

***Lot 2 – Review of  
Best Practice in  
Carbon Management***

***Project Report***

***Ref: 47066918***

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**1 EXECUTIVE  
SUMMARY**

# 1. Executive Summary

The University of Edinburgh ('the University') is currently developing a Climate Change Strategy which, in 2016, will supersede its existing Climate Action Plan (2010) and its 2012 update. The new strategy will set out revised carbon reduction targets and identify a number of potential pathways to achieve significant reductions in carbon emissions.

To inform the development of the strategy, and with support from the Scottish Funding Council (SFC), the University has commissioned AECOM to undertake a review of carbon reduction best practice in the university sector. The overarching aim of this project is to make evidence-based recommendations for improving carbon management to the University, and the wider university sector in Scotland.

Significant investment has been made in low-carbon energy infrastructure<sup>1</sup>, energy efficiency measures, and also behaviour change programmes, the University is not on track to achieve the current absolute carbon reduction targets set out in the University's Climate Action Plan (2010) and 2012 update. Since the original targets were set, the University campus has increased substantially in size due to mergers and new developments and student numbers have grown by some 20%. The University's normalised data for emissions against gross internal area and turnover show decreases, but the University recognises that it needs to take further action to reduce its absolute emissions.

AECOM, in partnership with the University, identified 32 universities to potentially take part in the study. The University identified a number of universities, including those in the Russell Group in the UK that it wished to participate in the study. The review consisted of a short questionnaire, an interview and in some cases, a desk top review of publically available information. In total 20 universities were included in the final review. The depth of information provided by the universities was variable with the University of British Columbia (UBC) and Strathclyde University providing the most detailed information.

AECOM developed and undertook a comparison of the University's current carbon management structures and performance against the participating universities. As a result we propose the following recommendations.

- Governance – create a new or strengthen the established Climate Policy Manager role to include a 'Carbon Programme Manager' role whose responsibilities could include managing and improving the robustness of carbon data, evaluating Capex projects for carbon impact and overall provide a focal point for the University's carbon activity;
- Developing a Carbon Action Plan - the University should review the process to be used for developing the Carbon Action Plan to ensure the key components identified by UBC are in place. This includes for example, funding a secretariat and a communications plan.
- Targets – Maintain but revise the University's absolute carbon reduction target following the re-baselining of its carbon emissions. To assist with analysing performance against the absolute target the University should consider developing and implementing a normalised target of emissions

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<sup>1</sup> During the period 2003-2013, the University installed four energy centres providing combined heat and power (CHP) and district heating (DH).

against a range of possible factors including turnover, number of staff or students and size of the estate. It is suggested the focus of this normalised target should be against number of students. This could be further supported by normalised metrics for aspects such as waste, water and transport;

- Projects – review pre-project engagement and ensure that all carbon savings are captured as part of the carbon reduction programme; and
- Project funding – consider developing a ‘green revolving fund’ where savings achieved are subsequently re-invested in further carbon reduction projects and consider using price per tonne of carbon in the evaluation criteria for Capex projects.

## *2. INTRODUCTION*

## 2. Introduction

The University of Edinburgh ('the University') is currently developing a Climate Change Strategy which, in 2016, will supersede the existing Climate Action Plan (2010) and its update in 2012. The new strategy will set out revised carbon targets and identify a number of pathways to achieve significant reductions in carbon emissions. To inform the development of the strategy, and with support from the Scottish Funding Council (SFC), the University has commissioned three work streams:

- Lot 1: Develop a carbon modelling and scenarios tool;
- Lot 2: Review carbon reduction best practice in the University sector (AECOM); and,
- Lot 3: Develop business cases to support investment in renewables technologies and in energy reduction measures (AECOM).

This report sets out the findings from Lot 2, a review of carbon reduction best practice in the university sector in the UK and internationally. The overarching aim of this project is to make evidence-based recommendations for improving carbon management in the University, and the wider university sector in Scotland.

The aims of the project are three-fold:

1. Review best practice in 'carbon reduction'<sup>2</sup> in the University Sector including the following key topics of interest:

Table 1: Key topics of interest

<b>Governance and Reporting</b>	<ul style="list-style-type: none"> <li>• Key actions</li> <li>• Governance and reporting</li> <li>• Innovative approaches</li> <li>• Accounting for energy</li> </ul>
<b>Targets</b>	<ul style="list-style-type: none"> <li>• Carbon targets and metrics</li> <li>• Target setting processes and tools for decision making</li> </ul>
<b>Carbon Reduction Initiatives</b>	<ul style="list-style-type: none"> <li>• Approaches to energy provision and use</li> <li>• Behavioural change initiatives and communications</li> <li>• Laboratory design and management</li> <li>• Building design including laboratories and research areas</li> <li>• Space management</li> <li>• Micro-renewable usage and incentivisation</li> <li>• Green IT</li> <li>• Travel and waste</li> <li>• Use of off-site renewable energy production</li> </ul>
<b>Project Funding</b>	<ul style="list-style-type: none"> <li>• Capital programmes</li> <li>• Financial assessments and rules</li> <li>• Green revolving or sustainable projects funds</li> </ul>

<sup>2</sup> These indicative carbon reduction aspects were determined by the University and provided to AECOM in advance of the research starting.

2. Establish the key differences in data needs between the impending Scottish Government Carbon Reporting and the Higher Education Statistical Agency Environmental Management Reporting (HESA EMR).

Note: Initially, the University's 'Carbon Guru' carbon reporting platform was to be reviewed under the Lot 2 work stream. This work stream was revised as the University is, at the time of writing, in the process of finalising a new carbon tool to replace the functionality of 'Carbon Guru'. It was agreed during the workshop on the 19<sup>th</sup> of August 2015 that a review of Carbon Guru was no longer required.

3. Highlight and provide recommendations including the benefits of running a fund for sustainable projects.

## *3 METHODOLOGY*

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## 3. Methodology

The overarching aim of this project is to make evidence-based recommendations for improving carbon management to the University, and the wider university sector in Scotland.

In order to achieve this AECOM undertook:

1. **A review of The University of Edinburgh’s existing approach to carbon reduction:**

A desk based review of information available in the public domain and information collected by AECOM for the Lot 3 work stream. This information forms the baseline from which comparisons with the approaches of participant universities have been made.

2. **A review of best practice in carbon reduction in the university sector:**

The target number of universities for engagement was 20; recognising that not all invited to do so would respond, a total of 32 universities were invited to participate. The target universities were identified in conjunction with the University and the SFC, and include those in the Russell Group<sup>3</sup>, those listed in the Sierra Club<sup>4</sup>, and other universities in the UK and internationally.

A short introductory letter and questionnaire, developed by AECOM and approved by the University, were emailed to the environmental, sustainability and/or estates departments at the target universities. A copy of the questionnaire is provided in Appendix A. Email reminders were sent shortly after initial issue.

Target universities were given the option to complete and return the questionnaire and/or take part in a face-to-face or phone interview with members of the AECOM project team. The purpose of the discussion was to assist the participating universities in completing the questionnaire (should they find this helpful), gain insight into existing carbon management approaches, programmes and specific projects.

Of the 32 universities invited to participate, 13 universities provided information to AECOM by returning a completed questionnaire and/or via a telephone/face-to-face interview with AECOM:

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<sup>3</sup> The Russell Group represents 24 of the leading research universities in the UK. The aim of the Russell Group is to help ensure that the member universities have the optimum conditions in which to flourish and continue to make social, economic and cultural impacts through their world leading research and teaching. The group provide strategy, policy development, intelligence, communications and advocacy for their member institutions. Russell Group Universities are also tend to be longer established universities, potentially with older building stock and hence, more likely to face similar constraints and opportunities to reducing greenhouse gas emission as Edinburgh University.

<sup>4</sup> The Sierra Club is one of the largest grassroots environmental organisations in the US whose aim is to lead the move away from fossil fuels to a clean energy economy in the US. The Sierra Club has a ‘Cool Schools’ initiative which ranks US universities based on their sustainability credentials, as reported via an online questionnaire. The answers are evaluated and a score awarded to each university. In 2015 Sierra received 153 responses and published a newsletter detailing the efforts of the top 10 universities. The ranking covers all aspects of sustainability – not just energy or carbon management.

**Table 2: Universities who participated in the research via questionnaire response and/or interview**

Bristol University	Stanford University
Cambridge University	Strathclyde University
Kings College London (KCL)	University College London (UCL)
Manchester University	University of British Columbia (UBC)
Nanyang University	University of California, Irvine
Oxford University	University of Warwick
Queens University Belfast (QUB)	

Desk-based reviews of publically available information were undertaken of the universities that did not respond to the original request for information and identified by the University as being of particular interest to the research project:

**Table 3: Universities for which a desk-based review was undertaken**

Copenhagen University	St Andrews University
Harvard University	University of California, Berkley
Royal Institute of Technology, Sweden (KTH)	University of Greenwich
Manchester Metropolitan University (MMU)	

Appendix B sets out the universities contacted and the nature of their response, if any.

The results of the questionnaire responses and interviews were collated and the information was categorised to highlight key findings (refer to Section 3 of this report).

3. From the questionnaires and interviews AECOM identified examples of best practice amongst the participating universities; a selection of these have been summarised as short case studies (refer to Appendix D).
4. To supplement information collected via the questionnaires , interviews and desk-based reviews and to obtain information on a wider cross-section of universities, AECOM undertook a review (desk-based) of :
  - The Sierra Club top ten ranked universities. The aim of this review was to try and identify any successful carbon reduction projects that the university could consider; and
  - The Environmental Association for Universities and Colleges (EAUC)'s 'Scottish Universities Carbon Management Performance Review', in particular the applicability of the recommendations made to the University.
5. AECOM also undertook a desk-based review of the requirements under the forthcoming Scottish Government's Carbon Reporting Requirements and the Higher Education Statistical Agency Environmental Management Reporting (HESA EMR). The findings of this element of the research are presented in Section 6 of this report.
6. AECOM has developed recommendations for improving carbon reporting procedures and practices based on the findings of the gap analysis and our existing knowledge and experience of assisting clients with the requirements of impending Government's Carbon Reporting Requirements.

An interim project workshop was held on the 19<sup>th</sup> August 2015. During the workshop AECOM provided a progress update and received feedback on progress to date and clarification of objectives, priorities and expected timescales for subsequent project delivery.

## *4 FINDINGS*

## 4. Findings

This section summarises the findings of our research into best practice carbon management in the universities sector and includes the findings of a review of the following:

- The University's current approach to carbon management;
- Peer best practice, as identified through:
  - Questionnaire responses and interviews with 13 universities; and
  - A desk-based review of information available on the websites of a further seven universities.
- The Sierra Club 2015;
- The Environmental Association for Universities and Colleges (EAUC)'s 'Scottish Universities Carbon Management Performance Review'<sup>5</sup>; and
- Emerging legislation on carbon reporting.

The section has been structured to provide an overview of practice in each of the 4 key topics of interest: Governance and Reporting, Targets, Carbon Reduction Initiatives and Project Funding in order to provide a clear comparison between the University's current position and best practice at peer universities in these areas.

### 4.1 Overview and context

#### The University of Edinburgh - Current Position

The information on the university's current position has been obtained through the work for the Lot 3 work stream and desk-top research undertaken by AECOM between October and November 2015. The preliminary findings were reviewed and clarified by the University during November 2015.

The University was a founding signatory to the Universities and Colleges Climate Commitment for Scotland (UCCCFs) in 2011, and this commitment to harness the University's expertise to reduce its carbon footprint was incorporated into the University's current Climate Action Plan (2010). This plan established a target of reducing absolute carbon emissions by 29% by 2020 against a 2007 baseline, with an interim target of a 20% reduction by 2015. The University is currently not on track to achieve its absolute carbon emissions reduction target, as shown in Figure 1. This is a result of a number of factors. Principally, the University has merged with three other institutions; Moray House School of Education (1998), The Roslin Institute (2011) and Edinburgh College of Art (2011). Additionally, the University has been successful in attracting greater numbers of students, growth in the University's research portfolio<sup>6</sup> and developing buildings with increased utilisation.

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<sup>5</sup> EAUC 'Scottish Universities Carbon Management Performance Review' June 2015. This report was provided by David Beards of the SFC.

<sup>6</sup> See figure 2 which shows a continuous rise in income between 1991 and 2011.

Concurrently the energy intensity of the estate has, and continues to increase, as a result of growth in science and engineering research facilities which are typically heavily serviced and contain relatively energy intensive equipment. An increase in the demand for IT has resulted in a requirement for IT infrastructure in all areas with associated increase in energy consumption, despite improvements in device efficiency. However, the University accepts its responsibility to ensure it takes forward action on climate change by reducing its direct emissions, and influencing carbon emissions from its indirect operations.

The University has made significant efforts to reduce its carbon emissions. This is illustrated in figure 2 where emissions have been normalised against income. Examples of significant projects include the four CHP district heating schemes in which the University invested over £20M between 2003 and 2013. Despite such progress it is clear that the current level of investment and intervention is no longer sufficient to maintain the University on track to achieve its 2020 absolute reduction target.

Figure 1: University of Edinburgh target and actual emissions

Table 1 - Key performance indicators

	2008	2009	2010	2011	2012	2013	2014	2015
Gross internal area (tonnes CO <sub>2</sub> / 1000m <sup>2</sup> )	139	127	131	136	124	122	112	101
Turnover (tonnes CO <sub>2</sub> / £M)	110	114	126	131	107	111	107	100

Table 2 - Absolute carbon emissions

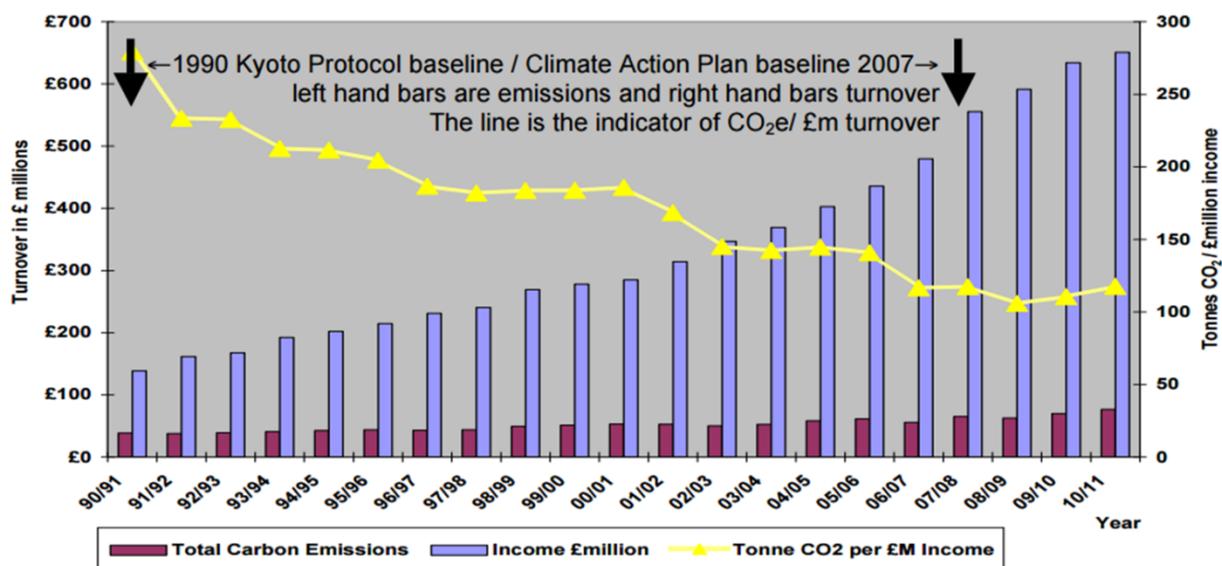


**Absolute carbon emissions**

Table 2 shows the upward trend of the University's emissions and includes emissions across both the academic estate and accommodation services.

- Scope 1:** Includes direct Greenhouse Gas (GHG) emissions from sources that are owned or controlled by the University such as natural gas combustion and University owned vehicles.
- Scope 2:** Accounts for GHG emissions from the generation of purchased electricity, heat and steam generated off-site.
- Scope 3:** Includes emissions from the transmission and distribution of electricity, staff and student commuting. This does not include GHG emissions related to business travel and procurement.

Figure 2: Carbon emissions against income<sup>7</sup>



The trends identified through analysis of responses to the questionnaire, interviews conducted and the desk top research undertaken are summarised by theme in this section.

The full responses from the participant universities are included in Appendix B.

### Overview and context: UK Universities

All the UK based participant universities have approached carbon management and reduction at the outset through participation of the Carbon Trust's Carbon Management Programme. Through this Programme, Universities developed Carbon Management Plans (CMPs) that included, for example, a governance structure, carbon reduction targets, sources of funding and identified carbon reduction projects. Initial drivers for universities to implement CMPs were legislative compliance, cost and carbon reductions. Subsequently, legislative requirements have increased as has the reputational impact of carbon management and wider sustainability for universities. All participant universities have board level involvement in carbon management, for example, through chairing of steering groups and/or signing off annual sustainability reports. This underlines the importance universities put on having board level governance of carbon management.

From the responses received for this research:

- The targets set in Carbon Management Plans remain in place today. It should be noted that a number of the target due dates are 2020. Consequently, a number of universities will begin the target setting process in the next couple of years. Day to day carbon management is managed by teams of specialists; and
- The focus of carbon reduction projects within universities has been on improving energy efficiency and on-site energy generation (renewables). This is a result of considerable cost and carbon

<sup>7</sup> Figure taken from The University of Edinburgh 2012 Climate Action Plan update.

savings often associated with energy efficiency and on site renewable energy generation projects. Day to day carbon management is generally through dedicated staff in stand-alone sustainability teams or dedicated staff within the estates function. Universities fund carbon reduction programmes from a variety of sources including university capital (which may be long term debt), maintenance budgets and loans.

It should be noted that universities in North America generally have access to increased capital investment as a result of higher income levels. Universities on the west coast of America have an additional focus on implementing water conservation measures in relation to drought prevention. This was particularly prominent in the review of the top ten ranked Sierra Club universities. While not directly relevant to the University it is helpful in understanding why universities in America are ranked highly.

## 4.2 Governance and Reporting

### Introduction

This section looks at areas such as commitment to carbon reduction and the actions and initiatives that have been put into place to implement this commitment across the universities. This includes governance structures in place, accountability and day-to-day responsibility and the processes in place for reporting performance both internally and externally to stakeholders.

### Governance and Reporting: University of Edinburgh

This section summarises the current /existing governance and reporting (by sub-topic) at the University.

#### Overall responsibility for carbon management

Overall governance responsibilities sit with the Social Responsibility and Sustainability (SRS) Committee which succeeded the former Sustainability and Environment Advisory Group (SEAG) in 2015. The scope and remit for the SRS Committee were reviewed by the University in 2015, recognising that in addition to the sustainability and environmental topics, the Committee's scope will also include fair employment and equalities and diversities issues, access to education and widening participation issues, community and public engagement. The University seeks to understand the social responsibility and sustainability issues that are important to its stakeholders and to the long term success of the University through engagement with the University and local communities, government relations and partnerships. The SRS Committee meets quarterly and reports to the University's Central Management Group. The Convenor of the Committee is currently the University Senior Vice Principal, Charlie Jeffery.

The University also has a Sustainability Operations Advisory Group (SOAG) whose function is to "Evaluate and monitor implementation of measures for energy conservation, energy efficiency, renewable energy supply and development and implementation of University carbon reduction plans".<sup>8</sup> The SOAG meets

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<sup>8</sup> <http://www.ed.ac.uk/about/sustainability/governance-publications-reports/committees/soag> accessed 20/11/15

quarterly. The group is convened by Director of Corporate Services, Hugh Edmiston in his role as the Strategic Board Representative and Project Sponsor for the Climate Action Plan.

### **Day to day responsibility for carbon management**

The SRS Department has oversight of the issue of climate change. The purpose of the Department for SRS is to provide high quality advice, support and action on social responsibility and sustainability to and on behalf of the University. Its mission is to enable the University to understand, explain and deliver on its ambition to be a leading socially responsible and sustainable University. Furthermore, the Department for SRS understands and explains what the important risks and opportunities are and develops the University's response to these challenges and opportunities. The department for SRS also delivers and facilitates programmes to catalyse action and collaboration across the University campus.

The University has a Climate Policy Manager. Elizabeth Vander Meer, whose role is to manage the review and ongoing development of the University's Climate Action Plan in response to the UCCCFs adopted by Court in 2009. The Climate Policy Manager is also responsible for the overall organisation, planning and management of climate policy issues to support delivery of annual implementation plans which underpin the SRS Strategy and the University's Strategic Plan.

The Estates Department leads on sustainable operations such as biodiversity, energy management, landscape management, travel and waste, with support from the SRS. The Estates Department contains an Energy Office responsible for recording, managing and reporting energy consumption, costs and trends. Accommodation Services lead on food issues while Sustainable Procurement is led by the Procurement Office.

### **Process for reporting carbon performance internally**

The Estates Department is responsible for reporting quarterly on energy consumption and waste generation, with transport data being reported annually to the SRS Committee. Carbon reduction project updates are reported by both Estates and the Department for SRS depending on who is the functional lead. Subsequently, the Department for SRS collates this data and provides updates against the strategic carbon reduction targets.

### **Process for reporting carbon performance externally**

The SRS Department is responsible for producing the annual Social Responsibility and Sustainability Report which is published on the University's website. The University has published five annual reports since 2009/10, detailing social responsibility and sustainability achievements and progress. More recently the University has used the Global Reporting Initiative (GRI) guidelines for further development of the annual Social Responsibility and Sustainability Report. Social responsibility and sustainability issues are also included within the University's Annual Report and Accounts.

### **The University's carbon reduction commitments**

The University was a founding signatory to the Universities and Colleges Climate Commitment for Scotland in 2011, and this commitment to harness the University's expertise to reduce its carbon footprint was incorporated into the University's Climate Action Plan (2010). The University is required to reduce its carbon

emissions to help meet Scotland’s national carbon emissions reduction target as set out in the Climate Change (Scotland) Act 2009.

Additionally, the University is in scope of the UK CRC Energy Efficiency Scheme which is a significant financial driver with the potential for reputational damage if the University were to fail to comply. Consequently, this is a major incentive for the University to establish a carbon reduction strategy, implement carbon reduction projects and improve carbon performance. AECOM understands that the University does not meet the participation criteria of and, therefore, does not have an obligation under The Energy Saving Opportunities Regulations 2014 (ESOS).

The University is required to have Energy Performance Certificates for 20 of its buildings as a result of the Energy Performance of Buildings (Scotland) Amendment Regulations (2012). Please see Section 6 for details of the impending Order for Public Bodies to report carbon emissions and wider aspects of sustainability to the Scottish Government on an annual basis.

### Findings on Governance and Reporting: participant universities

This section sets out the findings from the research on governance and reporting by sub-topic on the universities reviewed.

### Overall responsibility for carbon management

Table 4 details which job title of the position with top-level responsibility for carbon management:

Table 4: Overall responsibility for carbon management

University	Top-level responsibility
Berkeley University	Executive Vice President for Business Operations
Bristol University	Director of Estates / Bursar
Cambridge University	Pro-Vice Chancellor for Institutional Affairs
Copenhagen University	Sustainability Science Centre
Greenwich University	Vice-Chancellor
Harvard University	The Office for Sustainability
KCL	Principal
Manchester University	President and Vice Chancellor and Deputy President and Deputy Vice-Chancellor
Manchester Metropolitan University	Vice Chancellor and Deputy Vice Chancellor
Nanyang University	Provost
Oxford University	University Council
Queen’s University Belfast (QUB)	University Registrar and Chief Operating Officer

University	Top-level responsibility
St. Andrews University	The Sustainability Policy Group
Stanford University	Executive Director
Strathclyde University	Principal and Vice Chancellor
University of California, Berkeley	Not stated
University of California, Irvine	Not stated
University College London	UCL Council
Warwick University	Pro-Vice Chancellor

### Day-to-day responsibility for carbon management

Table 5 details which role / function has responsibility for day-to-day carbon management within the universities reviewed:

Table 5: Day-to-day responsibility for carbon management

University	Day to Day carbon management responsibility
Berkeley University	Director of Sustainability
Bristol University	Head of Sustainability
Cambridge University	Head of Environment and Energy
Copenhagen University	Team Leader Green Campus Project
Greenwich University	Carbon Management Board
Harvard University	The Office for Sustainability
King's College London	Sustainability team
Manchester University	Head of Sustainability
Manchester Metropolitan University	Environmental Sustainability Management Group
Nanyang University	At the time of the research, Nanyang were recruiting a Sustainability Manager
Oxford University	Carbon Reduction Manager
Queen's University Belfast (QUB)	Deputy Director of Estates
St. Andrews University	Environment and Energy Manager
Stanford University	The Department of Sustainability and Energy Management
Strathclyde University	Estates Services – Assistant Director, Sustainability and Environmental Management
University of California,	The office of Environmental Planning

University	Day to Day carbon management responsibility
Irvine	and Sustainability
University College London	UCL's Environmental Sustainability team
Warwick University	The operational Carbon Manager

### Process for reporting carbon performance internally

Table 6 summarises the scope, recipient and frequency of internal carbon performance reporting, which varies significantly across the universities reviewed.

Table 6: Internal reporting by participant universities

University	What?	To whom?	Frequency of Reporting
Berkeley University	Total emissions (all campuses update their emissions at least bi-annually)	Board of Regents	Annually
Bristol University	Carbon emissions and progress on carbon reduction projects	Estates Committee	Monthly
Cambridge University	Progress on carbon reduction targets and carbon reduction projects	Energy and Carbon Reduction Board (ECRP) who in turn report to the Environmental Council and Environmental Board	Quarterly
		Planning and Resources Committee and Buildings Committees	Annually
Copenhagen University	No response		
Greenwich University	Sustainability update	University Court	Bi-Annually
Harvard University	Progress report	University wide	Annually
King's College London	No formal reporting process		
Manchester University	Not stated	Carbon Leadership Group	Quarterly
Manchester Metropolitan University	Not stated	Sustainability Investment Board (chaired by the Deputy Vice-Chancellor) reports progress to Directorate and Board of Governors	Not stated
Nanyang University	No formal reporting process		
Oxford University	Environmental	Not stated	Monthly

University	What?	To whom?	Frequency of Reporting
	management data		
Queen's University Belfast (QUB)	Not stated	Steering group	Bi-annual
St. Andrews University	Progress report	Planning and Resources Committee (ultimately Directorate and Board of Governors)	Annually (at least)
Stanford University	The US Climate Registry requires third party certification of the university's GHG emissions inventory	Not stated	Not stated
Strathclyde University	Gas, Electricity and Water KPIs and deviation from targets	University Estates Committee	Not stated
University of California, Irvine	GHG emissions	Key stakeholders (student housing, transportation etc) through the internal Climate Change Working Group	Annually
University College London	Performance against the Environmental and Sustainability Strategy	University Council	Every two years
Warwick University	Sustainability	University wide through the University's website	Annually

### Process for reporting carbon performance externally

Scottish universities are required to report carbon emissions annually to the SFC via the Outcome Agreements. Previously Scottish Universities have also been required to submit Higher Education Statistical Agency Environmental Management Reporting (HESA EMER) data collected by the EAUC. English universities have to report annual carbon emissions to the Higher Education Funding Council for England (HEFCE).

UBC's GHG inventory, Carbon Neutral Action Reports (CNARs) and Annual Sustainability Reports are published on UBC's sustainability website, the CNARs are also published on the Ministry of Environment website. Two participating American Universities, University of California, Irvine and Stanford University both have their annual GHG emissions inventory verified by a third party. The former advised in their questionnaire response that they report to the Climate Registry and the American College and University President's Climate Commitment (ACUPCC).

Table 7: External reporting by participant universities

University	Scope of reporting	Where	Frequency
University of California,	Sustainability	Not stated	Annual

University	Scope of reporting	Where	Frequency
Berkeley	Emissions inventory	To the US Regulator	Bi-annually
Bristol University	Sustainability (external data verified by 3 <sup>rd</sup> party for CRC and ISO14064	University's website	Annual
Cambridge University	Carbon performance reported through Estates	HEFCE	Annual
	Sustainability	Published but to where has not been stated	Annual
Copenhagen University	Not stated		
Greenwich University	Not stated		
Harvard	Carbon emissions performance for baseline buildings and total campus against FY 2006	Not stated	
King's College London	No formal process		
Manchester University	EMR data	HESA	Annual
	Emissions	Manchester city Council (to support local carbon reduction targets)	Annual
Manchester Metropolitan University	Sustainability (Annual sustainability statement/report)	HEFCE	Annual
Nanyang University	No formal process		
Oxford University	Sustainability	Sustainability report - website	Annual
	Progress on carbon management	Twitter and Facebook	As and when
Queen's University Belfast (QUB)	Estates management statistics including energy consumption	Department of Employment and Learning (Northern Ireland)	Annual
	Sustainability data including waste and travel	'Area Network' run by Business in the Community	Not stated
St. Andrews University	Not stated		
Stanford University	GHG Inventory (third party verified)	The Climate Registry (US)	Annual
Strathclyde University	Climate Change Action Plan targets and progress (UCCCfs)	SFC	Annual
	Public Sector Duties Reporting	Sustainable Scotland Network (SSN)	Annual

University	Scope of reporting	Where	Frequency
	Estates Management Statistics	HESA EMR	Annual
	Progress against emissions reduction target, enabled via the pending District heating Scheme	SFC Outcome Agreement	Annual
UBC	GHG Inventory and Sustainability	Sustainability report; website	Annual
University of California, Irvine	GHG Inventory (externally verified)	The Climate Registry and ACUPCC	Annual
University College London	UCL's Financial Report includes section on carbon emissions	Not stated	Annual
Warwick University	Sustainability	Sustainability report; website	Annual

## Carbon reduction commitments

This sub-section sets out the carbon reduction commitments of participant universities, which responded to the question on carbon reduction commitments, has to either comply with (regulatory) or has signed up to (voluntary). The specific commitments are detailed in table 8.

Table 8: Carbon reduction commitments

University	Carbon reduction commitment regulatory	Carbon reduction commitment sector or voluntary
University of California, Berkeley	None stated	Internal university commitment to reducing carbon and sustainability
Bristol University	UK Energy Efficiency (CRC) Scheme	None stated but Bristol University is assumed to be bound by HEFCE's sector target (see Cambridge University below)
Cambridge University	UK Energy Efficiency (CRC) Scheme Energy Saving Opportunity Scheme (ESOS)	HEFCE's sector target for all English Universities for 2020 based on a 2005 baseline, requiring a 34% reduction for Cambridge
Copenhagen University	None stated	The EU's and Denmark's goal of reducing CO <sub>2</sub> emissions along with Copenhagen Municipality targets
Greenwich University	None stated	HEFCE's sector target
King's College London	UK Energy Efficiency (CRC) Scheme Display Energy Certificates (DECs)	None stated
Manchester University	'Yes' no further detail provided	

University	Carbon reduction commitment regulatory	Carbon reduction commitment sector or voluntary
Manchester Metropolitan University	None stated	HEFCE Strategic plan and Sustainable Development Action Plan
Nanyang University	None stated	Eco-campus scheme targets to reduce energy, water and waste by 35% in-line with Singapore national targets.
Oxford University	UK Energy Efficiency (CRC) Scheme Energy Saving Opportunity Scheme (ESOS) European Union Emissions Trading Scheme (EU ETS)	None stated
Queen's University Belfast (QUB)	UK Energy Efficiency (CRC) Scheme	None stated
St. Andrews University	None stated	Climate Change (Scotland) Act (2009); at least 80% reduction in GHG by 2050 with interim milestones
Strathclyde University	UK Energy Efficiency (CRC) Scheme	None stated
UBC	British Columbia's Carbon Neutral Government Regulation and Greenhouse Gas Reduction Target Act UBC has been required to report and offset its emissions since 2010, including emissions from all properties owned and leased by UBC and its subsidiaries.	None stated
University of California, Irvine	None stated	UC is a founding signatory of the American College and University President's Climate Commitment (ACUPCC)
University College London	UK Energy Efficiency (CRC) Scheme Energy Saving Opportunity Scheme (ESOS) European Union Emissions Trading Scheme (EU ETS) Display Energy Certificates	None stated

### Interpretation and analysis of carbon management governance and reporting (internal and external) findings

The University has demonstrated a clear existing governance structure for carbon management with governance resting with the SRS Committee convened by the Senior Vice Principal. Day-to-day

responsibility for carbon management is shared between departments depending on the functional lead. Internal reporting frequency varies with energy and waste data reported quarterly while transport data is reported annually. The SRS department produces an annual SRS report which includes a review of the University's carbon management performance. The remit and membership of the SRS Committee, its papers and minutes and the University's Annual SRS Report are published on the University's external website.

All participant universities have top-level accountability for carbon reduction and management, and all of those interviewed during the course of this project firmly believed that accountability at a high level within the organisation is key in driving carbon management and meeting carbon reduction targets. With governance responsibilities residing with the SRS Committee chaired by the Senior Vice Principal the University is in line with its peers.

In most cases, responsibility for day-to-day carbon management ultimately rests with a Sustainability/Environmental Team/Group or Estates. Bristol University would appear to have the largest sustainability team with 14 staff members with individuals responsible for areas such as energy management, waste management, transport and laboratories. Two universities, Oxford University and University of Warwick have dedicated 'carbon management' posts. While a direct correlation between effective carbon management and achieving carbon reduction targets and having a dedicated Carbon Manager is difficult to make, both the University of Warwick and Oxford University advised that having a dedicated position has been key to their successes with carbon management. None of the universities reviewed reported having a carbon policy manager. In this regard, the University is unique amongst the universities reviewed.

The University's carbon management reporting in terms of content, frequency and means of reporting is in line with those peers which participated in this research. Internal reporting is dominated by reporting of data to assess performance against targets. External reporting is in part driven by regulatory requirements and the majority of universities responding in detail on this aspect indicated publishing an Annual Sustainability Report on their websites.

The research shows that most of the participant universities do report internally. What is reported and to whom it is reported varies considerably across the participant universities. The most common frequency of reporting is annual.

Legislative requirements were cited as key drivers for carbon reduction commitments and/or the implementation of carbon management programmes.

Overall, with regard to governance and reporting AECOM believes the University is in line with best practice within the study, with the potential exception of day to day management of carbon and frequency of reviewing carbon-related data. This is detailed in the Recommendation below:

## Recommendation

- Consideration should be given to either:
  - a) Evolving the role of the Carbon Policy Manager to include responsibility for day-to-day aspects of carbon management; or
  - b) Establishing a dedicated post for day-to-day carbon management.

Proposed responsibilities for this (expanded) role could include:

- Collation, analysis and interpretation of carbon data ensuring that the data for all projects with the potential to reduce carbon emissions is captured;
- Lead in the on-going improvement and robustness of carbon data collated;
- Lead the carbon evaluation aspect of project business cases;
- Lead on the management of the project life cycle for carbon reduction projects (notably as the Carbon Programme Manager does at Oxford University); and
- Post evaluation (particularly evaluation of realised carbon savings versus anticipated carbon savings) of implemented carbon reduction projects.

The rationale behind this recommendation is that a carbon manager provides a focal point for all carbon related activity at the University. AECOM are aware of large private sector manufacturing organisations which have recently (within the last two years) established dedicated Carbon Manager posts. They have advised that this has resulted in successful absolute carbon reduction.

- Develop an action plan to facilitate an increase in the frequency of internal data reporting to monthly intervals to senior management so that trends can be better identified and as a result more focused intervention to further increase carbon savings.

## 4.3 Targets

### Introduction

This section focuses on carbon targets, the metrics used to measure performance against these targets. It also looks at how the targets were agreed and the carbon management plans in place to monitor performance against them.

### Carbon Targets: University of Edinburgh

The Climate Action Plan established a target of reducing absolute carbon emissions by 29% by 2020 against a 2007 baseline with an interim target of a 20% reduction by 2015. While the University assess performance against this absolute target, carbon emissions against income (normalised data) are measured (See figure 2).

## Target setting process

The targets were established to help the University make a proportionate contribution to national targets set in the Climate Change (Scotland) Act 2009. The targets were developed and included as part of the University's first Carbon Management Plan (CMP) which was adopted in 2010. The baseline has not been re-stated nor have there have been any revisions to the target since.

## Carbon Management Plan

The University participated in the Carbon Trust Carbon Management Programme in 2009. In 2010 the University formally adopted its Climate Action Plan 2010. The Plan was developed based around five broad drivers:

- Legislative – The UK Carbon Reduction and Energy Efficiency Commitment (CRC) and Building Standards;
- Political – the Scottish Government's expectation that public bodies will take the lead in meeting national targets set out in the Climate Change Act (2009);
- Economic – mitigating rising utility costs;
- Ethical – The University's 2010 Social Responsibility and Sustainability Strategy; and
- Reputational – internal and external image.

The 2007 baseline was based on scope 1 and 2 emissions of which emissions from buildings comprised 67% of the total reported emissions<sup>9</sup>.

The plan set out three key areas of opportunity to meet the target:

- Investment in energy efficient technologies;
- Improved space management; and
- Behavioural change across the University.

In 2012 the University undertook a review of the Climate Action Plan and produced an update to the Plan. Within the period of implementation of the Plan (2010) there has been a significant increase in academic activity resulting in new laboratories at the University. In addition, in the last 20 years, the University has merged with three other educational institutions; Moray House School of Education (merged with the University in 1998), The Roslin Institute (merged with the University in 2011) and Edinburgh College of Art (merged with the University in 2011). Consequently, the University has not been able to achieve a reduction in absolute greenhouse gas emissions. The update reports "on a relative basis a small percentage improvement". However, as Figure 2 shows the University has also tracked tCO<sub>2</sub>e emissions against turnover which in this case shows a more favourable position where revenue is increasing at a greater rate than carbon emissions.

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<sup>9</sup> The GHG Protocol defines scopes 1,2 and 3 emissions. Scope 1 emissions are direct emissions from fuel combustion, owned transport and fugitive emissions. Scope 2 emissions are indirect emissions from purchased electricity and purchased Heat, steam and cooling direct from suppliers. Scope 3 emissions are those from business travel, delivery and distribution, use of purchased materials and consumables, use of leased assets and waste disposal.

The estimated cost of delivering projects within these areas of opportunity was circa £45 million. A carbon reduction project register was included within the plan to be funded through Salix Finance Limited<sup>10</sup>, Government and University funding.

## Carbon targets: participant universities

### Carbon management plans

Table 9 shows which of the participant universities has Carbon Management Plans and associated commentary where provided:

Table 9: Participant universities Carbon Management Plans

University	Carbon Management Plan Yes/No	Details (where provided)
University of California, Berkeley	Yes	Each campus has their own strategy
Bristol University	Yes	None provided
Cambridge University	Yes	Published in 2010
Copenhagen University	No response	No response
Greenwich University	Yes	Sets out in detail strategy for reducing carbon emissions over next 5 years, detailing a range of measures and actions to reduce emissions across the university estate. These fall into two main categories; technical measures which require capital investment to achieve a direct reduction in emissions and; enabling measures which help embed carbon reduction and management in the operational processes of the university.
Harvard	Yes	Includes - Governance structure and organisational alignment - Energy and emissions tracking, planning and implementation - Transitioning to a cleaner energy supply - Policies and tools to drive to change - Integrating research and teaching with on-campus challenges
King's College London	Yes	Published on the university's website
Manchester University	Yes	The CMP is in the process of being updated (data cleanse). Scope 3 is outside of the target so needs to be removed from monitored figures.
Manchester Metropolitan University	Yes	None
Nanyang University	No	The University has an Energy, Water and Waste Plan
Oxford University	Yes	None
Queen's University Belfast (QUB)	Yes	None

<sup>10</sup> Salix Finance Ltd is an independent, publicly funded company, who provide 100% interest-free capital to the public sector to improve energy efficiency and reduce carbon emissions.

University	Carbon Management Plan Yes/No	Details (where provided)
St. Andrews University	Yes	The Carbon Management Plan (CMP) for the University of St Andrews sets out a five-year plan for the reduction of carbon emissions across the University's own activities. It has been produced in conjunction with the Carbon Trust in Scotland using the support of accredited consultants. The CMP is aligned with the University's Strategic Plan and supports the existing Sustainable Development Policy and Strategy 2012-2022.
Stanford University	Yes	Known as 'Energy and Climate Plan'
Strathclyde University	Yes	None
UBC	Yes	UBC's leadership in developing and implementing our Climate Action Plan has been recognized with several national and international awards, including the 2012 Association for the Advancement of Sustainability in Higher Education (AASHE) Campus Sustainability Case Study Award and an Honorable Mention in the Canadian Association of University Business Officers (CAUBO) Quality and Productivity Awards.
University of California, Irvine	Yes	First Climate Action Plan was developed in 2007 and updated in 2010
University College London	Yes	At the time of the research UCL has started to review its CMP
Warwick University	No response	

UBC provided good information on the development of their Climate Action Plan:

- The Plan includes strategies to reduce emissions in the areas of Campus Development and Infrastructure, Energy Supply and Management, Fleets and Fuel Use, Business Travel and Procurement, Transportation and Food;
- UBC's leadership in developing and implementing our Climate Action Plan has been recognized with several national and international awards, including the 2012 Association for the Advancement of Sustainability in Higher Education (AASHE) Campus Sustainability Case Study Award and an Honorable Mention in the Canadian Association of University Business Officers (CAUBO) Quality and Productivity Awards; and
- In 2015, work will commence on updating UBC Vancouver's Climate Action Plan for 2015-2020 to identify additional actions and measures to advance towards its aggressive targets.

According to UBC's case study (see Appendix D – Case Studies) the success of their Climate Action Plan has been based on the consultation process UBC undertook when the plan was developed. The consultation was based upon:

- ‘Philosophical commitment to stakeholder engagement;
- A mandate;
- Designation of a co-ordinating body;
- Budget and staff; and
- A motivated constituency’.

Also key was the secretariat role the Campus Sustainability Office played in co-ordination of the GHG inventory and consultation process, funding of a consultant to provide support to the working groups and management time to provide high level oversight of the process.

### **Current carbon reduction targets**

This section details the carbon targets each of the reviewed universities have and the process for establishing the targets.

Table 10 summarises the carbon reduction targets of participant universities.

**Table 10: Participant universities carbon reduction targets**

Name of University	Measurement unit (CO <sub>2</sub> or CO <sub>2</sub> e)	Scope	Absolute or Relative (normalisation factor)	Carbon reduction	Base Year	Target Year	Progress against target	Notes
Berkeley	CO <sub>2</sub>	1, 2 & 3	N/A	Carbon neutrality	N/A	2025	Not stated	Definition of carbon neutrality is as per the ACUPCC
Bristol	Not stated	Not stated	Absolute	33%	2005	2016	University of Bristol advised that they have “fallen well short” of their absolute target, although they have reduced relative carbon emissions, as normalised against income.	None
	Not stated	Not stated	Absolute	38%	2005	2020	See above	None
British Columbia	CO <sub>2</sub> e	1,2 & 3	Absolute	33%	2007	2015	By 2014: <ul style="list-style-type: none"> <li>• Absolute emissions reduced by 22% despite significant growth.</li> <li>• Relative emissions</li> </ul>	

Name of University	Measurement unit (CO <sub>2</sub> or CO <sub>2</sub> e)	Scope	Absolute or Relative (normalisation factor)	Carbon reduction	Base Year	Target Year	Progress against target	Notes
							reduced by 34% per full-time equivalent (FTE) students.	
	CO <sub>2</sub> e	1,2 & 3	Absolute	67%	2007	2020	N/A	None
	CO <sub>2</sub> e	1,2 & 3	Absolute	100%	2007	2050	N/A	
California, Irvine	Not stated	Not stated	Absolute	To achieve 1990 level	1990	2020	Not stated	None
	Not stated	1 & 2	Absolute	Carbon neutrality *	N/A	2025	Not stated	
Cambridge	CO <sub>2</sub> e	1,2 & 3	Absolute	34%	2005	2020	Not stated	When the Carbon Management Plan is updated, the University will review the targets to update them to challenging, yet achievable targets
Copenhagen	CO <sub>2</sub> e	1, 2 & 3 (transport)	Absolute	65%	Not stated	2020	Not stated	None
Greenwich	Not stated	Not stated	Absolute	30%	2009/2010	2016	Not stated	None
Harvard	Not stated	Not stated	Absolute	30%	2006	2016	Not stated	None
				80%	2006	2050	Not stated	None
KCL	Not stated	1 & 2 only	Absolute	43%	2005/2006	2019/2020	Not stated	None
Manchester (MMU)	Not stated	Not stated	Absolute	35%	2005/2006	2015/2016	Not stated	None

Name of University	Measurement unit (CO <sub>2</sub> or CO <sub>2</sub> e)	Scope	Absolute or Relative (normalisation factor)	Carbon reduction	Base Year	Target Year	Progress against target	Notes
				50%	2005/2006	2020/2021		
Manchester University	CO <sub>2</sub>	1 & 2	Absolute	40%	2007/2008	2020	Not stated	None
Nanyang	Not stated	Not stated	Absolute	35%	Not stated	Not stated	Not stated	None
Oxford		1 & 2 only	Absolute	33%	2005	2021	18% achieved so far	Oxford believe they are on track to meet their target
QUB	Not stated	Not stated	Absolute	21%	2008	2020	Not stated	None
St. Andrews			Absolute	Carbon neutrality	2006/2007	2015/2016	Not stated	None
Stanford	No targets have been set							
Strathclyde	CO <sub>2</sub> e	1 & 2	Absolute	25%	2009/2010	2020	12% reduction achieved by 2013-14	<p>Relative performance also monitored (emissions normalised by area and by income).</p> <p>Progress is monitored against target using the following parameters:</p> <ul style="list-style-type: none"> <li>Electricity intensity (kwh/m<sup>2</sup>);</li> </ul>

Name of University	Measurement unit (CO <sub>2</sub> or CO <sub>2</sub> e)	Scope	Absolute or Relative (normalisation factor)	Carbon reduction	Base Year	Target Year	Progress against target	Notes
								<ul style="list-style-type: none"> <li>Gas intensity (kWh/m<sup>2</sup>);</li> <li>Relative GHG emissions (tCO<sub>2</sub>e/m<sup>2</sup>);</li> <li>Relative GHG emissions (tCO<sub>2</sub>e/£M income);</li> <li>Water intensity (m<sup>3</sup>/Full Time Equivalent(FTE); and</li> </ul> Waste mass (kg/FTE). As at October 2015, Carbon Management Plan is being updated to align with the University Strategy 2015-2020 and include Scope 1, 2 and 3 emissions.
University College London	Not stated	Not stated	Not stated	34%	2005/2006	2020	Not stated	None
Warwick				60%	2005	?		The University is

Name of University	Measurement unit (CO <sub>2</sub> or CO <sub>2</sub> e)	Scope	Absolute or Relative (normalisation factor)	Carbon reduction	Base Year	Target Year	Progress against target	Notes
								<p>unlikely to meet the target because the university has grown by 17% and will grow by another 40%. A review is being organised to reconsider the scope of the targets and the possible achievements. Relative or Absolute metrics will be taken into consideration. Report on scope 1 and 2?. Consideration of carbon emission per staff or FTE and emission per turnover or per square meter. Currently the university calculates carbon emissions per unit of added value but added value is difficult to quantify in a university. They are</p>

Name of University	Measurement unit (CO <sub>2</sub> or CO <sub>2</sub> e)	Scope	Absolute or Relative (normalisation factor)	Carbon reduction	Base Year	Target Year	Progress against target	Notes
								using the 2005 baseline.

The end date for Harvard University, MMU and St. Andrews University's initial carbon management plans is the end of this year. Despite Harvard University MMU completing their carbon management plans at the end of 2015, both universities have committed themselves to further reduce GHG emissions by 80% and 50% by 2050 and 2020/2021 respectively.

### Target setting process

The approach to setting targets historically was distinctly different between UK and non-UK based universities.

#### UK-Based Universities:

All UK based universities cited the original Carbon Trust Carbon Management Programme as the basis for setting existing carbon reduction targets. In addition:

- Strathclyde University advised that they set a conservative target as they took account of the cumulative impact of property refurbishments, property divestments, and new construction meeting Sustainable Design Quality Standards and ongoing investment in energy efficiency;
- Manchester University developed their Carbon Management Plan as part of the Carbon Trust Programme but has subsequently developed its own internal carbon data analysis and reporting tool;
- St Andrews University has, with the assistance of the Carbon Trust in Scotland, undertaken a review of progress to date against the targets set out in the original CMP of 2008. This has included a review of ongoing efforts to reduce carbon emissions across University activities and development of a revised CMP;
- Bristol University set their targets in 2005 using the Carbon Trust's approach to Carbon Management Plans; and
- For Oxford University, The Carbon Trust and AECOM estimated what could be done (what projects were possible) from this the target was set.

#### Non-UK Based Universities:

- Harvard advised that their original target was developed on the findings and suggestions made by a 2008 taskforce consisting of expert faculty staff, students and support staff convened by the President of Harvard at the time; and
- Stanford University has chosen not to set targets only stating that they report on achievements as they happen.

The remaining universities did not provide a response to this question.

### Interpretation and analysis of the findings on carbon targets

The development of CMPs historically by UK based universities was based on the Carbon Trust Carbon Management model. These plans are nearing the end and Universities are beginning to consider the next iterations. North American universities have opted for Climate Action Plans or Strategies. The most

successful of these would appear to be UBC's based on a well-planned and implemented consultation process.

The University is in line with best practice by developing a Climate Action Plan to follow on from their Carbon Management Plan. The process used by UBC to develop through their Climate Action Plan came through strongly in the research, particularly the thoroughly planned and delivered stakeholder engagement plan to support the process.

The vast majority of universities have absolute carbon reduction targets and a number have normalised parameters/targets to support the absolute reduction target.

We have identified two key recommendations in relation to carbon targets which the University should consider:

### Climate Action Plan recommendation

- The University should review the process to be used for developing the Carbon Action Plan to ensure the key components identified by UBC are in place. This includes for example, funding a secretariat and a communications plan.

### Carbon target recommendation

- Given the growth in the University's Estate (predominantly through growth carbon intensive research facilities and mergers with other educational establishments) and growth in Full Time Equivalent (FTE) students, the University should consider re-baselining its carbon emissions. This would help to ensure that the new target going forward is against a baseline which accurately reflects the University's recent levels of emissions. However, the target would need to take account of the identification of large and small scale carbon reduction projects and the potential funding of these projects;
- Looking beyond the 2020 target the University should consider setting a realistic and achievable absolute GHG emissions reduction target. An absolute carbon reduction target would demonstrate the University's commitment to combatting climate change, contributing to the Higher Education sector and national targets. The university should also consider a normalised carbon intensity target. AECOM suggests the intensity ratio be carbon emissions against students; and
- This target could be supported by a range of reported intensity ratios for energy, water and waste against FTE student numbers. This would allow for analysis of performance against the absolute reduction target.

## 4.4 Carbon Reduction Initiatives

### Introduction

This section summarises the initiatives that have been put into place to reduce carbon emissions at the University and in participant universities. In particular it focuses on building design and management – including laboratories and research areas, behavioural change and communication programmes, travel and waste initiatives and green IT, space management micro-renewable usage and incentivisation and use of off-site renewable energy production.

## Carbon Reduction initiatives: University of Edinburgh

The University has implemented a number of carbon reduction projects over the life of the University's former Carbon Management Plan latterly and more recently the Carbon Action Plan. The University has invested a total of £20 million in Combined Heat and Power (CHP) District Heating to reduce energy costs and carbon emissions. There are four schemes in total with the fourth scheme installed in 2013, the schemes generated savings of £1.5 million and 8,500 tCO<sub>2</sub>e in 2014.

The University currently has links with various research project 'living labs' across a number of schools within the University. However, AECOM was advised by the University that the learning from these projects is not always taken into consideration when developing carbon reduction projects for the University itself.

The University has a sustainable laboratories programme to reduce the carbon footprint of laboratories given the associated high energy consumption, consumption of finite materials and generation of hazardous waste. In 2013 the University established a pilot programme to deliver an Environmental Assessment Framework for laboratories. Through this framework support was provided to technical and research staff to develop and implement resource efficient practices in laboratories across the University. This work is being continued through the recently appointed programme facilitator for laboratories<sup>11</sup>.

As part of the Lot 3 work AECOM reviewed with the University's Estates Department which technologies had been implemented and which are under consideration. Table 11 below provides a sample of the range of measures which the university has implemented.

