



CARBON MANAGEMENT PLAN

2010/11 – 2020/21

Revision 1 – Endorsed by University Resources Committee April 2015

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Forward from the Vice Chancellor

Ulster University, as part of its wider sustainability agenda, recognises that its activities have both direct and indirect environmental impacts and is committed to reducing these impacts.

Environmental sustainability is a key aspiration of the University and is established as a cross cutting aim within the University's Corporate Plan.

Ulster has already made significant strides in its efforts to reduce carbon emissions, and will continue to do so as it aspires to become a low carbon institution in respect of environmental sustainability.

This carbon management plan will play a significant role in reducing the University's overall environmental impact, through the implementation of carbon reduction projects in the areas of energy, water, waste, travel and procurement.

The Plan commits the University to a target of a 29% reduction in carbon emissions by 2020/21, from the baseline year of 2005/06.

This ambitious target can only be achieved through the entire University community, its staff and students, engaging with the Plan to create a 'carbon conscious' culture to ensure that the University becomes more environmentally efficient, and reduces unnecessary carbon emissions.

I am proud to wholly endorse this plan and encourage all our staff and students to engage with it.

Professor Sir Richard Barnett
Vice Chancellor
Ulster University

Executive Summary – 2015

This plan provides Ulster University's response to the challenge of global warming. It includes:-

- A plan for carbon reduction aligned with the targets set out in the UK Climate Change Act and by HEFCE.
- A programme from 2010/11 to 2020/21 updated in 2015 to take account of progress made by the University as well as changes to government guidance.
- Recognition that Ulster carbon emissions from energy usage reduced by around 30% between 1990 and 2013 while at the same time student numbers and building floor area grew by over 20%. In contrast HEFCE and AUDE reports indicate that average energy related emissions from English Universities actually increased by over 25% during the same period.
- Baseline carbon emissions from energy and other sources
- Carbon reduction targets
- Enabling projects and initiatives.
- £7M cost avoidance over the lifetime of the plan including reduction in the Carbon Reduction Commitment Tax – currently £240K per annum.
- Arrangements for carbon management governance and project financing.

A summary of the 2020/21 carbon reduction targets is given below:-

Carbon Emissions Source	Baseline Year	Baseline emissions (Tonnes)	Target Emissions (Tonnes)	Percentage Reduction
Energy use on campus	2005/06	19889	14207	29%
Other monitored sources	2009/10	5617	4718	16%

Carbon emissions reductions will be achieved in three ways:-

- Campus Rationalisation and Development – the replacement of ageing building stock with energy and space-efficient developments.
- Carbon reduction projects: - e.g. renewable energy installations, lighting upgrades, heating controls improvements etc.
- Operational efficiencies: -e.g. space utilisation, use of paper, sustainable procurement, management of staff travel, IT equipment running etc.

Carbon Reduction Projects will:-

- Generally be financed from University funds as grant assistance is not available for such projects.
- Be increasingly difficult to find in future years once those projects with a good return on investment have been completed.

As of 2015, the University is on programme to meet the targets set out within this plan.

Performance against the targets will continue to be monitored and reported to the Resources Committee of the University via the annual Environmental Sustainability Performance Report.

Background and Purpose

This plan provides Ulster University's response to the challenge of global warming. It sets out a plan for carbon reduction which is aligned with the targets set out in the UK Climate Change Act and by HEFCE.

Ulster University Carbon Vision

'A Low Carbon University fully aware of its impact on the environment, with an ongoing carbon reduction programme in place to continually improve the University's environmental sustainability performance.'

Benefits of Carbon Management

The principle purpose of carbon management is to limit the environmental impact of the institution.

There are a number of side benefits:-

1. Improved public perception.
2. Reduced operating costs e.g. fuels, carbon taxes, waste, water, business travel etc. As of 2013/14 the University expended over £4m on energy, water and associated fees while costs increased by 47.9% over the period 2005/06 to 2012/13 despite a significant reduction in energy usage. Over the lifetime of this Plan, it has been estimated that the University will avoid expenditure of approximately £7 million through the implementation of energy and carbon related initiatives.
3. Synergies with environmental sustainability-related academic activity.

Drivers of Energy Reduction and Carbon Management

The energy reduction and carbon management agendas at Ulster are driven by the following:-

Institutional Drivers

1. Corporate Social Responsibility

Ulster recognises its duty to be a good neighbour and to manage and limit its environmental impacts. The University has developed an environmental sustainability policy as well as supporting policies, strategies, procedures and plans such as this Carbon Management Plan.

2. Funding Body Requirements

The requirement for HE Institutions to develop Carbon Management Plans was set out by HEFCE and supported in N. Ireland by DEL. DFP/DEL require the University to provide detailed energy

and carbon information as part of the capital project grant funding application process.

Legislative Drivers

1. The Climate Change Act

The Climate Change Act 2008 introduces a long term legally binding framework to effect reductions in carbon emissions and establishes carbon emissions reduction targets of 34% by 2020 and 80% by 2050 relative to a 1990 baseline.

2. EU Energy Performance of Buildings Directive

The Directive aims to promote the improvement of the energy performance of buildings. Consequent regulatory changes in N. Ireland include revisions to the Building Regulations and the requirement for Energy Performance Certificates and Display Energy Certificates.

Economic Drivers

1. Energy Price Inflation and Volatility

Reliance on imported fuels has exposed energy users to volatility in the world's energy markets. Despite the University having reduced energy demand, energy costs have increased by 47.9% over the period 2005/06 to 2012/13.

2. Climate Change Levy

Introduced in 2001, the climate change levy is a tax levied on LPG, natural gas and electricity purchases, the rate of levy on each kilowatt hour (kWh) of energy consumed is directly set by Her Majesty's Revenue and Customs (HMRC).

3. Carbon Reduction Commitment Energy Efficiency Scheme

The University is a mandated participant in this scheme and is subject to a tax (of over £200K in 2013/14) proportional to its carbon emissions.

Previous Carbon Management and Energy Management Activity

Ulster has had energy management at the heart of its estates strategy for the past two decades. As a result, the University's carbon emissions are below sector average. A summary of the key projects/initiatives which have contributed to this are set out below:-

Enhancements to the Building Energy Management System (BEMS)

The University has had a BEMS installed for over twenty years; it efficiently monitors and controls the heating, ventilation and air-conditioning of buildings.

Full Time Energy Manager

The University's first full time energy manager was appointed in 1995 to co-ordinate and drive forward energy efficiency within the University.

Campus Energy Management Meetings

Monthly campus energy management meetings review the previous month's energy performance and identify opportunities to optimise energy consumption.

Automatic Monitoring and Targeting System (aM&T)

The aM&T system centrally monitors and provides reports on energy usage and has enabled more timely identification of energy and water wastage.

Fuel switching

Fuel switching from oil to natural gas across all four campuses has resulted in considerable carbon emissions reduction. Gas oil has been retained as a back-up fuel for the larger central boiler houses and provides some resilience.

