

December 2013
Carbon Management Plan

Cardiff University Carbon Management Plan 2014

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Cardiff University Carbon Management Plan

Foreword from Deputy Vice Chancellor

At a time of increasing environmental pressures, I am pleased to be able to present our new Carbon Management Plan 2014 - 2020. This recognises the opportunities and challenges that we face in order to achieve sustainable growth as a world class, research intensive university.

Environmental sustainability is a key objective and guiding principle in the University's "The Way Forward 2013 – 2017 Strategic Plan". This Carbon Management Plan sets out our contribution to addressing the issues of climate change together with financial and environmental sustainability.

Supported by the Vice Chancellor, Council and Executive Board, I will lead the University in the drive to reduce our carbon emissions. We are committed to early action, recognising that the carbon reduction agenda offers an opportunity to realise long term savings. We will ensure that this plan continues to make an important contribution to the image and reputation of Cardiff University as a place to study and work and continue to engage with students and staff to foster a culture of carbon reduction and environmental awareness as an integral aspect of university life.

Cardiff University signed up to the Welsh Government Sustainable Development Charter in 2010 and are therefore committed to reducing our emissions from gas and electricity by 20% per square metre by 2020 from our base year of 2005/06. To ensure this reduction, we are committed to implementing many energy saving projects with the aim to reduce our emissions on average by approximately 3% per m² per annum.

The campus is expected to expand by 1% on average per year, meaning that with a reduction in emissions by 3% per square metre, an absolute reduction of 10% is expected from our base year in 2005/06 by 2020.

This plan includes an update of our carbon reduction achievements since the previous carbon management plan, our plans for future carbon reduction and data on scope 3 emissions - water, travel, procurement and waste with targets and actions plans to reduce these emissions.

Professor Elizabeth Treasure

Deputy Vice Chancellor
Chair of Environmental Management Systems Committee

Executive Summary

Wales champions the 2008 Climate Change Act passed by the UK government which sets out national policy of a UK carbon emissions reduction target of 80% on 1990 levels by 2050, with an interim target of a 26% reduction by 2020. The Welsh government has outlined their own targets of reducing carbon emissions in the public sector by 3% annually.

There is a belief in Wales, that public sector bodies, including Higher Education Institutions should offer a lead in setting our own carbon reduction targets. There is also an expectation from our students, staff and external stakeholders that sustainability should be at the forefront of everything that we do, demonstrating our commitment to reducing our emissions in the interests of the next generation.

This new plan revisits the previous Carbon Management Plan of 2007 with the aim to build upon the challenges that we have met and work on greater new initiatives. The purpose of this plan is to set out a road map for the next 6 years of how the University intends to achieve its own internal targets, covering technical projects, engagement initiatives and the financing to make it happen.

Cardiff University is committed to reducing our emissions by 20% per square metre by 2020 from our base year 2005/06 for our scope 1 & 2 emissions, gas and electricity. To meet this target we aim to reduce our emissions on average throughout the course of this carbon management plan, by 3% per square metre, per annum. We will also look at our emissions against staff and student numbers to get a greater understanding of our position next to other research based universities of our size and the areas we need to improve.

The campus is expected to expand by 1% on average per year up until 2020 and therefore a reduction of 20% per m² by 2020 will also mean an absolute reduction of 10% in 2020 from our base year of 2005/06.

This plan also puts in place individual targets for scope 3 on waste, water, procurement and travel to ensure our carbon reduction is truly reflective in areas which the University has the most control and power to reduce emissions.

The University will be investing in implementing energy efficient technologies and infrastructure but we believe it is also the responsibility of our staff and students to work to reduce their own individual carbon footprint.

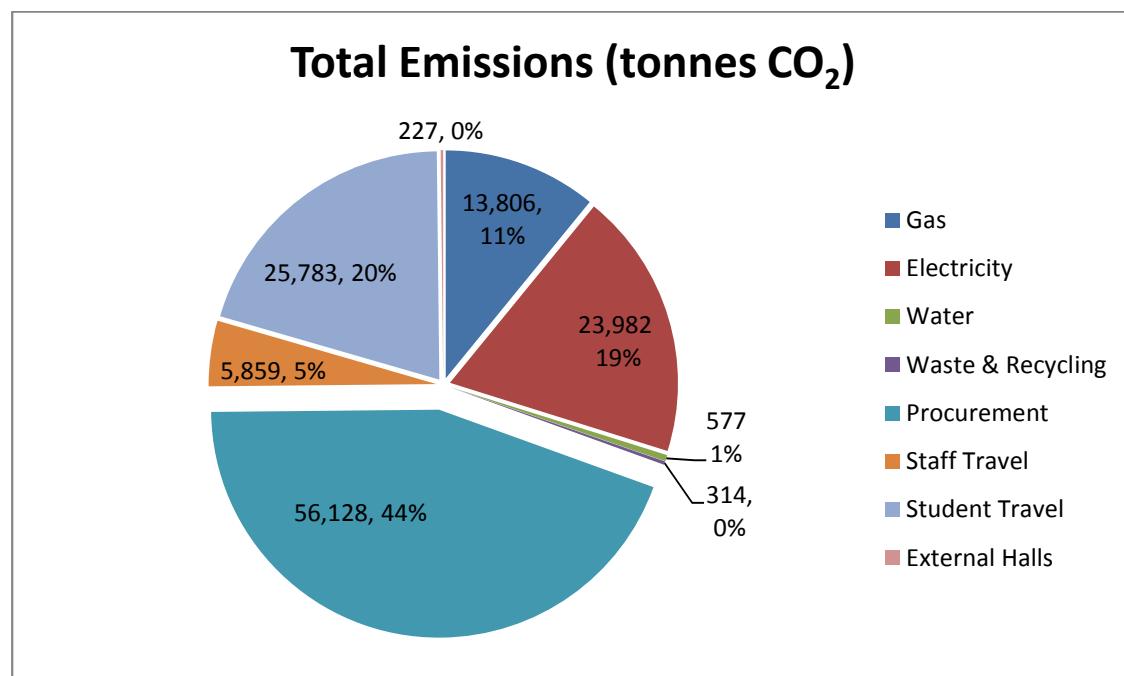
We have identified a number of projects capable of delivering our target, some of which are summarised in Appendix A. To implement these projects, the University is committed to investing substantial funding of up to £11 million to invest in energy saving projects and achieve the emissions reduction of 20% per square metre by 2020. This will ensure large financial savings of over a £1 million on our gas and electricity bills in 2019/2020.

The University is currently going through a period of vast change, with a new Vice Chancellor committed to investing £400 million into capital projects over the coming few years. This will ensure the reduction of emissions per square metre as departments move out of inefficient buildings and into less carbon intensive new buildings.

This document outlines the action plan and explains the financial and environmental reasons behind the implementation of this Carbon Management Plan for Cardiff University against the consequences of a “business as usual” scenario that would allow the University emissions of carbon dioxide and its energy expenditure to rise unabated.

Overall carbon emissions for 2012/13 are 126,676 tonnes. 37,788 tonnes of CO₂ from Scope 1 & 2 emissions and 88,888 tonnes of CO₂ from scope 3 emissions.

2012/13	Total Emissions (tonnes CO ₂)
Gas + University Fleet	13,806
Electricity	23,982
Water	577
Waste & Recycling	314
Procurement	56,128
Staff Travel	5,859
Student Travel	25,783
External Hall of Residence	227
TOTAL =	126,676



Introduction

Cardiff University is recognized as one of Britain's leading teaching and research universities and ranked amongst the top universities in the world.

The University is based in a number of sites in the city centre and on the Heath Hospital site. The University currently has over 28,000 students with approximately 5,200 living in student residences. The University has a turnover of over £450 million per year and employs over 6,000 staff. Cardiff University's academic community is the size of a small town. Research is undertaken in each of the University's 26 Schools/3 colleges and at any one time there are more than 1,800 research contracts and grants in operation.

The University occupies a large area within Cardiff's city centre; however the actual footprint extends from Heath Park in the North to Newport Road in the South. The main campus is concentrated around the Cathays Park which is conservation area at the heart of the city.

Cardiff University's vision lies in our ambition to be consistently among the top 100 universities in the world and the top 20 in the UK. To achieve this, Cardiff University follows these 10 guiding principles, as found in "The Way Forward Document"

- Outstanding academic and professional performance
- Respect for people and diversity
- Academic freedom
- Financial resilience
- Integrity
- Subsidiarity
- Dynamism
- Accountability
- Self-determination
- **Environmental and social sustainability**

One of Cardiff University's priorities is

"Controlling carbon emissions to fulfil our commitment to sustainability."

The purpose of this Carbon Management Plan is to set out our mission for the next 6 years up until the academic year 2019/2020 of how the University intends to achieve its own internal targets.

Corporate Targets

Unlike the English Higher Education Sector and Funding Council, the Welsh Higher Education sector does not have specific carbon reduction targets. Instead the Welsh Government has outlined targets for the Welsh Public sector as a whole, to reduce carbon emissions annually by 3%. As a corporately responsible institution it is important to play our part in reducing Wales's public sector carbon emissions and put in place our own carbon reduction targets.

Cardiff University's Vice Chancellor signed People and Planets "Green Education Declaration" in 2012 where he demonstrated his support for the introduction of sector-wide carbon reduction targets, acknowledging the benefits of a clear framework that shapes our collective responsibilities to the threat of climate change. Despite Wales's lack of external carbon reduction targets, Cardiff University believes it is a moral duty for Welsh Universities to set our own targets in reducing our carbon emissions. We understand that as the largest research based University in Wales our measure against other Welsh Universities may however be less of an indicator of our achievements and targets and thus we aim to fall in line with targets typical for the English Higher Education Sector and follow the lead of similar large Russell Group Universities.

Cardiff University is committed to reducing our emissions by 20% per square metre by 2020. To achieve this we will need to reduce our emissions on average by 3% per square metre as our campus is expected to grow on average by around 1% per annum. This will mean an absolute reduction since our 2005/06 base year, of 10% by 2019/20.

We have decided upon using a number of metrics to measure our carbon reduction. Our main metric will be our emissions reduction per square metre to ensure a decrease in energy consumption across campus. Our current target for emissions per m² is to be at 83.8kg of emissions in 2019/20 which is a 20% reduction in emissions per square metre since 2005/06. We will also look at our emissions per students and staff to ensure a greater understanding of our energy usage.