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<sup>11</sup> <http://www.ed.ac.uk/about/sustainability/about/programmes/sustainable-laboratories>

**Table 11: Sample of carbon reduction measures implemented by the University**

Type of Measure	Category	Technology	Energy Conservation Measure	Progress, as reported by the University as at September 2015
<b>Energy reduction</b>	Building envelope	Building fabric improvement	Insulate external building envelope and cavity walls. Typically, during refurbishments / redevelopments the University's standards exceed Government standards (T46 form)	Ongoing
		Improve windows	Where windows are single glazed, consider fitting secondary glazing to reduce heat losses in the winter and, to some extent, heat gains in the summer Repair seals and ventilators, install weather stripping, seal gaps between window frames and walls	Ongoing As above; windows usually changed due to maintenance requirement not for energy only - long payback
		Server room	Consolidate IT servers, and provide server room cooling using an existing condenser water circuit, rather than VC split units	Part way through doing this
		Lab equipment	Ensure all lab equipment is turned off when not in use, and that multiple devices are not used when one would suffice	Under investigation: SRS have asked the lab group to consider implementing this measure
	Heat recovery	Heat recovery, AHUs	Install heat recovery run-around coils to AHUs to reduce demand for heating and cooling in the system	On all new AHUs, hard (expensive) to retrofit
	Heating	Boiler	Identify older / less efficient boiler plant. Consider replacing older, inefficient boiler plant	Doing this, also CHP
		Low pressure hot water (LPHW)	Add VSDs and inverters on LPHW system	VSDs added
		Hot water thermal insulation	Insulate cylinders and pipework	Completed
	Heating and cooling	Split units	Commission local controls with time schedules, wider dead bands, night setback. Install interlocks with other split systems, central HVAC, and openable windows	Ongoing
	Humidification	Electric steam humidifiers	Review AHU humidification requirements in conjunction with requirements for spaces served.	Completed All large units changed to adiabatic, with good savings
	Lighting	Car park	Replace car park lighting with newer LED equivalents. Include timer or daylight-sensing controls	Completed All car park lighting is now LED
	PCs	Switch off	Some PCs may need to be left on for research purposes, however there could be significant opportunity to reduce demand by encouraging users to switch off at the end of the working day.	Information Services has rolled out auto shut down etc to PCs SRS – run campaigns on this

Type of Measure	Category	Technology	Energy Conservation Measure	Progress, as reported by the University as at September 2015
	Variable speed drives (VSD)	Motors, pumps, and fans	Add VSDs to motors, pumps, and fans across the University estate	Completed
	Behaviour Change	Windows	Encourage staff not to open windows when heating or air-conditioning systems are operating to reduce losses. Energy switch campaign for which a number of communications materials have been developed 'Switch and Save' campaign. Winter shutdown campaign. Energy co-ordinators being empowered to undertake face-to-face engagement with building users.	SRS behaviour change
	Servers / Data Centres	Consolidate servers	Consider consolidating server provision to a purpose built data centre building with highly efficient cooling system	Completed
	Rationalisation	Space use	Consider opportunities for rationalisation of the estate that could reduce energy use through a reduction in space requirements.	Ongoing
<b>Travel &amp; Transport</b>	Reduction in commuting energy use		Develop estate wide travel plans. Incentives for public transport, walking, and cycling. Incentives for car sharing and low emission cars	Ongoing This is tackled by default by number of parking spaces being reduced
	Electric fleet vehicles			Have some electric vans - works well as charged by CHP in quieter periods. Few pool cars but use city car club. Travel – installation of four electric vehicle charging points.
<b>Low / Zero Carbon Energy Generation</b>	Biofuels, biogas generation		Generation by Anaerobic Digestion. Reviewed in previous AECOM study and waste streams not sufficient / food waste collections in Edinburgh now	Completed
	Gas fired CHP		Install CHPs, using natural gas and / or biogas.	Installed
	Heat pumps		Heat pumps may be air-source, water-source, and/or ground-source heat pumps	GSHP at SCRIM which had issues to begin but now working better

Type of Measure	Category	Technology	Energy Conservation Measure	Progress, as reported by the University as at September 2015
		Solar thermal panels		A few have been installed.
<b>Efficiency of energy supply</b>		District heating network		Already in place There are four CHP district heating schemes; one for Pollock Halls constructed in 2003 (526 kWe), one for King's Buildings constructed in 2004 (2.7 MWe), a third serving George Square built in 2005 (1.6 MWe) and a fourth for Holyrood/Pleasance built in 2013 (1.4 MWe)
		Low temperature (i.e. 4th gen) district heating network		Moving towards this as buildings are refurbished
		Cooling network		Already in place at George Square and built in at Easter Bush; possibility for King's Buildings
		Visible power meters showing energy usage in buildings		6 or 7 of these in place
		Active network monitoring		Participate in STOR - trial with 1 at present
<b>Wider communication and engagement</b>			Sustainability Awards (running for five years)	Managed and delivered by the SRS Department. Last year's awards recognised 41 teams of staff and students

With regard to wider resource efficiency, the University has recently implemented a number of water, waste and travel measures.<sup>12</sup> For example:

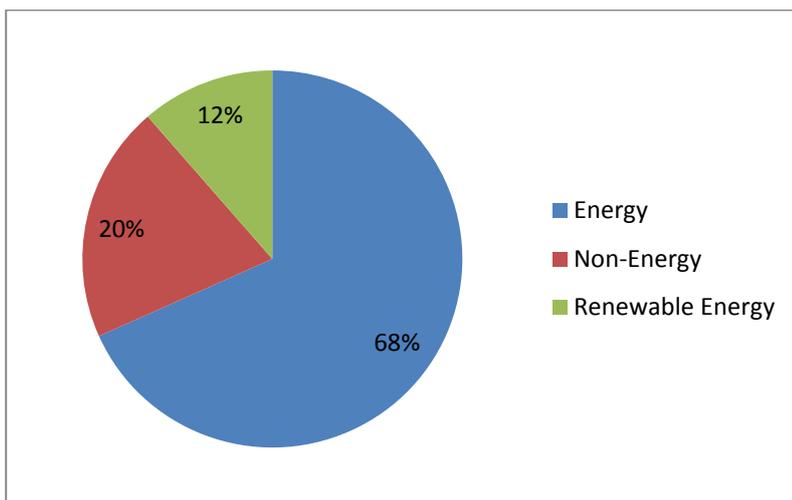
- Water – progress being made to remove free-standing water coolers;
- Waste – food waste bins have been installed in all University catering facilities; and
- Travel – University wide travel plan.

## Carbon reduction initiatives: Participant universities

### Types of projects

The participant universities reported having implemented a number of carbon reduction projects. Figure 3 shows the focus area of these carbon reduction projects.

Figure 3: Breakdown of implemented carbon reduction projects



The breakdown is reflective of universities investing in energy and renewable energy generation projects to generate significant reductions in energy costs and carbon emissions.

A further breakdown of all carbon reduction projects implemented by number and type by the participant universities reviewed is shown in figure 4 over the page:

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<sup>12</sup> The measures are detailed in the University's 2013/2014 Social Responsibility and Sustainability Report.

Figure 4: Breakdown of all carbon reduction projects by type

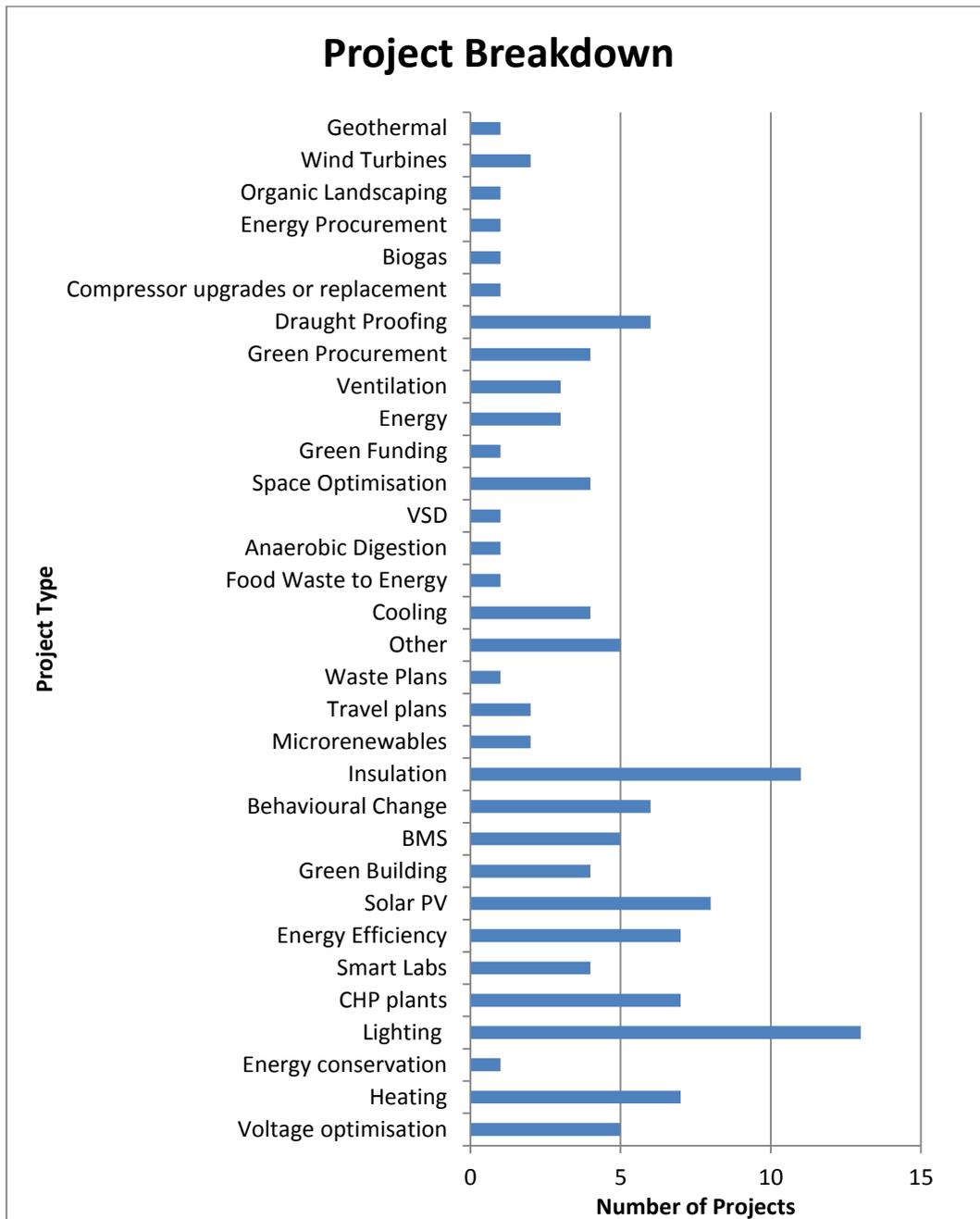


Figure 4 shows the range and total number of carbon reduction projects that the Universities have implemented. Note that the chart shows the number of projects implemented not the number of universities who have implemented that project type. It was clear through the research that some universities have implemented a number of projects of the same type.

Figure 5 overleaf details a breakdown of the energy only projects:

Figure 5: Breakdown of energy projects only

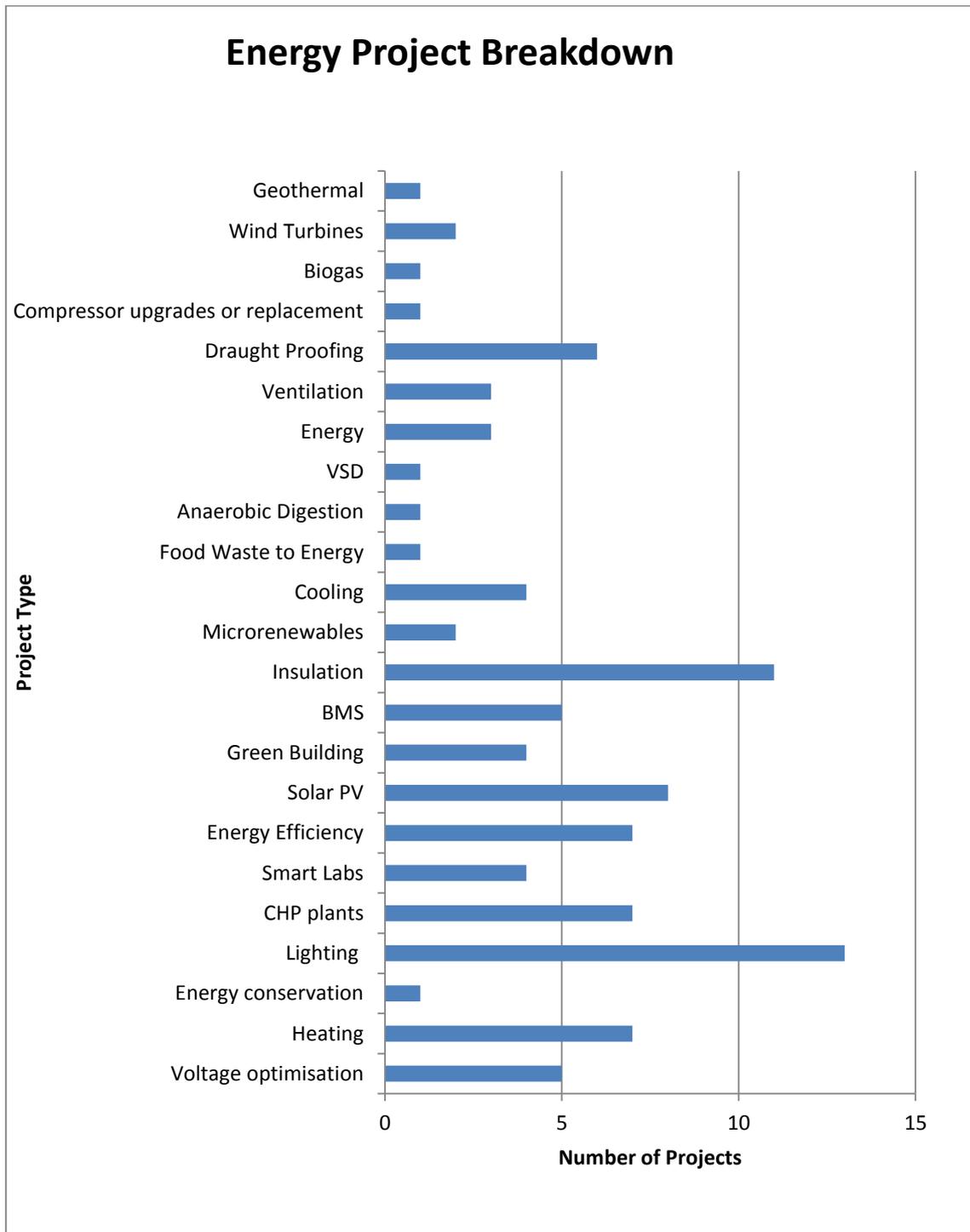
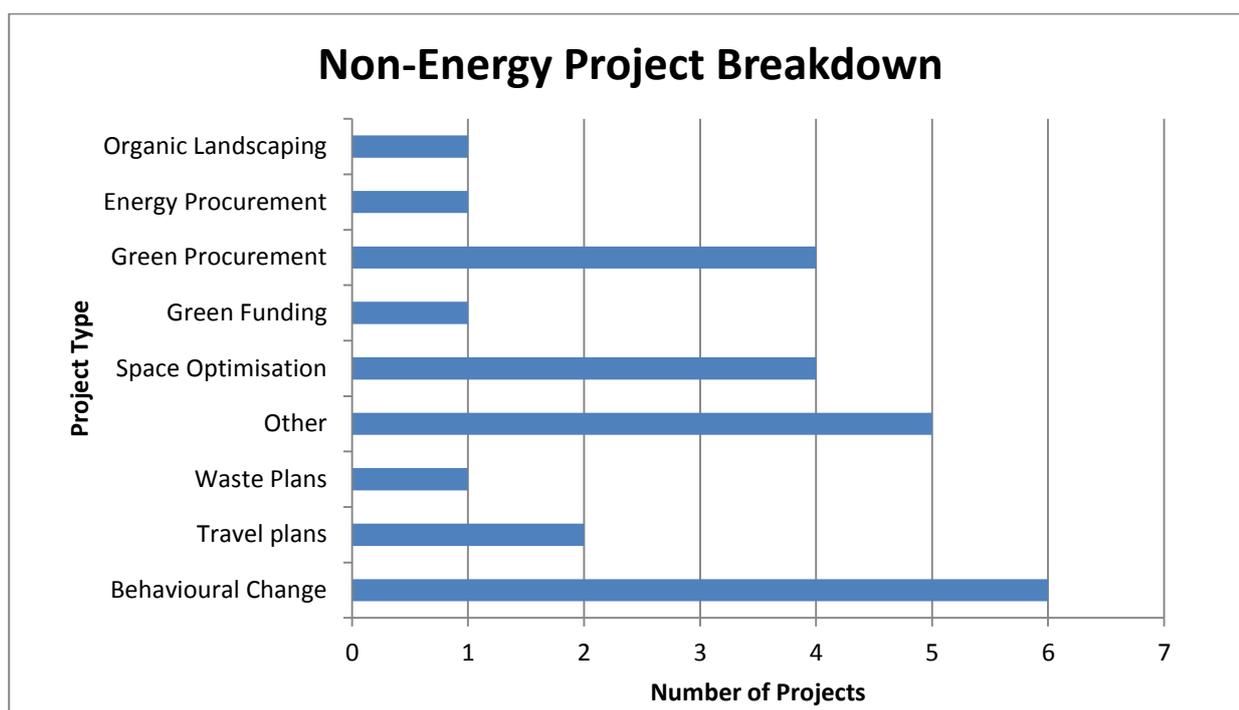


Figure 5 shows that traditional energy efficiency measures remain high on the priority list for Universities given the lower level of investment and higher return compared to other measures.

Figure 6 details a break-down of the non-energy projects:

Figure 6: Breakdown of all non-energy carbon reduction projects



Note that the energy project relates to energy procurement. This chart shows the focus of non-energy carbon reduction projects implemented by the universities reviewed has been on behaviour change and space optimisation. Appendix C contains further details of responses universities provided on projects.

Strathclyde University is following the University with the installation of a CHP district energy scheme at a cost of circa £16M. Other energy projects include boiler replacement, lighting upgrades including presence detection (PIRs), draught proofing and insulation and compressor upgrades. Stanford has also implemented a significant district heating scheme at a cost of approximately \$500M and reduced GHG emissions by approximately 65%. The recent trend of universities identifying laboratories as being a significant source of carbon emissions is apparent given the number of projects in this area.

St Andrews University has developed an off-site energy centre (Guardbridge Energy centre) which features:

- 6.5MW biomass boiler, fuel processing and handling system;
- 6km Flow and Return Transmission hot water pipeline;
- Local District Heating Network to 17 building complexes at North Haugh;
- Buildings integration and controls for plant rooms;
- Design, build and operate contract;
- £25M total project cost;
- 34.3 GWh of heat; and
- Phased carbon saving potential of at least 10,000 tonnes.

The project was funded in part by the Scottish Government and the European Regional Development Fund (ERDF). St Andrews University still has plans to develop an off-site wind farm consisting of six two

Megawatt (MW) wind turbines at Kenly Farm. St Andrews University estimate that generation of electricity through the off-site wind farm would save 19,000 tonnes of carbon per annum.

UBC's Climate Action Plan projects (Continuous Optimization, Academic District Energy System steam to hot water conversion and Bioenergy Research and Demonstration Facility) are forecast to achieve the targeted 33 per cent emissions reduction by 2016 compared to 2007 levels.

Many universities advised that they have made good progress with waste, water and transport related emissions but did not provide details of projects they have implemented on these aspects. Strathclyde University provided the most detail on performance with these aspects. In 2013 Strathclyde implemented segregated recycling collections to all areas of the campus including kitchens and food preparation areas and on public grounds and pavements. Strathclyde created the role of Environmental Co-ordinator to lead the face to face Head of Department (HOD) engagement and to facilitate student and staff consultation. This strategic and local level engagement paved the way for the uncontentious removal of general waste bins. The reduction in water intensity at Strathclyde has been achieved through behaviour change and the pilot Sustainable Laboratories audit and certification scheme. Regarding Green IT, Strathclyde University will undertake a sustainable Information and Communication Technology (ICT) review in 2015, no further details were provided. No other university provided specific details of waste, water and transport projects.

For the work undertaken for Lot 3 a range of energy efficiency and renewable generation technologies have been assessed and discussed with the University.

Also of note is the employment of a dedicated sustainable laboratories officer at Cambridge University whose role is in part to reduce the carbon footprint of the laboratories. At the time of the research Bristol University were in the process of identifying someone to fulfil a sustainable laboratories position at their university.

## Interpretation and analysis of carbon reduction projects

Overall Edinburgh University is considered to be aligned with best practice for carbon reduction projects, particularly with respect to types of project implemented and the Sustainable Laboratories programme. The sample of carbon reduction projects/initiatives summarised in table 11 demonstrates that the University has focused energy and Low Zero carbon projects. This is consistent with other universities in reviewed in the research who have focused on reducing energy consumption/generating renewable energy on/off site. AECOM understands that the feasibility of off-site renewables has been detailed in the Lot 3 Report, therefore no recommendations on off-site renewables are given in this Report.

No UK universities provided information on implemented water saving projects. This should not deter the University giving greater consideration to water saving projects going forward.

## Recommendations based on the research

- Consider targeted research projects for Degree and Master Degree dissertations to inform carbon management and thereby support the University's carbon reduction programme. Furthermore, the University should also consider further strengthening the ties between the SRS Department/Estates Department and research projects to ensure the output from relevant research projects being undertaken elsewhere within the University is harnessed for the benefit of carbon reduction projects and programmes;
- Continue to build on the University's current behaviour change programme such as for travel using current arrangements and communication channels to target campaigns to support the carbon management agenda. However, the University should consider expanding the role of the current Energy Co-ordinators to 'Carbon' Co-ordinators. Consequently, their engagement with building users could also consider waste, water and transport projects as appropriate. This would support on-going built environment projects to increase carbon savings.
- Given the level of activity to date on energy, waste and transport projects particular focus should be given to water reduction projects going forward.

## General Recommendations

- Projects being taken forward need a senior level project sponsor and a project committee with representatives from relevant stakeholder groups i.e. teaching staff, employees, facilities management, students, corporate communications, finance, etc.; and

Early engagement and on-going communication with stakeholders will help gain buy-in and help to facilitate those behavioural changes needed to successfully implement the project. This could include for example:

- what is happening;
- why is it happening;
- when is it happening;
- how will it affect me;
- what is in it for me; and
- what are the benefits, etc.

- Ensure infrastructure, water, waste and transport projects are evaluated for carbon benefits and this is subsequently fed into the overall carbon reduction programme.

## 4.5 Project funding

### Introduction

This section presents the findings relating to project funding, in particular capital investment programmes financial assessments and green revolving or sustainable project funds (drawn from central budgets) participant universities have to fund carbon reduction projects.

### Project Funding: University of Edinburgh

#### Description of how projects are funded (Green revolving fund, sustainable projects fund, or external funding)

Most carbon reduction initiatives are funded using internal funds however there are examples of external funding being used. The CHP District Heating networks have been part funded through the Department of Environment, Food and Rural Affairs (DEFRA's) "Community Energy Programme" and other community energy funds. CAPEX and maintenance budgets are the most frequently used for smaller energy projects. Currently, the University does not have a green revolving fund but the University is actively considering establishing such a fund.

#### Financial assessments and rules applied to funding for carbon reduction projects

The University uses the Development Cycle as the framework for developing projects and proceeding to the business case stage. A key element of Development Cycle is the Capital Projects Group (comprising senior staff, which has been in place for one year) acting as filter for the Estates Committee. The Group undertakes an initial assessment for viability based on:

- Strategic fit;
- Geographical fit/context;
- Financial assessment (payback/IRR/capital resource);
- Business continuity / student experience (wide range of issues, e.g. number of lorries to deliver biomass in centre of campus); and
- Resource to deliver.

The key financial measures used by the University are payback period and Internal Rate of Return (IRR).

If a project passes all initial screening questions the next stage involves reviewing how the project will be funded. The major capital projects are often driven by research funding, which will cover much of the requirements with additional funds pulled in from other sources by the University.

The University's Finance Department are in the latter stages of developing a new business case tool to be used for the appraisal of all capital projects going forward. The work undertaken by AECOM for Lot 3 has

worked on the development of a carbon assessment module for inclusion within the new business case tool and templates. See the Lot 3 report for further details.

### **Guidance used to assess the economic viability of Low / Zero Carbon (LZC) technology solutions**

Guidance is project specific. The current financial appraisal system is used for assessment purposes. AECOM understands that there is currently no single source of guidance the University uses for assessing Low or Zero Carbon (LZC) technology solutions specifically.

### **Assessment of business cases for low carbon infrastructure projects. Are any special governance arrangements such as ESCO's used?**

The CHP District Heating Networks are operated by an arms-length Energy Services Company (ESCO). This ESCO also funds some energy projects.

### **Project Funding: Other universities**

The research found that the universities reviewed use a range of funding types for implementing carbon reduction projects. Table 12 shows the number of universities who have used the various types of funding.

**Table 12: Summary of funding types used by participant universities**

<b>Funding type</b>	<b>Number of universities</b>
Green revolving funds	5
Salix funding	5
Long term debt	2
Bond funding	1
Capital programme	2
Maintenance budget	1
Government demo funding	1

Table 13 provides details on participant universities who advised they use green revolving funds and the information they provided on these funds.

**Table 13: Summary of participant universities who use green revolving funds**

University	Information provided	Projects funded
Manchester University	Manchester University's green revolving fund is ring fenced for energy efficiency projects.	None of the universities provided details of projects funded through green revolving funds other than the information related to energy savings provided by Strathclyde University.
MMU	No other information provided	
QUB	QUB's green revolving fund is used in addition to Salix funding and other internal funding	
Strathclyde University	Strathclyde University use in seed funding (£750,000) funded entirely from utility savings. This programme is achieving annual savings of 3,100 MWh of electricity, 5,500 MWh gas, 3,000 tonnes CO <sub>2</sub> e and £650,000 in utility expenditure (10% of utility budget) <sup>13</sup> .	
University of California, Berkeley	The Green Initiative Fund (TGIF) is how Berkeley refers to the fund – no other information was provided	

Table 14 provides details on participant universities who advised they use Salix funding and the information they provided on these funds.

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<sup>13</sup> Strathclyde University also advised that they have a £200,000 fund for enabling projects (awareness raising and consultancy), technical improvements (e.g boiler replacement) and all activity related to scope 3 emissions (e.g. waste reductions, sustainable travel activity).

**Table 14: Summary of participant universities who use Salix funding**

University	Information provided	Projects funded
Bristol University	Bristol University has used Salix previously but this conflicted with other loan schemes	None stated
MMU	Salix used in conjunction with green revolving fund	None stated
Oxford University	Salix funding has been used previously for energy efficiency projects	None stated
QUB	See above in previous table – Salix funding is used in conjunction with QUB’s green revolving fund	None stated
Strathclyde University	Used to fund a variety of projects	Compressor upgrades  BMS  Draught proofing  Heating  Insulation  Lighting  Space Optimisation
Warwick University	£650,000 of funding obtained through Salix	None stated

Table 15 provides details on participant universities who advised they use long-term debt and the information they provided on this.

**Table 15: Summary of participant universities who use long term debt to fund projects**

University	Information provided	Projects
Bristol University	Bristol University used Salix previously but this conflicted with other loan schemes so now use long term debt	None stated
Stanford University	Major capital energy related projects, are funded by general long term debt from external sources secured by the campus that is repaid by the corresponding campus budgets that pay for energy services	None stated

Table 16 provides details on participant universities who advised they use bond funding and the information they provided on this.

**Table 16: Summary of participant universities who use bond funding**

University	Information provided	Projects
University of California, Irvine	The campus uses energy bonds (15-year bonds sold by the UC Office of the President), and on bill financing (loans at 0% interest made by the investor owned utilities) for project funding. Savings from energy projects are allocated back into the utilities budget and are used for bond payments and reserves	None stated

### Financial assessments and rules that are applied to carbon reduction projects

Table 17 details the various assessments and rules applied to carbon reduction projects by the participant universities who responded to this aspect.

**Table 17: Financial assessments and rules applied by participant universities to carbon reduction projects**

University	Financial assessments and rules applied to carbon reduction projects	Guidance used to assess the economic viability of LZC technologies
University of California, Berkeley	Simple Payback Period (7.5 years)	None stated
Bristol University	Salix Criteria	Simple Payback Period (7 years)
Cambridge University	Simple payback of up to 10 years is typically used but can be beyond (in context of lifetime of equipment) and may use NPV rather than payback period if the project is more complex (e.g. chiller rationalisation project has a payback period of 12 years but expected life is 25 years so supported this). Cambridge also use cost of carbon savings (£/tCO <sub>2</sub> ), annual carbon savings and NPV calculations.	None stated
Harvard University	None stated	Harvard University uses their own Life Cycle costing calculator
King's College London	Salix Criteria	None stated
Manchester University	None stated	Feasibility studies completed as part of the design process
Oxford University	Price £ per tonne of carbon saved	None stated
Queen's University Belfast (QUB)	Simple Payback Period (7 years)	Simple Payback Period (7 years) and price per tonne of carbon saved
Stanford	Lowest Present Value (LPV) Cost	Stanford use Present Value Calculation (PVC)

University	Financial assessments and rules applied to carbon reduction projects	Guidance used to assess the economic viability of LZC technologies
University	Option	advising that if the project yields savings then the project is implemented
Strathclyde University	Simple Payback Period (5 years)  Aim for capital costs to be less than £1/tonne of CO <sub>2</sub> saved over the life of the project.  Projects are subject to a marginal abatement cost evaluation. Large scale projects are also assessed for Net Present Value (NPV).	None stated
UBC	If payback is less than 2 years, the project would be funded by the Energy and Water Services department. A 3-5 year payback would use the revolving fund or capital renewal fund where applicable.	Life Cycle Cost Analysis (LCCA)
University College London	None stated	Simple payback period 3-5 years
University of Warwick	Salix Criteria	None stated

### Assessment of business cases for low carbon infrastructure projects including any special governance arrangements used, such as ESCO's.

Table 18 details how business cases for low carbon infrastructure projects (including the use of ESCO's) are assessed by the participant universities who responded to this aspect.

Table 18: Financial assessments and rules applied by participant universities to carbon reduction projects

University	Assessment of business cases for low carbon projects including the use of ESCO's
Cambridge University	Funding through the SALIX revolving green fund is decided by Estates Management with the Director of Estates responsible. Funding allocation for ECRP projects is overseen by ECRP Board who agree projects up to £¼ million. Cambridge also reported that Departments are involved in the decisions and this can make it more difficult to implement projects as potential disruption can be viewed as a reason not to implement.
Strathclyde University	Undertaking a review of the benefits and challenges associated with setting up an ESCO or SPV for the District Energy Project
UBC	Large infrastructure projects require Board of Governor approval and undergo a series of stages and approvals.

### Interpretation and analysis of project funding findings

Participant universities leverage a range of options to fund carbon reduction projects. Green revolving funds and price per tonne of carbon were reported by the participant universities as being the more successful funding and assessment options.

## Recommendations

- The university should consider developing a ring fenced green revolving fund which could include a certain percentage of savings re-invested into further carbon reduction projects; and
- The university should consider establishing a price per tonne of projected carbon saved as a parameter for appraising potential carbon reduction projects. This should be considered in the context of the Lot 3 Report which is informing the development of a new business case template with a carbon assessment module included. In time this should be further extended to include waste, water and transport impact (both positive and negative) of a project and the associated carbon impact. This would require to be reviewed on an ongoing basis.

## 4.6 Sierra Club

AECOM has reviewed the summary of the Top Ten Universities provided by the Sierra Club and selected projects/initiatives, by sub-topic, for consideration by the University. The Top Ten Universities in the Sierra Club 2015 with their score by topic assessed are shown in table 19:

Table 19: Top ten Sierra Club ranked universities by score and sustainability topic

Rank	School	Total	Co-Curricular	Energy	Investments	Food	Innovation	Academics	Planning	Purchasing	Transport	Waste	Water
	Possible Score	1000	84	249	75	51	40	76	70	39	116	105	95
1	University of California, Irvine	867.29	77.00	198.63	75.00	35.45	40.00	59.79	70.00	30.09	98.60	104.33	78.39
2	University of California, Davis	787.46	84.00	163.26	75.00	35.84	40.00	47.57	70.00	29.02	88.74	76.92	77.10
3	University of Wisconsin-Oshkosh	786.91	84.00	200.88	75.00	32.96	40.00	39.22	70.00	15.31	73.97	68.58	87.00
4	Colorado State University	782.90	77.00	144.06	75.00	35.53	40.00	67.75	70.00	28.59	75.87	89.03	80.07
5	Middlebury College	779.08	84.00	146.78	55.00	35.84	40.00	49.66	70.00	27.31	79.15	96.35	95.00
6	Oberlin College	775.95	70.00	202.73	55.00	37.53	40.00	35.47	70.00	32.37	71.80	74.72	86.33
7	University of California, San Diego	766.77	84.00	121.60	75.00	34.37	40.00	40.19	70.00	14.94	93.00	101.93	91.75
8	University of Connecticut	766.30	77.00	131.06	75.00	38.38	40.00	64.71	70.00	27.09	73.79	86.09	83.18
9	Lewis & Clark College	762.55	68.25	162.11	75.00	37.95	40.00	38.39	70.00	34.26	81.57	92.42	62.60
10	University of Washington	761.70	77.00	137.45	60.00	42.01	40.00	62.70	70.00	35.67	96.46	77.63	62.77

AECOM has review the summary responses which the Sierra Club has published highlighting some of the successful projects at the top ten universities. AECOM has selected those which may be of interest to the University

## Waste and recycling

- At Lewis and Clark College students are required to pay extra for printing more than 650 pages in one academic year, which encourages double-sided printing. Discounts are offered to students who bring in re-usable containers for use in the dining halls;
- Middlebury College has a significant composting project resulting in 300 tonnes of food waste being composted each year which reduces carbon emissions associated with food disposal; and
- The University of Wisconsin in Oshkosh has a bio-digester that turns manure and compost into bioenergy, which contributes 20% of the annual heat demand.

### Transport and fleet

- Four of the top ten universities have policies in place to reduce car use. This includes incentivising the use of public transport and bicycles (the University of California Irvine), through to restricting the availability of parking spaces on campus to encourage cycle use (University of California Berkley); and
- The University of California (UC), San Diego operates 55 of its vehicles using biofuels and more than a third of UC's fleet is electric.

### Behavioural change initiatives and communications

- Six out of the top ten universities scored highly on their education of students in sustainability. Many of the universities have either major or minor subjects in environmental fields.

### Water usage

- Oberlin College has real time monitoring of water consumption in its 19 halls of residence. Other measures include the use of water efficient fixtures and fittings; and
- The University of California reduced annual water use by more than 30 million gallons and in 2014 recycled some 400,000 gallons.

### Funding

- The students at the University of Wisconsin voted to tax themselves \$3 per term to help fund sustainability projects (the nature of these projects has not been given).

## 4.7 Scottish Universities Carbon Management Performance Review

To supplement the information made available by the Universities directly engaged with and via university website, AECOM has also undertaken a review of ‘Scottish Universities Carbon Management Performance Review Report’ (June 2015). This report was prepared by the EAUC to provide the SFC with an up to date picture of carbon management performance in Scottish Universities and recommendations on how performance could be improved. A copy of the EAUC report is provided in Appendix E.

Table 20 presents a summary of the recommendations set out in the EAUC report for Scottish universities, along with the proposed relevance/applicability for the University.

Table 20: Summary of recommendations in the EAUC’s review of Scottish Universities’ carbon management performance

<b>EAUC: Specific Recommendations</b>	<b>Proposed relevance/value to the University of Edinburgh</b>
<b>Progress against Targets</b>	
The baseline and boundary that institutions are working to; over time these should be encouraged through guidance and tools to be similar e.g. by 2020/21, it would be useful for universities to set a similar carbon footprint boundary for the same baseline year.	Not entirely relevant unless the University is directed to use a specific baseline year.
<b>Data Reliability and Monitoring</b>	
Establish a robust and straight forward energy and utility monitoring system in order to fully understand all carbon emission sources within the boundary organisation.	Relevant. AECOM understands the University is currently looking into a new Energy Monitoring and Targeting system.
Put in place methodologies for better recording of travel, waste and water data.	Relevant. The University is aware of data and addressing issues with scope 3 emissions.
Make sure that all data recorded in relation to carbon management undergoes some form of limited assurance.	Relevant. Currently being considered by the University.
Use data to inform and continually improve on performance using the “Plan-Do-Check-Act “ Cycle.	Relevant. In place.
<b>Carbon Management Performance</b>	
Strengthen the management and governance aspects of CM within each organisation during the next phase of CM.	Not as relevant. The University, in relation to its peers, appears to have strong carbon management governance.
Establish a comprehensive CM committee that will be tasked with deciding a strategic direction and dissemination of CM information throughout the institution.	Relevant but according to the research would appear to be already happening within the university.
Ensure that responsibility for CM is spread throughout the entire organisational management team. This can be done through establishing team or dept. performance targets or carbon/financial budgets in relation to utility consumption and by requiring “authentic leadership” from all responsible staff in relation to CM.	Very relevant. University has good level of engagement on CM from its ‘schools’ but no carbon budgets.
Establish meaningful awareness and training programmes to ensure that all staff understand the importance of and are equipped to deal with CM.	Relevant but our research shows this already happening within the University.

<b>EAUC: Specific Recommendations</b>	<b>Proposed relevance/value to the University of Edinburgh</b>
Include CM responsibility in staff contracts and appraisal processes.	Relevant. Unclear to what extent, if any, the University currently does this.
Improved reporting of carbon reduction performance and regular intervals should be established. These reports should reach the Principal and corporate management team for review and consideration.	Relevant but in place at the University through annual reporting.
Establish a network of champions to make sure the CM Message is spread and upheld throughout the Institution.	Already in place
All university proposals and activities under consideration should also undergo a carbon appraisal.	Relevant. The Lot 3 work has addressed this.
<b>Project Implementation</b>	
Ensure a wide variety of projects are identified and implemented within the project register.	Already in place.
Make sure that projects are of a scale and quantity that will help the institution achieve its carbon Reduction Goals.	Already in place.
Project register should contain a list of both near and long term projects.	Already in place.
Relevant internal data should be used to justify and quantify project action- this requires compiling and reviewing data from a robust metering and monitoring strategy.	Relevant – see earlier observation on energy monitoring and targeting.
All projects should be SMART assessed before being listed in project register listing both achievable and aspirational as supported by Resource Efficient Scotland tools available.	University has in place a project review cycle.
The project register should be filled as projects come to fruition and are completed .This is important for short term projects especially.	Relevant but in place.
Additional funding should routinely be made available for short term carbon reduction activity.	Relevant
<b>Reporting</b>	
All HE Institutions should review the new reporting template and guidance that is currently available on the Sustainable Scotland Network website. All institutions should review governance and management strategies that relate to CM and energy management within each organisation.	University took part in the pilot reporting undertaken by SSN.
All institutions need to be prepared to report total carbon emissions by scope or source for previous years.	As we understand it the University has good data availability for previous years but the data has improved as time has gone on.
<b>Future Technologies</b>	
To negotiate effective sector carbon reduction targets, there needs to be a much more uniform approach to boundaries and reporting and better forecasting of the Business As Usual. The Higher Education sector is unusual within the public sector in that growth is seen as a positive outcome and encouraged. Therefore, there needs to be consideration to how that growth is driving changes in emissions before starting to think about what targets are realistic for the sector.	See recommendation on targets – target for absolute reduction supported by a normalized target.

<b>EAUC: Specific Recommendations</b>	<b>Proposed relevance/value to the University of Edinburgh</b>
The Scottish Government Required Order for the Climate Change Duties will drive improvements in the data but will require institutions to manage carbon data effectively, particularly in terms of project data and factors that impact on future emissions.	Relevant but being considered by the University through the Lot 1 work – implementation of a new carbon data reporting tool.
As universities get to the end of their CMPs, there is evidence of a falling off in project identification and annual tasks e.g. effective footprint reporting. In order to drive ongoing reductions, the Carbon Reduction Project Register needs to be brought back to centre stage and updated quarterly.	Relevant but the Scottish Government Required Order for the Climate Change Duties has brought carbon reporting back to the fore.
Previous and future projects demonstrate, to a certain extent, the likely make-up of the team that is driving carbon management within Institutions and in order for further opportunities to be identified, this team needs to be widened out to include other disciplines such as asset, procurement and travel.	Relevant. Currently at the University carbon management is facilitated by a partnership of the SRS and Estates departments.
There needs to be organisational shift where the responsibility for making carbon reductions is also put on other departments, staff and students, rather than being seen as something Estates will deal with.	See comments above re involvement of the schools within the university and working in partnership with estates.
<b>Additional recommendations</b>	
Putting more resources into detailed data analysis is likely to identify unseen opportunities. Energy data collection and resolution has increased hugely in the past ten years but few institutions resource the analysis of this dataset sufficiently and therefore there are likely to be missed opportunities.	Relevant. Underway at the University.
Higher education establishments have the challenge of a population of users who change frequently but also have the potential for high engagement and ideas. Leveraging the opportunities of the students and staff population to engage them with carbon management and increase its profile and importance within the university also likely to produce opportunities.	Relevant but research shows this is in place through, for example, the winter shutdown campaign and the sustainability awards.

***5 CARBON REPORTING  
OBLIGATIONS***

## 5. Carbon Reporting Obligations

### *Background*

The Scottish Government has set out a requirement for public bodies to prepare annual reports on compliance with climate change duties. The Order, which will come under Section 46 of the Climate Change (Scotland) Act 2009, will set out the form of these reports and the information to be included. The aim is to improve the quality and consistency of climate change information reported across the four main areas of the public sector in Scotland. The proposed title of the Order is: The Climate Change (Duties of Public Bodies: Reporting Requirements) (Scotland) Order 2015.

The Order applies to a number of large public bodies listed in the Consultation document,<sup>14</sup> including publically funded Further and Higher Education bodies. Consultation on the order closed in May 2015 and was due to be brought into force in November 2015. A pilot for reporting has been undertaken. The University participated in this pilot.

The University wishes to understand how the requirements of this reporting will differ to those of the HESA EMR that is currently adhered to voluntarily, and how it compares to the University's current carbon data tool 'Carbon Guru'. This section provides an overview of these two reporting requirements and explains the additional information required to meet the new Order.

### *Current status (Pre-Pilot)*

Much of the public sector collects and reports greenhouse gas emissions data on a voluntary basis with various sector specific reporting commitments or guidelines, e.g., The Universities and Colleges Climate Commitment for Scotland (UCCCfS), Climate Change Declaration (SCCD) Reports, Public Sector Sustainability Reports (PSSR). As a result of these different programmes, it is difficult for the Scottish Government to analyse public sector performance. To compound this, reports are not currently submitted centrally into one Government agency.

### *Why the change?*

The Duties of Public Bodies: Reporting Requirements Order, under Section 46 of the Climate Change (Scotland) Act 2009 requires specified public bodies to prepare annual reports on their compliance with climate change duties. The Order will provide a consistent approach across the sector as a standard reporting form will be used. Part of the pilot is to evaluate the effectiveness of the form. The report template has been set to align with reporting in England.

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<sup>14</sup> [https://consult.scotland.gov.uk/energy-and-climate-change-directorate/compliance-with-climate-change-duties/supporting\\_documents/361245\\_Climate%20Change\\_p4.pdf](https://consult.scotland.gov.uk/energy-and-climate-change-directorate/compliance-with-climate-change-duties/supporting_documents/361245_Climate%20Change_p4.pdf)

## The New Order: Key facts

**Aim:** To improve the quality and consistency of climate change information reported across the four main areas of the public sector in Scotland

**Written under:** Section 46 of the Climate Change (Scotland) Act 2009

**Known as:** Duties of Public Bodies: Reporting Requirements

**Requires:** specified public bodies to prepare annual reports on compliance with climate change duties

Reporting requirements cover a number of topics relating to climate change and its impacts on the organisation. Table 21 summarises the key topics and associated requirements

**Table 21: Topics to be reported under The Duties of Public Bodies Reporting Requirements Order**

Topic (Reporting indicator)	Requisite Details
Part 1: Organisational Profile	<ul style="list-style-type: none"> <li>Generic information – name, sector, staff numbers</li> </ul>
Part 2: Governance, Management and Strategy	<ul style="list-style-type: none"> <li>Details of the University's climate change governance, management and delivery</li> <li>Details of specific climate change mitigation and adaptation objectives</li> <li>Extent to which climate change action is embedded – e.g., details of a climate change plan or strategy, details of the organisations top 5 priorities with regard to climate change</li> </ul>
Part 3: Corporate Emissions, Targets and Projects	<ul style="list-style-type: none"> <li>Details of corporate emissions, renewable energy, targets, carbon savings</li> </ul>
Part 4: Adaptation	<ul style="list-style-type: none"> <li>Extent to which climate-related risks have been assessed and addressed</li> <li>Extent to which the policies and proposals in the Scottish Climate Change Adaptation Programme have been addressed</li> <li>Details of a risk review process</li> </ul>
Part 5: Procurement	<ul style="list-style-type: none"> <li>Information on the completion of the Flexible Framework Tool</li> <li>Achievements and challenges in incorporating climate change / sustainability into procurement</li> <li>Details of compliance of climate change duties through procurement policy</li> </ul>
Part 6: Validation and Declaration	<ul style="list-style-type: none"> <li>Details of internal / peer / external validation process</li> <li>Report sign-off</li> </ul>

## Corporate Emissions, Targets and Projects

Part 3: Corporate Emissions, Targets and Projects is of key relevance to the scope of this report, therefore is covered in more detail in this section. The following aspects should be reported in this section:

- Corporate emissions from start of baseline year to end of report year including greenhouse gas emissions from the organisation's estate and operations:

Measured and reported in accordance with Scopes 1 & 2 and selected Scope 3.

If data is not available an explanation is required.

- Breakdown of emissions sources from the organisation's most recent carbon footprint, including the emissions source, consumption data, emission factors used and any inclusions or exclusions;
- Generation, consumption and export of renewable energy:

Provide a summary of the organisation's annual renewable generation (if any) and whether it is used or exported

- Organisational targets - List all of the organisation's targets of relevance to its climate change duties.

Include overall carbon targets and separate energy efficiency, heat, waste, water, ICT, transport and travel targets

- Estimated total annual carbon savings from all projects implemented by the organisation in the report year.

Categories: Electricity, Natural gas, other heating fuels, Waste, Water and sewerage, Travel, Fleet transport, Other, Total

- Details the top 10 carbon reduction projects implemented by the organisation in the report year, including project name, funding source, first year or CO<sub>2</sub>e savings, capital costs, operational cost per year, project lifetime, primary fuel/emission source saved, estimated carbon savings per year;
- Estimated decrease or increase in emissions from other sources in the report year;
- Anticipated annual carbon savings from all projects implemented by the organisation in the year ahead;
- Estimated decrease or increase in emissions from other sources in the year ahead;
- Total carbon reduction project savings since baseline year; and
- Supporting information and best practice.

### ***Timescales and Implementation***

The legislation will replace the current voluntary UCCCfs. The first reporting period (pilot) is anticipated to be 1<sup>st</sup> April 2015 to 31<sup>st</sup> March 2016 and reports should be submitted within 6 months of the end of the reporting period. Reporting is expected to be via an online system which would be sent electronically to the Scottish Government. The Climate Change Public Bodies Duties Guidance will be updated with fresh guidance material focusing on Part 3 of the "Required Reporting" form covering corporate emissions, targets and projects.

### ***Review of the University's Carbon Reporting System***

During the interim workshop it was agreed with the University that a review of the existing system was not required as the Carbon Guru system is to be complemented via the Lot 1 carbon tool work. The new reporting and analysis tool is being developed under Lot 1. The Lot 1 project team are aware of the impending carbon reporting requirements and has advised the University that these have been accounted for in the design of the new tool.

N.B The University is currently participating in a pilot of the reporting template developed by the Sustainable Scotland Network (SSN). The completion of this report is due at the end of November 2015 and SSN will feedback to the public sector in Scotland thereafter.

## 6 GAP ANALYSIS

## 6. Gap Analysis

AECOM has undertaken a high level gap analysis of the University of Edinburgh's current position against the key opportunities and best practice identified during this commission. The findings of the gap analysis is summarised in Table using a Red, Amber, Green (RAG) rating for each sub-topic.

**Table 22: Summary of Gap Analysis**

Table key:

	The University of Edinburgh is not currently aligned with best practice as found by the research project
	The University of Edinburgh is currently partly aligned with best practice as found by the research project
	The University of Edinburgh is currently aligned with best practice

Carbon Management Topic	Carbon Management sub-topic	University's current position	Best Practice	Potential Gap (current university position against best practice) / Comment
<b>Governance and Reporting</b>	Position of overall responsibility for carbon reduction	Vice-Principal	Principal or Vice-Principal	None
	Day to day responsibility for carbon management	Social Responsibility and Sustainability Department/Estates Department	Carbon Programme Manager (e.g. Oxford)	One role focused on delivery of carbon savings and management of the carbon reduction programme overall.
	Process for reporting carbon performance internally	Through the SOAG/SEAG (quarterly) reporting to Central Management Team	Monthly reporting which is rolled up to the main committee (e.g. Oxford)	Potentially review reporting frequency of key data such as energy consumption to monthly.
	Process for reporting carbon performance externally	Annually to SFC and publically through SRS's webpage	Annually on website and to funders/regulators (various)	None
<b>Targets</b>	Carbon targets	29% reduction by 2020 based on 2007 baseline	Range of percentages, timescales and nature of target	AECOM would suggest that best practice would to have an absolute target alongside a normalised

Carbon Management Topic	Carbon Management sub-topic	University's current position	Best Practice	Potential Gap (current university position against best practice) / Comment
				intensity target of carbon emissions and against number of students but acknowledge that no university reviewed as part of this research had an official normalised target.
	Target setting process and tools used to set targets	Current targets were set as part of the Carbon Trust Carbon Management Plan process	Majority of the universities reviewed who responded to this question advised it was the Carbon Trust process	AECOM suggests this is Green but none of the Universities reviewed who responded have recently set or revised their carbon targets. Many of the University's carbon reduction targets were set a number of years ago.
	Carbon management plans	Climate Action Plan 2010 – 2020	Carbon Management Plans (Various) are fairly similar	Similar to carbon targets this topic is hard to assess as the UK universities follow a similar structure and content. The non UK universities reviewed are also similar in structure and content.
<b>Carbon Reduction Initiatives</b>	Project types	Majority of projects are energy efficiency or renewable energy generation	Across all universities reviewed it was clear that the focus has been on energy reduction	Edinburgh's four CHP District Heating Schemes makes it a leader in the field. There are examples of impressive water and waste projects given by the Sierra Club but these have to be considered in the specific context and climate of North America so may not be applicable.
<b>Funding and</b>	<b>Project Funding - Green</b>	<b>Edinburgh University does not</b>	<b>Most popular form of funding amongst</b>	<b>Edinburgh University should</b>

Carbon Management Topic	Carbon Management sub-topic	University's current position	Best Practice	Potential Gap (current university position against best practice) / Comment
<b>business case for carbon reduction projects (See also AECOM Lot 3 Report)</b>	Revolving fund/sustainable projects fund/external funding	currently use a green revolving or a sustainable projects fund but does use external funding	the universities reviewed is a green revolving fund	investigate the possible structure for such a fund and the initial start-up funding.
	<b>Financial assessment and rules applied to funding carbon projects</b>	Development cycle leading to business case development and project approval (this is currently being revised for all projects). IRR and payback are currently used.	Price per tonne of carbon saved (Oxford and Strathclyde) and three year simple payback period	Following the development of a carbon assessment module for the new business case development tool (See Lot 3)
	<b>Guidance used to assess the economic viability of LZC projects</b>	Other than the existing financial approval system no specific guidance is used	Life Cycle Cost Analysis (LCCA)	As per the comment above the economic assessment of LZC projects
	<b>Governance arrangements for assessing business cases for low carbon infrastructure projects (e.g ESCO's)</b>	There is an ESCO in place for the CHP District Heating Networks	Edinburgh University is best practice with the use of an ESCO to govern the CHP District Heating Network	None. Strathclyde University are considering an ESCO themselves for a CHP District Heating Network Project

## *7 RECOMMENDATIONS*

## 7. Recommendations

Based on the gaps identified in the gap analysis and the research as a whole we have made the following recommendations:

**Table 23: Table of recommendations by topic**

No.	Topic	Recommendation
1	Carbon governance	Investigate the potential of creating a designated Carbon Manager post, similar to Oxford and Warwick. This will help to bring all carbon reduction activity together. Alternatively, as the role of the Carbon Policy Manager evolves consideration should be given to incorporating carbon programme management into this role.
2	Carbon targets	Looking beyond the 2020 target the University should consider setting a realistic and achievable absolute GHG emissions reduction target. The university should also consider formalising a normalised carbon intensity ratio. AECOM suggests the intensity ratio be carbon emissions against students.  This target could be supported by a range of reported intensity ratios for energy, water and waste.
3	Projects	Projects being taken forward need a senior level project sponsor ( and a project committee with representatives from relevant stakeholder groups i.e. teaching staff, employees, facilities management, students, corporate communications, finance, etc.  Early engagement and on-going communication with stakeholders will help gain buy-in and help to facilitate any behavioural changes needed to successfully implement the project. This could include for example: <ul style="list-style-type: none"> <li>• what is happening;</li> <li>• why is it happening,;</li> <li>• when is it happening;</li> <li>• how will it affect me;</li> <li>• what is in it for me; and</li> <li>• what are the benefits, etc.</li> </ul> <p>Ensure infrastructure, water, waste and transport projects are evaluated for carbon benefits and this is subsequently fed into the overall carbon reduction programme.</p>
4	Project Funding	The university should consider developing a ring fenced green revolving fund which could include a certain percentage of savings re-invested into further carbon reduction projects.
5	Project appraisal	The university should consider establishing a price per tonne of projected carbon saved as a parameter for appraising potential carbon reduction projects. This should be considered in the context of the Lot 3 Report which is informing the development of a new business case template with a carbon assessment module included. In time this

		should be further extended to include waste, water and transport impact (both positive and negative) of a project and the associated carbon impact.
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## **8 SUMMARY AND CONCLUSIONS**

## 8 Summary and Conclusions

To inform the development of the University's Climate Action Plan the University, in partnership with the SFC, commissioned this review of carbon management best practice in the university sector. Initially, 32 universities were identified to participate and of this number, a total of 20 universities were reviewed. This comprised a mix of interviews, questionnaires and desk top reviews. The research also included a desk-top review of the University's current carbon management structures and performance.

