



UNIVERSITY OF
LINCOLN

Carbon Management Plan



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Foreword from the Vice Chancellor

As Global Climate Change is one of the major challenges facing our planet I am pleased that the University of Lincoln is taking positive steps to reduce its emissions of greenhouse gases. The ambitious programme described in this Carbon Management Plan sets out how the University can play its part in meeting national and international targets for emissions reduction.

Our target to cut carbon dioxide emissions by 43% by 2020 is challenging, but attainable. Reaching the target will mean that we will have to transform how we procure, supply and use energy around the University. The programme outlined in this document will also mean that the energy costs for our estate are controlled. We all have a part to play in this and I will be actively involved and I do hope everyone can embrace this agenda positively.



As an organisation we can have a huge impact on emissions of carbon dioxide around Lincolnshire and beyond. By providing our students with knowledge on sustainable development within our courses we can embed sustainability within society. Additionally, our carbon dioxide reduction target sets an example to other organisations around the region to reduce their greenhouse emissions.

A handwritten signature in black ink, appearing to read 'MSStuart', with a horizontal line underneath.

Prof. Mary Stuart
Vice Chancellor, University of Lincoln

1. Introduction

The University of Lincoln is a place of high ambition, an institution whose progress since it was created in 2001 has been rapid and solidly grounded. With over 10,000 students and 1,200 staff based on five campuses across Lincolnshire, the University sees itself as a 21st century expression of the old university ideal – where the student focus is paramount – at the same time as fulfilling the modern tasks of knowledge creation and transfer for the economic, social and cultural benefit of our society.

The University of Lincoln, along with many Higher Education Institutions (HEIs), acknowledges that climate change is a real and growing threat for countries, economies, and organisations in the public and private sector. By completing this Carbon Management Plan, the University is taking a strategic view of carbon emissions, and is contributing to HE sector and national commitments to reduce emissions of CO₂.

This plan sets out the University of Lincoln's vision for a lower carbon campus, assessing where we are now and what needs to be done over the next five years to ensure we are on course to meet the longer term 2020/21 carbon reduction targets. A key part of this plan is setting out how carbon management will be embedded into the day to day running of the University, supporting our wider corporate objectives and aspirations to become a Top 50 institution.

The University has received £100k from HEFCE and Salix Finance which, with an additional contribution from the university, has established a £125k Revolving Green Fund dedicated to investment in energy saving technologies.

The Environmental Team has been expanded with the creation of the post of Carbon Reduction Manager, providing a dedicated resource to deliver this plan and embed carbon management within all the University's operations and activities.

However, the most notable success to date is achieving an absolute reduction in our carbon emissions since 2005/06, despite expanding our campuses and increasing student numbers. This is a challenge that many other HEIs are struggling to meet and provides an excellent platform for ongoing carbon reduction success.

2. Carbon Management Strategy

Rather than a stand-alone concern, carbon management is recognised by the University of Lincoln as a whole-organisation approach which integrates with existing strategic aims and management systems. This approach enables a clear view of the carbon impact of all university operations and activities and allows key risks and opportunities to be identified and built into a plan to reduce carbon emissions effectively.

2.1 Context and drivers for Carbon Management

The Global and National Context

Recognition that climate change is a reality and that change is required to both mitigate and adapt to its effects has increased substantially in recent years. Over the next 50 years the daily effects of climate change, the availability and price of fossil fuels, environmental regulation and new technologies will fundamentally change the supply and use of energy, and make the emission of greenhouse gases one of society's key concerns.

In 2008 the UK became the first country to introduce a long-term legally binding framework specifically aimed at tackling the dangers of climate change. The Climate Change Act puts into statute the UK's targets to reduce carbon dioxide emissions by at least 80% by 2050, against a 1990 baseline. It also requires five-year carbon budgets to be in place, monitoring and limiting annual carbon emissions.

HE Sector Drivers

The Higher Education sector is a significant user of energy, spending around £200M and emitting around 3.3mtCO₂ each year. The 2009 grant letter to HEFCE from the Government states that the HE sector is expected to achieve a reduction in carbon dioxide emissions of at least 34% by 2020, against 1990 levels. In addition the letter puts forward an 80 percent reduction by 2050, in line with the Climate Change Act.

This was followed in 2010 by the HEFCE publication 'Carbon reduction target and strategy for higher education in England'. This restated the sector target against a 2005 baseline year and requires all institutions to establish realistic carbon reduction plans, setting clear targets up to 2020. As a clear financial driver, HEFCE have also linked capital funding to performance monitored against these plans.

Financial Drivers

The University's annual energy bill is around £2M. With gas and electricity prices linked to oil, price fluctuations of this valuable commodity cut right across the energy market. Continuing volatility of these markets combined with ongoing depletion of the world's oil stocks is likely to result in the further increase in the unit cost of energy. This is particularly pertinent to the university as its fixed-rate gas and electricity contracts finish at the end of 2010/11. A new flexible approach to energy procurement reduces the risk of extreme price shocks but energy demand minimization remains the most robust strategy for long term cost control.

Legislative Drivers

The University of Lincoln, like many HEIs, is also subject to increasing climate change-driven regulation. The Energy Performance of Buildings Directive requires Energy Performance

Certificates (EPCs) and Display Energy Certificates (DECs) to be produced for a number of buildings. With this brings increasing costs of compliance and raises the reputational bar as building energy performance is made more transparent and prominent.

The Carbon Reduction Commitment (CRC) now also requires the University to monitor, assess and manage carbon emissions throughout the year. These have to be reported annually to the Environment Agency and allowances have to be purchased for every tonne of CO₂ emitted. This provides a significant financial incentive for proactively reducing the University's carbon emissions.

Reputational Drivers

In addition to the financial drivers the CRC creates to reduce carbon, the publically available league table of performance adds a crucially important reputational driver. Similar leagues tables, such as the annual Green League are becoming more established and environmental performance is being scrutinized more than ever before.

Building on the good reputation established over the last ten years will be crucial for the University of Lincoln to achieve its strategic goal of becoming a Top 50 institution, and even more so following the announced changes in HE funding. It is therefore imperative that the university does not lag behind its peers and competitors.