We also believe it is important to split our targets in to scope 1 and 2, and separately scope 3. Scope 1 & 2, our emissions from electricity, gas and University fleet are directly the responsibility of Cardiff University and thus we have more control over what we can do to reduce these emissions. Scope 3 concerns the actions of people, which occur due to the University such as emissions from travel, waste, water and procurement which means our role here is to put in place actions to encourage others to reduce their own carbon footprint.

Finances

One of the key drivers to carbon reduction is the predicted financial savings from implementing energy saving projects. University energy and water bills are a significant cost at over £8 million a year. Cardiff University is therefore committed to energy saving projects which will ensure ongoing financial savings.

We are committed to ensuring finances for carbon management and energy efficiency projects which will occur through our ongoing maintenance and refurbishment plan and University owned Halls of Residence planned maintenance programme.

This carbon management plan sets out the plans for investment of over £11 million in energy saving projects to meet our emissions reduction target of 20% reduction per square metre by 2019/20 since our base year 2005/06.

In the academic year 2012/2013 Cardiff University spent £8,072,973 on our energy and water bills. The breakdown is demonstrated below.

	Spend
Electricity	£5,082,939
Gas	£2,154,047
Water	£835,987
TOTAL =	£ 8,072,973

In the academic year 2019/20 we aim to have reduced our emissions absolute by 10% from our 2005/06 base year. This is due to the expected increase in our campus size by 1% per annum and a reduction of emissions by 3% per square metre per annum.

This means that if energy prices rise by 10% per annum, our electricity and gas bill could increase from £7,236,986 in 2005/06 to £14,860,106 in 2019/20, or if energy prices rise by 5% per annum our electricity and gas bill would be £10,729,962 in 2019/20, if no action is taken to reduce our emissions.

The financial savings each year on our electricity and bills could be as much as £1,569,227 if energy prices rise by 10% per annum or £1,133,083 energy prices rise by 5% per annum by 2019/20 and measures are taken to save energy.

Value at Stake

The Value at Stake (VAS) represents the total savings in energy and carbon related costs that can be obtained through adopting energy saving projects to reduce our emissions by 3% per square metre and a 20% reduction in emissions per square metre by 2020 against our 2005/06 base year. The value at stake for the University is deemed to be the cost difference between full implementation energy saving projects and taking no action.

Cardiff University plans to invest over £11 million over the 6 years of the Carbon Management Plan to meet our carbon reduction targets and implement many energy saving projects.

With a reduction in emissions by 20% per square metre by 2020, despite an increase in campus size by 1% per annum, we aim to reduce our emissions on average by 3% per m² per annum up until 2020. We therefore expect to have reduced our absolute emissions by 10% by 2019/20 and therefore our energy bill should be 10% less than if business was as usual with no energy projects being implemented.

One of the scenarios is that electricity and gas prices will increase by 5% per annum. We expect our campus to increase by 1% per annum, adding an extra 0.75% to our gas and electricity bills each year as new buildings will be more energy efficient than the rest of the campus. However we aim to reduce our emissions by a total of 10.6% by 2019/20. This would mean that our gas and electricity bill in 2019/20 would be £9,596,879 if we implement energy saving projects.

The Business as Usual Scenario for our energy bills if we do not implement any energy saving projects and energy prices increase by 5% per annum is £10,917,732.

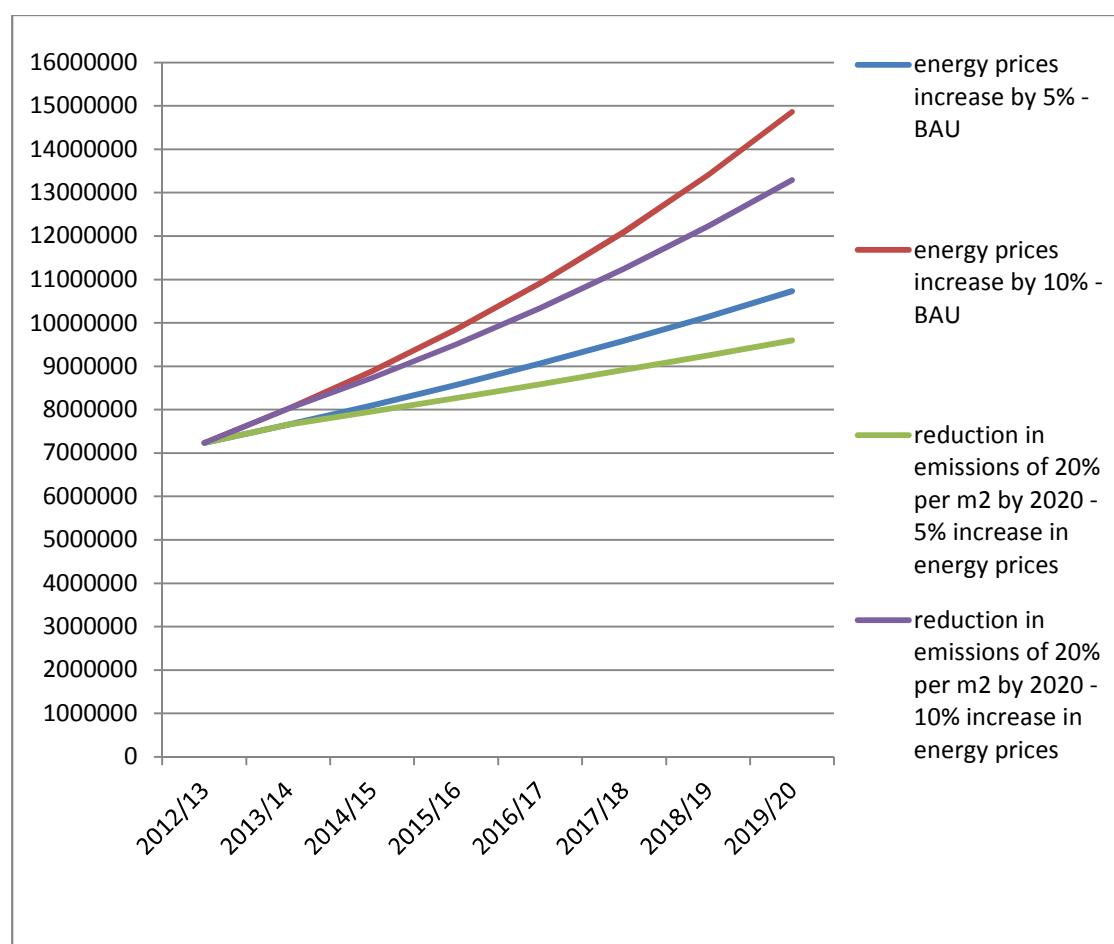
Another possible scenario is that gas and electricity prices could rise by as much as 10% per annum. We expect our campus to increase by 1% per annum, adding an extra 0.75% to our gas and electricity bills each year as new buildings will be more energy efficient than the rest of the campus. However we aim to reduce our emissions by a total of 10.6% by 2019/20. This would mean that our gas and electricity bill in 2019/20 would be £13,290,879 if we implement energy saving projects.

The Business as Usual Scenario for our energy bills if we do not implement any energy saving projects and energy prices increase by 10% per annum is £15,120,151.

It is therefore possible that the value at stake from not implementing energy saving projects could be as much as £1,569,227 in 2019/20 if we do not implement any energy saving projects and energy prices increase by 10%.

The value at stake if energy prices only rise by 5% per annum is still as much as £1,133,083. Therefore the financial savings to meet our emissions reduction target is a powerful motivator.

The graph below shows all possible scenarios for the total cost of electricity and gas over the next 6 years and shows the large financial savings expected for a reduction in our emissions by 3% per m² from the academic year 2014/15.



Data Collection

It is important that the University is aware of energy usage within all areas of the campus. Cardiff University is committed to gathering data regularly so we can measure our progress towards our targets. This will mean stronger governance structures to ensure each year there are people in roles which are committed to updating our carbon management plan and gathering the data to do so.

For this new Carbon Management Plan we have gathered data on many carbon emitting areas to develop a Scope 3 baseline. These new areas include procurement, waste, water and travel.

Outlined below are an explanation of the three different scopes followed by information on the accuracy of data we have collected for each scope and how the carbon emissions from each scope was calculated.

Scope 1

- Direct on-site combustion emissions from gas use in academic buildings
- Direct on-site combustion emissions from gas use in Cardiff University owned residential buildings
- Combustion emissions from diesel and petrol use in University owned vehicles

Scope 2

- Emissions from the use of purchased electricity in academic buildings
- Emissions from the use of purchased electricity in Cardiff University owned residential buildings.

Scope 3

- Water
- Waste
- Travel emissions associated with staff and student commute
- International and UK student travel emissions to study at Cardiff University
- Business and Study Travel
- Energy (gas and electricity) and water use in private Halls of Residence which provide students with accommodation.
- Supply chain emissions associated with procurement, including waste disposal and recycling as well as water supply and wastewater treatment

Accuracy and Calculation of Emissions

Scope 1

Gas

Carbon emissions for gas have been calculated using the DEFRA conversion factor which is 0.184 in 2013. Gas consumption in kWh has been collected from Corona Energy, our present gas supplier, with the data taken from meter readings and estimated readings across the entire campus of Cardiff University.

University Fleet

Emissions produced by University owned vehicles are also seen as scope 1 emissions as these are directly caused by Cardiff University. An accurate total of litres of petrol and diesel consumed annually has been calculated through weekly invoices provided by national petrol stations of the litres each vehicle has topped up each week. This annual total consumption for petrol and diesel separately was then calculated by multiplying the vehicles mileage with the 2013 DEFRA conversion factors of 0.24512 for Diesel and 0.23394 for Petrol.

Scope 2

Electricity

Carbon Emissions for electricity have been calculated using the DEFRA conversion factor which is currently 0.44548 in 2013. Electricity consumption in kWh has been collected from Swalec, our electricity supplier, with the data taken from meter readings across the entire campus of Cardiff University. All half-hourly meter readings are also collected by our Meter data collector and are available on a day + 2 basis for accurate reading information to be logged/recorded.

Scope 3

Travel

Carbon emissions calculated from travel are reasonably accurate as the travel survey carried out gained a very high response rate from 2,463 Student responses, approximately 10% of the student population and 1,619 responses from staff, approximately 28% of all staff. Improvements could be made in future such as requesting full postcode details of individuals as three/four digit postcode areas can be quite large and therefore there is a limit to how valuable responses are when really getting down to detail and suggesting improvements in individual areas. Very accurate mileage has been given by the Students Union on the amount of journeys made for student

sports and activities and therefore travel is overall a relatively accurate reflection of carbon emissions emitted in the academic year 2012/13.