A number of key topics and sub topics were considered; governance and reporting, carbon reduction targets, carbon reduction projects and carbon project funding. Overall, in many aspects the University was found to be line with best practice (for example, publication of an annual Sustainability Report) and itself setting best practice (having a Climate Policy Manager). The majority of the projects identified in the review of the Sierra Club top ten ranked universities are unlikely to be applicable at the University (for example, significant water savings through more efficient watering of playing fields) are not applicable given the varying climates. However, the University should consider some of the economic incentives American Universities have in place to incentivise resource efficient behaviour amongst its student community. Additionally, the research showed that many of the recommendations made in the EAUC's review of carbon management in Scottish Universities have been either implemented by the University.

A number of recommendations have however been made for the University to consider as part of the process to develop the University's Climate Action Plan.

- Governance – create a new or strengthen the established Climate Policy Manager role to include a 'Carbon Programme Manager' role whose responsibilities could include managing and improving the robustness of carbon data, evaluating Capex projects for carbon impact and overall provide a focal point for the University's carbon activity;
- Developing a Carbon Action Plan - the University should review the process to be used for developing the Carbon Action Plan to ensure the key components identified by UBC are in place. This includes for example, funding a secretariat and a communications plan;
- Targets – Maintain but revise the University's absolute carbon reduction target following the re-baselining of its carbon emissions. To assist with analysing performance against the absolute target the University should consider developing and implementing a normalised target of emissions against a range of possible factors including turnover, number of staff or students and size of the estate. It is suggested the focus of this normalised target should be against number of students. This could be further supported by normalised metrics for aspects such as waste, water and transport;
- Projects – review pre-project engagement and ensure that all carbon savings are captured as part of the carbon reduction programme; and
- Project funding – consider developing a 'green revolving fund' where savings achieved are subsequently re-invested in further carbon reduction projects and consider using price per tonne of carbon in the evaluation criteria for Capex projects.

# *Appendix A*



# Appendix A

## Template questionnaire

# Carbon Reduction in the University Sector

### Best Practice Questionnaire

AECOM has been appointed by the University of Edinburgh and the Scottish Funding Council to undertake a review of Best Practice in carbon reduction in the University Sector. As a first step we are approaching a number of Universities both within the UK and internationally to identify successfully implemented carbon reduction initiatives as well as any initiatives that are in the planning. We are also interested in how the business case was made and why it succeeded as this will inform recommendations on presentation of future business cases.

To facilitate this process we would like 30 minutes of your time for a short telephone discussion to run through the questionnaire below. We will be in contact to arrange a convenient time during the next 3 weeks to have this discussion.

If a telephone call is not convenient then we would be grateful if you could complete the form and return it by email to [Alex.greenwood@aecom.com](mailto:Alex.greenwood@aecom.com) before the 7<sup>th</sup> August 2015.

Your answers will be used to help develop best practice materials for use by the University of Edinburgh and the wider University sector. We will issue a summary report of our findings to participating Universities.

If you have any questions please contact Alex Greenwood on the email address above or on +44 (0)207 798 5058.

We thank you in advance for your time.

Dave Gorman,

Director of Social Responsibility and Sustainability, University of Edinburgh

## Contact details

Name:

Role:

University Name:

Contact details:

## A. Governance & Reporting

1. Who has overall responsibility for carbon reduction in your organisation?
2. Who is responsible for the day to day management of carbon?
3. What is your process for reporting carbon performance internally?
4. What is your process for reporting carbon performance externally?
5. Is the University bound by carbon reduction commitments?

## B. Targets

6. Does your University have any carbon targets? Please provide details e.g. scope of targets, baseline etc.?
7. If you have answered yes to Q6. Please describe target setting processes and any decision tools used?
8. Does your University have a carbon management plan?

## C. Carbon reduction initiatives

9. Please provide details of any carbon reductions projects/initiatives in the table below. Suggested areas include but are not limited to:
  - behavioural change initiatives and communications;
  - energy efficiency;
  - approaches to energy provision and use;
  - micro renewable usage and incentivisation;
  - travel and waste;
  - laboratory design and management;
  - building design including laboratories and research areas;
  - capital programmes;
  - green IT;
  - space management; and

- Use of off-site renewable energy production.

<b>Project Description</b> <b>(include how project identified and implemented)</b>	<b>Project Status:</b> <b>Planned / Completed / In Progress?</b>	<b>Expected and Actual (if implemented) savings (£, (kWh) and carbon saving)</b>	<b>Anticipated project lifetime and timescales for key stages (development / build)?</b>	<b>Is the project considered a success? Any learning points? Any non-carbon / cost benefits?</b>	<b>Process for project approval (steps / information provided / criteria used)</b>	<b>How was the project funded? (development stage and capex)</b>	<b>If external funding – what was the source, type and terms?</b>	<b>Did / does the project receive any grant or incentive payments or other support?</b>	<b>Who is the owner of the asset and has / will this change over lifetime of project?</b>
---------------------------------------------------------------------------------------	---------------------------------------------------------------------	----------------------------------------------------------------------------------	------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------	------------------------------------------------------------------	-------------------------------------------------------------------	-----------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------

*Please insert further rows as required.*

If you have any published materials that would help illustrate this information, please provide details or send through files if you are able.

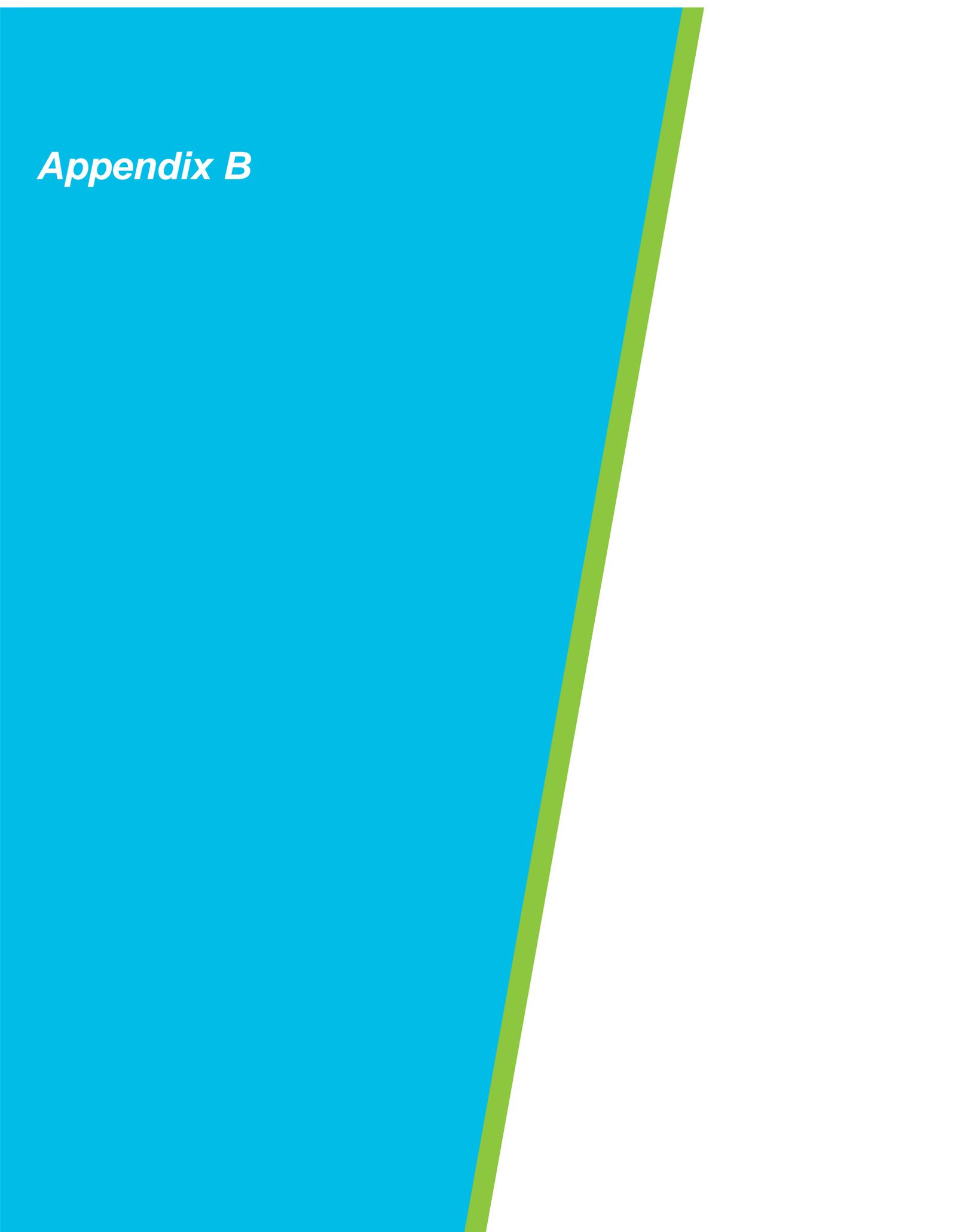
## D. Project Funding

10. Please provide further details of project funding? Do you have any green revolving or sustainable project funds? Have you accessed any external funding?
11. What financial assessments and rules do you apply to project funding for carbon reduction projects?
12. What guidance do you use to assess the economic viability of LZC (low zero carbon) technology solutions?
13. How are business cases for low carbon infrastructure projects assessed within the University and are there any special governance arrangements that are employed e.g. university ESCO's?

Thank you for taking the time to participate in this survey. This is a really important step in understanding best practice on carbon reduction in Universities. Once we have received responses for everyone they will be collated and your feedback will help to shape best practice carbon reduction guidance.

Security of data and information is central to AECOM's Project Quality Management System. Information and data provided will only be used for the purposes of this project. Please make clear if you do not wish any of the information / data provided to be published. Please direct us, in the questionnaire and /or the interview, to any existing published data/information.

# *Appendix B*



# Appendix B

## Universities contacted and summary of response received

University	Questionnaire	Telephone Interview	No Response	Desk based research undertaken
Bristol University	X	X		
California Irvine	X			
Cambridge		X		
Copenhagen University			X	X
ETH Zurich			X	
Exeter University			X	
Florida State			X	
Glasgow University			X	
Göteborg University			X	
Harvard			X	X
Hong Kong			X	
Kings College London	X			
KTH University			X	X
Leicester			X	
London School of Economics			X	
Manchester Metropolitan University			X	X
Manchester University	X	X		
McGill			X	
Nanyang University		X		
Oxford University		X		
Peking			X	
Queens University Belfast	X	X		
RMIT	X			
St Andrews			X	X
Stanford	X	X		
Strathclyde	X			
University of British Columbia	X			
University of California, Berkeley			X	X
University College London		X		
University of Greenwich			X	X
University of Warwick		X		
Yale			X	



## University of Bristol

# Carbon Reduction in the University Sector

### Best Practice Questionnaire

AECOM has been appointed by the University of Edinburgh and the Scottish Funding Council to undertake a review of Best Practice in carbon reduction in the University Sector. As a first step we are approaching a number of Universities both within the UK and internationally to identify successfully implemented carbon reduction initiatives as well as any initiatives that are in the planning. We are also interested in how the business case was made and why it succeeded as this will inform recommendations on presentation of future business cases.

To facilitate this process we would like 30 minutes of your time for a short telephone discussion to run through the questionnaire below. Alex Greenwood will be in contact in the next 48 hours to arrange a convenient time during the next 3 weeks to have this discussion.

If a telephone call is not convenient then we would be grateful if you could complete the form and return it by email to [Alex.greenwood@aecom.com](mailto:Alex.greenwood@aecom.com) before the 4<sup>th</sup> August.

Your answers will be used to help develop best practice materials for use by the University of Edinburgh and the wider University sector. We will issue a summary report of our findings to participating Universities.

If you have any questions please contact Alex Greenwood on the email address above or on +44 (0)207 798 5058.

We thank you in advance for your time.

**Dave Gorman,**

**Director of Social Responsibility and Sustainability, University of Edinburgh**

## Contact details

Name: Martin Wiles

Role: Head of Sustainability

University Name: University of Bristol

Contact details: [M.R.Wiles@bristol.ac.uk](mailto:M.R.Wiles@bristol.ac.uk)

0117 9288034

## A. Governance & Reporting

1. Who has overall responsibility for carbon reduction in your organisation?

Top level – Director of Estates/Bursar

The carbon Management Plan delivery is through the sustainability team (14 people) with staff dedicated to particular areas such as energy manager, transport, water, waste, procurement (both in the sustainable procurement sense but also energy procurement).

2. Who is responsible for the day to day management of carbon?

Head of Sustainability (Martin) and his team.

3. What is your process for reporting carbon performance internally?

- Annual Sustainability report (externally) which is published on the university's website
- Report to estates committee on a monthly basis as well.

4. What is your process for reporting carbon performance externally?

Annual Sustainability report (externally) which is published on the university's website

External data verification by an independent 3<sup>rd</sup> party verification company for CRC and ISO14064 and looking to implement ISO 50001.

Is the University bound by carbon reduction commitments?

The University is in CRC, came out of EU ETS when CRC came in.

## B. Targets

5. Does your University have any carbon targets? Please provide details e.g. scope of targets, baseline etc.?

33% carbon reduction target (2005 baseline) by 2016 and 38% by 2020 as part of the carbon descent plan. However, the university is not achieving the target because of increases in student numbers and floor area. Considering normalised data there has been a 25% improvement in intensity. There has also been an increase of 13% in lab activity.

6. If you have answered yes to Q6. Please describe target setting processes and any decision tools used?

Set in 2005 using the Carbon Trust's approach to Carbon Management Plans.

7. Does your University have a carbon management plan?

Yes a CMP is on the University's website. The CMP has evolved over time but was originally developed based on the carbon Trust template.

## C. Carbon reduction initiatives

8. Please provide details of any carbon reductions projects/initiatives in the table below. Suggested areas include but are not limited to:

- behavioural change initiatives and communications;
- energy efficiency;
- approaches to energy provision and use;
- micro renewable usage and incentivisation;
- travel and waste;
- laboratory design and management;
- building design including laboratories and research areas;
- capital programmes;
- green IT;
- space management; and
- Use of off-site renewable energy production

<b>Project Description</b> <b>(include how project identified and implemented)</b>	<b>Project Status: Planned / Completed / In Progress?</b>	<b>Expected and Actual (if implemented) savings (£, (kWh) and carbon saving)</b>	<b>Anticipated project lifetime and timescales for key stages (development / build)?</b>	<b>Is the project considered a success? Any learning points? Any non-carbon / cost benefits?</b>	<b>Process for project approval (steps / information provided / criteria used)</b>	<b>How was the project funded? (development stage and capex)</b>	<b>If external funding – what was the source, type and terms?</b>	<b>Did / does the project receive any grant or incentive payments or other support?</b>	<b>Who is the owner of the asset and has / will this change over lifetime of project?</b>
Voltage Optimisation	£1.5m. Completed								
Re-boiler and boiler controls replacement	£4m. Complete.								
Smaller energy conservation measures	£3m. ongoing								
Lighting	£2m. Ongoing.								
3X CHP plants (2x2MW + 1x1MW)									

*Please insert further rows as required.*

If you have any published materials that would help illustrate this information, please provide details or send through files if you are able.

## D. Project Funding

9. Please provide further details of project funding? Do you have any green revolving or sustainable project funds? Have you accessed any external funding?

Previously used Salix funding but this was conflicting with other loan schemes the university was using. Now use university long-term debt to fund projects.

10. What financial assessments and rules do you apply to project funding for carbon reduction projects?

A variation of the salix model but not as stringent.

11. What guidance do you use to assess the economic viability of LZC (low zero carbon) technology solutions?

Projects tend to have to be within a 7 year payback.

12. How are business cases for low carbon infrastructure projects assessed within the University and are there any special governance arrangements that are employed e.g. university ESCO's?  
13.

Bristol do not use ESCO's.

Thank you for taking the time to participate in this survey. This is a really important step in understanding best practice on carbon reduction in Universities. Once we have received responses for everyone they will be collated and your feedback will help to shape best practice carbon reduction guidance.

Security of data and information is central to AECOM's Project Quality Management System. Information and data provided will only be used for this project only. Please make clear if you do not wish any of the information / data provided to be published. Please direct us, in the questionnaire and /or the interview, to any existing published data/information.



## University of California Irvine

# Carbon Reduction in the University Sector

### Best Practice Questionnaire

AECOM has been appointed by the University of Edinburgh and the Scottish Funding Council to undertake a review of Best Practice in carbon reduction in the University Sector. As a first step we are approaching a number of Universities both within the UK and internationally to identify successfully implemented carbon reduction initiatives as well as any initiatives that are in the planning. We are also interested in how the business case was made and why it succeeded as this will inform recommendations on presentation of future business cases.

To facilitate this process we would like 30 minutes of your time for a short telephone discussion to run through the questionnaire below. Alex Greenwood will be in contact in the next 48 hours to arrange a convenient time during the next 3 weeks to have this discussion.

If a telephone call is not convenient then we would be grateful if you could complete the form and return it by email to [Alex.greenwood@aecom.com](mailto:Alex.greenwood@aecom.com) before the 4<sup>th</sup> August 2015.

Your answers will be used to help develop best practice materials for use by the University of Edinburgh and the wider University sector. We will issue a summary report of our findings to participating Universities.

If you have any questions please contact Alex Greenwood on the email address above or on +44 (0)207 798 5058.

We thank you in advance for your time.

**Dave Gorman,**

**Director of Social Responsibility and Sustainability, University of Edinburgh**

## Contact details

Name: Matt Deines

Role: Senior Planner, Office of Environmental Planning & Sustainability

University Name: University of California Irvine

Contact details: [mdeines@uci.edu](mailto:mdeines@uci.edu) 949.824.4929

## A. Governance & Reporting

1. Who has overall responsibility for carbon reduction in your organisation?

2. Who is responsible for the day to day management of carbon?

*The Office of Environmental Planning & Sustainability (EP&S) is responsible for tracking GHG emissions. EP&S tracks scopes 1, 2 & 3 emissions along with applicable Renewable Energy Credits (REC's) and offsets realized through the Local Offsets Program.*

3. What is your process for reporting carbon performance internally?

*Annual GHG emissions are reported to stakeholders across the campus (student housing, transportation, etc.) through the internal Climate Change Working Group. This information is also provided to campus leadership on an annual basis.*

4. What is your process for reporting carbon performance externally?

*Using the financial control approach UC Irvine gathers a comprehensive annual inventory of GHG emissions on campus. Once reviewed internally the report is independently verified using the Climate Registry General Verification Protocol. We report GHG emissions annually through The Climate Registry (TCR), American College and University President's Climate Commitment (ACUPCC), and the UC Annual Report on Sustainable Practices.*

5. Is the University bound by carbon reduction commitments?

*UC is a founding signatory of the American College and University President's Climate Commitment (ACUPCC). UC Irvine's 2007 Climate Action Plan developed carbon reduction goals consistent with the UC Policy on Sustainable Practices committing the University of California to reduce GHG emissions to 1990 levels by 2020, achieve climate neutrality for scope one and two emissions by 2025 and scope 3 emissions as soon as possible.*

## B. Targets

6. Does your University have any carbon targets? Please provide details e.g. scope of targets, baseline etc.?

*The 2007 Climate Action Plan and the UC Policy on Sustainable Practices commits the UC Irvine campus to reduce carbon emissions to 2000 baseline levels by 2014, 1990 baseline levels by 2020 (Scope 1,2,3), and climate neutrality by 2025 (Scope 1 & 2).*

7. Does your University have a carbon management plan?

*Yes. The first Climate Action Plan was developed in 2007 and was recently updated in 2013.*

## C. Carbon reduction initiatives

8. Please provide details of any carbon reductions projects/initiatives in the table below. Suggested areas include but are not limited to:

- behavioural change initiatives and communications;

- energy efficiency;
- approaches to energy provision and use;
- micro renewable usage and incentivisation;
- travel and waste;
- laboratory design and management;
- building design including laboratories and research areas;
- capital programmes;
- green IT;

<b>Project Description (include how project identified and implemented)</b>	<b>Project Status: Planned / Completed / In Progress?</b>	<b>Expected and Actual (if implemented) savings (£, kWh) and carbon saving)</b>	<b>Anticipated project lifetime and timescales for key stages (development / build)?</b>	<b>Is the project considered a success? Any learning points? Any non-carbon / cost benefits?</b>	<b>Process for project approval (steps / information provided / criteria used)</b>	<b>How was the project funded? (development stage and capex)</b>	<b>If external funding – what was the source, type and terms?</b>	<b>Did / does the project receive any grant or incentive payments or other support?</b>	<b>Who is the owner of the asset and has / will this change over lifetime of project?</b>
Smart Labs Initiative  (included in Energy Efficiency Projects below)	13 Labs buildings completed/ Ongoing	60% reduction in lab energy use, 7,347,822 kWh annual savings	Ongoing	Yes  Plan measurement and verification early on to know where energy is being used must know amount.  Maintenance savings.	University Regents approval/ payback analysis/ meets campus savings to debt ratio	California Statewide Energy Partnership (SEP) between universities and Investor  Owned Utilities	Bonds paid back by utility savings over 15 years.	Yes  Incentives payments	Regents of the University of California will own for the life.
Energy Efficiency SEP Projects	Project completed since 2009 totalled over \$46 million in total	Implemented projects expected to save \$6.5 million energy utility costs,	Ongoing	Yes  Plan measurement and verification early on to	University Regents approval/ payback analysis/ meets campus savings to	California Statewide Energy Partnership (SEP) between universities and Investor	Bonds paid back by utility savings over 15 years.	Yes  Completed projects have received over \$11 million in	Regents of the University of California will own for the life.

	project costs/ additional projects are planned and additional projects are under construction	40 million kWh per year electricity & 2.3 million therms natural gas.  2,975,000 kWh (2,400 MT CO2E) annual reduction		know where energy is being used must know amount.  Maintenance savings.	debt ratio	Owned Utilities	incentives
Parking Structure Solar Canopies	Completed	2,211,000 kWh annual savings (1,500 MT CO2E)	25 years?	Yes			Third party owns, University agrees to purchase kWh produced.
Landfill Solar Array (5MW)	Planned	3,500 MT CO2E annual reduction	25 years?				
Rooftop Solar System (895 KW)	Completed	457 MT CO2E annual reduction		Yes			Third party owns, University agrees to purchase kWh produced.

Green Building Program	Ongoing	500 MT CO2E annual reduction		Yes					
New Construction	Projects are completed, ongoing and planned	Varies too much to list	ongoing	Yes	University Regents approve Project Program Guide. Design & Construction Services manages project and approves construction meets Campus Standards and energy savings	New construction is funded by Capital Project bonds	Not available	Yes	Regents of the University of California will own for the life.
				Since the 1990's construction was required to exceed the State Energy Code by at least 20%				Savings by Design program provided rebates for buildings exceeding State Energy Code	

*Please insert further rows as required.*

If you have any published materials that would help illustrate this information, please provide details or send through files if you are able.

## D. Project Funding

9. Please provide further details of project funding? Do you have any green revolving or sustainable project funds? *No* Have you accessed any external funding?

*No, except for SEP projects have bond funding.*

*The campus uses energy bonds (15-year bonds sold by the UC Office of the President), and on bill financing (loans at 0% interest made by the investor owned utilities) for project funding. Savings from energy projects are allocated back into the utilities budget and are used for bond payments and reserves.*

10. What financial assessments and rules do you apply to project funding for carbon reduction projects?

*All project decisions are based on the projected energy cost savings. SEP projects are based on net simple payback of less than 7.5 years. The savings to debt ratio must be 1.15 or higher.*

11. What guidance do you use to assess the economic viability of LZC (low zero carbon) technology solutions?

*All project decisions are based on the projected energy cost savings and payback.*

12. How are business cases for low carbon infrastructure projects assessed within the University and are there any special governance arrangements that are employed e.g. university ESCO's?

*University has used Design-Build for a few projects.*

Thank you for taking the time to participate in this survey. This is a really important step in understanding best practice on carbon reduction in Universities. Once we have received responses for everyone they will be collated and your feedback will help to shape best practice carbon reduction guidance.

Security of data and information is central to AECOM's Project Quality Management System. Information and data provided will only be used for the purposes of this project. Please make clear if you do not wish any of the information / data provided to be published. Please direct us, in the questionnaire and /or the interview, to any existing published data/information.

# University of Cambridge

## Best Practice Questionnaire

### Carbon Reduction in the University Sector

AECOM has been appointed by the University of Edinburgh and the Scottish Funding Council to undertake a review of Best Practice in carbon reduction in the University Sector. As a first step we are approaching a number of universities both within the UK and internationally to identify successfully implemented carbon reduction initiatives as well as any initiatives that are being planned. We are also interested in how the business case was made and why it succeeded, as this will inform recommendations on presentation of future business cases.

To facilitate this process we would like 30 minutes of your time for a short telephone discussion to run through the questionnaire below. Alex Greenwood will be in contact in the next 48 hours to arrange a convenient time during the next 3 weeks to have this discussion.

If a telephone call is not convenient then we would be grateful if you could complete the form and return it by email to [Alex.greenwood@aecom.com](mailto:Alex.greenwood@aecom.com) before the XX August.

Your answers will be used to help develop best practice materials for use by the University of Edinburgh and the wider university sector in Scotland. We will issue a summary report of our findings to participating universities.

If you have any questions please contact Alex Greenwood on the email address above or on 0207 798 5058.

We thank you in advance for your time.

(UoE name/signature here)

Date: 28 July 2015

#### Contact details

Name: Joanna Chamberlain

Role: Head of Environment and Energy

University Name: University of Cambridge (UoC)

Contact details: [Joanna.Chamberlain@admin.cam.ac.uk](mailto:Joanna.Chamberlain@admin.cam.ac.uk) Tel: 01223 330 883

#### A. Governance & Reporting

1. Who has overall responsibility for carbon reduction in your organisation?
  - Pro-vice-chancellor for institutional affairs (see carbon management plan (CMP) for structure chart although this out of date)
  - Some re-organisation since CMP and this ongoing

2. Who is responsible for the day to day management of carbon?
  - Head of Environment and Energy (Joanna Chaimberlain)
3. What is your process for reporting carbon performance internally?
  - The Energy and Carbon Reduction Project (ECRP) was set up about 2010/11
  - Through ECRP there is a £2m/yr budget for energy and carbon reduction projects
  - Quarterly reporting is made to the ECRP project board
  - Annual reporting is made to the planning and resources committee and building committee
  - At the time that the carbon management plan was written in 2010, there were 3 committees involved in policy and decision making. These committees are being streamlined to one committee sitting at the right level in the organisation to achieve its aims. The new environmental and sustainability strategy committee will oversee energy and carbon reduction and will take on all of the functions of the ECRP board. This committee will report to the environmental council and environmental board.
4. What is your process for reporting carbon performance externally?
  - Carbon performance is reported through University estate management records through the Higher Education Funding Council for England (HEFCE) and an annual sustainability report is made public through the ECRP programme
5. Is the University bound by carbon reduction commitments?
  - Yes. University is bound by carbon reduction commitments through HEFCE's sector target for all English Universities for 2020 based on a 2005 baseline, requiring a 34% reduction for Cambridge , CRC Energy Efficiency Scheme, and Energy Saving Opportunity Scheme (ESOS) which applies to Cambridge (and Oxford).

## **B. Targets**

6. Does your University have any carbon targets? Please provide details e.g. scope of targets, baseline etc.?
  - Yes
  - The HEFCE target is 34% carbon emission reduction, so this target was chosen for the University of Cambridge
  - Target 34% emission reduction target by 2020 against 2005 baseline
  - Part of the University's Carbon Management Plan is a reduction of overall emissions from scope 1, 2, and 3 emissions
  - When the Carbon Management Plan is updated, the University will review the targets to update them to challenging, yet achievable targets
7. If you have answered yes to Q6. Please describe target setting processes and any decision tools used?
  - No external tools / software packages were used as decision tools or for carbon reporting. In-house tools and calculations only (spreadsheet based)

- UoC follows reporting guidance from HEFCE, Department for Environment Food and Rural Affairs (DEFRA), and Department for Energy and Climate Change (DECC) guidance, CRC, and ESOS

8. Does your University have a carbon management plan?

- Yes. UoC has a carbon management plan that was published in 2010

**C. Carbon reduction initiatives**

9. Please provide details of any carbon reductions projects/initiatives in the table below. Suggested areas include but are not limited to:

- behavioural change initiatives and communications;
- energy efficiency;
- approaches to energy provision and use;
- micro renewable usage and incentivisation;
- travel and waste;
- laboratory design and management;
- building design including laboratories and research areas;
- capital programmes;
- green IT;
- space management; and
- Use of off-site renewable energy production

Project Description (include how project identified and implemented)	Project Status: Planned / Completed / In Progress?	Expected and Actual (if implemented) savings (£, (kWh) and carbon saving)	Anticipated project lifetime and timescales for key stages (development / build)?	Is the project considered a success? Any learning points? Any non-carbon / cost benefits?	Process for project approval (steps / information provided / criteria used)	How was the project funded? (development stage and capex)	If external funding – what was the source, type and terms?	Did / does the project receive any grant or incentive payments or other support?	Who is the owner of the asset and has / will this change over lifetime of project?
<p><b>Energy demand control ventilation system</b> Location: Hutchinson Medical Research Laboratory</p> <p>Ventilation rate is set according to air quality and measured every 15 min (includes VOCs / CO<sub>2</sub> etc). Fans are adjusted accordingly and can ramp up if there is a need for high ACH</p>	Completed about 2013	<p>40% reduction in gas, and 90% reduction in electricity</p> <p>230,000 kWh electricity; 1.5 million kWh gas savings</p>	Implemented in a few months, including initial work and feasibility	Success; Minimal interruption to install; Improved air quality remarked on by users; safer because air quality is monitored continuously and adjusted	Approval was outside the ECRP committee because the building was owned by the Medical Research Council (MRC) at the time	Split 50 – 50 between MRC and Cambridge; no requirement for development funding as free survey provided by installer	NA	No	UoC is now owner of building
<p><b>University Library</b> (Copyright library with archives which require close environmental control) Rationalisation and improvement of chillers (change from 7 to 3 chillers)</p> <p>Changed from fixed to flexible set points for temperature and relative humidity (maintain as range of temperature rather than fixed)</p>	Onsite, in progress	Ask for details	<p>2015 expected completion</p> <p>Development stage (technical rationalisation and improvement, design/feasibility/implementation) Worked with curators, explaining it would not damage artefacts was a 3-yr process which involved research and monitoring, and site visit to Museum of Scotland in Edinburgh</p>	Can be applied to other controlled environments and hoped that it can be rolled out to other buildings	<p>ECRP project funding for chillers</p> <p>Flexible set points had to be approved by University Library</p> <p>Devolved governance structure, means departments have to agree to projects</p>	Salix funding in part for chillers as had to be used by certain date; ECRP funding for remainder	No external funding	No	UoC is owner

<p><b>Chemistry fume cupboard extraction system based on wind condition</b></p> <p>Fans will adjust according to wind to provide appropriate dispersion of exhaust</p> <p>This system has been successfully implemented by the University of Southampton</p>	<p>Approved by ECRP board, currently in design</p>	<p>920,000 kWh electricity, 10% of electricity consumption for fume cupboards, Simple payback of 5 years</p>	<p>Chiller rationalisation was onsite before discussing flexible set points with curators</p> <p>Now 1 year into project, at planning stage</p> <p>Changes on site are minor</p> <p>Model built in America to model wind systems took time</p> <p>Need planning permission to put wind anemometer on building – needs to be in reasonable proximity to exhausts</p>	<p>No learning points yet</p> <p>Project in process</p> <p>Could potentially apply concept to other labs with fume cupboards</p>	<p>ECRP fully-funded project, no external funding</p>	<p>ECRP fully-funded project, no external funding</p>	<p>NA</p>	<p>No</p>	<p>UoC owned</p>
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## D. Project Funding

10. Please provide further details of project funding? Do you have any green revolving or sustainable project funds? Have you accessed any external funding?
- Energy and carbon reduction ECRP funding is £2m/yr for 10 years for existing buildings
  - UoC's Capital Programme covers new building activities which are required to meet building regulations so this does not come out of the ECRP budget
  - UoC has a Revolving Green Fund based on SALIX, which has funded a number of projects, to a value of £900k to date – Cambridge were one of the first Universities to pioneer this
11. What financial assessments and rules do you apply to project funding for carbon reduction projects?
- Simple payback of up to 10 years typically but can be beyond (in context of lifetime of equipment) and may use NPV rather than payback period if the project is more complex (e.g. chiller rationalisation project has a payback period of 12 years but expected life is 25 years so supported this)
  - Cost of carbon savings (£/tCO<sub>2</sub>)
  - Annual carbon savings
  - NPV calculations
12. What guidance do you use to assess the economic viability of LZC technology solutions?
- Nothing specific, case by case assessment by involved parties using either payback period or NPV
13. How are business cases for low carbon infrastructure projects assessed within the University and are there any special governance arrangements that are employed e.g. university ESCOs?
- SALIX revolving green fund decided by estates management - director of estates responsible
  - Funding allocation for ECRP projects is overseen by ECRP board
  - ECRP committee agree projects up to £¼ million
  - There are no university ESCOs
  - Departments are involved in the decisions and this can make it more difficult to implement projects as potential disruption can be viewed as a reason not to implement

Thank you for taking the time to participate in this survey. This is a really important step in understanding best practice on carbon reduction in Universities. Once we have received responses for everyone they will be collated and your feedback will help to shape best practice carbon reduction guidance.

### Additional thoughts

- **Key to the success at the University is having resource available to deliver projects; the ECRP funds resources for this purpose. Funding alone is not sufficient and is often not a barrier to implementation.**

- **ECRP budget funds the positions of two people to implement projects. People on the ground are required to work with departments and to implement projects. Internal roles are required to manage external consultancies.**

**Environment and energy section now set up at UoC to manage implementing energy reduction and carbon saving projects and to spend ECRP funding on projects.**



## University of Copenhagen

# Carbon Reduction in the University Sector

### Best Practice Questionnaire

AECOM has been appointed by the University of Edinburgh and the Scottish Funding Council to undertake a review of Best Practice in carbon reduction in the University Sector. As a first step we are approaching a number of Universities both within the UK and internationally to identify successfully implemented carbon reduction initiatives as well as any initiatives that are in the planning. We are also interested in how the business case was made and why it succeeded as this will inform recommendations on presentation of future business cases.

To facilitate this process we would like 30 minutes of your time for a short telephone discussion to run through the questionnaire below. Alex Greenwood will be in contact in the next 48 hours to arrange a convenient time during the next 3 weeks to have this discussion.

If a telephone call is not convenient then we would be grateful if you could complete the form and return it by email to [Alex.greenwood@aecom.com](mailto:Alex.greenwood@aecom.com) before the 4<sup>th</sup> August 2015.

Your answers will be used to help develop best practice materials for use by the University of Edinburgh and the wider University sector. We will issue a summary report of our findings to participating Universities.

If you have any questions please contact Alex Greenwood on the email address above or on +44 (0)207 798 5058.

We thank you in advance for your time.

**Dave Gorman,**

**Director of Social Responsibility and Sustainability, University of Edinburgh**

## Contact details

**Tomas Refslund Poulsen**

Green Campus Team Leader

The University of British Columbia

Store Kannikestræde 18 | 1169 Copenhagen K

Phone 2132 8828

[trp@adm.ku.dk](mailto:trp@adm.ku.dk)

<http://greencampus.ku.dk/>



## A. Governance & Reporting

### 1. Who has overall responsibility for carbon reduction in your organisation?

No info available

### 2. Who is responsible for the day to day management of carbon?

Most likely Tomas Refslund Poulsen, team leader, and responsible for the Green campus Project

[http://greencampus.ku.dk/green\\_results\\_and\\_indicators\\_/Gr\\_nt\\_regnskab\\_webversion\\_-\\_engelsk\\_udgave.pdf?bcsi\\_scan\\_e956bcbe8adbc89f=llKMG47ceU9xsoCULLN/HZfe2yUOAAAADs1xFA==&bcsi\\_scan\\_filename=Gr\\_nt\\_regnskab\\_webversion\\_-\\_engelsk\\_udgave.pdf](http://greencampus.ku.dk/green_results_and_indicators_/Gr_nt_regnskab_webversion_-_engelsk_udgave.pdf?bcsi_scan_e956bcbe8adbc89f=llKMG47ceU9xsoCULLN/HZfe2yUOAAAADs1xFA==&bcsi_scan_filename=Gr_nt_regnskab_webversion_-_engelsk_udgave.pdf)

### 3. What is your process for reporting carbon performance internally?

No info available.

### 4. What is your process for reporting carbon performance externally?

No info available.

### 5. Is the University bound by carbon reduction commitments?

Essential climate targets that UCPH will actively contribute to achieving:

- The EU's goal of reducing CO<sub>2</sub> emissions by 20% by 2020 and 80-95% by 2050 compared to 1990
- The Danish government's goal of reducing CO<sub>2</sub> emissions by 40% by 2020 compared to 1990
- Copenhagen Municipality's aim to make Copenhagen a carbon-neutral capital by 2025

## B. Targets

### 6. Does your University have any carbon targets? Please provide details e.g. scope of targets, baseline etc.?

In 2008, UCPH put a greener and more sustainable University on the agenda. The board adopted the ambitious targets of reducing energy consumption and CO<sub>2</sub> emissions by 20% per FTE (Full Time Equivalent for staff and

students) in 2013 compared to 2006. This target has been reached. By 2013, CO2 emissions were reduced by 28.8% per FTE and energy consumption was reduced by 20.4% per FTE. Against this background, UCPH has established the following strategy for a continued sustainable development leading up to 2020.

- 65% reduction of CO2 emissions from energy consumption and transportation per FTE
- Reduction of growth of CO2 emissions from transport to 1% per year.
- Mapping and reduction of the University's overall climate footprint

<http://greencampus.ku.dk/strategy2020/>

**7. If you have answered yes to Q6. Please describe target setting processes and any decision tools used?**

No info available.

**8. Does your University have a carbon management plan?**

No info available. The University of Copenhagen should have implemented a carbon management plan; however this is not communicated on their website.

## C. Carbon reduction initiatives

**9. Please provide details of any carbon reductions projects/initiatives in the table below. Suggested areas include but are not limited to:**

- behavioural change initiatives and communications;
- energy efficiency;
- approaches to energy provision and use;
- micro renewable usage and incentivisation;
- travel and waste;
- laboratory design and management;
- building design including laboratories and research areas;
- capital programmes;
- green IT;
- space management; and
- Use of off-site renewable energy production.



Green Action      Completed  
behavioural  
campaign  
(approximately 13%)  
By focusing on  
energy-  
efficient habits  
among staff  
and students,  
Green Action  
has succeeded  
in making a  
significant  
contribution  
to the total  
reduction.

Energy              Ongoing  
management  
at the faculties  
(approximately 18%)  
The University  
is focusing  
attention on  
intelligent  
energy  
management

and initiatives  
such as  
lighting  
control, etc.

switch to an  
energy-  
efficient  
ventilator  
system

Completed

the total  
power  
consumption  
was reduced  
from 228,000  
kWh to  
184,000 kWh  
per year, 16  
tonnes of CO2

Lighting

Completed

saved  
155,200 kWh  
saved annually,

62.7 tonnes of  
CO2 saved  
annually

Green  
Procurement  
Contract

Planned

will reduce  
energy  
consumption  
by 5,000-  
10,000 MWh  
(5-10 million  
kWh) over the

next 15 years,

will save up to  
4,000 tonnes  
of CO2 over  
the next 15  
years

*Please insert further rows as required.*

If you have any published materials that would help illustrate this information, please provide details or send through files if you are able.

Information about UBC's sustainability initiatives are available online as follows:

[http://greencampus.ku.dk/strategy2020/Full\\_strategy\\_GC2020 -  
webversion\\_english.pdf?bcsi\\_scan\\_e956bcbe8adbc89f=IJMVKO0VA6XNVMSQITGoVwHWE2kO  
AAAA6cB0FA==&bcsi\\_scan\\_filename=Full\\_strategy\\_GC2020 - webversion\\_english.pdf](http://greencampus.ku.dk/strategy2020/Full_strategy_GC2020_-_webversion_english.pdf?bcsi_scan_e956bcbe8adbc89f=IJMVKO0VA6XNVMSQITGoVwHWE2kOAAAA6cB0FA==&bcsi_scan_filename=Full_strategy_GC2020_-_webversion_english.pdf)

## D. Project Funding

**10. Please provide further details of project funding? Do you have any green revolving or sustainable project funds? Have you accessed any external funding?**

No info available.

**11. What financial assessments and rules do you apply to project funding for carbon reduction projects?**

No info available.

**12. What guidance do you use to assess the economic viability of LZC (low zero carbon) technology solutions?**

No info available.

**13. How are business cases for low carbon infrastructure projects assessed within the University and are there any special governance arrangements that are employed e.g. university ESCO's?**

No info available.

Thank you for taking the time to participate in this survey. This is a really important step in understanding best practice on carbon reduction in Universities. Once we have received responses for everyone they will be collated and your feedback will help to shape best practice carbon reduction guidance.

Security of data and information is central to AECOM's Project Quality Management System. Information and data provided will only be used for the purposes of this project. Please make clear if you do not wish any of the information / data provided to be published. Please direct us, in the questionnaire and /or the interview, to any existing published data/information.



## Harvard University

# Carbon Reduction in the University Sector

### Best Practice Questionnaire

AECOM has been appointed by the University of Edinburgh and the Scottish Funding Council to undertake a review of Best Practice in carbon reduction in the University Sector. As a first step we are approaching a number of Universities both within the UK and internationally to identify successfully implemented carbon reduction initiatives as well as any initiatives that are in the planning. We are also interested in how the business case was made and why it succeeded as this will inform recommendations on presentation of future business cases.

To facilitate this process we would like 30 minutes of your time for a short telephone discussion to run through the questionnaire below. Alex Greenwood will be in contact in the next 48 hours to arrange a convenient time during the next 3 weeks to have this discussion.

If a telephone call is not convenient then we would be grateful if you could complete the form and return it by email to [Alex.greenwood@aecom.com](mailto:Alex.greenwood@aecom.com) before the 4<sup>th</sup> August 2015.

Your answers will be used to help develop best practice materials for use by the University of Edinburgh and the wider University sector. We will issue a summary report of our findings to participating Universities.

If you have any questions please contact Alex Greenwood on the email address above or on +44 (0)207 798 5058.

We thank you in advance for your time.

**Dave Gorman,**

**Director of Social Responsibility and Sustainability, University of Edinburgh**

## Contact details

**Name: Heather Henrikson**

**Role:**

**University Name: Harvard University**

**Contact details:**

**Heather Henriksen**

Director of the Harvard University Office for Sustainability.

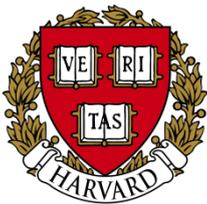
Harvard University

46 Blackstone Street South, Cambridge, MA 02139, US

Phone 617-495-3822

sustainability@harvard.edu

<http://green.harvard.edu/>



## A. Governance & Reporting

### 1. Who has overall responsibility for carbon reduction in your organisation?

The Office for Sustainability (OFS) has been created to ensure the University's Greenhouse Gas Reduction Goal is achieved based on implemented governance structure and the organizational framework.

The Harvard Office for Sustainability(OFS), under the oversight of the Executive Vice President and the Vice

President for Campus Services, leads the development and the implementation of Harvard's sustainability goals and initiatives. OFS is responsible for developing and managing the University-wide implementation strategy and reporting for the Harvard Sustainability Plan.

Harvard's institutional sustainability initiatives are overseen by an Executive Committee co-chaired by the Executive Vice President Katie Lapp and two senior faculty members: Professor Jeremy Bloxham, Dean of Science in the Faculty of Arts and Sciences, and Robert S. Kaplan, Senior Associate Dean and Professor of Management Practice at Harvard Business School.

[http://green.harvard.edu/sites/green.harvard.edu/files/Harvard%20Sustainability%20Plan-Web.pdf?bcsi\\_scan\\_ab11caa0e2721250=0&bcsi\\_scan\\_filename=Harvard%20Sustainability%20Plan-Web.pdf](http://green.harvard.edu/sites/green.harvard.edu/files/Harvard%20Sustainability%20Plan-Web.pdf?bcsi_scan_ab11caa0e2721250=0&bcsi_scan_filename=Harvard%20Sustainability%20Plan-Web.pdf)

### 2. Who is responsible for the day to day management of carbon?

The Harvard Office for Sustainability(OFS).

### **3. What is your process for reporting carbon performance internally?**

The Office for Sustainability releases an annual university-wide progress report detailing greenhouse gas reduction to date.

- See more at: <http://green.harvard.edu/topics/energy-emissions/greenhouse-gas-reduction-goal#sthash.qtg3KxFz.dpuf>

### **4. What is your process for reporting carbon performance externally?**

Harvard's emissions are reported annually in two ways, 1) FY06 vs. current fiscal year for just our Baseline Buildings (e.g., Buildings that have remained constant since FY 2006) and 2) FY06 vs. current fiscal year for the Total Campus (including any growth in square footage or usage).

- See more at: <http://green.harvard.edu/topics/energy-emissions/greenhouse-gas-reduction-goal#sthash.qtg3KxFz.dpuf>

### **5. Is the University bound by carbon reduction commitments?**

No, Universities in the U.S. are not obliged to report on GHG emissions.

## **B. Targets**

### **6. Does your University have any carbon targets? Please provide details e.g. scope of targets, baseline etc.?**

In 2008, Harvard established a long-term commitment to reduce greenhouse gas emissions based on the best available science and set a short-term goal to reduce University-wide emissions 30% by 2016. In 2016, the University will develop new greenhouse gas emissions and energy reduction goals based on the recommendations of a planned Task Force composed of students, faculty, and staff. - See more at: <http://green.harvard.edu/commitment/our-plan#sthash.0MesdAxG.dpuf>

The University also committed to adopting a long-term strategy to reduce Harvard's greenhouse gas emissions by the maximum practicable rate, aligned with the United Nations Intergovernmental Panel on Climate Change's recommendations to reduce emissions 80% by 2050. - See more at: <http://green.harvard.edu/topics/energy-emissions/greenhouse-gas-reduction-goal#sthash.qtg3KxFz.dpuf>

The sustainability framework/roadmap has been put into effect by Harvard's Sustainability Plan. [http://green.harvard.edu/sites/green.harvard.edu/files/Harvard%20Sustainability%20Plan-Web.pdf?bcsi\\_scan\\_ab11caa0e2721250=0&bcsi\\_scan\\_filename=Harvard%20Sustainability%20Plan-Web.pdf](http://green.harvard.edu/sites/green.harvard.edu/files/Harvard%20Sustainability%20Plan-Web.pdf?bcsi_scan_ab11caa0e2721250=0&bcsi_scan_filename=Harvard%20Sustainability%20Plan-Web.pdf)

**7. If you have answered yes to Q6. Please describe target setting processes and any decision tools used?**

The greenhouse gas goal was approved based on the findings and recommendations of a 2008 task force of expert faculty, students, and staff convened by President Faust.

After the announcement of the goal in 2008, five working groups were created (GHG Inventory; Energy Supply; Building Efficiency & Demand Management; Finance; Communications & Engagement) and worked from 2008-2010 to create the GHG Implementation Plan. A Student Advisory Group of over 40 undergraduate and graduate students reviews the implementation decisions and is currently crafting a Student GHG Reduction Plan.

- See more at: <http://green.harvard.edu/topics/energy-emissions/greenhouse-gas-reduction-goal#sthash.qtg3KxFz.dpuf>

**8. Does your University have a carbon management plan?**

Harvard's carbon management plan includes:

- Governance structure and organisational alignment
- Energy and emissions tracking, planning and implementation
- Transitioning to a cleaner energy supply
- Policies and tools to drive to change
- Integrating research and teaching with on-campus challenges

## C. Carbon reduction initiatives

**9. Please provide details of any carbon reductions projects/initiatives in the table below. Suggested areas include but are not limited to:**

- behavioural change initiatives and communications;
- energy efficiency;
- approaches to energy provision and use;
- micro renewable usage and incentivisation;
- travel and waste;
- laboratory design and management;
- building design including laboratories and research areas;
- capital programmes;
- green IT;

- space management; and
- Use of off-site renewable energy production.



<b>Project Description (include how project identified and implemented)</b>	<b>Project Status: Planned / Completed / In Progress?</b>	<b>Expected and Actual (if implemented) savings (£, kWh) and carbon saving)</b>	<b>Anticipated project lifetime and timescales for key stages (development / build)?</b>	<b>Is the project considered a success? Any learning points? Any non-carbon / cost benefits?</b>	<b>Process for project approval (steps / information provided / criteria used)</b>	<b>How was the project funded? (development stage and capex)</b>	<b>If external funding – what was the source, type and terms?</b>	<b>Did / does the project receive any grant or incentive payments or other support?</b>	<b>Who is the owner of the asset and has / will this change over lifetime of project?</b>
Green IT	In Progress								
Harvard Strategic Procurement	In Progress								
Harvard Climate Preparedness Working Group	In Progress								
Organic landscaping	In Progress	Savings of two million gallons of water in first year (30% reduction)							

Green Building Standards	On-going	Harvard has implemented over 1,000 energy conservation measures resulting in annual savings. In FY12 and FY13 Harvard's Schools completed 375 energy conservation measures resulting in an estimated \$2.3 million in utility savings annually and 5,600 reduction in MTCDE annually.
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Renewables - CHP	Completed	Production: 14.8 million kWh/year
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Renewables – Completed	1140
Solar - PV	MWh/year

Renewables – Completed	20000
Roof mounted wind	kWh/year

*Please insert further rows as required.*

If you have any published materials that would help illustrate this information, please provide details or send through files if you are able.

