University of Reading

Carbon & Water Management 2012 Update

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Contents

Related Documents

University of Reading Carbon Management Plan (CMP), 2 March 2011

Foreword from the Vice Chancellor

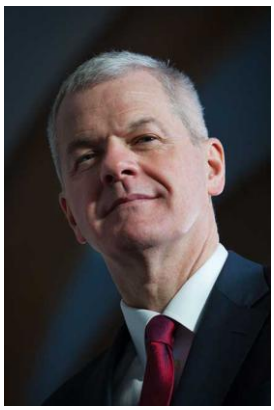
The University of Reading is at the forefront of research and teaching in global climate change. Undoubtedly, this is the greatest environmental challenge of our times.

Alongside this research and teaching, the University recognises the importance of strong leadership in managing its own environmental impacts, underlined by our aim to reduce our carbon emissions by 35% by 2015/16. The recent Times Higher Education Student Experience Survey also underlines the value our students place on the University's campus environment and the importance of maintaining it and enhancing it into the future.

Tackling our carbon emissions goes hand in hand with improving our estate. It is also essential in protecting ourselves from rising energy and carbon costs. Achieving our 35% carbon reduction can achieve cumulative cost savings of £19.6m by 2016.

We have made a great start, reducing our carbon emissions by 10% in our first full year compared to our 2008/09 baseline year. As this update outlines, we intend to build on this early success to ensure our ambitious plans for the University are realised. That way, we will maintain our position as one of the leaders in higher education when it comes to carbon and water management.

David Bell
Vice Chancellor



Executive Summary

The University of Reading has reduced its carbon emissions by 10% to the year ending July 2011; a significant first step towards the ambitious targets of 35% reduction by 2016 and 45% by 2020 laid out in its Carbon Management Plan. The 3,858 tCO_2e reduction achieved to date has been achieved across a range of emission sources, from heating fuel and electricity, to waste, water and transport. If weather trends are factored in, these savings would equate to 14% on a like-for-like basis. In recognition of savings made to date, and the strength of its energy management systems, the University has achieved Carbon Trust Standard accreditation.

The carbon reductions outlined above have resulted in cumulative cost savings of over £1.3m to date, for an initial investment of £853,000 in direct carbon reduction initiatives, a net cost saving of £474,000. Funding has come from a range of sources, including internal investment, interest free borrowing through Salix Finance as well as some external funding.

The case for further action remains strong, with energy costs continuing to rise, increasing reputational drivers for action and continued concerns about the impacts of global climate change.

The original Carbon Management Plan estimated a £3.5m investment could achieve cumulative cost savings of £18.5m, with projects identified that would meet 84% of the overall reduction target. Further work has taken place to expand and firm up the planned project list, with 96% of required projects now identified and further work planned for 2012/13 to identify projects totalling 110% of the target. Total investment costs of £4.04m (of which £853,000 has been spent) are now estimated to achieve £19.6m of cumulative savings to 2016.

The projects undertaken so far, and those currently planned for the future, are outlined in this Carbon Management Update, which now also includes opportunities for water efficiency. An interim target of 10% reduction in water consumption has been set for 2012/13.

A report on progress to the year ending July 2012 will be produced in the autumn, with a further full carbon management update planned annually.

1. Introduction

In March 2011, the University of Reading committed to reduce its carbon emissions by 35% by the end of the 2015/16 academic year. The University's Carbon Management plan, endorsed by the then Vice Chancellor Professor Gordon Marshall, set out the clear financial, reputational and environmental benefits of achieving this aim.

One year on, this document provides an update to the original plan, both in terms of progress to date and in terms of the planned carbon reduction initiatives for 2012/13. It should be read as an addendum to the original plan rather than a replacement for it.

The University continues to evolve and an annual review of the Carbon Management Plan is essential to ensure it remains relevant. An update is also timely, given the University has appointed a new Vice Chancellor, Sir David Bell, as well as a new Energy Manager, Dan Fernbank.

The political and legislative landscape for carbon reduction is also changing rapidly, including changes to low carbon incentives such as the Feed in Tariff for renewable energy and the continued evolution and possible replacement of the Carbon Reduction Commitment (CRC) Energy Efficiency Scheme, which requires large organisations such as universities to purchase allowances for every tonne of carbon they are responsible for. By December 2012, the University will have withdrawn from the EU ETS scheme, participating instead solely in CRC.

Energy prices also continue to rise. The University's current fixed price energy contracts expire during 2012 and if replaced on a like-for-like basis, are estimated to result in a 14% rise in energy costs[1]. Savings for individual projects in this document are presented in current contract units, and therefore present a very conservative view of the potential cost savings achievable.

The IPCC's latest report[2] underlines once again the importance of tackling carbon emissions globally. It predicts more extreme weather events as a result of climate change, including 90-100% probability of the following impacts:

- Increased frequency and magnitude of maximum daily temperature extremes
- Increased length, frequency, and/or intensity of warm spells or heat waves over most land areas
- Increased extreme coastal high water levels; causing particular problems for tropical small island states along with increased tropical cyclone wind speeds

On many levels, the case for action has never been stronger.

[1] *EIC are Energy Consultants appointed to advise the University on their energy procurement*

[2] *IPCC – "Managing the risks of extreme events and disasters to advance climate change adaptation - Summary for policymakers" -http://www.ipcc-wg2.gov/SREX/images/uploads/SREX-SPMbrochure_FINAL.pdf*

2. Progress Review

Carbon reduction to July 2011

The Carbon Management Plan presented a projection of business as usual carbon emissions and target carbon emissions to 2015/16. The graph below shows how the University has progressed up to the end of the 2010/11 financial year (to 31 July) against this projection. Further explanation of the graph follows below.

