

Harper Adams University Carbon Management Programme

Carbon Management Plan (CMP) 2013 Update



Date: *March 2013*

Version number: *3.0*

Owner: *Karen Hughes, Environment & Waste Management Officer*

Approval route: *Finance & General Purpose Committee & Board of Governors*

Approval status: *For approval by Finance and General Purposes Committee on 21.03.2013
and on the agenda for approval by the Board of Governors on 19.04.2013*

Contents

Management Summary	3
1 Introduction	7
2 Carbon Management Strategy	9
2.1 Context and drivers for Carbon Management	9
2.2 Strategic themes	11
2.3 Targets and objectives	12
3 Emissions Scope, baseline & targets	13
3.1 Scope	13
3.2 Baseline & targets	14
4 Carbon Management Projects	15
4.1 Current projects	16
4.2 Near term projects 2013/14	17
4.3 Projected achievement towards target	18
5 Financing	22
5.1 Benefits / savings – quantified and un-quantified projects	22
6 Implementation	22

Management Summary

This updated Carbon Management Plan 2013 (CMP) has been produced at the half-way point in the programme and sets out how Harper Adams University (formerly Harper Adams University College) is progressing on its five year plan. The Carbon Management Programme continues to be supported by students, staff, Senior Management Team, University Executive, Finance & General Purpose Committee, Board of Governors and the Vice Chancellor.

The case for action

The case for action in simple terms remains the urgency to help with the fight against climate change and to do as much as we can to reduce our impact on the environment by reducing our carbon emissions.

Having a detailed and extensive carbon management plan has focused our efforts on;

- Reducing our consumption; of energy, water, materials and resources
- Being more self-reliant on our own energy generation
- Reducing costs
- Reducing our impact on the environment
- Enhancing the institution's reputation by leading by example with students, staff and visitors
- Embedding sustainability into our core business
- Promoting Best Practice
- Reducing exposure to price volatility in the utilities market
- Protecting ourselves from increasing costs of site infrastructure

Carbon emission baseline and target setting

Included in this updated plan is updated data relating to our baseline emissions for emissions data that at the time of writing the 2010 plan was not available. These were predominantly transport and procurement emissions under scope 3.

Where collective reduction targets were set for our scope 3 emissions, these have now been split out and individual targets have been set. These include; waste, water, transport and procurement.

The overall target set within the Carbon Management Plan 2010-2015 remains unchanged at a **32%** reduction in carbon emissions against our 2009/10 baseline.

Harper Adams University carbon emissions reduction target is 32% by 2015.

**This reduction equates to reducing our 2009/10 emissions of 4,324 tCO₂,
by 1,384t to 2,940tCO₂.**

This includes scopes 1, 2 & 3 emissions and encompasses the whole campus.

**The University's 2020 target is to reduce emissions by 43% against the
2005/6 baseline for scopes 1 & 2 from 3,414 tCO₂ to 1,946 tCO₂.**

Scopes & boundary included

The boundary of the carbon management plan includes the whole campus, including the Farm. The Farm is included in the 2005/6 and 2009/10 carbon emissions baseline and will now remain until the end of the programme to give an overall view of the University carbon performance.

This plan has been updated to include all the scope 3 emission data that wasn't previously available at the time of writing the 2010 carbon management plan. Baselines and targets have been set for all compositions of the scopes to provide an overall view of where our emissions are being produced and aid in monitoring and targeting areas to improve.

Future Expansion

The University has been steadily expanding in size since 2010/11 and will continue to expand throughout the remainder of the programme. Having been voted the Best University College 6 years in a row (2008-2012), prior to the new University status, it has attracted a year on year increase in applicants. This has meant additional teaching buildings and facilities; accommodation and social areas had to be provided.

The University Strategic Strategy and Estates Strategy support and manage this expansion to safeguard the University in the economic climate whilst maintaining its commitment to reducing its carbon emissions through capital investment, sustainable building design and change behaviour.

Progress against Target

Fig.1 shows our actual emissions progress against the reduction target (top line in blue) and highlights our projected path (Business As Usual) for the next three years (bottom line in red) against the reduction target path. Our projected path takes into account future campus growth and estimated reduction in scope 1 and 2 emissions through future projects. It clearly shows that we are over exceeding on our target of 32% set in 2010 by 2015.

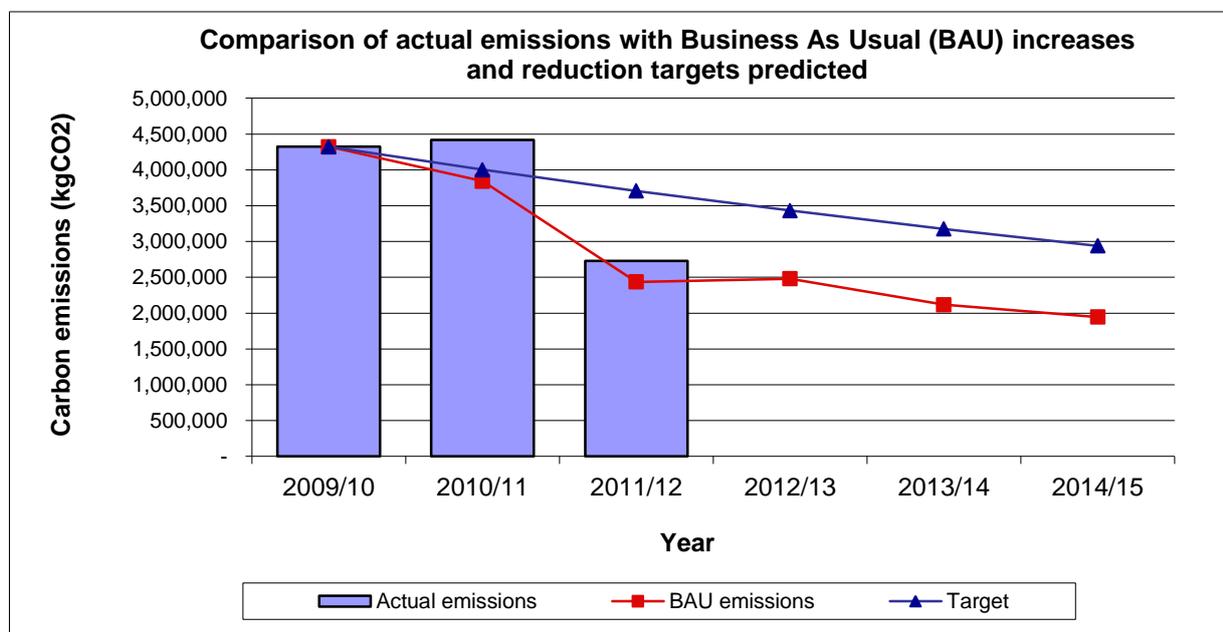


Fig. 1 Progress against target

Progress against this target is updated annually a) to ensure that projects are successfully completed and b) as opportunities, new partnerships, new technologies and finance become available and further efficiencies can be made to reduce carbon and operational costs.

Projects

Most of projects in the 2010 carbon management plan have now been completed; some superseded with more cost effective and energy efficient projects. Additional projects have also been completed and there are new projects currently underway or planned. This is one of the main reasons for updating the carbon management plan with this supplement.

By the end of the 2011/12 academic year (the half-way point) we had exceeded our 2015 carbon emission target. The majority of the carbon savings made have been achieved through the completion of the anaerobic digester (AD). In 2011/12 it reduced our emissions by 1902 tCO₂ and currently contributes to 52% of the total 3657 tCO₂ savings identified for all projects in the plan.