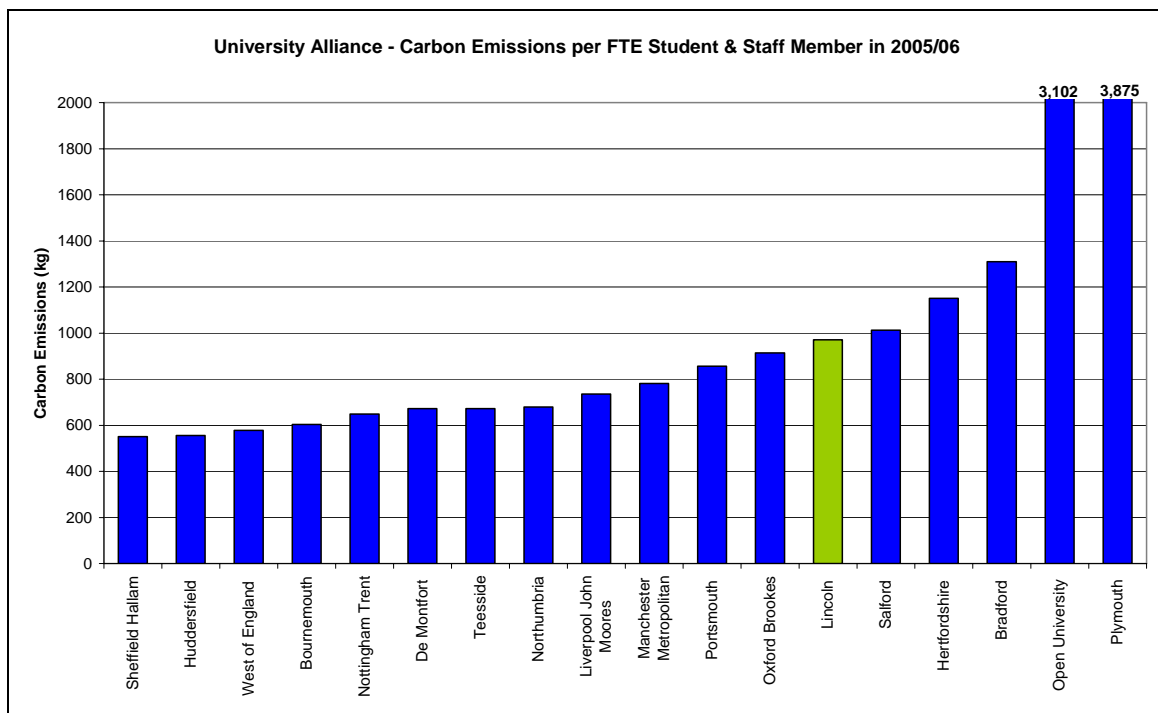


Figure 1: Comparison of the carbon intensity of University Alliance member institutions.

In comparison with the other English members of the University Alliance group of HE institutions the University of Lincoln has a relatively high level of carbon emissions per full time equivalent (FTE) student and staff member. There are 18 members of the University Alliance in England and Lincoln has the fifth highest level of carbon emissions out of this group. The high level of carbon emissions indicates that there is potential for significant reductions in carbon emissions.

2.2 Our low carbon vision

For the University of Lincoln to be known as an organisation working to minimise the carbon emissions associated with all of its activities, and one that proactively engages with staff and students to establish a campus culture where low carbon choices become the standard.

2.3 Strategic themes

The activities that the University will undertake to achieve our low carbon vision can be broadly grouped into five strategic themes:

1. Leadership and management

Carbon Management will be led by senior management and will be embedded across the institution through the alignment of policies, management practices and procedures in support of the low carbon vision.

2. Data Management

Data collection, monitoring & targeting processes will be developed to improve timeliness, accuracy and usefulness of data available for the purposes of: assessing the business cases for technical energy reduction measures; as a basis for targeted communication to stakeholders on progress towards carbon reduction targets; and to ensure continued transparency of reporting.

3. Building Infrastructure Improvements

Opportunities to reduce carbon emissions through investments in technical measures in campus buildings will be identified, considering how energy demand can be reduced and assessing opportunities to adopt zero and low carbon technologies.

4. Communications supporting a low-carbon culture

Regular and relevant communications to support a transition to a low carbon culture across the University will continue.

5. External partnerships and HE sector networking

Keep informed with the development and use of innovative carbon saving measures, both within the HE sector and through strong local networks and partnerships with external organisations.

2.4 Targets and objectives

In line with the recommendations set out by HEFCE in their January 2010 document “Carbon reduction target and strategy for higher education in England”; the University of Lincoln has set the following carbon reduction target:

A reduction in annual carbon emissions of 43% by the end of the 2020/21 academic year, compared to 2005/06 baseline emissions.

Two interim targets have also been set:

- **A reduction in annual carbon emissions by 12% by 2012/13**
- **A reduction in annual carbon emissions by 29% by 2017/18**

The University aspires to go beyond these targets and will assess possible further carbon savings at each milestone target.

All annual emissions are measured over the university academic year, running from 1st August to 31st July; refer to all scope 1 and 2 emissions (described in section 3.1); and will be stated in terms of tonnes of carbon dioxide equivalent (tCO₂e).

Objectives

The following supporting objectives have also been set:

1. The University will raise awareness of carbon management at both strategic and operational levels across the institution and will publish an annual report on carbon reduction progress to date.
2. Carbon management will be embedded and aligned with all university policies and strategies by 2020, with the Estates Strategy being the first to be reviewed in 2011.
3. Regular analysis and dissemination of energy, carbon and cost data will be established in 2010/11.
4. All existing infrastructure will be assessed for carbon reduction potential and carbon reduction considerations will be incorporated in all new build and major refurbishment projects.
5. The Eco-Champions network will be expanded to cover all university departments and the Students Union by 2012, establishing itself as core channel for carbon reduction communications.
6. Internal and external funding for carbon reduction investment will be actively sort and considered by the University.
7. A methodology for calculating indirect carbon emissions (scope 3) will be developed to enable inclusion in future carbon management reporting.

3. Emissions baseline and projections

Calculating an emissions baseline is the first step in enabling the University to gain a better understanding of its overall carbon contribution. This baseline 'carbon footprint' will become the comparison year to measure the University's annual emissions going forwards, tracking progress against the carbon reduction targets.

This section outlines the emission sources that have been included and methodology applied to calculate the baseline.

3.1 Scope

The Greenhouse Gas (GHG) Protocol defines direct and indirect emissions as follows:

- **Direct GHG emissions** are emissions from sources that are owned or controlled by the university.
- **Indirect GHG emissions** are emissions that are a consequence of the activities of the university, but occur at sources owned or controlled by another entity.

These can be further categorized into three broad scopes:

- **Scope 1:** All direct GHG emissions – e.g. gas, oil, LPG used on site
- **Scope 2:** Indirect GHG emissions from consumption of purchased electricity, heat or steam.
- **Scope 3:** Other indirect emissions, such as transport-related activities in vehicles not owned or controlled by the university, outsourced activities, waste disposal, etc.

The 2005/06 baseline calculations include Scope 1 and 2 emissions resulting from the activities of all University of Lincoln campuses.

All comparison annual emissions will include Scope 1 and 2 emissions as a minimum. In addition (as stated in Objective 7 above), Scope 3 emissions will also be included as reliable data becomes available.

Emissions are expressed in terms of carbon dioxide equivalent (CO₂e). This converts the global warming potential values of each GHG emission included in Scopes 1-3 into a single carbon dioxide measure.

3.2 Baseline

The University's 2005/06 emissions baseline is 9,781 tonnes of CO₂e.

The baseline year is the 2005/06 academic year (1st August 2005 – 31st July 2006). This is the earliest year that the University holds sufficient data records and corresponds with HEFCE's carbon reporting requirements for the HE sector.

