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The University of Sheffield

Carbon Management Plan

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Approvals

Sign-off, approvals, and document status, in accordance with the Higher Education Institution's normal operating procedure.

1 Management summary

1.0 Introduction

The University participated in the Carbon Trust's Higher Education Carbon Management (HECM) Programme in 2007-8, and one of the formal deliverables to the Carbon Trust was a Carbon Management Plan. The University's Plan was introduced in February 2008.

Much of the plan remains relevant; but the introduction of new legislation and changes to national and HEFCE policy and guidance meant that the plan was in need of review.

We also committed to review carbon targets and milestones and ensure our Carbon Management Plan aligns with the latest HEFCE guidelines.

1.1 Progress to date

The format of the latest Plan is based on good practice guidance produced by HEFCE, and comprises the following:

a. A carbon management policy or strategy
b. A carbon baseline for 2005 (i.e. August 2005 to July 2006) that covers all scope 1 and 2 emissions[1]
c. Carbon reduction targets that:
   - cover scope 1 and 2 emissions, (although it is planned to set additional targets for some scope 3 emissions)
   - are set against a 2005 baseline
   - are set to 2012, 2017 and 2020, as this is the timescale for interim government targets
   - are publicly available.
d. An implementation plan to achieve absolute carbon emission reductions across scopes 1, 2 and 3 including timescales and resources
e. Clear responsibilities for carbon management
f. A commitment to monitor progress towards targets regularly and to report publicly annually.
g. Sign off by UEB.

1.2 Targets

It is proposed to align the emission reduction targets with those set for the sector by Hefce[2]. These are based on a 2005 baseline and are as follows:

- a 43% reduction by 2020
- an 83% reduction by 2050

[1] The World Resources 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.
[2] See http://www.hefce.ac.uk/pubs/hefce/2010/10_01/10_01a.pdf

2 Introduction

The Carbon Management Strategy and Implementation Plan

This is the 2011 version of the University of Sheffield's Carbon Management Plan. The original Plan was a formal deliverable following the University's participation in the Carbon Trust's HECM programme and was launched in 2008.

This Plan comprises:

- The quantification of emissions reduction opportunities and projects, in terms of cost, financial benefit, and carbon saved.
- The balancing of projects with measurable emissions reductions alongside complementary actions that embed carbon management effectively.
- The scheduling of chosen projects and actions into a realistic, achievable plan that fits with our priorities and resourcing.
- The coordination of the plan with existing plans, policies and strategies.
- The definition of ownership and governance in the plan – defining and communicating the roles and responsibilities of individuals at all levels to ensure that the plan will be delivered and reviewed, and benefits measured.

The Plan defines the steps we will take to achieve these outcomes.

3 Carbon Management strategy

The University of Sheffield's activities continue to place a huge strain on the environment, and as a socially responsible organisation we are committed to minimising this impact.

This section summarises the main drivers for change, identifies the vision, specifies objectives and targets and confirms the strategy to be followed.

3.1 Context and drivers

Numerous individuals and groups across the University have an interest and expertise in environmental issues. We will continue to engage with the academic and non-academic communities, and the student body in implementing the Carbon Management strategy.

The University's Environment Policy[3] underpins the strategy being undertaken currently to reduce our environmental impact. The Policy states that:

"The University recognises the challenge posed by climate change, and will identify and set targets to reduce its carbon emissions and the environmental impact of its activities.

The University will set challenging environmental targets to improve continuously its environmental performance. The University will allocate sufficient staff, finances and other resources to carry out its broad environmental aims and objectives. The University recognises that reducing its environmental impact requires joint effort and commitment by staff and students, and will work in partnership with the Union of Students to do so."

The targets being set to improve environmental performance focus on the following key areas:

- Academic curriculum
- Energy and water
- Waste
- Transport
- Procurement
- Biodiversity and landscape
- Construction & the Built Environment
- Communications
- Pollution

The Carbon Management strategy will complement the work currently undertaken across the University academic and non-academic communities.

[3] See http://www.sheffield.ac.uk/polopoly_fs/1.4675!/file/Environmental-Policy-Aug-2009.pdf

Drivers

The continued development of a carbon management strategy is important to the University of Sheffield. There are legislative, financial, environmental and other drivers, and these are summarised below:

1. Legislative drivers

   - EU Energy Performance of Buildings Directive - the University must comply with the requirements of this legislation, which includes the certification of all major buildings. This has financial implications and makes our buildings' energy performance highly visible to building users.
   - Carbon Reduction Commitment (CRC) – the University's participation in this emissions trading scheme will require us to purchase credits to cover our annual carbon emissions. This has significant financial and reputational impacts.
   - Building Regulations – the requirements under Part L of the Building Regs have recently been tightened and further changes and improvements are planned.