Previously stated in our 2010 carbon management plan we knew that a large scale project such as the AD would exceed our target, but it has also provided the University with a number of additional benefits not quantified in terms of CO₂ e.g. offers protection against recent developments in the energy sector relating to shortages of supply resulting from closures of UK power stations¹.

The AD project is both a pioneering and a major contributor to the sector with regards to renewable technology and has done more than just help the University save money; it has attracted over 2200 visitors since its opening in May 2011; provided the University with 65% of its electricity requirement and diverted 15,740 tonnes of food waste (received externally and internally) and farm slurry from our farm from landfill during 2011/12.

From late 2013 it will provide 42% of the heat demand (based on actual consumption in 2011/12) to the north side of the campus. This goes a long way to protecting the University further from the risk of rising energy prices and providing energy security as well other environmental benefits. Plans are also underway to extend the capacity at the AD to generate more electricity to provide the campus with all its electricity demand and selling the surplus back to the grid.



Fig. 2 Bio gas bubble (AD)



Fig. 3. AD Plant

¹ <http://www.bbc.co.uk/news/business-21501878>

Updated Investment & cost savings of plan

The total cost of the projects within this carbon management plan includes projects completed, current and future projects and will be in the region of £4.9m. The anaerobic digester makes up £3.6m of this and is funded by Salix Finance, private funding and the Estates budget. The other projects in the plan are funded by Salix Finance, donations and a budget outlined from operating activities.

Table 1 Investment costs for projects

Project	Funding	Amount in £ (000's)
Anaerobic Digester	Salix Finance, Private & Estates	3,600
Virtual Desktop	IT Budget	340
Anaerobic Digester expansion	Estates Budget	500
District Heat Ring	Estates Budget	300
UPVC windows	Estates Budget	69
PIR's	Estates Budget	27
Swimming Pool Cover	Estates Budget	20
Lighting projects (1)	Estates Budget	16
Lighting projects (2)	Estates Budget	31
Labs refurbishment	Estates & Labs Budget	17
Food waste recycling	Estates Budget	2
Awareness campaigns	Estates budget	2

Projects are discussed in more detail in section 4.

Cost Savings

Direct financial savings will be made predominately on energy costs (scopes 1 & 2) in the region of £895,574.00 (cumulative) over the five year period of the carbon management programme (for projects where capital and operating costs and emission source savings are known).

Payback for the projects is expected to be up to 18.8 years, with an average of 8.23 years. Some projects will not pay back, but had to be implemented to update systems, replace and modernise older buildings.

Direct carbon savings will be in the region of 3,657 tCO₂ (cumulative) through completing the projects outlined in section 4. This is 264% of our targeted emissions reduction and 84% of our 2009/10 baseline.

1 Introduction

Harper Adams University is the largest specialist higher education institution in the UK providing land based courses, with a student population in excess of 2,700 students. Since the 2010 carbon management plan the University has undergone a number of changes; as outlined below.

The Estate & Farm

The Estate has grown in size to accommodate the addition of student accommodation, teaching buildings and facilities, meeting rooms and student union focused space. Some existing buildings/offices have undergone refurbishment and restructuring to accommodate the increase in staff numbers.

The Buildings

Sustainable building design is very important to the University and all new capital developments since 2009/10 have been built to Building Research Establishment Environmental Assessment Method (BREEAM) specification and achieved a 'Very Good' or 'Excellent' rating. All future capital developments will be BREEAM rated 'Very Good' as a minimum.

Old outdated buildings have been demolished and new energy efficient buildings have been rebuilt in their place.

At the end of 2009, the Regional Food Academy and Post Graduate Centre were the first BREEAM rated buildings on campus gaining a 'Very Good' and 'Excellent' rating respectively. The new Students Services Building received an 'Excellent' rating in the latter part of 2010; the new teaching block and a centre for precision farming will be 'Very Good' rated when complete in the summer of 2013.

Various refurbishments have taken place in the last two years, with the lowering of ceilings, division of large office spaces, replacing fluorescent tube lighting with LED lighting and replacing single pane, metal framed windows with double glazed UPVC windows to reduce energy consumption and improve comfort.

The Farm

The University Farm is central to the academic objectives of the University and is a unique asset that sets us apart from your typical university. Whilst maintaining financially viable it underpins and provides an important part of the educational facilities required of a high quality academic institution. The Farm plays a significant part in the anaerobic digester (AD project) as farm slurry is used to generate power from the waste and provide digestate that goes back onto the farm land. In late 2012 the Farm signed a 10 year agreement under Higher Level Stewardship Scheme (HLS) with Natural England to maintain and create farmland conducive to increase biodiversity and prevent water pollution through land erosion and run off.

National and International Students

The University continues to develop a national and international reputation for its work abroad. In particular, it has a number of links with prestigious Chinese land-based institutions. A formal association with Beijing Agricultural College have been successfully managed and c. 90 Chinese students are based at the Harper Adams for part of their undergraduate degree programme, while others are also continuing their studies at postgraduate level. Two new relationships with leading agricultural universities in China have been forged. We have received funding from the Department for Business, Innovation and Skills to assist with research student partnerships with China Agricultural University and we will be implementing this programme during 2013. Our partnership with Huazhong Agricultural University will also be developed further during the course of the year.

Relations with universities around the world continued to be a key priority in 2012 and will be further developed in 2013 via the Science Without Borders initiative that will fund Brazilian students to study agricultural engineering at Harper Adams. We have recently signed a new agreement with the University of Sao Paulo, opening up opportunities for collaboration with our new Brazilian partner.

Current Position

In January 2012 the University was awarded the Carbon Trust Standard for a second time through the stricter recertification process. On-going recertification will be applied for again in the early part of 2014.

Whilst it is accepted that our carbon emissions will increase as a result of the current and considered development for 2013/14 and beyond, the University is aware measures have to be taken to step up our efforts to reduce our carbon emissions and stay on track to meet the 2015 and 2020 target and this will be achieved through sustainable building design (BREEAM), awareness campaigns, improved waste management and employing energy efficiency measures through existing projects and planned projects.

Display Energy Certificates (DECs)

Display Energy Certificates (DEC's) have played an important role in focusing efforts on the poorer performing buildings and the results show a steady improvement in building energy performance. Particular success has been in the Engineering Department where a lot of work has taken place through works undertaken by the Estates department and the Engineering Department themselves.

Recent changes to legislation in January 2013 has introduced the stipulation that all new public sector buildings with a floor space of under 500m² will now have to have an Energy Performance Certificate (EPC) displayed. Table 2 below shows building performance for the last four years.

Table 2. DEC results 2008 - 2011

	Main Building	Foulkes Crowther & Labs	Bamford Library	Queen Mother Hall (Dining)	Student Union Bar	Engineering Dept.	RFA & Post Grad Centre
2008	E118	E118	E118	E118	E118	E118	
2009	E120	D99	C72	F131	E105	F134	
2010	E113	D95	C73	E109	E102	E125	
2011	D79	D98	E102	F136	E102	C75	C67

Renewable technologies

The AD project is both a pioneering and a major contributor to the sector with regards to renewable technology and has done more than just help the University save money; it has attracted over 2200 visitors since its opening in May 2011; provided the University with 65% of its electricity requirement and diverted 15,740 tonnes of food waste (internal and externally sourced) and farm slurry from our farm from landfill during 2011/12.

From late 2013 it will provide 42% of the heat demand (based on actual consumption in 2011/12) to the north side of the campus. This goes a long way to protecting the University further from the risk of rising energy prices and providing energy security as well other environmental benefits. Plans are also underway to extend the capacity at the AD to generate more electricity to provide the campus with all its electricity demand and selling the surplus back to the grid.