Table 1 identifies the sources of data used to calculate the baseline and CO₂e conversion factors used:

Fuel Type	Data Source	Fuel Quantity	CO ₂ e Conversion Factor
Electricity	Invoices, backed up by meter readings	11,510,882 kWh	0.56113 kgCO ₂ e/kWh
Gas		13,606,619 kWh	0.18523 kgCO ₂ e/kWh
Heating Oil	Delivery report from supplier	218,165 Litres	3.0212 kgCO ₂ e/L
LPG		75,072 Litres	1.4920 kgCO ₂ e/L
Vehicle Fuel	Fuel card and deliveries reports	Tractor Oil: 7,679 L	Tractor Oil: 3.0212 kgCO ₂ e/L
		Diesel: 1,630 L	Diesel: 2.6720 kgCO ₂ e/L
		Petrol: 1,023 L	Petrol: 2.3220 kgCO ₂ e/L

Table 1: Baseline Data Information

Notes on Table 1 (above):

1. Heating oil and LPG fuel volumes refer to the amount of fuel delivered between 1st August 2005 and 31st July 2006, rather than the amount consumed. This data could be improved in future by installing tank meters.
2. All carbon conversion factors are taken from the '2010 Guidelines to Defra / DECC's GHG Conversion Factors for Company Reporting', produced by AEA. Version 1.2.1 FINAL, Last updated: 06/10/2010.
3. Vehicle fuel consists of petrol and diesel purchased for vehicles owned by the University and fuel used by tractors operating at the Riseholme Campus.

Table 2 and figure 2 (below) detail how the university's total baseline emissions are split between the different fuel sources.

Tonnes of Carbon Dioxide equivalent (tCO ₂ e)						
Year	Electricity	Gas	Heating Oil	LPG	Vehicle Fuel	All Fuels
2005/06	6,459	2,520	659	112	30	9,781

Table 2: Breakdown of baseline emissions by fuel type

2005/06 Baseline Emissions by Fuel Source (tCO₂e)

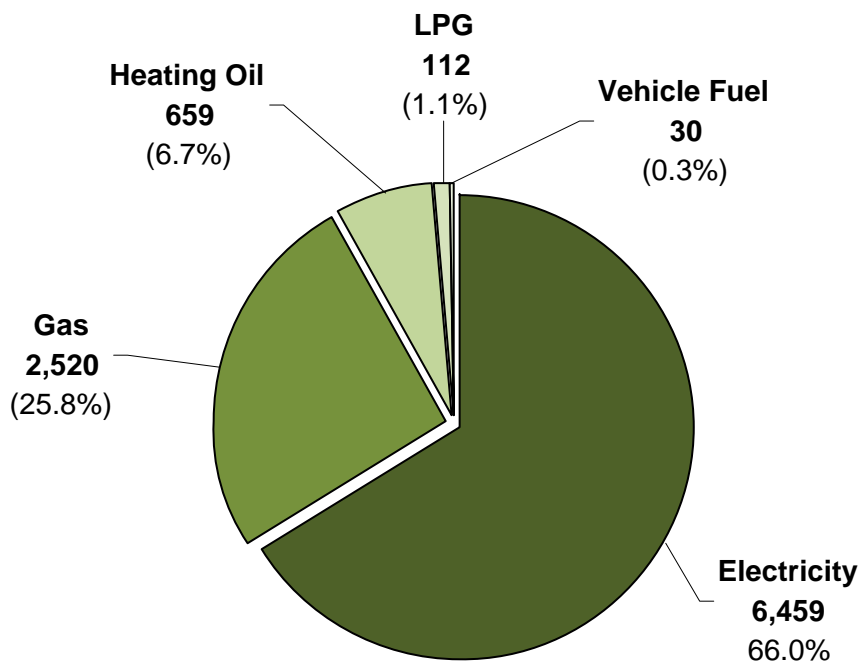


Figure 2: Breakdown of baseline emissions by fuel type

3.3 Annual Emissions – 2005/06 to 2009/10

Scope 1 and 2 annual carbon emissions have been calculated for each academic year between 2005/06 and the end of the most recent academic year, 2009/10 (Table 3).

Year	Tonnes of Carbon Dioxide equivalent (tCO ₂ e)					
	Electricity	Gas	Heating Oil	LPG	Vehicle Fuel	All Fuels
2005/06	6,459	2,520	659	112	30	9,781
2006/07	5,963	2,798	568	81	28	9,438
2007/08	6,315	2,730	604	97	29	9,774
2008/09	6,077	2,568	593	97	34	9,369
2009/10	5,984	2,586	638	92	36	9,335

Table 3: Annual emissions by fuel type, 2005/06 – 2009/10

As Table 3 shows, annual carbon emissions have fallen between 2005/06 and 2009/10 by 446tCO₂e which equates to 4.6%.

**The University of Lincoln has reduced its annual carbon emissions
by 4.6% between 2005/06 and 2009/10.**

Of the 4.6% carbon reduction to date, 2.5% was the direct result of energy demand reduction. Compared to many other HEIs who have seen significant increases in their annual carbon emissions over the same period, this is a credible start.

The additional 2.1% carbon reduction was achieved as a result of a decarbonised electricity supply. The carbon intensity of electricity delivered by the national grid varies as the fuel mix used to generate the electricity changes; if nuclear, renewable and gas power stations supply much of the electricity, the carbon conversion factor for each unit of electricity used will be lower than if coal power stations met a larger proportion. The UK Low Carbon Transition Plan indicates that "The Plan to 2020 will ... cut emissions from power and heavy industry together by 22% on 2008 levels". It can therefore be anticipated that grid electricity will be further decarbonised, positively contributing towards the University's carbon reduction target.

3.4 Progress to date

The annual carbon emissions calculated in section 3.3 have been plotted against an evenly weighted carbon reduction path for each interim target period in Figure 3 below:

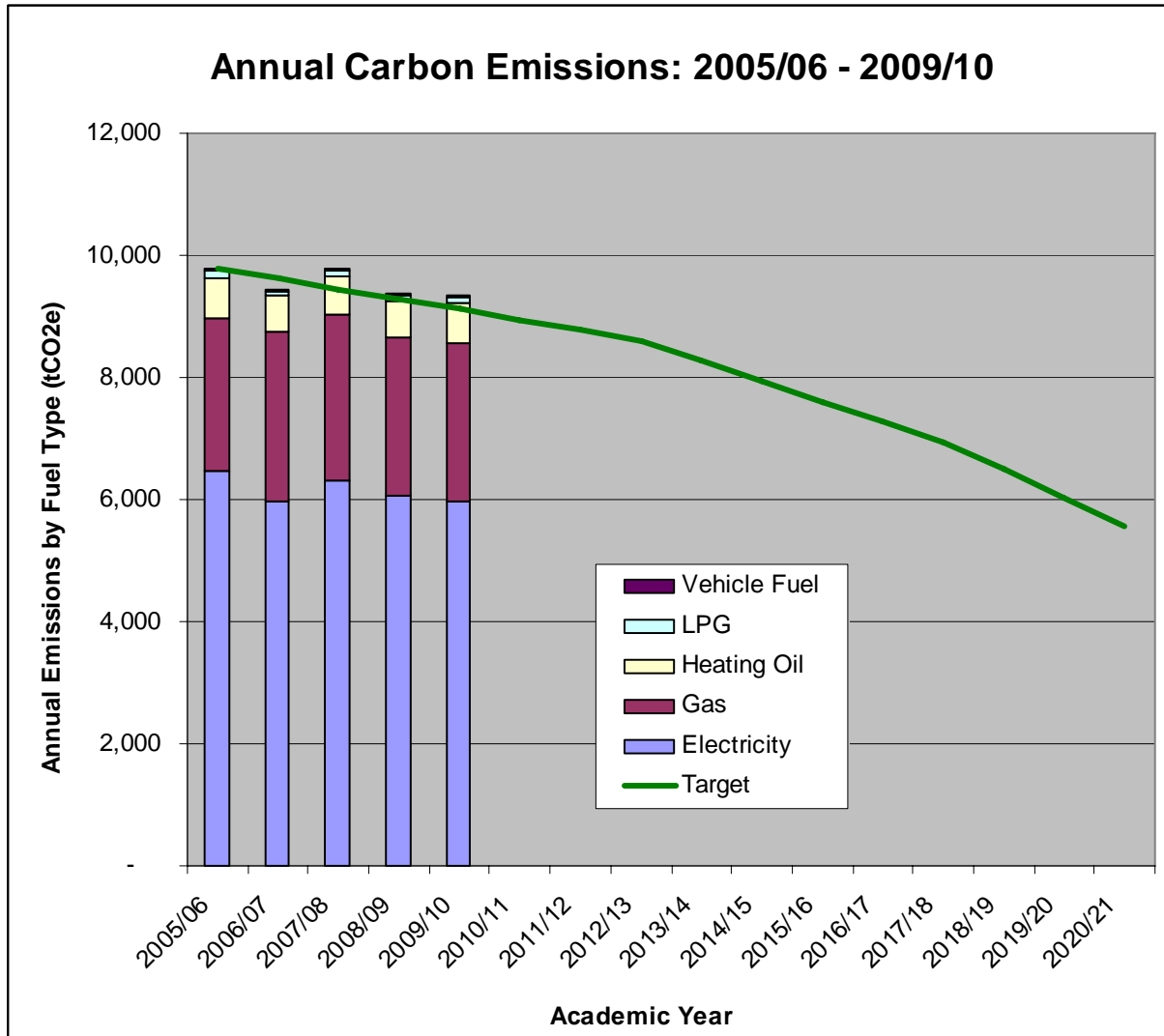


Figure 3: Tracking annual emissions against target emission levels.

This highlights the scale of the challenge set out in our carbon reduction targets. Whilst the University has successfully reduced its carbon emissions by 4.6% since 2005/06, 2009/10 emissions were still higher than the target line above. The implication of this is that between 2010/11 and 2012/13, year on year carbon reductions will have to be greater to ensure that the first milestone target is met. This has been considered throughout this plan and considered achievable.

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4. Carbon Reduction Projects

The tables below provide details of existing carbon reduction projects, projects that have already been planned and funding secured, projects expected to take place in the near term but have not been allocated specific funding, plus some medium and longer term projects that are yet to be fully planned but are likely to take place.

The tables are not an exhaustive list and will be updated as part of the annual review.

4.1 Existing Projects

Ref	Project	Lead	Cost			Annual Savings		Pay back	Year
			Capital	Revenue	Resource	Financial	Carbon		
	PIR Controls for Science Building	DC	£ 8,154	£ -	£ -	£ 2,880	15.7	2.8	2009/10
	Desktop PC Energy Efficiency	DC	£ 16,701	£ 1,400	£ -	£ 46,000	250.2	0.4	2009/10
	Rural Science Centre BMS	DC	£ 3,329	£ -	£ -	£ 1,260	3.7	2.6	2009/10
	Lighting Controls - MHT Building	DC	£ 2,806	£ -	£ -	£ 959	4.3	2.9	2010/11

4.2 Planned / Funded Projects

Ref	Project	Lead	Cost			Annual Savings		Pay back	Year
			Capital	Revenue	Resource	Financial	Carbon		
	BMS Bacnet System for Holbeach Campus	DC	£ 7,267	£ -	£ -	£ 2,294	9.4	3.2	2010/11
	Time Switches for Electrical Equipment	DC	£ 1,500	£ -	£ -	£ 672	3.1	2.2	2010/11
	GCW Library Plant Room Insulation	DC	£ 910	£ -	£ -	£ 281	1.6	3.2	2010/11
	Eco Hand Dryers - Brayford Campus	DC	£ 11,497	£ -	£ -	£ 4,284	27.7	2.7	2010/11
	GCW Library - Lighting Controls	DC	£ 1,750	£ -	£ -	£ 460	2.1	3.8	2010/11
	Engine Shed Lighting Improvements	DC	£ 8,455	£ -	£ -	£ 2,618	11.9	3.2	2010/11
	Energy awareness campaign	CT	£ -	£ 4,000	£ -	£ 15,000	45.0		2010/11
	Development of Eco-Champions Network	CT/ DC	£ -	£ -	£ 2,000	£ 4,000	6.0		2010
	Developing building action plans	CT	£ -	£ -	£ 2,000	£ 7,000	8.0		2011

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4.3 Near Term projects

Ref	Project	Lead	Cost			Annual Savings		Pay back	Year
			Capital	Revenue	Resource	Financial	Carbon		
	PIR Controls Bridge House Stairs	PL	£ 2,500	£ -	£ -	£ 540	2.5	3	2011
	PIR lighting controls for MHT & MAB corridors	PL	£ 5,500	£ -	£ -	£ 1,700	11.0	3.2	2011
	Boiler optimisation trial at Brayford Campus	SC	£ 4,000	£ -	£ -	£ 2,000	7.0	2	2011
	AMC Lighting improvements	PL	£ 8,000	£ -	£ -	£ 2,500	11.0	3.2	2011
	BMS control review	CT	£ -	£ -	£ 2,000	£ 8,000	10.0	0.25	2011
	Brayford Campus Street Lighting to LED	PL	£ 25,000	£ -	£ -	£ 8,000	15.0	3.1	2011/12
	Rolling LED Lighting Programme – start with LPAC	DC	£100,000	£ -	£ -	£ 20,000	30.0	5	2012
	LTM Plan Plant Upgrades	GMc	£4M	£ -	£ -	£120,000	1,000.0	N/A	2011-2020
	Cathedral Campus Consolidation	GMc	£7M	£ -	£ -	£ 54,000	300.0	N/A	2015

4.4 Medium to Long Term Projects

Ref	Project	Lead	Cost			Annual Savings		Pay back	Year
			Capital	Revenue	Resource	Financial	Carbon		
	Moving ICT Servers off site	ICT	£ -	£ -	£ -	N/A	800	N/A	2013
	Voltage Optimisation at Riseholme	PL	£ 40,000	£ -	£ -	£ 8,000	48	5	2013
	Replacement of old building stock at Riseholme	GMc	£8M	£ -	£ -	£100,000	120	N/A	2015
	CHP plant for Brayford Campus	GMc	£2M	£ -	£ -	£400,000	3,000	5	2017
	Photovoltaic Panels	DC	£150,000	£ -	£ -	£ 20,000	20	N/A	2013

5. Implementation Plan financing

5.1 Financial Risks

There is significant potential that the energy costs to the University could increase significantly in the years up to 2020. This is particularly true for electricity costs. The European Large Combustion Plant Directive means that many of the coal fired power stations in the UK will need to be replaced or adapted by 2015. In addition, many of the older nuclear power stations are due to be decommissioned between 2011 and 2020. Therefore, significant investment will be required in large scale electricity generating capacity. Much of this investment may be produced by passing costs on to the consumer. Electricity prices of 15 pence per kilowatt-hour could be expected by 2015, in comparison to current rates of circa. 9 p/kWh.

