher Education Institutions, to seek a higher standard in addressing sustainability, including climate change. HEFCE had previously announced in its January 2008 grant letter that "all institutions in receipt of capital funding should have plans to reduce carbon emissions and performance against these plans should be a factor in future capital allocations".

HEFCE has set the sector a carbon emissions target of reducing scope 1 and 2 emissions by 34% by 2020 against a 1990 baseline, which equates to a 48% reduction against a 2005/06 baseline (HEFCE, 2010/01).

In January 2010, HEFCE published its Carbon reduction target and strategy for higher education in England (HEFCE, 2010/01) and from 2011 capital allocations will be linked to carbon reduction. All Universities have been requested to develop a carbon management plan that includes:

1. A carbon management policy or strategy;
2. A carbon baseline for 2005/06 that covers all scope 1 & 2 emissions;
3. Carbon reduction targets. These must:
 - a. Cover scope 1 and 2 emissions, although one can set additional targets for scope 3 emissions;
 - b. Be set against 2005/06 baseline, although one can set targets against an alternative baseline;
 - c. Be set to 2020 to correspond to interim Government targets. HEFCE recognise that institutions must develop their own carbon reduction targets based on their particular circumstances and ambitions and the University of Southampton's target is to cut carbon emissions by 20% in absolute terms compared to 2005/06 levels; and
 - d. Be publicly available and communicated within the University community and beyond
4. An implementation plan to achieve absolute carbon emission reductions across scopes 1, 2 and 3 including timescales and resources;
5. Clear responsibilities for carbon management;
6. A commitment to monitor progress towards targets regularly and to report publicly annually;
7. The carbon management plan and targets must be signed-off by the governing body.

The absolute reduction target of 20% by 2020 hides a far larger real terms reduction. Using expected staff and student numbers as a per capita proxy for activity, our real terms reduction would be about 38%.

This document recommends the methods by which University will attempt to meet these requirements and reduce carbon emissions whilst maintaining its reputation as a world class research and teaching institution. A Carbon Management Plan is now a HEFCE requirement.

2. Further Drivers for carbon reduction

As a leading global university Southampton has a significant responsibility to not only play its part in achieving a significant and sustainable reduction in carbon emissions, but also to lead the development of new technological and social responses to facilitate the required global reduction. The drivers are strong and the University's response to these and its performance will not only demonstrate its commitment across its community but also to its stakeholders national and international.

2.1 The Carbon Reduction Commitment (CRC) Energy Efficiency Scheme

The Carbon Reduction Commitment Energy Efficiency (CRCEE) Scheme began its “introductory” phase on 1st April 2010. The introductory phase ends in three years from now, on 31st March 2014. Subsequent phases will each last 6 years. Under the scheme, organisations consuming in excess of 6000MWh of half hourly metered, electricity must register as full participants in the Scheme and be subjected to compliance and credit purchase requirements. As the University of Southampton consumes about 153,385 MWh’s of electricity pa on average, it therefore must participate in the scheme by purchasing allowances.

The first sale of allowances will take place in 2012 and will cover the 2011/12 emissions. Thereafter, a performance league table showing each participating organisation’s carbon emissions will be published as a benchmarking and reputational tool.

2.2 Planning

In Planning terms, there is a growing awareness of the powers conferred upon Development Control through the “Merton rule” which substantially strengthens the ability of a planning authority to demand highly sustainable and low energy solutions. This, together with the publication of Southampton City’s Local Development Framework in January 2010 and its demand of “BREEAM Excellent” as a planning policy requirement seems certain to drive an approach of a low carbon approval process (SCC, 2010). Thus it becomes important for the University to demonstrate a strongly proactive approach to carbon reduction in all developments as “BREEAM Excellent” incorporates very challenging energy reduction targets in both new build and increasingly, in refurbishment.

2.3 Good Citizenship and Stakeholder Reputation

The University’s Strategic Framework enshrines environmental sustainability. Having a reputation for energy efficiency and a commitment to responsible consumption is an increasingly important aspect of the University’s profile with current and prospective students and staff as well as with regional and national stakeholders. The University’s commitment and performance are increasingly visible.