Water

Carbon Emissions for water have been calculated using the 2013 DEFRA conversion factor. Water consumption in cubic metres has been collected from meter readings across the entire campus of Cardiff University and multiplied by the water supply conversion figure of 0.3441 per cubic metre and water treatment conversion figure of 0.7085 per cubic metre so that carbon emissions from water for 2012/2013 are very accurate and can be used as our base year.

Waste

Carbon Emissions for waste have been calculated using the 2013 DEFRA conversion factor. Weight of waste to landfill has been gathered from our contractors Veolia and Biffa. This weight in tonnes has then been multiplied by the municipal waste 2013 DEFRA conversion figure of 289.83 kgCO₂e. Carbon emissions from recycling have also been calculated using the 2013 DEFRA conversion factor of 21.0 kgCO₂e for paper, plastic, cardboard and tins for waste from our residences and academic campus.

Procurement

Procurement related carbon emissions have been generated from the production and transportation of goods, services and works purchased by Cardiff University (CU). These emissions have been calculated by converting CU's annual 'influenceable' procurement expenditure on goods, services and works to 'equivalent emissions', using the HESCET [Higher Education Supply-Chain Emissions Tool]. The accuracy of the spend on the numerous categories asked for by the HESCET tool is taken straight from the Universities finance Oracle system and is as accurate as the data sources (coding, P2P efficiency, timing in relation to year end cut-off etc.) that are input to it. The most frequent reason data may be inaccurate, despite using the HESCET tool, may be data accounted for between different cut-off dates due to invoices received at a later period or a lack of accurate invoices from the supplier. Accuracy is also dependent upon our Estates Departments calculations when alternative data sources have been used, (such as volume consumption data from cu metres, kWh etc.), and then converted to Tonnes CO₂e. It is possible that these results will fail to map closely (they may even be substantially disparate) to the HESCET tool's 'spend' based results for emissions. Annual trends in categories of total GHG emissions will take time to be established as CU's operational activities will vary each year. The longer the reference period (eg: 5+ years) the more confident should be the trend analysis.

Communication and Engagement

Managing our energy consumption is an issue that we believe is a shared responsibility by all staff and students which needs to be embedded into the culture of our University. We are already conducting many engagement activities with ongoing structures to filter messages throughout the University as well as undertaking annual awareness raising events. However we would still like to build on these current achievements.

Listed below are our current engagement activities

- The ECO network of staff in every department is responsible for promoting sustainability and encouraging energy saving.
- The annual ‘Student Switch Off’ campaign run by NUS to encourage students to save energy in University owned Halls of Residences.
- This year we are taking part in “Snap it off” NUS campaign encouraging students to take photos where electricity is being wasted, followed by the NUS contacting organisation to switch off the electricity.
- This year we are also taking part in the Live Greener NUS program which includes “Blackout” NUS campaign.
- Green Impact as part of “Live Greener” is also being implemented throughout the campus with teams of staff within departments putting in place actions to reduce total carbon emissions.
- An annual student led People & Planet Go Green week.
- Fairtrade Fortnight
- Sustainability Week
- Positive Health and Environment Week
- Student Allotments – SU garden/Allansbank Road
- Universities Designing a Community Garden Course -
<http://www.cardiff.ac.uk/learn/widening-access/live-local-learn-local/designing-a-community-garden/>
- Fruit and Veg Co-op
- Support a local environmental charity, The Size of Wales with fundraising for “Go Green Day”.
- Environmental Champions – SU student volunteering and Cardiff council recycling and litter pick project.
- A waste and recycling awareness campaign for students living in University owned Halls of Residence in the form of posters, online information / induction / web pages.
- A Travel Survey was recently undertaken to assist in calculating carbon emissions from Scope 3 Travel and engage staff and students in thinking about their own carbon footprint.
- Energy Saving Initiatives Competition is being undertaken to raise awareness of this new carbon management plan.
- In 2012 Cardiff University achieved Bronze food for life award in with the Soil Association and we are currently considering actions required to progress to Silver standard.

Responsibilities for Carbon Management at Cardiff University

Staff and students

Ultimately the responsibility for reducing carbon emissions and saving energy falls to both the University's management and to individual staff and student members. The community of Cardiff University have a collective responsibility to reduce emissions from our activities. Clearly this responsibility will need to be supported through awareness raising events and training as well as the implementation of key carbon reduction policies and projects.

EMS Steering Group

The Environmental Management Systems Steering Group was formed in 2009 after the merger of the Environment Group and the Energy Working Group. The Group looks at a range of areas including carbon, waste, travel and biodiversity and works on improving the University's position in the People and Planet Green League. The EMS Steering group is chaired by the Deputy Vice Chancellor, Professor Elizabeth Treasure, and has a wide representation from operational areas of the University together with representatives from the academic schools, the Student Union and an elected ECO's representative. The meetings are held bi-monthly and reports to the University Health, Safety and Environment Committee.

Progress against the targets and objectives within this Carbon Management Plan will be monitored by the EMS Steering Group. Details of annual emissions from scopes 1, 2 and 3 will be reported on an annual basis to the Health, Safety and Environment Committee as part of the management review requirement of the integrated SHE Management system.

Environmental Compliance Officers (ECOs)

The University has a network of ECOs across the estate with a representative in each school and professional service. The ECO role includes maintaining environmental documentation, providing general environmental sustainability advice and working with the University EMS Steering Group on implementation of environmental sustainability objectives and targets.
<http://www.cardiff.ac.uk/sustainability/week/eco-champions/role-profile.html>

Occupational Safety Health and Environment Unit (OSHEU)

OSHEU are responsible for the management of the Integrated Safety, Health and Environment Management System (ISO 14001 & 18001). The Assistant Director within OSHEU coordinates the University EMS Group and manages the hazardous waste of the University. It is this area which co-ordinates much of the staff and student behavioural change activities for the University including "Green Impact".

Estates Department

The Estates Department is responsible for energy management, monitoring and targeting, and delivering energy efficiency projects. Estates also handles all of the University's academic campus domestic waste disposal streams including recycling, and the production of all necessary building Display Energy Certificates (DEC's) and Energy Performance Certificates (EPC's). The Estates Department is also responsible for the design, construction, commissioning and ongoing statutory and cyclical maintenance of new buildings, the refurbishment of the existing building stock and statutory and cyclical maintenance of the existing building stock. Within Wales all new public buildings are required to meet the Welsh Government Building "BREEAM Excellent Standard". BREEAM (Building Research Establishment Environmental Assessment Methodology) is the world's foremost environmental assessment method and rating system for buildings, more information can be found within the construction section.

Campus Services Department (CSERV)

The Campus Services Department is responsible for operational management of the following services:

- Residences Services,
- Catering & Bar Services,
- Sport and Exercise Services,
- Security and Portering Services

Carbon Management responsibilities are as follows:

- Management of waste and recycling in University owned Halls of Residence,
- Joint responsibility (with Estates) for energy management in University owned Halls of Residences,
- Development and management of the University Travel Plan,
- Provision of "Front of House" Management Services (Facilities Management and Reception Services) within certain multi occupancy University buildings.

Information Services

Information Services provide library, IT, media resources, and advanced research computing services for Cardiff University. The department plays a key role in introducing nationally-leading carbon reduction projects, providing electronic and collaboration services which help to reduce the need for paper and travel carbon across the University, and offering support and advice to the University community to help reduce our overall environmental impact. Some examples of recent Information Services initiatives are given in the 2007 Carbon Management Plan Update in Appendix C.

Process and Strategy

The new Carbon Management Plan has been produced by a project officer working closely with the Director of Finance, Assistant Director Environment, the University's Maintenance Engineer, the Carbon Trust and a specialist and consultant in this area, an academic working for the University - Professor Ian Knight.

A Carbon Management Task and Finish Group met monthly and included all areas who worked on the plan including, Finance, Estates, Procurement, IT, Waste, Residences, representatives from the Students Union as well as an Environmental Compliance Officer (ECO).

The Carbon Management Task & Finish Group sat below the Environmental Management Systems Steering Group and was supported by many areas of the University.

The final carbon management plan was passed through the carbon management plan task and finish group followed by the Environmental Management System Steering Committee. Once passed in both of these groups it was taken to University Executive Board to be passed by the Vice Chancellor and to the Health Safety and Environment Committee for information.

This carbon management programme has been adopted by the Estates Department and is being driven forward by the Director of Estates. A regular update on carbon management is provided by the Director of Estates at the bi-monthly Environmental Management Systems Steering Committee.

Current and Future Commitments

Cardiff University has demonstrated our commitment to sustainability and carbon reduction through many actions in previous years including signing up to a number of charters, bills and projects which are listed below.

- Cardiff University has committed to reducing carbon emissions by 20% by 2020 following signing up to the Welsh Governments Sustainable Development Charter in 2010.
- The first Higher Education Institution in Wales to achieve the Carbon Trust Standard, achieved in 2010;
- Commitment to building BREAAM ‘Excellent’ buildings. All future builds will meet this high environmental standard with two buildings on our estate that already meet this standard.
- Achievement and continuation of ISO 14001 certification for the University as a whole;
- Multiple awards and nominations for the University’s national leadership in environmental performance and innovation [<http://www.cardiff.ac.uk/sustainability/ourperformance/awards/index.html>];
- Implementation of a programme of nationally-leading sustainability initiatives by the University’s Information Services Directorate;
- Currently undertaking Green Impact award throughout departments
- Currently running Student Switch Off, Snap It Off & Blackout Project
- Sustainability Week
- Go Green Week
- The Vice Chancellor signed the Green Education Declaration which has committed to working towards sector-wide carbon reduction of 43% by 2020 on 2005 emission levels as well as committing to integrating education for sustainable development into the curricula, recognising the key role we play in educating those who will create a sustainable low carbon economy and society.
- Cardiff University has a number of leading academic research institutes which conducts energy research in Wales to help deliver a low carbon future. More information on the University’s leading research programme into carbon efficiency and environmental sustainability can be found at www.cardiff.ac.uk/sustainability/ourresearch

Stakeholders

The Carbon Trust identified wider engagement throughout university staff, students and the wider community as an area that needs to be improved. Carbon Management needs to be a priority to a variety of different people. Listed below are the numerous stakeholders who influence the procedure and implementation of this Carbon Management Plan.