2. Financial drivers

   - Hefce funding – in their Carbon Reduction Strategy for HE in England, Hefce confirmed that future capital funding will be linked to institutions' performance against carbon management plans. This could have significant implications for the University of Sheffield.
   - Energy costs - the University spends over £8m per year providing its buildings with power, heat and water. Utility costs are volatile and an upward trend in future years is likely.
   - Climate Change Levy (CCL) – this tax on energy use cost the University £56,000 in 2009-10. We avoid additional costs of £300,000 with our commitment to procuring green electricity and by connecting to the energy from waste district heating scheme.

3. Environmental drivers

   - Climate change - the release of carbon dioxide and other greenhouse gases is widely believed to be a major contributor towards changes in the climate. As a leading academic institution it is important that the University reduces its own impacts, and contributes to the development of low-carbon technologies.
   - Transport – the impact of University staff, students and visitors places a considerable strain on the local road network, particularly at peak times. This contributes to congestion, safety, air quality and environmental issues. We cannot currently determine the total impact associated with commuting and business travel, so will consider how to accurately quantify this.

4. Other drivers

   - Strategic Plan - the University commits to "manage and reduce our carbon emissions" under the 2010-15 Strategic Plan and a Key Performance Indicator that

seeks to achieve a reduction in absolute emissions is identified. An effective carbon management strategy is key to help achieving this.

- Image and reputation - the University is a high profile institution that is increasingly required to publish our environmental performance both locally and nationally. Managing our environmental impact – and being seen to do so – will raise the University's profile and improve its image.
- Student recruitment – environmental issues are becoming increasingly important in student recruitment. An UCAS survey in 2006 revealed that for 45% of those intending to study education, social sciences, architecture and building and planning "a good track record on sustainable development was important or very important in choosing where to study".
- Internal links – the desire for a low carbon economy offers considerable research opportunities and grants are available to develop technologies that may be appropriate to be trialled on University buildings. The University's academic and non-academic communities will continue to work closer together for mutual benefit.

Where are we now?

The following is the Carbon Trust's Carbon Management matrix. The blocks shaded in grey identify the status of carbon management at the University of Sheffield at the beginning of the programme, with the black showing the current position. Where there is no change, only the grey is shown.

	POLICY	ORGANISATION	INFORMATION AND DATA	COMMUNICATION AND TRAINING	FINANCE	MONITORING & EVALUATION
5	Specific sustainability / climate change policy with targets signed off and implemented. Action plan with clear goals and regular reviews to confirm actions undertaken and targets achieved/being progressed.	Accountabilities for sustainability /climate change defined at senior level, e.g. senior Sustainability / climate change responsibilities integrated into responsibilities of relevant people in different departments, e.g. Teaching, Finance, Estates	CO_2 emissions compiled for all main HEI sources for a baseline year and regular collation of annual emissions data. Data externally verified.	Formalised communication and training plan for all staff on carbon and energy related matters, including integration in induction and other normal training processes. Communication on carbon and energy related matters with the academic and student body and other key business partners	Use of innovative external funding mechanisms for carbon related projects. Development of internal financing mechanisms, e.g. self sustaining fund, specifically for carbon related projects	Management Review of carbon management process by senior management. Regular reviews by core team on progress with carbon management.
4	Specific sustainability / climate change policy with targets developed and signed off, but not implemented	Sustainability / climate change responsibilities integrated into responsibilities of relevant people in different departments, e.g Teaching, Finance, Estates	CO_2 emissions compiled for all main HEI sources for a baseline year (i.e. buildings, transport and commuting, etc. Data inter[illegible]y reviewed.	Formalised communication and training plan for all staff on carbon and energy related matters, including integration in induction and other training, and awareness ra[illegible]g	Strategic plan for developing internal financing mechanisms and obtaining funds from external sources	Regular reviews on progress with carbon management (e.g. review of actions, check against emissions profile and targets, addition of new opportunities etc.)
3	Sustainability / Climate change included in wider policy documents	Sustainability / climate change/ carbon management is part-time responsibility of moderate ranking personnel, e.g. Energy Manager, Sustainability / Environment Officer	CO_2 emiss[illegible]s data compiled for some sources for a baseline year (e.g. buildings) and source data available for other sources (e.g. transport)	Ad hoc comm[illegible]ication and training delivered to all staff/students on carbon and energy related matters	Some internal financing on an ad hoc basis for carbon and/or energy efficiency related projects Review conducted on applicable external funding sources	Ad hoc assessment of all aspects of carbon/energy policies/strategies, targets and action plans
2				Communication and training to specific groups in the HEI (e.g. environment team) on carbon/energy related matters	Some internal financing on an ad hoc basis for carbon and/or energy efficiency related projects	Ad hoc reviews of specific aspects of carbon/energy policies/strategies, targets and action plans
1						

This confirms that whilst some progress has been made towards effective carbon management, opportunities for improvement do exist.