In addition, a series of schemes introducing carbon pricing into the energy market are having a financial impact on the University. The University already incurs a significant cost through legislative schemes aimed at tackling climate change. All of our electricity and gas bills include the Climate Change Levy (CCL). In the 2009/10 financial year the CCL costs to the University amounted to £48.8k for electricity and £22.7k for gas.

From April 2011 the University will incur the additional cost of complying with the Carbon Reduction Commitment (CRC). This places a charge of £12 per on each tonne of carbon that participants generate. The expected cost to the University of the CRC is around £112,000 per annum.

The current plan is that after the first two years of the CRC the cost of carbon allowances will float on an open market. Therefore, the price of each tonne of carbon could increase significantly above £12. At £30 per tonne (a price reached on the European Carbon Market) the cost to the University would be around £280k per annum.

For every tonne of carbon dioxide that the University can reduce from its emissions baseline the overall financial risk is reduced. By cutting carbon the University will cut utilities costs, cut CRC costs and move towards meeting HEFCE carbon reduction targets.

5.2 Funding the Carbon Management Plan

Revolving Green Fund

In 2009 the University received £100k from the HEFCE Revolving Green Fund, which is a joint initiative between HEFCE and Salix Finance. Under the scheme the funding can be used to implement energy saving projects provided that they meet a set of criteria covering payback periods and lifetime carbon savings.

The Revolving Green Fund is provided as an interest free loan on condition that savings from the projects are reinvested in more energy saving initiatives. Provided that compliant projects can be identified the loan does not have to be repaid.

In the years up to 2015 the Revolving Green Fund will be a key element of the funding of the Carbon Management Plan. It will be used to fund projects such as plant room insulation,

automatic lighting and boiler optimisation. Increasingly the Fund will be used to implement LED lighting projects as the technology becomes more developed.

In addition, Salix Finance regularly has funding streams for one off interest free loans for energy efficiency projects.

Long Term Maintenance Funding

In 2008 a report was produced for the University by White Young Green on long term maintenance around the Estate. This report identified a number of projects where major items of plant such as boilers and chillers would need replacing. Under the LTM Plan the projects were prioritised and will be tackled over each summer break.

Already the chiller units and boilers have been replaced in the Main Administration Building and the Media Humanities and Technology Building. By replacing old inefficient equipment with the latest kit it has been possible to produce significant energy savings.

In future years the LTM Fund can make a significant contribution to the reduction of carbon emissions. The opportunity to cut carbon emissions needs to be a key consideration in every project that is undertaken through the LTM Plan.

Invest to Save

The University has some money available for 'Invest to Save' projects where clear savings and payback times can be demonstrated. Potentially energy saving projects could be submitted to this fund, although it has relatively similar criteria to the Salix Fund.

Energy Services Contracts

ESCOs offer a major potential to implement energy saving projects without the need for direct capital investment from the University. Under an ESCO the University would sign an agreement with an energy services company for a specific energy project. The project could be for a major investment such as a Combined Heat and Power facility – the ESCO would build, operate and maintain the facility and the University would sign a long term contract to purchase heat and power from the CHP.

ESCOs can also be undertaken for renewable energy projects and major plant refurbishment schemes. ESCOs can take many different forms, but often the agreement would be for the ESCO to operate and manage a facility. Performance and operating guarantees would be built into the contract. These guarantees are likely to be similar to those expected in any operation and maintenance contract. Energy savings and reductions of CO₂ emissions will not necessarily be guaranteed, but the expectations of the parties to the arrangements will be that they will be reduced because of the type of plant being operated and maintained by the private sector ESCO. In some examples the ESCO agreement does include agreed energy savings within the contract.

6. Managing indirect emissions

Otherwise known as Scope 3 emissions, indirect emissions are those that result as a consequence of the activities of the University but occur from sources not owned or controlled by the University. Whilst these indirect emissions are not included in the 43% carbon reduction target, the university has set an objective to measure and reduce these emissions (see section 2.4).

This section splits indirect emissions into five broad groups. For each emission source an overview of current data availability and planned actions to improve measurement and reduction of emissions are outlined. As these are developed, additional scope 3 reduction targets will be set in subsequent Carbon Management Plan reviews.

6.1 Externally managed buildings

The 17 student accommodation buildings at the Brayford Campus were transferred to a management company in 2005. As the buildings are not directly controlled and managed by the University their carbon dioxide emissions have not been included within the baseline calculation.

The carbon emissions from the student accommodation are classed as scope three emissions. In 2009/10 the buildings generated 612 tonnes of carbon dioxide from electricity usage and 891 tonnes from gas consumption. These emissions will continue to be monitored and reported on as indirect emissions and ongoing work with the management company to help reduce these will be pursued.

6.2 Waste

Carbon emissions result from the production, transportation and disposal of waste products. The '2010 Guidelines to Defra / DECC's GHG Conversion Factors for Company Reporting' provides a 'Life-Cycle Factors for Waste Disposal' conversion which can be used to estimate the sum of these emissions (Figure 4 below).

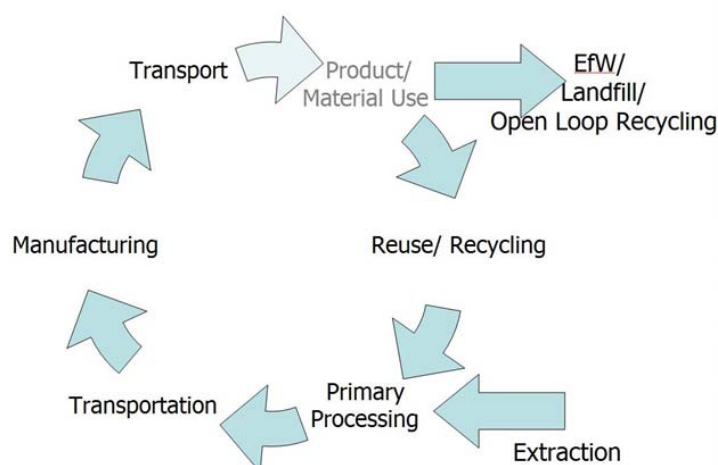


Figure 4: Life-Cycle Factors for Waste Disposal

At present the waste management company that collects waste from the University is not able to provide details of the weight of waste collected. However, estimated figures have been obtained by using the volume of the bin, the density of the material and the number of collections.

Using this information, a calculation of the carbon emissions for all waste recycled and sent to landfill in 2009/10 has been made (Table 4 below).

Emission Source	Carbon Emissions (tCO₂e)
Paper & cardboard	48.5
Dense plastic	1.1
Plastic film	0.7
Ferrous metals	5.4
Non-ferrous metals	-25.9
Glass	3.5
Waste sent to landfill	1,988
Total	2,021

Table 4: 2009/10 indirect carbon emissions from recycled and landfill waste.

Note that the figured for non-ferrous metal recycling gives a negative carbon dioxide emissions figure. This is because using waste aluminium products in smelting uses vastly less energy than smelting aluminium from raw materials.