Sustainably constructed and refurbished buildings

- Belfast Campus Warwick Building is an exemplar low carbon building and includes tri generation combined heat and power (CHP), natural cooling, solar shading and grey water recycling.
- Magee Campus library is naturally ventilated and has a bespoke solar shading system.
- The Jordanstown Campus' High Performance Centre incorporates the use of borehole water, grey water recycling, ground source heat pumps and efficient lighting controls.
- Jordanstown Combined Heat and Power (CHP) unit installed 1997 has resulted in an annual carbon reduction of approximately 500 tonnes.

Wind Turbine

An 800 kW wind turbine was installed at the Coleraine Campus in 2008. It produces approximately 1.6 GWh of renewable electricity each year amounting to 23% of the electricity used on the campus. Following revised guidance from HEFCE the electricity generated by the wind turbine has been included as zero carbon in the 2014 revised Carbon Management Plan.

Carbon Management Plan – Approach

The approach to carbon management set out in the plan is as follows:-

1. To establish the University's baseline carbon emissions;
2. To define the scope of carbon emissions included within the Plan;
3. To set targets for reducing carbon emissions;
4. To outline carbon emissions reduction projects
5. To identify funding sources for the carbon emissions reduction projects.
6. To outline governance arrangements

Baseline Carbon Emissions

The carbon emission sources included within the scope of this Plan are divided into 3 emission “scopes” as developed by the World Resources Institute.

Scope 1 emissions – direct emissions occurring from combustion sources owned or controlled by the organisation
Scope 2 emissions – emissions from the generation of purchased electricity consumed by the organisation
Scope 3 emissions – all other indirect emissions which are a consequence of the activities of the organisation

SCOPE 1 & 2 EMISSIONS BASELINE

Ulster has been proactive in its management of energy over the past two decades.

Ulster's energy performance since 1990/91 has been solid despite increasing student numbers and changes to the size and complexity of its Physical Estate. Associated carbon emissions have reduced by approximately 30.5% over the period 1990/91 to 2012/13.

The following chart presents the University's annual Scope 1 & 2 carbon emissions since 1990/91.

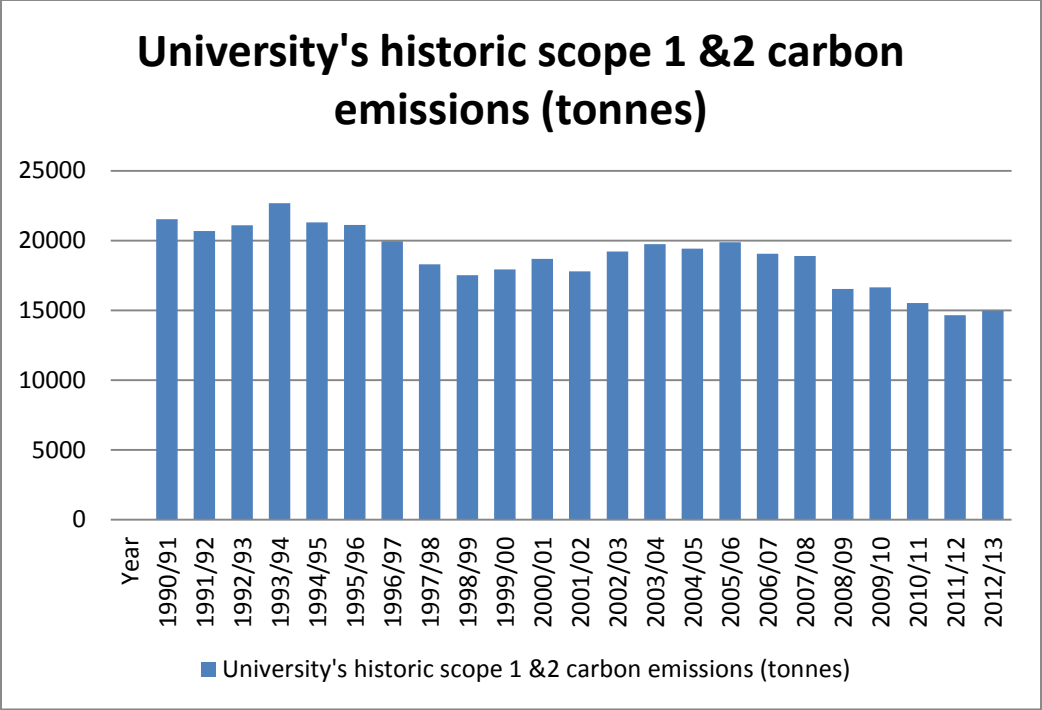


Figure 1- The University's historic scope 1 & 2 carbon emissions (tonnes)

Figure 2 illustrates the increase in student numbers and estates floor area over the same period.

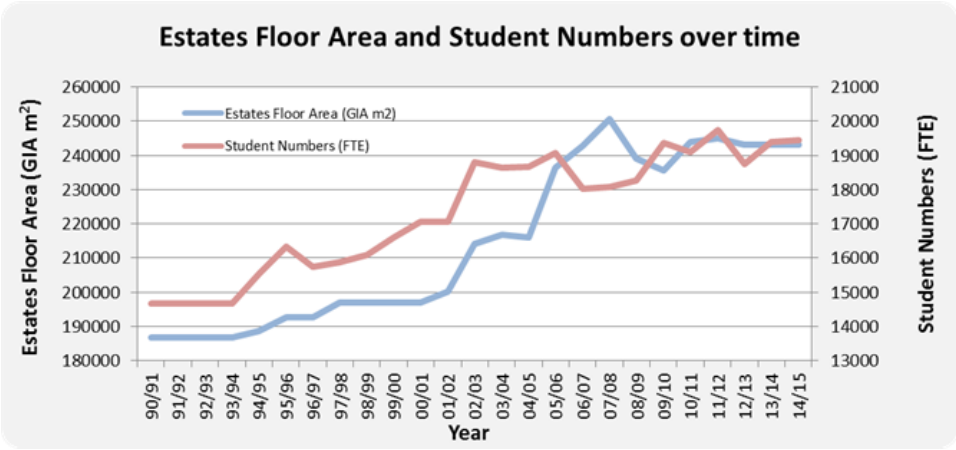


Figure 2- University's student numbers and estates floor area

2005/06 has been chosen as the baseline year for the University's Scope 1 & 2 emissions to align with HEFCE guidance on Carbon Management Planning in HE.

In the baseline year 2005/06, the University's Scope 1 & 2 carbon emissions totalled 19,889 tonnes.