- Policy – the existing Environment Policy is in need of improvement, and work is on-going to update and develop it. Separate supporting documents such as the Energy Policy and Integrated Transport Policy already exist and a Sustainable Construction document is being developed.
- Organisation – the Corporate Social Responsibility UEB sub-group and the recently created Carbon Management Group has helped raise the profile of sustainability at the most senior level and should help embed it in all areas of University business.
- Information and Data – some areas of carbon emission data is missing. It is not proving straightforward to collate business travel and commuting data for example but work is ongoing to obtain this.
- Communication and Training - a formal communications strategy is currently being developed to heighten the awareness of carbon and energy matters to staff, students and other stakeholders. Led by the Energy and Environment Team with assistance from Internal and External Relations, this is likely to be trialled in the Faculty of Science.
- Finance – we have a £500,000 Salix/Hefce-supported recycling fund that is being utilised to finance carbon and energy efficiency projects that meet Salix compliancy requirements. There are also small internal funds for non-compliant schemes.
- Monitoring and Evaluation – annual reviews of carbon performance take place, and the impact of changes in activity, and as a result of refurbishment and new-build are considered in far more detail.

We will report on progress towards the aim of achieving level 5 under each area of the Carbon Management matrix.

Vision

Sustainable development is seen as key to the University of Sheffield's vision for the future.

Embedding low carbon issues into the Estates Strategy, other corporate and strategic plans and into the University's culture are vital components in helping the University improve its environmental performance.

The strategic objectives of the Carbon Management Programme are to:

- generate a corporate commitment to a low carbon future
- set high level objectives for managing our carbon emissions
- develop policies and actions to support the above objectives
- set challenging but achievable carbon reduction targets for the long-term
- develop management tools to ensure accurate data and reporting tools are in place
- measure the University's performance and report this to all stakeholders

Objectives and targets

The Climate Change Act 2008 aims to improve carbon management in the UK and sets the world's first legally binding reduction targets for greenhouse gas emissions: against a 1990 baseline the target reductions are at least 34 per cent by 2020 and at least 80 per cent by 2050.

In their September 2010 document 'Carbon reduction target and strategy for higher education in England'[4], HEFCE acknowledged that "higher education needs to play its part in meeting national targets for carbon reduction." They require institutions to adopt a more demanding approach to carbon reduction and have established a link between carbon reduction performance and future capital allocations by adapting the Capital Investment Framework. The document confirms that HEFCE have set sector-level targets in line with UK targets.

HEFCE require institutions to set their own targets for 2020 for scope 1 (direct emissions occurring from sources that are owned or controlled by the University, such as emissions from combustion in owned boilers and vehicles) and scope 2 emissions (resulting from the generation of purchased electricity consumed by the University), with an aspiration to achieve reductions beyond the sector targets. They have also set milestones to allow progress to be measured against the sector targets.

A commitment to monitor and report scope 3 emissions (all other indirect emissions that are a consequence of the University's activities, but occur from sources not owned or controlled by it for example, commuting and procurement) has also been identified.

It is acknowledged that Higher Education is a diverse sector, but as the University of Sheffield is one of the largest organisations in the sector (responsible for the 14th largest total emissions in 2005)[5] it is important that we play a leading role. It is therefore considered appropriate that the University of Sheffield aligns itself with both the sector level carbon emissions targets and milestones.

These are set in absolute terms, so whilst it is acknowledged that the University's performance can be affected by issues outside its control, we have not normalised consumption against factors such as weather conditions or business activity.

Energy and emissions data for 2005 is far more robust than for 1990, so we will aim to reduce scope 1 and 2 carbon emissions against our 2005 baseline by:

- 12% by 2012
- 29% by 2017
- 43% by 2020 and
- 83% by 2050

It is acknowledged that this is extremely challenging, but it is vital that the University aligns itself with Hefce targets.