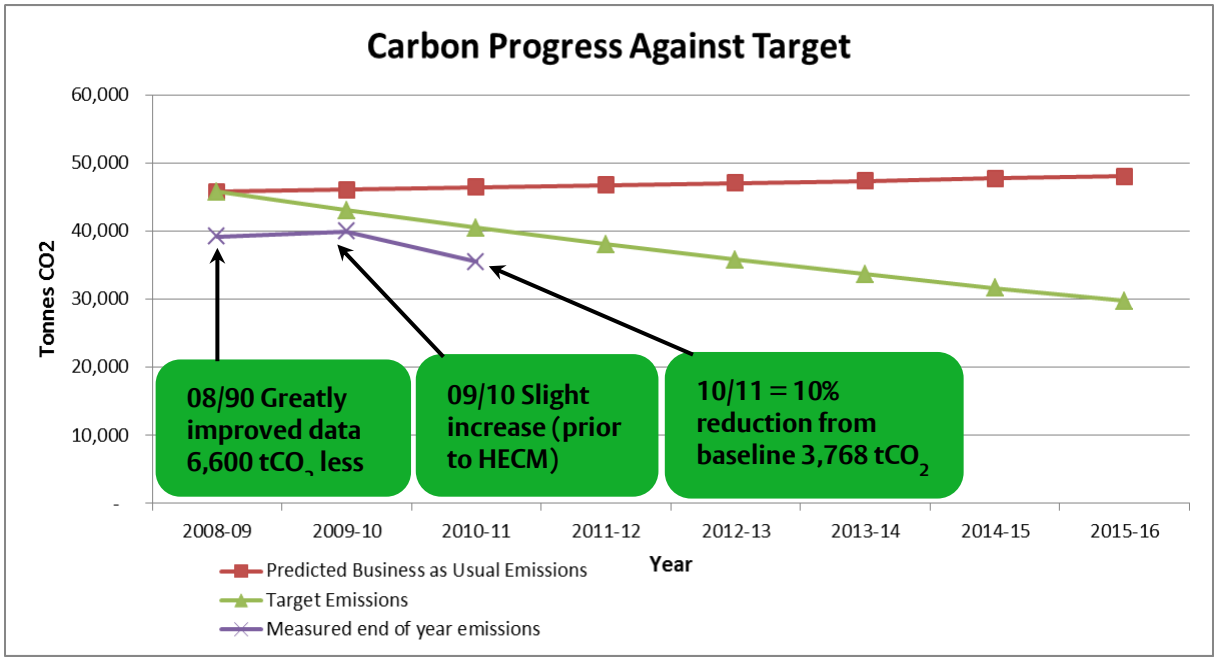


Figure 1- Progress against projected carbon reduction to 2011

Revised 2008/09 baseline

Since signing up to the Carbon Trust's Carbon Management Programme in 2010, significant progress has been made in improving the robustness of the University's energy data, not least through the appointment of a Carbon Data Analyst. As a result, a number of anomalies have been ironed out and the University's original estimated baseline emissions of 45,824 tCO_2e has been corrected to 39,254 tCO_2e.

The 35% carbon reduction target for 2015/16 and 45% target for 2019/20 will be applied to this revised baseline.

Emissions reduction progress

In 2010/11, the University reduced its emissions by 10% compared to its 2008/09 baseline. The preceding year, which was prior to producing the Carbon Management Plan, saw a slight increase in emissions, demonstrating the value of having a well-defined and supported plan.

Table 1 - Emissions source breakdown - baseline and current year

Emissions Source	2008-09 tCO_2e	2010-11 tCO_2e	% change
Liquid fuels	1,544.2	788.4	-49%
Gaseous fuels	12,936.9	10,928.6	-16%
Vehicle fleet	137.8	133.0	-3%
Grid electricity	21,076.7	20,343.0	-3%
Business Travel	2,855.4	2,480.0	-13%
Waste	4258	402.2	-6%
Water	277.1	202.7	-27%
Refrigerants	-	207.5	n/a
Total:	**39,253.9**	**35,485.5**	**-10%**

As can be seen from Figure 2 below, emissions are down for all sources, with the exception of refrigerants, since these emissions were not recorded for the original baseline year.

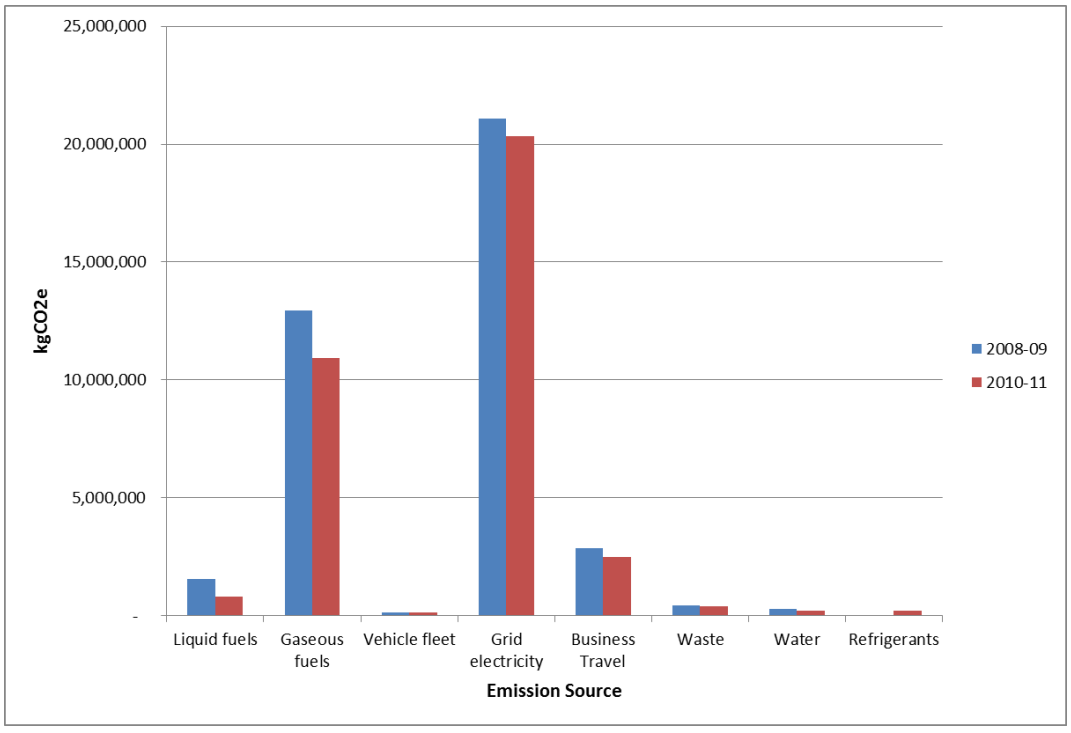


Figure 2 - Comparison of baseline and current year emissions by source

Carbon reduction in 2010-11

Table 2 shows the carbon reduction projects completed since the Carbon Management Plan was signed off in March 2011 until the end of December 2011.