The anaerobic digester (AD) is expected to generate the equivalent of 1,900,000 kWh of heat in late 2013 from the excess heat from the AD process. This will save the University around £55,000 per annum at current energy prices (2.894p per kilowatt hour for gas).

2 Carbon Management Strategy

This section sets out what is driving the University to reduce its carbon emissions both externally and internally.

2.1 Context and drivers for Carbon Management

There have been some changes to the national drivers affecting the University due to changes in legislation.

National drivers

The UK Government is putting increasing pressure on the whole public sector to lead by example in cost saving and climate change mitigation through energy efficiency and emissions reduction. Action by the public sector will be critical to the achievement of the Government's climate change objectives. The Climate Change Act (2008) has a long term goal to reduce CO₂ emissions by 34% by 2020 and 80% by 2050 from a 1990 baseline to help the transition to a UK low carbon economy. This has created a number of legislative drivers:

- **Capital funding for HEIs linked to carbon performance:** Following HEFCE's 2008 and 2009 grant letters from the Secretary of State demanding the establishment of a link between performance on carbon reduction and future capital allocations, leading to the requirement for HEIs to set their own carbon reduction targets for 2020², and establish carbon reduction plans, funding has been released through the Teaching Capital Investment Fund 2012-13 and Research Capital Fund 2011-12 to 2014-15³, with the focus of reducing carbon emissions through improved space utilisation and collaborative partnerships between HEIs and industry in return for investment.
- **Display Energy Certificates & Energy Performance Certificates:** From the 1st of January 2013 there have been some significant changes to the legal requirement for all public sector buildings; with the introduction that all new public buildings built over 500m² – 21,000m² must have an Energy Performance Certificate displayed and thereafter have a Display Energy Certificate displayed and renewed every 10 years. Buildings 1,000m² continue to display and renew DEC's every 12 months.
- **HE Policy:** The HEFCE Land Based Review⁴ recognised that land based studies should be recognised as a strategically important subject and have a part to play in the global issues of food production, food security and related environmental concerns.
- **Government Agri-Tech Strategy 2013:** Government drive to improve soil and water management, precision farming and robotics.
- **DEFRA Climate Change Plan 2010 (Adapting to Climate Change)**⁵: DEFRA's Climate Change Plan 2010 recognises that agriculture and associated land uses cover around 75% of the UK and provide a wide range of environmental, social and economic benefits to society– with an influence that goes well beyond their primary purpose of producing food and non-food crops.
- **Ofgem warnings of reduced power station capacity:** UK power station capacity is reducing quicker than planned which will lead to more energy imports, pushing up energy prices as the UK will become more reliant on gas over the next 3-5 years⁶.

² Carbon reduction target and strategy for England, HEFCE, January 2010

³ Capital Investment Fund 2, HEFCE, March 2011. More information available at http://www.hefce.ac.uk/media/hefce1/pubs/hefce/2011/1108/54347.11_08.pdf

⁴ HEFCE Land Based Review, 2007. More information available at http://www.HEFCE.ac.uk/pubs/rdreports/2007/rd09_07/

⁵ DEFRA Climate Change Plan, 2010. More information available at www.defra.gov.uk/environment/climate/.../climate-change-plan-2010.pdf

⁶ <http://www.bbc.co.uk/news/business-21501878>

Local Drivers

The role that the University plays in the community and the farming sector is of utmost importance to the reputation of the University and it is a significant player in industry-based research in the field of land-based higher education. As the largest land-based studies institution in the UK, the University has an advisory role to play as well as leading by example. In achieving this the University has a number of associations with various advisory bodies in the area of research and development and knowledge transfer and partnerships with local and agri-sector businesses with whom we work closely on student placements and scholarships.

Community engagement

Community engagement is very important to the University based on its rural locale, close proximity to local villages and the town and its connections with the local farming community in advising and showcasing its renewable technologies to reduce its impact, as well as providing short courses in this area. The installation of the anaerobic digester is a prime example, obtaining the community buy-in and support for the project through extensive consultation. It has become an integral part of teaching and research.

Partnerships

The University has a number of partnerships in the work that it undertakes through its Reach Out and Research and Knowledge Transfer activities, such as;

- Have validated a suite of programmes for the food industry many of which will be available via the Advanced Training Partnership. Partnerships will develop and deliver specialist training programmes for postgraduate degrees, as well as continuing professional development courses. Each programme will focus on a particular research area, and the four are complementary, covering the full range of food production from soil to plate. The university is involved in the 'Establishment of a strategic training hub for the advancement of the UK agri-food industry'. This programme has been designed in response to feedback from industry about training needs and will be flexible and responsive, spanning the entire agri-food chain, including soils, water, crops, animals, post-harvest, food and nutrition.
- Join the consultation on the Agri-Tech Strategy and play a role in the delivery of a number of its objectives around precision farming and robotics in agriculture and soil and water management.
- Joined Brazil's science and education programme 'Science without Borders' which will fund Brazilian students to study agricultural engineering at Harper Adams from 2013.
- Developing carbon management strategies for HE institutions with agricultural landholding, a HEFCE Leadership, Management and Governance Fund project. The project provided leadership to institutions with agricultural landholdings to enable them to (i) measure carbon emissions arising from agricultural activities and the educational estate, (ii) establish realistic carbon reduction targets and (iii) develop informed carbon management plans. Sector specific workshops were held to offer support and advice. Two concluding reports were produced detailing knowledge gained during the project and a guide for the participating institutions in how they can work with tenant farmers to reduce carbon emissions.
- Work with the JCB Academy delivering a week long residential programme for 14-19 year olds specialising in engineering that is relevant to the Academy's curriculum.
- Work with Natural England under the Natural England Environmental Stewardship Scheme to provide demonstration plots on how to support wildlife on the farm.

The University through close working relationships with Local Enterprise Partnerships (LEPs) will play an important part in economic development for the Marches LEP that covers the Shropshire, Telford & Wrekin and Herefordshire local authorities.

The University also exhibits and hosts various events aimed at farmers and landowners interested in renewable technologies such as; the LEAF (Linking Environment and Farming) National Technical Field Show, Birmingham Local Enterprise Partnerships Green Futures Conference, Horizon & Grainseed Event and ADBA Trade Show, Oxford Farming Conference in Jan 2013 and the NFU Conference and City Food Lecture in February.

Internal Drivers for Harper Adams University

In addition to the moral obligation of reducing our environmental impact and helping towards reducing the damaging effects of climate change, there are a number of factors that drive the University to producing a robust carbon management plan to ensure that these factors are implemented in future developments, activities and working practices.

The main internal drivers for the University include;

1. Environmental stewardship and an ethical approach to consumption
2. Financial savings in short and long term – energy security and reduction in consumption
3. Reducing our exposure to price volatility in the utilities market
4. An opportunity to demonstrate applied use of technologies to the student body and wider community in order to encourage diversification in the rural economy

1. ***Environmental Stewardship*** - as a land-based higher education institution the University has embedded the core values of environmental stewardship into its curriculum, research and development. As a high quality academic institution it has the ability to translate research into practice and to provide higher level skills to enable those who go on to work in the agri-food sector to employ the results of that research, and related technological advances, in their businesses. The University has invested heavily in Farm resources to enable it to meet its academic aims and act as a centre of excellence.
2. ***Financial savings*** – this will come from being frugal with our consumption and negotiating forward contracts. Awareness campaigns will be used with staff and students to encourage them to do simple things like turn off lights, recycle more and adapt working practices to reduce waste. Generating our own energy will reduce the amount we buy from the grid but we will also invest to save through energy efficiencies and refurbishments.
3. ***Reduce exposure to price volatility*** – depleting natural resources make the pricing of such utilities open to increases in cost due to scarcity. Energy security and rising energy prices is of concern to the University. The installation of the anaerobic digester and other renewable technologies on site will provide the campus with much of its energy requirements in future years and therefore shelter us from fluctuating energy prices for at least the next 10 years.
4. ***Installation of renewable technologies*** - the University has installed a number of renewable technologies on the campus over the last five years. It prides itself on the use of renewable technologies and showcases these to students and visitors by undertaking group tours ranging from local businesses, school children, community members, dignitaries and other universities.

