

**Queen's University Belfast  
Carbon Management Programme**

**Carbon Management Plan (CMP 2013)**



**5 June 2013**

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## Management Summary

### 1. Background

Queen's University Belfast was selected in 2009 to take part in the Carbon Trust's Higher Education Carbon Management Programme (CMP). The aim of the programme was to develop a CMP, setting out the University's strategic direction on carbon management until 2020 together with the establishment of carbon management as a core business process.

A CMP was subsequently developed and approved by Senate in June 2010 and then updated in 2013 to reflect a number of developments, including:

- (i) Additional change guidance and legislation on how organisations should measure and report on their emissions.
- (ii) Continued growth of the estate and intensification of use arising from the new Estate Strategy 2012-22 and the Information Services Strategy 2012-16.
- (iii) The future impact of alternative energy projects on the emissions targets approved in 2010.

In November 2012, the Carbon Management Steering Group (CMPSG) agreed that the CMP should be updated to take account of these developments to ensure continued alignment with the University's strategic priorities. It should be noted that the end of the revised CMP period will remain 2020 as per the original CMP.

### 2. Progress to Date

Since publication of the original CMP, the University has made good progress towards achieving its target reduction in carbon emissions. This has been achieved through successful implementation of technical projects, together with positive behavioural change by staff and students.

### 3. Our Vision

The CMP (2013) reiterates that: **The University will endeavour to be a low carbon organisation, by reducing our carbon emissions and providing a high quality and sustainable working and learning environment for students and staff.**

The successful implementation of the CMP, which builds on the mobilisation of the whole organisation, rather than focusing on a strictly technical approach to carbon saving, requires the commitment of all staff and students.

### 4. Our Target

The target for the University is an ambitious **21% reduction in carbon emissions by 2020 against a 2008 base year**. This equates to a 34% reduction against a 1990 base year. The target will be regularly reviewed in the light of experience, emerging technology or changes in legislation.

## 5. Future Developments

Thus far, the University's investment in carbon management initiatives has been primarily aimed at reducing energy consumption. Whilst this remains important, the generation of heat and electricity through Alternative Energy (Renewables & CHP) generating technologies is an increasingly necessary component of our carbon reduction strategies.

Consequently, the University is now in the process of investing approximately £2.7million in the installation of CHP systems at two of the University's largest sites. A third CHP project is currently being planned in collaboration with the Belfast Health and Social Care Trust (BHSCT). When fully implemented, this project will result in substantial carbon savings and financial benefits for both organisations.

## 6. Future Challenges

Delivering the strategic priorities identified in the University's Corporate Plan will require the continuous enhancement of services and infrastructure. It is inevitable that some of these enhancements will result in growth in carbon emissions.

The CMP initially estimated that carbon emissions, if left unchecked, would grow by approximately 3,000 tonnes per year by the end of the CMP period. This figure has since been revised and is now estimated to be in the region of 4,706 tonnes per year, as a result of the continued development of the estate (4,334 tonnes) together with increases in ICT activity (372 tonnes).

It is anticipated that this future growth in emissions will be offset through the implementation of alternative energy generation projects discussed above. Any shortfall will be offset through further alternative energy projects, yet to be identified, and/or by the Government-sponsored decarbonisation of grid supplied electricity.

## 7. Funding

An overall investment in carbon management initiatives of almost £10m, up to 2020, will be needed in order to achieve the University's target.

The monetary savings from this investment will rise progressively over the period of the CMP and are estimated at approximately £2.4m per annum by 2020. These savings will be fully reinvested in the University's Green Revolving Fund (GRF) and used to fund technical and Change Management projects, thereby ensuring that the CMP remains resource neutral.

The costs and recurrent savings outlined above indicate that the overall CMP has a relatively short payback period of approximately 4.2 years.

## 8. Accountability

The accountability of budget holders across the University for the achievement of agreed carbon reduction targets is key to the success of the CMP. A comprehensive awareness raising and educational programme will continue to be developed to help staff and students understand carbon management and its impact on the University.

Budget holders will also continue to be supported by a network of Environmental Champions, selected in consultation with Heads of School and Academic Support Directors, who will help promote the low carbon agenda in their areas.

9. Annual Performance Review

Carbon reduction is incorporated as a KPI at both institutional and School/Directorate level, with progress in meeting targets included in all School and Directorate Annual Performance Reviews submitted to the University Operating Board in November each year. These are, in turn, reported to the University Management Board, the Planning and Finance Committee and, ultimately, to Senate each December.

## 1. Introduction

Queen's University Belfast is a broadly-based research-driven university, and member of the Russell Group, with a dynamic world-class research and education portfolio and strong international connections.

The University's Corporate Plan 2011-16 identifies four strategic priorities:

- ***To offer an exceptional student experience and high quality education, leading to improved progression, attainment and excellent career opportunities for our graduates***
- ***To enhance internationally recognised, globally competitive and sustainable research areas***
- ***To grow an efficient, effective and sustainable enterprise***
- ***To develop global citizens and address international challenges***

Carbon and energy management are critical if we are to grow an efficient, effective and sustainable enterprise. Benchmarked against our group peers, the University is one of the more energy efficient users. We have a good record in managing energy, and have implemented a significant number of projects to reduce consumption and costs. We are also striving to build the most energy efficient buildings possible. Furthermore, recent years has seen a step change in the way that energy and utility data is managed; and we are now better placed than ever to assess the effectiveness of the measures we implement.