Table 2 - Completed Carbon Reduction Projects Mar 2011 - Dec 2011

Project Ref	Description of Project	Initial cost	Annual CO_2 savings	Annual £ savings	Date of completion	Quantification type: 1 - Measured 2 - Calculated 3 - Estimated
UoR017	Switch off Blade super computer	-	1,110	169,957	03/2011	Estimated
UoR018	Student Switch Off (2nd Year)	-	31	4,790	01/2011	Estimated
UoR019	Fine tune BMS to align with central room bookings , and switch off plenum systems where window ventilation adequate	24,000	21	1,866	02/2011	Calculated
UoR020	Upgrade BMS and expand Greenlands coverage to N.House, Main Building & IoD	61,000	160	14,344	02/2011	Estimated
UoR022a	Carnego Project (Carrington)	5,773	13	1,916	07/2011	Measured
UoR029	Insulation to pipework and valves	55,000	334	30,000	03/2011	Estimated
UoR034	Heating zoning (URS)	52,203	102	10,383	12/2011	Estimated
UoR038	Reduce heating season by one week either end of season	-	102	15,347	10/2011	Calculated
UoR040	Roof Insulation: Agriculture & Meteorology/Psychology link	-	32	3,305	04/2011	Measured
UoR044a	Solar PV - Carrington	-	10	1,840	12/2011	Calculated
UoR044b	Solar PV - FMD	-	10	1,811	12/2011	Calculated
UoR046	Lighting control Chemistry and Food Bio	64,094	109	16,660	07/2011	Estimated
UoR047a	A/C R22 replacement - year 1	-	98	15,041	03/2011	Calculated
UoR047b	A/C R22 replacement - year 2	-	15	2,852	11/2011	Calculated
UoR048	Whiteknights 33kVA sub-station upgrade	-	668	102,194	06/2011	Estimated
UoR049	Insulation to steam/hot water pipework, valves & calorifiers (phase 3)	9,900	9	1,380	12/2011	Estimated
UoR051	BMS Controls Greenlands Campus (Project 2)	88,592	192	17,222	07/2011	Estimated
UoR052	Install 25 Vending Misers	4,849	17	3,029	08/2011	Estimated
UoR053	Ventilation CO2 detector in Meteorology, RUSU, FMD	£ 2,670	5	802	06/2011	Measured
UoR055	Carbon brain printing	-	3	524	11/2010	Measured
UoR059	Roof Insulation: Agriculture - phase 2	1,200	2	276	01/2012	Measured
		£ 382,081	**3,043**	**£ 415,538**		

These projects are a combination of initiatives identified in the original plan, projects which have been identified and implemented subsequent to the original plan, and projects which whilst not directly undertaken to reduce carbon, have nonetheless had an added carbon saving benefit.

Over a full year, these projects are anticipated to save just over 3,000 tCO_2e. As many of the projects were implemented during the year, their full benefit will not be realised until the following financial year.

Some projects, such as the switch off of the blade super computer, were not specifically undertaken to save energy, but have still had significant carbon reduction benefits. For this reason, their costs have not been captured in this document.

Case Study 1 – Improved Building Management System

Many buildings across the University are controlled by the central Building Management System (BMS). Significant improvements have been made over the last year to provide closer control for heating and ventilation systems, including significant expansion in the Henley Business School's Greenlands estate. These improvements will save 378 tCO_2 and over £34,000 annually.

Wherever possible, project savings are accurately measured to ensure the anticipated savings are actually achieved. Where this is not possible, savings are either calculated or as a last resort, are estimated. The relevant level of accuracy for each project is noted in Table 2. Over the next year, improvements are proposed to the University's utilities metering, which will enable closer measurement of full project benefits.

Case Study 2 – Behaviour Change

In 2010, we worked with Carnego Systems to run a highly successful behaviour change project, engaging building users with good quality energy performance data for their buildings. The pilot scheme in the Carrington building achieved savings of over 25% in lighting and small electrical item consumption, and is now being rolled out in a number of further buildings.

2010-11 Weather

An important factor affecting the University's energy consumption is the weather. The emission reductions reported are *absolute* reductions, i.e. they do not take account of the weather patterns for each year.

If weather patterns (based on published degree days data) are factored in, 2008/09 was a milder year than the 2 subsequent years, therefore on a like-for-like basis, in 2010/11, carbon emissions actually reduced by 14% against the 2008/09 baseline.

Figure 3 - Staff and students embody our 35% reduction commitment

Carbon Trust Standard

In November 2011, the University achieved Carbon Trust Standard accreditation, which verifies the University has reduced its carbon emissions compared to the previous 2 years, as well as recognising that it has strong energy management processes in place to continue to reduce its carbon emissions year on year.

Building portfolio changes

With a property portfolio as large as the University's, there are inevitably continuing changes to its estate, which can affect the University's carbon emissions both positively and adversely. The University remains committed to overall carbon reduction, therefore the detail of every building change is beyond the scope of this document. However a few significant changes of note may fundamentally affect the University's footprint over time.

The first is the sale (on a long-term lease) of the majority of the University's Halls of Residence. For the time being, the University continues to purchase utilities on behalf of the new owner, UPP and therefore their emissions continue to form part of our footprint. UPP have committed to support the University in achieving its carbon reduction targets.

The second project in the pipeline is the development of a satellite campus in Malaysia. Emissions from this campus will fall outside the direct scope of the Carbon Management Plan, however opportunities to influence decisions on carbon reduction will be sought where appropriate.

Additionally, a new University Strategy is currently being defined, which may result in a further review of the Carbon Management Plan being required to ensure the 35% carbon reduction target remains achievable.

Emissions scope and emissions factors

The University's current baseline carbon footprint is reasonably comprehensive already, but will be expanded in the future to include further scope 3 emissions (see page 13).

The factors used to convert energy and other emissions sources into carbon are published annually by DECC/Defra. Reported carbon savings will therefore be based on the most up-to-date emissions factors each year.

Energy prices

As identified on page 5, energy prices continue to rise and in the coming months, the University's existing fixed price contracts expire, therefore a significant cost increase is anticipated. The Carbon Management Plan assumed annual increases of 5.2% in calculating the potential value at stake of a 35% reduction in carbon emissions by 2015/16. This assumption now appears conservative, with the Carbon Trust's current analysis suggesting annual increase of 11.6% can be expected (see also page 14).