2.2 Strategic themes

The University's strategic themes are embedded into its strategies which uphold our mission statement. One such theme is;

'To provide a high quality physical environment that is cost effective, environmentally sustainable and safe for students, staff and visitors'

These also correlate with each other and contribute to the University's overall Strategic Plan. They will help the University achieve its intentions in this plan through;

- The Estates Strategy 2010 – 2020 which focuses on some main factors such as; better space utilisation, building sustainable buildings, installing renewable technologies to generate our own

heat and power. Carbon reducing measures will be considered in all new builds and renovations and will be the responsibility of the Estates department.

- The Farm Strategy 2010-2015 – focuses on land management and environmental stewardship, improving farming practices through the use of technology, imparting research through knowledge transfer and demonstrating through best practice.
- Environmental Sustainability Strategy 2010 – 2015 – focuses on ensuring that the University considers all its activities to reduce its impact on the environment and incorporates all of the University's strategies.
- Finance Strategy 2009 – 2013 – this supports the strategies above.

2.3 Targets and objectives

Included in this updated plan is updated data relating to our baseline emissions for emissions data that at the time of writing the 2010 plan was not available. These were predominantly transport and procurement emissions under scope 3.

Where collective reduction targets were set for our scope 3 emissions, these have now been split out and individual targets have been set. These include; waste, water, transport and procurement.

The overall target set within the Carbon Management Plan 2010-2015 remains unchanged at a **32%** reduction in carbon emissions against our 2009/10 baseline.

Harper Adams University carbon emissions reduction target is 32% by 2015.

**This reduction equates to reducing our 2009/10 emissions of 4,324 tCO₂,
by 1,384t to 2,940tCO₂**

This includes scopes 1, 2 & 3 emissions and encompasses the whole campus.

The overall target for the University is still aligned with the sector and Government targets to reduce carbon emissions by 43% by 2020.

The University's 2005/6 baseline for scopes 1 & 2 is 3,414 tCO₂.

The 2020 target is to reduce these emissions by 43% to 1,946 tCO₂.

This target is regularly reviewed as opportunities, new developments, partnerships, technologies and finance become available; and further efficiencies can be made to reduce carbon and operational costs.

Staff and students play an important role in the University achieving its carbon reduction target and the University has actively engaged them through wide communication and participation in the carbon management programme, setting up a dedicated email address for staff to contribute carbon saving ideas and launched a Harper Adams Green Award to formalise and incentivise this; and work closely with the Student Union and Student Services departments.

HEFCE and Government Targets

Harper Adams University agreed to meet the Sector and Government carbon reduction targets by signing the 'statement of intent on sustainable development by university and college leaders'⁷ in January 2010.

- The sector carbon reduction target is a 43% reduction in emissions by 2020 against a 2005/6 baseline.
- The Government carbon reduction target is a 34% reduction in emissions by 2020 against a 1990 baseline.

Our reduction target set for the programme will make up a significant portion of the sector wide carbon reduction target and see us achieve the Government target by 2020.

HEFCE stated that it requires an absolute reduction in carbon emissions by 2020 on a baseline of 2005/6 for scopes 1 & 2 (gas, electric, fuel in owned vehicles and fuel for heating) and suggested that data for scope 3 be collected and included in the baseline to give an overall baseline. This data is included in this updated carbon management plan.

HEFCE linked funding to carbon reduction performance from 2011 following the 2008 and 2009 grant letters from the Secretary of State requiring the establishment of a link between performance on carbon reduction and future capital allocations leading to the need for HEIs to set their own carbon reduction targets for 2020⁸, and establish carbon reduction plans. This funding has been released through the Teaching Capital Investment Fund 2012-13 and Research Capital Fund 2011-12 to 2014-15, focusing on space utilisation and improved collaborative partnerships between HEIs and industry in return for investment.

3 Emissions Scope, baseline & targets

3.1 Scope

Scopes 1 and 2 emission sources are classed as emissions that fall under direct control of the University. The scope of these emissions is based on the World Business Council for Sustainable Development (WBCSD) Greenhouse Gas Protocol and is as follows:

- Refrigerant gas loss (scope 1) – used in air conditioning units
- Fuel use in buildings and estates (scope 1) – gas consumption
- Fleet transport emissions (scope 1) – this includes all Estates, Porters, Grounds departments vehicles and fuel consumed by farm vehicles.
- Electricity consumption in buildings and street lighting (scope 2)

Scope 3 emission sources have been included in this updated carbon management plan to give a complete baseline, and these include;

- Waste – this includes all waste to landfill, recycled waste and construction waste.
- Water consumption – water drawn from the campus boreholes & used in metered student accommodation

⁷ More information can be found about GuidIHE 'A statement of intent on sustainable development by university and college leaders' at <http://www.harper-adams.ac.uk/sustainability>

⁸ Carbon reduction target and strategy for England, HEFCE, January 2010

- Business travel – vehicle hire, rail and air travel for business use.
- Supply Chain (Procurement) – the embodied upstream emissions associated with the manufacture and distribution of a product or service purchased from the supply chain

These emissions are indirect emissions and not controlled directly by the University but occur as a result of its activities.

3.2 Baseline & targets

This section has been updated to include all the scope 3 emission data that wasn't previously available at the time of writing the carbon management plan in 2010. Baselines and targets have been set for all compositions of the scopes to aid monitoring and targeting areas to focus attention on improving; as well as providing an overall view of where our emissions are being produced.

Tables 3.2.1 and 3.2.2 show the composition of the carbon emissions (CO₂) generated by each of the scopes within the University during our baseline year of 2009/10 and the targets for reduction in emissions and in percentage terms for 2012/13.

Table 3.2.1. Summary table of baseline, emissions and targets

	Scope 1	Scope 1	Scope 2	
	Gas	Fleet Transport	Electric	Total
Baseline CO ₂ emissions (tonnes)	1002	256	2627	3885
Target reduction %	15	2	5	
Target reduction tCO ₂	982	251	1313	2546
Baseline Cost (£)	143,740	112,342	264,251	502,333

Table 3.2.2. Summary table of baseline, emissions and targets

	Scope 3	Scope 3	Scope 3	
	Waste	Water	Business Travel	Total
Baseline CO ₂ emissions (tonnes)	249	60	131	440
Target reduction %	5	1	10	
Target reduction tCO ₂	236	59	118	413
Baseline Cost (£)	66,936	207,144	32,617	306,697

Tables 3.2.1 and 3.2.2 above show that the majority of the University's carbon emissions are from gas and electricity consumption (84% combined), with 9% produced from transport (6% from fuel used in its owned vehicles and 3% from business commuting) and the remaining 7% from waste (6%) and water (1%). The quantities of refrigerant gases are so low that it doesn't contribute to our carbon emissions.

Progress against the set target reduction for 2012/13 will be reviewed and a new target set for the following year and so on until the end of the programme. Setting a target on an annual basis for each

composition of the scope sources allows for tighter monitoring and control and adjustments to be made to the target to ensure we stay on track.