- **The Governing Body and University Executive Board** – It is paramount that these two influential bodies understand the importance of carbon reduction and our main priority areas so that future decisions are made with energy efficiency in mind.
- **Finance** - A key driver or restraint when it comes to energy management is finance and thus it is important that this plan and future carbon management plans have full support from the University's management.
- **Estates & Campus Services** – The implementers and creators of the energy saving opportunities. It is thus important that all agreed energy saving initiatives are sensible and achievable.
- **All University staff** - everyone must be aware of the current environmental policies and carbon reduction targets to ensure every individual plays their part. The University would like to embrace all skills and passions of staff to create behavioural change throughout the Universities culture.
- **Students** - The reason the University is here and the next generation who will benefit from an environmentally responsible society. Studies have shown that students would rather work somewhere with good environmental records and thus spreading the word about our carbon management plan can only be beneficial. We will and have worked closely with the Students Union staff and student representatives to gauge support and ideas so that the implementation of behavioural change throughout students is a smooth process.
- **The Carbon Trust** – the Carbon Trust are working on behalf of the Welsh government to support Public Sector institutions so that we can contribute to the target of a 3% annual reduction in carbon emission of public sector bodies across Wales.
- **HEFCW** – The Higher Education Funding Council for Wales has also supported the creation of this Carbon Management Plan and believes that Higher Education institutions have a duty to set and meet our own targets and play our part in reducing our burden on the environment.
- **The Cardiff, Welsh and International Community** – we have a duty to our fellow citizens to be a responsible institution which does its utmost to reduce carbon emissions and bring global prosperity to the next generation.

Drivers for Change

Legislation

In November 2008 the UK Government passed the Climate Change Act which makes it a legal requirement to achieve at least a 34% reduction of UK carbon emissions (compared to 1990 levels) by 2020, and a reduction of at least 80% by 2050. The Welsh government are very committed to Wales using only its fair share of the earth's resources, and radically reducing carbon emissions by 80-90% with annual 3% reductions in greenhouse gas emissions in the public sector. The Higher Education Funding Council for Wales (HEFCW) has not set their own targets for Higher Education Institutions. Instead HEFCW encourage Universities to set their own targets and as Cardiff benchmarks itself against other Russell Group Universities it is important that our targets reflect those of our competitors. HEFCW has recently decided that carbon management will be included in the institutional risk review processes from 2014/15 as part of the estates assessment and that institutions are required to have an appropriate carbon management strategy in place, which is published on their website, including identified targets, prioritised potential projects, annual reporting and identified resources. HEFCW are currently in the process of consulting a number of institutions to put in place exact requirements and therefore it is important that we work closely with HEFCW to ensure our carbon management plan will fall in line with their requirements.

Financial

The 2007 Carbon Management Plan acknowledged that until recently energy prices were generally falling and subsequently energy efficiency remained a relatively low priority. This meant that energy efficiency projects were often driven primarily by the need to replace infrastructure and improve the quality of the estate. Today energy prices are increasing steadily with Cardiff Universities 2012/13 gas and electricity bill being £7,236,986 with associated emissions of 37788 tonnes of CO₂, which we are very keen to reduce. Energy taxation mechanisms such as the Climate Change Levy and the carbon reduction commitment (CRC) which provides the University with a specific annual allowance of "carbon credits" also incentivises the University to keep a low level of carbon emissions as when credits are not fully utilised, they can be sold and conversely will have to be purchased where allocations are exceeded. The University needs to manage its carbon use year on year as the price of a carbon allowance is expected to increase in the future and we need to minimise our financial commitment to this scheme by reducing our emissions.

Responsibility & Moral Duty

Cardiff University understands that Climate Change is one of the biggest challenges facing the world to date and believes that we have a responsibility not to have a negative impact on future generations. We have a duty to act in a socially responsible way and lead by example. so that our students follow suit and demonstrate concern for reducing their own carbon footprint.

Reputation

A greater public and political awareness of sustainability and climate change in particular has impacted on Cardiff University's desire to be seen as a socially responsible institution. The increasing recognition of the positive image and marketing benefits that are generated from responsible energy management has also impacted on the importance of this carbon management plan along with wanting to be able to show our good environmental credentials as illustrated by interest in such initiatives as the People and Planets Green League. The Green League also looks at our environmental actions and commitments in comparison to other universities and thus we want to appeal to prospective students as a university that is socially responsible. A recent survey found that there is growing awareness and increased expectations amongst students for universities to adopt a low carbon approach, with students wanting more information on universities' environmental and social policies and performance before coming to university.¹

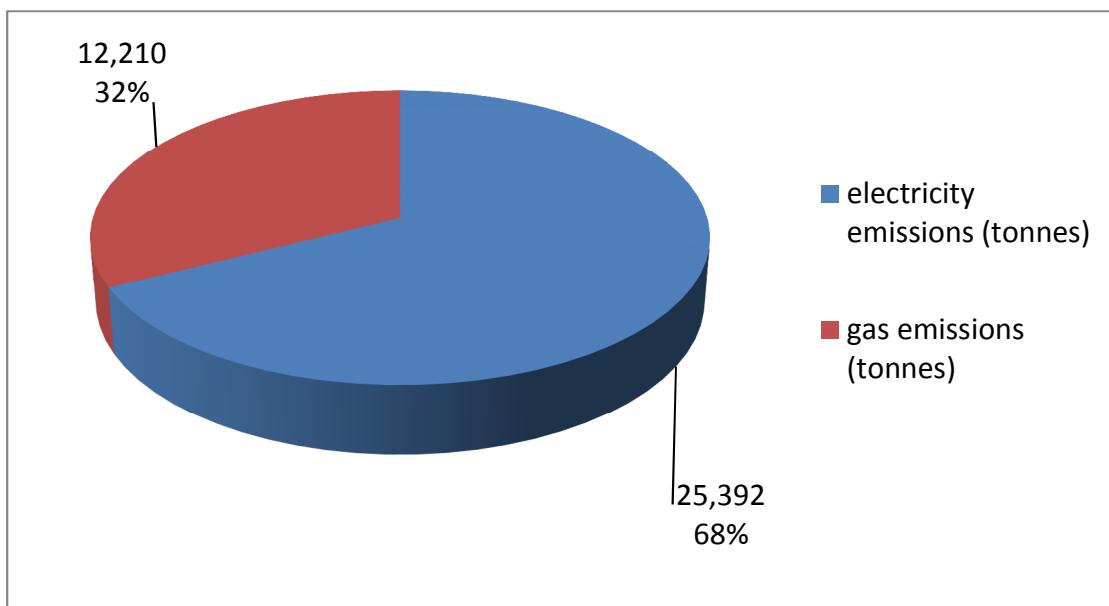
¹.The Future Leaders Survey: A report by UCAS and Forum for the Future. www.forumforthefuture.org.uk. (2007/8)

Base Year information

Our Base Year for scope 1 and 2 emissions (from electricity, gas and the university fleet) is the academic year 2005/06. This year was chosen as a baseline because it is used for reporting against UK targets, and it is the common baseline across the sector.

In 2005/06 carbon emissions were 37,573 tonnes with 12,112 tonnes coming from gas, 98 tonnes coming from the university fleet and 25,362 tonnes coming from electricity.

	Gas & Fleet CO₂ emissions (tonnes)	Electricity CO₂ emissions (tonnes)	TOTAL CO₂ emissions (tonnes)
2005/06	12,210	25,362	37,573



Emissions have been calculated for all buildings on the Cathays campus, and all buildings that Cardiff University owns and has control over at the Heath Park campus. It also includes all University owned halls of residence.

Buildings that are of shared use, where electricity and gas is paid for by the Heath Hospital have not been included as these buildings have been accounted for in the Carbon Management Plan for the University of Wales, Heath Hospital.

In 2005/06 Cardiff University's gross internal area, which covers all buildings owned by Cardiff University and directly pay the energy bills, was 358,452m² and therefore emissions per m² in 2005/06 were 104.8kg – we therefore aim our emissions to be 83.8kg per m² in 2019/20.

2007 Carbon Management Plan Update

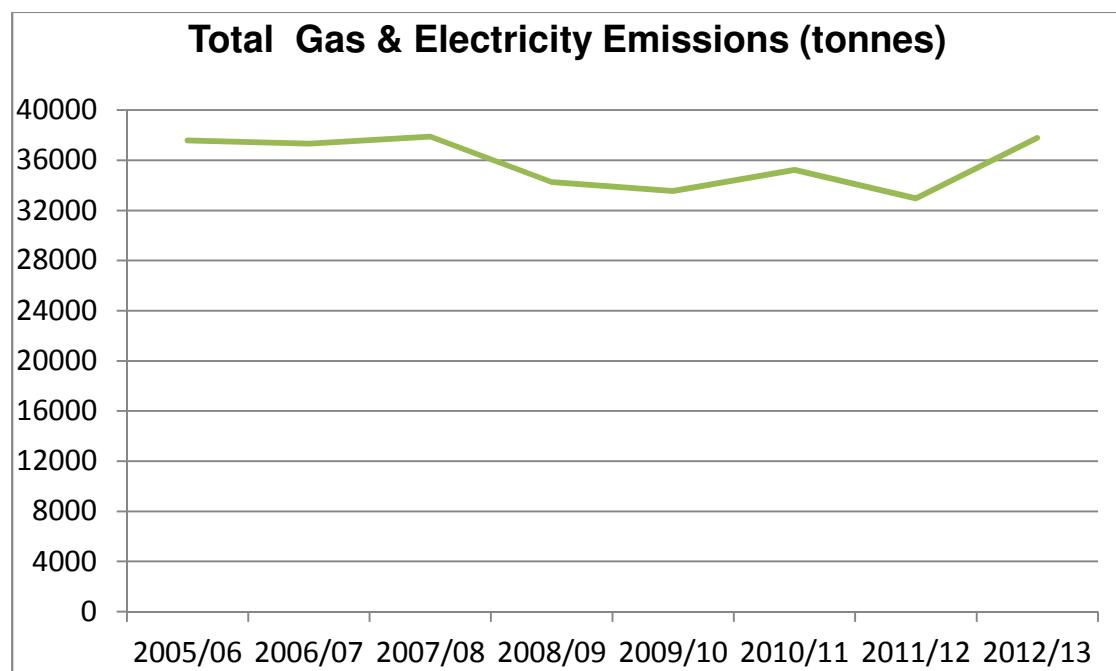
Since the completion of the previous Carbon Management Plan, we have implemented many new energy saving projects and initiatives which are listed below.