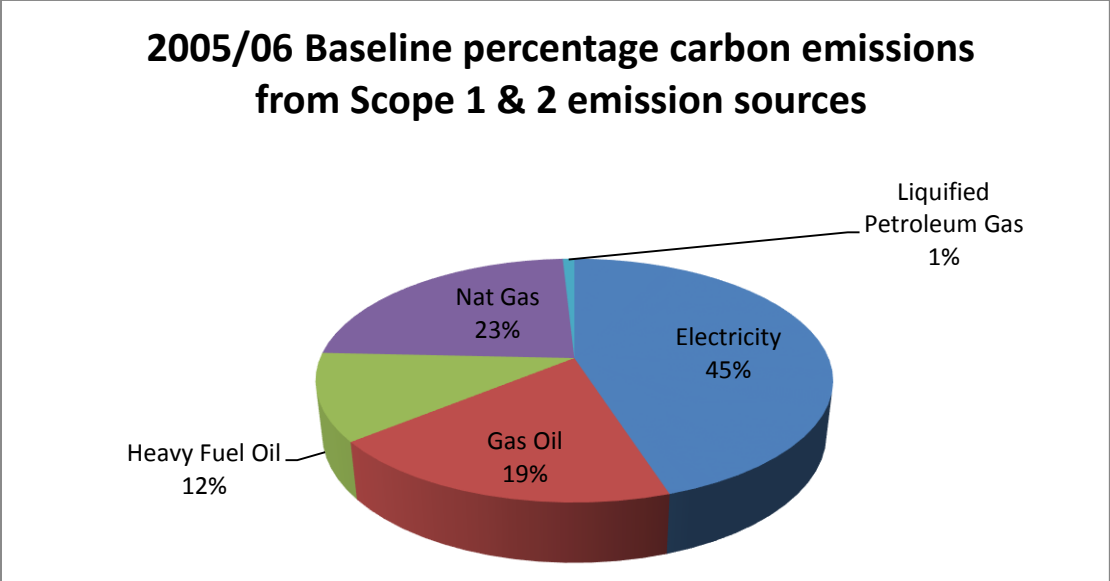


Figure 3 – 2005/06 baseline percentage carbon emissions from the University’s Scope 1 & 2 emission sources

The baseline data is tabulated below

	Source	Consumption	Associated Carbon Emissions (tonnes)
Scope 1 Emissions	Natural gas	25,147,571 kWh	4658
	Gas oil	1,260,232 litres	3807
	Heavy fuel oil	730,828 litres	2300
	Liquefied petroleum gas	114,924 litres	172
Scope 2 Emissions	Purchased electricity	18,991,837 kWh	8952
Scope 1 & 2 Emissions total			19,889

Figure 4 - Scopes 1 & 2 emissions baselines

It should be noted that Ulster’s proactive approach to energy management throughout the period from 1990 to 2005 led to a reduction of 7.6% in its scope 1 & 2 emissions despite an expansion in student numbers and estate. In contrast the scope 1 & 2 emissions of HE institutions in England increased by 14.8% during the same period.

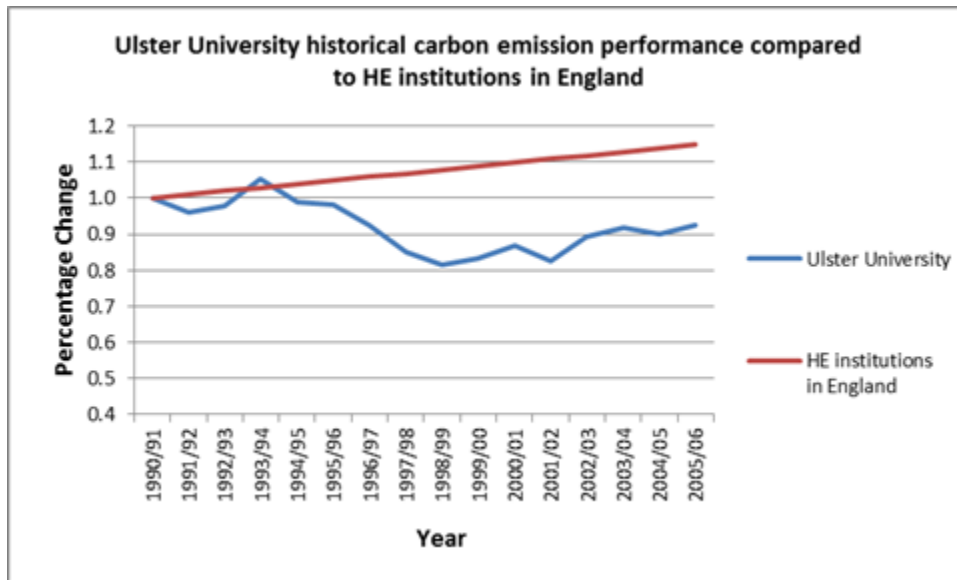


Figure 5 – Ulster historical carbon emissions performance compared to HE Institutions in England

SCOPE 3 EMISSIONS BASELINE

The 2012 HEFCE guidance on how Institutions should consider measuring and reporting scope 3 emissions focuses on the following key sources

1. Supply chain (procurement)
2. Transport
3. Water and waste

It is widely recognised that it can be difficult to measure and calculate an organisation’s scope 3 emissions. Ulster has therefore concentrated on measuring and calculating certain scope 3 emissions in line with DEFRA recommendations. The inclusion of scope 3 emissions targets in Carbon management plans and the reporting of scope 3 emissions are deemed to be voluntary by HEFCE whereas scopes 1 & 2 emissions targeting and reporting are mandatory.

In line with the typical sector approach, the **monitored scope 3 emissions** sources included within the Carbon Management Plan baseline are those for which the University has robust data available. These monitored scope 3 emissions represent only a fraction of the likely overall scope 3 emissions of the University. Universities have a wide range of approaches to scope 3 emissions with many not including them in carbon management plans at all, and some including them in the baseline but not setting out targets. In 2012/13 HESA Estates Management Statistics 58 out of 158 Institutions reported on their supply chain scope 3 emissions.

The University set the original baseline year for monitored scope 3 carbon emissions as 2009/10 based on the availability of appropriate management data. The baseline year for emissions from Business Travel by Air has subsequently been reset to calendar year 2013 because of improvements in the quality of data provided by the University’s travel provider.

In the baseline year, the University’s Monitored Scope 3 carbon emissions totalled 5617 tonnes.

Measured Scope 3 Baseline year CO2 Emissions (Tonnes)

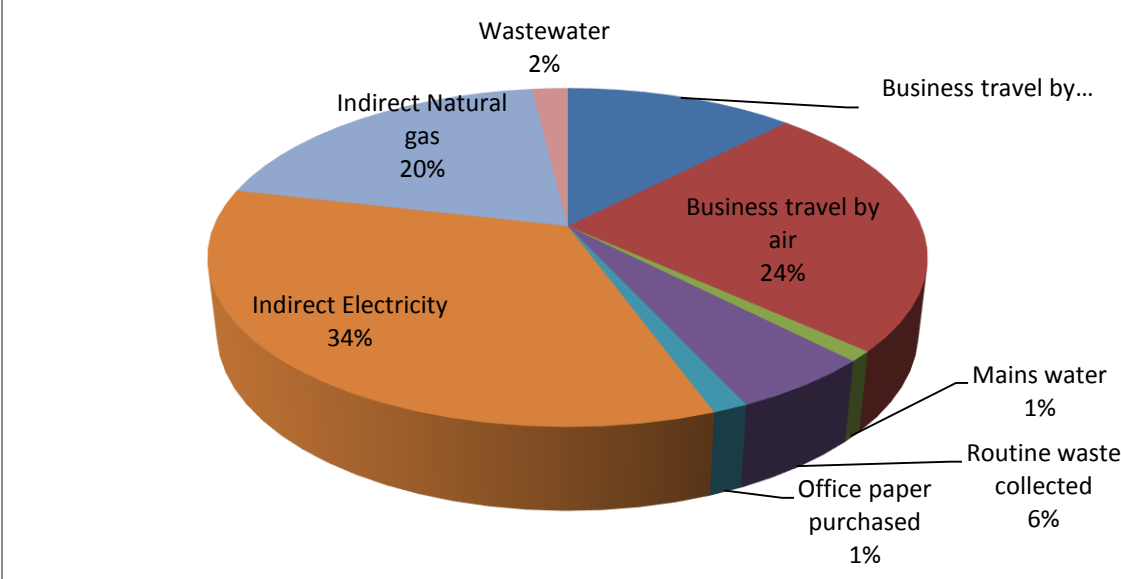


Figure 6 - Chart showing the percentage composition of the University's monitored Scope 3 emissions sources for the baseline year (2013 for business travel by air, 2009/10 for all other monitored scope 3 emissions sources)

The following table summarises the baseline consumption and emissions data for the University's carbon baseline years (2013 for business travel by air, 2009/10 for other monitored Scope 3 emissions).