“People and Planet’s Green League” (originally published in 2007) ranks each University’s performance in addressing environmental concerns. This, together with other available benchmarking data, e.g. “Green Gown awards”, “Universities that Count” etc. offers increasing accessibility and public comparison of individual Universities’ performance, in addressing the sustainability agenda.

2.4 Showcasing Research and Educating Global Citizens

Southampton’s world class research on renewable energy and sustainable development is of major importance and the University should demonstrate its practical value to its own operations and estate. In this way the University can enhance its reputation as having real world impact as well as providing demonstration projects for new technologies.

As a leading global University Southampton strives to produce global citizens who will contribute to leading and shaping the sustainable economies and societies of the future. Equipping students with knowledge revealed by university practice and engaging them in monitoring and auditing performance in terms of carbon reduction will be an important means of contributing to their experience.

2.5 Supply Price Volatility.

In the financial year 2008/09, the University expended £3.34m on gas and £3.64m on electricity (excluding NOC, Chilworth Science Park, Southampton University Hospital Trust and other “outsourced sites”). The University’s present consumption of energy has an upward trend whilst it seems inevitable that both supply price cost and volatility will increase. This has been very recently demonstrated by the political instability in the Middle East resulting in oil reaching \$120 a barrel. Reducing the University’s overall demand reduces its exposure to this risk and minimises negative financial impact. Even using the current expenditure figures (which included 5 months when the VAT rate was 15% rather than the current 20%), a 20% reduction in energy costs would equal £1.4 million per annum.

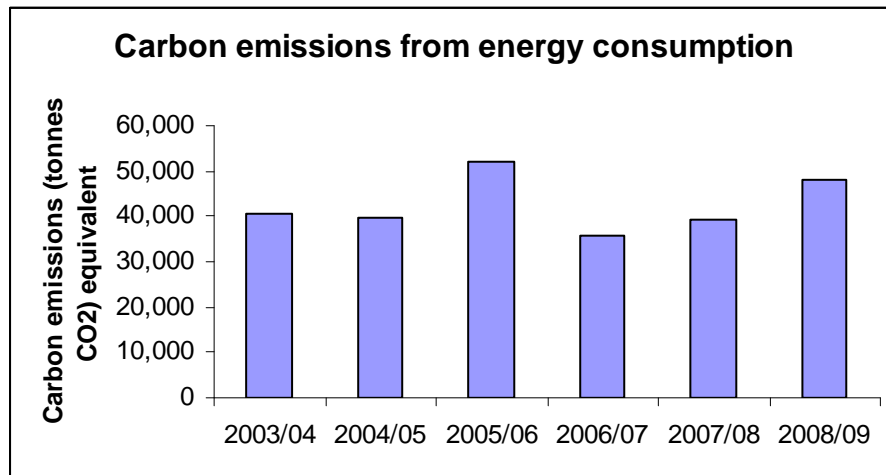
3. Energy consumption by the University of Southampton.

The University of Southampton has an overall floor area of 379,539 sq metres and the ‘carbon footprint’ is generated largely by the following:

- Heating, cooling and ventilation loads in buildings;

- Lighting in buildings and landscape/car parks;
- Energy consumed by activity e.g. research tools and equipment including ICT and
- Travel including business travel on University business and University fleet consumption.

In 2008/09, the University's energy consumption resulted in an output of c 48,000 tonnes of CO₂:



Both best practice and common sense indicate that a clear understanding of the University's current energy consumption is a pre-requisite to identifying future reduction opportunities.

Although the University currently lacks the precise picture of use, this does not prevent some immediate observations to be made which will help inform the way forward.

- The University's energy consumption is rising year on year since 2006/07, mainly because of commissioning of the energy intensive Mountbatten building and increased activity on University sites.
- Staff and Student comfort expectations have, in common with business generally, risen and continue to rise. For example, user installed air conditioning and ICT has increased dramatically over the last 5 years. As this is likely to continue, this will further add to the overall carbon footprint. This mirrors the experience of the UK generally, where electrical loads have been growing at approximately 2% pa compound for some time.
- Growth in staff and student numbers in future will, similarly, continue to add to the base load.
- "Working the Estate" harder, particularly with longer working days, may impact significantly upon energy consumption especially given the predominantly winter (and thus 'dark hours') concentration of activity.
- A growth in some of our most highly regarded research areas (high performance computing, opto-electronics, nanotechnology etc) will substantially increase power usage.
- The carbon footprint of 'spin off' companies is not captured, nor that footprint of subsidiaries such as Chilworth Science Park. Inclusion of this data, which is mandatory for the Carbon Reduction Commitment Energy Efficiency Scheme will, inevitably, make matters worse.