- Residences Services have been running a successful annual energy-saving competition in University owned Residences, called “Students Switch Off”. In the academic year 2012/13, analysis of energy usage showed that there was an average of 6.5% reduction in electricity usage. This has saved a total of 171,282 kWh, approximately £13,704 in electricity expenditure (assuming a typical expenditure of 8p/kWh) and over 92 tonnes of CO₂.
- Deployment of Renewables. We have 52 solar hot water systems installed, and our latest major build project has a 60 kWp solar pV system. We have been working with Partnership for Renewables to investigate wind and alternative energy sources, New pV schemes have been submitted for funding for a further 40kWp to take the campus pV generation to around 100kWp in total.
- Our Estates department have continuously been making technical enhancements, improving lighting, installing energy efficient boilers, installing water-saving devices, and updating controls – this is the area where we have saved the majority of the University’s Carbon Emissions. A significant proportion of these enhancements have been implemented as part of Residences Services Planned Maintenance programme.
- We have achieved ISO 14001 certification for the University as a whole;
- Information Services and ARCCA have implemented a wide range of carbon reduction initiatives, which can be found <http://www.cardiff.ac.uk/insrv/sustainability/>. These include
 - a programme of reducing the number of central computer servers while simultaneously improving user service, and saving another estimated £100k and 500 tonnes of carbon dioxide every year;
 - the provision of a nationally-leading advanced research computing facility (in partnership with ARCCA) which received multiple award nominations for its environmental efficiency and leading-edge design;
 - the provision of many virtual services to reduce the need for transport and paper, including a major increase in the number of

- electronic resources, new virtual collaboration software, and more efficient printing and photocopying services;
 - work in partnership with the Estates department to improve the energy efficiency of our libraries and data centres; and information, hints and tips for the University's staff and students, and the wider UK higher education community, to help them to reduce the environmental impact of their work.
- We have installed over 1,000 gas, electricity, water and heat meters across campus, including over 500 onto our automated monitoring and targeting (aM&T) system, creating an extensive data gathering network. Again, a significant proportion of these enhancements have been implemented as part of Residences Services Planned Maintenance programme.
 - We have made significant savings on our vending machines, having worked closely with our suppliers to reduce our electricity consumption. We have over 50 vending machines, with 40 of them under one supplier. Overall electricity consumption has reduced by 4052 kW in our hot drinks machines, 5913 kW have been saved from our snack machines and 9855 kW have been saved from our cold drinks machines since the end of the academic year 2011/12. In 11 of our vending machines, LED lighting has been fitted as well as an environmental management system fitted which means that when there is no one near the vending machines, day or night, they power down. The vending machines in our Humanities and JCR buildings are also fitted with timer controls to turn the lights off overnight. We are currently looking in to how this can be rolled out throughout all our vending machines.

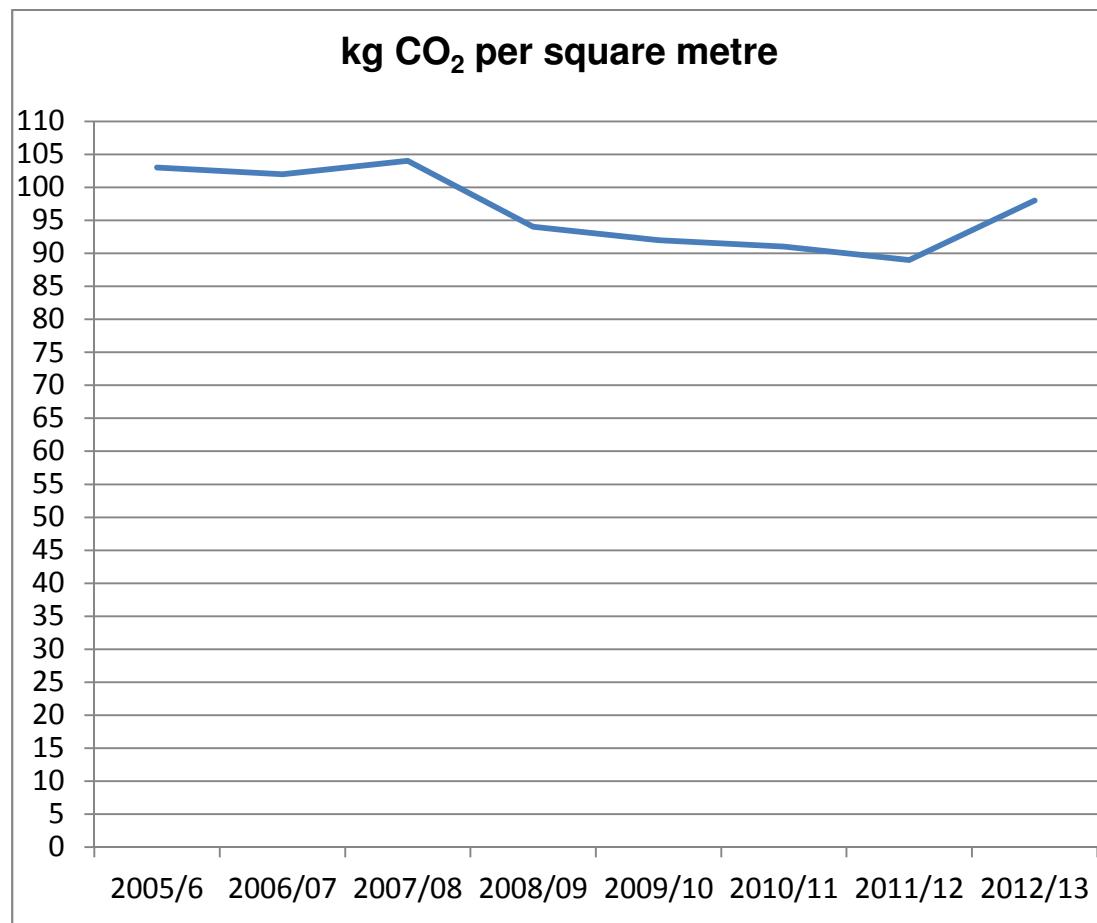
The table and graph below show the annual carbon emissions since 2005/2006.

Academic Year	Electricity emissions (tonnes)	Gas & University Fleet Emissions (tonnes)	Total Scope 1 & 2 Carbon Emissions (tonnes)	Emissions per square metre (kg)
2005/06	25,362	12,210	37,573	104.8
2006/07	24,947	12,381	37,329	102.6
2007/08	24,757	13,087	37,875	104.2
2008/09	21,384	12,873	34,257	93.6
2009/10	21,030	12,517	33,548	92.7
2010/11	22,584	12,657	35,241	91.6
2011/12	22,138	10,818	32,956	89.2
2012/13	23,982	13,806	37,788	98.7



Since the academic year 2005/06 our total emissions have increased very slightly by 215 tonnes of CO₂. This is likely to be down to the creation of new buildings throughout the University and an increase in student numbers, despite the implementation of many energy saving projects across campus.

We have however reduced our emissions by 6kg of CO₂ per m² since the academic year 2005/06 in line with our aims. The gross internal area in 2012/13 was 382,802m² and therefore emissions per m² are 98.7kg. This is a reduction of almost 1% per m² per annum from 2005/06. We therefore need to work towards our target and reduce emissions by 3% per m² on average from the academic year 2013/14 to meet our carbon reduction target.



In 2005/06 emissions per member of staff were 7.8 tonnes CO₂ and in 2012/13 emissions per member of staff had reduced to 7.1 tonnes of CO₂ which is a reduction 700kg per staff member.

Emissions per student in 2005/06 were 2.1 tonnes of CO₂ which has reduced slightly to 1.9 tonnes in 2012/13.

Emissions per staff and student in 2005/06 were 1.6 tonnes which has decreased slightly to 1.53 tonnes CO₂.

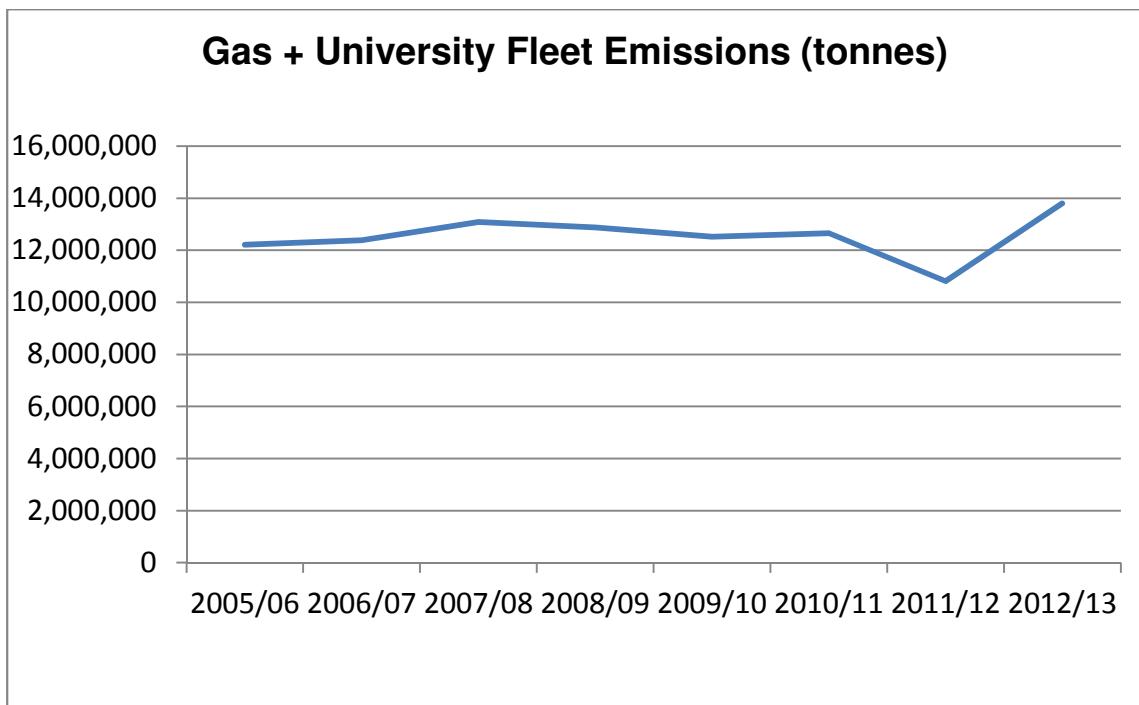
Gas

Our Gas consumption since 2005/06 has increased by 1596 tonnes CO₂ despite many new boilers being fitted around campus. Up until 2012/13 gas consumption was reducing at a steady pace, suggesting that the increase in gas consumption is likely to have been down to the cold winter of 2012/13 and the extended opening hours of buildings including libraries around campus where heating is now running for longer hours leading to a very small increase of 2kg per m² over the past 5 years.