	Source	Baseline Measurement	Associated Carbon Emissions (tonnes)
Monitored Scope 3 Emissions	Business travel by car	2,258,754 miles	692
	Business travel by air	9,975,640 kilometres	1370
	Mains water	159,821 cubic metres	55
	Routine waste collected	681.55 tonnes	305
	Office paper purchased	£96,713	75
	Indirect Electricity	18,460,445 kWh	1919
	Indirect natural gas	38,893,365 kWh	1093
	Waste water	151,830 cubic metres	108
Monitored Scope 3 Emissions total			5617

Figure 7 - Scopes 3 emissions baselines

Carbon Emissions Targets

SCOPE 1 & 2 EMISSIONS TARGETS

In line with the targets set out by the UK Government in the Climate Change Act, and those set by HEFCE, Ulster will target a carbon emissions reduction for its Scope 1 & 2 emissions of 29% by 2020/21 and 78% by 2050 from a 2005/06 baseline.

Figure 8 shows the targets for Scope 1 and 2 emissions over the lifetime of this Plan to be met through the successful implementation of the specific projects detailed in this Plan, as well as further specific projects yet to be identified and ongoing housekeeping and minor improvement works.

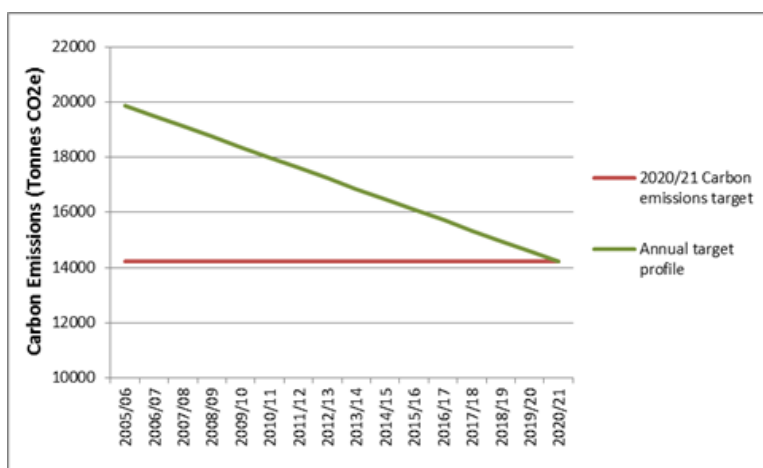


Figure 8- Scope 1 & 2 carbon emissions targets over the lifetime of the University's Carbon Management Plan

These yearly targets are presented in the table below.

Year	Annual Scope 1 & 2 Carbon Emissions Target (tonnes)
2005/06	19889
2006/07	19510
2007/08	19131
2008/09	18752
2009/10	18373
2010/11	17994
2011/12	17615
2012/13	17236
2013/14	16857
2014/15	16478
2015/16	16099
2016/17	15720
2017/18	15341
2018/19	14962
2019/20	14583
2020/21	14207

Figure 9- Scope 1 & 2 Annual carbon emissions targets

Note that the carbon emissions and associated calculations

- Do not take into account any future decarbonisation of the UK's electricity supply;
- Do not make allowance for the effects of weather patterns on carbon emissions
- Are based on energy cost and consumption data associated with the academic years 2008/09 (for those projects completed since the Carbon Management Plan has been in place) and 2012/13 (for those new projects identified in this latest version of the Plan).

BEYOND 2020/21

In order to align its carbon reduction aspirations with the UK Climate Change Act, which requires an 80% reduction in emissions by 2050 relative to a 1990 baseline, the University has calculated that it must reduce its Scope 1 & 2 carbon emissions by 78% by 2050/51 (from a 2005/06 baseline).

The graph below shows the University's target emissions profile to 2050/51.

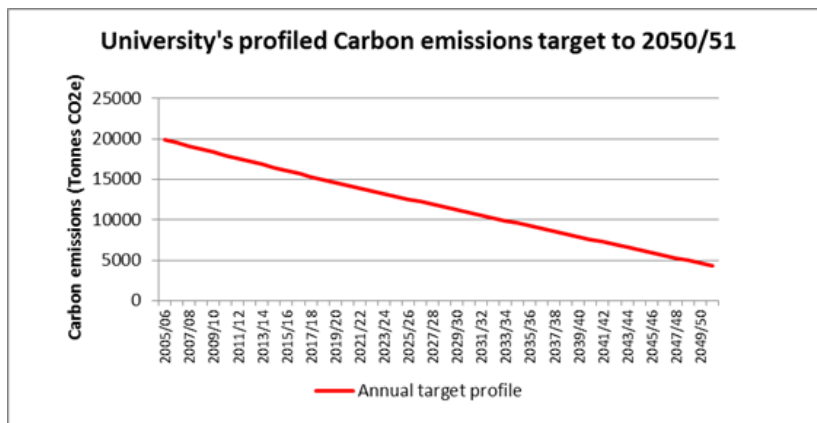


Figure 10- Scope 1 & 2 Annual carbon emissions targets to 2050/51

Whilst the carbon management plan focuses on the efforts to achieve the 2020/21 target, the University is mindful of the longer term challenge and recognises that fundamental changes to current practices will need to be adopted if the 2050 target is to be met.

SCOPE 3 EMISSIONS TARGETS

No specific reduction targets have yet been set by HEFCE for Scope 3 emissions.

For its monitored scope 3 emissions, as agreed by the Resources Committee of the University (4th Apr 2011) the University will target a carbon emissions reduction of 16% by 2020/21 from baseline. This will be achieved through the following elements:-

Element	% Carbon Reduction	Completion Date
Reduce the amount of business travel by car	15	July 2016
Reduce the amount of business travel by air	20	July 2021
Reduce the amount of waste generated	10	July 2016
Reduce the amount of mains water being consumed	20	July 2021
Reduce the amount of office paper being used	20	July 2016
Reduce the amount of indirect electricity emissions ¹	15	July 2021
Reduce the amount of indirect natural gas emissions ²	15	July 2021
Reduce the amount of wastewater generated	20	July 2021

Figure 11- Scope 3 carbon emissions targets

Over the period of this Plan, the University will endeavour to improve the monitoring and reporting of scope 3 emissions. The University currently voluntarily reports on some scope 3 emissions as part of its annual HESA return.

It should be noted that scope 3 carbon emissions are likely to be a significant focus in the post 2020 period since they are of greater magnitude than scope 1 and 2 emissions combined.