We also commit to measure the University's scope 3 carbon emissions baseline, including procurement by December 2013 and set target(s) for scope 3 emissions by December 2014.

[4] See http://www.hefce.ac.uk/pubs/hefce/2010/10_01/
[5] See http://www.hefce.ac.uk/pubs/rdreports/2010/rd14_10/

Strategy

The following summarises the general priorities and principles that will be adopted to help deliver the vision and achieve the targets

We will:

- Develop a working relationship with Veolia to improve business continuity, cost and carbon performance
- Develop and deploy an estate-wide metering strategy
- Completion of a full estate survey, focussed on energy use and building conditions
- Develop an estate building improvement strategy
- Adopt recommended existing building systems improvement measures, as set out in recent University Energy Strategy document
- Deploy behaviour change enablers to facilitate successful adoption of identified actions
- Prioritise studies of feasibility around self-generation options set ou in recent Energy Strategy document
- Build on the success of phase 1 of the Environmental Controls project by implementing a second phase
- Develop an environmental management system and comply with all relevant environmental legislation and regulations
- Utilise external funding streams wherever appropriate and continue to exploit the Salix/Hefce ring-fenced investment budget
- Invest in all cost effective energy saving measures
- Ensure energy saving features are integrated into all new build developments
- Allocate sufficient staff, finances and other resources to carry out our environmental aims and objectives
- Ensure that the principles of sustainability are included in the academic curriculum wherever appropriate
- Encourage sustainable alternatives to single occupancy car travel for staff commuting to the University
- Aim to reduce business travel.
- Encourage sustainable methods of transport where business travel is necessary
- Reduce the environmental impact of the products and services which the University buys by developing an environmentally responsible purchasing policy and by working in partnership with our key suppliers
- Complete construction and refurbishment building projects according to best environmental practice
- Aim to meet current environmental best practice for the maintenance of our buildings, plant and equipment

- Work with all University building users to raise awareness of environmental issues, affect long-term behaviour change, and encourage participation in environmental projects
- Create and build upon partnerships with local community and national organisations to reduce our environmental impact on Sheffield and South Yorkshire.
- Investigate methods of capturing data to ensure our complete carbon footprint can be accurately ascertained

4 Emissions baseline and projections

Introduction

It is a requirement that HEI's carbon management plans include a carbon baseline for 2005 that cover all scope 1 and 2 emissions. The SQW report Carbon baselines for individual Higher Education Institutions in England[6] identified these and it is this figure that we have used.

Having established the emissions baseline, informed assumptions on known and potential developments across the University's operations have been made. This allows us to make forecasts of future energy consumption and carbon emissions under a 'Business as Usual' (BaU) scenario.

Armed with this information it is then possible to estimate the financial implications for the University given the external drivers already identified such as the price of energy.

The difference in benefits and costs between the BaU and reduced emission scenarios allows us to calculate the Value at Stake (VaS). Calculating and communicating the financial Value at Stake (VaS) should help stakeholders understand one important aspect of the case for taking action to reduce emissions.

Scope

The SQW baseline comprises emissions from the following sources:

- Energy use (electricity, gas and oil) from all University-managed
  - Non-residential buildings and
  - Residential buildings
- Vehicle use from:
  - The University fleet

It is acknowledged that this is not a comprehensive list of all University activities impacting on carbon emissions. District Heating emissions were not included in the SQW figures, and as this heat is also not considered within the Carbon Reduction Commitment Energy Efficiency Scheme they have been excluded. Similarly the SQW report ignored emissions associated with water use and waste disposal.

We continue to develop systems for obtaining accurate data in other areas and will continue to do so. The current situation is as follows:

- Staff and student commuting (data obtained - see page 14)
- Academic and business travel (to be included/reported in Spring 2014 – see page 14)
- Resource consumption e.g. paper (to be investigated in 2014-15)
- Estates functions e.g. maintenance and project work (to be investigated in 2014-15)

[6] See http://www.hefce.ac.uk/pubs/rdreports/2010/rd14_10/

Baseline

A key source of data for the SQW baseline calculation was the EMS return. The appropriate conversion factor was applied to the annual consumptions reported. The gross calorific value conversion factor was used for heating fuels, and for electricity the average of the 2005 and 2006 conversion factors was used.