In 2005/06 emissions from gas and university fleet per member of staff were 2549kg CO₂. Emissions per member of staff in 2012/13 were 2602kg of CO₂ which is an increase of 53kg per staff member.

Emissions per student in 2005/06 were 684kg of CO₂ which has increased slightly to 711kg, an increase of 27kg.

Emissions per staff and student for gas in 2005/06 were 539kg, which has also increased very slightly by 20kg to 559 kg CO₂.



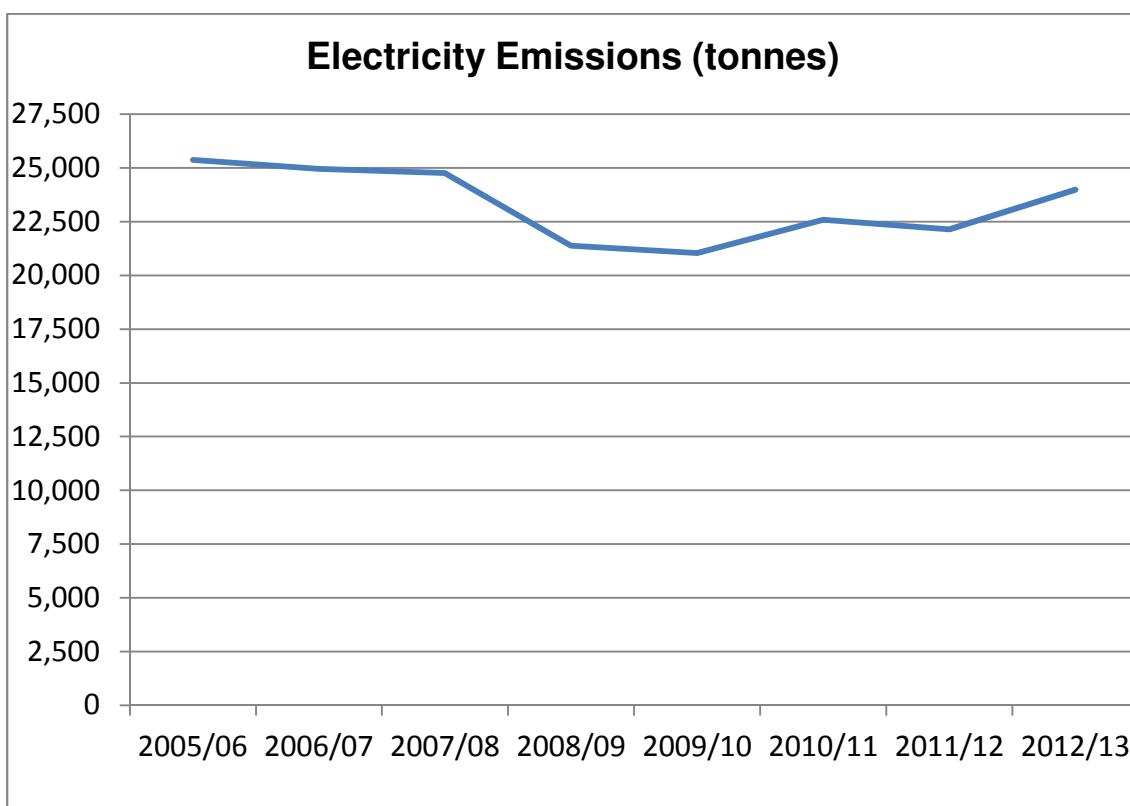
Electricity

Since 2005/06, our carbon emissions from electricity have reduced by 1380 tonnes CO₂ from 25,362 tonnes to 23982 tonnes. Emissions per m² have also decreased very slightly from 66kg in 2005/06 to 58kg in 2012/13. This is down to the implementation of many energy saving projects specifically lighting projects which will have had an impact on reducing our electricity consumption.

In 2005/06 emissions from electricity per member of staff was 5295kg CO₂ which has decreased by 774kg to 4521kg in the academic year 2012/13. Emissions from electricity per student in 2005/06 were 1421kg of CO₂ which has decreased by 185kg to 1236kg in 2012/13. Emissions per staff and student for electricity in 2005/06 were 70kg which has also decreased very slightly by 8kg to 62kg CO₂.

This demonstrates both the success of our new energy saving projects but also the behavioural change programmes with staff and students in the University.

We also purchase renewable energy from the grid through a green tariff with Swalec and hope to continue doing so in future. Currently the reduction in emissions from purchasing less carbon intensive electricity cannot be accounted for within our Carbon Management Plan as energy companies themselves have accounted for this within their own carbon emissions total and carbon management plan.

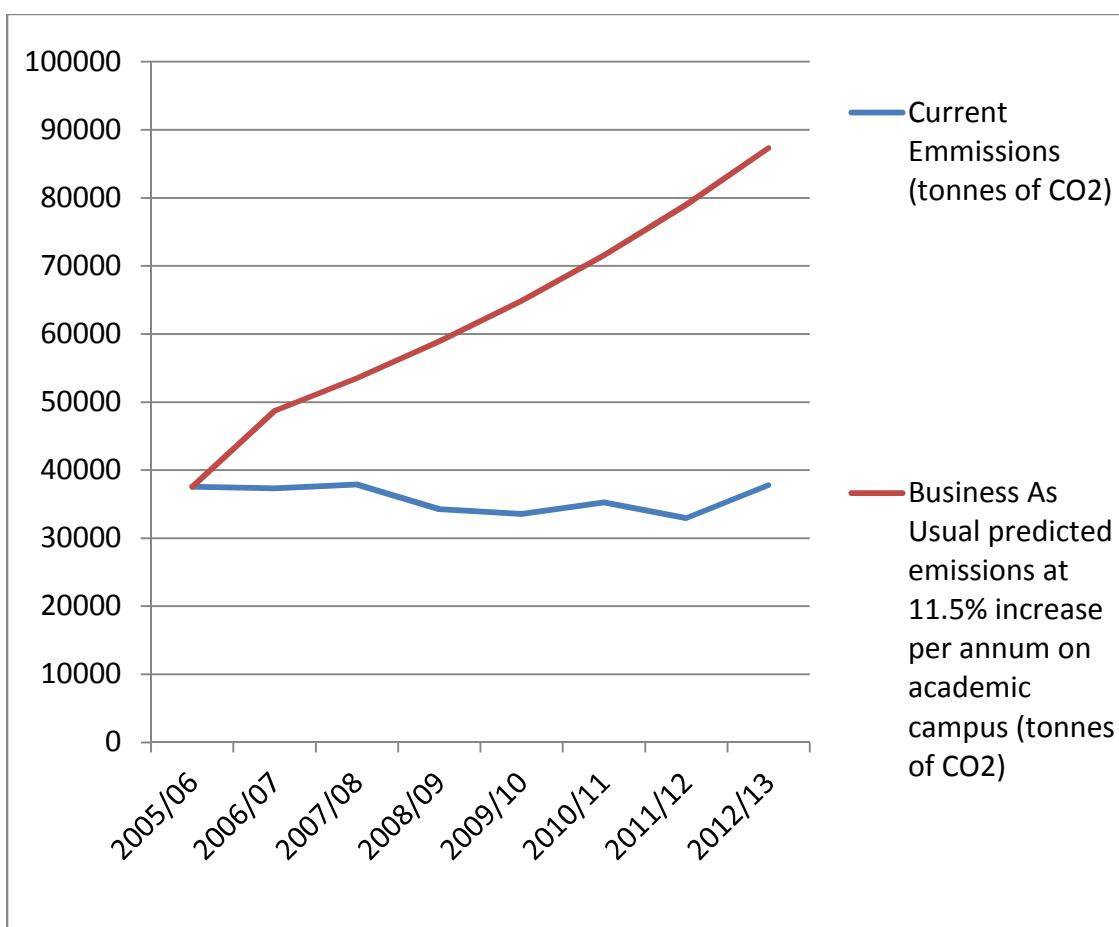


Business as Usual Update

In the previous Carbon Management Plan, it was predicted that energy consumption on the academic campus would increase by 10% per annum with University owned Halls of Residences not increasing in consumption at all and therefore an increase in 11.5% emissions per annum from the academic campus.

The Business as Usual Scenario from 2005/6 therefore predicted that if we hadn't taken any actions to curb our emissions, emissions would currently be 87,312 tonnes of CO₂ in the academic year 2012/13 – instead our current total emissions are less than half of that prediction 37788 tonnes of CO₂.

The University has implemented many energy saving projects, more information on these can be found in Appendix B which has clearly made a significant impact in the emissions not reaching the predicted increase in emissions.



Financial Spend on Energy Saving Projects

Since the completion of the last Carbon Management Plan, many energy saving projects have been implemented around the University and have required funding. Many energy saving projects have been implemented alongside the replacement of old appliances with more energy efficient technologies when refurbishing buildings and within new builds, which have not been accounted for as these are part of the University Maintenance and Estates plan. Energy Saving Projects have been funded from a combination of the Estates maintenance budget and grants from HEFCW. Campus Services have also implemented many energy saving initiatives within University owned Halls of Residences which have been implemented via the Residences Planned Maintenance Programme.

The table below shows the total spends on energy saving projects annually. A breakdown of individual projects run by Estates on the academic campus and by Campus Services within University owned Halls of Residence can be found in appendix B.

Financial Spend on Energy Saving Projects on the academic campus

Year	Total Spend £K
2006/2007	136.5
2007/2008	1404
2008/2009	358
2009/2010	389.4
2010/2011	405
2011/2012	279.3
2012/2013	114.9
TOTAL =	£3,087,100

Financial Spend on Energy Saving initiatives within University owned Halls of Residence

Year	Total Spend £K
2010/2011	680
2011/2012	509
2012/2013	521
TOTAL =	£1,710,000

Overall spend for energy saving projects since the academic year 2008/2009 is £4,797,100. Projects included replacing boilers, air conditioning and lighting with more energy efficient technologies. More details can be found in appendix B.

The University has also implemented many projects which have reduced our scope 3 emissions. Funding has been received from the local council for some projects such as the introduction of more bike racks and recycling bins which have been put around campus. More details of these projects can be found in the appendix B.