Carbon Emissions Reduction Projects and Initiatives

The University has identified a number of specific carbon management and emissions reduction projects.

This section summarises the key strategic themes upon which the University's focus will be concentrated.

In addition to the projects formally defined, there will also be an ongoing programme of 'housekeeping' improvements and more minor improvement projects. It is anticipated that these projects will achieve a steady reduction in carbon emissions over the life of the Plan.

¹ Relates to losses in the transmission and distribution of electricity – not the electricity used on campus.

² Relates to losses in the extraction, processing and distribution of natural gas – not its consumption on campus.

SCOPE 1 & 2 EMISSIONS REDUCTION – KEY STRATEGIC THEMES

1. TECHNOLOGY SOLUTIONS

Ulster will continue to monitor and evaluate the deployment of sustainable energy technologies across the estate. The implementation of such technologies will be subject to the appraisal of life-cycle costs and carbon saving potential. Examples of such technologies are noted below.

IT Solutions

One of the key themes within the University's IT strategy is the development of a lean structure to ensure both cost effective implementation strategies and reductions in carbon emissions.

The related projects will deliver an overall reduction in the University's electricity consumption and subsequent generation of carbon emissions, and will also have the added benefit of reduced maintenance and replacement costs.

The Information Services Department continues to undertake feasibility studies on alternative technologies and the associated carbon impacts.

Lighting technology

Lighting within buildings accounts on average for 30% of their electrical consumption. The University's electricity consumption for 2005/06 gave rise to 8952 tonnes of carbon; it is therefore estimated that the corresponding emissions due to lighting are approximately 2686 tonnes.

In reviewing opportunities for improvement, Ulster will consider the following technologies

LED Lighting

LED lighting technology has in recent years become a cost effective option for the refurbishment of existing lighting arrangements. It can typically provide a 20-30% reduction in power consumption and associated carbon emissions compared with modern fluorescent or metal halide light fittings.

The technology also has the benefit of longer hours of use, thereby reducing replacement, recycling and maintenance costs.

Automatic Lighting Controls

Ulster has already implemented PIR/Photocell automatic lighting controls across the majority of its Estate.

Controls configuration is an important consideration. The vast majority of University automatic lighting control has been set to turn off after 10minutes of no-presence detection. Some of the earlier automatic lighting control systems now require further work to optimise performance to current best practice.

Lighting controls will continue to be installed as buildings are upgraded.

Renewable electricity generation

The University has in place some small scale Photovoltaic (PV) generation and a large wind turbine generator. Both technologies are mature, qualify for government subsidies, and can provide significant carbon and cost savings where the generated electricity is utilised on site.

2. STAKEHOLDER ENGAGEMENT IN CARBON MANAGEMENT

The development of a structured formal carbon awareness and communications programme and a supporting Environmental Champions network are essential elements of this Plan. Engaging staff and students in effective carbon management by giving them an understanding of the impact they make and encouraging a sense of ownership for the areas and equipment they use will assist in carbon reduction.

One of the key aims of this Carbon Management Plan is to facilitate a change in culture within the University Community to encourage improved environmental behaviours e.g. energy conservation through switching off lights, equipment etc. when activities are over at the end of the working day or at the end of lectures.

In the preparation of this plan consultations were held with key Faculties and Departments. This raised awareness and also enabled the Faculties and Departments to contribute to the Plan's development.

The Carbon Management Plan has been communicated to the Students' Union and key Faculty and Department Heads, who will play an important role in continuing to promote the Plan and encourage participation in carbon emissions reduction measures.

3. ESTATE DEVELOPMENT

It has been estimated that building stock accounts for approximately 50% of all carbon emissions in the UK. As such, it is the single biggest contributor to the emissions of non-industrial/transport based organisations.

The Estates Strategy 2010/11 to 2018/19 provides a frame of reference for accommodation planning in support of the University's strategic plans for Teaching & Learning and Research over the period.

Changes to the Physical Estate resulting from the Estates Strategy could result in a reduction in the gross internal area of University accommodation by circa 26,500m², with estimated carbon emissions reduction of 5358 tonnes.

The key Estates Strategy projects contributing to these carbon emissions reductions are

1. The construction of space efficient new buildings to significantly increase the size of the Belfast campus, with the relocation of the majority of Jordanstown activities to Belfast, and the subsequent closure of obsolete building stock at Jordanstown.
2. Campus rationalisation at Coleraine to include new buildings to replace existing aged inefficient buildings, improved use of space and the subsequent demolition of redundant buildings.

BREEAM (Building Research Establishment Environmental Assessment Method) is the most widely used environmental assessment system for buildings.

Ulster has set a requirement of BREEAM Excellent for all new build projects, and BREEAM Very Good for major refurbishments.

SCOPE 3 EMISSIONS REDUCTION – KEY STRATEGIC THEMES

The University will develop processes to ensure that baseline environmental/carbon performance data for its significant scope 3 emissions are monitored and reported. To complement this, a series of improvement programmes will also be included within the Plan to reduce the carbon emissions from monitored scope 3 emissions. The following are the key scope 3 strategic themes which will be included.

1. PROCUREMENT

The carbon emissions associated with the purchase and consumption of A4 office paper for printing and photocopying have been included as monitored scope 3 emissions within this Plan.

The University will seek to reduce the amount of A4 paper being used by introducing a series of initiatives including

- Encouraging the use of duplex (two sided) printing;
- Staff and student awareness to encourage the use of electronic media; and
- Migration to the use of networked multi-function devices to reduce the number of standalone printers, photocopiers and fax machines.

Other University goods and services will be evaluated to determine how feasible it is to accurately assess their carbon impact. Where carbon impact can be determined, consideration will be given to the development of further carbon reduction projects.

It is anticipated that the evaluation process will be informed by good practice guidance developed during the lifetime of this Plan, e.g. by funding bodies or government departments.

An overarching sustainable/ green procurement strategy will be developed by the University with the aim of reducing the University's indirect environmental impact through its suppliers. Specific to this Plan, policy will be developed to ensure that the purchase of equipment, consumables and infrastructure will be undertaken with due consideration to appropriate environmental factors such as the whole life energy consumption of equipment.

2. SUSTAINABLE TRAVEL

During the lifetime of this Plan, initiatives will be completed to reduce the direct and indirect carbon emissions associated with business travel (direct) and staff and student commuting (indirect).

Sustainable travel has been included as one of four key strategic themes within the University's "Carbon Conscious- because we care" awareness and communications campaign. As part of this, the University has introduced a series of initiatives to reduce unnecessary business travel (through, for example, the promotion of the University's remote conferencing facilities and encouragement of staff to use these facilities) and to reduce the indirect carbon emissions associated with staff and student commuting (through, for example, encouraging the use of more sustainable transport modes such as public transport, car sharing, cycling and walking).

The relocation of the majority of existing activity from the Jordanstown campus into the city centre Belfast campus (as part of the Greater Belfast Development project) is likely to significantly reduce staff and student single occupancy car commuting however further reductions will be more difficult given the high numbers of staff and students living in areas with poor public transport links.