The University of Sheffield baseline carbon emissions were confirmed as follows:

	2005-6 consumption	Conversion factor	CO_2 (tonnes)
Oil	726,900 kWh	0.2463	179
Gas	33,395,600 kWh	0.1852	6,186
Electricity	50,783,400 kWh	0.5391	27,377
Transport	tbc	tbc	129
TOTAL			33,871

Note - district heating emissions were excluded in our 2005-6 EMS return due to the absence of a confirmed district heating carbon intensity factor. Veolia now publish carbon intensity factors and we are in discussions with Hefce as to how this will feed into our baseline, milestones and targets. Commuting and Business Travel – see below

It can clearly be seen that building energy use – and electricity consumption in particular - has the greatest impact on carbon emissions.

Recent years have seen an increasing demand for power, primarily in research areas. A greater demand for 24-hour operation, tight bands of temperature and humidity and the requirement for air-conditioning goes some way to explaining why the consumption of electricity accounts for over 80% of emissions. The impact of oil consumption and fuel usage in fleet vehicles is comparatively insignificant.

To meet the targets set out above, our target emissions in each of the key years are as follows:

	Target	CO_2 (tonnes)
2005-6 baseline		**33,871**
2012-13 milestone	-12%	29,806
2017-18 milestone	-29%	24,048
2020-21 target	**-43%**	**19,306**
2050-51 target	**-83%**	**5,758**

Commuting and Business Travel

The University has started to assess the carbon impact associated with Travel. This is intended to contribute towards the environmental policies of the University and also be key data to report to HEFCE annually. Whilst these scope 3 emissions are not included in the Carbon Management Plan reduction targets, the aim is to reduce these emissions in line with the targets included in the Plan.

Staff and Student Commuting

A key purpose in undertaking biennial Travel Surveys is to capture data on the carbon impact associated with commuting travel. The data gathered through the travel survey have been used to assess this impact.

The survey captured actual distances travelled by each mode of transport, including an assessment of vehicle type for car drivers and car sharers, and is summarised below
In order to assess the carbon emissions generated by commuting traffic a number of assumptions have been made which are listed, in no particular order of importance, below:

- That the average full time student attends campus on 150 days per annum;
- That the average member of staff works 225 days per annum (taking into account annual leave, bank holidays and absence);
- Response rates have been factored up to represent the full staff/student base figures;
- Only the regular commute to campus for students has been considered (as per HEFCE guidance the trip from parental/family home is not required);
- The DEFRA 2011 conversion factors have been used to calculate carbon emissions;
- For motorcyclists an average vehicle type has been adopted (due to the limited number that travel by this mode it is unlikely to impact on the result);
- Car share results are based on all responses with 50% reduction for conservative assessment of car share matches;
- Vehicle types for car drivers have been factored up on the basis of the results within the travel survey.

The following summary table illustrates the total greenhouse gas (GHG) emissions by mode of transport (per annum) in line with Scope III requirements.

		Grand Total GHG(kg CO2)				
Sector	**Car Alone**	**Car Share**	**Train**	**Tram**	**Bus**	**Total**
Student	2,501,097	283,812	362,565	123,845	568,583	3,839,902
Staff	1,603,596	33,466	1,130,088	132,451	461,198	3,360,799
TOTAL	**4,104,693**	**317,278**	**1,492,652**	**256,296**	**1,029,781**	**7,200,701**

A total of 7,200,701 kg CO2e equates to 7200.7 tonnes CO2 from commuting.