With 2009/10 Scope 1 and 2 emissions totalling 9,335 tCO₂e, this calculation demonstrates that the indirect emissions generated by waste produced by the university are significant. By proactively minimizing waste generation and increasing recycling rates, the university will therefore benefit both financially and reduce its direct and indirect environmental impact.

The University will work with its current waste contractor to improve data availability and develop internal processes to analyse and report this information regularly. Updated carbon emissions will also be calculated in subsequent reviews of the Carbon Management Plan.

6.3 Water

Carbon emissions result from the supply and treatment of water, and the industry's buildings and transport. The '2010 Guidelines to Defra / DECC's GHG Conversion Factors for Company Reporting' provides 'Life-Cycle Conversion Factors for Water' which, like waste, can be used to estimate indirect carbon emissions resulting from the university's water consumption.

As all university water consumption is metered, data quality for the amount consumed is very good. Since 2005/06, the university has reduced its water consumption. For the latest academic year, 2009/10, the University used 39,070 m³ of water. Table 5 shows the indirect carbon emissions resulting from the university's water use in 2009/10.

Emission Source	Carbon Emissions (tCO₂e)
Water Supply	11.5
Waste-water treatment	28.9
Total	40.4

Table 5: 2009/10 indirect carbon emissions from water consumption.

Emission figures from water consumption will continue to be calculated and reported on for subsequent years, and targets may later be set.

The university will also continue to actively manage its water consumption, driven both financially and from its wider environmental concern to conserve this limited natural resource. However, within the scope of the carbon management plan, there is unlikely to be a strong emphasis on reducing water use as even substantial volume savings will make a relatively small contribution to reducing the university's overall carbon footprint.

6.4 Travel

Carbon emissions that result from travel for university activities can be split into three broad categories:

- Staff and student business travel;
- Staff and student commuting; and
- Student travel between home and the university

In addition, the different modes of transport used (car, train, bus, aeroplane etc) are responsible for different levels of carbon emissions. Collecting data for all of these categories and modes of transport is therefore a complex process.

The '2010 Guidelines to Defra / DECC's GHG Conversion Factors for Company Reporting' provides a range of conversion factors that can be applied to quantities of fuel used or distances travelled by a range of different modes of transport, enabling the carbon emissions from these activities to be calculated. However, at present the University does not collate data in a form that could be used to calculate these emissions.

To enable these emissions to be reported in future, the university will review the current data available and develop a plan to address any data gaps. Progress will continue to be reported in all subsequent reviews of the Carbon Management Plan.

6.5 Procurement

At present, the university has not attempted to calculate its indirect carbon emissions as a result of its procurement activities. The '2010 Guidelines to Defra / DECC's GHG Conversion Factors for Company Reporting' does provide a template for estimating these. Before the next review, work will be undertaken to identify how these emissions can be estimated going forwards.

7. Actions to Embed Carbon Management in the Organisation

This Carbon Management Plan sets out the University of Lincoln's low carbon vision, its carbon reduction targets and its plan to achieve these. It has been endorsed by the Vice-Chancellor and is available publically, demonstrating the institution's commitment to embedding carbon management.

Appendix A shows the Carbon Management Embedding Matrix which consists of seven subject headings with embedding actions for each subject that are ranked in five levels from worst to best practice.

An assessment has been made of the University's perceived current score for each category and the scores expected to be achieved by the 2012/13 and 2017/18 interim target dates. These are summarised in Table 6 below and discussed further in sections 7.1 to 7.6.

Area of Work	Current Score (5=best, 1=worst)	Expected Score by 2012/13	Expected Score by 2017/18
Policy	3	5	5
Responsibility	3	4	5
Data Management	3	4	5
Communication & Training	2	4	5
Finance & Investment	3	5	5
Procurement	2	4	5
Monitoring & Evaluation	2	4	5

Table 6: Carbon Management Matrix Assessment Summary

7.1 Policy

In 2009 the University of Lincoln established an Environmental Policy and an Energy Policy. These set a commitment to 'establish a culture where environmental performance is continually improved', outlining specific areas of focus including the prevention of pollution, reducing energy consumption, sustainable procurement and additional Scope 3 carbon emission sources. Additionally, the Energy Policy states that the University will measure carbon dioxide emissions and set targets for their reduction. These policies are due to be reviewed in 2010/11 and any amendments will be approved by the University's Infrastructure Committee (chaired by the Vice-Chancellor).

Policy reviews will subsequently be aligned with annual reporting on progress against the Carbon Management Plan and will follow guidance specified in best practice standards ISO14001 Environmental Management System and BS EN 160001 Energy Management System, enabling the University to score 5 in the policy section of the embedding matrix by the end of 2012/13.

Additional policies will also be developed to support the wider Environmental Policy related to areas including sustainable procurement, whole life costing and business travel.

Policy Performance Criteria & Assessment Summary

5 Best	<ul style="list-style-type: none"> • SMART Targets signed off • Action plan contains clear goals & regular progress reviews • Strategy launched internally & to community 	By 2012/13
4	<ul style="list-style-type: none"> • SMART Targets developed but not implemented 	
3	<ul style="list-style-type: none"> • Draft policy • Climate Change reference 	Current Position
2	<ul style="list-style-type: none"> • No policy • Climate Change aspiration 	
1 Worst	<ul style="list-style-type: none"> • No policy • No Climate Change reference 	

7.2 Responsibility

Strategic carbon management is the responsibility of the Director of Estates and Commercial Facilities. Day-to-day operational carbon management responsibility lies with the Carbon Reduction Manager (a full-time post created in September 2010). A growing network of Eco-Champions is also being established, integrating carbon management across all academic and service departments within the University and is supported by the Vice-Chancellor.

Responsibility Performance Criteria & Assessment Summary




5 Best	<ul style="list-style-type: none"> • CM is full-time responsibility of a few people • CM integrated in responsibilities of senior managers • VC support • Part of all job descriptions 	By 2017/18
4	<ul style="list-style-type: none"> • CM is full-time responsibility of an individual • CM integrated in to responsibilities of department managers, not all staff 	By 2012/13
3	<ul style="list-style-type: none"> • CM is part-time responsibility of a few people • CM responsibility of department champions 	Current Position
2	<ul style="list-style-type: none"> • CM is part-time responsibility of an individual • No departmental champions 	
1 Worst	<ul style="list-style-type: none"> • No CM responsibility designation 	

Increasing focus will be placed on devolving carbon management responsibility to departmental managers and topic-specific working groups (such as ICT and Space Planning & Timetabling). These actions will enable the University to meet the level 4 embedding requirements, and provide a firm foundation for the additional formal devolving of responsibility needed to meet level 5 by 2017/18.

7.3 Data Management

The University currently has substantial building-level sub metering across the Brayford Campus for gas, water and electricity. The majority of electricity consumed on other campuses is provided on a half-hourly contract allowing visibility of consumption profile for discrete groups of buildings. Itemised vehicle fuel deliveries are provided by suppliers for owned vehicle emissions but considerable work is required to capture data for other transport emissions. This will be incorporated by 2012/13 along with waste and water emissions data enabling an increase to level 4 of the embedding matrix.