## D. Project Funding

### **10. Please provide further details of project funding? Do you have any green revolving or sustainable project funds? Have you accessed any external funding?**

The Green Revolving Fund (GRF) is a \$12 million revolving fund that provides capital for high-performance campus design, operations, maintenance, and occupant behavior projects. Basic project eligibility guidelines state that projects must reduce the University's environmental impacts and have a payback period of five to ten years or less. Since its inception, the GRF has supported nearly 200 projects that have yielded over \$4 million in energy savings annually. - See more at:

<http://green.harvard.edu/programs/green-revolving-fund#sthash.YqSX8IsA.dpuf>

### **11. What financial assessments and rules do you apply to project funding for carbon reduction projects?**

- Applicants must use Harvard's Life Cycle Costing Calculator for greenhouse gas emissions or utility reduction projects (see application).
- Disbursed funds are repaid based on estimated annual savings.
- Applicants must pursue rebates/incentives.
- Projects must have a SIR of 1 or greater and be NPV+ (savings to University).
- There is no administrative fee. Disbursed funds up to \$1 Million will be considered.
- Disbursed funds must be paid back within 11 years.
- Funds must be drawn within one year of the approval of the application.
- Applicants need to provide revised application if there is a change of scope requiring additional funds.
- Multiple conservation measures can be combined in one application. Funds can cover the full cost or the incremental cost of a conservation measure.
- Applicants are required to provide data verifying performance of implemented projects.

- See more at: <http://green.harvard.edu/programs/green-revolving-fund#sthash.YqSX8IsA.dpuf>

### **12. What guidance do you use to assess the economic viability of LZC (low zero carbon) technology solutions?**

Harvard's Life Cycle Costing Calculator.

<http://green.harvard.edu/topics/green-buildings/life-cycle-costing>

**13. How are business cases for low carbon infrastructure projects assessed within the University and are there any special governance arrangements that are employed e.g. university ESCO's?**

The most commonly funded categories (in order) include:

- Lighting
- HVAC
- Kitchen
- All types of commissioning
- Behavior change
- Controls
- Insulation
- Renewable energy
- Metering
- Cogeneration

<http://green.harvard.edu/programs/green-revolving-fund>

Thank you for taking the time to participate in this survey. This is a really important step in understanding best practice on carbon reduction in Universities. Once we have received responses for everyone they will be collated and your feedback will help to shape best practice carbon reduction guidance.

Security of data and information is central to AECOM's Project Quality Management System. Information and data provided will only be used for the purposes of this project. Please make clear if you do not wish any of the information / data provided to be published. Please direct us, in the questionnaire and /or the interview, to any existing published data/information.



## King's College London

# Carbon Reduction in the University Sector

### Best Practice Questionnaire

AECOM has been appointed by the University of Edinburgh and the Scottish Funding Council to undertake a review of Best Practice in carbon reduction in the University Sector. As a first step we are approaching a number of Universities both within the UK and internationally to identify successfully implemented carbon reduction initiatives as well as any initiatives that are in the planning. We are also interested in how the business case was made and why it succeeded as this will inform recommendations on presentation of future business cases.

To facilitate this process we would like 30 minutes of your time for a short telephone discussion to run through the questionnaire below. Alex Greenwood will be in contact in the next 48 hours to arrange a convenient time during the next 3 weeks to have this discussion.

If a telephone call is not convenient then we would be grateful if you could complete the form and return it by email to [Alex.greenwood@aecom.com](mailto:Alex.greenwood@aecom.com) before the 4<sup>th</sup> August.

Your answers will be used to help develop best practice materials for use by the University of Edinburgh and the wider University sector. We will issue a summary report of our findings to participating Universities.

If you have any questions please contact Alex Greenwood on the email address above or on +44 (0)207 798 5058.

We thank you in advance for your time.

**Dave Gorman,**

**Director of Social Responsibility and Sustainability, University of Edinburgh**

## Contact details

Name: [Tom Yearley](#)

Role: [Energy Manager](#)

University Name: [King's College London](#)

Contact details: [07876685322](#)

## E. Governance & Reporting

1. Who has overall responsibility for carbon reduction in your organisation?

[Principal has overall sign-off on targets etc.](#)

2. Who is responsible for the day to day management of carbon?

[Sustainability team \(includes Energy Manager\)](#)

3. What is your process for reporting carbon performance internally?

[Report both internal and externally but no formal reporting process at present \(looking to change this as the Sustainability Team becomes more established\).](#)

4. What is your process for reporting carbon performance externally?

[As above.](#)

[CMP is published. Other external publication to website and social media.](#)

5. Is the University bound by carbon reduction commitments?

[CRC and DECs](#)

## F. Targets

6. Does your University have any carbon targets? Please provide details e.g. scope of targets, baseline etc.?

[Yes, target is 43% reduction by 2019/20 \(on a 05/06 baseline\), looking at Scope 1 & 2 only.](#)

7. If you have answered yes to Q6. Please describe target setting processes and any decision tools used?

[Target set prior to Tom, unknown process.](#)

8. Does your University have a carbon management plan?

[Yes, published on website.](#)

## G. Carbon reduction initiatives

9. Please provide details of any carbon reductions projects/initiatives in the table below. Suggested areas include but are not limited to:

- behavioural change initiatives and communications;
- energy efficiency;
- approaches to energy provision and use;
- micro renewable usage and incentivisation;
- travel and waste;
- laboratory design and management;
- building design including laboratories and research areas;

- capital programmes;
- green IT;
- space management; and
- Use of off-site renewable energy production

Specific projects not discussed but initiatives have include lighting, BMS, lagging and insulation.

There is a separate S-Labs Champion.

Plan to increase the communications and behaviour side of things. With PFI contract buildings introduced behavioural change as part of FM contract.

<b>Project Description (include how project identified and implemented)</b>	<b>Project Status: Planned / Completed / In Progress?</b>	<b>Expected and Actual (if implemented) savings (£, (kWh) and carbon saving)</b>	<b>Anticipated project lifetime and timescales for key stages (development / build)?</b>	<b>Is the project considered a success? Any learning points? Any non-carbon / cost benefits?</b>	<b>Process for project approval (steps / information provided / criteria used)</b>	<b>How was the project funded? (development stage and capex)</b>	<b>If external funding – what was the source, type and terms?</b>	<b>Did / does the project receive any grant or incentive payments or other support?</b>	<b>Who is the owner of the asset and has / will this change over lifetime of project?</b>
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*Please insert further rows as required.*

If you have any published materials that would help illustrate this information, please provide details or send through files if you are able.

## H. Project Funding

10. Please provide further details of project funding? Do you have any green revolving or sustainable project funds? Have you accessed any external funding?

£1m revolving green fund with SALIX. Other ad hoc funding.

11. What financial assessments and rules do you apply to project funding for carbon reduction projects?

All projects require a business case, using Salix finding guidelines. Payback is somewhat flexible depending on business case (for example business case taking into account maintenance and other savings).

12. What guidance do you use to assess the economic viability of LZC (low zero carbon) technology solutions?

As above. No large standalone renewables project so far (only a part of new built or re-furbishment).

13. How are business cases for low carbon infrastructure projects assessed within the University and are there any special governance arrangements that are employed e.g. university ESCO's?

n/a

Thank you for taking the time to participate in this survey. This is a really important step in understanding best practice on carbon reduction in Universities. Once we have received responses for everyone they will be collated and your feedback will help to shape best practice carbon reduction guidance.

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## KTH Royal Institute of Technology

# Carbon Reduction in the University Sector

### Best Practice Questionnaire

AECOM has been appointed by the University of Edinburgh and the Scottish Funding Council to undertake a review of Best Practice in carbon reduction in the University Sector. As a first step we are approaching a number of Universities both within the UK and internationally to identify successfully implemented carbon reduction initiatives as well as any initiatives that are in the planning. We are also interested in how the business case was made and why it succeeded as this will inform recommendations on presentation of future business cases.

To facilitate this process we would like 30 minutes of your time for a short telephone discussion to run through the questionnaire below. Alex Greenwood will be in contact in the next 48 hours to arrange a convenient time during the next 3 weeks to have this discussion.

If a telephone call is not convenient then we would be grateful if you could complete the form and return it by email to [Alex.greenwood@aecom.com](mailto:Alex.greenwood@aecom.com) before the 4<sup>th</sup> August 2015.

Your answers will be used to help develop best practice materials for use by the University of Edinburgh and the wider University sector. We will issue a summary report of our findings to participating Universities.

If you have any questions please contact Alex Greenwood on the email address above or on +44 (0)207 798 5058.

We thank you in advance for your time.

**Dave Gorman,**

**Director of Social Responsibility and Sustainability, University of Edinburgh**

## Contact details

**Name: Charlene Ponto**

**Role: Coordinator, Sustainability Reporting and Engagement, Campus and Community Planning department**

**University Name: University of British Columbia**

**Contact details:**

KTH Royal Institute of Technology

SE-100 44, Stockholm, Sweden

Phone

[kth-miljo@kth.se](mailto:kth-miljo@kth.se)

<https://www.kth.se/en/om/miljo-hallbar-utveckling>



ROYAL INSTITUTE  
OF TECHNOLOGY

## E. Governance & Reporting

**1. Who has overall responsibility for carbon reduction in your organisation?**

No info available.

**2. Who is responsible for the day to day management of carbon?**

No info available.

**3. What is your process for reporting carbon performance internally?**

No info available.

**4. What is your process for reporting carbon performance externally?**

No info available.

**5. Is the University bound by carbon reduction commitments?**

No info available.

## Targets

**6. Does your University have any carbon targets? Please provide details e.g. scope of targets, baseline etc.?**

KTH contributes to sustainable development by providing educational programmes, conducting research and by interacting with the surrounding community.

**7. If you have answered yes to Q6. Please describe target setting processes and any decision tools used?**

No info available.

**8. Does your University have a carbon management plan?**

No info available.

## F. Carbon reduction initiatives

**9. Please provide details of any carbon reductions projects/initiatives in the table below. Suggested areas include but are not limited to:**

- behavioural change initiatives and communications;
- energy efficiency;
- approaches to energy provision and use;
- micro renewable usage and incentivisation;
- travel and waste;
- laboratory design and management;
- building design including laboratories and research areas;
- capital programmes;
- green IT;
- space management; and
- Use of off-site renewable energy production



<b>Project Description (include how project identified and implemented)</b>	<b>Project Status: Planned / Completed / In Progress?</b>	<b>Expected and Actual (if implemented) savings (£, (kWh) and carbon saving)</b>	<b>Anticipated project lifetime and timescales for key stages (development / build)?</b>	<b>Is the project considered a success? Any learning points? Any non-carbon / cost benefits?</b>	<b>Process for project approval (steps / information provided / criteria used)</b>	<b>How was the project funded? (development stage and capex)</b>	<b>If external funding – what was the source, type and terms?</b>	<b>Did / does the project receive any grant or incentive payments or other support?</b>	<b>Who is the owner of the asset and has / will this change over lifetime of project?</b>
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*Please insert further rows as required.*

If you have any published materials that would help illustrate this information, please provide details or send through files if you are able.

No info available

## G. Project Funding

**10. Please provide further details of project funding? Do you have any green revolving or sustainable project funds? Have you accessed any external funding?**

No info available

**11. What financial assessments and rules do you apply to project funding for carbon reduction projects?**

No info available

**12. What guidance do you use to assess the economic viability of LZC (low zero carbon) technology solutions?**

No info available

**13. How are business cases for low carbon infrastructure projects assessed within the University and are there any special governance arrangements that are employed e.g. university ESCO's?**

No info available

Thank you for taking the time to participate in this survey. This is a really important step in understanding best practice on carbon reduction in Universities. Once we have received responses for everyone they will be collated and your feedback will help to shape best practice carbon reduction guidance.

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## Manchester Metropolitan University

# Carbon Reduction in the University Sector

### Best Practice Questionnaire

AECOM has been appointed by the University of Edinburgh and the Scottish Funding Council to undertake a review of Best Practice in carbon reduction in the University Sector. As a first step we are approaching a number of Universities both within the UK and internationally to identify successfully implemented carbon reduction initiatives as well as any initiatives that are in the planning. We are also interested in how the business case was made and why it succeeded as this will inform recommendations on presentation of future business cases.

To facilitate this process we would like 30 minutes of your time for a short telephone discussion to run through the questionnaire below. Alex Greenwood will be in contact in the next 48 hours to arrange a convenient time during the next 3 weeks to have this discussion.

If a telephone call is not convenient then we would be grateful if you could complete the form and return it by email to [Alex.greenwood@aecom.com](mailto:Alex.greenwood@aecom.com) before the 4<sup>th</sup> August 2015.

Your answers will be used to help develop best practice materials for use by the University of Edinburgh and the wider University sector. We will issue a summary report of our findings to participating Universities.

If you have any questions please contact Alex Greenwood on the email address above or on +44 (0)207 798 5058.

We thank you in advance for your time.

**Dave Gorman,**

**Director of Social Responsibility and Sustainability, University of Edinburgh**

## Contact details

Contact details:

**Dr John Hindley**

Environment Team

MMU

Oxford Road, Manchester, M15 6BH

Phone 0161 247 6038

environment@mmu.ac.uk / j.hindley@mmu.ac.uk

<http://www.mmu.ac.uk/environment/>



## A. Governance & Reporting

### **14. Who has overall responsibility for carbon reduction in your organisation?**

Vice Chancellor and Deputy Vice Chancellors

[http://www.mmu.ac.uk/policy/pdf/policy\\_ref\\_Environmental\\_Sustainability\\_Policy.pdf#page=](http://www.mmu.ac.uk/policy/pdf/policy_ref_Environmental_Sustainability_Policy.pdf#page=)

### **15. Who is responsible for the day to day management of carbon?**

Environmental Sustainability Management Group

[http://www.mmu.ac.uk/policy/pdf/policy\\_ref\\_Environmental\\_Sustainability\\_Policy.pdf#page=](http://www.mmu.ac.uk/policy/pdf/policy_ref_Environmental_Sustainability_Policy.pdf#page=)

### **16. What is your process for reporting carbon performance internally?**

Progress against the actions set out in this strategy will be monitored and evaluated by a new Sustainability Investment Board chaired by DVC (Student Experience), which will report progress to Directorate and Board of Governors.

[http://www.mmu.ac.uk/environment/pdf/environmental\\_strategy.pdf](http://www.mmu.ac.uk/environment/pdf/environmental_strategy.pdf)

### **17. What is your process for reporting carbon performance externally?**

Our Annual Environmental Sustainability Statement reports on our progress towards achieving the aims and objectives set out in our Environmental Policy and Strategy.

[http://issuu.com/mmuenvironment/docs/annual\\_environmental\\_sustainability](http://issuu.com/mmuenvironment/docs/annual_environmental_sustainability)

**18. Is the University bound by carbon reduction commitments?**

- The HEFCE Strategic plan and Sustainable Development Action Plan (2008).
- Government agenda on climate change.

[http://www.mmu.ac.uk/environment/pdf/environmental\\_strategy.pdf](http://www.mmu.ac.uk/environment/pdf/environmental_strategy.pdf)

## B. Targets

**19. Does your University have any carbon targets? Please provide details e.g. scope of targets, baseline etc.?**

Manchester Metropolitan University will reduce emissions from its buildings and vehicles by:

- 35% from the 2005/6 baseline by 31 July 2016
- 50% from the 2005/6 baseline by 31 July 2021

<http://www.mmu.ac.uk/environment/pdf/carbon-management-plan.pdf>

**20. If you have answered yes to Q6. Please describe target setting processes and any decision tools used?**

Not available.

**21. Does your University have a carbon management plan?**

Yes. In response to a number of legislative, financial and reputation drivers, MMU developed a Carbon Management Plan (CMP) which was formally approved by the Board of Governors on 2nd July 2010.

<http://www.mmu.ac.uk/environment/pdf/carbon-management-plan.pdf>

## C. Carbon reduction initiatives

**22. Please provide details of any carbon reductions projects/initiatives in the table below. Suggested areas include but are not limited to:**

- behavioural change initiatives and communications;
- energy efficiency;
- approaches to energy provision and use;
- micro renewable usage and incentivisation;
- travel and waste;
- laboratory design and management;
- building design including laboratories and research areas;
- capital programmes;

- green IT;
- space management; and
- Use of off-site renewable energy production.



installed on 6000

computers.

New Art and Design **Completed**

building opens with

solar thermal panels

and grey water

recycling.

Eco-Campus **Completed**

environmental

management system

in place acrossMMU.

Birley Fields Campus **Completed**

complete with the

target of being Zero

Carbon, ZeroWater,

ZeroWaste.

Data centre project (Part of a wider project to consolidate 20 server rooms to 3	<b>In progress</b>	591 annual tonnes carbon savings, £113,600 annual saving
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by 2014, the new  
data centre

utilises highly  
efficient ambient air  
and water chillers  
and is estimated to  
reduce the

University's carbon  
footprint by 3%  
annually.)

*Please insert further rows as required.*

If you have any published materials that would help illustrate this information, please provide details or send through files if you are able.

Information about UBC's sustainability initiatives are available online as follows:

[http://www.mmu.ac.uk/environment/pdf/carbon\\_review\\_11.pdf](http://www.mmu.ac.uk/environment/pdf/carbon_review_11.pdf)

## D. Project Funding

**23. Please provide further details of project funding? Do you have any green revolving or sustainable project funds? Have you accessed any external funding?**

Salix/ HEFCE Revolving Green Fund. £650K Revolving Green Fund was awarded to MMU in 2009 to invest in energy saving projects. It's 'revolving' because the savings made through these projects are put straight back into the fund to finance further carbon saving measures. So far it's covered extensive loft insulation and light refurbishment as well as power down software for more than 3,500 PCs.

<http://www.mmu.ac.uk/environment/pdf/carbon-management-plan.pdf>

We have further invested in energy efficiency projects, secured £1m of external funding for LED lighting, upgrades and server-room consolidation projects, and continued to roll out extensive sub-metering across the estate to better understand our consumption.

[http://www.mmu.ac.uk/environment/pdf/mmu\\_2013\\_sustainability.pdf#page=4](http://www.mmu.ac.uk/environment/pdf/mmu_2013_sustainability.pdf#page=4)

**24. What financial assessments and rules do you apply to project funding for carbon reduction projects?**

Not available.

**25. What guidance do you use to assess the economic viability of LZC (low zero carbon) technology solutions?**

Not available.

**26. How are business cases for low carbon infrastructure projects assessed within the University and are there any special governance arrangements that are employed e.g. university ESCO's?**

Not available.

Thank you for taking the time to participate in this survey. This is a really important step in understanding best practice on carbon reduction in Universities. Once we have received responses for everyone they will be collated and your feedback will help to shape best practice carbon reduction guidance.

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# University of Manchester

## Carbon Reduction in the University Sector

### Best Practice Questionnaire

AECOM has been appointed by the University of Edinburgh and the Scottish Funding Council to undertake a review of Best Practice in carbon reduction in the University Sector. As a first step we are approaching a number of Universities both within the UK and internationally to identify successfully implemented carbon reduction initiatives as well as any initiatives that are in the planning. We are also interested in how the business case was made and why it succeeded as this will inform recommendations on presentation of future business cases.

To facilitate this process we would like 30 minutes of your time for a short telephone discussion to run through the questionnaire below. Alex Greenwood will be in contact in the next 48 hours to arrange a convenient time during the next 3 weeks to have this discussion.

If a telephone call is not convenient then we would be grateful if you could complete the form and return it by email to [Alex.greenwood@aecom.com](mailto:Alex.greenwood@aecom.com) before the 4<sup>th</sup> August 2015.

Your answers will be used to help develop best practice materials for use by the University of Edinburgh and the wider University sector. We will issue a summary report of our findings to participating Universities.

If you have any questions please contact Alex Greenwood on the email address above or on +44 (0)207 798 5058.

We thank you in advance for your time.



Dave Gorman,

Director of Social Responsibility and Sustainability, University of Edinburgh

### Contact details

Name: Emma Gardner

Role: Head of Sustainability

University Name: The University of Manchester

Contact details: E: [emma.l.gardner@manchester.ac.uk](mailto:emma.l.gardner@manchester.ac.uk) T: 0161275 2240

## A. Governance & Reporting

1. Who has overall responsibility for carbon reduction in your organisation?  
President & Vice-Chancellor and Deputy President & Deputy Vice-Chancellor (Chair of Carbon Leadership Group).
2. Who is responsible for the day to day management of carbon?  
Head of Sustainability and Principal Mechanical and Energy Engineer. There are 4 people in sustainability and energy team.
3. What is your process for reporting carbon performance internally?  
Reported quarterly to the Carbon Leadership Group, this is chaired by Deputy President & Deputy Vice-Chancellor and annually to the Senior Leadership Team and University Board
4. What is your process for reporting carbon performance externally?  
Via the EMR (HESA) annual stocktake report and locally to support Manchester City Council targets
5. Is the University bound by carbon reduction commitments?  
Yes (CRC)

## B. Targets

6. Does your University have any carbon targets? Please provide details e.g. scope of targets, baseline etc.?  
Yes, Scope 1 & 2 carbon target (2007-08 baseline) of 40% reduction by 2020.  
Also have individual carbon targets as part of masterplan and some long term maintenance works (large projects have targets, which helps towards the overall target).
7. If you have answered yes to Q6. Please describe target setting processes and any decision tools used?  
Originally, University selected the target during in 2008 to take part in Higher Education Carbon Management (HECM) programme with Carbon Trust to reduce carbon and develop a carbon management plan to meet target reductions. I believe a Carbon Trust template was used to support target setting, then presentations to engage and get buy in.  
Currently, have an in-house tool to help set targets as well as using benchmark data and HEEPI figures for buildings. The tool looks at infrastructure, buildings, behaviour, IT etc. and tries to be a more strategic plan to 2022 (have £1billion investment and carbon is a large part of that, with a focus moving on towards energy reduction).

8. Does your University have a carbon management plan?

Yes, but is in the process of being updated (data cleanse). Scope 3 is outside of the target so needs to be removed from monitored figures.

## C. Carbon reduction initiatives

9. Please provide details of any carbon reductions projects/initiatives in the table below. Suggested areas include but are not limited to:

- behavioural change initiatives and communications;

**Energy reduction campaign focused on 10 key buildings and looking at initiatives there. 200 registered sustainability enthusiasts (see charter here**

**<http://www.sustainability.manchester.ac.uk/staff/enthusiasts/enthusiastsupport/>), green impact (<http://www.sustainability.manchester.ac.uk/staff/greenimpact/>)**

- energy efficiency;

**Revolving Green Fund (LEDs, fume cupboards), energy audits, top up fund to purchase energy efficient equipment and Long Term Maintenance Plan including window replacement and TRVs**

- approaches to energy provision and use;
- micro renewable usage and incentivisation;

**some onsite**

- travel and waste;

**travel and waste plan, Bin the Bin, Furniture reuse centre, recycling facilities and campaigns, waste contract with landfill diversion rates +75%, University of Manchester Bike User Group, University of Manchester Running, cycling provision, e-pool car, EV charging points, low emission vehicle scheme for reduced car parking.**

- laboratory design and management;

**Lean labs group, green impact labs**

- building design including laboratories and research areas;

**Building targets, tracker and Environmental Sustainability Advisors procured as part of the design team– targets for EE and CO<sub>2</sub>**

- capital programmes;

**as above**

- green IT;

**Plan which resulted in over 14% reduction, new plan being prepared. Managed printer, powerman shut down**

- space management; and

- Use of off-site renewable energy production.

## D. Project Funding

10. Please provide further details of project funding? Do you have any green revolving or sustainable project funds? Have you accessed any external funding?

Revolving green fund ring fenced for energy efficiency

11. What financial assessments and rules do you apply to project funding for carbon reduction projects?

Nothing specific at the moment

12. What guidance do you use to assess the economic viability of LZC (low zero carbon) technology solutions?

Feasibility studies completed as part of design.

13. How are business cases for low carbon infrastructure projects assessed within the University and are there any special governance arrangements that are employed e.g. university ESCO's?

Approval for a CHP which has been advised by consultants. 3 phase project over 3 years.

5500te of carbon yearly saving.

Thank you for taking the time to participate in this survey. This is a really important step in understanding best practice on carbon reduction in Universities. Once we have received responses for everyone they will be collated and your feedback will help to shape best practice carbon reduction guidance.

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Please see our website for additional information



## Nanyang University

# Carbon Reduction in the University Sector

### Best Practice Questionnaire

AECOM has been appointed by the University of Edinburgh and the Scottish Funding Council to undertake a review of Best Practice in carbon reduction in the University Sector. As a first step we are approaching a number of Universities both within the UK and internationally to identify successfully implemented carbon reduction initiatives as well as any initiatives that are in the planning. We are also interested in how the business case was made and why it succeeded as this will inform recommendations on presentation of future business cases.

To facilitate this process we would like 30 minutes of your time for a short telephone discussion to run through the questionnaire below. Alex Greenwood will be in contact in the next 48 hours to arrange a convenient time during the next 3 weeks to have this discussion.

If a telephone call is not convenient then we would be grateful if you could complete the form and return it by email to [Alex.greenwood@aecom.com](mailto:Alex.greenwood@aecom.com) before the 4<sup>th</sup> August 2015.

Your answers will be used to help develop best practice materials for use by the University of Edinburgh and the wider University sector. We will issue a summary report of our findings to participating Universities.

If you have any questions please contact Alex Greenwood on the email address above or on +44 (0)207 798 5058.

We thank you in advance for your time.

**Dave Gorman,**

**Director of Social Responsibility and Sustainability, University of Edinburgh**

## Contact details

Name:

Role:

University Name:

Contact details:

## A. Governance & Reporting

1. Who has overall responsibility for carbon reduction in your organisation?

Nanyang University are currently in the process of setting up a structure around carbon management. They have targets as part of the ecocampus scheme to reduce energy water and waste by 35%. They have a sustainability office which sits outside of either facilities or academia and reports directly to Provost level. It is independent so that sustainability can be built into the culture of the university.

2. Who is responsible for the day to day management of carbon?

They are in the process of appointing someone responsible for the day to day management of Carbon.

3. What is your process for reporting carbon performance internally?

There is currently no process for reporting carbon internally. They do have to report energy, water and waste internally and to the Singapore steering committee

4. What is your process for reporting carbon performance externally?

No current carbon reporting requirements, just energy use. Reported once a year.

5. Is the University bound by carbon reduction commitments?

There are targets under the Eco-campus scheme to reduce energy, water and waste by 35% in-line with Singapore. The targets are likely to be achieved by 2020 and it is possible to achieve greater savings due to the quality of the buildings on site. Details can be found here:

<http://news.ntu.edu.sg/EcoCampus/Documents/NTU%20in%20SEI.pdf>

## B. Targets

6. Does your University have any carbon targets? Please provide details e.g. scope of targets, baseline etc.?

7. If you have answered yes to Q6. Please describe target setting processes and any decision tools used?

8. Does your University have a carbon management plan?

There is no carbon management plan. Under the eco-campus plan has targets for reducing energy, water and waste but there is no specific carbon plan. The plan is to implement measures across the campus and have some demonstration technologies to determine if they will work.

## C. Carbon reduction initiatives

9. Please provide details of any carbon reductions projects/initiatives in the table below. Suggested areas include but are not limited to:

- behavioural change initiatives and communications;
- energy efficiency;

- approaches to energy provision and use;
- micro renewable usage and incentivisation;
- travel and waste;
- laboratory design and management;
- building design including laboratories and research areas;
- capital programmes;
- green IT;
- space management; and
- Use of off-site renewable energy production.

There are several projects on site including plans that cover the whole campus and other small exemplar projects designed to test new technologies. :

- Campus wide – more efficient plant for cooling. Better air conditioning technology including induction.
- Lighting has been changed to LED.
- AC in labs. Lots of research labs. 50% energy use in Labs. Currently getting consumption data and they are analysing the report. Implementing secondary metering to get detailed data. 6-4 times more energy used in labs.
- Water – rainwater harvesting for a few buildings. Water efficient fittings are required by law so the fittings are already efficient. They are working to measure water use and are hoping to improve over the next 2 years.
- There is a plan to implement food waste to energy and waste to energy projects on site. There are policies in place to achieve this. There are also limited composting projects on site.
- There is a large solar PV installation 5MW on the roofs. 1.5MW will have been installed by the end of the year.

<b>Project Description (include how project identified and implemented)</b>	<b>Project Status: Planned / Completed / In Progress?</b>	<b>Expected and Actual (if implemented) savings (£, (kWh) and carbon saving)</b>	<b>Anticipated project lifetime and timescales for key stages (development / build)?</b>	<b>Is the project considered a success? Any learning points? Any non-carbon / cost benefits?</b>	<b>Process for project approval (steps / information provided / criteria used)</b>	<b>How was the project funded? (development stage and capex)</b>	<b>If external funding – what was the source, type and terms?</b>	<b>Did / does the project receive any grant or incentive payments or other support?</b>	<b>Who is the owner of the asset and has / will this change over lifetime of project?</b>
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*Please insert further rows as required.*

If you have any published materials that would help illustrate this information, please provide details or send through files if you are able.

## D. Project Funding

10. Please provide further details of project funding? Do you have any green revolving or sustainable project funds? Have you accessed any external funding?

Campus wide measures are funded by the maintenance fund. There is work being done on demo projects not yet tested which is government funded under the living "large" fund. There is Work with companies to test technologies. These projects are covered by grants to cover 50-60% of cost of projects.

Approximately 100 buildings and the university is about 25 years old. Most of the buildings have been built in the last 10-15 years. There are new buildings planned. There are 1000 students, 600 staff on site. 99% of the buildings are located in one location. There is One building in town for alumni and specific lectures.

11. What financial assessments and rules do you apply to project funding for carbon reduction projects?

To determine the cost of the projects, they use a pay back analysis. Below 3 years payback, the project is implemented. From 3 to 5 years the projects are generally accepted with some discussion. Where payback is greater than 5 years, these may be more strategic projects. The decision may be made to wait until cost reduces.

The photo voltaic cells have a long term payback due to the long term energy costs. The payback period is 9 years. However, they are longer lasting and the savings will continue for longer. Currently under consideration are waste to energy, fuel cells projects. Other options are not so feasible

12. What guidance do you use to assess the economic viability of LZC (low zero carbon) technology solutions?
13. How are business cases for low carbon infrastructure projects assessed within the University and are there any special governance arrangements that are employed e.g. university ESCO's?
14. Do you have any advice for Edinburgh university?

Consider your own energy generation – changing fuel mix from coal. It can be easier to achieve.

Education in the establishment – make an impact on the students. Student engagement can easily forgotten if facility managers in charge of the plan. Create opportunities for students to be engaged through and as part of their education. This will have more intangible benefits.

Consider contacting the ISCN International Sustainability Campus Network – annual report of the plans for member universities.

Thank you for taking the time to participate in this survey. This is a really important step in understanding best practice on carbon reduction in Universities. Once we have received responses for everyone they will be collated and your feedback will help to shape best practice carbon reduction guidance.

Security of data and information is central to AECOM's Project Quality Management System. Information and data provided will only be used for the purposes of this project. Please make clear if you do not wish

any of the information / data provided to be published. Please direct us, in the questionnaire and /or the interview, to any existing published data/information.



## Oxford University

# Carbon Reduction in the University Sector

### Best Practice Questionnaire

AECOM has been appointed by the University of Edinburgh and the Scottish Funding Council to undertake a review of Best Practice in carbon reduction in the University Sector. As a first step we are approaching a number of Universities both within the UK and internationally to identify successfully implemented carbon reduction initiatives as well as any initiatives that are in the planning. We are also interested in how the business case was made and why it succeeded as this will inform recommendations on presentation of future business cases.

To facilitate this process we would like 30 minutes of your time for a short telephone discussion to run through the questionnaire below. Alex Greenwood will be in contact in the next 48 hours to arrange a convenient time during the next 3 weeks to have this discussion.

If a telephone call is not convenient then we would be grateful if you could complete the form and return it by email to [Alex.greenwood@aecom.com](mailto:Alex.greenwood@aecom.com) before the 4<sup>th</sup> August.

Your answers will be used to help develop best practice materials for use by the University of Edinburgh and the wider University sector. We will issue a summary report of our findings to participating Universities.

If you have any questions please contact Alex Greenwood on the email address above or on +44 (0)207 798 5058.

We thank you in advance for your time.

**Dave Gorman,**

**Director of Social Responsibility and Sustainability, University of Edinburgh**

## Contact details

Name:

Role:

University Name:

Contact details:

## A. Governance & Reporting

1. Who has overall responsibility for carbon reduction in your organisation?

Top level – University Council, then Director of Estates, then head of environment & sustainability – then Carbon Reduction Programme Manager (it is her responsibility to achieve and report up the chain).

2. Who is responsible for the day to day management of carbon?

Energy manager + Deputy + Administrator – CRC, EUETS, metering & reporting (EMR meter): day to day stuff

Carbon Reduction Programme Manager – role to reduce carbon usage

Sustainable buildings officer: BREEAM on new build, district heating + sustainability for new estates

Sustainability officer for labs being recruited.

3. What is your process for reporting carbon performance internally?

- Annual report (externally)
- EMR data within the university
- Monthly reporting – carbon reduction programme Lucinda manages and reports to committee each month. Eventually reported up to top level

4. What is your process for reporting carbon performance externally?

Annual report is external.

Twitter & Facebook reported progress & press releases as and when required.

5. Is the University bound by carbon reduction commitments?

CRC & EUETS & ESOS (large £ so qualify for ESOS)

## B. Targets

6. Does your University have any carbon targets? Please provide details e.g. scope of targets, baseline etc.?

33% carbon reduction target (2005 baseline) by 2021

HESCI target so only scope 1&2 included. Focus entirely on energy. Separate transport & environment managers.

Scope 3 not included in the target.

Progress against target is ~18% of target so far: Lucinda to send example of report. On track to achieve their target, measure and report monthly.

7. If you have answered yes to Q6. Please describe target setting processes and any decision tools used?

At beginning of target setting The Carbon Trust + AECOM estimated what could be done (what projects were possible), from this a decision on target was set.

The University Council provide £6m funding to achieve target. £670/tonne carbon is the average (funding divided by total carbon reduction).

Estate growing – report in The Economist last month 5% each year increase. Challenging!

8. Does your University have a carbon management plan?

[Plan & strategy on website](#)

## C. Carbon reduction initiatives

9. Please provide details of any carbon reductions projects/initiatives in the table below. Suggested areas include but are not limited to:

- behavioural change initiatives and communications;
- energy efficiency;
- approaches to energy provision and use;
- micro renewable usage and incentivisation;
- travel and waste;
- laboratory design and management;
- building design including laboratories and research areas;
- capital programmes;
- green IT;
- space management; and
- Use of off-site renewable energy production



– causing  
problems!

Large scale  
renewables on  
the estate. AD  
plants etc.

Renewables  
will be  
different  
capital budget.

*Please insert further rows as required.*

If you have any published materials that would help illustrate this information, please provide details or send through files if you are able.



## D. Project Funding

10. Please provide further details of project funding? Do you have any green revolving or sustainable project funds? Have you accessed any external funding?

No external funding currently.

Some SALIX funding previously.

11. What financial assessments and rules do you apply to project funding for carbon reduction projects?

£/tonne is criteria.

12. What guidance do you use to assess the economic viability of LZC (low zero carbon) technology solutions?

Price per tonne

Solar: a few roof-mounted installations in place but these are limited by SSE capacity of 50kW per installation. The University are lobbying for movement on the limits to renewables + working with SSE on an engineering level on how to address.

Large scale projects require an additional fund with a formal business case. This is difficult to assess for renewables with the current Government policy changes. AD is more of a suitable/viable option + district heating.

13. How are business cases for low carbon infrastructure projects assessed within the University and are there any special governance arrangements that are employed e.g. university ESCO's?

Other comments:

Require more support than 'S-lab' – want a specific individual for labs as these are a key energy user.

It could be useful to get everyone together to discuss findings.

Thank you for taking the time to participate in this survey. This is a really important step in understanding best practice on carbon reduction in Universities. Once we have received responses for everyone they will be collated and your feedback will help to shape best practice carbon reduction guidance.

Security of data and information is central to AECOM's Project Quality Management System. Information and data provided will only be used for this project only. Please make clear if you do not wish any of the information / data provided to be published. Please direct us, in the questionnaire and /or the interview, to any existing published data/information.

# Queens University Belfast

## Carbon Reduction in the University Sector

### Best Practice Questionnaire

AECOM has been appointed by the University of Edinburgh and the Scottish Funding Council to undertake a review of Best Practice in carbon reduction in the University Sector. As a first step we are approaching a number of Universities both within the UK and internationally to identify successfully implemented carbon reduction initiatives as well as any initiatives that are in the planning. We are also interested in how the business case was made and why it succeeded as this will inform recommendations on presentation of future business cases.

To facilitate this process we would like 30 minutes of your time for a short telephone discussion to run through the questionnaire below. We will be in contact to arrange a convenient time during the next 3 weeks to have this discussion.

If a telephone call is not convenient then we would be grateful if you could complete the form and return it by email to [Alex.greenwood@aecom.com](mailto:Alex.greenwood@aecom.com) before the 7<sup>th</sup> August 2015.

Your answers will be used to help develop best practice materials for use by the University of Edinburgh and the wider University sector. We will issue a summary report of our findings to participating Universities.

If you have any questions please contact Alex Greenwood on the email address above or on +44 (0)207 798 5058.

We thank you in advance for your time.



Dave Gorman,

Director of Social Responsibility and Sustainability, University of Edinburgh

### Contact details

Name: [Sara Lynch](#)

Role:

University Name: [Queens University Belfast](#)

Contact details: [s.lynch@qub.ac.uk](mailto:s.lynch@qub.ac.uk)

## A. Governance & Reporting

1. Who has overall responsibility for carbon reduction in your organisation?  
University Registrar and Chief Operating Officer
2. Who is responsible for the day to day management of carbon?  
Director of Estates delegates to the Deputy Director of Estates (who is the Head of Development) and then the team for day to day work.
3. What is your process for reporting carbon performance internally?  
Biannual steering group meeting, chaired by the registrar, to report on performance and initiatives.
4. What is your process for reporting carbon performance externally?  
External estate management statistics return annually. Reporting to Department of Employment and Learning (energy data only). Reporting to the Arena Network (run by Business in the Community) on all aspects including waste and travel.
5. Is the University bound by carbon reduction commitments?  
Yes, the CRC

## B. Targets

6. Does your University have any carbon targets? Please provide details e.g. scope of targets, baseline etc.?  
Yes. Using a baseline of 2008, have a target of 21% reduction by 2020.
7. If you have answered yes to Q6. Please describe target setting processes and any decision tools used?  
The target was set to align with the national target.
8. Does your University have a carbon management plan?  
Yes, this is reviewed regularly and updated when required, the current plan is for 2010 to 2021.

## C. Carbon reduction initiatives

9. Please provide details of any carbon reductions projects/initiatives in the table below. Suggested areas include but are not limited to:
  - behavioural change initiatives and communications;
  - energy efficiency;
  - approaches to energy provision and use;
  - micro renewable usage and incentivisation;
  - travel and waste;

- laboratory design and management;
- building design including laboratories and research areas;
- capital programmes;
- green IT;
- space management; and
- Use of off-site renewable energy production.

The team is involved with initiatives in all of these areas, a summary is provided below:

On the energy side of things: energy-efficient lighting; micro-renewables; VSDs; designing for energy efficiency (particularly with reference to labs). IT server rooms designed for minimal cooling requirements, as well as virtualisation of servers.

Larger project example: Combined heat and cooling power plant. Used on existing buildings which had a centralised boiler system (set-up is like district heating system). The surplus heat is used off-site by the City Council for the nearby botanical gardens. The project cost around £2.5m and has a five year payback.

QUB have been part of the NUS Green Impact Scheme for the past 4 years. Encouraged all schools and their directors to take part and have 73 teams driving the environment champion network. Students can be trained to support the team in environmental audits and initiatives. The scheme is published using social media to spread the message and encourage volunteers to take part.

<https://www.qub.ac.uk/directorates/EstatesDirectorate/Sustainability/CarbonManagement/> (further info on Green Impact Scheme and CMP).

<b>Project Description</b> <b>(include how project identified and implemented)</b>	<b>Project Status:</b> <b>Planned / Completed / In Progress?</b>	<b>Expected and Actual (if implemented) savings (£, (kWh) and carbon saving)</b>	<b>Anticipated project lifetime and timescales for key stages (development / build)?</b>	<b>Is the project considered a success? Any learning points? Any non-carbon / cost benefits?</b>	<b>Process for project approval (steps / information provided / criteria used)</b>	<b>How was the project funded? (development stage and capex)</b>	<b>If external funding – what was the source, type and terms?</b>	<b>Did / does the project receive any grant or incentive payments or other support?</b>	<b>Who is the owner of the asset and has / will this change over lifetime of project?</b>
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*Please insert further rows as required.*

If you have any published materials that would help illustrate this information, please provide details or send through files if you are able.

## D. Project Funding

10. Please provide further details of project funding? Do you have any green revolving or sustainable project funds? Have you accessed any external funding?

Funding comes from a green revolving fund, with SALIX funding and other internal funding.

11. What financial assessments and rules do you apply to project funding for carbon reduction projects?

Payback is a key driver, using a threshold of 7 years. The cost per tonne of carbon saved is also recorded and used as a relative investment figure.

12. What guidance do you use to assess the economic viability of LZC (low zero carbon) technology solutions?

As above

13. How are business cases for low carbon infrastructure projects assessed within the University and are there any special governance arrangements that are employed e.g. university ESCO's?

Business cases are required for everything over £100k. For SALIX funded projects (over £100k), a business case is required for SALIX approval.

Projects over ~£50k require the approval of the capital projects group; they look at the cost per tonne metric and payback period.

Thank you for taking the time to participate in this survey. This is a really important step in understanding best practice on carbon reduction in Universities. Once we have received responses for everyone they will be collated and your feedback will help to shape best practice carbon reduction guidance.

Security of data and information is central to AECOM's Project Quality Management System. Information and data provided will only be used for the purposes of this project. Please make clear if you do not wish any of the information / data provided to be published. Please direct us, in the questionnaire and /or the interview, to any existing published data/information.



## St. Andrews University

# Carbon Reduction in the University Sector

### Best Practice Questionnaire

AECOM has been appointed by the University of Edinburgh and the Scottish Funding Council to undertake a review of Best Practice in carbon reduction in the University Sector. As a first step we are approaching a number of Universities both within the UK and internationally to identify successfully implemented carbon reduction initiatives as well as any initiatives that are in the planning. We are also interested in how the business case was made and why it succeeded as this will inform recommendations on presentation of future business cases.

To facilitate this process we would like 30 minutes of your time for a short telephone discussion to run through the questionnaire below. Alex Greenwood will be in contact in the next 48 hours to arrange a convenient time during the next 3 weeks to have this discussion.

If a telephone call is not convenient then we would be grateful if you could complete the form and return it by email to [Alex.greenwood@aecom.com](mailto:Alex.greenwood@aecom.com) before the 4<sup>th</sup> August 2015.

Your answers will be used to help develop best practice materials for use by the University of Edinburgh and the wider University sector. We will issue a summary report of our findings to participating Universities.

If you have any questions please contact Alex Greenwood on the email address above or on +44 (0)207 798 5058.

We thank you in advance for your time.

**Dave Gorman,**

**Director of Social Responsibility and Sustainability, University of Edinburgh**

## Contact details

**Name: Roddy Yarr**

**Role: Environment and Energy Manager**

**University Name: St. Andrews University**

**Contact details:**

**Roddy Yarr**

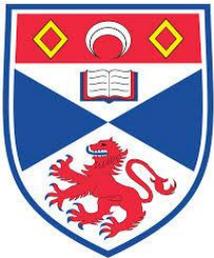
Environment and Energy Manager

Environment and sustainable development

University of St. Andrews

College Gate| KY16 9AJ Fife, Scotland, UK

[try@st-andrews.ac.uk](mailto:try@st-andrews.ac.uk)



## A. Governance & Reporting

### **1. Who has overall responsibility for carbon reduction in your organisation?**

The Carbon Management Group reports to the Sustainability Policy Group where the strategic approach and delivery is approved and monitored. The Sustainability Policy Group reports progress to the Planning and Resources Committee at least annually and ultimately to the University Court.

### **2. Who is responsible for the day to day management of carbon?**

Overall responsibility for delivery of the Carbon Management Plan (CMP) will lie with the Environment and Energy Manager. He will be supported on a day-to-day basis by the Energy Officer and, more widely, by the Carbon Management Group, which includes representatives from across all departments. Progress towards the CMP's aims and objectives will be reviewed annually by the Sustainability Policy Group and more regularly by the Carbon Management Group (Environment and Energy Manager, Dr Roddy Yarr).

<https://www.st-andrews.ac.uk/media/estates/documents/Carbon%20Management%20Plan%202012.pdf>

### **3. What is your process for reporting carbon performance internally?**

Carbon Management is integrated within the existing governance structure for Sustainable Development. The Carbon Management Group reports to the Sustainability Policy Group where the strategic approach and delivery is approved and monitored. The Sustainability Policy Group reports progress to the Planning and Resources Committee at least annually and ultimately to the University Court.

#### 4. What is your process for reporting carbon performance externally?

#### 5. Is the University bound by carbon reduction commitments?

Climate Change (Scotland) Act (2009) - The Climate Change (Scotland) Act 2009 outlines national GHG emissions reduction targets; specifically at least an 80% reduction in GHG emissions (relative to 1990 levels) by 2050 with an interim milestone target of at least 42% by 2020. The Scottish Government produced a Climate Change Delivery Plan in June 2009 to guide the national effort to meet the climate change targets and this will influence the University's policy priorities in this area.

<https://www.st-andrews.ac.uk/media/estates/documents/Carbon%20Management%20Plan%202012.pdf>

## B. Targets

#### 6. Does your University have any carbon targets? Please provide details e.g. scope of targets, baseline etc.?

University of St Andrews's overall target for carbon reduction is to become **carbon neutral** in energy consumption by the end of financial year **2015/16** (based on a baseline year of 2006/7). This equates to a reduction of around **21,000 tonnes CO<sub>2e</sub>**, and a cost saving of around **£20 million**, over the next 5 years.

<https://www.st-andrews.ac.uk/media/estates/documents/Carbon%20Management%20Plan%202012.pdf>

This section provides details of the University's carbon emissions baseline and projections through to 2015/16. There are two scenarios used in the projections:

- Business as Usual (BAU). This scenario assumes no additional actions are taken to reduce carbon emissions and shows the amount of carbon emitted by the University through to 2015/16;
- Reduced Emissions Scenario (RES). This scenario assumes that all actions outlined in this CMP are carried out to reduce carbon emissions.

The scope of the baseline estimates was established as being the following areas:

- Energy – metered energy consumption for which the University is responsible, spanning all Schools, Units and Halls of Residence;
- Waste – waste collected from within the University and landfilled;
- Fuel Use – recorded fuel used by University vehicles;
- Water – metered consumption across all Schools, Units and Halls of Residence;
- Business mileage – this is an estimated figure accounting for all University business travel (field trips, conferences etc.);

- Procurement – this is an estimated figure accounting

<https://www.st-andrews.ac.uk/media/estates/documents/Carbon%20Management%20Plan%202012.pdf>

**7. If you have answered yes to Q6. Please describe target setting processes and any decision tools used?**

With the assistance of the Carbon Trust in Scotland, the University has undertaken a review of progress to date against the targets set out in the original CMP of 2008. This has included a review of ongoing efforts to reduce carbon emissions across University activities and development of a revised CMP.

**8. Does your University have a carbon management plan?**

The Carbon Management Plan (CMP) for the University of St Andrews sets out a five-year plan for the reduction of carbon emissions across the University's own activities. It has been produced in conjunction with the Carbon Trust in Scotland using the support of accredited consultants.

This CMP is aligned with the University's Strategic Plan and supports the existing Sustainable Development Policy and Strategy 2012-2022.

<https://www.st-andrews.ac.uk/media/estates/documents/Carbon%20Management%20Plan%202012.pdf>

## C. Carbon reduction initiatives

**9. Please provide details of any carbon reductions projects/initiatives in the table below. Suggested areas include but are not limited to:**

- behavioural change initiatives and communications;
- energy efficiency;
- approaches to energy provision and use;
- micro renewable usage and incentivisation;
- travel and waste;
- laboratory design and management;
- building design including laboratories and research areas;
- capital programmes;
- green IT;
- space management; and

- Use of off-site renewable energy production.



certification.

Renewable energies – Wind farm	In progress	6 x2 megawatt wind turbines saving 19,000 Tonnes of carbon per year
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Procurement of conflict-free electronics and IT equipment.	In progress	
------------------------------------------------------------	-------------	--

Renewable energies CHP plant	Planned	£20M+, carbon emission reduction by 12,000T per year.
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Renewable energies – Solar thermal	Completed	Panels generate 45,000kWh of heat, saving 10 tonnes of carbon emissions
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annually.

Renewable energies – Ground sourced heat pump	Completed	<b>4 tonnes</b> of carbon per year
-----------------------------------------------------------	-----------	---------------------------------------

*Please insert further rows as required.*

If you have any published materials that would help illustrate this information, please provide details or send through files if you are able.

Information about St. Andrew's sustainability initiatives are available online as follows:

<https://www.st-andrews.ac.uk/media/estates/documents/Carbon%20Management%20Plan%202012.pdf>

## D. Project Funding

**10. Please provide further details of project funding? Do you have any green revolving or sustainable project funds? Have you accessed any external funding?**

- A rolling £1.7m energy investment (Salix) fund to ensure energy efficiency measures are fitted in all of the University estate. Salix is an independent company funded by the Carbon Trust. The University has so far invested £2.5 million to a variety of energy saving initiatives. We have 121 projects; saving 3,180 tonnes per annum.
- Capital Funding: The University has a capital fund for major asset development.

<https://www.st-andrews.ac.uk/media/estates/documents/Energy%20Strategy.pdf>

**11. What financial assessments and rules do you apply to project funding for carbon reduction projects?**

No info available.

**12. What guidance do you use to assess the economic viability of LZC (low zero carbon) technology solutions?**

No info available.

**13. How are business cases for low carbon infrastructure projects assessed within the University and are there any special governance arrangements that are employed e.g. university ESCO's?**

No info available.

# Stanford University

## UoE Carbon reduction Project

### Stanford University meeting notes, 23.7.15

Carbon Management is delivered through 2 key routes:

- Educational elements through the teaching staff and the students.
- Facilities elements are covered through the facilities department.

Stanford invested \$500m dollars in energy efficiency/carbon reduction. A key investment was in an upgrade of the district heating systems for the campus.

- Previously there was a combined cycle gas boiler operated by a third party
- This operated from 1987 to March 2015
- When the time came to renew the plant the university wanted to investigate low carbon options. A student research project was used to triage opportunities for low carbon alternatives.
- The facilities dept. set up a 8760 table (hrs in a year) to model base heat loads against cooling loads to understand the feasibility of combine heat, power and cooling.
- Heating/cooling data was overlaid and there was found to be an overlap in energy demand  $\frac{3}{4}$  of the time.
- Models were generated to compare the best gas cogen boiler against a regular gas boiler for efficiency and carbon emissions. The cost savings (carbon and energy spend) made by the cogen made a business feasible
- Overall the annual expenditure is comparable when maintenance etc is accounted for however the carbon savings are significant.
- The new system came on line in March 2015

The university has also signed a joint 25 yr contract with a solar PV provider.

2/3 of the University portfolio is running on green electricity.

Carbon performance is reported to the board. The University has chosen not to set carbon reduction targets. The Senior Management do not believe in setting targets that are unrealistic, have no foundation and can never be met.

Many Universities in the US have signed up to the Universities and colleges climate Commitment however Stanford has chosen not to. They don't want to make promises they cannot keep.

Other initiatives include:

- Electrification of buses owned by the university

The University divides energy into two elements - supply and demand

Supply:

- PV
- Green energy
- Ground source heat pumps
- District heating

Looking into energy from waste. The university does not generate enough of the right type of waste do they are in discussion with local municipalities/cities to find additional supply's and form partnerships.

Demand:

- 3-4 major programmes
- WBER programme
  - \$30m programme
  - Building retrofit
  - 25 buildings complete to date – approx. ¾ of estate
  - Will be working through remaining buildings
- Small retrofit programme
  - E.g. lighting retrofits etc

Educational campaign:

- Targeted communications/education
- Aiming for a 2-5% reduction in energy consumption
- Includes awareness raising through student orientation programme
  - Includes training in carbon and sustainable living
- Student green fund:
  - Students can apply for funds to undertake sustainability programmes.