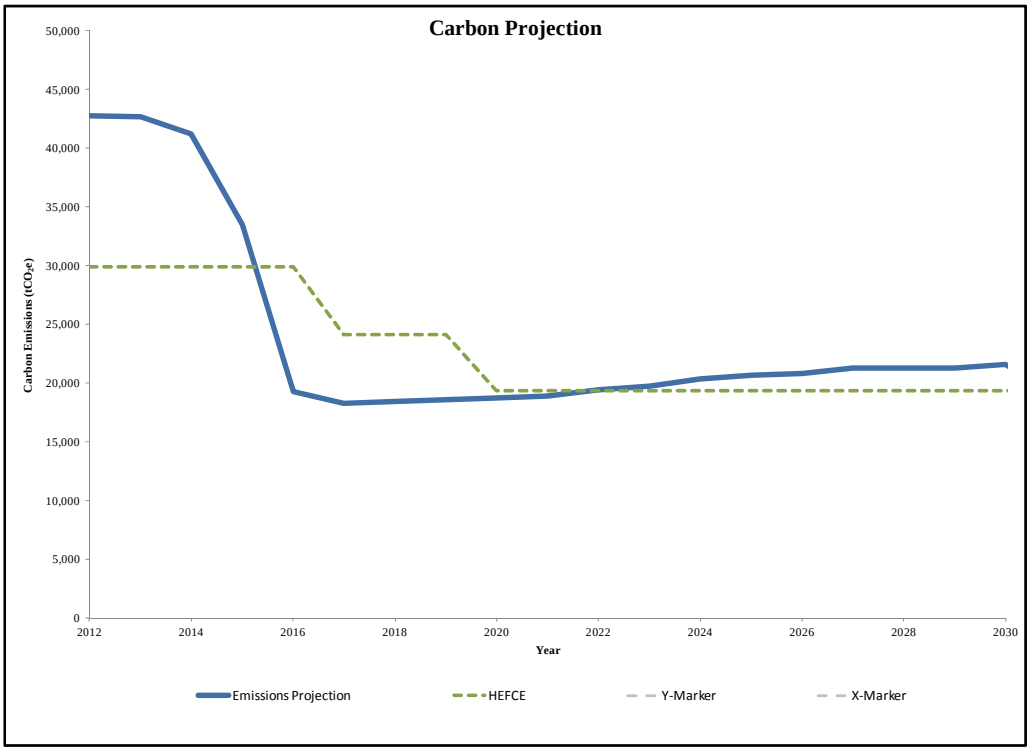
Business Travel

The University is currently collating information on business travel in line with HEFCE guidance and requirement for 2012/2013. These will be included and reported on in Spring 2014.

Projections

The following projection of University carbon emissions has been taken from the recent Energy Strategy document produced for the University. It reflects the effects of implementing all recommended intervention actions, as set out under the following three areas:

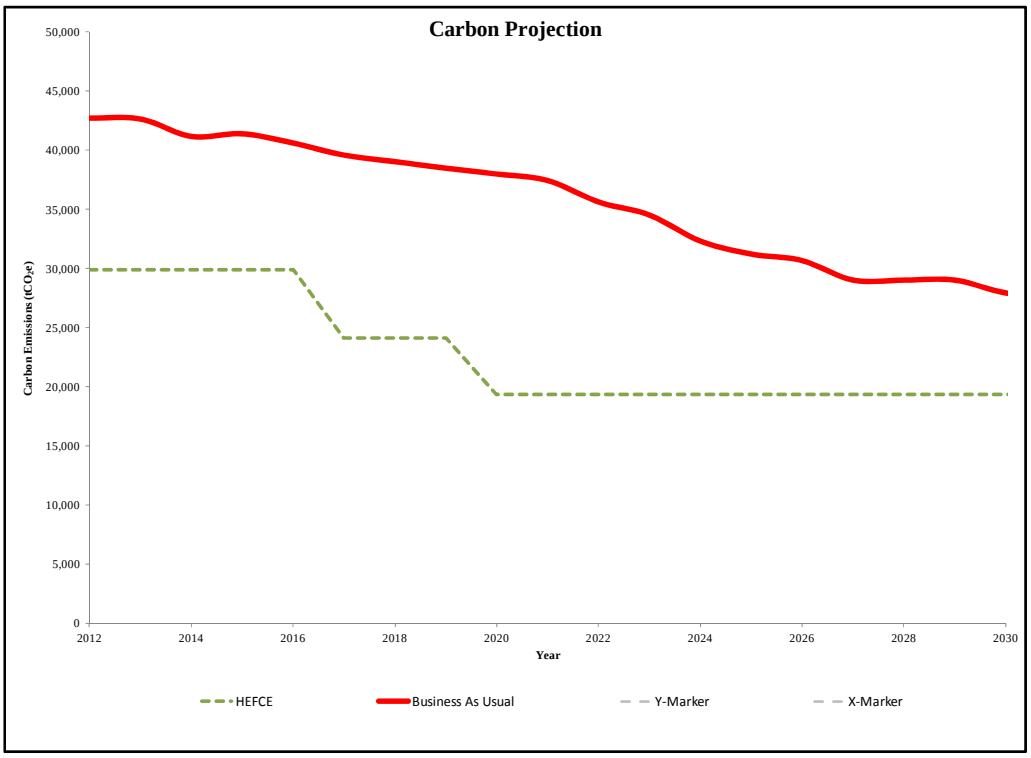
- Existing buildings
- Behaviour
- Self-generation



The projection of University carbon emissions is plotted against the trajectory of reductions stipulated by current HEFCE targets. As is shown, interventions proposed to date have been compiled on the basis of meeting the 2020 target.

Business as usual (BAU) scenario

The following emissions graph, also derived from the Energy Strategy work, displays a projection of University BAU emissions. This is based on no significant growth in the University's estate (beyond those already planned in the short-to-medium term).