Energy prices used in assessing the feasibility of future projects will be based on an analysis of the baseline data published by DECC, which is the basis of the Carbon Trust figures. Individual project savings presented in this document are based on current prices.

3. Carbon & Water Reduction 2011 - 2013

New projects

Table 3 shows the new projects which have been identified, some of which are at the early stages of investigation and others that are already underway. The majority of these projects are anticipated to be completed by the end of 2012/13 academic year, subject to them proving feasible. The street lighting project (Ref: UoR078) is likely to be implemented later.

Table 3 - Projects identified during 2011-12

Project Ref	Description of Project	Initial cost	Annual CO_2 savings	Annual £ savings
UoR22b	Green Impact - Environmental Champions	-	-	-
UoR050	Insulation to Harry Pit	£3,500	11	1,610
UoR054	AMR smart meters	£100,000	152	26,674
UoR056	Carbon farming - drying oven improvements	£8,500	10	2,563
UoR057	Upgrade library lighting	£161,907	322	60,964
UoR058	CO2 ventilation sensors - Multiple buildings	£40,350	86	16,284
UoR060	Lighting control - Harry Pitt	£20,000	-	-
UoR061	Roof Insulation - Greenlands Main House complex	£10,000	-	-
UoR062	Roof Insulation - multiple buildings 2012	£29,000	36	5,478
UoR063	TOB1 plant room insulation	-	-	-
UoR064	Lighting/Lighting controls - Meteorology & Agriculture	-	-	-
UoR065	BMS Greenlands Campus - River House, Jarratt AHU, Trust Suite	£67,000	37	9,574
UoR066	Windows draught proofing - multiple buildings	£200,000	294	44,165
UoR067	Thames Water efficiency project	£2,500	21	30,190
UoR068	London Rd library lighting upgrade	£9,500	7	1,611
UoR069	Cavity Wall Insulation	£45,000	45	6,740
UoR070	Flat Roof Insulation - HumSS & URS	£70,000	30	4,569
UoR071	Carnego behavioural change 2012/13 Carrington continuation plus Meteorology & AMS	£23,000	34	6,408
UoR072	Green Impact 2012/13	£5,500	57	10,753
UoR073	Behavioural change 2012/13 inc carbon dashboard, carbon counter, carbon app, e-learning, workshops & events	£16,500	17	3,277
UoR074	Whiteknights borehole refurbishment	£150,000	62	90,569
UoR075	Solar Thermal water heating - Chemistry	£50,000	18	11,260
UoR076	Steam boilers - reverse osmosis	£10,000	46	6,901
UoR077	TRVs in Greenlands Main House	£10,000	12	3,107
UoR078	Energy Efficient Street Lighting	£250,000	184	34,753
		£1,282,257	**1,481**	**£377,452**

Case Study 3 – draught proofing and insulation

A number projects proposed for the next 18 months focus on improving building fabric, through a combination of roof insulation, wall insulation and draught proofing. These projects are particularly cost-effective, will improve user comfort in many buildings and align well with the need to replace the district heating system's ageing steam boilers during the next few years; investment now will reduce the capacity required for the new boilers.

Water efficiency

The University is working with Thames Water to explore opportunities for reducing our water consumption. The University has already reduced its water consumption by 27% from the baseline year (see Table 1), but believes there is significant further scope for improvement.

In combination with Thames Water, the University plans to:

- Install additional water metering on all campuses, linking it up to suitable communications equipment and software for analysis.
- Identify and reduce the amount of water lost through water leaks
- Investigate and progress opportunities for water efficiency

The carbon impact associated with water results from the supply treatment and subsequent waste treatment processes. Whilst this carbon impact is small in terms of the University's overall footprint (0.6% in 2010/11), the efficient use of water is an essential part of good environmental practice and good utilities management.

As an interim target, **the University aims to reduce its water consumption by 10% by the end of 2012/13** academic year. This target will be reviewed with a view to extending it as our work with Thames Water progresses.

Existing identified projects

The projects in Table 4 were identified in the original Carbon Management Plan, but are yet to be implemented, either because they are not due for implementation yet, because there have been delays in moving forward with the project, or because they require further feasibility work to progress them.

Table 4 - Existing projects not yet implemented

Project Ref	Description of Project	Initial cost	Annual CO_2 savings	Annual £ savings
UoR023	Closure Bulmershe Campus	-	695	117,725
UoR024	Switch off computers overnight and at weekends	-	1,259	238,308
UoR025	Closure Sibly Hall	-	687	115,568
UoR026	Fume cupboards STC	£61,500	152	22,855
UoR027	Awareness raising campaign 2013/14	£30,000	424	80,293
UoR028	Awareness raising campaign 2014/15	£30,000	424	80,293
UoR032	Heating controls and systems and BMS (HUMSS)	£141,437	0	50
UoR035	Lighting upgrade to T5 high frequency	£300,000	449	85,010
UoR035a	HumSS, URS & Geography lighting efficiency upgrades	£200,000	150	28,442
UoR037	Reduce number of building used out of hours	-	25	4,194
UoR041	Boiler replacement programme	£240,000	451	67,810
UoR043	Fume Cupboards efficiency/management	£300,000	734	110,413
UoR045	Free Cooling Agriculture	£29,000	92	17,406
UoR047	Upgrading of Air Conditioning (5 year programme)	£75,000	163	24,990
		£1,406,937	**5,706**	**£993,358**

For these, and all other projects, a RAG (Red, Amber, Green) status report is maintained to monitor progress – see Appendix 1. This report is reviewed at the Carbon Management Project Team and Project Board meetings.

To date, only one project has been dropped completely from the plan; IT server virtualisation (ref UoR033) is not felt to be an appropriate solution for the University.