# Carbon Reduction in the University Sector

## Best Practice Questionnaire

AECOM has been appointed by the University of Edinburgh and the Scottish Funding Council to undertake a review of Best Practice in carbon reduction in the University Sector. As a first step we are approaching a number of Universities both within the UK and internationally to identify successfully implemented carbon reduction initiatives as well as any initiatives that are in the planning. We are also interested in how the business case was made and why it succeeded as this will inform recommendations on presentation of future business cases.

To facilitate this process we would like 30 minutes of your time for a short telephone discussion to run through the questionnaire below. Alex Greenwood will be in contact in the next 48 hours to arrange a convenient time during the next 3 weeks to have this discussion.

If a telephone call is not convenient then we would be grateful if you could complete the form and return it by email to [Alex.greenwood@aecom.com](mailto:Alex.greenwood@aecom.com) before the 4<sup>th</sup> August 2015.

Your answers will be used to help develop best practice materials for use by the University of Edinburgh and the wider University sector. We will issue a summary report of our findings to participating Universities.

If you have any questions please contact Alex Greenwood on the email address above or on +44 (0)207 798 5058.

We thank you in advance for your time.

**Dave Gorman,**

**Director of Social Responsibility and Sustainability, University of Edinburgh**

## Contact details

Name: Joseph C. Stagner

Role: Executive Director, Sustainability & Energy Manager

University Name: Stanford University

Contact details: 506 Oak Road, Stanford Ca 94305 ph: 650-444-8160

## A. Governance & Reporting

1. Who has overall responsibility for carbon reduction in your organisation?

The Department of Sustainability & Energy Management, led by the Executive Director

2. Who is responsible for the day to day management of carbon?

The Department of Sustainability & Energy Management, led by the Executive Director

3. What is your process for reporting carbon performance internally?

We use third party certified GHG inventory prepared under the rules of The Climate Registry

4. What is your process for reporting carbon performance externally?

We use third party certified GHG inventory prepared under the rules of The Climate Registry

5. Is the University bound by carbon reduction commitments?

No

## B. Targets

6. Does your University have any carbon targets? Please provide details e.g. scope of targets, baseline etc.?

Stanford is well informed of GHG reductions needed as outlined by the IPCC and others but chooses not to set GHG goals or targets but rather achieve and report on actual reductions as they are accomplished

7. If you have answered yes to Q6. Please describe target setting processes and any decision tools used?

8. Does your University have a carbon management plan?

Yes, it is called the Energy & Climate Plan and is available for public inspection on our Sustainable Stanford website.

## C. Carbon reduction initiatives

9. Please provide details of any carbon reductions projects/initiatives in the table below. Suggested areas include but are not limited to:

- behavioural change initiatives and communications;
- energy efficiency;

- approaches to energy provision and use;
- micro renewable usage and incentivisation;
- travel and waste;
- laboratory design and management;
- building design including laboratories and research areas;
- capital programmes;
- green IT;
- space management; and
- Use of off-site renewable energy production.

<b>Project Description (include how project identified and implemented)</b>	<b>Project Status: Planned / Completed / In Progress?</b>	<b>Expected and Actual (if implemented) savings (£, kWh) and carbon saving)</b>	<b>Anticipated project lifetime and key stages (development / build)?</b>	<b>Is the project considered a success? Any learning points? Any non-carbon / cost benefits?</b>	<b>Process for project approval (steps / information provided / criteria used)</b>	<b>How was the project funded? (development stage and capex)</b>	<b>If external funding – what was the source, type and terms?</b>	<b>Did / does the project receive any grant or incentive payments or other support?</b>	<b>Who is the owner of the asset and has / will this change over lifetime of project?</b>
Whole Building Energy Retrofits (WBERP) & Minor Capital Energy Retrofits (ERP)	In progress	\$5 million/year savings; implementing cost \$30 million; carbon savings 15,000 m-tons/year	2007 – 2017 to implement; 25 major whole building energy retrofits performed; expected life of at least 15 years per building	Yes- average paybacks of less than 7 years and compounding energy, cost, system reliability, occupant comfort, and GHG savings	Organize list of campus buildings in descending order by total energy use to address largest users earliest; perform Step 1 Engineering studies to identify potential energy conservation measures in each building; if potential for major retrofits exist perform	Capital debt to be repaid by building energy budgets	Capital debt secured as part of overall debt pool for Stanford; terms are confidential	Yes, rebates from the investor owned utility serving Stanford were achieved equivalent to about 12% of project cost were obtained	Stanford is the owner and this will not change

Step 2 detailed engineering studies to design fixes

Stanford Energy System Innovations (SESI- whole new campus energy system)	Complete	\$420 million savings from 2015 – 2050; 150,000 m-tons/year GHG reduction (68%); 70% reduction in total energy (gas and electricity) used	Planning 2009 – 2011; design and construction 2012 – 2014; Operation 2015 -2050; capital cost \$483 million	Yes- huge success- full transformation of Stanford energy system with major cost, GHG, and water savings- a system for the 21 <sup>st</sup> century that fits the 4 <sup>th</sup> Generation evolution of district energy as described by the 2015 UNEP report on District Energy	Detailed energy & economic modelling performed in-house with consultant support and peer reviewed by both external consultants and internal staff, faculty and leadership over a 2 ½ year process	Capital debt to be repaid by campus energy operations budget	Capital debt secured as part of overall debt pool for Stanford; terms are confidential	No external funding received for project, though subsequent large off-campus long term solar PV electricity supply project benefited from US federal Investment Tax Credit and Accelerated Depreciation programs	Stanford is the owner of the campus energy system and this will not change, however the off-campus PV project will be owed by the third party private developer for at least the first 25 years
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*Please insert further rows as required.*

If you have any published materials that would help illustrate this information, please provide details or send through files if you are able.

## D. Project Funding

10. Please provide further details of project funding? Do you have any green revolving or sustainable project funds? Have you accessed any external funding?

SESI and WBERP, as major capital energy related projects, are funded by general long term debt from external sources secured by the campus that is repaid by the corresponding campus budgets that pay for energy services

11. What financial assessments and rules do you apply to project funding for carbon reduction projects?

Stanford uses Life Cycle Cost Analysis to determine and compare the Present Value Cost of options and generally selects the lowest PVC option

12. What guidance do you use to assess the economic viability of LZC (low zero carbon) technology solutions?

We perform a PVC comparison of campus energy programs with and without a proposed option, whether that be on the Demand (building) or Supply (Central Energy Facility/Grid) side, and if it yields reliable long term savings we generally implement the project

13. How are business cases for low carbon infrastructure projects assessed within the University and are there any special governance arrangements that are employed e.g. university ESCO's?

We perform a PVC comparison of campus energy programs with and without a proposed option, whether that be on the Demand (building) or Supply (Central Energy Facility/Grid) side, and if it yields reliable long term savings we generally implement the project

Thank you for taking the time to participate in this survey. This is a really important step in understanding best practice on carbon reduction in Universities. Once we have received responses for everyone they will be collated and your feedback will help to shape best practice carbon reduction guidance.

Security of data and information is central to AECOM's Project Quality Management System. Information and data provided will only be used for the purposes of this project. Please make clear if you do not wish any of the information / data provided to be published. Please direct us, in the questionnaire and /or the interview, to any existing published data/information.



## Strathclyde University

# Carbon Reduction in the University Sector

### Best Practice Questionnaire

AECOM has been appointed by the University of Edinburgh and the Scottish Funding Council to undertake a review of Best Practice in carbon reduction in the University Sector. As a first step we are approaching a number of Universities both within the UK and internationally to identify successfully implemented carbon reduction initiatives as well as any initiatives that are in the planning. We are also interested in how the business case was made and why it succeeded as this will inform recommendations on presentation of future business cases.

To facilitate this process we would like 30 minutes of your time for a short telephone discussion to run through the questionnaire below. We will be in contact to arrange a convenient time during the next 3 weeks to have this discussion.

If a telephone call is not convenient then we would be grateful if you could complete the form and return it by email to [Alex.greenwood@aecom.com](mailto:Alex.greenwood@aecom.com) before the 7<sup>th</sup> August 2015.

Your answers will be used to help develop best practice materials for use by the University of Edinburgh and the wider University sector. We will issue a summary report of our findings to participating Universities.

If you have any questions please contact Alex Greenwood on the email address above or on +44 (0)207 798 5058.

We thank you in advance for your time.

**Dave Gorman,**

**Director of Social Responsibility and Sustainability, University of Edinburgh**

## Contact details

Name: Roddy Yarr

Role: Assistant Director (Sustainability and Environmental Management)

University Name: University of Strathclyde

Contact details: [rodny.yarr@strath.ac.uk](mailto:rodny.yarr@strath.ac.uk) tel 0141 548 4695

## A. Governance & Reporting

1. Who has overall responsibility for carbon reduction in your organisation?  
Principal and Vice Chancellor.
2. Who is responsible for the day to day management of carbon?

### **Estates Services**

Roddy Yarr – Assistant Director (Sustainability and Environmental Management)

Ross Simpson – Head of Building Services

Dean Drobot – Energy and Environmental Manager

David Charles – Energy Engineer

3. What is your process for reporting carbon performance internally?

Strategy for greenhouse gas emissions, including target setting and internal and external reporting, is managed via the University Estates Committee; key performance indicators (KPI) are reported through this group.

Gas, electricity and water use are monitored across the campus on a monthly basis. Our full time Energy Engineer is tasked with producing monthly electricity, gas, and water consumption targets, and reports on any deviations from targets. This data is used to a) plan investment project, b) validate progress against policy targets, and c) provide transparent data for engagement with heads of departments and building users.

4. What is your process for reporting carbon performance externally?

External Performance reporting includes:

- Climate Change Action Plan (CCAP) targets and actions are reported annually to the Scottish Funding Council through the Universities and Colleges Climate Commitment for Scotland (UCCCFs).
- Public Sector Bodies Duties reporting, as set out in the Climate Change (Scotland) Act and coordinated via the Sustainable Scotland Network, is to be reported annually from 2015.
- In Scotland we submit data to the Scottish Funding Council via the new Outcome Agreement Aim 7 and as part of the Climate Change Reporting Duties legislation
- Estates Management Statistics used to inform the HE sector.
- Progress against emission reduction targets, enabled via the pending district energy scheme, are reported to the Scottish Funding Council as part of our annual Outcome Agreement.

5. Is the University bound by carbon reduction commitments?

Yes. CRC applies to the University for carbon emissions arising from electricity and gas usage.

## B. Targets

6. Does your University have any carbon targets? Please provide details e.g. scope of targets, baseline etc.?

The University of Strathclyde was the first Scottish University to complete the Carbon Trust Carbon Management Programme, producing a Carbon Management Strategy and Implementation Plan in 2006 (CMP2006). An update to this strategy, the Carbon Management Implementation Plan (CMIP), was produced in 2011. The CMIP sets out an emissions baseline and long term reduction targets to 2050. The CMIP recognizes “Public Sector Bodies Duties” for target setting and reporting of GHG emissions, as stipulated in the Climate Change (Scotland) Act 2009.

A key delivery mechanism for the “Public Sector Bodies Duties” in Scottish higher education is the Universities and Colleges Climate Commitment for Scotland (UCCCfS). As a signatory of the UCCCfS the university are obliged to a) publically commit to GHG emissions reduction targets in line with the Climate Change (Scotland) Act 2009, b) provide a five year action plan to achieve those targets, and c) report progress against targets annually. The UCCCfS is supported by the Scottish Funding Council (SFC) who use annual UCCCfS reporting to verify Outcome Agreement commitments related to GHG emissions.

The Carbon Management Implementation Plan (CMIP) 2011 sets the university GHG emissions baseline as the 2009/10 academic year. Emissions reduction targets are aligned to the Climate Change (Scotland) Act 2009. Key targets are: a 10% reduction by 2015, a 30% reduction by 2020, and a 50% reduction by 2030, relative to the 09/10 baseline year.

[http://www.strath.ac.uk/media/ps/estatesmanagement/sustainability/UoS\\_CMIP\\_2011.pdf](http://www.strath.ac.uk/media/ps/estatesmanagement/sustainability/UoS_CMIP_2011.pdf)

Our Carbon Management Plan is currently being updated. Our updated plan, which is aligned to the University Strategy 2015-2020, includes internal targets and KPIs for scope three emissions.

A key performance target of a 25% reduction in absolute scope one and two GHG emissions, relative to a 2009/10 baseline year, by 2020 has been committed within the University Strategic Plan.

<http://www.strath.ac.uk/whystrathclyde/strategicplan/>

7. If you have answered yes to Q6. Please describe target setting processes and any decision tools used?

In 2011 an absolute GHG emissions target of 28,50015 TCO<sub>2</sub>e was set for 2014/15; this was a conservative estimate recognising the cumulative impact of a) property divestments, b) property refurbishments meeting Sustainable Design Quality Standard, c) new construction meeting Sustainable Design Quality Standard, and

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<sup>15</sup> The GHG baseline published in 2011 was calculated to be 32,690 Tonnes CO<sub>2</sub>e based on emissions factors current at that time; the baseline has subsequently been revised to 29,994 TCO<sub>2</sub>e based on back cast emissions factors published annually by DECC. The 10% reduction target of 28,500 Tonnes CO<sub>2</sub>e is based on the baseline established in 2011.

d) continued investment in energy efficiency. The university achieved this target in 2011/12, but in recent years GHG emissions have increased.

<b>Target</b>	<b>Units</b>	<b>2009/10 Published Baseline</b>	<b>2014/15 Published Target</b>	<b>13/14 Current Performance</b>	<b>Best Performance To Date</b>
<b>Electricity Intensity</b>	<b>kwh / m<sup>2</sup></b>	119	-	115	112
<b>Gas Intensity</b>	<b>kwh / m<sup>2</sup></b>	173	-	152	152
<b>Absolute GHG emissions</b>	<b>Tonnes CO<sub>2</sub>e</b>	32,690	28,500	29,313	27,726
<b>Relative GHG emissions</b>	<b>Tonnes CO<sub>2</sub>e/ m<sup>2</sup></b>	90	95	85	81
<b>Relative GHG emissions</b>	<b>Tonnes CO<sub>2</sub>e/ £M Income</b>	130	-	115	115

Other targets / metrics include:

- Electricity intensity reduced 5% from 120 to 114 kwh/m<sup>2</sup>
- Gas intensity reduced 11% from 170 to 150 kwh/m<sup>2</sup>
- Water intensity reduced 44% from 17m<sup>3</sup>/FTE to 9 m<sup>3</sup>/FTE
- Scope 1&2 GHG intensity reduced 10% from 91 to 80 Tonnes/m<sup>2</sup>
- Waste mass per FTE reduced 15% from 35kg to 29kg p.a.
- Waste to landfill reduced from virtually 100% to 0%.
- Recycling rate increase from near zero to 90%.
- SOV rates reduced to 12%.
- Student led, curriculum linked, facilities projects, increased from zero to 5-6 per annum.
- Our Sustainable Labs programme enables Phd students to lead laboratory audit and certification.
- Face to face engagement with Heads of Department on bespoke energy targets.

8. Does your University have a carbon management plan?

[http://www.strath.ac.uk/media/ps/estatesmanagement/sustainability/UoS\\_CMIP\\_2011.pdf](http://www.strath.ac.uk/media/ps/estatesmanagement/sustainability/UoS_CMIP_2011.pdf)

## Carbon reduction initiatives

9. Please provide details of any carbon reductions projects/initiatives in the table below. Suggested areas include but are not limited to:

The £750,000 in seed capital is fully committed and all future investments must be funded entirely from utility savings. This programme is achieving annual savings of 3,100 MWh of electricity, 5,500 MWh gas, 3,000 tonnes CO<sub>2</sub>e and £650,000 in utility expenditure (10% of utility budget).

Savings achieved to date from projects either completed or committed, amounting to £650k p.a..

In 2017/18 the University are anticipated to complete the installation of a Combined Heat and Power (CHP) District Energy (DE) Network on the John Anderson campus. This will allow the university to generate a significant amount of electricity onsite using gas fired combined heat and power engines. This will reduce the amount of electricity purchased from the grid, and increase the amount of fossil fuel combusted on site. The net impact will be a reduction in greenhouse gas emissions, relative to existing electricity and heating demand. The 'carbon efficiency' of electricity and heating supply on campus will improve significantly, offsetting increases in energy demand.

<b>Project Description (include how project identified and implemented)</b>	<b>Project Status: Planned / Completed / In Progress?</b>	<b>Expected and Actual (if implemented) savings (£, kWh) and carbon saving)</b>	<b>Anticipated project lifetime and timescales for key stages (development / build)?</b>	<b>Is the project considered a success? Any learning points? Any non-carbon / cost benefits?</b>	<b>Process for project approval (steps / information provided / criteria used)</b>	<b>How was the project funded? (development stage and capex)</b>	<b>If external funding – what was the source, type and terms?</b>	<b>Did / does the project receive any grant or incentive payments or other support?</b>	<b>Who is the owner of the asset and has / will this change over lifetime of project?</b>
CHP District Energy Project	Design Stage	January 2018  Anticipated saving of 6000 tonnes of CO2e (Phase 1).	Detailed design complete Q1 2016; Target completion January 2018.	Very significant step change; transformational, both technically and culturally.	Court Approval.	£8M capital grant from Scottish Funding with balance funding from the University.	£8M capital grant from Scottish Funding with balance funding from the University.	£8M capital grant from Scottish Funding with balance funding from the University.	University
Voltage Step down	Complete	859		Yes – internal step down of TXs was very effective.	Estates Approval.	Energy Management		Carbon Trust Funding to evaluate electrical voltage distribution in buildings; sector case study.	University
John Anderson Lighting Control -	Complete	70		Yes – very effective.	Estates Approval.	Energy Management			University

Corridors

Replace Burners to 2No Steam Boilers, John St Boilerhouse	Complete	495		Estates Approval.	Planned Maintenance	University
JA Chiller Replacement	Complete			Estates Approval.	Planned Maintenance	University
Provision of zone control – Graham Hills Building	Complete	100	Modest impact; significant commissioning issues developed.	Estates Approval.	SALIX	University
John Anderson Building – Zone Control	Complete	92	Modest impact; significant commissioning issues developed.	Estates Approval.	SALIX	University
181 SJR Draught Proofing	Complete	8	Small impact; good user engagement.	Estates Approval.	SALIX	University
Curran Draught Proofing	Complete	39	Small impact; good user engagement.	Estates Approval.	SALIX	University

Henry Dyer Draught Proofing	Complete	2	Small impact; good user engagement.	Estates Approval.	SALIX	University
McCance Draught Proofing	Complete	24	Small impact; good user engagement.	Estates Approval.	SALIX	University
McCance Boiler Replacement	Complete	47	Modest impact; issues with high return temperatures impacting condensing operation.	Estates Approval.	SALIX	University
St Pauls Draught Proofing	Complete	9	Small impact; good user engagement.	Estates Approval.	SALIX	University
Students Union Draught Proofing	Complete	5	Small impact; good user engagement.	Estates Approval.	SALIX	University
Operation of main Lecture Theatre – K325	Complete	91	Good impact; small in scale.	Estates Approval.	SALIX	University
Graham Hills Boiler Replacement	Complete	162	Modest impact; issues with high return temperatures	Estates Approval.	SALIX	University

			impacting condensing operation.				
Thomas Graham Compressor Replacement	Complete	17	Good impact; small in scale.	Estates Approval.	SALIX		University
181 St James Road - Mech Services Insulation	Complete	22	Good impact; difficult to monitor.	Estates Approval.	SALIX		University
Graham Hills - Mech Services Insulation	Complete	136	Good impact; difficult to monitor.	Estates Approval.	SALIX	Carbon Trust Funding to create savings tool.	University
John Anderson - Mech Services Insulation	Complete	69	Good impact; difficult to monitor.	Estates Approval.	SALIX	Carbon Trust Funding to create savings tool.	University
John Arbuthnott/Rob ertson Wing - Mech Services Insulation	Complete	36	Good impact; difficult to monitor.	Estates Approval.	SALIX	Carbon Trust Funding to create savings tool.	University
McCance - Mech Services Insulation	Complete	37	Good impact; difficult to monitor.	Estates Approval.	SALIX	Carbon Trust Funding to create savings tool.	University

Stepps Pavillion - Mech Services Insulation	Complete	5	Good impact; difficult to monitor.	Estates Approval.	SALIX	Carbon Trust Funding to create savings tool.	University
Lord Todd - Mech Services Insulation	Complete	11	Good impact; difficult to monitor.	Estates Approval.	SALIX	Carbon Trust Funding to create savings tool.	University
Centre for Sports and Recn. - Mech Services Insulation	Complete	17	Good impact; difficult to monitor.	Estates Approval.	SALIX	Carbon Trust Funding to create savings tool.	University
Architecture - Mech Services Insulation	Complete	40	Good impact; difficult to monitor.	Estates Approval.	SALIX	Carbon Trust Funding to create savings tool.	University
Curran - Mech Services Insulation	Complete	151	Good impact; difficult to monitor.	Estates Approval.	SALIX	Carbon Trust Funding to create savings tool.	University
SIPBS Room 101 - Ventilation PIR	Complete	4	Good impact; small in scale	Estates Approval.	Planned Maintenance		University
Boiler Replacement - Stepps	Complete	6		Estates Approval.	Planned Maintenance		University
Light Fitting and Control Upgrade	1 Committed	308	Excellent	Estates Approval.	SALIX		University

Light Fitting Upgrade - Assembly Hall	Complete	8		Excellent	Estates Approval.	SALIX	University
L6 Fume Cupboard Extract Upgrade / Controls Upgrade	Complete	215		Monitoring pending; some issues in low diversity rooms with limited extract capacity. Had to increase some extract fan motor sizes. Significant user behaviour change.	Estates Approval.	SALIX	University
L4 Fume Cupboard Extract Upgrade / Controls Upgrade	2 Planned	215	Concept committed; install pending 2015.		Estates Approval.	SALIX	University
Light Fitting and Control Upgrade	2 Planned	51	Concept Design Complete; install pending funding.		Estates Approval.		University

Light Fitting  
and Control  
Upgrade

2 Planned

163

Concept  
Design  
Complete;  
install  
pending  
funding.

Estates  
Approval.

University

*Please insert further rows as required.*

The following strategies are in place to manage GHG emissions reductions:

<p><b>Sustainable Estate Development</b></p>	<p><i>The "Sustainable Design Quality Standard (SDQS)" consists of fifty time bound performance targets addressing Process Management, Community Support, Biodiversity Enhancement, Pollution Minimisation, Healthy Environments, and Resource Efficiency, and acts as a framework for achieving sustainable built development. In addition, our "Project Management Guide to a Sustainable Campus" sets out key delivery requirements at each project gateway and RIBA stage. The achievement of SDQS standards must be evidenced to a level of detail that will give Estates Services the confidence to assess risk, best value, and certainty of achievement at each stage of the project. The Sustainable Design Quality Standards are applied to 100% of all new build and refurbishment projects and include the requirement to achieve BREEAM Excellent.</i></p> <p><i>Targets include:</i></p> <ul style="list-style-type: none"> <li><i>i. Primary Energy Design team proposals to incorporate 60% reduction - at time of planning application- on building regs CO2 targets for new build. Design team proposals to incorporate 50% reduction on energy use in existing buildings. Energy data to be presented as both CO2 impact and energy use of major components.</i></li> <li><i>ii. A rating for new build, As EPC for refurbishment</i></li> <li><i>iii. Fabric Performance – Insulation - Design team proposals to incorporate 30% increase over Regulations in new build and option appraisal on upgrade in existing properties, progressing to passive standards where practical.</i></li> <li><i>iv. Fabric, air tightness - Design team proposals to incorporate a maximum of 3 m3/m2/hr @ 50 Pa for new build. Target upgrade of existing properties to achieve maximum of 5 m3/m2/hr in all.</i></li> <li><i>v. Heating - Design team proposals to incorporate at least 50% reduction from industry benchmark - modelled</i></li> <li><i>vi. Renewable Energy - Design team proposals to incorporate options appraisal and proactive pursuit of best value options.</i></li> </ul>
<p><b>Waste Minimisation/ Resource Efficiency</b></p>	<p><i>The University of Strathclyde have enabled landfill diversions of 100% a recycling rate of 90% and total waste mass reductions of 22% p.a. Our aim is to progress to 'zero waste' from all activities by 2015. We completed our first staff attitudinal survey to waste management in 2004, following by waste audits in 2007 and 2009. In 2011 the university piloted their first pervasive segregated recycling system. In 2013 we began increasing the number and type of highly segregated collection containers for food waste, paper, plastic packaging, metals/foils, glass, and non-recyclables. Segregated recycling stations were made accessible at room/office level. Food and glass collections were introduced in kitchens and food prep/eating areas. Segregated recycling stations were installed on public grounds and pavements. The key to our success is the strategic engagement of Heads of Departments (HOD). A new student 'Environmental Coordinator' role was created to lead face to face HOD engagement</i></p>

	<p><i>and to facilitate student and staff consultation – critical to effective and successful infrastructure roll out. Our strong focus on strategic engagement enabled uncontentious removal of general waste bins - enabling a reliable and effective trans-departmental feedback network in the process. In 2013 and 2014 the Business School and Civil Engineering department created student/facilities partnerships in their Environmental Entrepreneurship and Environmental Studies MSc curriculum. Competitively appointed student projects delivered integrated research on e.g. student engagement, signage effectiveness, contract management, contamination and operational efficiency. In 2014 a delegation of students and staff presented a workshop session at the EAUC national conference.</i></p>
<b>Water (finite resources)</b>	<p><i>Water intensity has reduced 34% from 17m<sup>3</sup>/FTE to 11m<sup>3</sup>/FTE from our 2009 baseline. The university continues to pursue behaviour change activity to reduce water waste, particularly in laboratories. In 2013 the university completed a pilot Sustainable Laboratories audit and certification scheme, which includes the assessment of laboratory water efficiency.</i></p>
<b>Procurement</b>	<p><i>Our procurement team has successfully implemented a Sustainable Procurement Strategy, achieving Flexible Framework level 3. In 2013 the university analysed the GHG emissions associated with the procurement of goods and services. The 'scope 3' GHG emissions associated with goods and services in 2010/11, 2011/12, 2012/13 were 20,520 tonnes, 32,204 and 41,900 tonnes respectively. Priority areas for policy development include construction, IT equipment and laboratory supplies.</i></p>

- Energy and water efficiency behavioural change initiatives;
- Sustainable travel strategy
- ‘Sustainable Laboratory’ programme
  - i. Sustainable lab audit and awards.
- green IT;
  - i. Sustainable ICT review 2015

If you have any published materials that would help illustrate this information, please provide details or send through files if you are able.

## C. Project Funding

10. Please provide further details of project funding? Do you have any green revolving or sustainable project funds? Have you accessed any external funding?

An investment of £16M in our district energy network project is supported with an £8M grant from the Scottish Funding Council.

The majority of energy efficiency funding is provided by SALIX Finance. SALIX provided a £300,000 loan, match funded with £300,000 by Scottish Government, and £150,000 by Strathclyde, to create a seed fund of £750,000. This recycling fund generates ~£300,000 p.a. in available 'savings' which can be re-invested in lieu of immediate loan repayment, pending SALIX approval.

Internal planned maintenance funds of ~£200,000 p.a. fund enabling activity (e.g. awareness raising, consultancy), some technical projects (e.g. boiler replacements, lighting upgrades) and all activity related to scope three emissions (e.g. Sustainable travel activity, material waste reductions, procurement process reviews).

What financial assessments and rules do you apply to project funding for carbon reduction projects?

Generally five year simple payback; capital cost less than £100/Tonnes lifetime CO<sub>2</sub>. Projects are evaluated for marginal abatement cost, and deliverability. Large scale projects are assessed for NPV.

11. What guidance do you use to assess the economic viability of LZC (low zero carbon) technology solutions?

External consultancy, typically through major refurbishment and the application of our Sustainable Design Quality Standard, which requires BREEAM Excellent and a LZCT assessment.

12. How are business cases for low carbon infrastructure projects assessed within the University and are there any special governance arrangements that are employed e.g. university ESCO's?

The University senior governors sign off major infrastructure projects. The University has recently undertaken a review of the benefits and disbenefits associated with setting up an ESCO or SPV for the District Energy Project. Sector guidance on this aspect would be welcomed.

Thank you for taking the time to participate in this survey. This is a really important step in understanding best practice on carbon reduction in Universities. Once we have received responses for everyone they will be collated and your feedback will help to shape best practice carbon reduction guidance.

Security of data and information is central to AECOM's Project Quality Management System. Information and data provided will only be used for the purposes of this project. Please make clear if you do not wish any of the information / data provided to be published. Please direct us, in the questionnaire and /or the interview, to any existing published data/information.



## University of British Columbia

# Carbon Reduction in the University Sector

### Best Practice Questionnaire

AECOM has been appointed by the University of Edinburgh and the Scottish Funding Council to undertake a review of Best Practice in carbon reduction in the University Sector. As a first step we are approaching a number of Universities both within the UK and internationally to identify successfully implemented carbon reduction initiatives as well as any initiatives that are in the planning. We are also interested in how the business case was made and why it succeeded as this will inform recommendations on presentation of future business cases.

To facilitate this process we would like 30 minutes of your time for a short telephone discussion to run through the questionnaire below. Alex Greenwood will be in contact in the next 48 hours to arrange a convenient time during the next 3 weeks to have this discussion.

If a telephone call is not convenient then we would be grateful if you could complete the form and return it by email to [Alex.greenwood@aecom.com](mailto:Alex.greenwood@aecom.com) before the 4<sup>th</sup> August 2015.

Your answers will be used to help develop best practice materials for use by the University of Edinburgh and the wider University sector. We will issue a summary report of our findings to participating Universities.

If you have any questions please contact Alex Greenwood on the email address above or on +44 (0)207 798 5058.

We thank you in advance for your time.

**Dave Gorman,**

**Director of Social Responsibility and Sustainability, University of Edinburgh**

## Contact details

**Name: Charlene Ponto**

**Role: Coordinator, Sustainability Reporting and Engagement, Campus and Community Planning department**

**University Name: University of British Columbia**

**Contact details:**

**Charlene Ponto**

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THE UNIVERSITY OF BRITISH COLUMBIA

## A. Governance & Reporting

### 1. Who has overall responsibility for carbon reduction in your organisation?

As part of the requirements of the Province of British Columbia's Carbon Neutral Government Regulation and Greenhouse Gas Reduction Target Act (GGRTA, Bill 44, 2007) UBC is required to submit annual GHG inventory reports to quantify the GHG emissions created by its facilities and operations. The inventory is produced by uploading usage data to SMARTTool, the provincial GHG inventory tool.

Under the GGRTA and as part of the BC public sector, UBC is required to determine, publicly report, and verify campus GHG emissions. UBC follows a comprehensive quality assurance procedure for compiling its GHG inventory based on provincial guidelines and internal procedures. UBC's GHG Inventory and Quality Control procedures are reviewed and signed off on by UBC Executives on an annual basis and submitted to the provincial Climate Action Secretariat.

### 2. Who is responsible for the day to day management of carbon?

UBC's Carbon Neutral Action Reports (CNAR) are coordinated by Campus + Community Planning and Energy and Water Services departments.

### 3. What is your process for reporting carbon performance internally?

UBC's CNARs are signed off on by UBC executives and distributed to key stakeholders. UBC's progress in achieving our GHG targets are reported out in Place and Promise, UBC's Strategic Plan and in UBC Annual Sustainability Reports, presented to the UBC Board of Governors. More information about our sustainability reports are available online at: <http://sustain.ubc.ca/our-commitment/strategic-plans-policies-reports/annual-reports>.

#### **4. What is your process for reporting carbon performance externally?**

UBC's GHG inventory, CNARs, and Annual Sustainability Reports are published on the [sustain.ubc.ca](http://sustain.ubc.ca) website. CNARs are also published on the Ministry of Environment website as part of our provincial public sector GHG reporting at <http://www2.gov.bc.ca/gov/content/environment/climate-change/reports-data/carbon-neutral-action-reports>.

#### **5. Is the University bound by carbon reduction commitments?**

As a public sector organization under the Province of British Columbia's Carbon Neutral Government Regulation and Greenhouse Gas Reduction Target Act (<http://www2.gov.bc.ca/gov/topic.page?id=BE9BE637F7BA4FFB97AFFE62181F9A67>), UBC has been required to report and offset its emissions since 2010, including emissions from all properties owned and leased by UBC and its subsidiaries.

To measure its GHG emissions, UBC established a Technical Advisory Committee of academic, operations, staff and student members in 2007. The initial inventory used the World Resources Institute Greenhouse Gas Protocol to quantify 2006 emissions, which include direct and indirect emissions (Scope 1 and Scope 2), and optional emissions (Scope 3). The committee elected to adopt the broadest approach to scoping the institution's GHGs including faculty, staff and student daily commuting, paper procurement, solid waste, staff and faculty air travel and building lifecycle. This was based on the recognition that UBC has a sphere of influence to reduce emissions beyond its operational boundary.

## **B. Targets**

#### **6. Does your University have any carbon targets? Please provide details e.g. scope of targets, baseline etc.?**

In 2010, UBC's Vancouver Campus Climate Action Plan committed to aggressive GHG emission reduction targets, committing to reduce emissions 33 per cent by 2015, 67 per cent by 2020, and 100 per cent by 2050, compared to 2007 levels. The Plan includes strategies to reduce emissions in the areas of: Campus Development and Infrastructure, Energy Supply and Management, Fleets and Fuel Use, Business Travel and Procurement, Transportation, Food. To track progress towards achieving our GHG reduction targets, UBC produces annual Carbon Neutral Action Reports which include a detailed analysis and discussion of our GHG Inventory, which includes Scope 1, 2 and 3 emissions. <http://sustain.ubc.ca/campus-initiatives/climate-energy/climate-action-plan>.

#### **7. If you have answered yes to Q6. Please describe target setting processes and any decision tools used?**

A case study on the development and implementation of UBC's Climate Action Plan is available online in the following case study: <http://www.aashe.org/resources/case-studies/implementing-ubcs-climate-action-plan>.

## **8. Does your University have a carbon management plan?**

In 2010, UBC's Vancouver Campus Climate Action Plan committed to aggressive GHG emission reduction targets, committing to reduce emissions 33 per cent by 2015, 67 per cent by 2020, and 100 per cent by 2050, compared to 2007 levels. In 2014, UBC's Vancouver campus absolute GHG emissions have decreased by 22 per cent despite significant growth. Per capita, emissions have decreased 34 per cent per FTE student.

UBC's Climate Action Plan projects (Continuous Optimization, Academic District Energy System steam to hot water conversion, and Bioenergy Research and Demonstration Facility) are forecasted to achieve the targeted 33 per cent emissions reduction compared to 2007 levels in 2016. In 2015, work will commence on updating UBC Vancouver's Climate Action Plan for 2015-2020 to identify additional actions and measures to advance towards its aggressive targets.

UBC's leadership in developing and implementing our Climate Action Plan has been recognized with several national and international awards, including the 2012 Association for the Advancement of Sustainability in Higher Education (AASHE) Campus Sustainability Case Study Award and an Honorable Mention in the Canadian Association of University Business Officers (CAUBO) Quality and Productivity Awards.

More information about UBC's climate action plan, progress reports, inventories, and case studies is available online at: <http://sustain.ubc.ca/campus-initiatives/climate-energy/climate-action-plan>.

## **C. Carbon reduction initiatives**

9. Please provide details of any carbon reductions projects/initiatives in the table below. Suggested areas include but are not limited to:

- behavioural change initiatives and communications;
- energy efficiency;
- approaches to energy provision and use;
- micro renewable usage and incentivisation;
- travel and waste;
- laboratory design and management;
- building design including laboratories and research areas;
- capital programmes;
- green IT;
- space management; and

- Use of off-site renewable energy production.



<b>Project Description (include how project identified and implemented)</b>	<b>Project Status: Planned / Completed / In Progress?</b>	<b>Expected and Actual (if implemented) (kWh) and savings (£, carbon saving)</b>	<b>Anticipated project lifetime and timescales for key stages (development / build)?</b>	<b>Is the project considered a success? Any learning points? Any non-carbon / cost benefits?</b>	<b>Process for project approval (steps / information provided / criteria used)</b>	<b>How was the project funded? (development stage and capex)</b>	<b>If external funding – what was the source, type and terms?</b>	<b>Did / does the project receive any grant or incentive payments or other support?</b>	<b>Who is the owner of the asset and has / will this change over lifetime of project?</b>
BRDF (Fuel switch from Gas Steam Boilers to Waste wood Gasification Plant)	Completed	2014 Actual: 144,000 GJ of natural gas offset/year. 2015 Expected: 181000GJ of natural gas offset (9000tCO2 saving)	Implementation of project 3 years. 30 year lifetime of asset	Yes. Research and operational benefits. Diversity of commodity usage, reduction of commodity fluctuation.	Three Board of Governors presentations at varying design stages. Several public engagement sessions.	Two thirds of capital through research grants + remaining 9 million internal loan paid back by cost savings.		Yes.	Owner is Energy & Water Services Department
Steam to Hot Water District Energy Conversion	In progress	2014 Actual is 27,500 GJ of gas conserved. Upon project completion, 250,000GJ reduced,	Implementation of project 6 years. 30 year lifetime of asset	Yes. Maintenance and personnel savings, renewal of old district system,	Several Board of Governors presentations at varying design stages. Several public engagement	Internally funded by internal loan paid back by cost savings.			Owner is Energy & Water Services Department

		12,500tCO2 saving		upgrade of old power plant cost avoidance	sessions.			
Continuous Optimization Project	In progress. Completion of 20+ buildings.	2014 actual of 28,000 GJ reduced, 1400tCO2 avoided. Upon completion, expected 10% of core building energy reduction.	Project staged over four stages with groups of buildings in each. Continually monitor building performance to maintain life of savings indefinitely.	Yes, better control of buildings, improvement to occupant comfort.		Internally through capital renewal fund	Incentives from electrical utility.	Owner is Energy & Water Services Department
In-house optimization (ongoing optimization of building systems through better controls & programming)	Ongoing	2014 actual of 30,000 GJ reduced, 1500 tCO2 avoided. Upon completion, expected 10% of core building energy reduction.	Continually monitor building performance to maintain life of savings indefinitely.	Yes, better control of buildings, improvement to occupant comfort.	Hiring of staff for in-house work was justified internally with some incentive funding.	Internally and with gas utility funded position.	Incentives from gas utility.	Owner is Energy & Water Services Department

Heat Recovery Chiller	In progress	Expected savings of 10,000GJ/yr through heat recovery	15 year asset life, project length is 1-2 years		Internally and with gas utility incentives.	Incentives from gas utility.	Owner is Energy & Water Services Department
Aquatic Centre Heat Recovery (heat recovery of condensate to warm pools)	Complete	2013 actual savings of 8000 GJ of gas. Project coming to a close as system is transitioned to hot water district energy.	4 year project life	Yes, provides secondary heating supply for pools in case of steam system failure.	Internally and with gas utility incentives.	Incentives from gas utility.	Owner is Energy & Water Services Department

*Please insert further rows as required.*

If you have any published materials that would help illustrate this information, please provide details or send through files if you are able.

Information about UBC's sustainability initiatives are available online as follows:

- 2014 Carbon Neutral Action Report:  
[http://sustain.ubc.ca/sites/sustain.ubc.ca/files/uploads/CampusSustainability/CS\\_PDFs/PlansReports/Reports/UBCCarbonNeutralActionReport\\_2014.pdf](http://sustain.ubc.ca/sites/sustain.ubc.ca/files/uploads/CampusSustainability/CS_PDFs/PlansReports/Reports/UBCCarbonNeutralActionReport_2014.pdf)
- UBC Annual Sustainability Reports and International Sustainable Campus Network (ISCN) Reports:  
<http://sustain.ubc.ca/our-commitment/strategic-plans-policies-reports/annual-reports>
- Energy & Water Services website: <http://energy.ubc.ca/>

## D. Project Funding

### **10. Please provide further details of project funding? Do you have any green revolving or sustainable project funds? Have you accessed any external funding?**

Information about UBC's Climate Action Plan funding mechanisms, budget, and funding sources is online on our AASHE CAP case study: <http://www.aashe.org/resources/case-studies/implementing-ubcs-climate-action-plan>

UBC has also recently launched a Sustainability Revolving Fund: <http://sustain.ubc.ca/campus-initiatives/ubc-sustainability-revolving-fund>

### **11. What financial assessments and rules do you apply to project funding for carbon reduction projects?**

Generally if payback is less than 2 years, the project would be funded by the Energy and Water Services department as there would be a quick positive effect on their budget. A 3-5 year payback would generally look to the revolving fund or capital renewal fund where applicable. In BC, the carbon tax is \$1.50 CAD/GJ of natural gas and the public sector is required to pay a carbon offset of \$1.25CAD/GJ of natural gas which helps with the business cases. Electricity in BC is 95% hydro power and has very low carbon emission factor, and so carbon reductions come from natural gas reduction or displacement projects.

### **12. What guidance do you use to assess the economic viability of LZC (low zero carbon) technology solutions?**

Life cycle costing is the preferred method of assessing the economic viability of a technology, low carbon or not. This is stated in our technical guidelines.

[http://www.technicalguidelines.ubc.ca/technical/design\\_approvals.html](http://www.technicalguidelines.ubc.ca/technical/design_approvals.html)

### **13. How are business cases for low carbon infrastructure projects assessed within the University and are there any special governance arrangements that are employed e.g. university ESCO's?**

Business cases for low carbon projects (by means of energy reduction) are assessed by the Energy and Water Services department whose budget is directly tied to energy and carbon costs. Applications for the revolving fund are screen by the Energy and Water Services Energy Conservation Group for financial and technical viability. Large infrastructure projects require Board of Governor approval and undergo a series of stages and approvals.

Thank you for taking the time to participate in this survey. This is a really important step in understanding best practice on carbon reduction in Universities. Once we have received responses for everyone they will be collated and your feedback will help to shape best practice carbon reduction guidance.

Security of data and information is central to AECOM's Project Quality Management System. Information and data provided will only be used for the purposes of this project. Please make clear if you do not wish any of the information / data provided to be published. Please direct us, in the questionnaire and /or the interview, to any existing published data/information.



## University College London

# Carbon Reduction in the University Sector

### Best Practice Questionnaire

AECOM has been appointed by the University of Edinburgh and the Scottish Funding Council to undertake a review of Best Practice in carbon reduction in the University Sector. As a first step we are approaching a number of Universities both within the UK and internationally to identify successfully implemented carbon reduction initiatives as well as any initiatives that are in the planning. We are also interested in how the business case was made and why it succeeded as this will inform recommendations on presentation of future business cases.

To facilitate this process we would like 30 minutes of your time for a short telephone discussion to run through the questionnaire below. We will be in contact to arrange a convenient time during the next 3 weeks to have this discussion.

If a telephone call is not convenient then we would be grateful if you could complete the form and return it by email to [Alex.greenwood@aecom.com](mailto:Alex.greenwood@aecom.com) before the 7<sup>th</sup> August 2015.

Your answers will be used to help develop best practice materials for use by the University of Edinburgh and the wider University sector. We will issue a summary report of our findings to participating Universities.

If you have any questions please contact Alex Greenwood on the email address above or on +44 (0)207 798 5058.

We thank you in advance for your time.

**Dave Gorman,**

**Director of Social Responsibility and Sustainability, University of Edinburgh**

## Contact details

Name: [Richard Jackson](#)

Role: [Director of Sustainability](#)

University Name: [UCL](#)

Contact details: E: [richard.jackson@ucl.ac.uk](mailto:richard.jackson@ucl.ac.uk), T: 020 3108 8602, M: 07980 874552

## H. Governance & Reporting

27. Who has overall responsibility for carbon reduction in your organisation?

[UCL Council has overall sign-off on the strategy.](#)

28. Who is responsible for the day to day management of carbon?

[UCL's Environmental Sustainability Team \(Richard Jackson, Director of Sustainability, heads up this team\)](#)

29. What is your process for reporting carbon performance internally?

[Reporting to the Council on the Environmental and Sustainability Strategy every two years.](#)

30. What is your process for reporting carbon performance externally?

[UCL's external annual financial report \(includes section on carbon emissions\)](#)

[UCL's Environmental Sustainability annual report with sign-off from an internal steering group and senior management.](#)

31. Is the University bound by carbon reduction commitments?

[Standard UK legislation requirements: including CRC, EUETS, have DECs.](#)

## I. Targets

32. Does your University have any carbon targets? Please provide details e.g. scope of targets, baseline etc.?

[Redacted]

33. If you have answered yes to Q6. Please describe target setting processes and any decision tools used?

[Redacted]

34. Does your University have a carbon management plan?

[See above, new CMP in progress.](#)

The information above has been redacted at the request of Richard Jackson of UCL until the consultation process has been completed.

## J. Carbon reduction initiatives

35. Please provide details of any carbon reductions projects/initiatives in the table below. Suggested areas include but are not limited to:

- behavioural change initiatives and communications;

- energy efficiency;
- approaches to energy provision and use;
- micro renewable usage and incentivisation;
- travel and waste;
- laboratory design and management;
- building design including laboratories and research areas;
- capital programmes;
- green IT;
- space management; and
- Use of off-site renewable energy production.

Note – projects have been taking place/are planned in all of these areas. The only area not of focus for UCL is larger scale renewables projects. There tends to be limited scope for such projects due to location in central London.

We discussed the main funding streams and how projects are selected, although not specific projects.

There are some case studies on the UCL website: [https://www.ucl.ac.uk/greenucl/case\\_studies](https://www.ucl.ac.uk/greenucl/case_studies)

There is a plan to use a Carbon Culture IT platform to generate internal competition to make carbon savings between departments, initially starting with publishing their energy data on the platform.

A business case must be prepared for all projects to get funding. There are three types of funding available:

1. Capital programme (~£1.2Bn). This is funding agreed by the Council and focused on a range of projects across the university to improve the space and student research facilities. Sustainability Team role to make sure design teams consider, track and achieve carbon savings in these projects. Key learning point: be clear on the target; they now consider total carbon savings, rather than just regulated carbon.
2. Maintenance funding (£20m annual fund for planned works). Again not specifically targeted to sustainability but involves upgrading of plant equipment and improving efficiency. The team identifies activities which are key to achieving savings.
3. Sustainability funding (~£200k per year, increasing in future to ~£1.2m per year). Team identifies energy/carbon saving opportunities external to the other funding programmes and have developed a project pipeline of both quick win projects and longer-term payback. Team are conducting audits building by building, focusing on the most energy intensive first. Interventions are identified from the audits. Generally looking at 3-5 year payback period.

Project Description (include how project identified and implemented)	Project Status: Planned / Completed / In Progress?	Expected and Actual (if implemented) savings (£, (kWh) and carbon saving)	Anticipated project lifetime and timescales for key stages (development / build)?	Is the project considered a success? Any learning points? Any non-carbon / cost benefits?	Process for project approval (steps / information provided / criteria used)	How was the project funded? (development stage and capex)	If external funding – what was the source, type and terms?	Did / does the project receive any grant or incentive payments or other support?	Who is the owner of the asset and has / will this change over lifetime of project?
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*Please insert further rows as required.*

If you have any published materials that would help illustrate this information, please provide details or send through files if you are able.

## K. Project Funding

36. Please provide further details of project funding? Do you have any green revolving or sustainable project funds? Have you accessed any external funding?

[See previous section](#)

37. What financial assessments and rules do you apply to project funding for carbon reduction projects?

[See previous section](#)

38. What guidance do you use to assess the economic viability of LZC (low zero carbon) technology solutions?

[See previous section](#)

39. How are business cases for low carbon infrastructure projects assessed within the University and are there any special governance arrangements that are employed e.g. university ESCO's?

[See previous section](#)

Thank you for taking the time to participate in this survey. This is a really important step in understanding best practice on carbon reduction in Universities. Once we have received responses for everyone they will be collated and your feedback will help to shape best practice carbon reduction guidance.

Security of data and information is central to AECOM's Project Quality Management System. Information and data provided will only be used for the purposes of this project. Please make clear if you do not wish any of the information / data provided to be published. Please direct us, in the questionnaire and /or the interview, to any existing published data/information.



## University of Warwick

# Carbon Reduction in the University Sector

### Best Practice Questionnaire

AECOM has been appointed by the University of Edinburgh and the Scottish Funding Council to undertake a review of Best Practice in carbon reduction in the University Sector. As a first step we are approaching a number of Universities both within the UK and internationally to identify successfully implemented carbon reduction initiatives as well as any initiatives that are in the planning. We are also interested in how the business case was made and why it succeeded as this will inform recommendations on presentation of future business cases.

To facilitate this process we would like 30 minutes of your time for a short telephone discussion to run through the questionnaire below. Alex Greenwood will be in contact in the next 48 hours to arrange a convenient time during the next 3 weeks to have this discussion.

If a telephone call is not convenient then we would be grateful if you could complete the form and return it by email to [Alex.greenwood@aecom.com](mailto:Alex.greenwood@aecom.com) before the 4<sup>th</sup> August 2015.

Your answers will be used to help develop best practice materials for use by the University of Edinburgh and the wider University sector. We will issue a summary report of our findings to participating Universities.

If you have any questions please contact Alex Greenwood on the email address above or on +44 (0)207 798 5058.

We thank you in advance for your time.

**Dave Gorman,**

**Director of Social Responsibility and Sustainability, University of Edinburgh**

## Contact details

Name:

Role:

University Name:

Contact details:

## L. Governance & Reporting

40. Who has overall responsibility for carbon reduction in your organisation?

The head of sustainability is responsible for the CMIP (Carbon Management and Implementation Plan. It is managed by estates for the university. At Governance Level – the Pro Vice Chancellor has the sustainability Responsibility

41. Who is responsible for the day to day management of carbon?

The operational Carbon Manager. He has 4 direct reports, another 2 who work in Utilities, and BEN systems. There is also a network of 50 people or champions who are in closer contact with the students. The 4 direct reports: 2 are sustainability engineers and 2 are sustainability champions. The engineers work on data analysis and carbon reduction programmes, the champions are involved with engagement across the university. Raising awareness with Staff and Students. There are 23500 full time equivalent students on site and 5000 staff. There are a number of science lands but not able to quantify at this time. They are not at a point to be able to appoint a person who's focus is on efficiency within Labs but are thinking on how to develop user groups to think about plans for specific areas.

42. What is your process for reporting carbon performance internally?

Annual report on the website – around March to June. At the governance level the pro vice chancellor is the chair of the carbon challenge group. They are the supervisory group for the carbon projects. This group is reported to who then take it to the ultimate committee.

43. What is your process for reporting carbon performance externally?

There is no requirement for external reporting beyond the university statistics. They are not part of any CSR group.

44. Is the University bound by carbon reduction commitments?

The University is obligated by ESOS.

## M. Targets

45. Does your University have any carbon targets? Please provide details e.g. scope of targets, baseline etc.?

The University has set a target in line with the UK government target of 60%. They are unlikely to meet the target because the university has grown by 17% and will grow by another 40%. A review is being organised to reconsider the scope of the targets and the possible achievements. Relative or Absolute metrics will be taken into consideration. Report on scope 1 and 2?. Consideration of carbon emission per staff or FTW and emission per turnover or per square meter. BT currently calculate it of Carbon Emission per unit of added value but added value is difficult to quantify in a university. They are using the 2005 baseline.

Yes they should report to HASKEY? But unsure if there should be a target. HASKEY is struggling to decide if there should be a target esp as they want more international students.

46. If you have answered yes to Q6. Please describe target setting processes and any decision tools used?

47. Does your University have a carbon management plan?

## N. Carbon reduction initiatives

48. Please provide details of any carbon reductions projects/initiatives in the table below. Suggested areas include but are not limited to:

- behavioural change initiatives and communications;
- energy efficiency;
- approaches to energy provision and use;
- micro renewable usage and incentivisation;
- travel and waste;
- laboratory design and management;
- building design including laboratories and research areas;
- capital programmes;
- green IT;
- space management; and
- Use of off-site renewable energy production.

The first priority is energy efficiency and conservation,. Then district heating extension with a goal of conversion to low carbon energy and .....

The most successful project so far: Large district power 4.6MW heat generated on site. Commissioned a new energy centre at the end of last year to increase generation to 8.6mw self-generate estimated 70% of needs and cope with campus extension. £10million.

They have also spent more than 200K on LED lighting etc.