The downward trend of the projection is a result of the predicted lowering of the UK grid electricity emissions factor over this period.

Value at Stake

Whilst current purchasing of power under a 'Green Electricity' tariff continues to offset Climate Change Levy (CCL) charges, the University remains a member of the Carbon Reduction Commitment (CRC) scheme and subject to a related payments, linked to campus emission levels.

Whilst the CRC is the subject of review and reform, the Government announced in the 2012 Budget announcement that: "The Government will consult on simplifying the CRC Energy Efficiency Scheme to reduce administrative burdens on business. Should very significant administrative savings not be deliverable, the Government will bring forward proposals in autumn 2012 to replace CRC revenues with an alternative environmental tax, and will engage with business before then to identify potential options. Allowances sold with respect to 2012–13 emissions will be £12 per tonne of carbon dioxide".

As such, it is clear that charges for CRC scheme members will continue and that an opportunity to avoid or minimise these via carbon reducing interventions will remain.

5 Carbon Management Implementation Plan

To help achieve the savings identified above and embed Carbon Management into the University's day to day operations, a systematic programme of initiatives must be implemented.

The following section describes the individual actions and projects that will be undertaken. Governance, ownership and management of this vital area are identified under section 8, and whilst a fine level of detail will be necessary to manage each individual project, it is felt this level of resolution is not appropriate to this document.

Long-term enablement actions

The following table sets out enabling actions, as identified within the estate Energy Strategy document.

Actions	Description
Veolia MoU	Develop a working relationship with Veolia to improve business continuity, cost and carbon performance by: a) Developing the planned preventative maintenance (PPM) requirements applicable to both parties; and b) Identifying improvement opportunities with regard to the heat network operation, CHP self generation and other technology across the estate.
Metering Strategy	Development of estate wide metering strategy to enable the University to gather detailed information of energy use across the estate. Aim to understand in significantly more detail the current consumption across the estate and therefore allow for more targeted actions to be considered.
Metering Strategy Deployment	Deployment of developed metering strategy across the University's estate.
Full Estate Survey	Completion of a full estate survey covering all large energy-consuming buildings and focusing upon building condition, operations, services and infrastructure.
Building Improvement Strategy	Development of an all-encompassing building improvement strategy for the University's estate including a deployment programme and business case for all opportunities and interventions.
Behaviour Change Strategy Development	Development of an all encompassing behavioural change strategy covering all facilities, buildings and operations across the University's estate.

No- and low-cost emissions reduction actions

The following table sets out proposed low and zero cost carbon emission reduction actions.

Action	Description
Behavioural Change Enablers	Deployment of all behavioural change enablers to facilitate the efficient and effective deployment of behavioural change actions. This should include removing middle management barriers, formalisation of an energy officer role, improving support of the E&FM team and senior management team and development of a communications and implementation plan.

Emissions reduction actions requiring investment

The following table sets out proposed emission reduction actions requiring investment, with the estimated capital cost provided.

Action	Description	Estimated Cost
Lighting	Implementation of best practice lighting control initiatives across the University's estate including PIR control in intermittently occupied areas and daylight linking systems in other spaces.	£2,320,000
Building Fabric	Completion of survey work to fully understand the current performance of high energy consuming facilities not due for refurbishment or remodelling in the near future. Buildings expected to benefit from air tightness and roof insulation improvements. Deployment of a glazing strategy across the estate is likely to be beneficial.	£6,592,000
Heating	Deployment of heating control systems to move away from central control to local thermostatic controls and valves. Survey of building spaces to identify under and over provision of space heating followed by re-commissioning of control systems and upgrading of heating systems where appropriate. Full survey of heating plant across the estate and development of asset register.	£376,000
Cooling	Consideration of mechanical cooling control systems and re-commissioning of systems where appropriate. Deployment of weather compensated circuits resulting in increased water temperature during colder periods of the year. Survey of buildings to identify options for natural ventilation strategy across estate and deployment of solar shading where appropriate.	£984,000
Ventilation	Deployment of improved ventilation control systems in mechanically ventilated areas including CO_2 and temperature sensor based systems. Survey to identify areas suitable for switching to natural ventilation.	£1,470,000