Supply Chain (Procurement) emissions

Procurement emissions are not included in the Carbon Trust's baseline tool but a target has been set based on the baseline data provided by the NWUPC for the period of 2011/12.

This is the first year that supply chain emissions have been calculated using a reporting framework⁹ to measure supply chain based emissions based on the EEIO approach. The basic approach involves obtaining a spend profile of an organisation and mapping this to carbon intensity data, to estimate overall supply-chain (procurement) emissions. A key limitation of the current methodology is that 'sector average' carbon intensity values are used. This means they do not reflect 'local' differences in consumption such as consumption of 'eco-friendly' products. Indeed an organisation may record higher emissions using this methodology if the 'eco-friendly' product has a higher price. The alternative method of calculating emissions would be the life cycle assessment (LCA) which is more accurate but extremely time consuming and therefore not being used at the point.

Our baseline for 2011/12 is 13,703 tCO₂. We have set a target to reduce this by 5% by 2015 through the work we plan to undertake with the Flexible Framework for sustainable procurement. The largest contributor to our emissions through procurement was from food and catering.

Proposed Developments

New for 2013/14 - there are a number of building projects that are currently under design or construction such as; a new centre for precision farming, teaching block, Student Union bar extension, young stock barn at the Dairy and an extension at the Vet Nursing department with a hydro therapy pool; all of which will increase the University's energy consumption. It is unknown at the moment what the final plans for these buildings will be and therefore we can only make an 10% increase suggestion in energy consumption in 2013/14. This will be reviewed again once the building specification information is available. As part of the University's commitment to reduce our impact and to build sustainably, all the buildings will use sustainable building materials and have as many green credentials as possible within the budget for the schemes. All new capital developments will be BREEAM rated 'Very Good' as a minimum. The new Engineering building and teaching block will be BREEAM rated 'Very Good'.

4 Carbon Management Projects

As part of a wider staff and student engagement drive, two major initiatives were introduced in October 2012; the Harper Gr20een Award to encourage and incentivise staff and students to put forward suggestions of carbon saving ideas and the Student Energy Reduction Challenge appealing to the student's competitive streak to take control of reducing their energy usage in return for a share of the financial savings made.

The list of projects in the 2010 Carbon Management Plan is now mostly out of date. Many of the projects in the plan have been completed, superseded and new projects have been undertaken or are currently in progress.

Projects that have been completed and were not in the first carbon management plan include; the swimming pool cover, food waste recycling, replacement fume cupboards and furnaces in the

⁹ HEFCE (2012) Measuring scope 3 carbon emissions – supply-chain (procurement). Report to HEFCE on sector emissions by Arup, CenSA and De Montfort University' available at <http://www.hefce.ac.uk>

Laboratory department as part of a refurbishment, install of booster eTRVs and lighting projects. These are listed in the CMPR in appendix A.

4.1 Current projects

District Heat Network

One of the major projects for 2012/13 is the District Heat Ring pumping heat from the Anaerobic Digester (AD) to supply a large proportion of the north side of the campus from September 2013.

Ground works and installation of pipework into the Main Building has already begun.

The plant is expected to generate 1,900,000 kWh of heat, saving the University £55,000 per annum on gas at current energy prices of 2.894p per kWh and provide 42% of the heat demand (based on actual consumption in 2011/12) to the north side of the campus. It will also be responsible for reducing our carbon emissions by 349.5 tCO₂.

This project will not only provide the University with heat but protect it from rising energy costs, provide energy security for future years, making us less reliant on fossil fuels, therefore reducing our impact on the environment and uncertain national and global fossil fuel supply.

Lighting projects

Various lighting projects have been undertaken over the last three years and more are planned for 2013. To date the lighting projects have reduced our electricity consumption by 52,700 kWh and 27 tCO₂; and lighting projects planned for this year will reduce our electricity consumption by a further 21,000 kWh and 11 tCO₂.

New windows in B Block

B Block is a teaching building with numerous classrooms of varying sizes that was built back in the 1960's. It has single pane glass windows with metal frames in need of modernising. Replacement double glazed windows are planned for Spring 2013 which will reduce gas consumption by 10,204 Kwh per annum, saving £295 in the first year and 2 tCO₂.

Information Technology

We have been making some major changes to our IT solutions/facilities with regards to computers, printers, photocopiers and media screens and have a number of projects in the pipeline for 2013/14, which include;

- 1) The proposed build of a new data centre facility which is expected to utilize "free cooling" rather than refrigeration/air-conditioning, which is a much more favourable technology in terms of environmental sustainability.
- 2) We have been "sweating our assets" in terms of extending the working life of many PCs through a periodic rebuild and re-purposing of PCs to less performance-demanding purposes as they age, so that we have achieved working lives approaching 8 years - i.e. a policy of repeated re-use before they are ultimately recycled.
- 3) The large display screens (which are currently offline undergoing a lengthy re-configuration of their player units) when returned into action will automatically shut down from 2130hrs until 0730hrs (at which point they automatically reboot). This drops their power consumption from 160 watts (operational) to 1 watt (standby).

This will represent a reduction of 9,800 Kilowatt-hours per annum and 5 TCO₂.

- 4) We will shortly be investigating the suitability of "all-in-one" PCs as a precursor to a phased replacement of much of our ageing stock of desktop units. As part of this investigation we shall include the possibility both of energy consumption (of the devices themselves) and possible reduced thermal

output (waste heat). This is not just driven by the sustainability agenda, but also pressure to reduce desktop footprints (for space) and to reduce thermal output (to reduce their heat output into the room/building).

5) We now have some capacity (through SCCM) to monitor the "uptime" of desktop PCs, which will make it possible to consider patterns of scheduled or remotely-triggered desktop PC "standby" for certain identified cohorts of machines. Once we have a better understanding of Group Policy, we may be able to initiate such 'standbys' for PCs which are genuinely "idle" out of hours. We will avoid doing this until we have clear analytics available, to avoid the risk of any unfortunate consequences if such PC identifications are not 100% robust.

We are in the process of tendering for a managed print solution which will replace desktop printers with centralised Multi-Functional Devices (MFDs). Carbon saving data is yet to be calculated and will form part of the tender process.

Additional benefit

The new move to centralised MFDs means that the printer/photocopiers will be managed by an outside company who will have direct links to the machines when there is a fault. This will free up valuable time of the End User Support Team and Office Services Team. It will also cut the number of unnecessary print jobs being printed; approximately 20% of print jobs will be abandoned, saving energy, paper and ink.

Awareness campaigns

During Energy Saving Week October 2012 two major initiatives were launched to encourage participation from staff and students in assisting the University in lowering its consumption and carbon emissions.

The Student Energy Reduction Challenge runs from 1st October – 30th April and is aimed at putting responsibility of energy usage in the halls of residence in the hands of the students themselves through incentivising them with the reward of a share of the savings made.

Harper Green Award runs from 1st October 2012 – 14th April 2013 and was launched to encourage wider participation in the carbon management programme by staff and students and reward carbon and money saving projects that the University can implement.

Both the Student Energy Reduction Challenge and the Harper Green Award will be run annually in future.

Climate Week 4-10 March 2013 focused on different themes each day, with the Water day attracting a pledge from staff and students to save 876,000 litres of water through simple lifestyle changes.

These campaigns expect to make a conservative saving of 2.5% on gas and electricity, however this could be more. This will be determined when the results have been calculated after the closing dates.

4.2 Near term projects 2013/14

Expansion of the AD Plant.

Plans are being considered to expand the AD plant by adding another engine. Slightly smaller than the 450kWh one already in place, the 250kWh engine would provide the south side of the campus with electricity, providing the University with 2,000,000 kWh per year (26% of demand), at a cost of approximately £18,000 per annum at current unit cost of 8.908p/unit, saving 1,088 TCO₂ and combining it with the electricity generated from the larger engine would provide the University with a total of 91% of its electricity demand.