<b>Project Description (include how project identified and implemented)</b>	<b>Project Status: Planned / Completed / In Progress?</b>	<b>Expected and Actual (if implemented) savings (£, (kWh) and carbon saving)</b>	<b>Anticipated project lifetime and timescales for key stages (development / build)?</b>	<b>Is the project considered a success? Any learning points? Any non-carbon / cost benefits?</b>	<b>Process for project approval (steps / information provided / criteria used)</b>	<b>How was the project funded? (development stage and capex)</b>	<b>If external funding – what was the source, type and terms?</b>	<b>Did / does the project receive any grant or incentive payments or other support?</b>	<b>Who is the owner of the asset and has / will this change over lifetime of project?</b>
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*Please insert further rows as required.*

If you have any published materials that would help illustrate this information, please provide details or send through files if you are able.

## O. Project Funding

49. Please provide further details of project funding? Do you have any green revolving or sustainable project funds? Have you accessed any external funding?

The main source of funding is FALIX which provides £650K of funding.

50. What financial assessments and rules do you apply to project funding for carbon reduction projects?

The funding criteria is a reference for funding. They use these criteria to request for further funding. They stopped using re-building funds because they were adding complexity.

51. What guidance do you use to assess the economic viability of LZC (low zero carbon) technology solutions?

52. How are business cases for low carbon infrastructure projects assessed within the University and are there any special governance arrangements that are employed e.g. university ESCO's?

### Future Projects:

- 1) What other renewable technology can be considered? Driver is efficiency first. Renewables have reluctantly been looked at. Limited schemes 90kw of panels and a little solar thermal. They came through planning consent obligations. Renewables etc are not in the plan. This will be considered through the next review of the plan because of the expansion of the campus.
- 2) The renewables are going to be considered could possibly have 1-2MW of PV on the roofs. No other possible options for renewables. Always have to drive to the campus.

### Advice:

Behaviour is different and special for everyone. Universities could do more in terms of buying power and applying good practice in terms of technology. Could be a benefit in sharing procurements to procure systems. E.g. trying to push a project for changing lights to LEDs the cost of the products is an issue. If they want to buy more than maybe the price will be different.

Thank you for taking the time to participate in this survey. This is a really important step in understanding best practice on carbon reduction in Universities. Once we have received responses for everyone they will be collated and your feedback will help to shape best practice carbon reduction guidance.

Security of data and information is central to AECOM's Project Quality Management System. Information and data provided will only be used for the purposes of this project. Please make clear if you do not wish any of the information / data provided to be published. Please direct us, in the questionnaire and /or the interview, to any existing published data/information

# Appendix C

Project Type	Short Description	University	Project Description (include how project identified and implemented)	Project Status: Planned / Completed / In Progress?	Expected and Actual (if implemented) savings (£, (kWh) and carbon saving)	Anticipated project lifetime and timescales for key stages (development / build)?	Is the project considered a success? Any learning points? Any non-carbon / cost benefits?	Process for project approval (steps / information provided / criteria used)	How was the project funded? (development stage and capex)	If external funding – what was the source, type and terms?	Did / does the project receive any grant or incentive payments or other support?	who is the owner of the asset and has / will this change over lifetime of project?
Energy	Anaerobic Digestion	Oxford	Large scale renewables on the estate. AD plants etc.						Renewables will be different capital budget.			
Energy	BMS	KCL	BMS									
Energy	BMS	Oxford	BMS – paper in the next month about that (LinkedIn for Lucinda)	6 buildings per year to be done by 2019 (3 done so far)					Criteria is the £/tonne: £420/tonne carbon. £670/tonne is threshold.	From the Council fund.		
Energy	BMS	Strathclyde	JA - Building Zone Control	Complete	92		Modest impact; significant commissioning issues developed.	estates approval	SALIX			University
Energy	BMS	Greenwich	heating sustem modifications	Planned	32,000£, 184t							
Energy	BMS	Uni of British Columbia (UBC)	In-house optimization (ongoing optimization of building systems through better controls & programming)	Ongoing	2014 actual of 30,000 GJ reduced, 1500 tCO2 avoided. Upon completion, expected 10% of core building energy reduction.	Continually monitor building performance to maintain life of savings indefinitely.	Yes, better control of buildings, improvement to occupant comfort.	Hiring of staff for in-house work was justified internally with some incentive funding.	Internally and with gas utility funded position.	Incentives from gas utility.		Owner is Energy & Water Services Department
Energy	CHP plants	Bristol	3X CHP plants (2x2MW + 1x1MW)									
Energy	CHP plants	Oxford	CHP – 2 this year. 1 last year. A few new boilers – good savings.									
Energy	CHP plants	Oxford	CHP – Council district heating – causing problems!									
Energy	CHP plants	QUB	CHP	2.5M	5year payback		excess heat used by city council for the botanical gardens					

Energy	CHP plants	Strathclyde	CHP District Energy Project	design stage	anticipate 6000 TCO2e	detailed deisng complete Q1 2016; target completion Jan 2018	Very significant step change; transformational, both technically and culturally.	court approval	£8M capital frant from Scottish Funding with balanace funding from Uni.	£8M capital frant from Scottish Funding with balanace funding from Uni.	£8M capital frant from Scottish Funding with balanace funding from Uni.	University
Energy	CHP plants	Harvard	Renewables CHP	Completed	production. 14.8M kwh/yr							
Energy	CHP plants	St Andrews	renewable energies - CHP plant	Planned	£20M+ carbon emissions reduction by 12,000T/yr							
Energy	Compressor upgrades or replacement	Strathclyde	Thomas Graham compressor replacement	Complete	17		Good impact; small in scale.	estates approval	SALIX			University
Energy	Cooling	Nanyang	More efficient plan for cooling, Better AC technology									
Energy	Cooling	Strathclyde	JA Chiller replacement	Complete	n/a			estates approval	Planned Maintenance			University
Energy	Cooling	Cambridge	rationalisation/improvement of library chillers (7 to 3 chillers)	Ongoing	ask for details.	2015 expected completion.	can be applied to other controlled env	ECRP project funding for chillers	SALIX funding in part for chillers as had to be used by certain date, ECRP funding for remainder	no external funding	no	UoC is owner
Energy	Cooling	Uni of British Columbia (UBC)	Heat Recovery Chiller	In progress	Expected savings of 10,000GJ/yr through heat recovery	15 year asset life, project length is 1-2 years			Internally and with gas utility incentives.		Incentives from gas utility.	Owner is Energy & Water Services Department
Energy	Draught Proofing	Strathclyde	181 SJR draught proofing	Complete	8		Small impact; good user engagement.	estates approval	SALIX			University
Energy	Draught Proofing	Strathclyde	Currnan draught proofing	Complete	39		Small impact; good user engagement.	estates approval	SALIX			University
Energy	Draught Proofing	Strathclyde	Henry Dryer draught proofing	Complete	2		Small impact; good user engagement.	estates approval	SALIX			University
Energy	Draught Proofing	Strathclyde	McCance Draught Proofing	Complete	24		Small impact; good user engagement.	estates approval	SALIX			University
Energy	Draught Proofing	Strathclyde	St Pauls draught proofing	Complete	9		Small impact; good user engagement.	estates approval	SALIX			University

Energy	Draught Proofing	Strathclyde	Students Union Draught proofing	Complete	5		Small impact; good user engagement.	estates approval	SALIX		University		
Energy	Energy	Warwick	District Power on site	Completed		4.6MW							
Energy	Energy	Warwick	Energy Centre			8.6MW - 70% of needs							
Energy	Energy	Uni of British Columbia (UBC)	steam to hot water district energy conversion	In progress		2014 Actual is 27,500 GJ of gas conserved. Upon project completion, 250,000GJ reduced, 12,500tCO2 saving	Implementation of project 6 years. 30 year lifetime of asset	Yes. Maintenance and personnel savings, renewal of old district system, upgrade of old power plant cost avoidance	Several Board of Governors presentations at varying design stages. Several public engagement sessions.	Internally funded by internal loan paid back by cost savings.	Owner is Energy & Water Services Department		
Energy	Energy conservation	Bristol	Smaller energy conservation measures			£3m. ongoing							
Energy	Energy Efficiency	California Irvine	Energy Efficiency Projects	Completed		2,975,000 kWh (2,400 MT CO2E annual reduction)	ongoing	Yes	University Regents approval/ payback analysis/meets campus savings to debt ratio	California Statewide Energy Partnership (SEP) between universities and Investor Owned Utilities	Bonds paid by utility savings over 15 years	yes, completed projects have received over \$11M in incentives	Regents of the Uni of Cali will own for lifew
Energy	Energy Efficiency	Manchester	Energy Efficiency - efficient equipment, windows, energy audits etc										
Energy	Energy Efficiency	QUB	IT energy efficeincy										
Energy	Energy Efficiency	Stanford	Stanford Energy System Innovations (SESI- whole new campus energy system)	Complete		\$420 million savings from 2015 – 2050; 150,000 m-tons/year GHG reduction (68%); 70% reduction in total energy (gas and electricity) used	Planning 2009 – 2011; design and construction 2012 – 2014; Operation 2015 -2050; capital cost \$483 million	Yes- huge success- full transformation of Stanford energy system with major cost, GHG, and water savings- a system for the 21 <sup>st</sup> century that fits the 4 <sup>th</sup> Generation evolution of district energy as described by the 2015 UNEP report on District Energy	Detailed energy & economic modelling performed in-house with consultant support and peer reviewed by both external consultants and internal staff, faculty and leadership over a 2 ½ year process	Capital debt to be repaid by campus energy operations budget	Capital debt secured as part of overall debt pool for Stanford; terms are confidential	No external funding received for project, though subsequent large off-campus long term solar PV electricity supply project benefited from US federal Investment Tax Credit and	





					(9000tCO2 saving)			paid back by cost savings.		
Energy	Heating	Uni of British Columbia (UBC)	Aquatic Centre Heat Recovery (heat recovery of condensate to warm pools)	Complete	2013 actual savings of 8000 GJ of gas. Project coming to a close as system is transitioned to hot water district energy.	4 year project life	Yes, provides secondary heating supply for pools in case of steam system failure.	Internally and with gas utility incentives.	Incentives from gas utility.	Owner is Energy & Water Services Department
Energy	Insulation	KCL	Lagging and Insulation							
Energy	Insulation	Strathclyde	Mech services insulation - st james rd	Complete	22		Good impact; difficult to monitor.	Estates Approval.	SALIX	University
Energy	Insulation	Strathclyde	mech services insulation graham hills	Complete	136		Good impact; difficult to monitor.	Estates Approval.	SALIX	Carbon Trust Funding to create savings tool. University
Energy	Insulation	Strathclyde	mech services insulation - john anderson	Complete	69		Good impact; difficult to monitor.	Estates Approval.	SALIX	Carbon Trust Funding to create savings tool. University
Energy	Insulation	Strathclyde	mech services insulation - JA/R	Complete	36		Good impact; difficult to monitor.	Estates Approval.	SALIX	Carbon Trust Funding to create savings tool. University
Energy	Insulation	Strathclyde	mech services insulation - McCance	Complete	37		Good impact; difficult to monitor.	Estates Approval.	SALIX	Carbon Trust Funding to create savings tool. University
Energy	Insulation	Strathclyde	mech services insulation - stepps pavilion	Complete	5		Good impact; difficult to monitor.	Estates Approval.	SALIX	Carbon Trust Funding to create savings tool. University
Energy	Insulation	Strathclyde	mech services insulation - lord todd	Complete	11		Good impact; difficult to monitor.	Estates Approval.	SALIX	Carbon Trust Funding to create savings tool. University

Energy	Insulation	Strathclyde	mech services insulation - sports/rec	Complete	17	Good impact; difficult to monitor.	Estates Approval.	SALIX	Carbon Trust Funding to create savings tool.	University		
Energy	Insulation	Strathclyde	mech services insulation - architecture	Complete	40	Good impact; difficult to monitor.	Estates Approval.	SALIX	Carbon Trust Funding to create savings tool.	University		
Energy	Insulation	Strathclyde	mech services insulation - curran	Complete	151	Good impact; difficult to monitor.	Estates Approval.	SALIX	Carbon Trust Funding to create savings tool.	University		
Energy	Lighting	Bristol	Lighting	£2m. Ongoing.								
Energy	Lighting	KCL	Lighting									
Energy	Lighting	Nanyang	LED Lights									
Energy	Lighting	Oxford	Lighting – easy but not best payback. LED.	£/tonne is criteria.								
Energy	Lighting	QUB	Energy Efficient lighting									
Energy	Lighting	Warwick	LED Lighting									
Energy	Lighting	Copenhagen	energy management of faculties (ie.lighting control)	Ongoing								
Energy	Lighting	Copenhagen	Lighting	Completed	155,200kWh saved annually, 62.7 tCO2e saved annually							
Energy	Lighting	Strathclyde	John Anderson Lighting control corridors	Complete	70	Yes – very effective.	estates approval	Energy management	University			
Energy	Lighting	Strathclyde	Light fitting and control upgrade	Committed	308	Excellent	Estates Approval.	SALIX	University			
Energy	Lighting	Strathclyde	light fitting upgrade - assembly hall	Complete	8	Excellent	Estates Approval.	SALIX	University			
Energy	Lighting	Strathclyde	Light fitting and control upgrade	Planned	51	Estates Approval.		University				
Energy	Lighting	Strathclyde	Light fitting and control upgrade	Planned	163	Estates Approval.		University				
Energy	Smart Labs	California Irvine	Smart Labs Initiative	13 Labs Completed/Ongoing	60% reduction in lab energy use , 7,347,822 kWh annual savings	ongoing	Yes	University Regents approval/ payback analysis/meets campus savings to debt ratio	California Statewide Energy Partnership (SEP) between universities and Investor Owned Utilities	Bonds paid by utility savings over 15 years	yes, incentive payments	Regents of the Uni of Cali will own for lifew



Non-Energy	Behavioural Change	Manchester	Behavioural Change						
Non-Energy	Behavioural Change	Copenhagen	green action behavioural campaign	completed					
Non-Energy	Behavioural Change	Harvard	Harvard Climate Preparedness Working Group	In progress					
Non-Energy	Behavioural Change	St Andrews	Behaviour change - edu on energy savings	Ongoing					
Non-Energy	Behavioural Change	St Andrews	Behaviour change - environmental facilitators	Complete					
Non-Energy	Energy Procurement	Berkeley	Power Purchase Agreements (PPA) with Frontier Renewables	Completed	Suply 206,000mWh/yr of solar energy				UoC owned
Non-Energy	Green Funding	UCL	Sustainability Funding	200K per year increasing to 1.2M a year	3-5 year payback				
Non-Energy	Green Procurement	Copenhagen	Green Procurement Contract	Planned	reduce energy consumption by 5-10K Mwh over next 15 years (up to 4,000 tCO2e)				
Non-Energy	Green Procurement	Harvard	GreenIT	In progress					
Non-Energy	Green Procurement	Harvard	Harvard Strategic Procurement	In progress					
Non-Energy	Green Procurement	St Andrews	procurement of conflict-free electronics and IT equipment	in					
Non-Energy	Organic Landscaping	Harvard	Organic Landscaping	In progress	2M gallons of water in first year				
Non-Energy	Other	Manchester	plan -		14% saving				
Non-Energy	Other	UCL	Maintenance	20m annual fund					
Non-Energy	Other	Strathclyde	fume cupboard extract upgrade controls - L6	Complete	215	Monitoring pending; some issues in low diversity rooms with limited extract capacity. Had to increase some extract fan motor sizes. Significant user behaviour change.	Estates Approval.	SALIX	University

Non-Energy	Other	Strathclyde	fume cupboard extract upgrade controls - L4	Planned	215			Estates Approval.	SALIX			University
Non-Energy	Other	Cambridge	fume cupboard extraction system based on wind conditon	design stage	920 kWh electricity, simple paybacak 5 years	now 1 yr into project; at planning stage. Changes on site are minor.	No learning points yet Project in process Could potentially apply concept to other labs with fume cupboards	ECRP fully-funded project, no external funding	ECRP fully-funded project, no external funding	N/A	No	UoC owned
Non-Energy	Space Optimisation	UCL	Capital Fund to improve space and student research facilities	1.28Bn								
Non-Energy	Space Optimisation	Strathclyde	Provision of zone control - Graham Hills Bldg	Complete	100			estates approval	SALIX			University
Non-Energy	Space Optimisation	Strathclyde	Operation of main lecture theater	Complete	91		Good impact; small in scale.	estates approval	SALIX			University
Non-Energy	Space Optimisation	Uni of British Columbia (UBC)	Continuous Optimization Project	In progress. Completion of 20+ buildings.	2014 actual of 28,000 GJ reduced, 1400tCO2 avoided. Upon completion, expected 10% of core building energy reduction.	Project staged over four stages with groups of buildings in each. Continually monitor building performance to maintain life of savings indefinitely.	Yes, better control of buildings, improvement to occupant comfort.		Internally through capital renewal fund	Incentives from electrical utility.		Owner is Energy & Water Services Department
Non-Energy	Travel plans	Manchester	Travel and waste plan									
Non-Energy	Travel plans	QUB	NUS Green impact scheme with 73 teams driving change									
Non-Energy	Waste Plans	Manchester	Lean Lab Group									
Renewable Energy	Biogas	Berkeley	Biogas	Completed	5.6Mw installed							UoC is owner
Renewable Energy	Geothermal	St Andrews	renewable energies - ground sourced heat pump	completed	4tCO2e/yr							
Renewable Energy	Microrenewables	Manchester	some micro renewable usage									
Renewable Energy	Microrenewables	QUB	Micro-renewables									
Renewable Energy	Solar PV	California Irvine	Parking Structure Solar Canopies	Completed	2,211,000 kWh annual savings (1,500 MT CO2E)	25 years?	Yes					third party owns, uni agrees to purchase

Renewable Energy	Solar PV	California Irvine	Landfill Solar Array (5MW)	Planned	3,500 MTCO2e annual reduction	25 years?	kWh produced.
Renewable Energy	Solar PV	California Irvine	Rooftop Solar System (895kW)	Completed	457 MTCO2e annual reduction	yes	third party owns, uni agrees to purchase kWh produced.
Renewable Energy	Solar PV	Nanyang	Sola PV		1.5MW by end of 2015		
Renewable Energy	Solar PV	Berkeley	Solar PV	Completed	11Mw installed		
Renewable Energy	Solar PV	Berkeley	Solar PV	Planned	23MW		UoC is now owner of bldg
Renewable Energy	Solar PV	Harvard	Renewables Solar Pv	Completed	1140mwh/yr panels generate		
Renewable Energy	Solar PV	St Andrews	renewable energies - solar thermal	Completed	45,000kwh of heat, saving 10tCO2e/yr		
Renewable Energy	Wind Turbines	Harvard	Renewables - Roof mounted wind	Completed	20,000kwh/yr		
Renewable Energy	Wind Turbines	St Andrews	renewable energies - wind farm	in	6 x2 MW turbines savings 19,000 tCO2e/yr		

# *Appendix D*



# Appendix D Case Studies of Best Practice

This section highlights some of the best practice approaches and projects identified during our research, where sufficient information was available.

## Stanford University



### Carbon management approach

Stanford is not bound to any legislative carbon reduction commitments nor does it commit to any self-proclaimed targets.

The University has an Energy and Climate Plan (date?) which was peer-reviewed by two independent consultancies. The Plan incorporates both engineering and financial models and aims to reduce campus GHG emissions by 68 percent relative to 2017 business as usual.

The University is committed to carbon reduction and aims to:

- optimize demand side management of energy for new buildings;
- improve demand-side management and efficiency programs for existing buildings; and
- incorporate supply-side solutions.

Responsibility for implementing the carbon management plan lies with the Department of Sustainability and Energy Management (SEM) under the leadership of the Executive Director.

### Project:

Whole Building Energy Retrofits (WBERP) & Minor Capital Energy Retrofits (ERP)

### Project description:

The project started in 2007 and is scheduled for completion by 2017. Stanford has established total energy use by campus buildings and will address the largest consumers first. A series of engineering studies were conducted to identify potentially feasible energy conservation measures for each building.

### Capital costs

\$30,000,000

### Annual cost savings

\$5,000,000

### CO<sub>2</sub> savings

15,000 t/a

### Payback period

>7 years

**Miscellaneous:** Funded through capital debts to be repaid through building energy budgets

**Sources:** Project questionnaire

# Queen's University Belfast



## Carbon management approach

Queen's University Belfast set a target for a 21% reduction in carbon emissions by 2020 against a 2008 base year.

In order to reach this target it has established a carbon reduction strategy focusing on: procurement, green ICT, energy efficiency, waste minimisation, travel and transport, change management and alternative energy sources (Renewables & CHP).

The University has set aside approximately £10 million, up to 2020 for investment in carbon management initiatives to ensure that it meets its target and has estimated monetary savings will rise progressively over the period to be approximately £2.4m per annum by 2020. These savings will be fully reinvested into the University's Green Revolving Fund and used to fund technical and change management projects, thereby ensuring that the Carbon Management Plan (CMP) remains CAPEX neutral following the initial investment.

The CMP is endorsed at the most senior level by Senate and has strong support from the Registrar and Chief Operating Officer. The responsibility for implementation of the Carbon Management Plan lies with the Registrar and Chief Operating Officer and the Director of Estates.

## Project:

CHP Installation at Queen's University Belfast Physical Education Centre

## Project description:

The University will utilise alternative sources of energy to offset the anticipated growth of the estate and intensification of use. Two CHP units are planned to be installed at the Main and the DKB Ashby sites and are anticipated to reduce the university's carbon footprint considerably.

## Capital costs

£2,661,000

## Annual cost savings

£570,000

## Carbon dioxide savings

2,292 t/a

## Payback period

N/A

## Sources:

<https://www.qub.ac.uk/sites/CarbonManagementatQueens/HeaderContent/Filestore/Fileupload,394399,en.pdf>

## University of Bristol:



### **Carbon management approach**

The University of Bristol has set a target to reduce its carbon emissions by 22.5% by 2020/21, using 2005/06 levels as a baseline.

The University has identified key priorities for action to ensure targets are met; these include the management of energy demand, the efficient supply of energy, the design for low carbon buildings and the maximisation of opportunities for renewables.

Overall strategic leadership for sustainability is guided by the Vice-Chancellor and Deputy Vice-Chancellor. Project delivery is the responsibility of the Chair of the Sustainability Board and the Lead Energy Engineer. Both are supported by the Carbon Management Group, Project Delivery Group and the Behavior Change Group.

Funding for the projects comes from the Salix Recycling Fund and The University of Bristol's Carbon Management Project Fund.

### **Project**

Voltage Optimisation

### **Project description:**

The voltages measured at the university's electrical outlets are higher than those for which modern equipment is designed to run at. The University has embarked on a programme of voltage optimisation at its major sites which will reduce the power drawn by equipment, without affecting performance and potentially increasing the life of the equipment.

**Capital costs**  
£1,500,000

**Annual cost savings**  
£560,000

**Carbon dioxide savings**  
2,500 t/a

**Payback period**  
3 years

**Sources:** University of Bristol - Carbon Management Plan 2013–2020

# The University of Manchester



The University of Manchester

Carbon management approach

The University of Manchester has set a target to reduce its carbon dioxide emissions by 40% by 2020 using a 2007/08 baseline.

The University's carbon management plan was created by a University Project Team in close collaboration with the Carbon Trust as part of its Higher Education Carbon Management Programme. The Team is led by the Environmental and Sustainability Officer with guidance from the Associate Vice-President for Compliance, Risk and Sustainability. The Plan is supported by the President and Vice-Chancellor.

The University's policies, targets and actions are driven by the UK Government's and the Higher Education Funding Council for England (HEFCE) carbon reduction target, as well as reputational risks. In order to meet the targets, the University has defined strategic actions that comprise sustainable energy / energy efficiency, sustainable waste management, sustainable procurement and sustainable travel practices which are regularly monitored to assess performance.

Overall responsibility for day-to-day management lies with the University's Carbon Management Team.

**Project:**

Window replacement

**Project description:**

Energy consumption of buildings is the largest contributor to the University's carbon footprint accounting for more than 95% of total reported carbon emissions. The University has established long term maintenance projects to refurbish its buildings in order to reduce the requirement for energy for heating purposes. The replacement of windows started in 2010/11 and is ongoing.

**Capital costs**

£1,524,000

**Annual cost savings**

£213,000

**Carbon dioxide savings**

925 t/a

**Payback period**

7.5 years

**Sources:** [http://mbs-isis-cohortb-students.wikispaces.com/file/view/Carbon\\_Management\\_Plan.pdf?bcsi\\_scan\\_ab11caa0e2721250=0&bcsi\\_scan\\_filename=Carbon\\_Management\\_Plan.pdf](http://mbs-isis-cohortb-students.wikispaces.com/file/view/Carbon_Management_Plan.pdf?bcsi_scan_ab11caa0e2721250=0&bcsi_scan_filename=Carbon_Management_Plan.pdf)





## Carbon management approach

The University of Oxford has set targets to reduce its carbon emissions by 11% by 2015/16, and 33% by 2020/2021, using a 2005/6 baseline; It has allocated a budget of £14.6 million to fund carbon reduction projects throughout the estate. The identified projects are expected to save approximately 12,262 tCO<sub>2</sub> and £2,856,433 per year.

The University's governance structure consists of a Building and Estates Subcommittee, a Sustainability Steering Group, Energy and a Carbon Reduction Manager. Carbon reduction targets are largely driven by legal requirements such as The Higher Education Funding Council for England (HEFCE) and other external influencing factors such as rising energy costs / energy security (fossil fuels) and reputational risks.

The University's carbon management strategy seeks to deliver cost-effective and sustainable solutions to cut carbon emissions. To do so, the University has set out strategic enabling actions that include financing, procurement, communication, leadership for behaviour change, student engagement etc.

The ultimate responsibility for ensuring the delivery of the objectives and adhering to the strategy lies with the Pro-Vice Chancellor for Planning and Resources. The responsibility for day-to-day implementation of the plan lies with the University's sustainability team.

**Project:** HV/LV Transformer Replacement programme

Capital costs	Annual cost savings	Carbon dioxide savings	Payback period
Not available	£210,446	1,104 t/a	2.85 years

## Sources:

<http://www.admin.ox.ac.uk/media/global/wwwadminoxacuk/localsites/estatesservices/documents/environment/20140827- Carbon Management Plan.pdf>

[https://sustain.ubc.ca/sites/sustain.ubc.ca/files/uploads/CampusSustainability/CS\\_PDFs/CaseStudies/UBCClimateActionPlan\\_CaseStudy.pdf](https://sustain.ubc.ca/sites/sustain.ubc.ca/files/uploads/CampusSustainability/CS_PDFs/CaseStudies/UBCClimateActionPlan_CaseStudy.pdf)

# **CASE STUDY/** PLANNING FOR CLIMATE ACTION

UBC Campus Sustainability Office



a place of mind

THE UNIVERSITY OF BRITISH COLUMBIA

2009/2010

# CASE STUDY/ PLANNING FOR CLIMATE ACTION

**Content By:** UBC Campus Sustainability Office

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# Abstract/

CLIMATE ACTION / Abstract  
/ Introduction  
/ Context  
/ Story  
/ Replicability  
/ Impact  
/ Summary

UBC COMMITTED TO DEVELOPING A CLIMATE ACTION PLAN FOLLOWING A DECADE OF LEADERSHIP IN REDUCING ITS OPERATIONAL GREENHOUSE GAS EMISSIONS.

BY PUTTING IN PLACE A ROBUST SYSTEM OF GOVERNANCE, MEASUREMENT AND ENGAGEMENT MECHANISMS UBC WAS ABLE TO DEVELOP A COMPREHENSIVE AND VISIONARY PLAN TO REDUCE ITS DIRECT AND INDIRECT CARBON EMISSIONS.

UBC'S APPROACH TO CAMPUS AND COMMUNITY ENGAGEMENT LEVERAGED OPERATIONAL INSIGHT, ACADEMIC EXPERTISE AND GRASSROOTS PASSION FOSTERING INSTITUTIONAL COMMITMENT AND BROAD SUPPORT.

# Introduction/

CLIMATE ACTION / Abstract  
/ Introduction  
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/ Summary

ON MARCH 24, 2010, UBC BECAME THE FIRST CANADIAN UNIVERSITY TO ANNOUNCE BOLD GREENHOUSE GAS REDUCTION TARGETS PUTTING IT ON COURSE TO BE “NET ZERO EMISSIONS” BY 2050; THE TARGETS FRAMED UBC’S CLIMATE ACTION PLAN.

UBC adopted a Climate Action Plan (CAP) in 2010 to advance its Vancouver Campus towards a low-carbon future, committing the university to aggressive greenhouse gas (GHG) reduction targets of:

- 33% below 2007 levels by 2015;
- 67% below 2007 levels by 2020; and
- 100% below 2007 levels by 2050.

The Plan sets out actions for the six areas that are the key sources of UBC’s greenhouse gas emissions:

- 1) Campus Development and Infrastructure
- 2) Energy Supply and Management
- 3) Fleets and Fuel Use
- 4) Travel and Procurement
- 5) Food
- 6) Transportation.

It was realized through a comprehensive engagement model that mobilized the UBC community on climate action.

## THE UBC PRESIDENT'S COMMITMENT TO VISIONARY CLIMATE ACTION ENGAGES THE UBC COMMUNITY.

UBC's climate change story begins in the late 1990s, when it identified climate change as a priority concern requiring innovative solutions. Beginning in 1997, the university pioneered in launching energy efficiency initiatives to curb emissions and save costs. One such program, ECOTrek, was initiated in 2001 and was the largest energy (and water) retrofit on a Canadian campus at the time. As a result of ECOTrek, by 2007 UBC had reduced greenhouse gas emissions in its 277 core buildings by 6%, compared to 1990 levels, despite a floor space increase of 35%.

That year the university stepped up its climate action efforts through the establishment of a Technical Advisory Committee to begin to monitor and report on UBC GHG emissions.

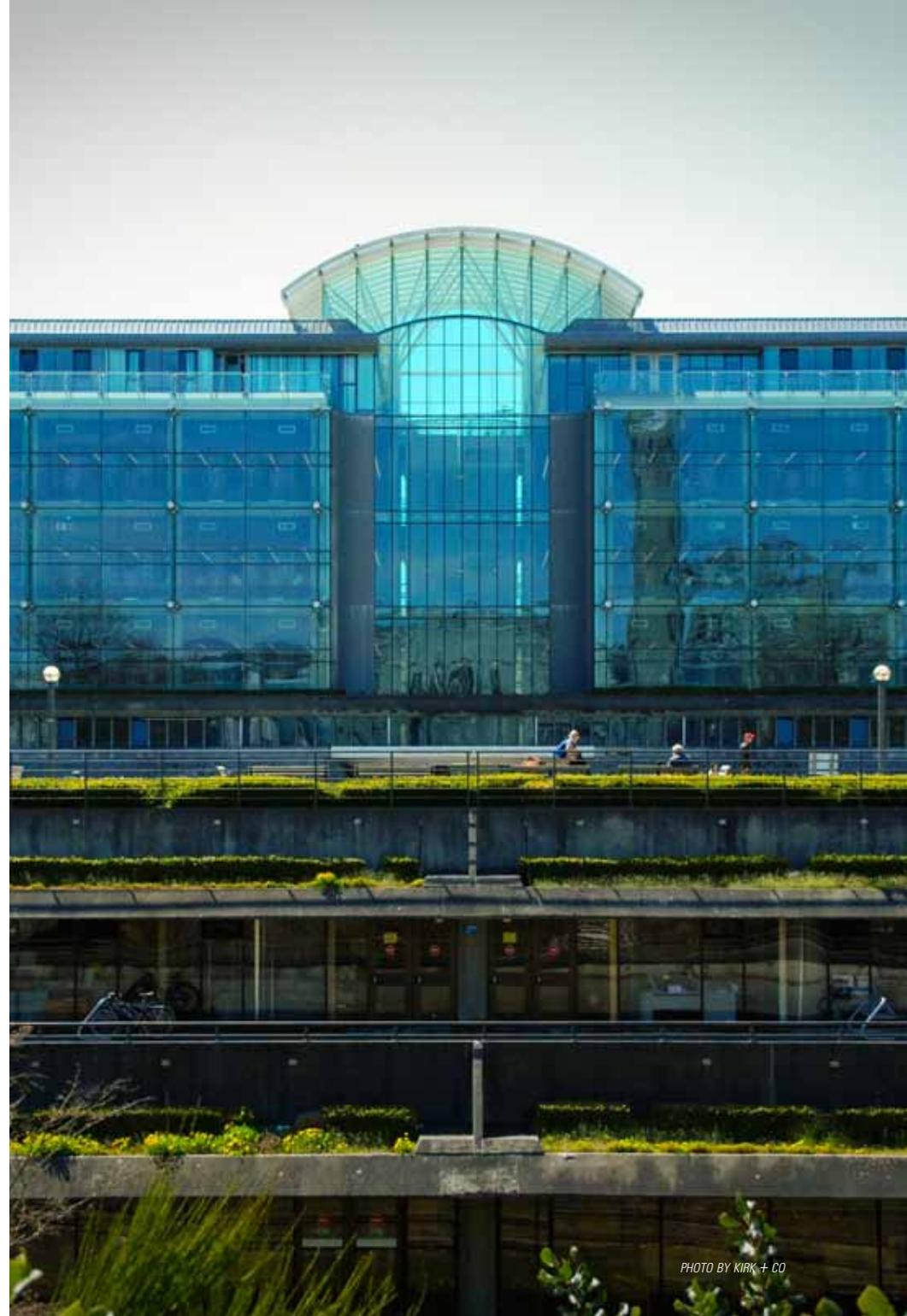
Also that year, the Province of BC introduced the Greenhouse Gas Reduction Targets Act, requiring all public sector organizations – including universities – to become carbon neutral in their operations by 2010.

A few months later in March 2008 UBC became one of six founding signatories to the "University and College Presidents' Climate Statement of Action for Canada". The Statement committed UBC to develop a "comprehensive plan to reduce greenhouse gases by creating a planning body that includes students, staff, faculty, researchers, administrators and other partners to set emissions reduction targets".

By signing the Statement, UBC committed to six deliverables, as follows:

- 1) Initiate the development of a comprehensive plan to reduce greenhouse gases by creating a planning body that includes students, staff, faculty, researchers, administrators and other partners to set emission reduction targets in accordance with each institution's jurisdiction.**
- 2) Within one year of signing this document, complete a comprehensive inventory of all greenhouse gas emissions on each campus.**
- 3) Within two years of signing this document, set targets and develop an institutional climate action plan that engages each institution's research, education and operations into a comprehensive strategy that catalyzes solutions for climate change.**
- 4) While the comprehensive plan is being created, immediately implement selected tangible actions to reduce greenhouse gas emissions.**
- 5) Make action plans, inventories and periodic progress reports publicly available for review and comment.**
- 6) Work co-operatively with governments, civil society, the business community and other institutions of higher learning to contribute to global climate change actions in recognition of our responsibility for equitable solutions.**

The co-authoring and signing of the President's Statement of Action on Climate Change for Canada committed UBC to the participatory development of a comprehensive climate action plan. This is the story of how the plan was developed.





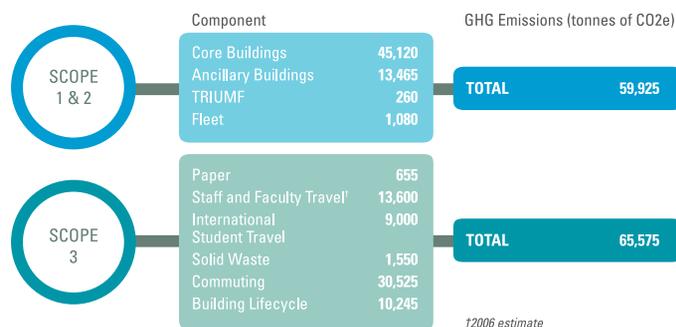
CLIMATE ACTION / Abstract  
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## UBC'S CLIMATE ACTION PLAN ENGAGEMENT PROCESS GENERATES A VISIONARY AND BOLD CLIMATE AGENDA, SUPPORTED BY THE UNIVERSITY COMMUNITY

Building on a decade of success in reducing energy consumption and GHG emissions, the development of UBC's Climate Action Plan had its roots in the university's 2007 efforts to engage its community in planning a leadership position on climate change. Early tasks included working with other BC universities to develop the President's Climate Statement, which established a mandate and laid out a roadmap for developing a Climate Action Plan, and setting up a process to measure the university's carbon footprint.

Underpinning UBC's approach to assessing its GHG emissions and all subsequent stages of CAP planning was a core commitment to the principles of participation and collaboration. Thus, each step of the CAP process ensured involvement of its key constituencies – students, staff, faculty and community members – to leverage expertise, solicit diverse views, and foster engagement, motivation and buy-in.

The climate action planning process began with measuring UBC's carbon footprint. To measure its GHG emissions, the university's Campus Sustainability Office (CSO) established a Technical Advisory Committee in 2007 made up of academic, operations, staff and student members. The initial GHG inventory used the World Resources Institute Greenhouse Gas Protocol to quantify 2006 emissions, which include direct and indirect emissions (referred to as Scope 1 and Scope 2), and optional emissions (Scope 3). The committee elected to adopt the broadest approach to scoping the institution's GHGs including faculty, staff and student daily commuting, and paper procurement, among other items. This was an important step for the university, and was based on the recognition that UBC has a sphere of influence to reduce emissions much broader than its operational boundary. The decision was taken to address as many emissions as feasible.



UBC's 2009 GHG EMISSIONS INVENTORY

Following the carbon footprint calculations, UBC's Climate Action Plan development process began in earnest in October 2008, when UBC hosted a Climate Action Symposium. This event brought together over 185 members of the UBC community to present on current progress, engage members of UBC's communities and develop a vision for climate action at UBC. The multi-year climate action planning process was officially launched at this event.

The university's next priority in the development of the Climate Action Plan was to establish a planning process that would allow for broad input from diverse members of UBC's communities. A committee structure was established that enabled students, staff and faculty members to provide oversight and support plan development through committees at each level of governance at UBC.

Critical committees in this structure included the President's Advisory Council on Sustainability (PAC-S), its Operations Working Group (OWG), the Technical Advisory Committee (TAC), and six Working Groups for specific emissions sources. The PAC-S, an interdepartmental group made up of deans, directors, and vice presidents, recommended sustainability priorities to the President's Office. The multi-stakeholder OWG provided oversight to the climate action planning process, and was mandated to advise UBC on measures to realize a sustainable campus. The Technical Advisory Committee was comprised mainly of faculty members and provided technical oversight to the development of the GHG inventory. The six Working Groups provided a broad point of engagement, ensuring that operations staff were given an opportunity to share their ideas and knowledge on how to reduce emissions.



This committee structure enabled a process by which operations staff, students, and faculty members could contribute to the development of a plan which ultimately received the broadest support and buy-in from all levels of governance at UBC.

Over the spring of 2009, the following participatory planning process was launched.

Key to the consultation process design was the identification of UBC's stakeholders who would be invited to participate. They included students, faculty, staff and residents who lived within the university's boundaries. The major engagement points consisted of "visioning" consultations in March 2009 – workshops in which stakeholders were invited to share their vision for climate action at UBC; technical working groups to provide input on action steps to achieve the vision; and ongoing community engagement opportunities through presentations and online feedback and input via electronic polls and surveys.

A communications plan was developed which included an outreach strategy to invite participation via ads in the university newspaper, broadcast e-vites to over 1,500 people, direct email invitations to approximately 500 faculty, staff and student "climate champions", and an interactive website ([www.climateaction.ubc.ca](http://www.climateaction.ubc.ca)). General outreach focused on raising awareness of the events and providing avenues for participation across the UBC community.

To maximize participation in the development of the climate action "vision" the Campus Sustainability Office held two workshops, one in the afternoon and another in the evening



Six Working Groups composed of staff and faculty who had jurisdiction over emission sources and / or had knowledge and expertise in the subject matter were established to develop measurable and achievable climate action strategies to achieve the vision in each of UBC's key emission source areas:

- Campus development and infrastructure
- Energy supply and management
- Fleets and fuel use
- Travel and procurement
- Food
- Transportation

In total, over 40 faculty, staff and students participated in 17 Working Group meetings between March and June 2009. They were supported in their deliberations by the consulting firm and the Campus Sustainability Office. The result of this process was the development of a series of actions to help UBC to move forward on its targets.

Throughout the CAP process, the Climate Action Plan website provided a vehicle for gathering and sharing information, including:

- a calendar of climate action events
- progress of the CAP report
- reports and resources
- feedback mechanisms.

The first draft of the Climate Action Plan was completed in the summer of 2009, and circulated amongst UBC executive and managing directors over the Fall for buy-in and sign off. During this period, an Alternative Energy Sources Project Study was commissioned, to assess low-carbon alternatives to the existing natural gas-based steam district heating system, the largest source of GHGs at UBC Vancouver. Limited revisions were made to the draft plan and in early 2010 the CAP reduction targets were adopted by the Board of Governors. These targets apply to Scope 1 and 2 emissions.

The Climate Action Plan commits the university to:

- reduce GHGs to 33% below 2007 levels by 2015
- reduce GHGs to 67% below 2007 levels by 2020
- reduce GHGs to 100% below 2007 levels by 2050.

The Plan delivers on the President's 2008 Commitment by:

- establishing UBC's 2008 energy and emissions baseline
- articulating a vision for climate action
- setting out emission reduction targets for 2015, 2020 and 2050
- putting forward a series of actions to reduce emissions across campus, and
- contributing to an understanding of climate change impacts and adaptation issues through its research activities.

The success of the Climate Action Plan process can be attributable to the planning framework the university put in place, as follows:

### **1) Establish a mandate for a community developed climate action plan**

By signing onto the 2008 President's Statement of Action on Climate Change for Canada, UBC committed to broad community engagement in the development of its Climate Action Plan.

### **2) Measure GHG emissions**

The Technical Advisory Committee of faculty members, operations staff and students provided important information on the magnitude of UBC's GHG emissions, and enabled the community to begin envisioning where GHG emissions reductions could be achieved.

### **3) Develop a governance structure that encourages all levels of participation**

The climate action committee structure ensured clear lines of accountability and responsibility, and reinforced the priority placed on the CAP throughout the university.

### **4) Engage the university community**

Engaging the university community was central to the development of the CAP. The participatory nature of the climate action planning process ensured the broadest possible support of, and engagement in, the development of the Climate Action Plan. This approach enabled a far reaching vision, and a set of strategies and priorities to meet this vision over the coming years.

This resulted in highly engaged students, faculty, staff, executive and the broader community who felt a key part of – and supported – UBC's Climate Action Plan.

# Impact/

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CLOSED-LOOP  
RESOURCE  
SYSTEMS

## THE CLIMATE ACTION PLAN PROCESS CONTRIBUTED TO MAKING UBC A LIVING LABORATORY FOR BC, CANADA AND THE WORLD.

### IMPACTS

The impact of the Climate Action Plan process is threefold:

- 1) Engagement
- 2) Shared ownership
- 3) Leadership

#### Engagement

Hundreds of UBC's stakeholders contributed to the development of its climate plan, including students, faculty, staff, residents and others in the broader university community. Twenty student volunteers were given the opportunity to develop their climate leadership and organizing skills. UBC provided its community the opportunity to "make a difference", a key plank in its overall mission to promote the values of a civil and sustainable society.

#### Shared Ownership

Academic environments can breed skepticism and cynicism, especially on topics that are central to the public debate. UBC's comprehensive outreach approach which openly engaged students, faculty, staff and the broader university community in shaping its vision, setting its targets and defining its action plan allowed for diverse views and voices to influence its climate agenda. This broad net harnessed grassroots passion and academic and operational insight to form a strong game plan for aggressive action on climate change. By taking a participatory, consultative approach, UBC fostered strong buy-in and commitment from its broad stakeholder community.

#### Leadership

The most significant impact of the planning process was successfully positioning UBC as a climate action leader amongst its academic peers. The Climate Action Plan delivered on the President's climate action commitment within two years of signing the statement with a bold vision and aggressive targets that set the bar for others in Canada: net zero emissions by 2050. The Plan's scope exceeded the regulatory requirements laid out by the Province and went further than other post secondary institutions to date. By leveraging core competencies within its expert faculty and staff, UBC was able to define a roadmap to implement a cost-neutral plan that significantly reduces its climate change impacts within a generation. By engaging its diverse constituents, it was able to scope a broad vision that leverages its sphere of influence for greater impact.

# Replicability/

CLIMATE ACTION / Abstract  
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/ Summary

The consultation process for the development of UBC's Climate Action Plan is highly replicable by other institutions of higher education. The foundational elements, which include a philosophical commitment to stakeholder engagement, a mandate, designation of a coordinating body, budget and staff person, and a motivated constituency, readily exist in other operating environments. That the BC government had established carbon neutral goals and that the President had made a public commitment to climate action, however, helped to galvanize UBC towards the timely development of its action plan. The urgency of climate change and the clear opportunities for cost savings from energy efficiency initiatives are still two important drivers for any post secondary institution.

To replicate UBC's approach it would be important to establish a secretariat function, a service provided by UBC's Campus Sustainability Office, to provide the following resources and support:

- Coordinator to manage the GHG inventory and consultation process
- Funding for a consultant to support the working groups
- Management time to provide project oversight

# Summary/

CLIMATE ACTION / Abstract  
/ Introduction  
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/ Summary

## THE WORLD IS CALLING FOR CLIMATE LEADERSHIP. UBC'S CLIMATE ACTION PLAN, AND THE ENGAGEMENT PROCESS THAT PULLED IT TOGETHER, PROVIDES A ROADMAP ANY INSTITUTION COULD FOLLOW.

### FUTURE

From here, the Campus Sustainability Office will monitor and report on implementation of the Climate Action Plan, which will be driven by units across the university. The UBC Sustainability website will continue to be a space for sharing progress on CAP implementation and for contributing ideas for climate action.

Since the completion of the Climate Action Plan, the University has established the University Sustainability Initiative (USI), a new way to promote and integrate sustainability in teaching and learning, research and campus operations.

The USI will support UBC's Vision for Climate Action by exploring opportunities to use the "Campus as a Living Laboratory" and by positioning "The University as an Agent of Change" through partnerships with civil society, business and government, both locally and globally.

### CONCLUSION

Well planned and executed collaboration on climate action can result in initiatives which engage the hearts and minds of people everywhere. University leadership can show the way for other organizations seeking to similarly foster climate action and impact.



# *Appendix E*



# Scottish Universities Carbon Management Performance Review Project

June 2015

Report compiled by:  
EAUC, SAUDE, JC Carbon Reporting and Carbon Forecasting

*connect box  
to set on demand  
01226 446350.  
10th August*



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## Introduction

The Environmental Association for Universities and Colleges (EAUC) has been tasked by the Scottish Funding Council over a 6-month period to review the performance of Scottish universities in relation to the listed key points:

- Have Scottish universities adhered to their carbon management (CM) strategy?
- To what extent have reduction projects been implemented and progress made?
- What factors are driving emissions for universities?
- What are the key technical themes that universities are considering in order to reduce utility consumption and carbon emissions?

The methodology, results and conclusions of this project are outlined within this report.

The focus of the project was on the implementation performance and data analysis of Scottish higher education institutions in relation to their carbon management plans (CMPs) and provides an assessment of future technologies required to meet carbon reduction targets.

Between the years of 2007/8 and 2010/11 all Scottish higher education institutions became signatories of the Universities and Colleges Climate Commitment (UCCCfS) and many took part in the Carbon Trust's Carbon Management programme. This assisted universities in creating an organisational strategy and practical project list that each institution would implement over a period of approximately five years in order to achieve carbon emissions reductions. These emissions reductions were noted as percentage reduction targets and were assessed against a baseline year identified in the CMP or UCCCfS Climate Change Action Plan (CCAP). These baseline years ranged from 2006/07 to 2009/10. The Plans were not simply focussed on direct energy and fuel consumption, but also on the impact of waste discard, water use and business travel; and where a CCAP was created, learning, teaching and research activity. Plans therefore tended to have a broad focus on all aspects of carbon emissions and estates development related to their institutional function. (For the purpose of this report, we will refer to all Plans here forward as CMPs.)

Additionally during this time period, the Scottish Government passed the Climate Change (Scotland) Act 2009<sup>1</sup>. This has committed the Government to achieving a demanding national CO<sub>2</sub>e reduction target of 80% by 2050 (against a 1990 baseline) with an interim target of 42% by 2020. Key to the legislation is Section 44 - Public Bodies Duties Regulations. The Duties require that a public body must, in exercising its functions, act:

- In the way best calculated to contribute to delivery of the Act's emissions reduction targets;
- In the way best calculated to deliver any statutory adaptation programme; and
- In a way that it considers most sustainable.

Section 44 will have a key implication for all public bodies in Scotland in relation to climate change performance and mandatory reporting which will come into effect next year.

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<sup>1</sup> Climate Change (Scotland) Act 2009 - [www.gov.scot/Topics/Environment/climatechange/scotlands-action/climatechangeact](http://www.gov.scot/Topics/Environment/climatechange/scotlands-action/climatechangeact)

## Methodology

Carbon emissions information has been gathered (where possible) for each university in Scotland. The data period ranges from 2006/07 – 2014/15. Most institutions were unable to provide a complete series of absolute data (within the time series) from their own records. As a result of this, HESA<sup>2</sup> data was used to calculate annual emissions totals. This data was broken down into seven main emissions sources (reflecting the CMP emissions sources):

- Electricity consumption
- Gas consumption
- Other fossil fuel consumption
- Heat and steam generation
- Waste discard to landfill
- Mains water consumption
- Business travel emissions

All CO<sub>2</sub>e emissions arising from each source were calculated using appropriate official DEFRA<sup>3</sup> carbon conversion information relative to each emissions source. Carbon data calculated from each source in a given year was then added together to produce an annual total for that year. The analysis used absolute emissions figures provided by the universities where possible. HESA data was then used to provide emissions totals for missing sources and years. Some annual totals have been estimated (using a direct comparison approach) where no emissions information was available from the university or HESA. A more detailed breakdown of the data used can be found in *Annex A*. It should be noted that estimation techniques were only used to bridge small data gaps in annual totals - where large data ranges were unavailable for key sources or years; this information was left blank to avoid large inaccuracy. It should also be stated that the most complete data series ranges from 2006/07 to 2012/13. This is due to the fact that HESA was still to publish data relating to 2013/14 at time of this report. In light of this, all analysis contained within this report will focus on the period of 2006/07 – 2012/13.

It is important to state clearly that this report has been compiled largely with secondary data made available from HESA. HESA information, whilst useful, may not match up with the total emissions sources that each organisation identifies within their CMP. It is also important to mention that some emission source data was not available for certain years and that the reporting structure and metrics used by HESA can vary regularly, making the information challenging to navigate and interpret.

The carbon management plans of all Scottish HE institutions (with the exception of Royal Conservatoire of Scotland) were reviewed with the following<sup>4</sup>.

- General adherence to the CMP
- Impact of project implementation in relation to carbon emissions reduction
- Relevance and scale of implemented projects
- Forward planning for future CMP

Given the lack of primary data and HESA data for some of the institutions for some reporting years, it has been necessary to exclude three institutions (UHI, SRUC and RCS) from certain parts (or all) of this analysis. *Table 1* below provides information on this.

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<sup>2</sup> Higher Education Statistics Agency - [www.hesa.ac.uk/](http://www.hesa.ac.uk/)

<sup>3</sup> DEFRA carbon emissions conversion factors - [www.ukconversionfactorscarbonsmart.co.uk/](http://www.ukconversionfactorscarbonsmart.co.uk/)

<sup>4</sup> University of Highland and Islands and SRUC have been included where data and information was available in the review.

HE institution	Comments
The University of Aberdeen	Data set included in report
University of Abertay Dundee	Data set included in report
The University of Dundee	Data set included in report
Edinburgh Napier University	Data set included in report
The University of Edinburgh	Data set included in report
Glasgow Caledonian University	Data set included in report
Glasgow School of Art	Data set included in report
The University of Glasgow	Data set included in report
Heriot-Watt University	Data set included in report
Queen Margaret University	Data set included in report
The Robert Gordon University	Data set included in report
The University of St Andrews	Data set included in report
SRUC	Data set included where possible
The University of Stirling	Data set included in report
The University of Strathclyde	Data set included in report
The University of the West of Scotland	Data set included in report
Royal Conservatoire of Scotland	Data set not included in report
University of the Highlands and Islands	Data set included where possible

Table 1 – University Data List

The information requested from universities comprised of the following.