4. Carbon Reduction Opportunities and Barriers to Change

4.1 Savings can be made

A 20% saving in energy consumption would equate to recurrent financial savings of £1.4M per annum based upon energy expenditure in 2008/09. That savings can be made, there is no

doubt. For example, a recent experiment undertaken in building 58, (Murray Building – largely Social Sciences), of simply turning off PC's (normally left on by users overnight) indicated potential savings in that building alone of £10.8k per annum. More recently still, analysis of data from Building 22, (temporary accommodation for Department of Civil Engineering and the Environment), indicated potential savings of 20,000 kwh/pa simply by effecting a minor controls modification. None of these savings would have been possible without the information offered by the University's recently installed Automatic Metering System.

4.2 Business strategy

Until 2010, a significant barrier lay in the lack of clarity relating to the University's business strategy. A carbon management plan should always align with the Institution's strategic plan, and as some of the University of Southampton's core research work, e.g. Photonics, Engineering, High Performance Computing, Chemistry etc, requires an intensive use of energy the fact that the University's strategic plan is now defined and visible has removed both any doubts and therefore the barrier.

4.3 Senior management commitment

The creation of the University of Southampton's Environment and Sustainability Advisory Group chaired by a Dean and comprising representatives from across the Faculties and Professional Services will strengthen commitment but the principles of achieving a low carbon University must be embedded in strategic decision making if progress is to be made

An effective carbon management plan requires commitment and support from the University Council. Carbon management will not be an optional extra in the future, it will be part of the regulatory framework in which the University operates.

4.4 Data analysis and boundaries.

Comprehensive energy usage data is fundamental to success, as is accurate analysis. For progress against targets to be adequately monitored, the parameters must remain constant or be adjusted proportionately. It must be recognised that further work is needed in the early phase of the plan to clarify and fix these parameters.

4.5 Institutional culture and staff engagement

Ownership of this plan by the whole University community is essential for its success. But the University is no different from society as a whole – there are environmental enthusiasts, but many individuals struggle to see how their actions will make a difference and feel that they lack the information which may support decisions to change behaviour. Regular dissemination of data, of best practice, case studies and success stories is essential. At the most basic level this could motivate individual members of staff to switch-off energy consuming equipment at the end of their working day. Students in hall already engage in the national Switch-Off campaigns. A change in culture could have profoundly positive effects. It is proposed that efforts to change behaviour will be increased e.g. an improved, electricity devolved charging scheme will be implemented in 2011 which will directly link Faculty electrical consumption to their charge and so, hopefully, encourage energy saving measures. We will improve the communication to building users and inform them of individual building energy consumption.

5. Recommended savings target

It is recommended that the University of Southampton should reduce energy consumption in the period to 2020. The target recommended is a 20% reduction for scope 1 & 2 emissions against a 2005/06 baseline. This is based on the agreed emission scopes as set out below:

Scope	Includes	Inclusion in baseline
Scope 1: Direct emissions from sources that are owned or controlled by the University	Emissions from energy use from fossil fuel (gas, coal, oil) combustion and electricity use. Transport emissions from fleet vehicles.	Mandatory
Scope 2: Indirect emissions.	Emissions associated with the consumption of purchased electricity within the University's estate	Mandatory
Scope 3: Other indirect	Emissions from other sources	Optional – a target to be set

emissions.	- water use, waste and procurement, land use, business and commuting travel	in due course.
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Adopting this target will require a cut in output of c10,400 tonnes of carbon (though further work is needed to resolve the boundary and scope of the baseline to ensure the University cuts carbon emissions directly within its control). Targets for Scope 3 emissions will also be developed and adopted in due course.