3. WASTE MANAGEMENT

The University has significantly reduced the quantity of its waste sent to landfill through the implementation of a managed waste contract with off-site recycling and recovery. This has reduced the landfill fraction from 100% to around 20%. Existing waste management practices will be continuously reviewed to identify opportunities to maximise re-use, recycling and recovery however going forward the focus should be on reducing the total waste generated much of which is from paper publication, packaging and printing.

During the lifetime of this plan, the University will also make improvements to monitoring and recording of waste disposal and recycling/ recovery performance.

4. WATER CONSERVATION AND WASTEWATER

The water conservation initiatives within this Plan include awareness raising to reduce water wastage and the inclusion of water conservation measures within refurbishments and capital development works to the physical estate. Measures which will be considered include water efficient fittings such as push taps/ electronic sensor taps, dual flush WCs and rainwater collection systems.

Improved monitoring of mains water consumption using the aM&T system will enable abnormal water consumption to be identified more quickly, so that it can be investigated and corrected where necessary. Within the period of this Carbon Management Plan to date, significant reductions in water wastage and associated costs have been made through the identification and repair of underground legacy leakage.

As a consequence of these water conservation measures, the volume of wastewater being disposed of will also be reduced.

In order to achieve the carbon emissions reduction targets within this Plan, the University will implement a series of projects and initiatives.

In addition the University has estimated that it will achieve a 0.3% annual reduction in carbon emissions during the life of the Plan as a result of general 'housekeeping' improvements and the implementation of smaller 'minor' improvement initiatives. While these have not been specifically included as projects within the plan, they will relate to the strategic carbon reduction themes described in the following section.

The University has identified twenty five carbon management and emissions reduction projects which should result in the 2020/21 targets being achieved.

It is envisaged that further carbon reduction projects will be identified during the remaining lifetime of the plan.

Project No.	Project title	Est. Carbon Reduction (tns)
1	BBRU humidifier replacement at the Coleraine Campus	91
2	The development of a centralised database to record and monitor the University's environmental sustainability performance	Enabling project
3	Introduction of an internal energy audit process across University Campuses	552
4	Lighting improvements at the Magee Campus	75
5	Review of PC running regimes within the University's computer laboratories	100
6	Development and introduction of a formal, structured carbon awareness campaign (with focus on scope 1 & 2 emissions initially)	552
7	Improvements to roof insulation at Jordanstown and Coleraine Residences	13
8	Improvements to the heating systems at Jordanstown and Coleraine Residences	19
9	Reduce the amount of waste generated across the University	31
10	Reduce the amount of mains water being consumed across the University	11
11	Reduce the amount of office paper being used across the University (linked to Project 9)	15
12	Reduce the amount of business travel by car across the University	104
13	Reduce the amount of business travel by air across the University	274
14	Control panel upgrades at BMS outstations at the Magee Campus	Enabling Project
15	Rationalisation of services at Science Blocks 1, 3 & 4 on the Coleraine Campus	TBD
16	Rationalisation of accommodation at the Coleraine Campus	663
17	Greater Belfast Development Project	1731
18	Consolidation of University data centres and server virtualisation	TBD
19	Installation of an additional Wind Turbine Generators at the Coleraine Campus	1441
20	Installation of a Biomass Boiler on the Coleraine Campus	On hold
21	Installation of a Biomass Boiler in the Duncreggan residences t the Magee Campus	On hold
22	Photovoltaic Generation – Magee Campus	20
23	Refurbishment of Block MI (Aberfoyle House) – Magee Campus	20
24	Electrical supply voltage reduction project – Magee and Coleraine campuses	81
25	Environment Champions Network	Enabling project

Figure 12 – Summary of specific carbon emissions reduction projects³

³ Projects 1-17 have been scheduled in the approximate order in which they will be introduced.

Projects 20 and 21 have been evaluated and are on hold pending more favourable fuel costs.

Projects 22-25 have been identified in revision 2 of the Plan (2014)

COST AVOIDANCE RESULTING FROM CARBON EMISSIONS REDUCTION

By demonstrating effective carbon management, the University will mitigate the effects of rising energy prices and deliver carbon and financial savings.

Over the lifetime of this Plan, it has been estimated that the University could avoid an expenditure of approximately £7 million on energy and carbon related activity through the implementation of effective carbon reduction initiatives. The table in appendix 3 shows the cumulative cost avoidance profile during the lifetime of the Plan.

There will be an expenditure requirement for the majority of these initiatives. It is difficult to isolate the costs associated with carbon reduction incorporated within wider project budgets i.e. the Greater Belfast Development and Coleraine Rationalisation projects.

Carbon Management Plan Financing

Considerable financial investment will be needed to implement the identified projects, however the majority of the improvement works within the Plan have a relatively short payback period (i.e. less than 5 years). As a result, the University will realise considerable energy cost savings in the medium to long term.

Project plans have been and will continue to be built into annual budgets. Funding sources and arrangements are set out below:-

GOVERNMENT FUNDING

DELNI

Ulster has in recent years benefited from annual grant funding from the Department of Finance and Personal (DFP) Central Energy Efficiency Fund (CEEF) which funded energy conservation schemes within Northern Ireland's public sector with a short to medium payback period.

As a result of the recent comprehensive spending review by the UK Government, and the preparation of the subsequent budget by the Northern Ireland Executive, the Department of Finance and Personnel has suspended CEEF and this funding stream is no longer available.

UK Funding Bodies have informed institutions that the allocation of grant funding is now linked to the carbon performance of institutions. HEFCE had previously placed a requirement on funded institutions in England to establish a carbon management strategy and plan by March 2011.

DELNI have yet to communicate the exact mechanisms for Northern Ireland, however it is expected that these will be similar to those proposed for England.

The University will continue to engage with DELNI to ensure that any carbon reduction requirements are met, and that any potential funding to invest in carbon reduction is exploited.

NON-GOVERNMENT ORGANISATIONS (NGO) FUNDING

SALIX FINANCE

Salix Finance, a partner organisation of the Carbon Trust, has been providing loans and funds to GB HE institutions to promote carbon reductions and energy savings.

No funding schemes are open to participants in Northern Ireland, but this may be reviewed.

INTERNAL FUNDING

University funding will continue to be required for the year on year carbon reduction initiatives. This funding will often have a direct payback in reduced energy bills and through a reduction in the costs of participation in the CRCEES scheme.

It is vital therefore that University budgets include funds for identified projects to ensure that the agreed targets for energy and carbon reduction are met. Failure to meet the targets or achieve the year on year reductions could have a significant financial impact in future years e.g. should funding allocation be reduced.

In addition, delays in the implementation of these 'invest to save' projects will reduce the potential for medium/ longer term cost avoidance in energy bills.

CAPITAL DEVELOPMENT FUNDING

The implementation of the University's Estates Strategy 2010/11 to 2018/19 should contribute significantly to the University's carbon reduction efforts.

The University's adoption of BREEAM Excellent as the sustainability standard on new build capital projects and BREEAM Very Good on major refurbishment projects should improve the energy efficiency of the building stock.

The carbon reductions, whilst being an important consideration during the design and construction of the buildings, are but one of a number of benefits of the investment.

It should be noted that capital development funding is made up of Government and internal funding along with other funding which may be pursued when available. The provision of project capital funding by Government will continue to be contingent on the University being able to demonstrate that projects bring space and environmental performance benefits.