The CMP, first adopted in 2010 and then updated in 2013, also reflects the University's commitment to environmental sustainability. This is against a background of increasing evidence of human-induced climate change damage, the threat of rapidly depleting fossil fuel reserves, the need to react to rising energy prices and changes to Government legislation.

Accordingly, the CMP is critical in addressing a broad range of Corporate risks, which can be categorised as:

- **Financial** - Increasingly, legislation is now designed to reward those organisations that take the threat of climate change seriously and reduce their carbon emissions; whilst penalising those that do not.
- **Reputational** - Students and potential business partners have begun pressing universities for more disclosure on environmental credentials, including information on carbon emissions. For example, information is being compiled and published annually – the Green League - by the People & Planet student network. The University needs to be seen to be “ahead of the game” if it is to continue to attract additional status.
- **Operational** - Carbon emissions have now become key metrics in assessing the operational performance of Higher Education estates, with organisations required to submit information annually to the Higher Education Statistics Agency (HESA).

The key benefit in developing the CMP is that the University has a plan, agreed at a senior level, to reduce carbon emissions over the coming years in line with best practice and to meet the Government target of a 34% reduction in carbon emissions by the year 2020. The Plan will enable the University to better absorb increased energy and carbon prices.

The CMP will underpin the University's Environmental Management Policy over the coming years. It is recognised, however, that this will be a dynamic process, requiring regular review in order for it to be both pro-active and reactive to the various social, technical, regulatory and other changes that will undoubtedly occur.

## 2. Carbon Management Strategy

### 2.1 Context and Drivers for Carbon Management

The objective of the CMP is to minimise the risks and maximise the opportunities arising from carbon management and climate change, in the context of a rapidly evolving regulatory framework, volatile market forces and increased stakeholder concerns.

We recognise carbon management as a strategic, whole-organisation approach that integrates with our existing strategy and management, enabling the institution to:

- Understand the impact of carbon emissions
- Identify key risks and opportunities
- Formulate a plan to reduce carbon emissions
- Effectively implement, review and update the CMP
- Communicate success

Adoption and implementation of the CMP will result in an increased awareness of the potential impacts of climate change on the University and a greater capacity to identify and deal with these impacts. By establishing carbon management as a core business process, we will be better able to adapt to an increasingly carbon-constrained economy whilst also reducing our energy costs.

### 2.2 Our Low Carbon Vision

**The University will endeavour to be a low carbon organisation, by reducing our carbon emissions and providing a high quality and sustainable working and learning environment for students and staff.**

### 2.3 Measures to Mitigate Carbon Emissions

Realising the University's low carbon vision will involve a thorough appraisal of the impacts in relation to:

- (i) Procurement
- (ii) Green ICT
- (iii) Energy Efficiency
- (iv) Waste Minimisation
- (v) Travel and Transport
- (vi) Change Management
- (vii) Alternative Energy (Renewables & CHP)

### 3. Emissions Baseline and Projections

Calculating a carbon emissions baseline is the first step in enabling the University to quantify its carbon footprint and to gain a better understanding of its overall carbon contribution. The baseline is used to measure the University's future carbon reduction performance as carbon-saving initiatives are implemented.

The following sections describe the scope and source of carbon emissions included in the CMP.

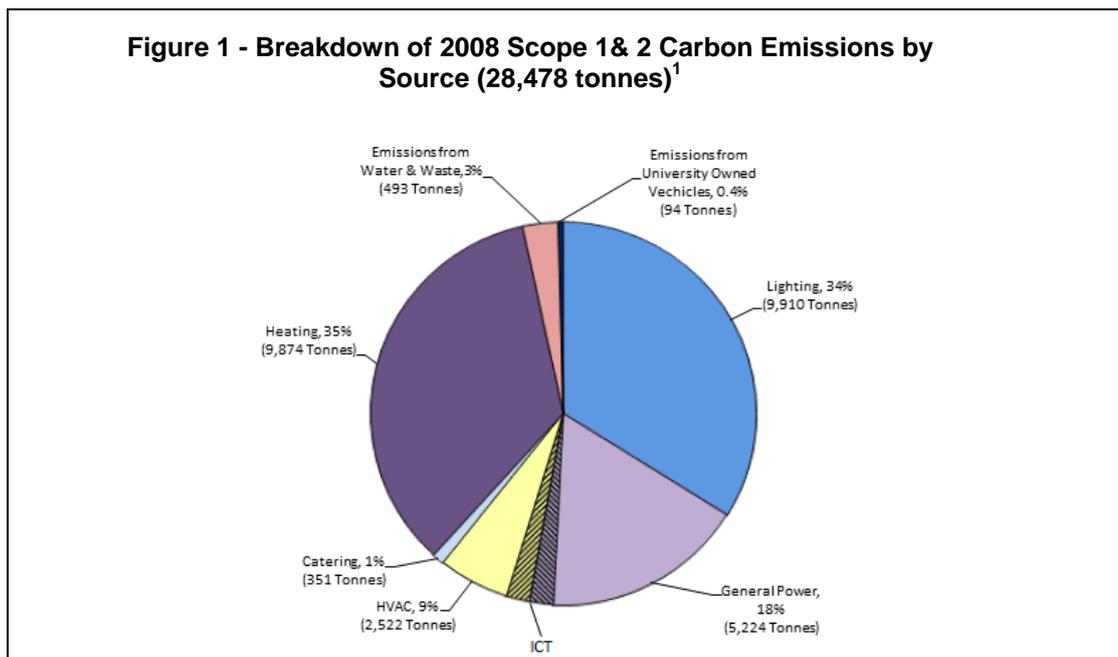
#### 3.1 Scope of Carbon Emissions

The World Resource Institute (WRI) has developed a classification of carbon emission sources as follows:

- **Scope 1** is direct carbon emissions that occur from sources that are owned or controlled by the organisation, for example, carbon emissions from combustion of fuel in owned or controlled boilers, generators, vehicles.
- **Scope 2** accounts for carbon emissions from the generation of purchased electricity consumed by the organisation.
- **Scope 3** is all other indirect carbon emissions which are a consequence of the activities of the company, but occur from sources not owned or controlled by the organisation – for example, water, waste, travel and procurement.

The University's primary focus is to make reductions in carbon emissions derived from fuel, electricity, water and waste, as these can be more accurately quantified.

Figure 1 below sets out the breakdown of current carbon emissions across the University by source.



Note 1: Based on 2012 DEFRA Green House Gas Conversion Factors for Company Reporting.

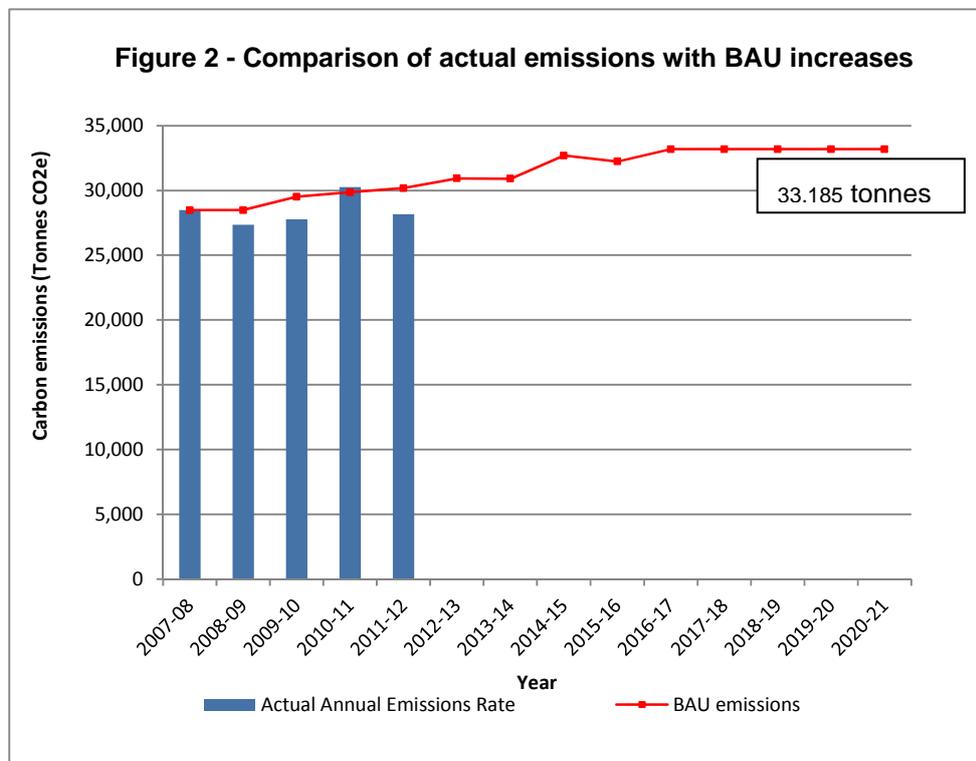
In relation to travel and procurement carbon emissions (Scope 3), the University has committed to improving the measurement of carbon emissions with the intention of setting targets in the future, as more reliable data becomes available.

### 3.2 Business as Usual (BAU)

Achievement of the Corporate strategic priorities will increase the University's carbon emissions in the short to medium term.

Figure 2 shows the estimated potential increase and future forecast, based on historical trends and taking into account planned changes to the estate, services and infrastructure. This is a do nothing scenario referred to by the Carbon Trust as BAU and assumes:

- No investment in low carbon projects
- Staff and students are not actively encouraged to participate in carbon management
- The University takes no additional measures to reduce carbon emissions
- Continued development of the estate, together with increases in ICT activity, will result in an additional 4,334 tonnes and 372 tonnes, respectively, of carbon emissions each year by the end of the CMP period (2020)



### 3.2.1 Managing the BAU Scenario

If carbon emissions continue unchecked, the University will emit approximately 33,185 tonnes of carbon per year by 2020 – a 16% increase from a 2008 baseline of 28,478 tonnes.

### 3.2.2 Measures to Mitigate Carbon Emissions

To mitigate the increase in carbon emission levels described above, the University is continuing to undertake a range of projects under the following strategic initiatives:

- (i) Procurement
  - (ii) Green ICT
  - (iii) Energy Efficiency
  - (iv) Waste Minimisation
  - (v) Travel and Transport
  - (vi) Change Management
  - (vii) Alternative Energy (Renewables & CHP)
- } Technical Initiatives

### 3.3 The University Target

**The target for the University continues to be an ambitious 21% reduction in carbon emissions by 2020 against a 2008 base year.** This equates to a 34% reduction against a 1990 base year. The target will be reviewed and adjusted in the light of experience, emerging technology or changes in legislation.