- Carbon Management Plan
- Annual (and disaggregated) carbon emission and energy consumption data, where available for years 2006/07 – 2012/13
- HESA carbon and energy consumption data, where available for 2006/07 – 2012/13<sup>5</sup>
- Anecdotal evidence provided by each university during site visits
- List of implemented reduction projects relevant to the CM

In further assessing the progress institutions have made against their own targets, a set of five questions were asked to provide an outline for next steps moving towards 2020.

- 1) What progress has the sector made against targets and how does this inform overall sector ambitions?
- 2) What factors are driving emissions in the Higher Education sector? What is the Business As Usual?
- 3) What is the distribution of implemented project against the end use of emissions and what are the potential gaps in this distribution that can be exploited further?
- 4) What future opportunities have been identified and what gaps are there?
- 5) What conclusions can be drawn from the analysis and how can the key findings be used to inform future funding and support of the sector?

<sup>5</sup> Higher Education Statistics Agency - <https://www.hesa.ac.uk/>

## Results

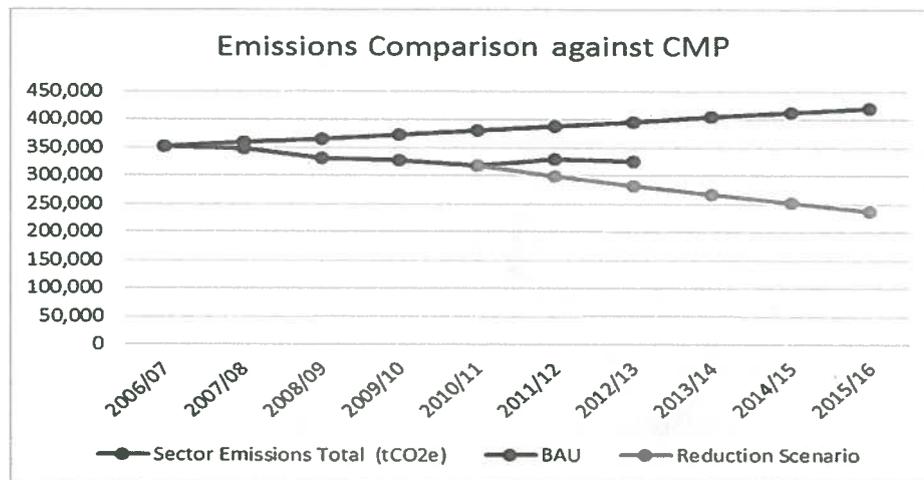
### General Adherence to the CMP

Of the 17 universities visited, it was generally observed that most individuals who have a direct responsibility to carbon management, or whose roles are linked to carbon management issues, are informed and committed to achieving the aims set out in the CMP.

However, despite the dedication shown by these relevant staff, many individuals were of the opinion that awareness and commitment to carbon management was not fully embedded across the entire institution and, crucially, not across all senior management and academic staff. This has had the effect of establishing carbon management as a general maintenance and estates issue rather than a fully integrated aspect of institutional function, such as health and safety etc. This has had a limiting effect on the impact that carbon management could make in universities.

It is also the case that most universities have, or will, fail to achieve their stated carbon reduction targets within existing Plans. What the results of this study suggest is that institutions in general are addressing financially and technically robust energy efficiency projects, but that the scale and number of these projects needs to be increased.

Most carbon management plans began in 2010/11, finishing in 2014/15 or 2015/16, using a baseline comparison year of 2007/08. The average target stated in the CMPs is 23%. Assuming an incremental decrease in overall carbon emission starting from 2010/11 towards that stated target (green line), *Graph 1* below shows that the sector is off-course in relation to emissions reduction (blue line), whilst still achieving some reduction.



*Graph 1 – Sector Carbon Performance*

Overall, the sector is reducing in terms of total carbon emissions; however, it is not following an average reduction scenario representative of all carbon management plans developed over the past 5 to 10 years. The results of this study also suggest that there may need to be a refocus on electricity reduction projects. For most universities, total emissions associated with electricity use will be significantly higher than those from burning natural gas. However, as electricity generation decarbonises the relative contribution of electricity use towards total emissions will decrease: emission factors for electricity should decrease in future years while those for fossil fuels will remain relatively static

### Carbon Management Performance

In order to achieve the above target baselines, the sector as a whole would have had to identify and implement projects totalling an annual carbon emissions tonnage of 90,246 tCO<sub>2</sub>e. While some institutions have met and exceeded their targets, others are unclear at this stage of their CMPs if this is achievable and a few that will not meet their targets. However, the figures indicate that collectively, the sector has not met the targets set in the Climate Change Act. There has been a great deal of effort and progress made, however the changing landscape of growing estates has had an impact.

### Project Implementation Rates

Of all institutions that provided project implementation information, 4 completed their project registers in total. The general trend of implementation was high with an average rate of 76%. This suggests a commitment to address carbon reduction activity. However, a significant number of projects listed for all universities seemed to be derived from established action plans created from SALIX funded activity. Whilst this action is to be commended, the SALIX funding principles and payback timescales can limit the scale of projects to a small and medium size, due to the 8-year payback maximum timeframe. This may have had a limiting effect on the likelihood of larger reduction target achievement. However, Salix eligibility criteria means that it was the only funding often available to projects that would not otherwise have proceeded. Therefore the value of Salix funding should remain as an enabler.

The total annual carbon tonnage attributed to all projects listed within CMPs is 51,459 tCO<sub>2</sub>e. This total equates to 57% of the notional target that needed to be achieved in relation to all institutions achieving their carbon reduction targets. All projects implemented to date total an annual tonnage of 41,436 tCO<sub>2</sub>e as outlined in *Table 2* below. This again takes the sector further away from the total reduction target, meaning that all institutions need to identify and implement a significantly greater number of reduction projects in general. It should also be noted that many universities have undertaken or managed ongoing awareness campaigns. The savings impact of these projects is very difficult to quantify but remain invisible within most CM Plans.

HE Institution	Total Number of projects	Implementation Rate	Total tCO <sub>2</sub> e reduced (annual)
The University of Aberdeen	70	71%	7028
University of Abertay Dundee	36	83%	1201
The University of Dundee	14	93%	2637
Edinburgh Napier University	56	73%	906
The University of Edinburgh	34	100%	1962
Glasgow Caledonian University	53	66%	1213
Glasgow School of Art	10	80%	508
The University of Glasgow	32	100%	1475
Heriot-Watt University	22	77%	1274
Queen Margaret University	34	74%	2498
The Robert Gordon University	11	55%	5515
The University of St Andrews	116	100%	3125
SRUC	27	41%	101
The University of Stirling	88	37.5%	7358
The University of Strathclyde	26	100%	2476
The University of the West of Scotland	39	79.5%	2048
University of the Highlands and Islands	8	75%	56

Table 2 – University Carbon Emissions

Carbon Management by Project Type

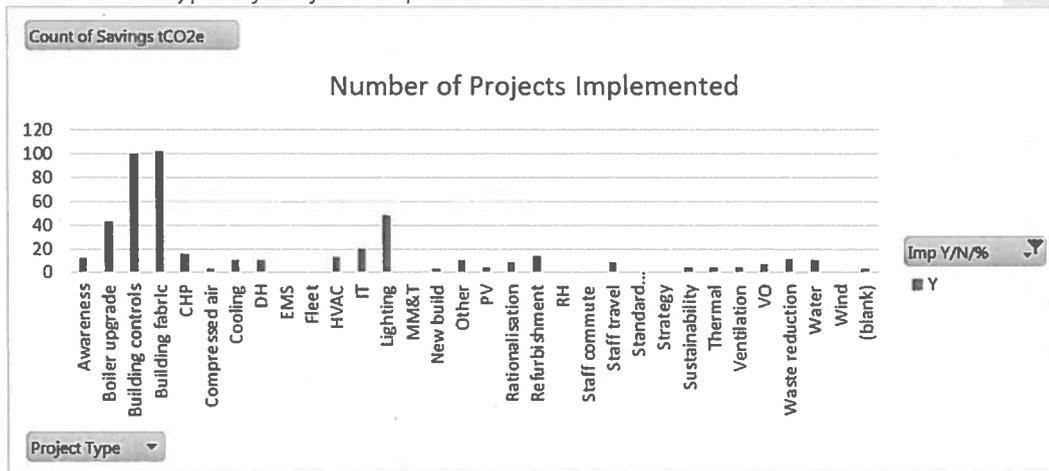
A total of 675 projects were listed throughout all the carbon management plans reviewed. Of these, 514 were fully implemented at the time of this review. Table 3 below shows the cumulative annual saving (as listed in the CMP project register) of each project type. It should be noted that the savings listed may not reflect the actual savings realised. However, these totals can still be used to approximate the impact of carbon management as a whole.

Project Type	Total Savings (tCO2e)
Awareness	2,620
Boiler upgrade	5,475
Building controls	7,857
Building fabric	2,974
Combined Heat and Power	4,925
Compressed air	32
Cooling	1,030
District Heating	794
Energy Management Systems	72
Fleet	23
Heating, ventilation, and air conditioning (HVAC)	369
Information Technology	1,438
Lighting	1,623
Monitoring, Measuring, & Targeting (MM&T)	751
New build	4,898
Other	325
Photovoltaics Panels	27
Rationalisation	1,730
Refurbishment	1,091
Renewable Heat (RH)	9
Staff commute	3
Staff travel	347
Strategy	389
Thermal	223
Ventilation	97
Voltage Optimisation (VO)	2,039
Waste reduction	146
Water	103
Wind	26
<b>TOTAL REDUCTION</b>	<b>41,436</b>

*Alphabet Order!*

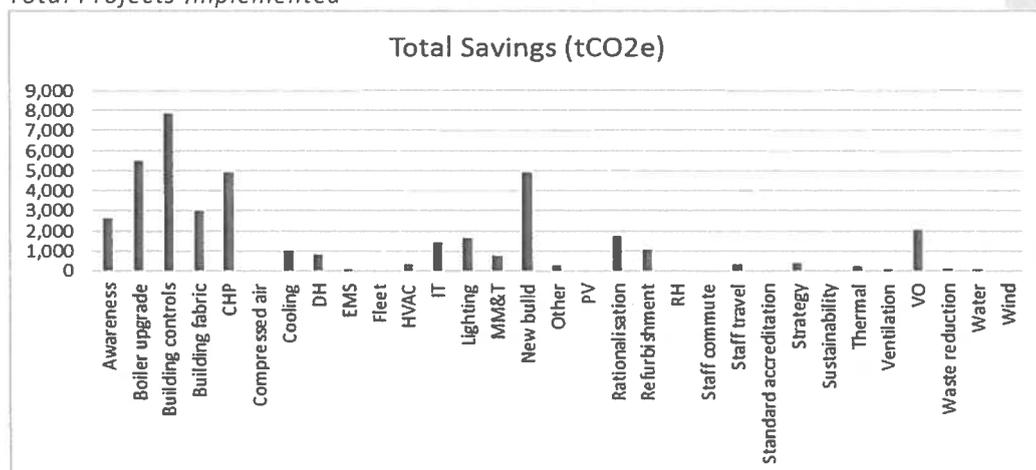
Table 3 – Project Type and Total Emissions

Number and Types of Projects Implemented



Graph 2 – Number of Implemented Projects

Total Projects Implemented



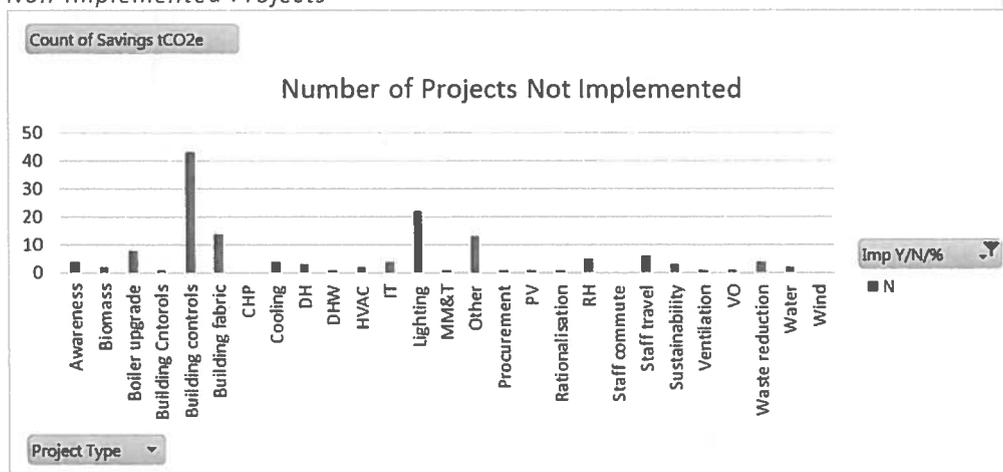
Graph 3 – Grouped Savings of Project Types

As can be seen from *Graphs 2 & 3* above, the majority of implemented project savings are related to upgrades and improvements in building control, plant and fabric. The top five project groups are as follows.

1. Building control projects generally refer to upgrades in specific and building control systems such as lighting, heating, ventilation and presence detection as well building energy management system improvements.
2. Many institutions are also involved in upgrade of old inefficient gas boiler plants. In most cases these projects seem to be part of general maintenance and rolling programmes as boilers reach their end of life.

3. New build projects are prevalent within the sector as many institutions have been in the process of renewing and increasing their estate over the past 5 years. These new structures should be of a better standard in terms of building fabric and air tightness as well as improved utilities and service monitoring and control.
4. Implementation and upgrade of CHP units account for a significant carbon reduction total. Combined heat and power plants are ideal for sites with extended demand for power and hot water over a 24 hour period.
5. Building fabric projects are grouped as internal and external insulation, draught stripping, and window and roof replacement.

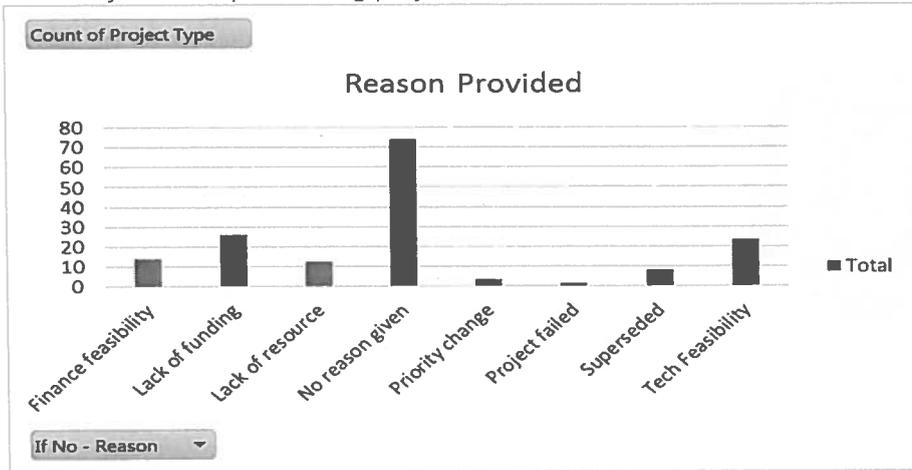
#### Non-Implemented Projects



Graph 4 – Project Types Not Implemented

Of the remaining 161 non implemented actions, outlined in *Graph 4*; building controls, lighting and building fabric projects are the main types rejected from project registers. It shows a rough proportionality in relation to implemented projects, with building controls showing the highest rejection total.

Reasons for not implementing projects



Graph 5 – Reasons for Non Implementing Projects

Graph 5 above shows the majority of non-implemented projects, no reason was provided for why these projects did not go ahead. This was in part due to staff changes and an absence of recorded information in relation to CM projects. Until information for these unexplained project rejections are found, it is difficult to ascertain if there is a trend in relation to why they were not enacted. SAUDE will investigate into other possible reasons to assist with future projects

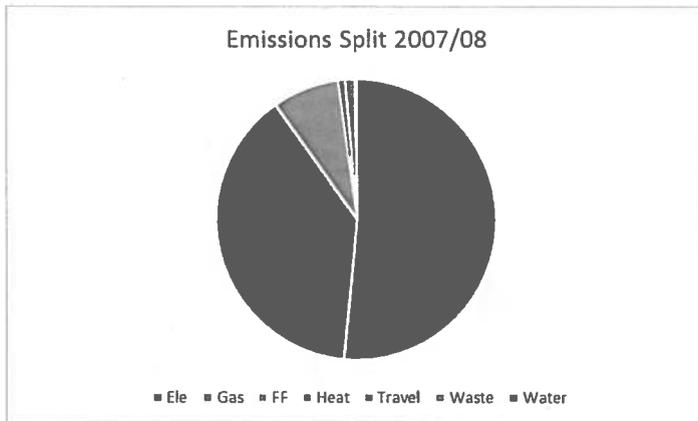
Carbon Emission Split

In order to assess the impact of projects within an organisation, it is useful to assess the split in carbon emissions in relation to their sources, shown below in Table 4. Over time the proportion of emissions from each source may change in relation to the impact that carbon management has had.

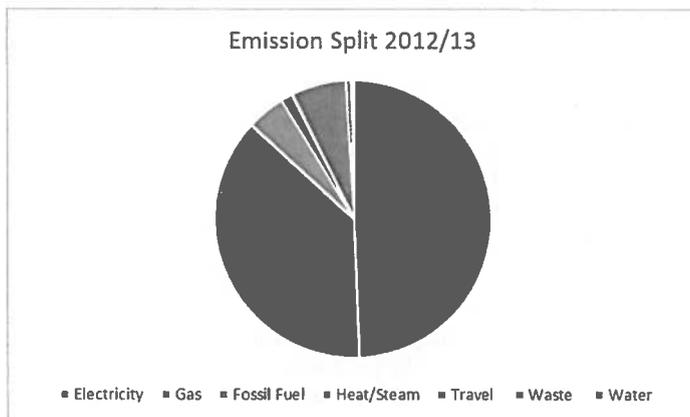
Source	2007/08 Split	2012/13 Split	Change +/-
Electricity	51.5	49.4	-2.1
Gas	38.6	37.4	-1.2
Fossil Fuel	7.7	4.5	-3.2
Heat	0.8	1.4	+0.6
Travel	0	6.4	+6.4
Waste	1.1	0.6	-0.5
Water	0.2	0.3	+0.1

Table 4 – Carbon Emission Split

Emissions splits can show whether a dent in carbon emissions has been made in a particular source, showing a propensity for certain project types. In short, it can help to show whether you need to focus projects on a particular area. However, this data doesn't show that. What it does show is a decrease in fossil fuels and an increase in travel data. This is likely due to increased travel data being recorded and better data collection.



Graph 6 – Emission Split 2007/08



Graph 7 – Emission Split 2012/13

The above *Graphs 6 & 7* show that there has been little movement in the percentage split over time. Fossil fuel emissions have reduced showing that institutions have likely switched fuel or closed buildings that relied on these traditional fuel types. Emissions from heat/steam have also increased slightly and this possibly reflects the increasing influence of CHP and district heating. Overall however, the proportions of emissions arising from gas and electricity have remained steady with a slight decrease, possibly in relation to a more rounded emissions boundary that takes in smaller sources such as travel and water. This reflects an increase in sophistication of recording and monitoring carbon. If more time was available, it would have been useful to include further analysis on trends in total electricity and gas use across the sector, rather than expressing in carbon. This would demonstrate progress in energy efficiency and demand reduction without the complicating factor of varying emission factors, which institutions cannot influence.

Decarbonisation of the electricity grid offers the potential of low to zero carbon heat via heat pumps in the medium to longer term, and emphasis on renewable heat in general perhaps needs to be increased. It may be worth further developing themes touched on in the report about short, medium and long term strategies and the actions institutions should be taking to ensure that the transition to the long term vision is as efficient as possible.

### Combined Heat and Power

Of the existing current and completed project lists, 15 CHP projects were cited on project registers and 14 had been implemented at the time of this survey. This accounts for a total annual carbon reduction impact of 4,925 tCO<sub>2</sub>e across the sector. It is backed up by an observed rise in the total emissions related to heat/steam, as previously stated. Over 50% of the total number of universities across the sector sited CHP as a probable future technology that would be implemented in the coming years. While this is a viable option, it is recommended that building controls are audited first to ensure existing systems are running efficiently.

CHP still has the potential to make a significant impact on overall Scope 1 and 2 emissions, and to provide significant cost savings. The relative carbon reduction benefit of gas fired CHP will however erode as electricity generation decarbonises (perhaps in only around 15 years or so) where there will be lower carbon emissions in using grid electricity.

## Assessment of Targets Progression

### Progress against targets

The first analysis question in assessing progress looked at where the universities were in terms of their targets. This cohort analysis is not straightforward because the sector does not start from the same point in terms of baseline year, have the same target, or the same end year for the target, nor does it have the same most recent year of carbon footprint publication. In order to compare the universities equitably, a calculation of current versus expected position was made using the total number of years in the target phase.

The results are shown below in *Table 5* and demonstrate the range of positions with respect to targets. Of the sample included in this analysis (16 universities), 11 institutions are ahead of where they would be expected to be (score of more than 100%). None of these institutions have published data that enables confirmation that the target has been met but they are on track to deliver against their targets. Three institutions made reductions in their footprints but are behind where they would be expected to be (score of between 0 and 100%) and a further two have increased their carbon footprint (score of less than 0%). Although there are more universities that are ahead of their expected position to date, across the sector, there are more emissions in the amber and red categories (43% ahead and 57% behind). This is due to the larger size of the footprints in the bottom section of the table.

There are likely to be a number of explanations for the patterns in this table which will be explored in subsequent sections. However, it should be noted that for a significant proportion of the sector, the most recent data for their carbon footprints came from HESA returns (highlighted in red), rather than published by the organisation. Therefore, there could be discrepancies in the carbon footprint boundary measured in the baseline year versus the most recent footprint.

Organisation	Baseline year	Baseline footprint (tCO <sub>2</sub> e)	Start Year	End Year	Number of years in target period	Most recent footprint	Year of most recent footprint	Number of years left	Expected reduction to date	Reduction to date	Progress against expected position
Glasgow Art School	2008/09	3,528	2009/10	2014/15	5	1,958	2012/13	2	318	1,570	494%
GCU	2008/09	10,952	2010/11	2015/16	5	8,298	2012/13	3	876	2,654	303%
Abertay	2008/09	4,222	2011/12	2016/17	5	3,582	2012/13	4	211	640	303%
Strathclyde	2009/10	32,690	2010/11	2014/15	4	28,026	2012/13	2	1,635	4,664	285%
Glasgow	2007/08	64,275	2009/10	2014/15	5	43,487	2012/13	2	7,713	20,788	270%
RGU	2008/09	15,179	2010/11	2020/21	10	9,850	2014/15	6	2,550	5,329	209%
QMU	2009/10	2,297	2010/11	2015/16	5	1,482	2012/13	3	472	815	173%
UWS	2008/09	11,499	2010/11	2014/15	4	9,748	2012/13	2	1,150	1,751	152%
Edinburgh Napier	2006/07	11,166	2008/09	2013/14	5	8,063	2012/13	1	2,233	3,103	139%
UHI	2009/10	454	2010/11	2015/16	5	389	2013/14	2	27	37	136%
Aberdeen	2008/09	29,336	2009/10	2014/15	5	25,055	2012/13	2	3,520	4,281	122%
Stirling	2007/08	16,651	2008/09	2012/13	4	14,742	2012/13	0	3,330	1,909	57%
Heriot Watt	2007/08	19,445	2009/10	2013/14	4	17,878	2013/14	0	4,375	1,567	36%
Dundee	2008/09	25,367	2010/11	2015/16	5	25,023	2012/13	3	2,029	344	17%
St Andrews	2006/07	36,861	2010/11	2016/17	6	41,799	2014/15	2	4,915	-4,938	100%
Edinburgh <sup>6</sup>	2007/08	76,959	2010/11	2020/21	10	85,889	2012/13	8	4,464	-8,930	200%

Table 5: Position of universities with respect to targets

<sup>6</sup> The Climate Action Plan 2010 to 2020 states the baseline carbon footprint to be 114,000 tCO<sub>2</sub>e, with 76,000 tCO<sub>2</sub>e from buildings, 34,400 tCO<sub>2</sub>e from transport and 3,700 tCO<sub>2</sub>e from waste and water. However, the CAP 2012 update restates the 2007/08 baseline as 76,959 tCO<sub>2</sub>e (whole campus including accommodation). Therefore, it is likely that the subsequent data for the University of Edinburgh is actually based on the buildings footprint only.

What this means in terms of longer term Scottish targets relates to the Climate Change (Scotland) Act and set long-term targets of 42% by 2020 and 80% by 2050, but both of these are based on a 1990 baseline, which few institutions have the data to assess. The SFC allows individual universities and colleges to set their own targets through the CMPs using 8% per annum as an aspiration. These statistics show that the public sector 8% per annum would be an extremely challenging target for the sector as a whole, based on the current evidence. If it is reasonable to assume that many of the easier and most cost-effective reduction projects have already been implemented, reductions are likely to get progressively harder over time.

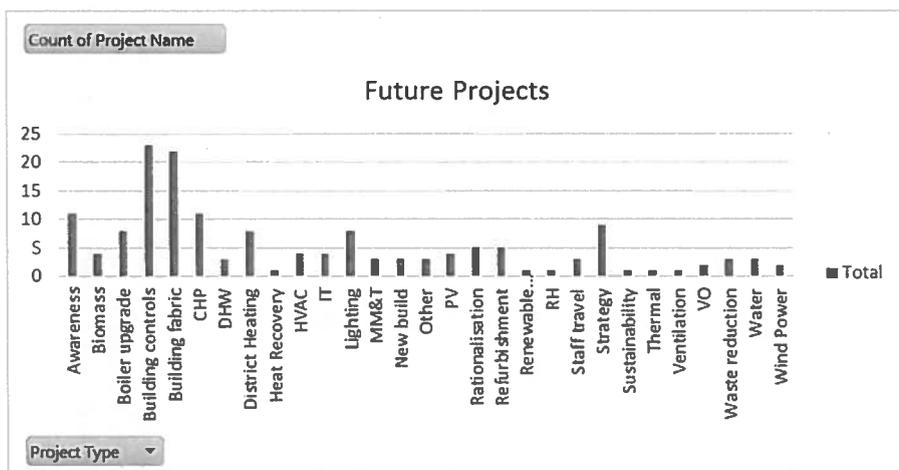
**Recommendations:**

In order to be able to understand what sort of sectoral targets are realistic, it is important to understand:

- The baseline and boundary that institutions are working to; over time these should be encouraged through guidance and tools to be similar e.g. by 2020/21, it would be useful for universities to set a similar carbon footprint boundary for the same baseline year.
- What is the underlying growth in the sector (what Business As Usual is for the Higher Education sector in terms of emissions)?
- What opportunities are left to decrease the sector footprint through carbon reduction projects? This is not a static position but will evolve over time with technology and understanding of how to make projects work
- What is the funding and resourcing appetite within the sector and from the SFC?

### Future Projects

A total of 154 projects have been identified by the sector.



Graph 8 – Future Projects

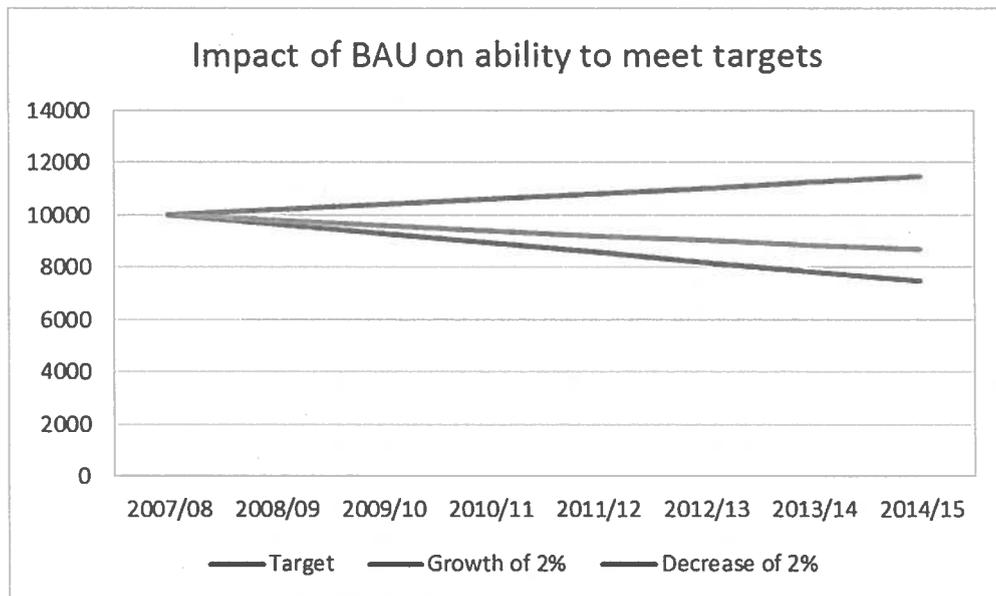
All universities were asked to provide information relating to future projects that they intended to undertake to further reduce utility consumption and carbon emissions. Only one institution was able to provide a partially costed project list. The remaining universities provided information on general approaches and technology themes that would form part of their future CMPs. Graph 8 above shows that the trend of project types mentioned is broadly proportional to the identified and implemented projects of the former CMPs.

### Business as Usual and the University Sector

There has been increasing attention over the past five years paid to the underlying growth or decrease in the carbon emissions of a university as a result of both internal and external factors that are out with the control of those dealing with climate change activity. This is collectively referred to as the Business As Usual scenario, although this is a slightly misleading term. At the time when most of the Scottish Higher Education Institutions were writing their first CM Plans, BAU was generally modelled as a 0.7% increase in emissions over the whole of the footprint, regardless of the source of the emissions and without considering the actual circumstances of the individual university. However, understanding of the significance that BAU has on whether institutions are likely to meet their targets has improved considerably since then following work with other public sector organisations, such as Scottish Water and the Scottish Government.

It is useful to consider the implications of different patterns of BAU growth on the ability of a university to meet their carbon reduction targets.

Graph 9 below shows an institution with a baseline footprint of 10,000 tCO<sub>2</sub> in 2007/08 and a target of 25% to be met by 2014/15 (blue line). If the underlying growth in emissions is a 2% increase per year (orange line), then the institution will need to find nearly 4,000 tCO<sub>2</sub>e savings by 2014/15 to meet the target, whereas if the organisation is decreasing by 2% per year (grey line), they will only need to find just over 1,000 tCO<sub>2</sub>e by 2014/15 to meet their target. Therefore, the underlying growth or reduction in the BAU has a huge impact on the effort that an institution needs to put in to meet their target.



Graph 9: How different rates growth in BAU impacts on the ability of institutions to meet targets

What are the impacts of a university not undertaking an accurate forecasting of their BAU?

- 1) There can be a loss of faith by management in the process; if the BAU is increasing more rapidly than the carbon management team can implement projects to reduce it, it looks like the projects are not working and the investment is failing to produce results, whereas in reality,

the team is running very fast just to stand still. Effective forecasting and communication of the BAU can help demonstrate this.

- 2) If the BAU is decreasing and the institution is getting the benefit of both carbon reduction projects and reducing emissions from other factors, the institution can get complacent about the future effort that will be required to meet further and more stretching targets.

The impact of BAU on the ability of any institution to meet targets is starting to be recognised. In the Scottish Higher Education sector with the University of Edinburgh and the Scottish Funding Council investing in developing a specific tool to help them both forecast the impact of management decisions and also demonstrate the impact of management decisions on meeting targets. The University of Glasgow have been active in forecasting their BAU and in particular, the impact of the external electricity grid factor on their emissions.

The factors affecting the footprint of institutions is a tricky question (if it were simple, it would have been done a long time ago). In reality, the evidence is that there are multiple growth factors that impact on different parts of carbon footprints, in different directions and with different degrees of directness. A few of the potential factors are discussed in more depth below.

- **Electricity grid** – all institutions use an average UK electricity grid factor for calculating the emissions resulting from the Scope 2 consumption of grid electricity. This factor is currently around 0.5 kgCO<sub>2</sub>e/kWh. However, there are a number of energy policies that are designed to decarbonise the grid (e.g. increasing the proportion of renewables in the grid). So far these policies have had little impact in decarbonising the grid but the future might be different; currently each unit of electricity 'costs' more than twice as much carbon as a unit of gas, however, if the grid decarbonises, this relationship will change, making projects that save gas relatively more important in saving carbon. However, predicting the rate of change of the grid carbon factor is very tricky. A good base assumption for the next 5 to 10 years is that it will be easier to decarbonise the grid if everyone is more efficient and conservative about electricity use, especially at peak hours (the most carbon intensive forms of electricity are generated when demand is highest or rising). Therefore, electricity saving projects should be currently given a high priority.
- **Student numbers** – it is unlikely that student numbers have a simple and linear impact on carbon emissions. It is likely student numbers have more impact on emissions resulting from end uses of transport, waste, IT, catering and hot water, than on heating, HVAC and lighting as these are part of the energy running costs of buildings. However, the better the buildings are run in terms of matching energy use to demand and reducing energy use in unused areas, the closer student numbers should track overall energy consumption.
- **Income** – it should be noted that Higher Education institutions have multiple functions; education, research and, in some cases, consultancy. Income can increase independently from student numbers as research funding is attracted and this can also have an impact on carbon emissions, particularly if the money is attracted for energy-intensive activities. It can also have a large impact on international travel, if this is included in the carbon footprint.
- **Floor area** – statistics around floor area for different use categories (e.g. residential, administrative etc.) is collected by HESA and would be worth analysing. There is likely to be relationships between emissions and floor area but these are likely to be complex, as other factors around using space more effectively. Such as taking older buildings offline, increasing the efficiency of new builds, increasing intensity of activities will all have an impact.
- **Research Intensity** - in parallel with the NHS where building energy reduces but the energy intensity of healthcare equipment increases, many institutions face increasing energy

demands from increased intensity of research, counteracting savings made elsewhere in building services.

The table below shows some of the data from HESA around student numbers and income for the HE institutions in the sample. This shows that over this period, overall student numbers decreased slightly, although there were large differences between different institutions. During the same period, income increased by 15% overall, with all but one institution experiencing some level of increase. It should be noted that in reality, a small increase over this period once inflation has been added in is likely to be an actual reduction in income. The percentage change for these two parameters is shown in *Table 6*.

Organisation	Student numbers			Income (£k)		
	2013/14	2009/10	% change	2013/14	2009/10	% change
SRUC	1,565	1,005	56%	84,068	50,387	67%
Abertay	4,755	4,200	13%	36,747	36,252	1%
Edinburgh	27,625	25,690	8%	780,630	633,979	23%
Glasgow	27,390	25,600	7%	511,341	439,471	16%
St Andrews	9,735	9,135	7%	193,880	155,788	24%
Glasgow Art School	1,825	1,785	2%	29,642	21,403	38%
Stirling	11,090	10,870	2%	107,570	101,948	6%
UHI	7,465	7,505	-1%	62,731	68,174	-8%
RGU	13,410	13,715	-2%	103,329	94,321	10%
QMU	5,215	5,400	-3%	34,968	33,552	4%
Heriot Watt	10,895	11,295	-4%	191,302	142,662	34%
GCU	16,755	17,670	-5%	116,752	115,258	1%
Dundee	15,195	16,195	-6%	243,087	219,090	11%
Strathclyde	19,960	21,310	-6%	254,377	230,664	10%
Edinburgh Napier	12,690	14,100	-10%	112,750	105,708	7%
Aberdeen	13,825	15,535	-11%	232,499	225,289	3%
UWS	15,280	17,425	-12%	101,526	95,479	6%
Overall	214,675	218,435	-2%	3,197,199	2,769,425	15%

*Table 6: Potential BAU growth factors from HESA data*

## Conclusions

Overall, it is difficult to draw firm and detailed conclusions in relation to the information provided by institutions through the course of this project. However, the data and anecdotal evidence provided shows a modest reduction in emissions over the course of the averaged carbon management phase. The following conclusions can be drawn from reviewing the information.

**Comment [DH1]:** Not sure what this means.

### Carbon Performance of the Sector

The initial review of carbon emissions is a positive one. The data shows a modest reduction and downward trend in emissions over the reporting time period. However, the reporting metrics used to assess carbon intensity in relation to institutional change shows the sector is working very hard to maintain lower emissions as it experiences significant estate growth and change.

This would suggest that that all reduction projects implemented so far have done a good job of maintaining the status quo and have prevented runaway carbon increase. However, a more strategic and large scale approach to carbon reduction needs to be addressed by the sector as whole if it is to make substantial carbon savings towards 2020.

### Data Reliability and Monitoring

The majority of data used to compile this report was not primary information provided directly by institutions. This means that there are some key caveats to bear in mind when reviewing this information.

- Some of HE institutions in Scotland still do not specifically monitor and report on the progress of their carbon management plans. This means that data for some emissions sources initially identified within plans are not assessed.
- HESA data is sometimes not reflective of emissions totals provided as primary evidence by some institutions and in some cases, this information is estimated rather than actual. This may mean accumulated inaccuracies when aggregating emissions totals for the sector.
- Some carbon emissions source information can generally be difficult to obtain within institutions due to administrative, departmental and data collection issues. Staff travel data was noted as a key example.
- It has also been noted by institutions that some mandatory recording systems that automatically calculate emissions data do not produce accurate results. This was noted for the online procurement reporting system in use.

### Recommendations for Institutions:

- Establish a robust and straight forward energy and utility monitoring system in order to fully understand all carbon emission sources within the boundary of an organisation.
- Put in place methodologies for better recording of travel, waste and water data.
- Make sure that all data recorded in relation to carbon management undergoes some form of limited assurance.
- Use data to inform and continually improve on performance using the "Plan – Do – Check – Act" cycle.

### Overall Carbon Management Performance

The performance of the majority of institutions (and the sector as a whole) is good. Most institutions have attempted to adhere to their plans to the best of their ability in the face of marked sector and individual estate change. Most institutions were able to provide some evidence in relation to carbon

management work and most institutions had at least one named responsible person dealing with carbon management.

However, many within the sector cited lack of senior management support as a key barrier to fully integrating carbon management throughout their institutions. Lack of internal communication was also highlighted in that many departments and teams were not sharing enough information in order to work towards carbon reduction in a strategic manner. This lack of communication also caused maintenance and estates teams to have to play catch up in relation to decisions taken within faculties regarding equipment purchase, tender applications and academic research.

**Recommendations for Institutions:**

- Strengthen the management and governance aspects of CM within each organisation during the next phase of CM.
- Establish a comprehensive CM committee that will be tasked with deciding on strategic direction and dissemination CM information throughout the institution.
- Ensure that responsibility for CM is spread throughout the entire organisational management team. This can be done through establishing team or dept. performance targets or carbon/financial budgets in relation to utility consumption and by requiring “authentic leadership” from all responsible staff in relation to CM.
- Establish meaningful awareness and training programmes to ensure that all staff understand the importance of and are equipped to deal with CM.
- Include CM responsibility in staff contracts and appraisal processes.
- Improved reporting of carbon reduction performance and regular intervals should be established. These reports should reach the Principal and corporate management team for review and consideration.
- Establish a network of champions to make sure the CM message is spread and upheld throughout the institution.
- All university proposals and activities under consideration should also undergo a carbon appraisal.

**Present and Future Project Implementation**

The project implementation rate across the sector was generally high. This seems to be due to the fact that most projects were identified and quantified through the established funding model of SALIX. Although this is a valid way of identifying and, more importantly, ensuring that projects listed are implemented, there are still further opportunities available with an increased range and scale of projects linked to CM with wider capital investment options. In short, the success rate was high but the number of projects identified was limited to make a significant impact.

The project types most successfully implemented and delivering the largest savings tended to focus on building controls, CHP and boiler upgrade. This suggests that issues related to control and delivery of space heating and domestic hot water have been the mainstay of all CMP project lists. This needs to be rebalanced with more focus on electricity consumption. Most importantly (given the nature of higher education institutions) efficiencies in IT need to be addressed. Lighting is also a major issue given many university campuses own and operate significant amounts of external and street lighting. However often this isn't specified as to internal and external.

**Recommendations for Institutions:**

- Ensure a wide variety of projects are identified and implemented within the project register.
- Make sure that projects are of a scale and quantity that will help the institution achieve its carbon reduction goals.
- Project register should contain a list of both near and long term projects.

- Relevant internal data should be used to justify and quantify project action – this requires compiling and reviewing data from a robust metering and monitoring strategy.
- All projects should be SMART assessed before being listed in project register listing both achievable and aspirational as supported by Resource Efficient Scotland tools available.
- The project register should be filled as projects come to fruition and are completed. This is important for short term projects especially.
- Additional funding should routinely be made available for short term carbon reduction activity.

### Reporting

The Public Bodies Duties regulations contained within the Climate Change (Scotland) Act 2009<sup>7</sup>, now requires all publically funded institutions to return sustainability/climate change reports to the Scottish Government by 2016. This will be an annual requirement. The purpose of this reporting is to encourage organisations to address the key aspects of robust climate change management and to retrieve numerical data on progress in a uniform way that will over time produce a reliable and validated data set. Universities and colleges are listed as ‘major players’ under the Duties on Public Bodies.

Given the issues raised in this report regarding data, cultural change and CM leadership, the requirements of this new reporting structure will help to address some of these issues and improve the carbon management performance of all public bodies.

#### Recommendations for Institutions:

- All HE institutions should review the new reporting template and guidance that is currently available on the Sustainable Scotland Network website.<sup>8</sup> All institutions should review governance and management strategies that relate to CM and energy management within each organisation.
- All institutions need to be prepared to report total carbon emissions by scope or source for previous reporting years.

### Future Technologies

The analysis to date shows that answering the initial questions was not necessarily simple due to the quality of the dataset and the inherent difficulties in analysing data that is not easily categorised. However, there are a number of key findings that should be used to inform future funding and support of the sector.

- To negotiate effective sector carbon reduction targets, there needs to be a much more uniform approach to boundaries and reporting and better forecasting of the Business As Usual. The Higher Education sector is unusual within the public sector in that growth is seen as a positive outcome and encouraged. Therefore, there needs to be consideration to how that growth is driving changes in emissions before starting to think about what targets are realistic for the sector.

<sup>7</sup>Climate Change (Scotland) Act 2009 - [www.legislation.gov.uk/asp/2009/12/contents](http://www.legislation.gov.uk/asp/2009/12/contents)

<sup>8</sup>[www.keepsotlandbeautiful.org/sustainability-climate-change/sustainable-scotland-network/reporting-on-climate-change-duties/](http://www.keepsotlandbeautiful.org/sustainability-climate-change/sustainable-scotland-network/reporting-on-climate-change-duties/)

- The Scottish Government Required Reporting Order for the Climate Change Duties will drive improvements in the data but will require institutions to manage carbon data more effectively, particularly in terms of project data and factors that impact on future emissions.
- As universities get to the end of their CMPs, there is evidence of a falling off in project identification and annual tasks e.g. effective footprint reporting. In order to drive ongoing reductions, the Carbon Reduction Project Register needs to be brought back to centre stage and updated quarterly.
- Previous and future projects demonstrate, to a certain extent, the likely make-up of the team that is driving carbon management within Institutions and in order for further opportunities to be identified, this team needs to be widened out to include other disciplines such as IT, procurement and travel.
- There needs to be an organisational shift where the responsibility for making carbon reductions is also put on other departments, staff and students, rather than being seen as something Estates will deal with.

There are still likely to be lots of reduction opportunities available. However, without much more detailed analysis, it is not easy to offer a couple of 'fix all' technological solutions that should be implemented in all institutions. It is also a high risk strategy to rely on massive breakthrough in terms of technologies e.g. looking for novel solutions.

There are ongoing improvements in technology, especially in terms of cost effectiveness e.g. the energy efficiency of technologies improves or the unit cost comes down. It is important that universities keep on top of these possibilities and communicate to the sector when something becomes relatively inexpensive and works for them. Examples are likely to be found in IT, lighting, catering and renewables. However, there are other strategies that could also be employed alongside:

- Putting more resources into detailed data analysis is likely to identify unseen opportunities. Energy data collection and resolution has increased hugely in the past ten years but few institutions resource the analysis of this dataset sufficiently and therefore there are likely to be missed opportunities.
- Higher education establishments have the challenge of a population of users who change frequently but also have the potential for high engagement and ideas. Leveraging the opportunities of the students and staff population to engage them with carbon management and increase its profile and importance within the university also is likely to produce opportunities.
- There was an interview with Dave Brailsford, British Cycling's performance director<sup>9</sup> and a question was asked about the 'marginal gains' that underpin everything the team did. His response was simple; *"The whole principle came from the idea that if you broke down everything you could think of that goes into riding a bike, and then improved it by 1%, you will get a significant increase when you put them all together"*. Because carbon emissions come from lots of small sources, the same approach can be applied to energy use/carbon emissions within an organisation or, better still, a single building. This is where 'awareness' projects can succeed, as part of a technological/behavioural suite of changes.

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<sup>9</sup> August 2012, <http://www.bbc.co.uk/sport/0/olympics/19174302>

**Annexes are to be removed before publication.**

## Annex A – Data and Analysis of CMPs and HESA

### Data

This following table gives a breakdown of the data available in each reporting year for each institution.

University	Total Emissions (tCO <sub>2</sub> e)						
	06/07	07/08	08/09	09/10	10/11	11/12	12/13
Aberdeen	24,562	26,366	29,336	30,144	27,197	26,961	25,055
Abertay	2,850	2,850	4,222	4,125	3,918	3,722	3,582
Dundee	24,597	22,056	25,367	24,987	15,176	23,868	25,023
Napier	11,166	9,151	8,238	7,994	8,286	6,974	8,063
Edinburgh	114,000	114,000	62,630	65,550	74,699	83,021	85,889
GCU	8,540	8,846	10,952	9,992	9,534	9,229	8,298
GSA	2,218	3,125	3,528	3,494	2,655	2,439	1,958
Glasgow	42,089	39,114	48,658	48,935	47,039	47,765	43,487
HWU	18,407	18,603	19,335	18,741	17,317	18,096	17,626
QMU	3,505	2,504	3,004	2,297	2,508	1,850	1,482
RGU	9,096	10,536	15,179	9,674	9,626	8,897	9,689
St Andrews	36,861	37,715	38,382	40,554	41,583	41,181	42,537
Stirling	16,651	16,651	17,629	17,167	17,153	16,018	14,742
Strathclyde	30,284	27,609	33,886	32,690	31,634	30,112	28,026
UWS	7,221	9,741	11,499	10,590	9,200	9,687	9,748
UHI	454	454	454	454	463	423	417
<b>Totals</b>	<b>352,501</b>	<b>349,321</b>	<b>332,299</b>	<b>327,388</b>	<b>317,988</b>	<b>330,243</b>	<b>325,622</b>

### Note:

- Where figures are given in black – they have been submitted by the institution as primary data.
- Where figures are given in blue – they have been calculated using HESA data.
- Where figures are given in red – they have been estimated due to lack of data or anomalous information.
- No business travel emissions were available for HESA data for 2006/07 and 2007/08. Given the size of the data range missing, applying an estimation technique would have caused further inaccuracy and so the emissions information for this source in these years has been left blank.

### Absolute CO<sub>2</sub>e Emissions 2006/07 – 2012/13

Analysis of the total annual emissions in the period is given below. This shows that there has been a slight decrease in total CO<sub>2</sub>e sector emissions from 2006 to 2013 of 26,879tCO<sub>2</sub>e over the time period.

Year	Sector Emissions Total (tCO <sub>2</sub> e)
2006/07	352,501
2007/08	349,321
2008/09	332,299
2009/10	327,388
2010/11	317,988
2011/12	330,243
2012/13	325,622

Table 3 – Total Sector Emissions

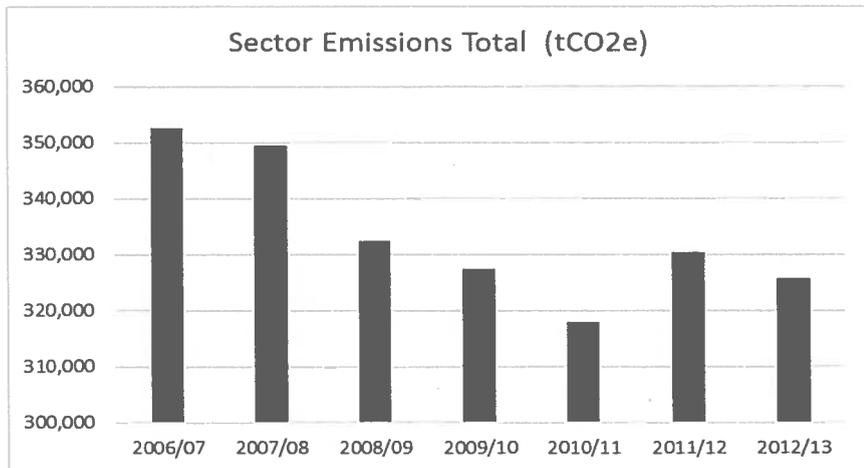


Chart 1 – Total Sector Emissions

This shows a 7.6% decrease in absolute carbon emissions over the time period analysed. This shows a modest positive result in relation to carbon reduction. The dip on 2010/11 is unexplained from the data available, but there could be various reasons for this – new buildings, general control improvements to estates that were running to maximum most of the time, building rationalisation etc.

#### CO2e emissions relative to CMP reduction targets

All universities in Scotland have written carbon management plans with stated percentage reduction targets that should be achieved by a given year. Most carbon management plans began in 2010/11, finishing in 2014/15 or 2015/16, using a baseline comparison year of 2007/08. The average target stated in the CMPs is 23%. Assuming an incremental decrease in overall carbon emission starting from 2010/11 towards that stated target (green line), the chart below shows that the sector is off-course in relation to emissions reduction (blue line), whilst still achieving some reduction.

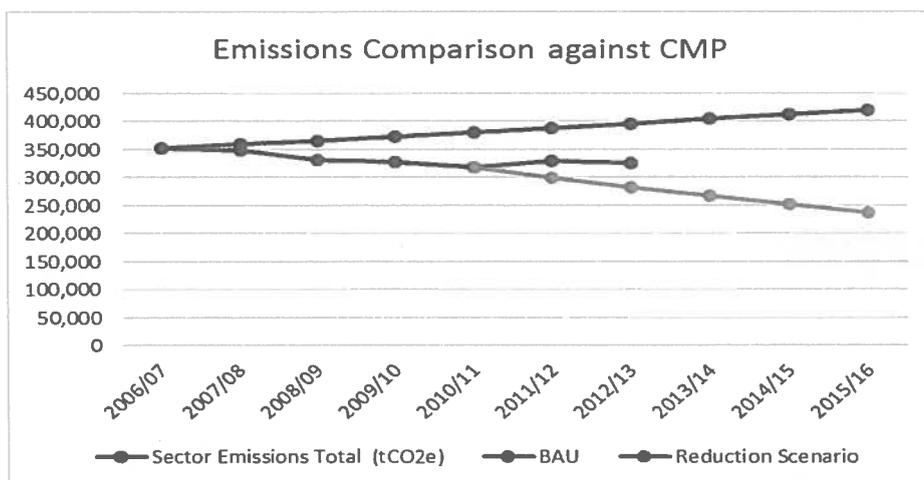


Chart 2 – Projected and Actual Emissions

However, as with all CMPs, a business as usual curve (red line) has been added to take account of the predicted emissions scenario if no carbon reduction action had been undertaken. This assumes a natural increase of 2% per year in utility consumption. Thus it can be seen that the sector seems to be making progress but not in line with CMP projections.

From reviewing implementation rates of carbon reduction projects listed within all carbon management plans; it is clear that Scottish universities are all taking action to address carbon and energy reduction. Chart 2 above would suggest that despite the action taken, most institutions are effectively firefighting in relation to carbon emissions.

In relation to achieving the interim target of 42% by 2020 stated in the Climate Change (Scotland) Act 2009; it is impossible to assess how realistic this would be for any sector within the Scottish economy. This is due to the fact that this nominal target has been baselined against 1990 carbon emission data, which does not exist for this sector. It is also the case that no one sector is required to achieve these targets specifically, as no provisions have been made for this in the Act. Requiring individual institutions and sectors to legally oblige by reduction targets would require a robust auditing and data validation system such as exists for EUETS and the Carbon Reduction Commitment Energy Efficiency Scheme.