Data Management Performance Criteria & Assessment Summary

5 Best	<ul style="list-style-type: none"> • Quarterly collation of CO₂ emissions for all sources • Data externally verified • M&T in place for: <ul style="list-style-type: none"> ○ Buildings ○ Waste 	 <div style="border: 1px solid black; padding: 5px; display: inline-block;">By 2017/18</div>
4	<ul style="list-style-type: none"> • Annual collation of CO₂ emissions for: <ul style="list-style-type: none"> • Buildings • Transport • Waste • Data internally reviewed 	 <div style="border: 1px solid black; padding: 5px; display: inline-block;">By 2012/13</div>
3	<ul style="list-style-type: none"> • Collation of CO₂ emissions for limited scope i.e. buildings only 	 <div style="border: 1px solid black; padding: 5px; display: inline-block;">Current Position</div>
2	<ul style="list-style-type: none"> • No CO₂ emissions data compiled • Energy data compiled on a regular basis 	
1 Worst	<ul style="list-style-type: none"> • Not compiled: <ul style="list-style-type: none"> ○ CO₂ emissions ○ Estimated billing 	

Building-level monitoring and targeting will also be in place for the Brayford Campus by 2012/13 (Objective 3). The University has invested in eSight energy management software and ongoing work to maximise its utilisation continues. This will enable monthly carbon emissions calculations by Carbon Reduction Manager, which will be disseminated to the Infrastructure Committee on a regular basis. However, the University does not expect to achieve level 5 on the embedding matrix by 2012/13 as there are no current plans to meet the additional cost of having the data externally verified.




Making energy, cost and carbon emissions data available to staff and students on a regular basis is a key strategic theme of this plan. During 2010/11 work will be undertaken to consult with senior managers, staff and students to identify how best to disseminate the information.

7.4 Communication and Training

The University's low carbon vision to be an institution that 'proactively engages with staff and students to establish a campus culture where low carbon choices become the standard'

highlights the importance placed on embedding low carbon communications and training into all our operation and activities.

Communication and Training Performance Criteria & Assessment Summary

5 Best	<ul style="list-style-type: none"> • All staff & students given formalised CM: <ul style="list-style-type: none"> ○ Induction ○ Training Plan ○ Communications • CM matters regularly communicated to: <ul style="list-style-type: none"> ○ External community ○ Key partners 	 <div style="border: 1px solid black; padding: 2px; display: inline-block;">By 2017/18</div>
4	<ul style="list-style-type: none"> • All staff & students given CM: <ul style="list-style-type: none"> ○ Induction ○ Communications • CM communicated to: <ul style="list-style-type: none"> ○ External community ○ Key partners 	 <div style="border: 1px solid black; padding: 2px; display: inline-block;">By 2012/13</div>
3	<ul style="list-style-type: none"> • Environmental / energy group(s) give ad hoc: <ul style="list-style-type: none"> ○ Training ○ Communications 	
2	<ul style="list-style-type: none"> • Regular poster/awareness campaigns • Staff & students given ad hoc CM: <ul style="list-style-type: none"> ○ Communications 	 <div style="border: 1px solid black; padding: 2px; display: inline-block;">Current Position</div>
1 Worst	<ul style="list-style-type: none"> • No communication or training 	

To date there have been various environmental awareness activities that have run across the campus. These include posters, establishing the Eco-Champion role, an environmental section in all staff inductions, and features in the staff magazine and daily email alerts. These activities provide a strong platform to increase current performance in the embedding matrix from level 2 to level 4 by 2012/13.

Planned activities include:

- Extending the Eco-Champion network to cover all departments and establish regular meetings and communication channels to share carbon reduction idea, activities, and provide feedback.
- Developing specific carbon reduction plans for the biggest energy users, starting with Main Admin, MHT, Science and Architecture buildings. These will be developed in consultation with the relevant Eco-Champions, staff and students in each building.
- In 2010/11, the Environment Team will launch a dedicated website which will include a specific section on carbon reduction. Additional forms of social media will also be used, including blogs and twitter.

- A regular feature on carbon reduction will go in the Staff Magazine and further joint working with the Marketing and Communications Team to promote carbon reduction activities both internally and externally.

7.5 Finance and Investment

This factor of embedding Carbon Management is covered in section five of this Plan. By 2012/13 the University should achieve level 5.

Finance and Investment Performance Criteria & Assessment Summary

5 Best	<ul style="list-style-type: none"> • Granular & effective financing mechanisms for CM projects • Finance representation on CM Team • Robust task management mechanism <ul style="list-style-type: none"> ○ Ring-fenced fund for carbon reduction initiatives 	By 2012/13
4	<ul style="list-style-type: none"> • Regular financing for CM projects • Some external financing <ul style="list-style-type: none"> ○ Sufficient task management mechanism 	
3	<ul style="list-style-type: none"> • Ad hoc financing for CM projects • Limited task management <ul style="list-style-type: none"> ○ No allocated resource 	Current Position
2	<ul style="list-style-type: none"> • Ad hoc financing for CM related projects • Limited task coordination resources 	
1 Worst	<ul style="list-style-type: none"> • No internal financing or funding for CM related projects 	

7.6 Procurement

Procurement Performance Criteria & Assessment Summary

5 Best	<ul style="list-style-type: none"> • Senior purchasers consult & adhere to ICLEI's Procura+ manual & principles • Sustainability comprehensively integrated in tendering criteria • Whole life costing <ul style="list-style-type: none"> ○ Area-wide procurement 	By 2017/18
4	<ul style="list-style-type: none"> • Environmental demands incorporated in tendering • Familiarity with Procura+ <ul style="list-style-type: none"> ○ Joint procuring between HEIs or with LAs. 	By 2012/13
3	<ul style="list-style-type: none"> • Whole life costing occasionally employed <ul style="list-style-type: none"> ○ Some pooling of environmental expertise 	
2	<ul style="list-style-type: none"> • Green criteria occasionally considered • Products considered in isolation 	Current Position
1 Worst	<ul style="list-style-type: none"> • No Green consideration • No life cycle costing 	

At present carbon reduction principles are not systematically included as part of the standard procurement process. However, a common set of supply chain principles that require all suppliers tendering for work to meet minimum environmental criteria is in place. In addition, some departments consider life costing, particularly for electrical equipment purchases.

With procurement being responsible for a substantial part of the university's indirect carbon emissions (see section 6.5), further joint-working with the central procurement team will continue, identifying the most appropriate way forward for the University of Lincoln.

7.7 Monitoring & Evaluation

Whilst efforts to review carbon management have been made to date, these have not been systematic. A clear outcome of this plan will be to embed this into the regular duties of the Carbon Reduction Manager, utilising the eSight software to automatically collect and analyse energy data from the building sub-meters.