It should be noted that the base year of 2008 refers to the University's 2007-08 financial year.

Table 1 below sets out the estimated savings that should be realised by the end of 2013 as a result of the various measures and supporting initiatives identified in section 3.2.2. The percentage savings are set against the 2008 carbon emissions rate of 28,478 tonnes/year.

Table 1: Breakdown of Targeted Savings

Initiative	Target Carbon Emission Saving		Estimated Savings Achieved up to 2013	Balance of Savings to be Achieved by 2020
	%	tonnes	tonnes	tonnes
<b>Procurement</b>	-	-	-	-
<b>Green ICT</b>	2.00	566	255	311
<b>Energy Efficiency</b>	12.80	3,621	2,041	1,580
<b>Waste Management<sup>1</sup></b>	0.16	98	68	30
<b>Travel and Transport<sup>1</sup></b>	0.04	34	29	5
<b>Change Management</b>	6.00	1,698	808	890
<b>Sub Total</b>	21.00	6,017	3,201	2,816

Notes:1. Target revised for 2013 as CMP 2010 target has been exceeded.

Future growth in emissions of 4,706 tonnes arising from the priorities identified in the Corporate Plan will be offset through the implementation of alternative energy generation projects. Any shortfall will be offset by further alternative energy projects yet to be identified, and/or by de-carbonisation of the electricity grid.

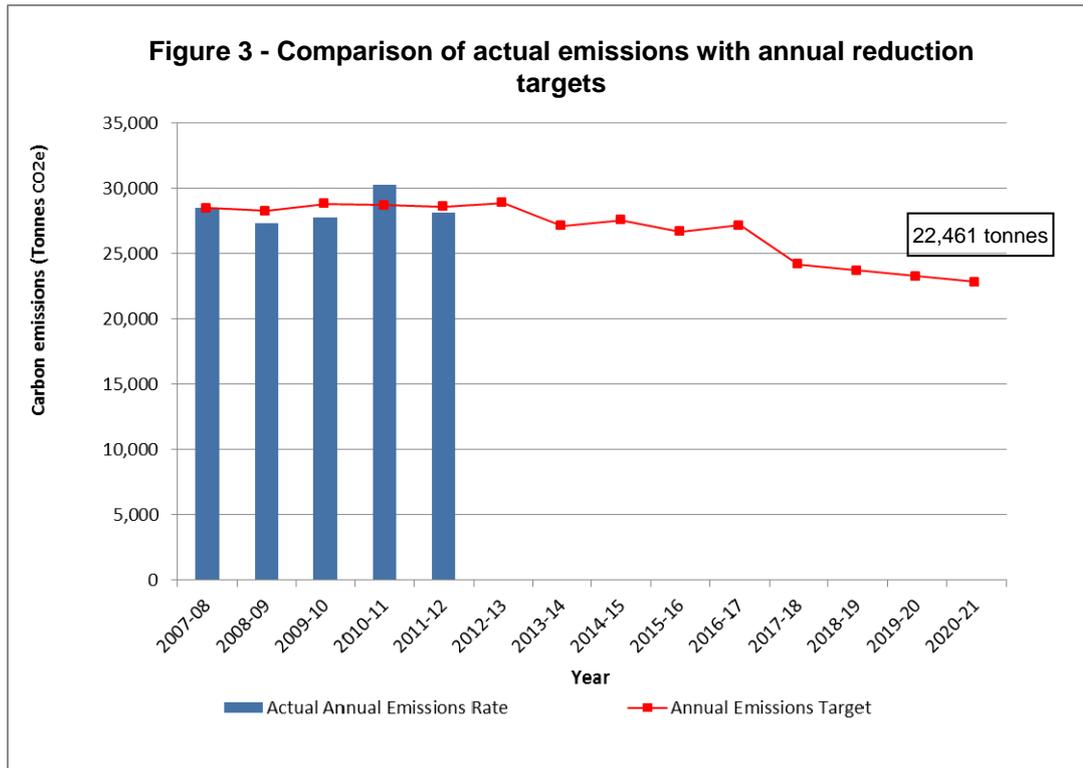
Table 2 below summarises the estimated carbon savings and costs associated with these projects.

Table 2: Summary of Alternative Energy (Renewables & CHP) Projects

Location of Alternative Energy Projects	Investment	Estimated Carbon Saving	Status
		tonnes	
<b>Main Site (CHP)</b>	£1,581,880	1,344	Completion Autumn 2013
<b>Keir/Ashby Site (CHP)</b>	£1,079,352	948	Completion Autumn 2013
<b>Health Sciences Campus (CHP)</b>	£2,149,000	2,414	Business case submitted
<b>Total</b>	£4,810,232	4,706	-

### 3.4 Projections

Figure 3 projects the University's annual targets for the duration of the CMP together with performance to date.



It is worth noting that extreme weather was the primary reason for the increase in carbon emissions during 2010-11. This was due to temperatures being substantially lower than the previous 20 year average.

Normalising the emissions data to exclude the effect of the weather, indicates that emissions for 2010-11 would have been 27,791 tonnes and on target for the year.