#### CO2e Emissions Relative to Institutional Change

##### Carbon Metrics in Relation to Student Numbers (Student Population)

All institutions within the Scottish HE sector have undergone significant change within the last 7 years. These are:

- Increase in estate related to university contracts and projects with external companies etc.
- New build and refurbishment of academic buildings
- New build and refurbishment of student accommodation
- Increased in student numbers
- Increased international travel related to university contracts and service provision

All these factors will have a material effect on the total carbon emissions of an institution and therefore the carbon intensity should be measured against these factors, in order to understand the extent to which carbon emissions are controlled and to mitigate the effects of these varying factors. The report will look at two factors; changes in total student numbers and total m<sup>2</sup> of the institutions built portfolio.

University	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	Total Change
Aberdeen	14,025	14,140	14,855	15,535	16,180	15,515	15,320	+1295
Abertay	4,180	4,140	4,050	4,200	4,975	4,930	4,835	+655
Dundee	18,225	16,735	15,615	16,270	16,275	16,585	15,945	-2280
Napier	14,540	12,995	13,645	14,100	13,970	14,060	12,855	-1685
Edinburgh	24,225	23,555	24,525	25,690	25,700	27,675	27,690	+3465
GCU	17,450	16,770	18,410	17,670	17,335	16,120	15,925	-1525
GSA	1,685	1,750	1,765	1,785	1,795	1,720	1,730	+45
Glasgow	25,300	23,735	24,240	25,600	26,550	26,395	26,635	+1355
Heriot-Watt	10,560	10,065	10,430	11,295	11,180	10,870	11,065	+505
QMU	5,280	5,330	5,045	5,400	5,460	5,245	5,340	+60
RGU	12,985	12,265	13,625	13,715	13,125	12,700	13,055	+70
St Andrews	8,965	8,175	9,275	9,135	9,540	9,850	9,465	+500

Stirling	10,510	9,805	10,125	10,870	11,625	11,120	10,735	+225
Strathclyde	26,000	21,740	21,300	21,310	20,405	19,870	19,950	-6050
UHI	6,855	7,585	7,665	7,505	7,075	7,280	7,420	+565
UWS	14,270	18,135	17,895	17,425	16,655	14,845	15,370	+1100
<b>Totals</b>	<b>216,570</b>	<b>208,650</b>	<b>214,090</b>	<b>219,315</b>	<b>219,700</b>	<b>216,675</b>	<b>215,175</b>	

Table 4 – Total Number of Students

The following table provides information carbon emissions per student for the Scottish HE sector.

Year	CO2e/Student
2006/07	1.63
2007/08	1.67
2008/09	1.55
2009/10	1.49
2010/11	1.45
2011/12	1.52
2012/13	1.51

Table 5 – tCO<sub>2</sub>e/ Student

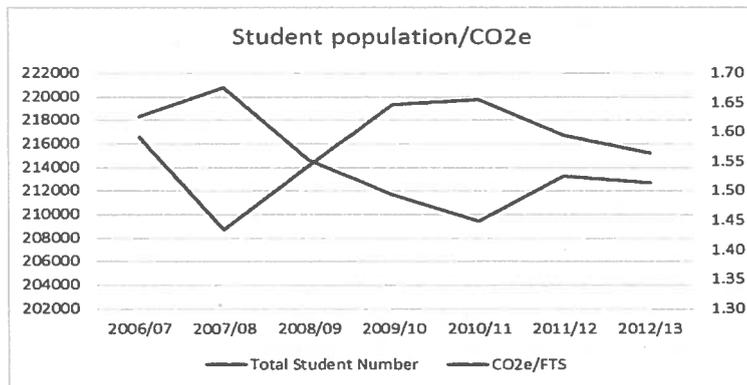


Chart 3 – CO<sub>2</sub>e/Student Comparison

In total the Scottish student population (orange line) has varied over the time period with a dip in student numbers in 2007/08 to its peak in 2010/11, tailing off slightly towards 2012/13. The emissions total per total students (blue line) has increased and decreased within a variance of 0.22tCO<sub>2</sub>e over the same time period. The chart shows a slight inverse proportionality in relation to student numbers and carbon emissions. This suggests that carbon emissions per student is most efficient when university buildings are occupied by more students, but that those sites continue to use the same energy and fuel (and therefore emit the same amount of carbon) during times of lower population. This may indicate an inability to closely control energy/utility consumption at individual sites.

### Increase in Total Internal Area

In terms of total internal area, the Scottish HE sector total m<sup>2</sup> has increased in the reporting time period. The table overleaf shows this change over time<sup>10</sup>. This is due to a number of institutions undergoing major rebuild programmes for academic and residential space. These rebuild/refurbishment projects will replace and extend existing buildings as well as increasing the total area of some universities. Whilst building, refurbishing and extending current sites, some institutions are also selling and vacating rented sites that are no longer required as well as increasing building occupation in order to make remaining space work more efficiently.

The table shows that there has been a net increase in total built area of 188,718m<sup>2</sup>. This increase is most notable in universities located in larger urban area such as Edinburgh and Aberdeen University.

	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	Total Change
<b>Aberdeen</b>	224,958	226,510	226,510	233,554	247,287	254,038	264,446	+39,488
<b>Abertay</b>	47,821	47,821	47,821	47,821	52,842	52,842	52,841	+5,020
<b>Dundee</b>	210,203	214,483	222,734	222,734	218,563	218,903	218,903	+8,700
<b>Edinburgh Napier</b>	103,345	105,829	84,981	84,981	101,267	105,053	105,053	+1,708
<b>Edinburgh</b>	661,308	692,444	694,337	702,493	726,368	734,153	736,185	+74,877
<b>GCU</b>	119,805	121,235	119,015	117,824	116,320	121,113	121,017	+1,212
<b>GSA</b>	37,980	39,098	39,799	40,174	40,574	40,574	40,574	+2,594
<b>Glasgow</b>	381,170	363,013	370,140	376,645	375,149	382,512	380,076	-1,094
<b>Heriot-Watt</b>	177,258	169,392	171,613	173,717	173,682	173,083	178,029	+771
<b>QMU</b>	47,855	45,730	45,729	45,729	45,729	23,661	23,661	-24,194
<b>RGU</b>	96,383	97,836	97,218	98,414	98,619	99,712	101,790	+5,407
<b>St Andrews</b>	229,792	220,893	229,037	239,713	249,857	299,892	250,693	+20,901
<b>Stirling</b>	146,046	146,046	146,046	147,018	147,018	151,013	151,013	+4,967
<b>Strathclyde</b>	339,251	334,163	334,092	334,092	337,884	337,884	349,514	+10,263
<b>UWS</b>	95,727	128,070	130,618	130,326	128,550	130,125	133,825	+38,098
<b>Totals m<sup>2</sup></b>	<b>2,918,902</b>	<b>2,952,563</b>	<b>2,959,690</b>	<b>2,995,235</b>	<b>3,059,708</b>	<b>3,124,557</b>	<b>3,107,620</b>	<b>188,718</b>

Table 6 – Total Internal Area (m<sup>2</sup>)

The following table provides information carbon emissions per meter squared for the Scottish HE sector.

Year	tCO <sub>2</sub> e/m <sup>2</sup>
<b>2006/07</b>	0.121
<b>2007/08</b>	0.118
<b>2008/09</b>	0.112

<sup>10</sup> It should be noted that The University of the Highlands and Islands has been removed from this report as no internal floor area data could be obtained for this institution. All calculations have been modified accordingly.

2009/10	0.109
2010/11	0.104
2011/12	0.106
2012/13	0.105

Table 7 – tCO<sub>2</sub>e/m<sup>2</sup>

From the table above, it is clear that there is a consistent downward trend in CO<sub>2</sub>e emissions in relation to universities total internal area increase, with CO<sub>2</sub>e/m<sup>2</sup> emissions being reduced by 16kg over the reporting time period. This is an indication that despite an increased total internal area, the sector is maintaining its carbon emissions levels at a relatively constant rate.

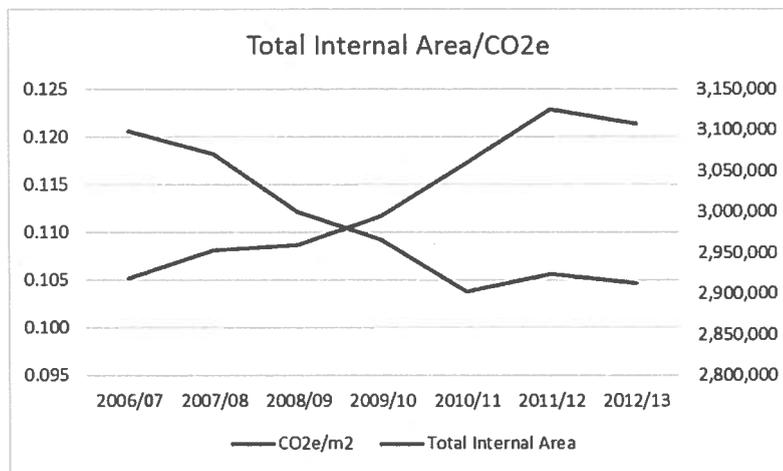


Chart 4 – CO<sub>2</sub>e/Internal area

#### Monitoring and Reporting

The Public Bodies Duties Regulations will require all public sector organisations in Scotland to report on sustainability and climate change action. This will come into effect in 2016, with an option to report voluntarily this year. The report format will focus on the following:

- Organisation details
- Governance and management
- Corporate emissions
- Climate change adaptation
- Procurement
- Information validation

This required reporting will have a set format using identical factors to convert utility use etc. into carbon emissions. This will mean that key public sector climate information is recorded in an identical fashion, ensuring that assumptions on performance and change in carbon emissions are more reliable. The reporting template and associated guidance can be found at <http://www.keepsotlandbeautiful.org/sustainability-climate-change/sustainable-scotland-network/reporting-on-climate-change-duties/>.



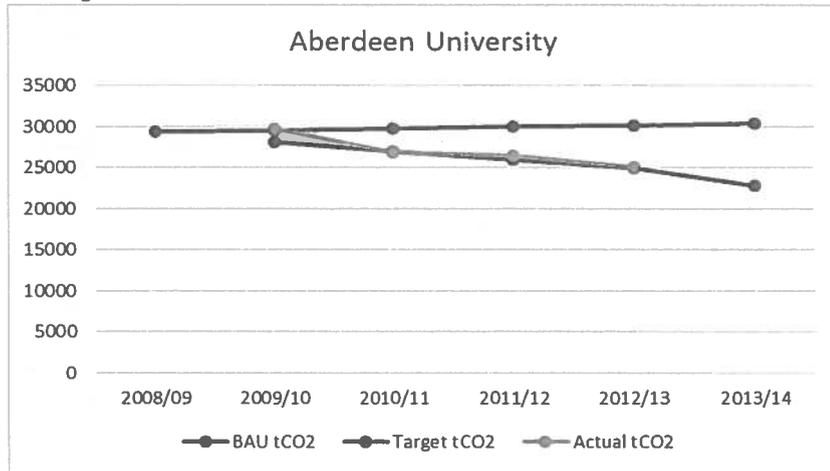
## Annex B – Individual Performance Breakdown into Metrics, Progress & Implementation

Individual Performance  
**Aberdeen University**

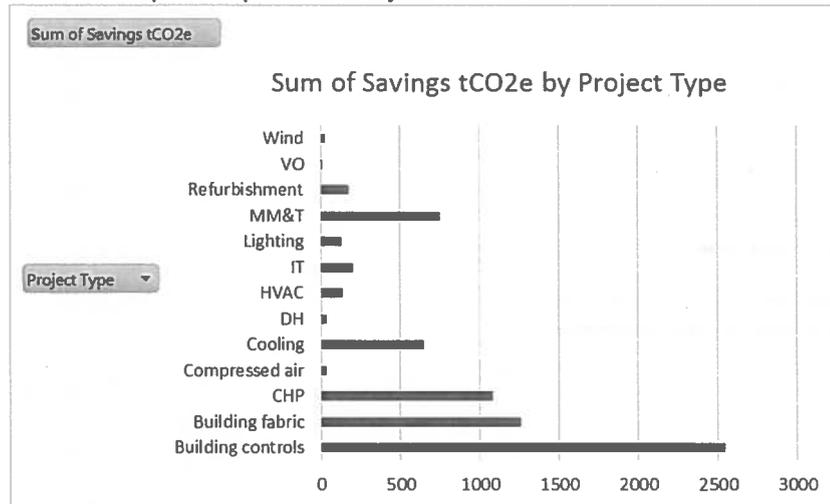
### CM Metrics

Baseline Year	2008/09
Baseline Total (tCO2e)	29,336
Target Reduction	20%
Target Year	2014/15
New Emission Total (tCO2e)	22,836

### CM Progress



### CM Carbon Impact – Implemented Projects

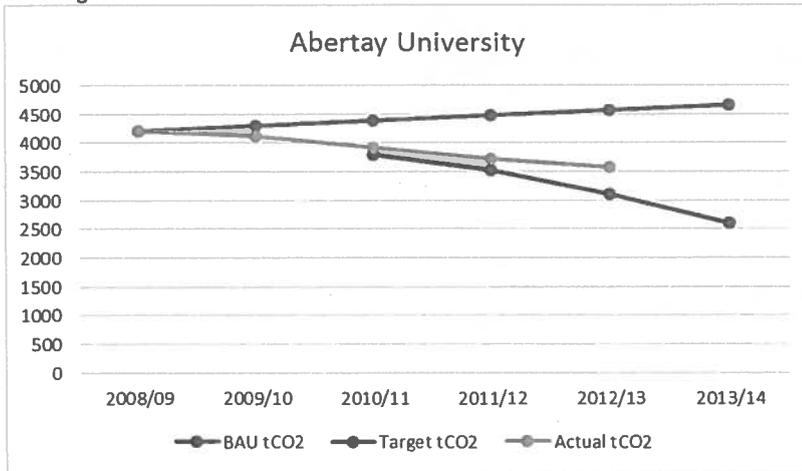


**Abertay University**

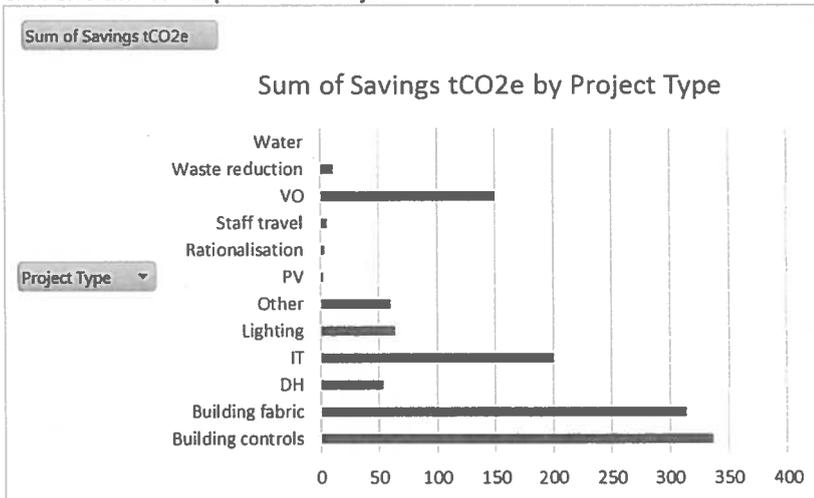
**CM Metrics**

Baseline Year	2008/09
Baseline Total (tCO2e)	4,222
Target Reduction	30%
Target Year	2016/17
New Emission Total (tCO2e)	2,955

**CM Progress**



**CM Performance - Implemented Projects**

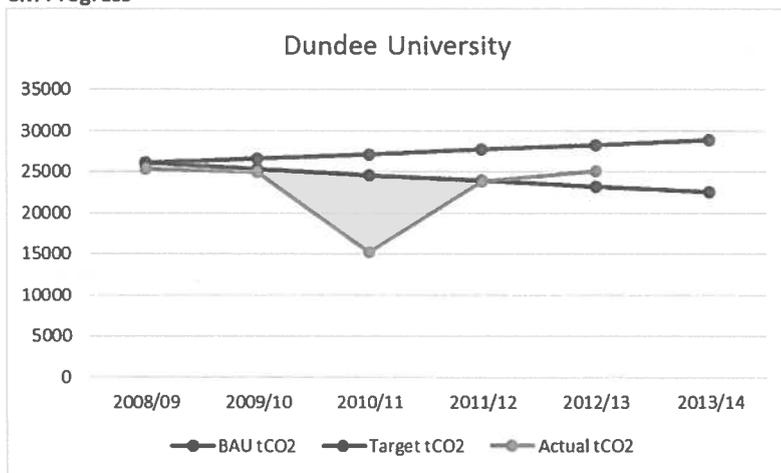


Dundee University

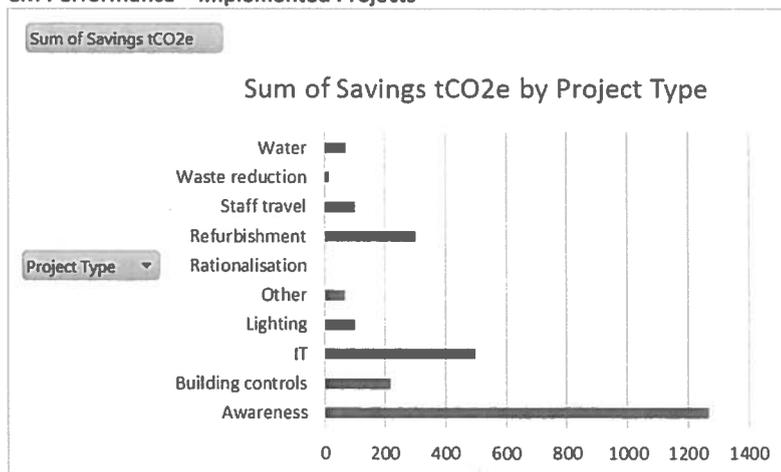
CM Metrics

Baseline Year	2008/09
Baseline Total (tCO2e)	26,111
Target Reduction	20%
Target Year	2015/16
New Emission Total (tCO2e)	21,759

CM Progress



CM Performance – Implemented Projects



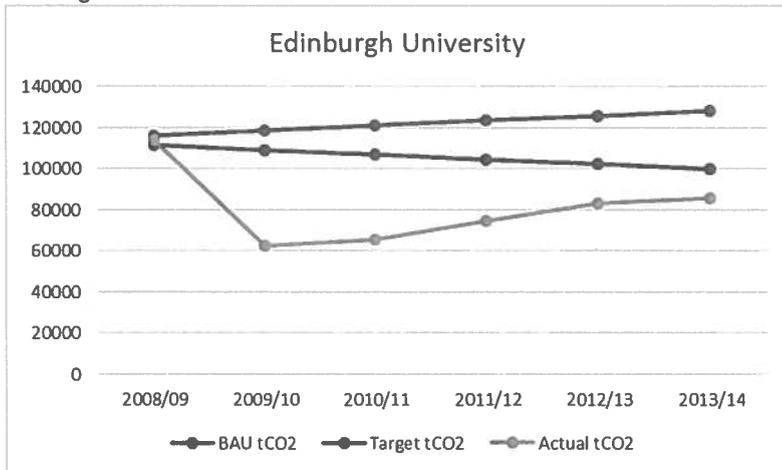


Edinburgh University

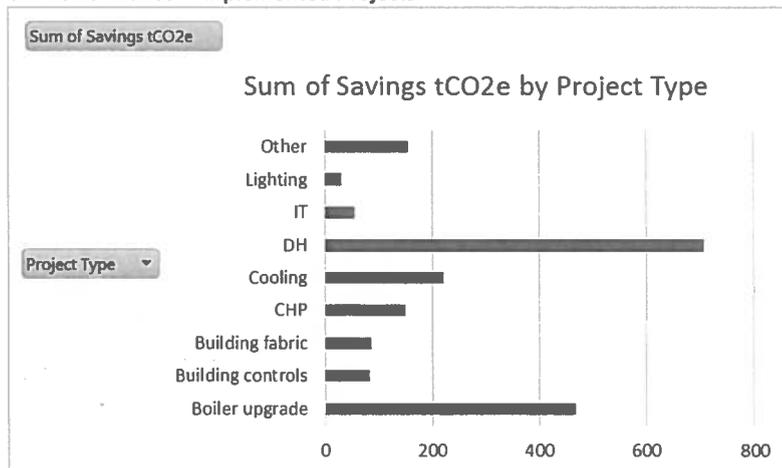
CM Metrics

Baseline Year	2007/08
Baseline Total (tCO2e)	114,000
Target Reduction	29%
Target Year	2020/21
New Emission Total (tCO2e)	81,000

CM Progress



CM Performance – Implemented Projects

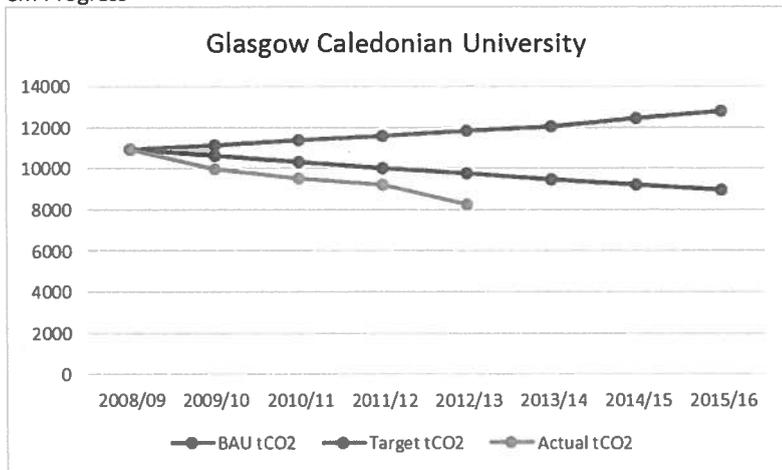


**Glasgow Caledonian University**

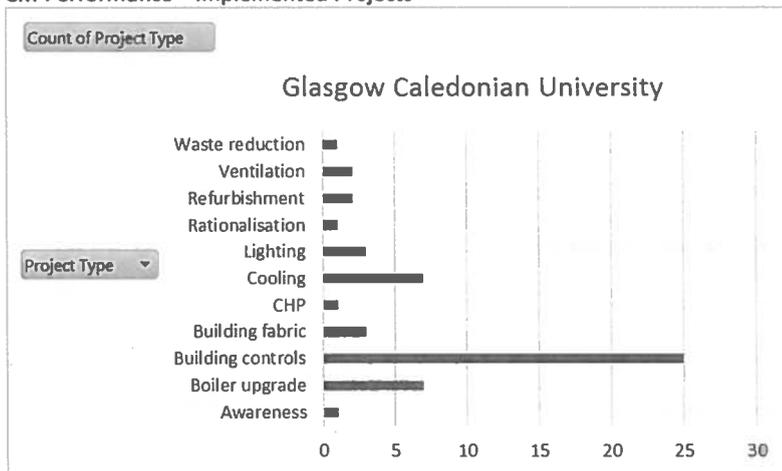
**CM Metrics**

<b>Baseline Year</b>	2008/09
<b>Baseline Total (tCO2e)</b>	10,952
<b>Target Reduction</b>	20%
<b>Target Year</b>	2015/16
<b>New Emission Total (tCO2e)</b>	8,762

**CM Progress**



**CM Performance – Implemented Projects**

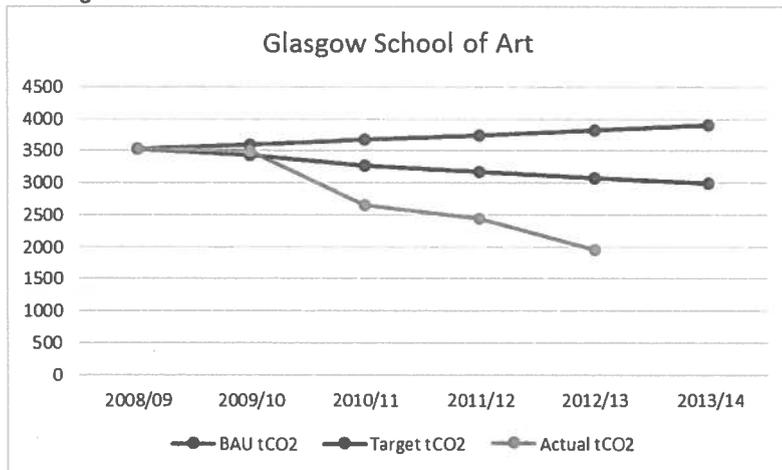


**Glasgow School of Art**

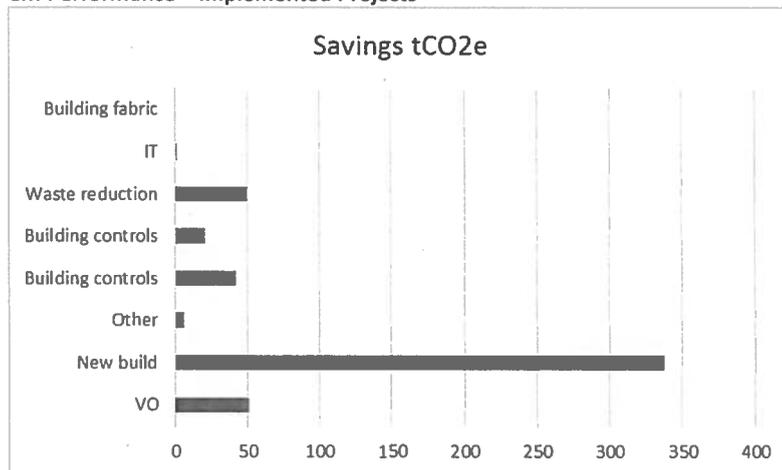
**CM Metrics**

<b>Baseline Year</b>	2008/09
<b>Baseline Total (tCO2e)</b>	3,528
<b>Target Reduction</b>	15%
<b>Target Year</b>	2014/15
<b>New Emission Total (tCO2e)</b>	2,999

**CM Progress**



**CM Performance – Implemented Projects**

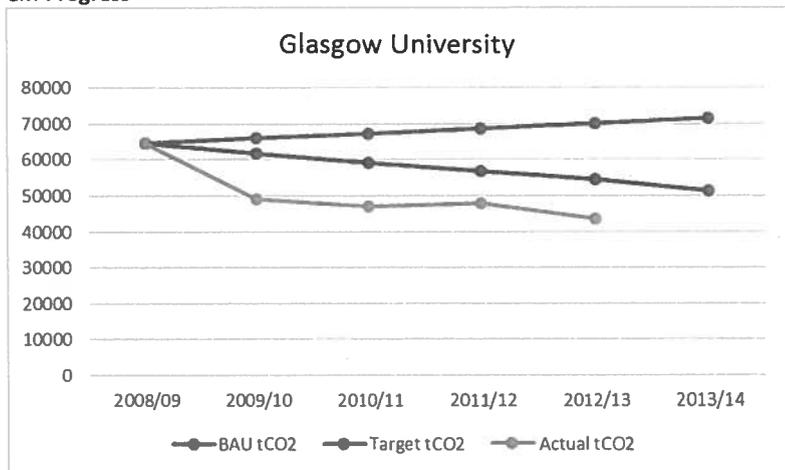


**Glasgow University**

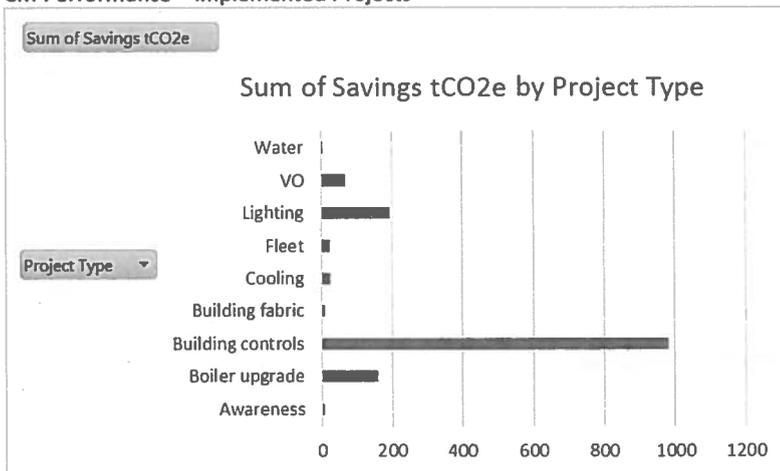
**CM Metrics**

Baseline Year	2007/08
Baseline Total (CO2e)	64,275
Target Reduction	20%
Target Year	2014/15
New Emission Total (CO2e)	51,420

**CM Progress**



**CM Performance – Implemented Projects**

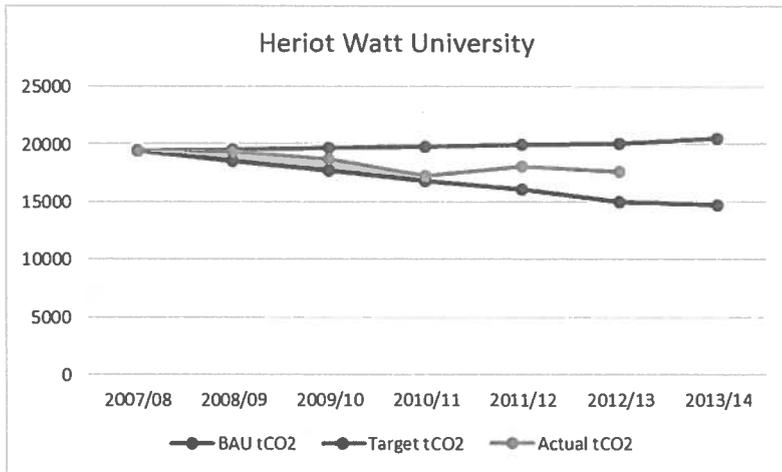


**Heriot Watt University**

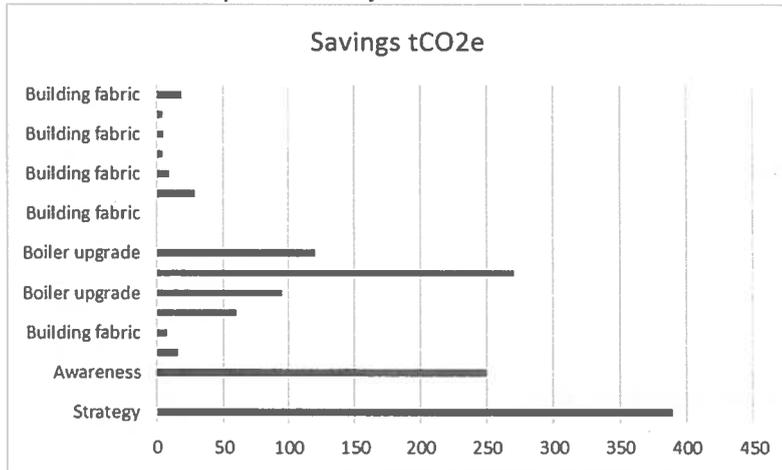
**CM Metrics**

<b>Baseline Year</b>	2007/08
<b>Baseline Total (tCO2e)</b>	19,445
<b>Target Reduction</b>	23%
<b>Target Year</b>	2013/14
<b>New Emission Total (tCO2e)</b>	15,070

**CM Progress**



**CM Performance – Implemented Projects**

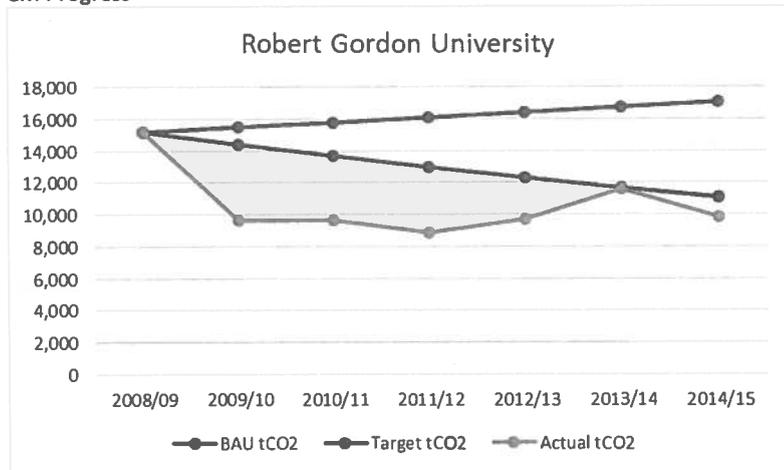


**The Robert Gordon University**

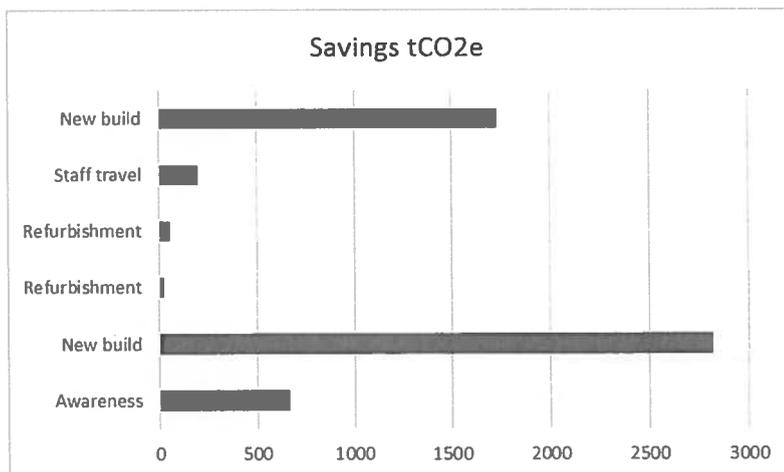
**CM Metrics**

<b>Baseline Year</b>	2008/09
<b>Baseline Total (tCO2e)</b>	15,179
<b>Target Reduction</b>	42%
<b>Target Year</b>	2020/21
<b>New Emission Total (tCO2e)</b>	8,804

**CM Progress**



**CM Performance – Implemented Projects**

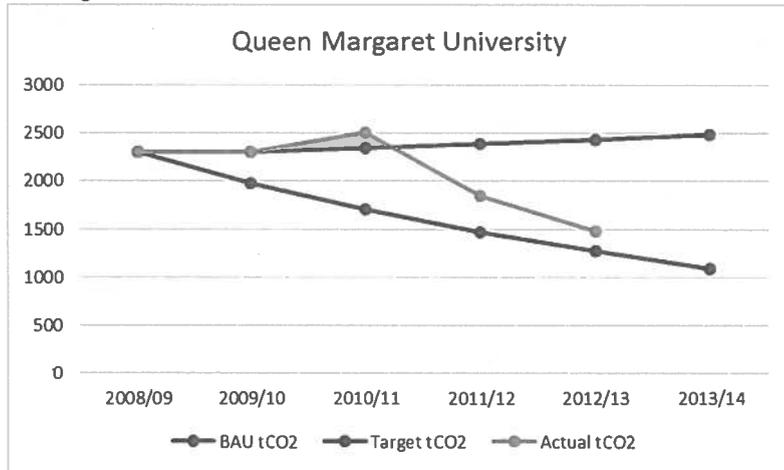


**Queen Margaret University**

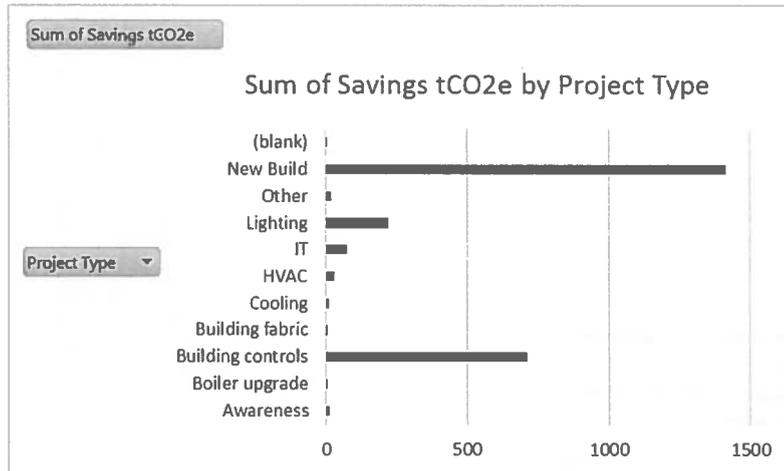
**CM Metrics**

<b>Baseline Year</b>	2008/09
<b>Baseline Total</b>	2,297
<b>Target Reduction</b>	51%
<b>Target Year</b>	2015/16
<b>New Emission Total</b>	1,126

**CM Progress**



**CM Performance**

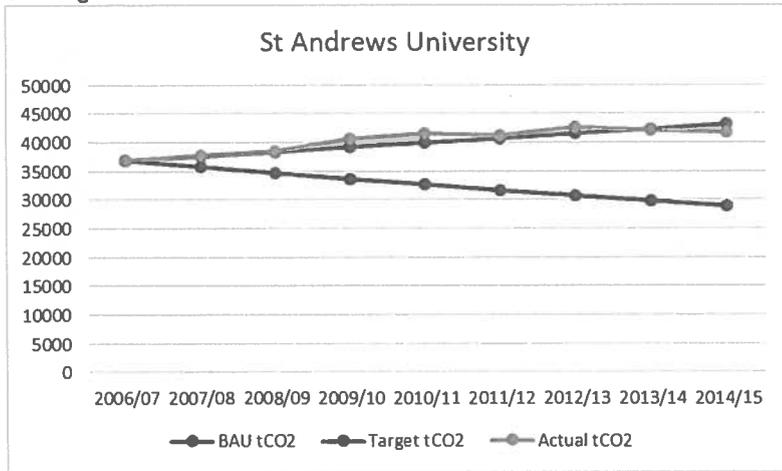


**St Andrews University**

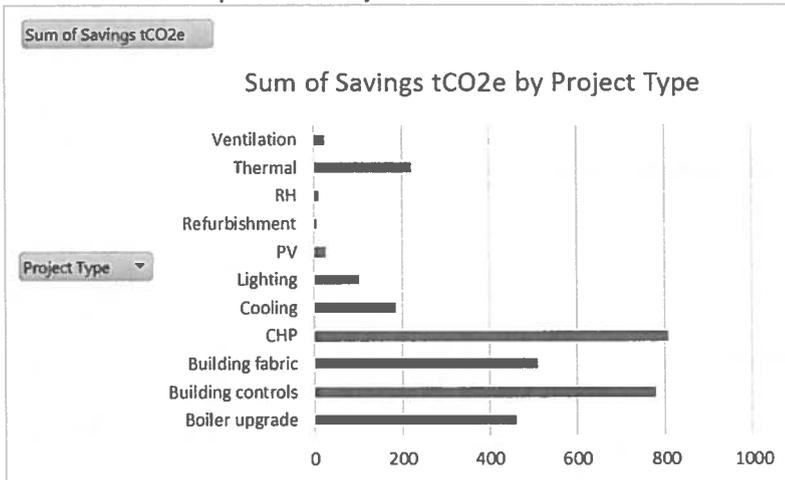
**CM Metrics**

<b>Baseline Year</b>	2006/07
<b>Baseline Total</b>	36,861
<b>Target Reduction</b>	20%
<b>Target Year</b>	2014/15
<b>New Emission Total (Interim)</b>	29,489

**CM Progress**



**CM Performance – Implemented Projects**

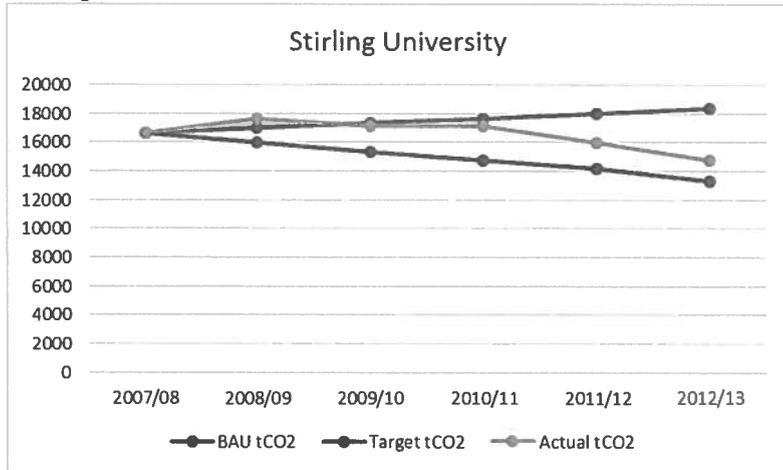


**Stirling University**

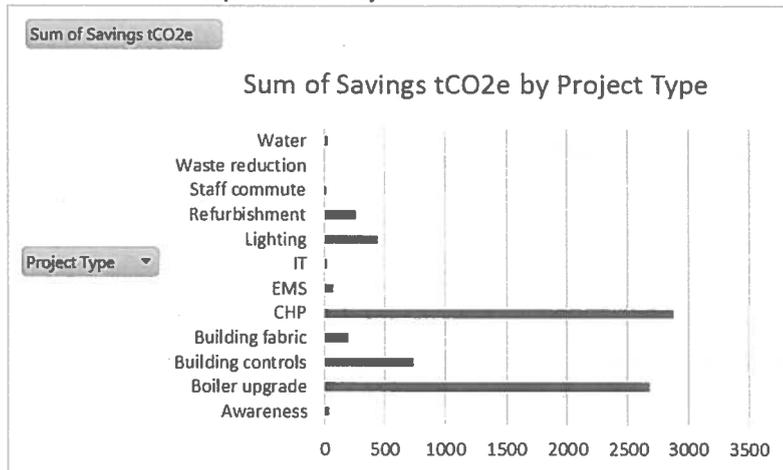
**CM Metrics**

Baseline Year	2007/08
Baseline Total (tCO2e)	16,651
Target Reduction	20%
Target Year	2012/13
New Emission Total (tCO2e)	13,321

**CM Progress**



**CM Performance – Implemented Projects**

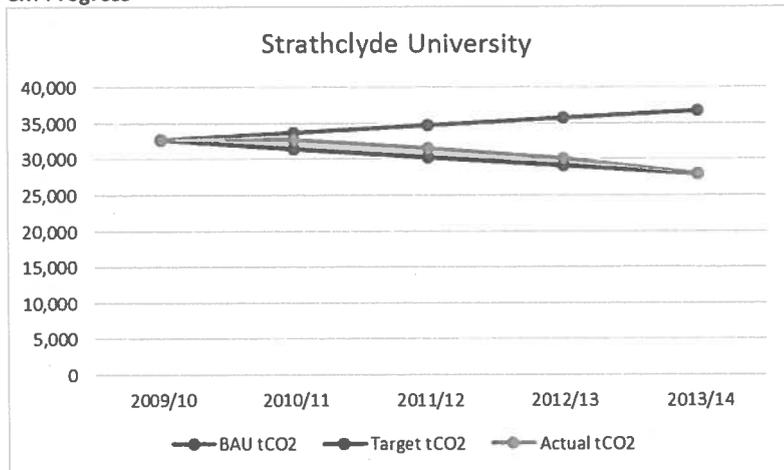


**Strathclyde University**

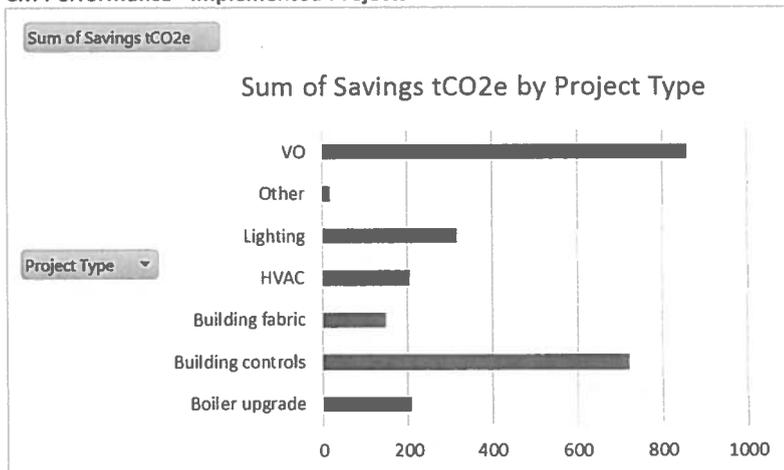
**CM Metrics**

Baseline Year	2009/10
Baseline Total (tCO2e)	32,690
Target Reduction	10%
Target Amount	2014/15
New Emission Total (tCO2e)	28,500

**CM Progress**



**CM Performance - Implemented Projects**

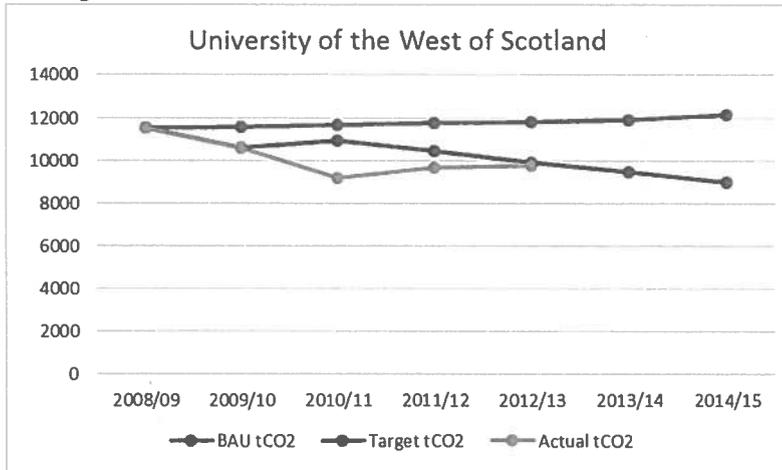


University of the West of Scotland

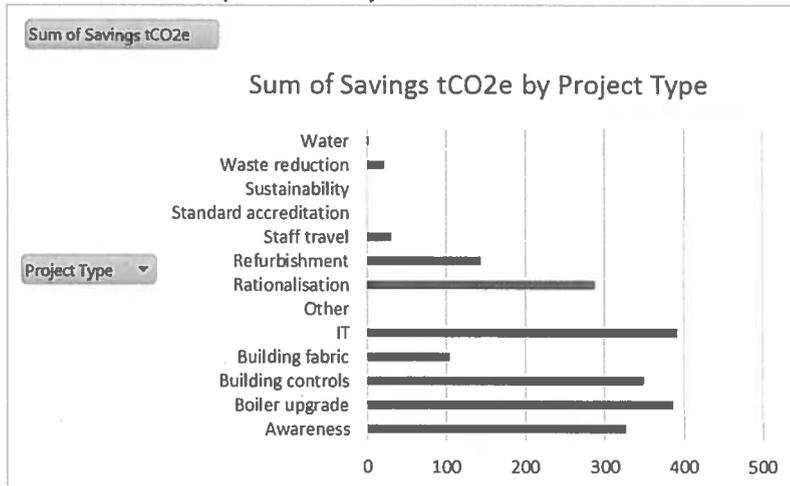
CM Metrics

Baseline Year	2008/09
Baseline Total (tCO2e)	11,499
Target Reduction	20%
Target Year	2014/15
New Emission Total (tCO2e)	9,199

CM Progress



CM Performance – Implemented Projects

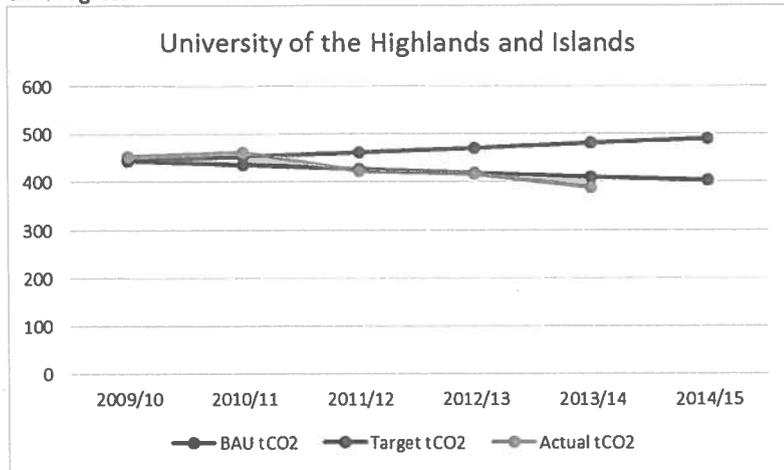


**University of the Highlands and Islands**

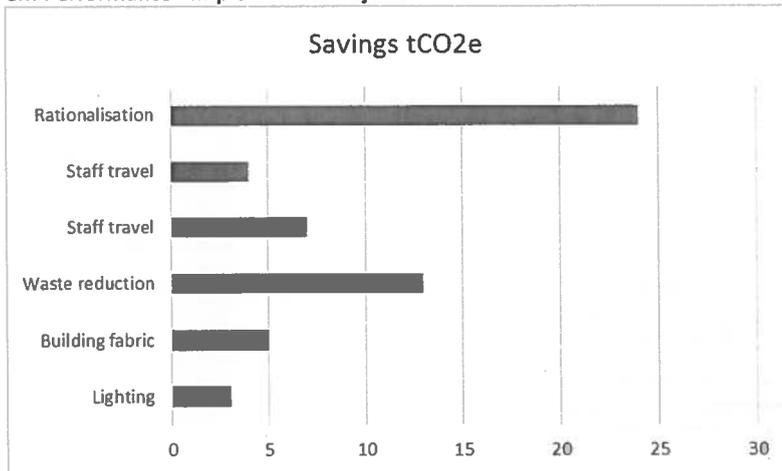
**CM Metrics**

<b>Baseline Year</b>	2009/10
<b>Baseline Total</b>	445
<b>Target Reduction</b>	10%
<b>Target Year</b>	2015/16
<b>New Emission Total</b>	400

**CM Progress**



**CM Performance - Implemented Projects**

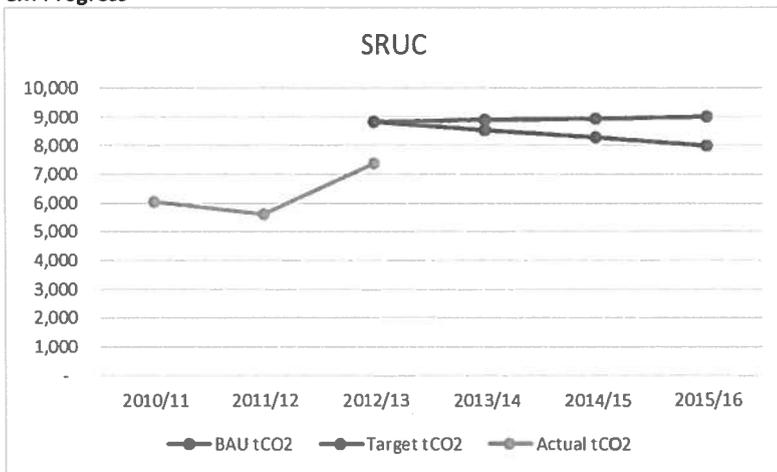


**SRUC**

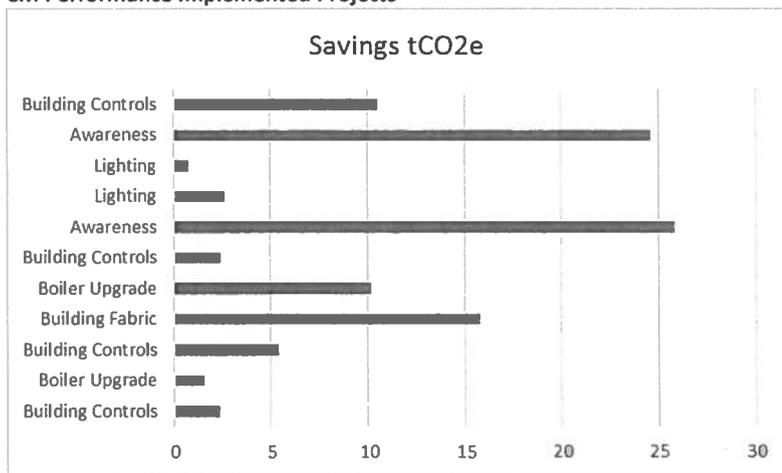
**CM Metrics**

<b>Baseline Year</b>	2012/13
<b>Baseline Total</b>	8,826
<b>Target Reduction</b>	15%
<b>Target Year</b>	2015/16
<b>New Emission Total</b>	7,502

**CM Progress**



**CM Performance Implemented Projects**





## **ABOUT AECOM**

In a complex and unpredictable world, where growing demands have to be met with finite resources, AECOM brings experience gained from improving quality of life in hundreds of places.

We bring together economists, planners, engineers, designers and project managers to work on projects at every scale. We engineer energy efficient buildings and we build new links between cities. We design new communities and regenerate existing ones. We are the first whole environments business, going beyond buildings and infrastructure.

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