Rain water harvesting

At the end of 2012 a full water audit was conducted by M&C Energy Ltd and identified all water volumes and sources into the campus and volumes of water being used around the campus. This audit will be used to investigate the feasibility of installing rain water harvesting in locations where rainfall is abundant and can be harnessed.

4.3 Projected achievement towards target

Fig. 4 below is imported from the carbon management baseline tool and shows our actual emissions for 2009/10 – 2011/12 and projected path over the next three years (BAU emissions in red) and our target trajectory (in blue). This graph gives a clear indication that we are still likely to exceed our set target, mainly as a consequence of the installation of the AD plant and the impending district heat ring and future AD expansion. An assumption has been made for the energy requirements of the additional buildings under construction now for 2013, but actual performance of these buildings will become apparent in 2014.

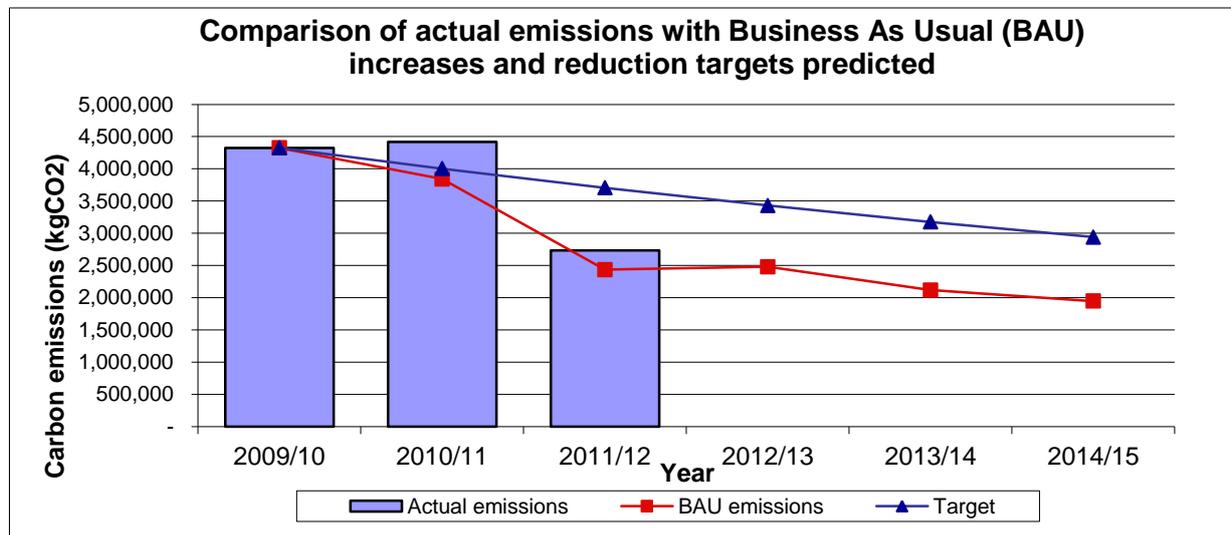


Fig. 4. 5 year programme projection of carbon emissions

Achievements from the projects that have been undertaken and the changes in behaviour can be best seen through illustration in the following graphs below.

Total CO₂ emissions from all sources

Fig. 5 below shows our performance of all sources of our activities that create CO₂ emissions. The dramatic reduction in emissions during 2011/12 is a consequence of onsite electricity generation from the Anaerobic Digester (AD) reducing the emissions produced from the purchase of grid electricity.

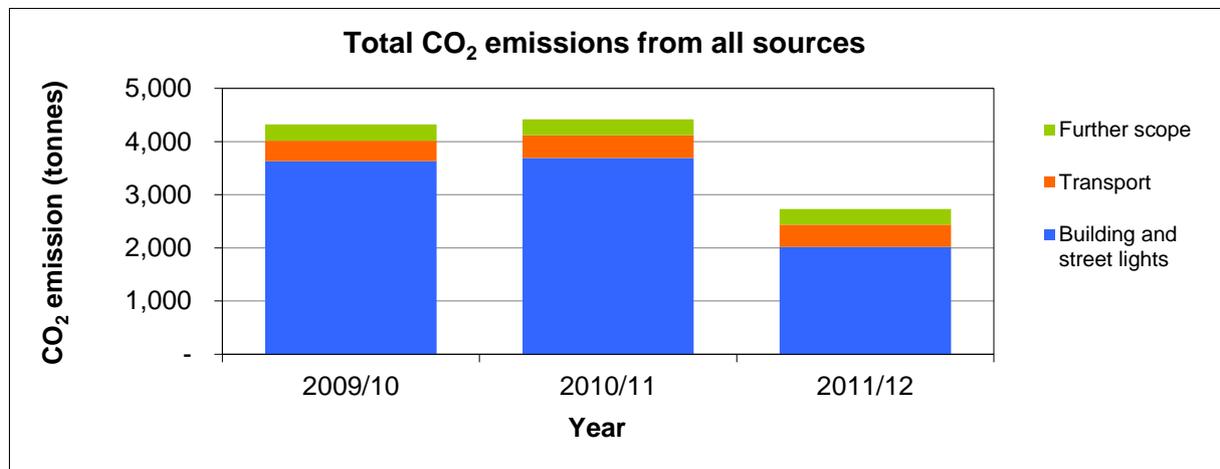


Fig. 5 All emission sources

Baseline tool terminologies: Further scope refers to waste and water, transport refers to fuel used in our fleet and for business commuting and building and street lights refers to gas and electricity used.

Energy

Emissions from energy are predominantly from electricity consumption with the largest user being the non-residential buildings relating to teaching and learning as shown in the graph below (Fig.6).

Residential buildings are our second highest consumer of electricity, however this has steady been reducing over the last three years with our focus being on sustainable building design of the newest halls of residence, installation of energy efficiency measures in the older buildings and awareness campaigns with the students.

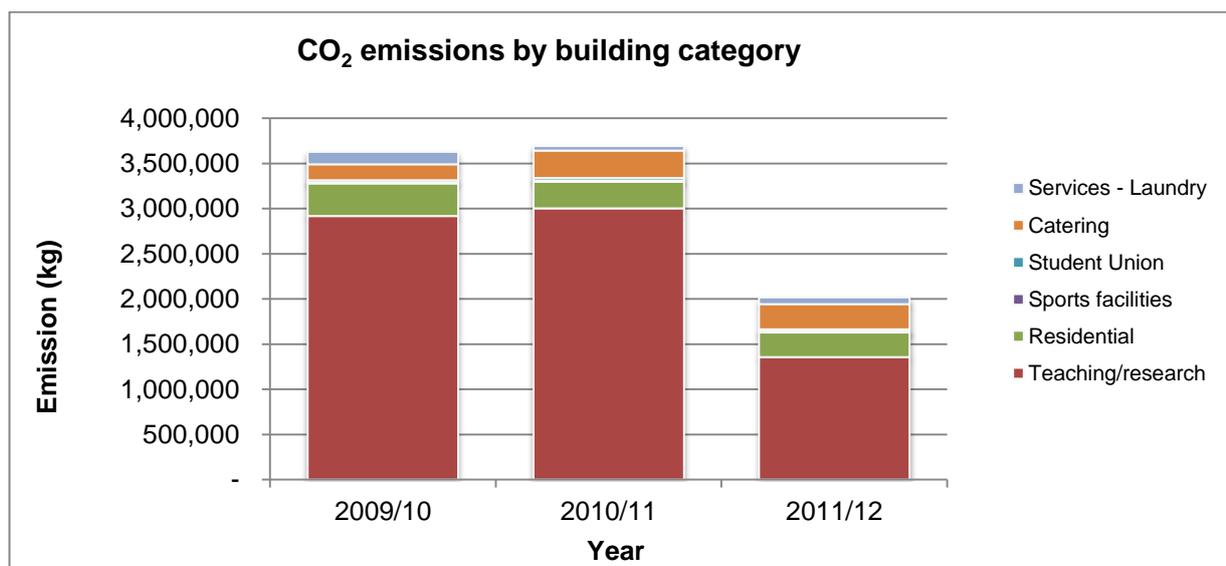


Fig. 6 Emissions by building category

Waste and Water

Waste and water increased during 2010/11 as a result of the expansion of the campus at that time and reduced again during 2011/12. There will be a significant reduction in waste during 2012/13 as a result of our waste contractor purchasing a vehicle that has the facility to weigh our waste. This has proved to highlight the inaccuracies in the previous method of calculating weight using a conversion factor for volume. With a significant 50% reduction in waste now being reported.