In the event of other extreme weather incidents during the remainder of the Plan period, actual emissions will continue to be reported as in 2010-11. However, a normalised figure will also be calculated to enable the progress of the various strategic initiatives, discussed in 3.2.2, to be assessed.

#### 4. Strategic Initiatives

The CMP is based on the identification of opportunities relating to seven strategic initiatives. These are supported by a range of projects implemented over defined timescales.

##### 4.1 Procurement

###### **Strategy Statement**

The University is committed to improving its environmental performance. It is dedicated to executing its purchasing activities in an environmentally responsible manner and ensuring that ultimately, and where practicable, the University deals only with suppliers who have developed sound environmental credentials.

###### **Key Objectives**

- (i) Develop a formal Environmental Purchasing Policy which supports the University's Environmental Policy
- (ii) A proactive approach to be taken with key suppliers to progress environmental initiatives, influence environmental policies and exchange best practice
- (iii) In preparation for future reporting, identify methods that will enable emissions derived from procurement sources to be reported in due course

###### **Targets**

The Procurement initiative is treated as an enabling opportunity which will support many of the remaining initiatives and as such, there is no specific target. Low carbon procurement techniques will assist or contribute to the an overall 21% reduction in carbon emission levels compared to 2008.

##### 4.2 Green ICT

###### **Strategy Statement**

Information Services is dedicated to environmentally sustainable computing and improving the energy efficiency of data centres and computing systems throughout the University. This will be achieved through the adoption, and promotion, of processes and technology developed to improve energy performance.

###### **Key Objectives**

- (i) Implementation of virtualisation technology
- (ii) Improvement in design of core systems
- (iii) Better overall infrastructure for hosting/managing IT
- (iv) Compliance with latest power consumption standards for IT equipment
- (v) Close co-operation with the Purchasing Office to improve standards

Progress toward Target	tonnes of CO <sub>2</sub>
Target (2%)	566
Progress to Date (2013)	255
<b>Balance Remaining (by 2020)</b>	<b>311</b>

#### 4.3 Energy Efficiency

##### Strategy Statement

Energy efficiency in the operation of buildings across the campus is key to reducing carbon emissions. The main focus in relation to existing building stock will be to improve energy efficiency and so reduce energy consumption. The Estates Directorate will continue to identify opportunities where energy efficiency technology and conservation measures can be implemented to achieve this aim.

##### Key Objectives

- (i) Reduce energy consumption in relation to services in existing buildings, through targeted upgrade programmes
- (ii) Achieve BREEAM Excellent rating on all new build projects
- (iii) Achieve BREEAM Very Good rating on all major refurbishment projects

Progress toward Target	tonnes of CO <sub>2</sub>
Target (12.8%)	3,621
Progress to Date (2013)	2,041
<b>Balance Remaining (by 2020)</b>	<b>1,580</b>

#### 4.4 Waste Minimisation

##### Strategy Statement

The Waste Management Policy confirms the University's commitment to minimising waste and maximising recycling, and is based on the Waste Hierarchy – Reduce, Re-use, Recycle, Disposal.

It is recognised that minimisation of waste and increased recycling will contribute to a reduction in carbon emissions.

##### Key Objectives

- (i) Reduce the quantities of waste generated, and maximise recycling of those materials which enter the waste stream
- (ii) Ensure waste is managed with minimal impact on the environment and public health
- (iii) Develop a controlled internal process for the collection and preparation of waste, to enhance recycling and reduce costs

- (iv) Adopt and promote more sustainable practices for resource consumption and waste management
- (v) Provide staff and students with increased opportunity to contribute to environmental protection

Progress toward Target	tonnes of CO <sub>2</sub>
Target (0.16%)	98
Progress to Date (2013)	68
<b>Balance Remaining (by 2020)</b>	<b>30</b>

It is worth noting that the target for waste has been increased from the original CMP (2010) target on the basis of the high level of performance to date.

#### 4.5 Travel and Transport

##### Strategy Statement

The Fleet Management Policy provides a mechanism to ensure continual environmental improvement. The long term strategy is to further reduce the environmental impact of all transport activities and help maximise institutional efficiency. The Policy includes:

- Vehicle Acquisition Procedure
- Vehicle Management Information Procedure
- Vehicle Disposal Procedure

The Travel Plan outlines the University's strategy to reduce the environmental impact of staff and students travelling to and from the University and identifies opportunities for influencing the travel behaviours of its staff, students and customers.

##### Key Objectives

- (i) That fleet is operated efficiently, whilst risk is efficiently managed
- (ii) The environmental impact of vehicles is considered prior to purchase
- (iii) In preparation for future reporting, identify methods that will enable emissions derived from business travel and staff and student commuter travel.

Progress toward Target	tonnes of CO <sub>2</sub>
Target (0.04%)	34
Progress to Date (2013)	29
<b>Balance Remaining (by 2020)</b>	<b>5</b>

It is worth noting the target for travel and transport has been increased from the original CMP (2010) target based on the high level of performance to date.

## 4.6 Change Management

### Strategy Statement

The mission of this Change Management Strategy is to:

'Empower staff and students to achieve a low carbon lifestyle'.