Aspirational projects

The following projects represent longer-term aspirations and are likely to be implemented beyond the initial target period of 2015/16 and will be a first step towards the 45% reduction target for July 2020:

Table 5- Aspirational Projects

Project Ref	Description of Project	Initial cost	Total CO2 savings	Total £ savings
UoR036	Reduce total of non-residential area by 15%	£ 800,000	694	75,660
UoR039	Double Glazing in Whiteknights House	£ 660,000	184	16,500
UoR042	CHP/District Heating Energy Centre	£ -	-	-

Scope 3 emissions

The Higher Education Funding Council for England (HEFCE) intend to introduce mandatory reporting for Scope 3 carbon emissions. The University already includes the following Scope 3 emissions within its reporting and its 35% carbon reduction target:

- Waste
- Water
- Business travel

For future reporting, the University will look to also incorporate:

- Procurement-related emissions
- Student commuter travel

In late 2011, the University appointed a Sustainable Travel Co-ordinator, who has already carried out a comprehensive travel survey and site survey and is progressing a University-wide Travel Plan due for publication in the summer.

Total carbon savings identified

Table 1 showed the University's 2008/09 baseline emissions to be 39,254 tCO_2e. Factoring in modest consumption growth of 0.7% per annum (in line with the original Plan) would see a rise to 41,265 tCO_2e by the year 2015/16, so a 35% reduction in carbon emissions equates to a reduction of 14,443 tCO_2e. Currently identified and implemented projects are therefore estimated to achieve 96% of this target:

Table 6 - Summary CO_2 saving potential

Project Status	tCO_2e
Implemented in original CM Plan	3,572
Implemented to Dec 2011	3,043
Not yet implemented	7,187
Total:	**13,802**

To allow for potential delays, increasing costs and for greater growth in the University, projects totalling 110% of the original target will be sought during 2012/13, equating to a further 2,085 tCO_2 savings.

4. Business Case & Financing

Cost savings achieved to date

Cumulative energy costs since the 2008/09 baseline year to the end of July 2011 are estimated to be £1,327,169 lower than the business as usual scenario outlined in the Carbon Management Plan. This compares against a current project outlay of £853,269, equating to a net cost avoidance of £473,900 as illustrated in Figure 4.

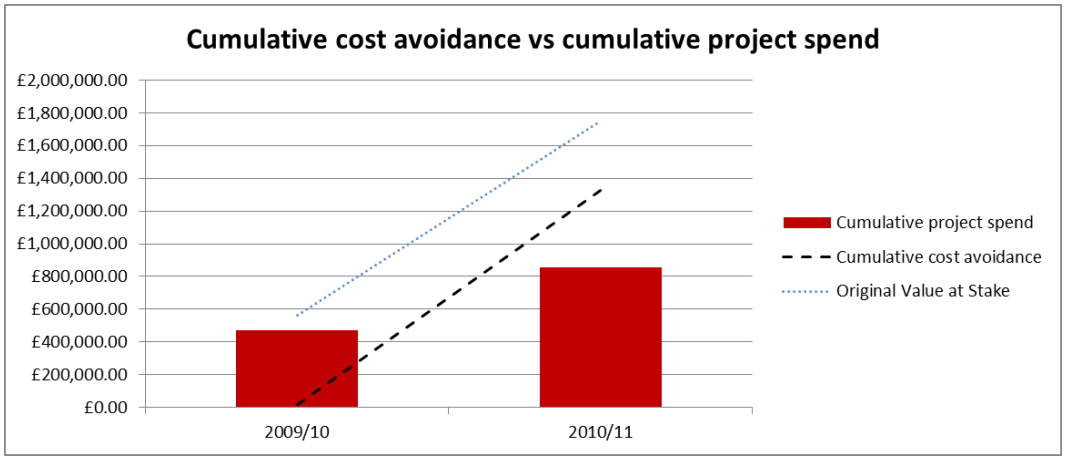


Figure 4 - Costs & Savings to July 2011

The original Carbon Management Plan estimated by July 2011, cumulative savings of £1.75m would have been achieved, therefore whilst the savings achieved to date are substantial, they fall short of this estimate. The main reason for this is it assumed a steady cost and carbon reduction from the baseline year, meaning savings of £563,000 were anticipated during 2009/10. In fact, the plan was only finalised in March 2011 and these year 1 savings have not been realised, however savings during 2010/11 are as expected.

In carbon terms, this equates to cumulative savings of 3,858 tCO_2e, which is in line with the overall 35% reduction target, but behind the cumulative savings anticipated for the reason outlined above.

Value at Stake

The Carbon Management Plan projected an investment of approximately £3.6m could realise cumulative cost savings of £18.5m by 2016. Figure 5 shows this 'value at stake' now stands at £19.6m, despite the smaller than predicted savings during year 1. This is because energy costs have increased at a greater rate than originally predicted and DECC's projections for cost increases over the next 5 years[3] stand at 10.6% and 8.8% for electricity and gas respectively, compared to the previously assumed 5.2%.

[3] *Based on analysis of the 2011 DECC Projections of Fuel Price Increases - Annex F*

It also takes into account CRC costs, with a conservative assumption of a 5% annual increase in the cost per tCO_2 emitted.

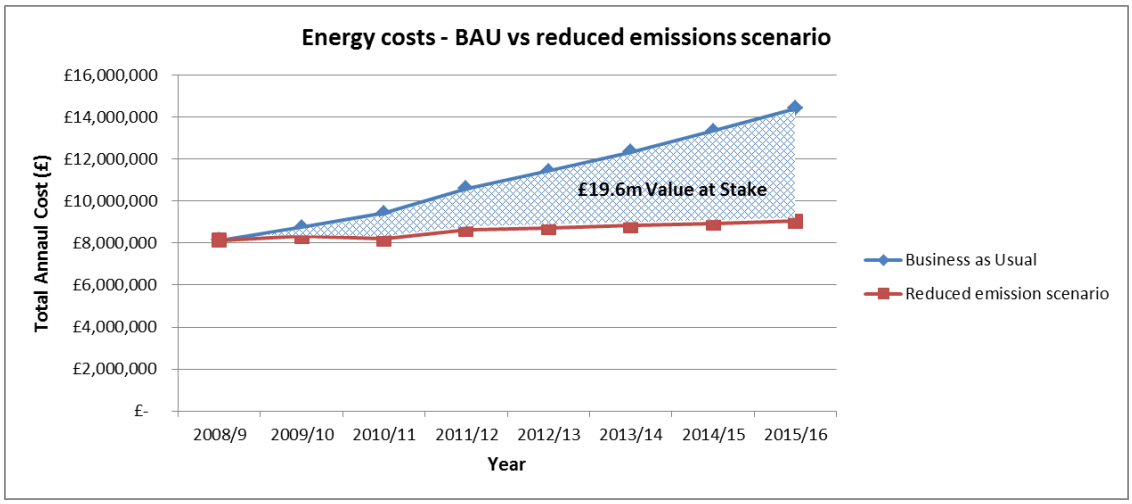


Figure 5 - Cumulative Value at Stake

Project spend and sources of funding

Figure 6a shows the funding sources of projects either completed to date or with funding secured. A commitment of £1.68 million has been made to the year ending July 2013, not just from significant internal investment but also through securing over £750,000 from Salix Finance on an interest free basis. The 'FMD' funding stream relates to that projects were carried out for reasons other than direct carbon savings, but have nevertheless helped cut carbon emissions. For example, upgrading the Whiteknights main substation has enabled transformer voltage to be reduced, therefore reducing electricity consumption.