In the previous 2007 Carbon Management Plan, it was estimated that there would be an overall spend of £710,000 on energy saving projects in the 5 years following the academic year 2007/2008. Spending on energy saving projects was actually more than 6 times the amount that was estimated. This extra unexpected expenditure was largely down to HEFCW funding given in February 2007, specifically given to fund energy saving projects but also the large amount of energy saving initiatives that Campus Services have implemented as part of planned refurbishment of University owned Halls of Residence.

However not all projects which were outlined in the previous Carbon Management Plan have been implemented due to improvements in technologies creating better energy saving initiatives which may have replaced original projects. Energy saving projects have also been implemented throughout all refurbishments in the University.

In the previous plan, 10 key opportunities were identified – an update on each of the projects identified can be found in appendix C.

Carbon Management Plan 2014-2017

In 2012 the previous Cardiff University Carbon Management Plan came to an end with many of the energy saving projects having been implemented and achieved. We have reduced our emissions by 6kg of CO₂ per m² since 2005/06, which is a reduction of almost 1% per m² per annum. The University is therefore keen to set bigger challenges and aims to reduce emissions by 3% per square metre, per annum. This would make an absolute reduction of 10% in our emissions since the base year 2005/06. This will ensure our target of a 20% reduction per m² by 2020 can be met.

A number of projects have been identified which will be implemented to ensure we meet our carbon reduction targets. A number of these energy saving projects can be found in appendix A.

As new technologies develop and new information arises, our Carbon Management Plan will be updated regularly to ensure we capitalise on the best ways to reduce our emissions and our energy bills.

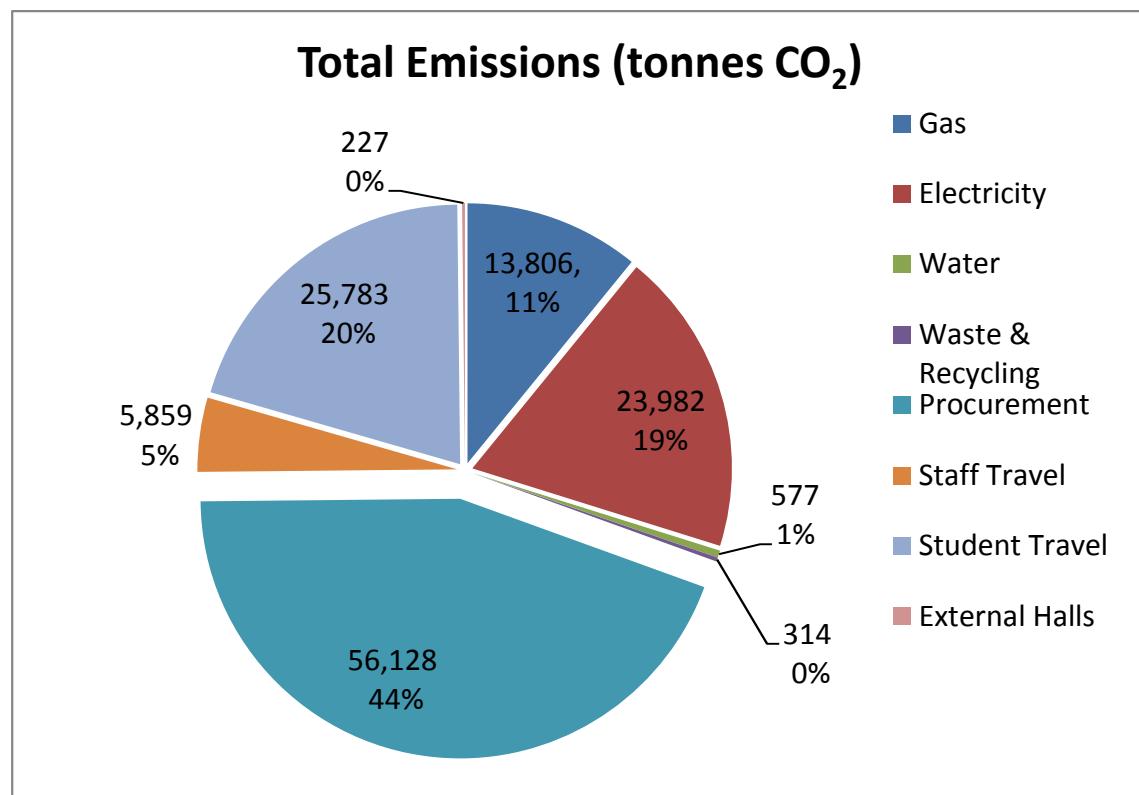
This year we now have the data needed for a base year for Scope 3 emissions having undertaken a staff and student travel survey and gathered the information needed for procurement, waste and water. This will mean that we are now able to put together an action plan and set targets for the reduction of scope 3 emissions.

Total Emissions

Outlined below is a breakdown of all emissions, including scope 3 for the academic year 2012/13.

2012/13	Total Emissions (tonnes Co2)
Gas + University Fleet	13,806
Electricity	23,982
Water	577
Waste & Recycling	314
Procurement	56,128
Staff Travel	5,859
Student Travel	25,783
External Halls of Residence	227
TOTAL =	126,676

Overall carbon emissions for 2012/13 is 126,742 tonnes.



Total emissions per full time student are 6.5 tonnes of CO₂.

Total emissions per staff member are 23.8 tonnes CO₂.

Total emissions per staff and students are 5.1 tonnes CO₂.

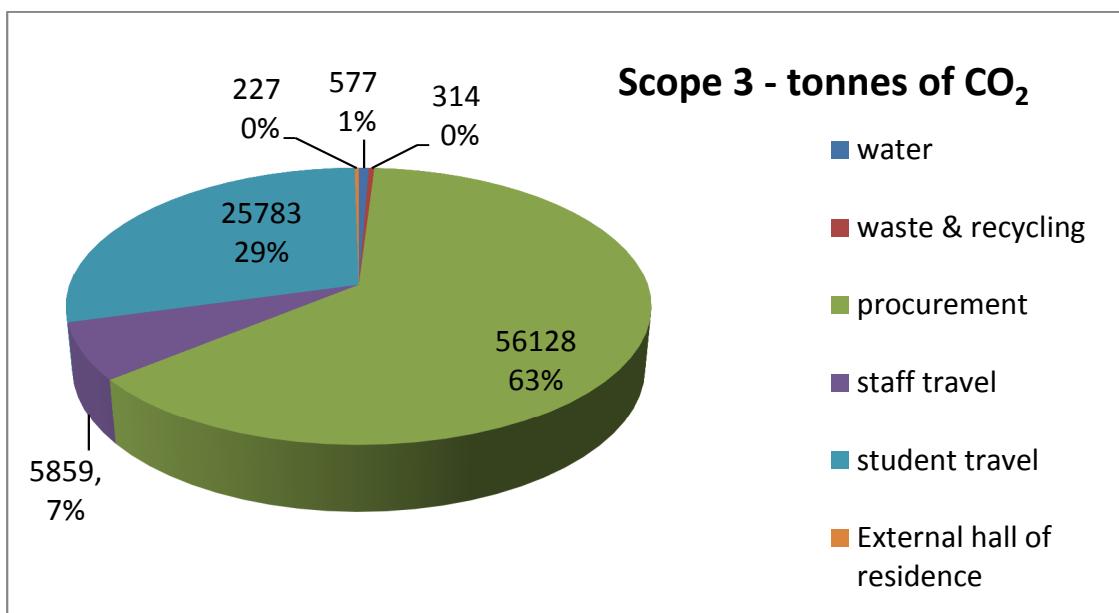
Total emissions per m² are 330kg of CO₂.

Scope 3 Emissions

Scope 3 emissions are those indirect emissions that occur as a consequence of the activities of our organisation, but which are not owned or controlled by us. Generally speaking, calculating scope 3 emissions is more complex than for scope 1 and 2 and methodologies are less robust.

Demonstrated below is a breakdown of scope 3 emissions for our 2012/2013 base year. Total Scope 3 emissions are 88,888 tonnes.

Source	Tonnes of CO ₂ (tonnes)
Water	577
Waste & Recycling	314
Procurement	56,128
Staff Travel	5,859
Student Travel	25,783
External Hall of Residence	227
TOTAL =	88,888 tonnes



This is 4.5 tonnes of CO₂ per full time student, 15.5 tonnes of CO₂ per member of staff, 3.5 tonnes of CO₂ per staff and students and 232kg per m², from scope 3 emissions.

Procurement

Procurement emissions result from the production and transportation of goods and services purchased by Cardiff University. The purchasing of goods, services & works is an intrinsic part of Cardiff University's corporate research, teaching & business activities and is therefore expected to grow as the campus expands.

Sustainable Development is a key area taken into account throughout the procurement cycle which means looking beyond the initial price to whole life costs, quality and other benefits.

Our Sustainable Procurement Policy states that

"Sustainable procurement is about embedding the principles of sustainable development into spending and investment decisions. Cardiff University is committed to meeting its needs for goods, services, works and utilities in a way that achieves value for money on a whole life basis in terms of generating benefits not only to the University, but also to society and the economy, whilst minimising damage to the environment."

This Sustainable Procurement Policy prompts all staff and postgraduate students involved in the procurement of goods and services to include sustainability as a factor in their purchasing decisions.

Despite procurement not being included in the 2007 Carbon Management Plan, a strategy was passed through University Council in 2012 with a list of actions which various departments have committed to adopt. The policy and strategy can be found online here and in Appendix D.