### Key Objectives

- (i) Reduce the University's Scope 1 and 2 carbon emissions by 6% by 2020 (compared to BAU) through a targeted and sustained Change Management plan. This will contribute to, and underpin, the University's overall target of a 21% reduction by 2020 (compared to BAU).
- (ii) Sustain Change Management progress to date
- (iii) Improve further on the Change Management contribution to carbon savings
- (iv) Achieve behavioural change in student accommodation
- (v) Raise the profile of Queen's as an example of best practice in carbon management

Progress toward Target	tonnes of CO <sub>2</sub>
Target (6%)	1,698
Progress to Date (2013)	808
<b>Balance Remaining (by 2020)</b>	<b>890</b>

## 4.7 Alternative Energy (Renewables & CHP)

### Strategy Statement

While the conservation of energy has an important role to play in reducing carbon emissions, this area is already well developed within the University. To date, this approach has made sense in terms of investment of time and money.

However, the generation of heat and electricity from alternative methods, such as CHP or renewable energy sources, is increasingly becoming a necessary component of strategies aimed at reducing carbon emissions.

### Key Objectives

Reduce carbon emissions that result from the generation of electricity and heat through the appraisal and targeted implementation of renewable and low carbon energy generation projects including:

- (i) Gas CHP Engines
- (ii) Solar PV
- (iii) Wind Turbines
- (iv) Biomass
- (v) Anaerobic Digestion

<b>Progress toward Target</b>	<b>tonnes of CO<sub>2</sub></b>
Target (CMP 2013)	4,706
Progress to Date (2013)	0
<b>Balance Remaining (by 2020)</b>	<b>4,706</b>

#### 4.8 Monitoring, Reporting and Review

Monitoring, reporting and review will be undertaken by the Carbon Management Working Groups, referred to in section 7, with the progress reported annually to the CMPSG.

## 5. Financing the Plan

### 5.1 Introduction

This section outlines the financial implications of the various actions and initiatives required to achieve the target reduction in carbon emissions.

### 5.2 Targets and Core Assumptions

The target reductions are set out in section 4 and summarised in Table 3 below:

Table 3: Summary of Carbon Emissions, Savings and Offsets Required

Summary of Carbon Emissions, Savings and Offsets		Target Carbon Emission Savings (tonnes/year)	Total Carbon Emissions (tonnes/year)
2008 Baseline			<b>28,478</b>
Less Savings from:	<i>Procurement</i>	-	
	<i>Green ICT</i>	(566)	
	<i>Energy Efficiency</i>	(3,621)	
	<i>Waste Management</i>	(98)	
	<i>Travel and Transport</i>	(34)	
	<i>Change Management</i>	(1,698)	
<b>Sub Total</b>		<b>(6,017)</b>	<b>22,461</b>
Increase in emissions due to growth over the Plan period (see section 3)		4,706	
Offset by <b>alternative energy</b> generation		4,706	
<b>Sub Total</b>		0	
<b>Total Projected Carbon Emissions by 2020</b>			<b>22,461</b>

There are a wide range of variables involved in the CMP, and uncertainty regarding many areas of technological advancement and future Government policy. Consequently, a number of assumptions have been used to estimate both the financial benefit and the costs associated with implementing the CMP:

- (i) The required reduction of 6,017 tonnes CO<sub>2</sub> on the 2008 steady state level will be saved by the strategic initiatives detailed in section 4 and summarised in Table 3
- (ii) Projected growth in carbon emissions of 4,706 tonnes CO<sub>2</sub> as detailed in section 3 will be offset through the implementation of alternative energy generation projects. Any shortfall will be offset by further alternative energy projects yet to be identified, and/or by de-carbonisation of the electricity grid.
- (iii) A carbon factor of 0.45kg/kWh is applicable for electricity
- (iv) Average ambient temperatures will remain unchanged throughout the period to 2020
- (v) Progress to date against the targets for both Travel & Transport and Waste Management have been achieved with no cost incurred. Any future initiatives in these areas are also assumed to have no cost and are therefore not considered further in this section
- (vi) Savings are based on 2013 energy prices

### 5.3 Green ICT

The target emissions reduction for Green ICT is 566 tonnes per annum, as outlined in section 4. The University has implemented projects in the initial years of the CMP, which have created a total carbon reduction of 255 tonnes, representing good progress towards the 566 tonnes. The annual financial saving from the reduction has been calculated as £73,643. On this basis, should the target savings of 566 tonnes be met, the annual financial saving will rise to £163,459.

These gains have all come from projects funded from existing Information Services budgets. The reductions in carbon emissions are by-products of projects implemented for institutional ICT purposes and so there is no additional cost to the University. Funding for future projects over the remainder of the CMP period will come from either existing IS Rolling Plan budgets, DEL Capital Grant funding, specifically approved ICT projects, or the GRF.

### 5.4 Energy Efficiency

#### 5.4.1 Progress to Date

Table 4 below summarises the cost and savings associated with the Energy Efficiency projects undertaken to date.

Table 4: Summary of Energy Efficiency Projects Completed to Date

Number of projects completed in year	Capital Value	Annual Financial Saving from in-year projects	Annual CO <sub>2</sub> saving from in-year projects tonnes	Average Payback period years
	10 (2009-10)	£379,840	£97,248	502
8 (2010-11)	£187,684	£47,699	229	3.9
5 (2011-12)	£320,836	£71,685	365	4.5
6 (2012-13)	£1,273,063	£200,362*	945*	6.4
<b>29</b>	<b>£2,161,423</b>	<b>£416,994</b>	<b>2,041</b>	<b>5.2</b>

\*Estimated annual saving from recently completed projects

The 2,041 tonnes per annum saved to date represents good progress in the initial years of the original 12 year CMP. If this progress is continued over the seven years from 2013-14 to 2019-20, the University should achieve the target set for energy efficiency projects.