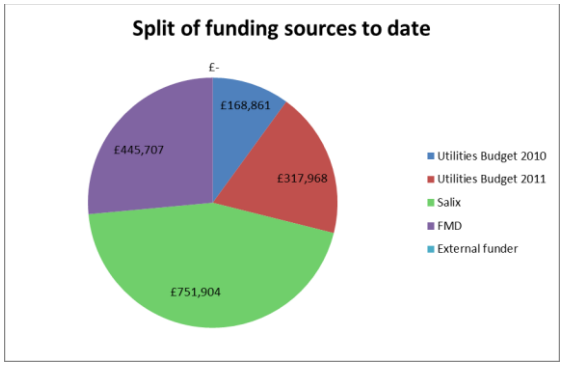


Figure 6a - Sources of secured funding

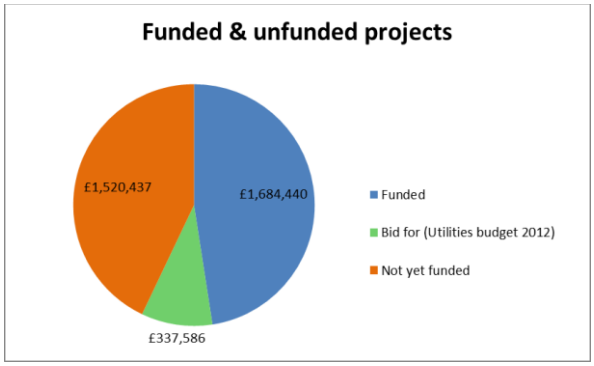


Figure 5b – Funding status to 2015/16

Whilst good investment has already been made/committed, Figure 6b illustrates that a further £1.86 million is required to fund the currently identified projects, plus an additional investment of approximately £500,000 to meet 110% of the carbon reduction target as referenced on page 14.

5. Governance

Project Board & Project Team

The Carbon Management Project Board and Project Team, set up during the original Carbon Management programme, continue to play an important role in the direction and progression of the Carbon Management Plan.

Both groups meet 3 times a year, with the Project Board Sponsored by Professor Tony Downes, Deputy Vice Chancellor and Colin Robbins, Director of Estates and Facilities Management.

Work is underway to expand the membership of the Carbon Management Team to ensure there is strong representation from across academic, research, student and support functions. The halls provider UPP have also been invited to attend future meetings to develop strong relationships and ensure cross-fertilisation of carbon and water reduction initiatives.

Project Management

A new Carbon Management Project Register has been developed to ensure all projects are recorded and tracked, from initial concept to post-completion analysis.

Work is on-going to ensure carbon management initiatives align with both maintenance and capital project priorities, and also to ensure energy efficiency opportunities are considered during planned maintenance and capital project works. Working closely together is proving mutually beneficial in addressing common needs and considerations.

During 2012/13, the University intends to seek ISO 50001 Energy Management accreditation, to ensure robust management systems are in place for continued energy reduction.

Reporting

Project progress continues to be reported and discussed at both Project Board and Project Team meetings, using the Appendix 1 RAG status report. A formal progress update will be published each September detailing progress against target for the previous financial year, and a further update on completed and pipeline projects will be published each spring.

Embedding

The Carbon Management Team recently updated the Embedding Matrix in Appendix 2, which shows the progress made in actions needed to embed carbon management in the organisation. Clear and consistent progress can be seen across all areas, with responsibility and communication remaining the key areas needing further action.

An Environmental Communication Strategy and associated Action Plan will be published during the summer, detailing the strategy and actions proposed to ensure carbon reduction, and wider sustainability initiatives, are embedded across the organisation.

Opportunities will also be explored to strengthen links to some of the University's core research and teaching areas; in particular its climate change research and construction management.