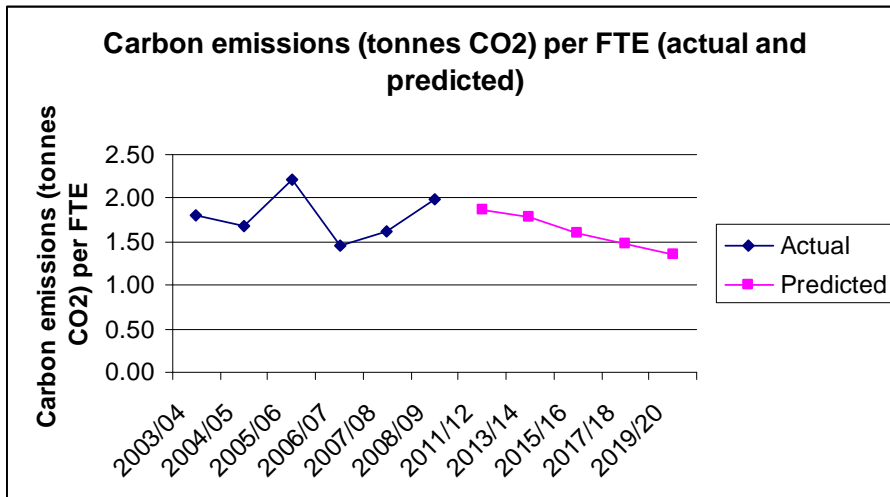
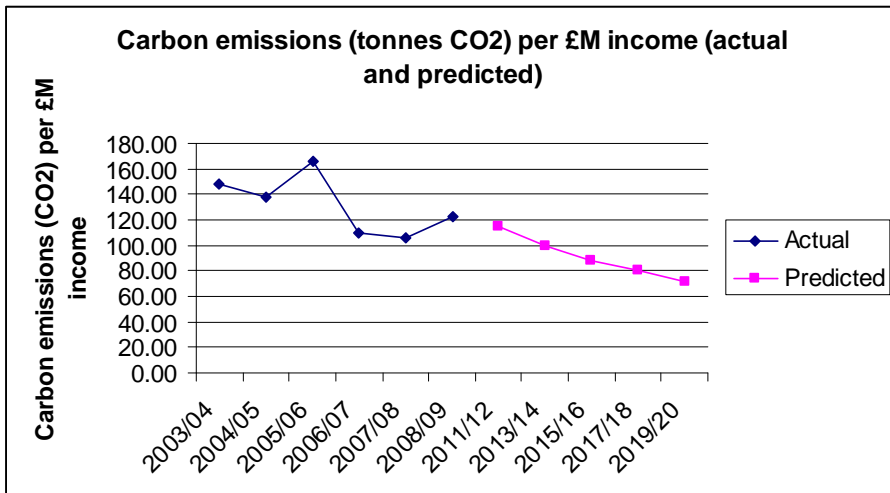
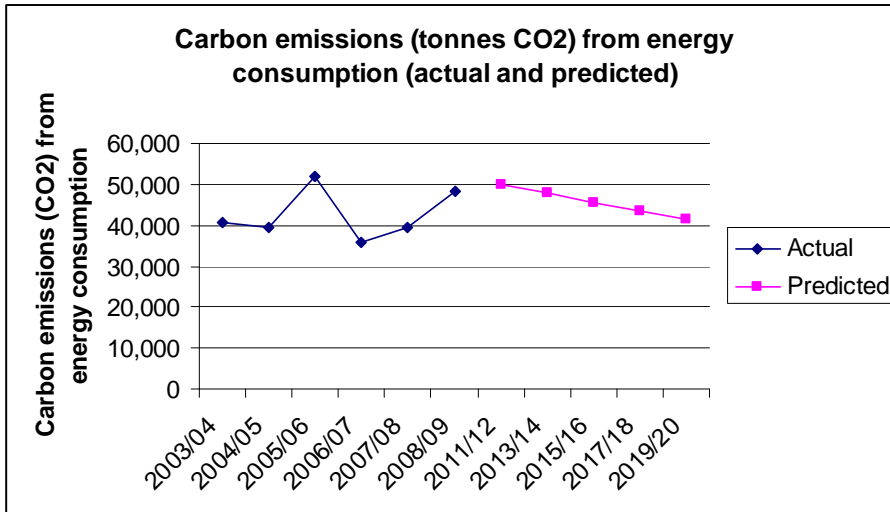
To take account of the growth of the University both in terms of its estate and activity additional targets are recommended, based on the following metrics:

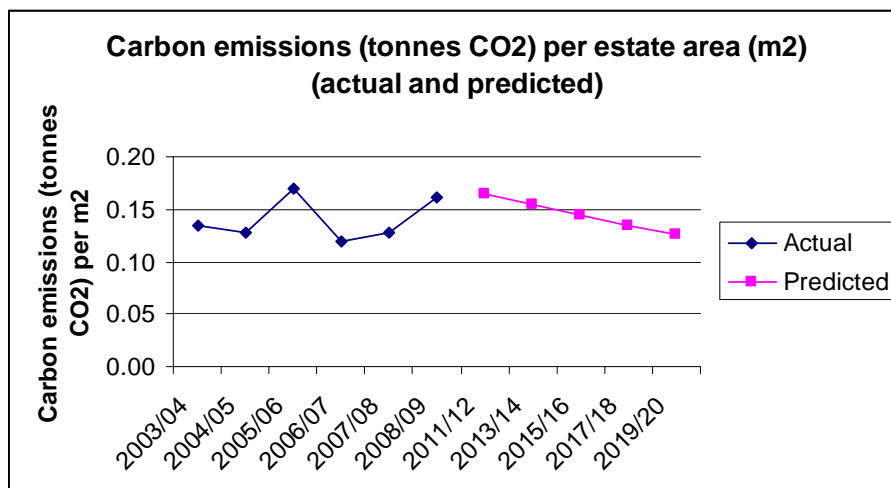
Estate	Metric (tonnes carbon dioxide equivalent (CO2 e))
University	10,400 tonnes Absolute reduction
Campus	Per m ²
Halls	Per student occupancy
University	Per £M turnover

These targets are shown more fully in Appendix A, and are summarised below.

	Actual		Estimated	
	2005/06	2008/09	2015/16	2019/20
Energy consumption	174443928	162,165,974	-	-
Carbon emissions from energy consumption (tonnes CO2)	51,878	48,156	45,653	41,503
Income (£M)	311.7	394.2	515	580
Total FTE	23,362	24,284	28,550	30,350
Net internal area (m2)	304,820	297,612	315,828	328,588
Carbon emissions per £M income	166	122	88.6	71.6
Carbon emissions from energy consumption (tonnes CO2) per FTE	2.2	2	1.6	1.37
Carbon emissions from energy consumption (tonnes CO2) per m2	0.17	0.16	0.14	0.13

The reduction together with reasonable intermediate targets is shown graphically below.





In the graphs above, it has been assumed that spatial growth in the estate will continue at the rate of 1% pa including and beyond 2011.

6.0 Implementation Plan and Investment

6.1 Investment

From August 2011, the University will commit £1M per annum to carbon reduction projects. Where investment against specific projects is identified, there should be a clear pay back. It is proposed that the payback should be generally c 5 years or less in terms of prioritisation of project but that this rule should be capable of variation and extension if an adequate business case is presented.

6.2 Projects

Examples of specific and early implementation of projects are shown in Appendix B, the delivery mechanism being structured around a team (the Carbon Reduction Team) which will be established within Estates and Facilities to focus substantially on the targeted reduction. This delivery group will consider, promote and seek additional approaches to funding this work, such as shared saving schemes with Energy Services Companies (ESCOs) as well as seeking other sources of funding, such as HEFCE, Salix, and Feed-in Tariffs.

6.3 Measurement

A key element of this Implementation Plan will be the continuing measurement of utility use to determine progress. In compliance with this objective the University will continue to invest in its Automatic Monitoring System (AMS) and Building Energy Management System (BEMS) in order to provide accurate data for auditing and corrective intervention. More electricity, heat and water meters are needed and will be added as opportunities arise.