Monitoring & Evaluation Performance Criteria & Assessment Summary

5 Best	<ul style="list-style-type: none"> • Senior management review CM process • Core team regularly reviews CM progress • Published externally on website • Visible board level review 	← By 2017/18
4	<ul style="list-style-type: none"> • Core team regularly reviews CM progress: <ul style="list-style-type: none"> ○ Actions ○ Profile & Targets ○ New opportunities quantification 	← By 2012/13
3	<ul style="list-style-type: none"> • CM team review aspects including: <ul style="list-style-type: none"> ○ Policies / Strategies ○ Targets ○ Action Plans 	
2	<ul style="list-style-type: none"> • Ad hoc reviews of CM actions progress 	← Current Position
1 Worst	<ul style="list-style-type: none"> • No CM monitoring 	

Collection of additional data (such as occupancy hours and degree-days) will also be pursued to aid more sophisticated analysis of building energy consumption and to set realistic building-level targets.

8. Management of Carbon Reduction Actions

To ensure that all the actions identified in this document are implemented as planned, ongoing management of the carbon reduction process is vital. This section identifies the key stakeholders involved in this process and sets out how this document will be used and reported on going forwards.

8.1 Ongoing stakeholder management

Stakeholders are those parties either within or external to the University who will be affected by the programme to reduce carbon emissions and may influence its success. The key stakeholders have been identified in Table 7 below:

Stakeholder	Influence	Key issues/concerns	Communication Channels
Governing Body	High	Strategic support	Committees Annual report
VC & Executive Board	High	Budgets & funding Future strategic goals Reputation/profile of university	Executive Board Meetings Infrastructure Committee Annual and interim reports
Deans and Heads of Departments	High	Budgets Staff numbers Space utilisation	Managers briefing updates Building management plans Departmental communications
Finance	High	Financial planning Procurement & contracts Life-cycle costing	Departmental communications
Estates	High	Estates Strategy Maintenance & facilities costs Capital costs New builds / refurbishments Space Management Utility budget	Building Action Plans Department communications
Staff	High	Comfortable working conditions Cost & ease of travel Job security	Eco-Champions network Departmental meetings Website Departmental communications
Students	Medium	University's customer Expectations of facilities and services Growing environmental awareness	Students Union/ societies Academic and research projects Halls management company. Student communications.
Local Authorities & Agencies	Medium	Local Area Agreement Funding to University	Meetings
Contractors & Suppliers	Medium	Retain contract Added costs burden	Contract tenders Meetings
Media & Press	Low	Corporate image	Press releases
Community	Low	Travel congestion Corporate image	Press releases Community groups

Table 7: Key carbon management plan stakeholders.

8.2 Annual Progress review

Each year a formal annual review of carbon reduction progress against this document will be undertaken. The first review will take place in October 2011, with each subsequent review undertaken annually from that date.

The review will consider all the costs and benefits resulting from the carbon reduction activities outlined in this plan. These will assess:

- Financial savings, either cashable or returned to the 'rotating fund'
- Carbon savings against target
- Less-quantifiable benefits, such as influencing the staff and student body, and local community

Led by the Carbon Reduction Manager and in consultation with key stakeholders, this review will be submitted by the Director of Estates and Commercial Facilities to the Infrastructure Committee (chaired by the Vice-Chancellor) and made publically available via the University of Lincoln website and supporting communications.

Appendix A - Carbon Management Embedding Matrix

	POLICY	RESPONSIBILITY	DATA MANAGEMENT	COMMUNICATION & TRAINING	FINANCE & INVESTMENT	PROCUREMENT	MONITORING & EVALUATION
5 BEST	<ul style="list-style-type: none"> SMART Targets signed off Action plan contains clear goals & regular progress reviews Strategy launched internally & to community 	<ul style="list-style-type: none"> CM is full-time responsibility of a few people CM integrated in responsibilities of senior managers VC support Part of all job descriptions 	<ul style="list-style-type: none"> Quarterly collation of CO₂ emissions for all sources Data externally verified M&T in place for: <ul style="list-style-type: none"> Buildings Waste 	<ul style="list-style-type: none"> All staff & students given formalised CM: <ul style="list-style-type: none"> Induction Training Plan Communications CM matters regularly communicated to: <ul style="list-style-type: none"> External community Key partners 	<ul style="list-style-type: none"> Granular & effective financing mechanisms for CM projects Finance representation on CM Team Robust task management mechanism Ring-fenced fund for carbon reduction initiatives 	<ul style="list-style-type: none"> Senior purchasers consult & adhere to ICLEI's Procura+ manual & principles Sustainability comprehensively integrated in tendering criteria Whole life costing Area-wide procurement 	<ul style="list-style-type: none"> Senior management review CM process Core team regularly reviews CM progress Published externally on website Visible board level review
4	<ul style="list-style-type: none"> SMART Targets developed but not implemented 	<ul style="list-style-type: none"> CM is full-time responsibility of an individual CM integrated in to responsibilities of department managers, not all staff 	<ul style="list-style-type: none"> Annual collation of CO₂ emissions for: <ul style="list-style-type: none"> Buildings Transport waste Data internally reviewed 	<ul style="list-style-type: none"> All staff & students given CM: <ul style="list-style-type: none"> Induction Communications CM communicated to: <ul style="list-style-type: none"> External community Key partners 	<ul style="list-style-type: none"> Regular financing for CM projects Some external financing Sufficient task management mechanism 	<ul style="list-style-type: none"> Environmental demands incorporated in tendering Familiarity with Procura+ Joint procuring between HEIs or with LAs. 	<ul style="list-style-type: none"> Core team regularly reviews CM progress: <ul style="list-style-type: none"> Actions Profile & Targets New opportunities quantification
3	<ul style="list-style-type: none"> Draft policy Climate Change reference 	<ul style="list-style-type: none"> CM is part-time responsibility of a few people CM responsibility of department champions 	<ul style="list-style-type: none"> Collation of CO₂ emissions for limited scope i.e. buildings only 	<ul style="list-style-type: none"> Environmental / energy group(s) give ad hoc: <ul style="list-style-type: none"> Training Communications 	<ul style="list-style-type: none"> Ad hoc financing for CM projects Limited task management No allocated resource 	<ul style="list-style-type: none"> Whole life costing occasionally employed Some pooling of environmental expertise 	<ul style="list-style-type: none"> CM team review aspects including: <ul style="list-style-type: none"> Policies / Strategies Targets Action Plans
2	<ul style="list-style-type: none"> No policy Climate Change aspiration 	<ul style="list-style-type: none"> CM is part-time responsibility of an individual No departmental champions 	<ul style="list-style-type: none"> No CO₂ emissions data compiled Energy data compiled on a regular basis 	<ul style="list-style-type: none"> Regular poster/awareness campaigns Staff & students given ad hoc CM: <ul style="list-style-type: none"> Communications 	<ul style="list-style-type: none"> Ad hoc financing for CM related projects Limited task coordination resources 	<ul style="list-style-type: none"> Green criteria occasionally considered Products considered in isolation 	<ul style="list-style-type: none"> Ad hoc reviews of CM actions progress
1 Worst	<ul style="list-style-type: none"> No policy No Climate Change reference 	<ul style="list-style-type: none"> No CM responsibility designation 	<ul style="list-style-type: none"> Not compiled: <ul style="list-style-type: none"> CO₂ emissions Estimated billing 	<ul style="list-style-type: none"> No communication or training 	<ul style="list-style-type: none"> No internal financing or funding for CM related projects 	<ul style="list-style-type: none"> No Green consideration No life cycle costing 	<ul style="list-style-type: none"> No CM monitoring