As outlined above, projects completed to date have created savings amounting to over half of the 3,621 tonnes target. On average, each tonne of carbon saved has cost £1,059 of capital investment with an average payback on these projects of 5.2 years.

Going forward, payback periods are expected to now steadily increase as opportunities for quick-wins reduce. The assumption is that the average payback period for the remainder of the CMP will rise to approximately seven years.

On this basis, the total capital investment required over the next seven years to achieve the 3,621 tonnes target is £2.250m, or £321,428 per annum on average. Identifying suitable projects is likely to become more challenging in the future, but the University is committed to actively pursuing all opportunities available to make carbon savings over the period.

#### 5.4.2 Financing of Energy Efficiency Projects

The University has established a GRF totalling £1.028m and partially funded by Salix Finance. Salix is a Carbon Trust funded company set up to accelerate public sector investment in energy efficiency technology projects through 'invest to save' schemes.

The underlying principle of the GRF is that the savings generated from capital investment in energy efficiency projects will be recycled to the fund for reinvestment in other energy efficiency projects.

The annual recurrent savings from projects completed to date of £416,994, as outlined in Table 4, should be more than sufficient to fund the required annual capital expenditure of £321,428.

## 5.5 Change Management Initiatives

In addition to reducing carbon emissions through technical initiatives, the University aims to reduce energy consumption through changing staff and student behaviour. As outlined in Table 3, the target reduction in emissions from Change Management initiatives is 1,698 tonnes. This section deals with the financial costs and savings of these initiatives.

### 5.5.1 Progress to Date

The University has developed a Change Management Strategy for carbon management which has been influential in driving behavioural change within Queen's. There has been a step change in emission levels, with many organisational units achieving significant reductions, primarily in the area of electricity consumption. The actual carbon saving from reduction in electricity in 2011-12, the most recent full academic year, was 808 tonnes at an annual financial saving of approximately £232,000.

A total of £143,900 has been spent on Change Management to date, including specific initiatives and staff costs. The annual recurrent cost over the remaining life of the CMP is expected to be £72,000 per annum. A key aim of the Change Management Strategy going forward is to ensure savings achieved to date are sustained in future years.

### 5.5.2 Financing of Future Change Management Initiatives

The recurrent investment in Change Management initiatives of £72,000 per annum for the next seven years (i.e. £504,000) will easily be financed by the associated annual savings of £232,000 per annum, based on performance to date. The annual saving is projected to rise to an estimated £488,000 by the end of the CMP period, assuming the current saving of £288 per tonne is maintained and the target Change Management reduction of 1,698 tonnes is achieved.

## 5.6 Alternative Energy (Renewables & CHP) Projects

The University has decided to utilise alternative sources of energy to offset the anticipated growth of the estate and intensification of use. The projects identified to date are based on Combined Heat & Power (CHP) technology and are discussed in more detail in sections 3 and 4.

The first CHP projects are scheduled to be completed in 2013-14 on the Main and the DKB Ashby sites, costing £2.661m and delivering annual recurrent financial savings of £0.570m and 2,292 tonnes of carbon.

A further project is scheduled for the Health Sciences campus in 2016-17, costing £2.149m and providing estimated financial annual savings of £0.408m

and 2,414 tonnes of carbon subject to approval of the business case by the Department of Health Social Services and Public Safety.

Based on the foregoing, the average payback period for these CHP projects will be 4.9 years.

The 4,706 tonnes of carbon savings generated by the CHP projects will offset the envisaged 4,706 tonnes increase in emissions by 2020 due to University growth. Any shortfall will be offset by further alternative energy projects, yet to be identified, and/or by de-carbonisation of the electricity grid. The CHP projects will be fully self-financing, funded from a revolving fund similar to the GRF.

## 5.7 Summary

The University has made good progress over the initial years of the CMP towards achieving its target reduction in carbon emissions. Based on a number of assumptions, the University has put in place financial arrangements to enable it to achieve its target reduction in carbon emissions by the 2020 deadline. All initiatives are currently expected to be fully self-financing. The capital cost to the University of meeting the target, and the projected annual savings, is summarised in Table 5.

Table 5: Estimated Capital Cost of Meeting Target

	Capital Costs			Recurrent Savings	
	Initiatives completed to 2012-13	Planned Initiatives to 2019-20	Total	to 2012-13	at 2020
<b>Green ICT<sup>1</sup></b>	-	-	-	£73,643	£163,459
<b>Energy Efficiency</b>	£2,161,423	£2,250,221	<b>£4,411,644</b>	£416,994	£737,994
<b>Change Management Initiatives</b>	£143,900	£504,000	<b>£647,900</b>	£232,396	£488,377
<b>Alternative Energy Generation</b>	-	£4,810,232	<b>£4,810,232</b>	-	£978,144
<b>Total</b>	<b>£2,305,323</b>	<b>£7,564,453</b>	<b>£9,869,776</b>	<b>£723,033</b>	<b>£2,367,974</b>

Note 1 : ICT projects to be implemented as part of normal business, so no additional cost.