Actions	Deployment of all behavioural change actions across the University's estate focusing on the most applicable space types and high energy consuming faculties.	£98,000
Change Management	All encompassing coherent and effective change management incorporating communications, rewards, incentives and accountability at a department level.	
PV	Installation of PV panels to appropriate identified University building roof area, with a total capacity of 100 kW	£270,000
Gas CHP	Deployment of 6MWe of gas CHP, prioritising the synergies of sites where large University building electrical loads exist in combination with the presence of a mini-heat network serving St Georges to Jessop campus area and Veolia connection pipework to facilitate heat injection.	£11,000,000
Biomass Boilers	Incorporation of around 4MW of biomass boilers at locations suitable for heat provision to existing or future buildings and supplementary injection into Veolia distribution pipework.	£575,000
Offsite Wind	Increase in 6.5MWe of offsite Wind generation via an additional turbine at the AMRC site and potential multiple turbines at the Harpur Hill site.	£15,000,000

6 Implementation Plan financing

It is acknowledged that significant investment will be required to undertake the main emissions reduction actions identified above. The identification of appropriate internal and external investment streams will be essential to ensure for the schemes are implemented and the emission target reductions achieved.
A further option for the funding of identified carbon saving measures and projects is to seek external financing. A primary source for such funding is HEFCE who, through Salix Finance Ltd, offer repayable loans in relation to energy efficiency and carbon reduction measures.

The most recent HEFCE/Salix funding mechanism is the 'SEELS 5' scheme which allows public sector bodies to apply for an interest free loan to finance up to 100% of the costs of energy saving projects, subject to the meeting of certain eligibility criteria.

This initial tranche of loans are paid back to Salix on a 6 monthly basis over a period of 4 years with projects having to be completed within a 9 month timeframe from the commitment date.

7 Stakeholder management and communications

A key element of the recent Energy Strategy study was the consultation and communication with identified stakeholders, both internal to the University and external.

Internally, a number of workshops were held with a number of identified University Faculties, with the aim of engaging stakeholders in an inclusive process, enabling them to provide their own perspectives and ideas to feed into the Energy Strategy.

This ensured that all potential interventions proposed were realistic, achievable and would address the agendas of all stakeholders. In particular, these workshops aimed to build knowledge of initiatives developed by University Faculties independently of the E&FM team and also to identify where behaviour change opportunities exist or could be built upon.

Externally, similar workshops were held with key local stakeholders comprising:

- Sheffield Teaching Hospital Trust (STHT)
- Sheffield Children's Hospital Charitable Trust
- Sheffield Homes (SH)
- Sheffield City Council (SCC)

This consultation took the form of two workshop events and provided the opportunity to both share ideas and present emerging recommendations for University actions.

Continued communication with all stakeholders will be sought in order to ensure support and coordination of carbon saving efforts and actions.

8 SIP governance, ownership and management

This section describes how the Implementation Plan will be owned and driven at a high level, and the leadership and management activities that must take place to keep the whole programme fresh and on-track.

Carbon Management Implementation Plan: Responsibility Table.

Activity	**Responsible person**			
	Project Sponsor	**Carbon Manager**	**CM core group**	**Others**
Carbon Management Implementation Plan - Set objectives - Manage implementation plan - Monitor and review progress - Manage risks and issues - Manage stakeholders and communication - Report				

Financing of Carbon Management Activities				
Carbon Management - Buildings				
Carbon Management - Transport				
Carbon Management - Waste				
Maintenance of the opportunity database				
Purchasing				

Risks and issues management

Carbon Management Implementation Plan: Risk management table.

Risk	**Mitigation plan**
Initial senior level enthusiasm for Carbon Management is not maintained	Reinforce the benefits of the Plan via the Project Sponsor
Changes to Corporate structure	Maintain emphasis on the link between Carbon Management and financial efficiency
Insufficient capital to invest in carbon reduction opportunities	Update and promote Value at Stake calculation Bring forward the implementation of opportunities with the lowest marginal carbon abatement costs Investigate and secure additional external funding, initially from Salix
Energy prices rise significantly	University's Carbon Dashboard model allows for impact to be assessed and case for supporting and implementing the Carbon Management strategy to be strengthened
The introduction of new legislation (e.g. DECs - Display Energy Certificates)	Energy labelling of University buildings will make our performance publicly available and will strengthen the case for implementing the strategy
Lack of available data means accurate carbon footprint cannot be calculated	Identify where gaps in data exist and set up appropriate methodologies for ensuring the missing data can be collated, including a complete estate metering strategy
Carbon management issues are not considered as part of capital developments	Ensure requirements for appropriate standards (e.g. BREAAM) are incorporated in specifications
Departments believe there is little incentive to engage with the process	Senior management should communicate what is expected of all building users. Consider devolving budgets to departmental or Faculty level