Governance

In order to ensure the Carbon Management Plan's continued suitability and implementation, the University will put in place effective governance arrangements. These arrangements are summarized as follows.

PUBLICATION OF THE PLAN

In the interests of transparency and openness, this Carbon Management Plan document shall be publicly available via externally accessible web pages, which will also report on Ulster's wider environmental sustainability plans and performance.

MANAGEMENT OF CARBON & ENERGY

During the earlier stages of this Plan, a fundamental review of governance arrangements will be undertaken to ensure that carbon management and the wider environmental sustainability agenda are identified as strategic priorities for the University. This in turn will encourage their integration into University operations, which will result in improved environmental performance.

The University will endeavour to ensure that all future strategies, policies and procedures are aligned to the Plan where deemed relevant.

RISK MANAGEMENT

The University recognises that there are considerable risks to the effective and timely implementation of this Plan, and the achievement of the target carbon emissions reductions. The University has identified the key risks and allocated controls to minimise these risks.

A risk register and associated controls is presented in Appendix 1.

REVIEW

Following the 2014-15 review of the carbon management plan there will be no further formal revision of the plan.

Carbon performance will be reviewed on an annual basis and reported publicly through the University's annual environmental sustainability performance report.

The University's Sustainability Manager will be responsible for completing the periodic review of carbon performance as well as preparing future carbon management plans.

KEY ROLES AND RESPONSIBILITIES

A summary of the key roles and responsibilities for carbon management within the University is as follows;

VICE-CHANCELLOR

The Vice-Chancellor is responsible for the executive management of the institution and its day to day direction. As a result, he is ultimately responsible for the delivery of the University's strategic and operational plans.

This Carbon Management Plan is a key strategic plan which will contribute to the University's wider corporate social responsibility agenda.

It is vital to the successful implementation of this Plan that the University's Senior Management is committed to reducing carbon emissions and takes account of environmental sustainability in its decision making.

PRO VICE-CHANCELLORS, PROVOSTS, DEANS, DIRECTORS

As the senior management overseeing the day to day activities within Faculties and Departments, pro vice-chancellors, provosts, deans and directors are responsible for promoting effective carbon management practices within their respective areas. This, in turn, supports the successful implementation of the Carbon Management Plan.

ENVIRONMENTAL SUSTAINABILITY STEERING GROUP

The University has established an Environmental Sustainability Steering Group to develop and embed environmental sustainability policy across the institution.

The group will oversee the development and introduction of high level environmental sustainability policy and strategy with the aim of significantly reducing the University's impact on the environment. The group will also raise the profile of environmental sustainability internally and encourage participation in initiatives by staff and students.

In the context of this Plan, the Environmental Sustainability Steering Group will provide oversight and direction.

The Steering Group will receive periodic progress updates on the delivery of targets, which will be monitored by the University's Sustainability Manager.

The Steering Group is chaired by a member of the University's senior management, who as chair acts as the University's Environmental Sustainability Champion. The Chair's role is to raise the profile of environmental sustainability at the University and to promote and ensure delivery of key targets.

ENVIRONMENTAL SUSTAINABILITY SUB GROUPS

The University has established two Environmental Sustainability Sub Groups to assist with the development and implementation of an Environmental Sustainability Strategy and Action Plan for the University. The Groups are as follows;

- Environmental Sustainability Working Group (Operations)- responsible for the effective implementation of environmental improvement initiatives within academic support operations/ activities
- Environmental Sustainability Working Group (Students' Union)- responsible for the effective implementation of environmental improvement initiatives within the Students' Union and student population

THE UNIVERSITY COMMUNITY

The University Community, i.e. its staff and students, has an important role to play in reducing the University's carbon emissions. It is they who use equipment, generate waste, commute, and purchase goods etc. so they should be aware of the positive impact they can have on the successful implementation of the Plan.

All staff and students must take ownership of the equipment and facilities they use to minimise energy and resource wastage, and reduce the generation of unnecessary carbon emissions.

PHYSICAL RESOURCES DEPARTMENT

The Physical Resources Department will play a key role in the successful implementation of this Plan. The Department is responsible for making upgrades to the physical estate to improve energy efficiency within the following areas;

1. Overseeing the construction of new buildings, consolidation and refurbishment of existing buildings and the demolition of obsolete buildings; and
2. Overseeing improvements to building fabric, plant, equipment, controls and monitoring systems to enhance the efficient use of energy.

In relation to the University's monitored scope 3 emissions, the Department is also responsible for waste management, water conservation and sustainable travel policy development.

INFORMATION SERVICES DEPARTMENT

The Information Services Department will make a contribution through the effective introduction of greener ICT practices during the lifetime of this Plan.

PROCUREMENT OFFICE

The Procurement Office is responsible for overseeing the procurement activities of the University. As a significant portion of any organisation's indirect environmental impact comes from its supply chain, the Procurement Office will play an important role in reducing carbon emissions.

APPENDICES

Appendix 1 Carbon Management at Ulster- Risk Register and Controls

CARBON MANAGEMENT RISK REGISTER: ASSESSMENT AND RANKING								
RISK TITLE	BEFORE CONTROLS				AFTER CONTROLS			
	ASSESSMENT			RANK	ASSESSMENT			RANK
	L	I	P		L	I	P	
Carbon Management is not seen as a strategic priority by the University	4	5	20	1	2	4	8	3
Reputational risk resulting from the University not demonstrating its commitment to environmental sustainability/ carbon reduction	3	3	9	9	2	3	6	4
The focus on the implementation of the carbon reduction projects is diluted (e.g. staff changes, changes to workload priorities, the introduction of more onerous legislation) resulting in implementation dates and targets slipping	4	3	12	5	2	3	6	4
Internal funding for the implementation of the non-capital projects is not available	4	3	12	5	2	3	6	4
Staff do not participate in relevant carbon reduction projects (e.g. behaviour change, changes to working practices) as it is not seen as a priority in their jobs	4	4	16	2	3	3	9	1
An increase in energy intensive research programmes within the University over the Plan period increasing energy use and associated carbon emissions threatens the Plan's achievement of its carbon emissions reduction target	3	5	15	4	2	3	6	4
Improvements to the University's Physical Estate through the Estates Strategy do not realise the calculated carbon emissions reductions within the Plan period	3	4	12	5	2	3	6	4
Full funding is not secured for the completion of the Greater Belfast Development project, with the potential for planned energy efficiency/ carbon reduction works being removed during any resultant value engineering exercises	4	4	16	2	3	3	9	1
The Greater Belfast Development project is not completed on time, resulting in the Carbon Management Plan's carbon emissions reduction target not being achieved.	3	4	12	5	2	3	6	4

Notes

- L – Likelihood Ranked 1-5, in accordance with Ulster standard risk register scoring
- I – Impact Ranked 1-5, from 1- Insignificant to 5- Catastrophic
- P – Product Likelihood score multiplied by Impact score