The overall cost of £9,869,776 and recurrent savings of £2,367,947 outlined above indicate that the overall Plan has a relatively short payback period of 4.2 years.

In summary, good progress has been made in the early years of the CMP towards meeting the overall target emissions reduction. There is a considerable amount still to be done but, on the basis of a number of informed assumptions, the overall target is achievable by 2020 and all projects will be fully self-financing.

## 6. Actions to Embed Carbon Management

The process of embedding carbon management in the University's operations and management will continue as part of the CMP implementation.

### 6.1 Corporate Strategy

The CMP is endorsed at the most senior level through formal approval by Senate and very strong support from the Registrar and Chief Operating Officer, who chairs the CMPSG. Carbon management and carbon reduction targets are included in all Corporate strategic plans and all Schools and Directorates are required to report progress on an annual basis.

### 6.2 Curriculum, Learning and Research

The CMP offers an opportunity to embed carbon management within the curriculums offered by various University Schools, as well as contributing in the development of future modules. For example, the CHE3010 module within the School of Chemistry and Chemical Engineering will be adapted to include areas of resource efficiency, life cycle thinking, carbon measurement and management, methods for measuring and managing resource efficiency and the carbon footprint. The module will also be enhanced using examples and case studies derived directly from the CMP, such as the alternative energy initiatives previously discussed.

### 6.3 Students' Union

The Students' Union recognises the risks associated with climate change and fully supports the University's CMP. Going forward, the President will lead the Students' Union in implementing particular aspects of the CMP and will be assisted in this by an Environmental Committee comprising of four dedicated and elected Students' Union Council members.

### 6.4 Responsibility

The project sponsor, and person responsible at senior management level for the implementation of the CMP, is the Registrar and Chief Operating Officer. The Director of Estates is project manager, with operational responsibility for delivering the CO<sub>2</sub> reduction targets. This will be undertaken in conjunction with the relevant Directors, Deans and Heads of School, all of whom have specific responsibilities for projects and targets.

Support will be provided by the following Carbon Management Groups:

- Technical Working Group
- Change Management Working Group
- Scope 3 Working Group

In addition, the accountability of budget holders across the University for the achievement of agreed targets is key to the success of the CMP and, to assist them in this, a system of quarterly energy consumption reporting has been introduced. Consumption data for all Operational Units is also published, so

making it clear which units have been successful in reducing consumption and meeting targets.

#### 6.5 Data Management

The University has implemented a wide ranging programme of meter and sub meter installation across the campus, providing a clear analysis of energy consumption in individual buildings over time. A Data Analyst is also employed to undertake monitoring and targeting of energy projects.

#### 6.6 Change Management Strategy and Action Plan

Engaging the whole University and increasing the carbon management awareness of both staff and students is central to the successful implementation of the CMP. The effective implementation of the Change Management Strategy and Action Plan is key to this.

## 7. Programme Management of the CMP

In order for the CMP to succeed, appropriate management structures have been put in place to clearly reflect ownership and responsibilities.

### 7.1 Strategic Ownership and Oversight

The CMPSG has strategic ownership of the CMP and meets twice each year to review progress against targets, and the implementation of projects against defined programmes.

### 7.2 Succession Planning for Key Roles

The Director of Estates acts as the project leader with this role covered by the Deputy Director of Estates (Head of Estates Development).

The Deputy Director of Estates acts as Chair of the Technical Working Group with this role covered by the Head of Estates Services.

The Dean of Engineering and Physical Sciences acts as Chair of the Change Management Working Group with this role covered by a senior academic representative.

The Chair of the Scope 3 Working Group will be covered by a senior representative of the Purchasing Department.

### 7.3 Progress Reviews

- (i) There is a bi-annual review of progress in implementing the CMP.

Updates are provided by the working groups for review/approval by the CMPSG. The carbon management webpage is also used to disseminate information.

- (ii) Annual Performance Review

Carbon reduction is incorporated as a KPI at both institutional and School / Directorate level. Progress in meeting targets is included in all School and Directorate Performance Reviews submitted to the University Operating Board in November each year; and then reported to the University Management Board, the Planning and Finance Committee and, ultimately, to Senate in December.

### 7.4 Managing the Risks

#### 7.4.1 The CMP may fail to deliver because of:

1. Poor design
2. Lack of support

Poor design would arise largely as a result of CMP measures being less effective than anticipated, leading to a shortfall in the quantity of measures needed or their longevity.

These risks will be managed by:

- Using nationally-agreed Carbon Trust tools for determining the likely effect of measures
- Regular review of the efficacy of installed measures, and expansion of our metering system to accommodate this better

Failure of the CMP, due to lack of support, may arise if measures are “cherry-picked” to prioritise short payback times, and funding is refused for measures with longer paybacks.

A commitment to maintaining the Energy Efficiency Team, approved by UOB in May 2011, together with the key posts of Energy Manager and Environmental Manager are pivotal to ensuring the momentum of the CMP. This commitment is implicit in the adoption and approval of the CMP (2013).

Scrutiny of progress against targets will ensure that the programme continues on schedule.

#### 7.4.2 Ongoing Risk Management

As part of the University’s risk assurance mechanism, each School/Directorate is required to provide a status report, twice yearly, to the Risk Management Committee. Both the Estates and Finance Directorates will identify and manage risks in relation to the implementation of the CMP, together with other related emerging risks.