Monitoring data will be delivered as follows:

Source	Scope	Data Source	Responsibility	Reporting frequency
Electricity	1 & 2	Meters Bills	Director of Estates and Facilities devolved to Assistant Director (Engineering) & E&F Finance Manager	Monthly
Gas	1	Meters Bills	Director of Estates and Facilities devolved to Assistant Director (Engineering) & E&F Finance Manager	Monthly
Fleet vehicles	1	Fuel use and/or mileage	Director of Estates and Facilities devolved to Deputy Director/Transport	Annual

			Team.	
Water	3	Meters Bills	Director of Estates and Facilities devolved to Assistant Director (Engineering) & E&F Finance Manager	Monthly
Waste	3	Bills Contractor returns Carrier notes	Director of Estates and Facilities devolved to Campus Services Manager/Building Programmes Manager/Capital Projects Manager	Quarterly
Transport - commuting	3	Biannual/tri-annual surveys	Director of Estates and Facilities devolved to Deputy Director/Transport Team.	Biannual (staff) Tri-annual (students)
Transport - business travel	3	Travel Management Company	Head of Procurement	Annual
Transport - international students	3	International Office	Director of Estates and Facilities devolved to Deputy Director/Transport Team.	Annual
Procurement	3	Suppliers	Head of Procurement	Annual

6.4 Communication and training

Performance against carbon reduction targets will be made publicly available..The existing carbon management website will be updated and maintained with current information and advice. Regular communication and workshop sessions will be delivered to encourage carbon reduction practices. Training will be provided for staff to ensure they are aware of the opportunities for implementing carbon saving technologies.

Where possible, information will be available at a building level for users. This will include Halls of Residence.

An annual publicly available progress report will be published.

7.0 Scope 3 emissions

Reduction in Scope 3 Emissions is not yet legally required but it is anticipated that this will change within 3-5 years.

7.1 Water

In 2007/08 the University consumed 598,876 m³ of water and based upon an estimated 90% return of water to sewer, carbon emissions are estimated at 538 tonnes CO₂ equivalent.

The AMS includes some water meters but now requires to be extended to provide data on high consumption areas and a target for reducing water consumption will, in due course, be required.

7.2 Waste

In 2005/06, the University estimated carbon emissions from waste disposal as c.6,400 tonnes. Since that date, however, the University has introduced a comprehensive reuse and recycling scheme and carbon emissions should have reduced. This approach has extended to the building programme, where for example, 86% of the waste arising from the decant/decommissioning of Boldrewood has been diverted from landfill for reuse/recycling.

The University will work with its waste disposal contractors to estimate the carbon emissions for waste management activities before setting reduction targets.

7.3 Procurement

The University's Procurement department has direct influence over supplier selection and negotiation of commercial terms on 59% of the University's £99M non-manpower spends. Whilst management of Carbon emissions associated with the University's supply chain is in its infancy, the University will work with its major suppliers to estimate and eventually reduce carbon emissions from goods and services. In due course, targets will be set.

7.4 Transport

The University submitted to its Travel Plan to Southampton City Council in 2010. This plan included a series of measures to reduce transport carbon emissions against an agreed timescale and, since then, good progress has been made against the required actions.

- Commuting - carbon emissions will be estimated from staff and student travel surveys. The next staff survey is planned for June 2011, while the student survey is planned for February 2013.
- Business travel – at present, it is not possible to estimate business carbon emissions at a University of Southampton level due to a lack of data and decentralised procurement. It is recommended that this be structured under a centralised contract.
- International student travel – In due course, the University will calculate carbon emissions following the method in HEFCE's good practice guide (HEFCE, 2010/02).

8.0 Risks

The major risks currently identified fall into five general categories which will be monitored on a quarterly basis:

- 1 Insufficient resources (human, financial, expertise) to meet the reduction targets
- 2 Failure to engage staff and students in the delivery plan
- 3 Changes to legislation which demand increasingly stretching reduction targets
- 4 Uncertainty around fiscal schemes or incentives that increase capital investment risks
- 5 Increases in the cost of energy or carbon reduction technologies

9.0 Summary

The University will aim to reduce Scope 1 and 2 emissions by at least 20% in absolute terms by 31st July 2020 against the 2005/06 baseline. A Carbon Reduction team will be established, focussed on both cultural change and energy efficiency projects supported by an annual investment of £1m per annum. Scope 3 data will be constructed such that anticipated legislative change can be accommodated with minimal disruption and impact. The reduction plan will be monitored by the Estates and Facilities Board and the University's Environment and Sustainability Advisory Group

References

HEFCE (2009/03) Sustainable development in higher education. 2008 update to strategic statement and action plan
HEFCE (2010/01) Carbon reduction target and strategy for higher education in England
HEFCE (2010/02) Carbon management strategies and plans. A guide to good practice.
SCC (2010) Local Development Framework Core Strategy Development Plan