Water consumption shown in Fig. 7 shows a reduction achieved through improved monitoring, leak detection and greater awareness of usage. Rain water harvesting is being investigated to identify where potential water sources can be used to reduce demand on our boreholes and increase water security for the future.

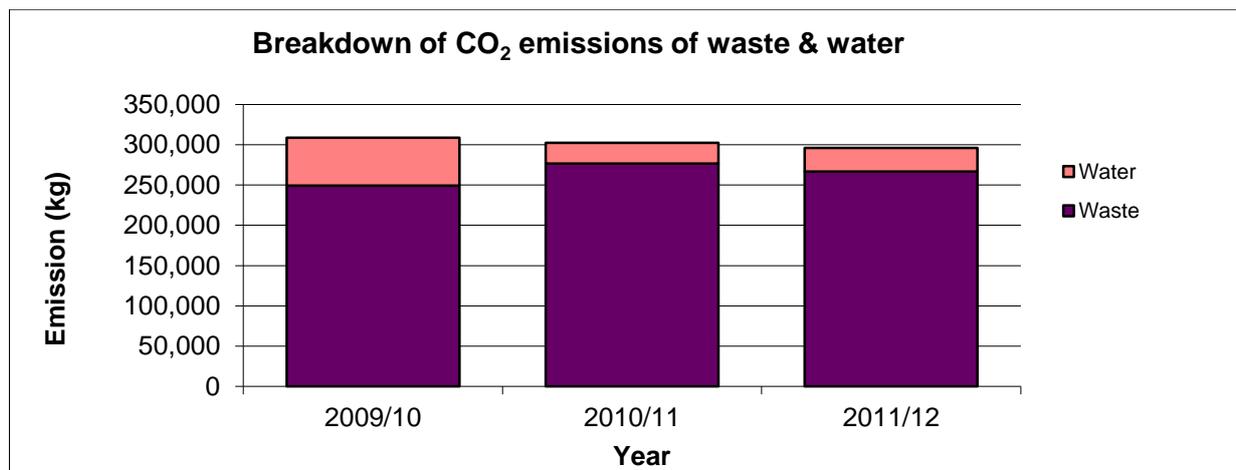


Fig. 7 Emissions for waste and water

Travel emissions

Travel emissions are split between business commuting and fuel used in the University's fleet vehicles. Fig. 8 and Fig. 9 show an increase in travel emissions in 2010/11 which have decreased slightly in 2011/12, however the University expanded in size and in staff numbers therefore more vehicles were needed on site to undertake jobs on campus. Although travel emissions have increased overall, business travel emissions have decreased as a result of leaner travel arrangements and the increase in use of Skype and video conferencing.