Appendix 1: Project RAG Status

Project No	Title	Owner	Mar-11 R A G	Jun-11 R A G	Dec-11 R A G	Target Date	Status	Date of Completion	CO2	Quantification type
UoR001	Insulation to pipework and valves	Neal Farwell	G	G	G	2009/10	Implemented	Jun-2010	460	Estimated
UoR002	Lighting control Carrington and Sports Park	Neal Farwell	G	G	G	2009/10	Implemented	Jun-2010	95	Estimated
UoR003	Variable speed drives URS, Library and Palmer	Neal Farwell	G	G	G	2009/10	Implemented	Jun-2010	48	Estimated
UoR004	BMS Installation Greenlands Campus	Colin Barwick	G	G	G	2009/10	Implemented	Jun-2010	45	Estimated
UoR005	LED Lighting Greenow and McCrombie	Neal Farwell	G	G	G	2009/10	Implemented	Jun-2010	18	Estimated
UoR006	Behavioural Change Whiteknights and Palmer Buildings (TCT)	Tom Yearley	G	G	G	2009/10	Implemented	Jun-2010	25	Estimated
UoR007	Behavioural Change Carrington, Greenow, McCrombie and RUSU	Tom Yearley	G	G	G	2009/10	Implemented	Jun-2010	40	Estimated
UoR008	Green Impact	Tom Yearley	G	G	G	2009/10	Implemented	Jun-2010	59	Estimated
UoR009	Greenlands Boiler replacement	Mike Evans	G	G	G	2009/10	Implemented	Jun-2010	335	Estimated
UoR010	Awareness raising campaign	Tom Yearley	G	G	G	2009/10	Implemented	Jun-2010	383	Estimated
UoR011	Student Switch Off (1st Year)	Tom Yearley	G	G	G	2009/10	Implemented	Jun-2010	60	Estimated
UoR012	Free Cooling Maths IT room	Neal Farwell	G	G	G	2009/10	Implemented	Jun-2010	95	Estimated
UoR013	Closure Bridges Hall	Mike Evans	G	G	G	2009/10	Implemented	Jun-2010	973	Estimated
UoR014	Closure Childs Hall	Mike Evans	G	G	G	2009/10	Implemented	Jun-2010	935	Estimated
UoR015	Refurbishment HUMSS	Mike Evans	G	G	G	2009/10	Implemented	Jun-2010	0	Estimated
UoR016	Security Room	Neal Farwell	G	G	G	2009/10	Implemented	Jun-2010	0	Estimated
UoR017	Switch off Blade super computer	Mark Cockshoot	A	G	G	2010/11	Implemented	Mar-2011	1110	Estimated
UoR018	Student Switch Off (2nd Year)	Tom Yearley	A	A	G	2010/11	Implemented	Jan-2011	31	Estimated
UoR019	Fine tune BMS to align with central room bookings , and switch off plenum systems where window ventilation adequate	Colin Barwick	A	A	G	2010/11	Implemented	Feb-2011	21	Calculated
UoR020	Upgrade BMS and expand Greenlands coverage to N.House, Main Building & IoD	Colin Barwick	A	A	G	2010/11	Implemented	Feb-2011	160	Estimated
UoR022	Awareness raising campaign	Tom Yearley	A	A	A	2010/11	In Progress		440	
UoR022a	Carnego Project (Carrington)	Tom Yearley	A	A	G	2010/11	Implemented	Jul-2011	13	Measured
UoR022b	Green Impact - Environmental Champions	Tom Yearley	A	A	A		In Progress		0	
UoR023	Closure Bulmershe Campus	Mike Evans	A	A	A	2011/12	In Progress		695	
UoR024	Switch off computers overnight and at weekends	Mark Cockshoot	R	A	R	2011/12	Identified		1259	
UoR025	Closure Sibly Hall	Mike Evans	A	A	A	2011/12	Identified		687	
UoR026	Fume cupboards STC	Dan Fernbank	A	A	R	2010/11	Identified		152	
UoR027	Awareness raising campaign 2013/14	Tom Yearley	R	R	A	2012/13	Identified		424	
UoR028	Awareness raising campaign 2014/15	Tom Yearley	R	R	A	2014/15	Identified		424	
UoR029	Insulation to pipework and valves	Steve Slatter	A	A	G	2010/11	Implemented	Mar-2011	334	Estimated
UoR032	Heating controls and systems and BMS (HUMSS)	Steve Slatter	R	R	R	2013/14	Identified		0	
UoR033	Virtualisation/ thin computer	Mark Cockshoot	R	A	R	2014/15	Dropped		68	
UoR034	Heating zoning (URS)	Steve Slatter	R	A	G	2011/12	Implemented	Dec-2011	102	Estimated
UoR035	Lighting upgrade to T5 high frequency	Heather Williams	R	R	G	2014/15	Identified		449	
UoR035a	HumSS, URS & Geography lighting efficiency upgrades	Heather Williams	R	R	G	2012/13	Identified		150	
UoR036	Reduce total of non-residential area by 15%	David Wallace	R	A	A	2017/18	Identified		694	
UoR037	Reduce number of building used out of hours	Janis Pich	R	R	A	2012/13	Identified		25	
UoR038	Reduce heating season by one week either end of season	Colin Barwick	R	R	G	2011/12	Implemented	Oct-2011	102	Calculated
UoR039	Double Glazing in Whiteknights House	Mike Evans	R	R	A	2015/16	Identified		184	
UoR040	Roof Insulation: Agriculture & Meteorology/Psychology link	Mike Evans	R	A	G	2011/12	Implemented	Apr-2011	32	Measured
UoR041	Boiler replacement programme	Mike Evans	R	R	A	2015/16	Identified		451	
UoR042	CHP/District Heating Energy Centre	Mike Evans	R	A	A	TBA	Identified		0	
UoR043	Fume Cupboards efficiency/management	Dan Fernbank	R	R	A	2015/16	Identified		734	
UoR044	Solar PV roof Project	Dave Young	A	A	A	2011/12	Implemented	Dec-2011	0	
UoR044a	Solar PV - Carrington	Dave Young	A	A	G	2011/12	Implemented	Dec-2011	10	Calculated
UoR044b	Solar PV - FMD	Dave Young	A	A	G	2011/12	Implemented	Dec-2011	10	Calculated
UoR045	Free Cooling Agriculture	tbc	R	R	A	2015/16	Identified		92	
UoR046	Lighting control Chemistry and Food Bio	Steve Slatter	A	A	G	2011/12	Implemented	Jul-2011	109	Estimated
UoR047	Upgrading of Air Conditioning (5 year programme)	Paul Harding	A	A	G	2014/15	Part Implemented		163	
UoR047a	A/C R22 replacement - year 1	Paul Harding	A	A	G	2010/11	Implemented	Mar-2011	98	Calculated
UoR047b	A/C R22 replacement - year 2	Paul Harding	A	A	G	2011/12	Implemented	Nov-2011	15	Calculated
UoR048	Whiteknights 33kVA sub station upgrade	Chris Smith	G	G	G	2009/10	Implemented	Jun-2011	668	Estimated
UoR049	Insulation to steam/hot water pipework, valves & calorifiers (phase 3)	Steve Slatter	n/a	n/a	n/a	2011/12	Implemented	Dec-2011	9	Estimated
UoR050	Insulation to Harry Pit	Steve Slatter	n/a	n/a	n/a	2011/12	Implemented	tbc	11	Estimated
UoR051	BMS Controls Greenlands Campus (Project 2)	Colin Barwick	n/a	n/a	n/a	2011/12	Implemented	Jul-2011	192	Estimated
UoR052	Install 25 Vending Misers	Tom Yearley	n/a	n/a	n/a	2011/12	Implemented	Aug-2011	16	Estimated
UoR053	Ventilation CO2 detector in Meteorology, RUSU, FMD	Colin Barwick	n/a	n/a	n/a	2011/12	Implemented	Jun-2011	5	Measured
UoR054	Expansion of metering	Dan Fernbank	n/a	n/a	n/a		Identified		152	
UoR055	Carbon brain printing	Tom Yearley	n/a	n/a	n/a	2010/11	Implemented	Nov-2010	3	Measured
UoR056	Carbon farming - CeDR drying oven improvements	tbc	n/a	n/a	n/a	2011/12	Identified		10	
UoR057	Upgrade library lighting	Dave Young	n/a	n/a	n/a		Identified		322	
UoR058	CO2 ventilation sensors - Multiple buildings	Colin Barwick	n/a	n/a	n/a	2011/12	Identified		86	
UoR059	Roof Insulation: Agriculture - phase 2	Colin Barwick	n/a	n/a	n/a		Implemented	Jan-2012	2	Estimated
UoR060	Lighting control - Harry Pitt	Steve Slatter	n/a	n/a	n/a		Identified		0	
UoR061	Roof Insulation - Greenlands Main House complex	Steve Slatter	n/a	n/a	n/a	2012/13	Identified		0	
UoR062	Roof Insulation - multiple buildings 2012	Colin Barwick/ Heather Williams	n/a	n/a	n/a	2011/12	Identified		36	
UoR063	TOB1 plant room insulation	tbc	n/a	n/a	n/a		Identified		0	
UoR064	Lighting/Lighting controls - Meteorology & Agriculture	tbc	n/a	n/a	n/a	2012/13	Identified		0	
UoR065	BMS Greenlands Campus - River House, Jarratt AHU, Trust Suite, Thames Court	Colin Barwick	n/a	n/a	n/a	2012/13	Identified		37	
UoR066	Windows draught proofing - multiple buildings	Dan Fernbank	n/a	n/a	n/a	2012/13	Identified		294	
UoR067	Thames Water efficiency project	Dan Fernbank	n/a	n/a	n/a	2012/13	Identified		21	
UoR068	London Rd library lighting upgrade	Heather Williams	n/a	n/a	n/a	2012/13	Identified		7	
UoR069	Cavity Wall Insulation	Heather Williams	n/a	n/a	n/a	2012/13	Identified		45	
UoR070	Flat Roof Insulation - HumSS & URS	Heather Williams	n/a	n/a	n/a	2012/13	Identified		30	
UoR071	Carnego behavioural change 2012/13 Carrington continuation plus Meteorology & AMS	Tom Yearley	n/a	n/a	n/a	2012/13	Identified		34	
UoR072	Green Impact 2012/13	Tom Yearley	n/a	n/a	n/a	2012/13	Identified		57	
UoR073	Behavioural change 2012/13 inc carbon dashboard, carbon counter, carbon app, e-learning, workshops & events	Tom Yearley	n/a	n/a	n/a	2012/13	Identified		17	
UoR074	Whiteknights borehole refurbishment	Dave Young	n/a	n/a	n/a	2012/13	Identified		62	
UoR075	Solar Thermal water heating - Chemistry	Heather Williams	n/a	n/a	n/a	2012/13	Identified		18	
UoR076	Steam boilers - reverse osmosis	Heather Williams	n/a	n/a	n/a	2012/13	Identified		46	
UoR077	TRVs in Greenlands Main House	Heather Williams	n/a	n/a	n/a	2011/12	Identified		12	
UoR078	Energy Efficient Street Lighting	tbc	n/a	n/a	n/a	2014/15	Identified		184	