	Risk	Controls
1	Carbon Management is not seen as a strategic priority by the University	<ul style="list-style-type: none"> – Vice Chancellor is briefed on the University’s Carbon Management Plan and its importance to the University – The Plan includes a Foreword by the Vice Chancellor to demonstrate his commitment to its successful implementation – A high level Environmental Sustainability Steering Group has been established to oversee the implementation of the Plan. – [MAY 2014 UPDATE] Carbon Management Plan has been subject to mid-term review.
2	Reputational risk resulting from the University not demonstrating its commitment to environmental sustainability/ carbon reduction	<ul style="list-style-type: none"> – The University has developed this Plan, and has also ensured that appropriate governance arrangements are in place to ensure its successful implementation
3	The focus on the implementation of the carbon reduction projects is diluted (e.g. staff changes, changes to workload priorities, the introduction of more onerous legislation) resulting in implementation dates and targets slipping	<ul style="list-style-type: none"> – The importance of the Plan and its projects will be effectively communicated to senior staff within each Department, who in turn should cascade the information to their staff
4	Internal funding for the implementation of the non-capital projects is not available	<ul style="list-style-type: none"> – Proposals will be developed to ensure that funding for carbon reduction projects is sourced within the available resources, and opportunities to develop a ‘ring fenced’ carbon fund will be kept under review.
5	Staff do not participate in relevant carbon reduction projects (e.g. behaviour change, changes to working practices) as it is not seen as a priority in their jobs	<ul style="list-style-type: none"> – The importance of the Plan will be communicated by the University’s Senior Management to demonstrate top level commitment – The objectives of the Plan will be communicated to all staff <p>Staff will be kept informed of progress and made aware of how they can contribute to the successful implementation of the Plan</p> <p>[MAY 2014 UPDATE] Refer to Project 25. A network of environmental champions will be established which should promote sustainability initiatives and awareness.</p>
6	An increase in energy intensive research programmes within the University over the Plan period increasing energy use and associated carbon emissions threatens the Plan’s achievement of its carbon emissions reduction target	<ul style="list-style-type: none"> – Effective energy consumption monitoring is in place to identify trends – The Physical Resources Department will be kept fully informed of developments in research programmes to ensure that the additional energy use requirements are planned effectively – [MAY 2014 UPDATE] - BREEAM Excellent standard for new capital projects

7	Improvements to the University's Physical Estate through the Estates Strategy do not realise the calculated carbon emissions reductions within the Plan period	<ul style="list-style-type: none"> - The respective improvement projects will be planned effectively, and all the necessary funding will where possible be available to ensure the projects are completed on schedule - The sustainable construction elements, particularly those relating to energy efficiency/ carbon reduction will where possible not be removed/ reduced as a result of any potential 'value engineering' exercises
8	Full funding is not secured for the completion of the Greater Belfast Development project, with the potential for planned energy efficiency/ carbon reduction works being removed during any resultant value engineering exercises	<ul style="list-style-type: none"> - As above
9	The Greater Belfast Development project is not completed on time, resulting in the Carbon Management Plan's carbon emissions reduction target not being achieved.	<ul style="list-style-type: none"> - The entire project will be managed effectively. - A well-resourced project management team, consisting of internal staff and external consultants, is in place to ensure the effective governance, planning and implementation of the project - Early communication of potential delays will enable identification of mitigating projects

Appendix 2 2012/13 Key Scope 1 & 2 emissions sources consumption and costs data

Campus	Elec (kwh)	Elec costs (£'s)	Nat Gas (kwh)	Nat Gas costs (£'s)	Gas Oil (kwh)	Gas Oil costs (£'s)	LPG (kwh)	LPG costs (£'s)
Jordanstown	8,601,256	914,642	12,910,232	714,741	680,573	43434		
Coleraine	6,902,924	673,360	12,119,719	506,639	574,025	38009	40,194	1,906
Magee	3,006,103	394,747	5,553,526	233,794		0	-	
Belfast	1,948,182	263,309	3,081,148	155,941		0	8,784	452
Total	20,458,465	2,246,058	33,664,625	1,611,116	1,254,598	81,444	48,978	2,358

Appendix 3 Profiled cost avoidance resulting from the carbon reduction initiatives detailed within the Plan.

Cost avoidance (£'s)											
Project	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	Cum savings
Refurbishment of MI Building – Magee Campus				5,486	5,486	5,486	5,486	5,486	5,486	5,486	38,400
Refurbishment of Block ME – Magee Campus					2,420	2,420	2,420	2,420	2,420	2,420	14,522
Magee campus extension						-34,857	-34,857	-34,857	-34,857	-34,857	-174,286
Greater Belfast Development					10,567	10,567	10,567	5,284	520,862	520,862	1,078,708
Coleraine Rationalisation (South Buildings)				36,946	50,946	50,946	50,946	220,448	220,448	220,448	851,128
Coleraine Crèche					7,519	7,519	7,519	7,519	7,519	7,519	45,114
PC running regime			20,321	20,321	20,321	20,321	20,321	20,321	20,321	20,321	162,568
Magee lighting		15,241	15,241	15,241	15,241	15,241	15,241	15,241	15,241	15,241	137,169
BBRU ultrasonic humidifier	20,087	20,087	20,087	20,087	20,087	20,087	20,087	20,087	20,087	20,087	200,870
Insulation improvements- JN & CE residences		2,642	2,642	2,642	2,642	2,642	2,642	2,642	2,642	2,642	23,778
Heating system improvements JN & CE residences		3,861	3,861	3,861	3,861	3,861	3,861	3,861	3,861	3,861	34,749
Internal energy audit	56,086	112,172	112,172	112,172	112,172	112,172	112,172	112,172	112,172	112,172	1,065,634
Awareness and communications campaign		37,391	74,781	112,172	112,172	112,172	112,172	112,172	112,172	112,172	897,376
Housekeeping and minor works improvements	18,612	18,612	11,169	11,169	11,169	11,169	11,169	11,169	11,169	11,169	126,576
2no. wind turbine generators Coleraine					209,743	423,513	423,852	425,752	432,011	431,968	2,346,839
Magee PV Installation					13,500	13,500	13,500	13,500	13,500	13,500	81,000
Electrical supply voltage reduction project	12,593	19,622	19,622	24,723	24,723	24,723	24,723	24,723	24,723	24,723	224,896
Biomass Coleraine											TBC
Biomass Magee residences											TBC
Totals	107,378	229,628	279,896	359,334	614,663	793,575	793,914	960,033	1,481,871	1,481,828	7,155,041

Appendix 4 Table of Acronyms

aM&T	automatic Monitoring and Targeting
BREEAM	Building Research Establishment Environmental Assessment Method
CEEF	Central Energy Efficiency Fund
CHP	Combined Heat and Power
CRCEES	Carbon Reduction Commitment Energy Efficiency Scheme
DELNI	Department for Employment and Learning Northern Ireland
DEFRA	Department for the Environment, Food and Rural Affairs
DECC	Department of Energy and Climate Change
GHG	Green House Gas
HEFCE	Higher Education Funding Council for England
ICT	Information and Communications Technology
IT	Information Technology
KW	kilowatt
KWh	kilowatt hour
LED	Light Emitting Diode
MWh	megawatt hour
PIR	Passive Infrared Sensor
T&D	Transmission & Distribution
TBC	To Be Confirmed
TBD	To Be Determined
WTG	Wind Turbine Generator
WTT	Well To Tank

Appendix 5 Carbon Management Plan – Long Form Version – Table of Contents

Further technical detail if needed can be found in the long form version of the Carbon Management Plan.

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