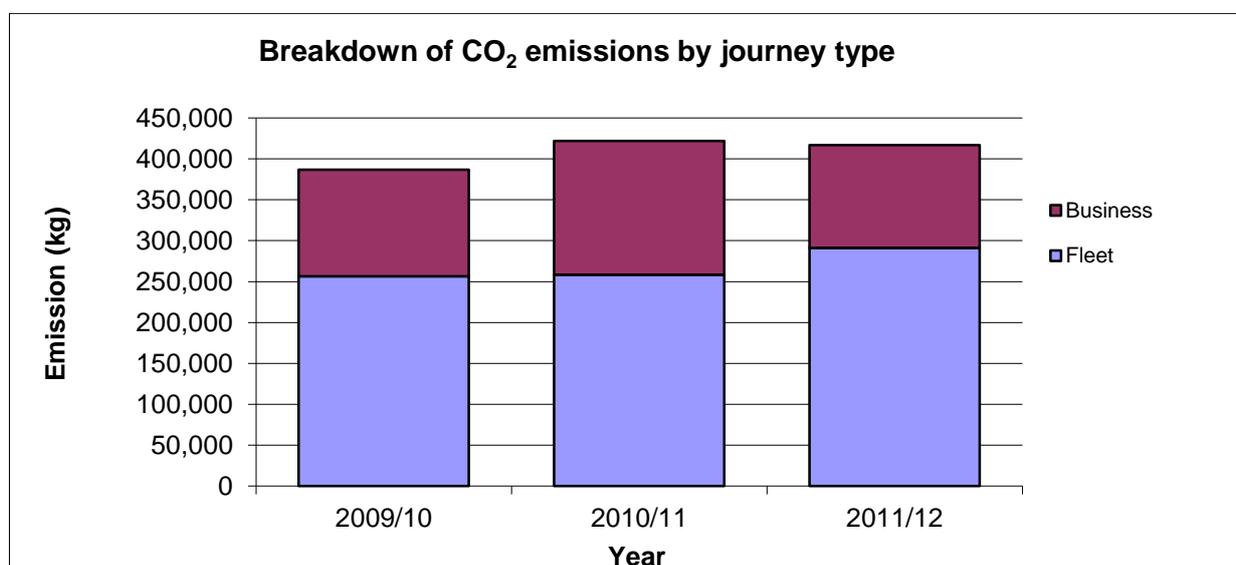


Fig. 8 Emissions for fleet and business commuting

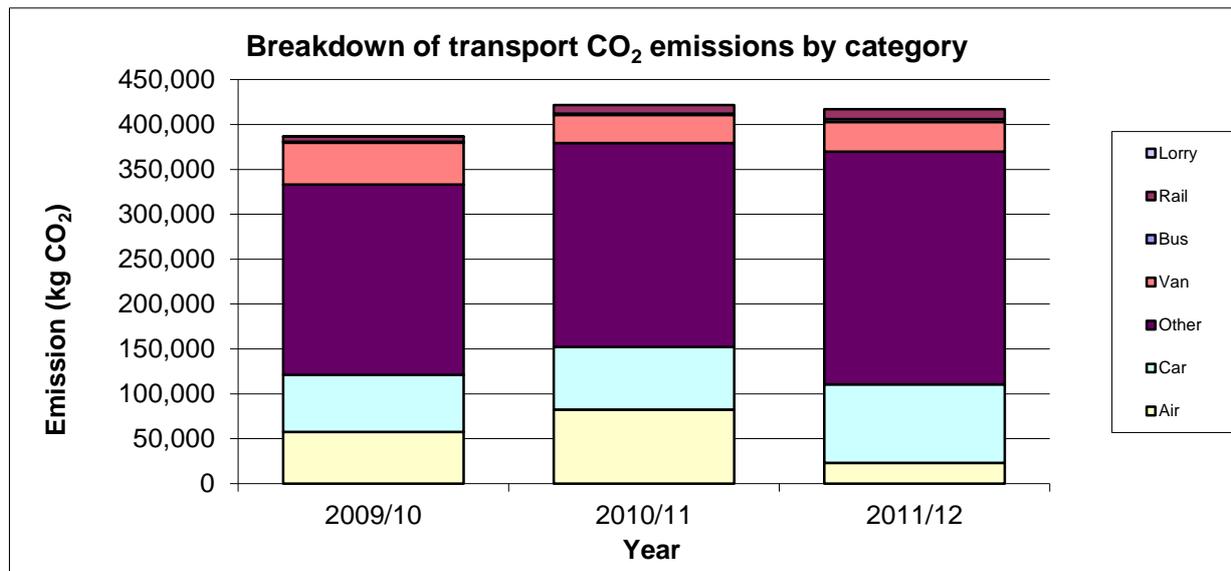


Fig. 9 Emissions from all types of business commuting

Major changes in travel emissions are shown in the increase of rail travel and reduction in international travel. Most international travel was conducted in 2010/11 when the University was strengthening its relationship with China. Changes to policies regarding domestic travel (rail travel and car hire) are reflected in the 2011/12 results as increasing due to the University's concentration on developing relationships within the sector and industry. One of the fundamental changes with car hire have been the stipulation that small cars be used in all cases, with the exception of larger cars being used where car sharing is done and/or equipment is needed for exhibitions/shows and such like. Car hire use is closely monitored and we should see a reduction in 2012/13.

5 Financing

The University sets out its capital expenditure programme which is in line with the corporate strategy and reflected in the Estates Strategy 2010-2020. Both revenue and capital expenditure are funded as far as possible from reserves generated from operations by the University.

In addition to this, additional finance is raised through fund raising activities, donations from industry, charities, grants (Higher Education Funding Council), energy efficient loans (Salix 'Revolving Green Fund') and commercial borrowings.

5.1 Benefits / savings – quantified and un-quantified projects

Tables 5.1.1 and 5.1.2 are provided and populated from the Carbon Management Projects Register (CMPR) tool and summarise the financial and CO₂ savings each year based on the projects in the CMPR/Plan.

Table 5.1.1 Benefits / savings

The annual cost and CO₂ savings are summarised below.

	2009	2010	2011	2012	2013	2014
Annual cost saving	£0	£2,722	£11,093	£223,849	£235,042	£422,868
Annual CO₂ saving	0	25	99	2018	2099	3634
% of target achieved	0%	2%	7%	146%	152%	263%

Table 5.1.2 Financial costs

The key financial metrics are summarised below.

Discounted Costs	2009	2010	2011	2012	2013	2014
Total annual capital cost	£357,957	£3,610,938	£12,631	£47,691	£885,000	£0
Total annual operational cost	£0	£0	£76,200	-£307,982	-£305,982	-£305,982
Total costs	£357,957	£3,610,938	£88,831	-£260,291	£579,018	-£305,982

Un-quantified benefits include:

- Reduced maintenance costs through energy efficiency measures and equipment
- Reduced resource requirements and time, i.e. IT projects and lighting projects
- Protection against price volatility
- Improved reputation within the sector, industry, local community, visitors, staff and students through measures to reduce our impact on the environment and lead through Best Practice.

6 Implementation

Many of the improvements around the campus to the buildings, equipment and maintenance are funded from the Estates department budget. The Estates department has the largest single budget of all the departments. Scopes 1, 2 and 3 fall under the responsibility of the Estates department and as such will continue to deliver the projects set out in this carbon management plan.

APPENDIX A

Ref	Project	Lead	Cost		Annual Savings (yr 1)		Pay back (yrs)	Net Present Cost(£)	% of Target	Implementation Year
			Capital	Operational	Financial (Gross)	tCO ₂				
1	Virtual Desktop	Chris Taylor	£340,310	£76,200	£7,740	70.2 tCO ₂	does not payback	£583,265	5.07%	2009
2	Led Lighting - Engineering	Arthur Broadhurst	£10,498	£0	£1,762	16. tCO ₂	6.0	-£18,548	1.16%	2009
3	UPVC Windows install - Vet Nursing	Mark Southall	£8,764	£0	£565	5.1 tCO ₂	15.5	-£554	0.37%	2010
4	LED Lighting - Bottom of staff Car Park	Arthur Broadhurst	£6,540	£0	£365	3.3 tCO ₂	17.9	£531	0.24%	2009
5	Halide Lighting - Dairy	Arthur Broadhurst	TBA					Missing data		2012
6	LED Lighting - Post Room	Arthur Broadhurst	£609	£0	£30	.3 tCO ₂	does not payback	£247	0.02%	2009
7	Installation of Anaerobic digester	Paul Moran	£3,600,000	-£384,192	£209,678	1901.7 tCO ₂	6.1	-£6,187,874	137.44%	2010
8	UPVC windows install - B Block	Arthur Broadhurst	£60,000	£0	£306	1.9 tCO ₂	does not payback	£54,955	0.14%	2013
12	PIRS - FC & Library	Arthur Broadhurst	£2,174	£0	£630	3.9 tCO ₂	3.5	-£3,065	0.28%	2010
14	PIRs for lighting (elsewhere)	Arthur Broadhurst	£25,000	£0	£8,269	75. tCO ₂	3.0	-£31,843	5.42%	2013
15	Biodiesel substitution	Marek Hammond	£0	£0	£2,950	6.8 tCO ₂	0.0	-£13,320	0.49%	2012
16	Awareness campaigns (on-going)	Karen Hughes	£1,000	£2,000	£10,188	81.4 tCO ₂	0.1	-£21,941	5.88%	2012
17	LED Lighting projects 2011	Arthur Broadhurst	£10,045	£0	£627	5.7 tCO ₂	16.0	£542	0.41%	2011
18	Booster eTRVs - Flatt Farm	Arthur Broadhurst	£550	£10	£129	.8 tCO ₂	4.6	-£820	0.06%	2011
19	Food Waste Recycling	Karen Hughes	£2,036	£2,641	£340	13. tCO ₂	no financial savings	£2,036	0.94%	2011
20	Computer Switch Off	Richi Jenkin	TBA	£0	£0	. tCO ₂	no financial savings	TBA	0.00%	2012



21	Swimming Pool Cover	Arthur Broadhurst	£26,856	£500	£0	. tCO2	does not payback	£31,014	0.00%	2012
22	Pay per lift recycling	Karen Hughes	£0	£0	£0	9.8 tCO2		£0	0.71%	2011
23	Heat Network	Paul Moran	£300,000		£57,000	349.5 tCO2	5.3	-£510,107	25.26%	2013
24	LED Lighting projects 2012	Arthur Broadhurst	£2,465	£0	£411	3.7 tCO2	6.0	-£3,372	0.27%	2012
25	Managed Print Solution	Marek Hammond	TBA		£0	. tCO2	no financial savings	TBA	0.00%	2013
26	Labs - replacement furnaces	Victoria Talbot	£7,082	£0	£377	3.4 tCO2	18.8	£1,718	0.25%	2012
27	AD extension	Paul Moran	£500,000		£120,000	1088.4 tCO2	4.2	-£1,477,782	78.66%	2013
28	Labs - replacement fume cupboards	Victoria Talbot	£10,288	£0	£0	. tCO2	#DIV/0!	£10,288	0.00%	2012
29	LED lighting projects 2013		TBC		£1,252	11.4 tCO2	no financial savings	TBC	0.82%	2013
30	IT - Media screen shutdown	Roger Greenhaulgh	£0	£0	£588	5.3 tCO2	0.0	-£1,647	0.39%	2013