Appendix 2: Embedding Matrix

	POLICY	RESPONSIBILITY	DATA MANAGEMENT	COMMUNICATION & TRAINING	FINANCE & INVESTMENT	PROCUREMENT	MONITORING & EVALUATION	
								Target
5 BEST	• SMART Targets signed off • Action plan contains clear goals & regular progress reviews • Strategy launched internally & to community	• CM is **full**-time responsibility of a **few** people • CM integrated in responsibilities of **senior** managers • VC support • Part of all job descriptions	• **Quarterly** collation of CO_2 emissions for all sources • Data **externally** verified • M&T in place for: o Buildings o Waste	• All staff & students given formalised CM: o Induction o Training Plan o Communications • CM matters **regularly** communicated to: o External community o Key partners	• **Granular & effective** financing mechanisms for CM projects • **Finance representation on CM Team** • **Robust** task management mechanism • **Ring-fenced fund** for carbon reduction initiatives	• **Senior** purchasers consult & adhere to ICLEI's **Procura+** manual & principles • Sustainability comprehensively integrated in **tendering** criteria • Whole life costing • Area-wide procurement	• Senior management review CM process • Core team regularly reviews CM progress • Published externally on website • Visible board level review	Apr 2012
4	• SMART Targets **developed but not** implemented	• CM is **full**-time responsibility of an **individual** • CM integrated into responsibilities of department **managers**, not all staff	• **Annual** collation of CO_2 emissions for: o Buildings o Transport o waste • Data **internally** reviewed	• All staff & students given CM: o **Induction** o Communications • CM communicated to: o External community o Key partners	• Regular financing for CM projects • **Some** external financing • **Sufficient** task management mechanism	• Environmental demands incorporated in tendering • Familiarity with **Procura+** • **Joint procuring** between HEIs or with LAs	• **Core team regularly** reviews CM progress: o Actions o Profile & Targets o New opportunities quantification	Jan 2011
3	• Draft policy • Climate Change **reference**	• CM is **part**-time responsibility of a **few** people • CM responsibility of department champions	• **Collation** of CO_2 emissions for limited scope i.e. buildings only	• **Environmental / energy** group(s) give ad hoc: o Training o Communications	• **Ad hoc** financing for CM projects • Limited task management • No allocated resource	• **Whole life** costing occasionally employed • Some **pooling** of environmental expertise	• CM team review aspects including: o Policies / Strategies o Targets o Action Plans	Jul 2010
2	• No policy • Climate Change **aspiration**	• CM is **part**-time responsibility of an **individual** • No departmental champions	• **No CO_2** emissions data compiled • Energy data compiled on a regular basis	• Regular poster/awareness campaigns • **Staff** given ad hoc CM: o Communications	• Ad hoc financing for CM **related** projects • Limited task coordination **resources**	• **Green** criteria occasionally considered • Products considered in **isolation**	• Ad hoc reviews of CM actions progress	
1 Worst	• No policy • **No** Climate Change reference	• No CM responsibility designation	• Not compiled CO_2 emissions • Estimated billing	• No communication or training	• No internal financing or funding for CM related projects	• No Green consideration • No life cycle costing	• No CM monitoring	