<http://www.cardiff.ac.uk/purch/sustainableprocurement/sustainable-procurement.html>

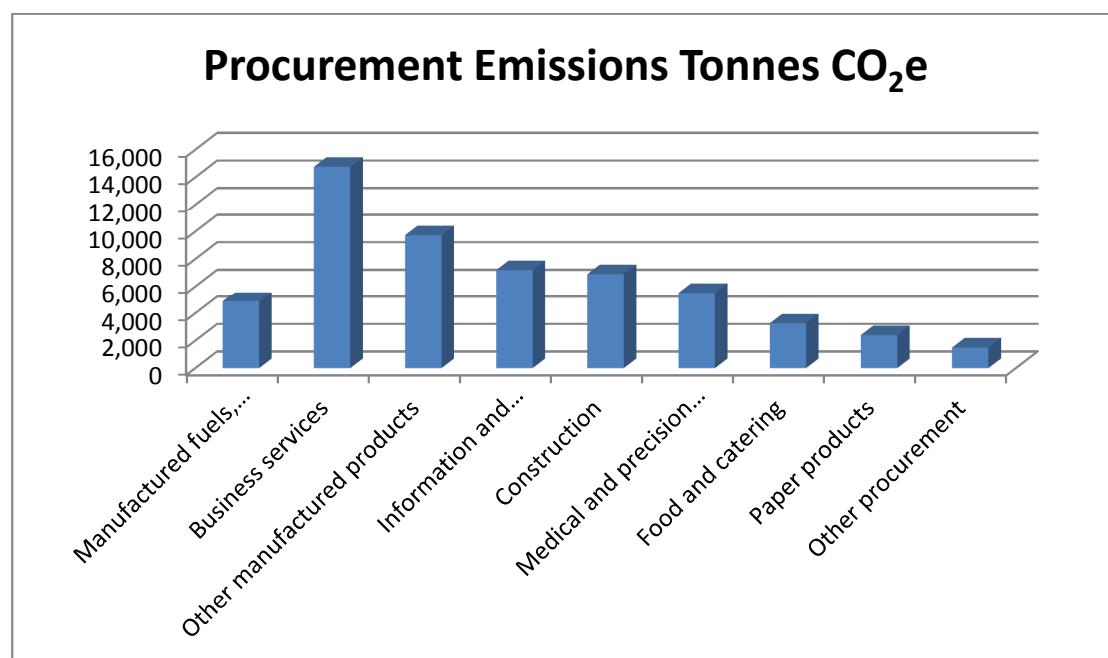
Procurement related carbon emissions have been generated from the production and transportation of goods, services and works purchased by Cardiff University. These emissions have been calculated by converting Cardiff University's annual 'influenceable' procurement expenditure on goods, services and works to 'equivalent emissions', using the HESCET [Higher Education Supply-Chain Emissions Tool].

It should be noted that the following data excludes annual spend and related emissions from electricity, gas, air travel and other travel related categories. These are being separately considered, variously under Scope1 & 2 emissions and Travel survey results.

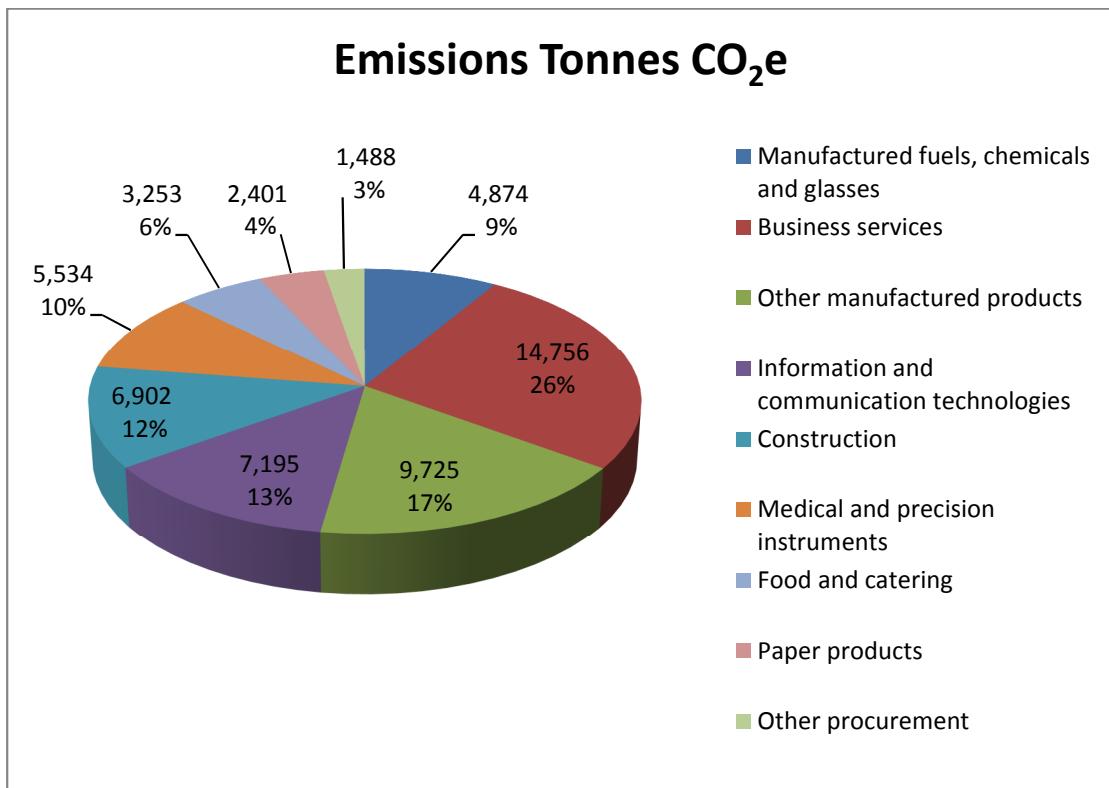
It should be noted that "procurement" in this context means requirements associated with the University's business operational, teaching and research activities. Procurement has the largest amount of carbon emissions out of all categories and therefore is an area which needs to be looked at.

The table and graph below shows the total emissions from Procurement calculate to 56,128 tonnes of CO₂ in and shows the amount of carbon emissions produced from each section in procurement in the academic year 2012/13.

DEFRA - 10 - Categories	Emissions Tonnes CO ₂ e	%
Manufactured fuels, chemicals and glasses	4,874	9.0
Business services	14,756	26.0
Other manufactured products	9,725	17.0
Information and communication technologies	7,195	13.0
Construction	6,902	12.0
Medical and precision instruments	5,534	10.0
Food and catering	3,253	6.0
Paper products	2,401	4.0
Other procurement	1,488	3.0
Total	56,128	100%



The Pie chart below demonstrated the amount of carbon emissions coming from each section of procurement for 2012/2013.



The largest contributors to the procurement emissions are Business services - This sub-sector includes spending on a wide range of services (financial, legal, marketing etc.) and represents 26% of the total; emitting 14,756 tonnes of CO₂.

Other Manufactured Products are the group which produces the 2nd largest emission which consists of raw materials & production for furniture, plastics etc. with 17% emissions and 9,724 tonnes CO₂e.

Information and communication technology procurement are the 3rd largest emitters of CO₂. These are emissions associated with manufacture of ICT products purchased by Cardiff University including PCs, monitors, printers and associated consumables (including ink and toner cartridges) which represents 13% emitting 7,195 tonnes of CO₂ emissions.

Outlined in the Appendix E is the action plan we are putting in place to reduce our procurement carbon emissions.

As this is the base year for procurement we aim to maintain carbon emissions at its current levels until we have a greater understanding of purchasing patterns across the University and what can be done to reduce total emissions from procurement. A review of this target will be undertaken next year.

Construction

In the coming few years, there is likely to be a large increase in Cardiff University campus size which will require an even greater effort to be made to reduce our carbon emissions from construction as it is already one of our largest emitters of carbon within procurement.

Carbon emissions from the procurement of goods for construction, as identified through the HESCET procurement emissions calculation tool amount to 6,902 tonnes of CO₂ in the academic year 2012/13 which is 12% of the whole procurement emissions.

Currently the Welsh Government requires the University to achieve a BREAAM "Excellent" rating on all new buildings constructed on campus and achieve a given percentage for use of reused/recycled materials on future construction schemes. BREAAM is the world's foremost environmental assessment method and rating system for buildings. Within the University's design teams there is always a BREAAM Assessor to ensure the team thinks about a low carbon and low impact design, minimising the energy demands of the new building. A design assessment report is created and submitted to BREAAM before the construction begins to set out the target score which the building contractor is tasked with achieving. Typically the contractor employs an assessor to prepare a 'tracker' to ensure all the credits are achieved and the University assessor then monitors and prepares the 'as built' assessment at completion, which is then submitted to BREAAM for final certification. This means that all new buildings have been constructed to minimise emissions from energy consumption.

An example of one of our new builds the Cochrane Building at the Heath Park Campus can be found here.

<http://www.cardiff.ac.uk/estat/newbuildingsandrefurbs/current/cochrane-breeam-info.html>
The construction company "BAM" were used to build the Haydn Ellis. Their sustainability report can be found here.
<http://www.bam.co.uk/brochure/csr/BAM%20Sustainability%20Report%202012.pdf>

There are a number of contractors which have constructed many of the new builds within Cardiff University. One of the current construction projects in progress is Talybont Gate a new Halls of Residences which will be constructed to a BREAAM excellent standard. The construction company employed for the construction of Talybont Gate is "Cowlin Construction" (part of the "Balfour Beatty Group"). Their sustainability strategy can be found here.
<http://www.balfourbeattysuk.com/sustainable-commitments/sustainability/>

Travel

'Transport accounts for around a quarter of the man-made greenhouse gas emissions from the UK.' (Department for Transport web-site, 2006)

Sustainable travel is a key area the University has been working on so that we can reduce our impact on the environment and contribute to the long-term well-being of the people, and support Wales in securing a low-carbon future.

In 2008 a travel plan was created to encourage sustainable staff and students to use more sustainable modes of transport. The Travel Plan was reviewed, updated and re-launched in October 2012. It is part of a long term process to encourage our staff and students, and our visitors, to think about how they travel to, from and within the University estate, and how they go about their day-to-day work, with the overall aim to help reduce the University's Carbon Footprint.

The emissions associated with staff and student commuting are classified under scope 3, because the emissions are generated in private vehicles or modes of transport (bus, train, taxi) operated by individuals or private companies, in which the University has little or no control. These emissions are also a consequence of the activities of the University, which can be reduced through a wider use of public transport, car shares or through the promotion of walking and cycling which are already encouraged through the University's Sustainable Travel webpages.

<http://cardiff.ac.uk/sustainability/sustainableuniversity/sustainabletravel/>

Two travel surveys covering staff and student travel at Cardiff University have been undertaken for the academic year 2012/2013 which has given us reliable data on the transport used to travel to and from the University as well as business travel and travel required for study purposes. This data has then been used to calculate the amount of carbon emissions created from travel so that we can measure the success of Travel Action Plan objectives in terms of reduction in emissions as a result of more sustainable travel choices by Staff and Students.

The Travel Surveys were conducted by the Campus Services Division in liaison with the Students' Union. Analysis of survey responses was undertaken by Masters Students from our school of City and Regional Planning and included carbon emission calculation—using the DEFRA tool, following the formula demonstrated below. The results of the travel surveys are shown below.

Student Travel Emissions

Student carbon emissions have been calculated using a simple equation:

GHG emissions



Km travelled per student per year



Conversion factor

GHG emissions calculated for the student sample are uplifted to all 27,744 students at Cardiff university in the year 2012-13 using the equation:

GHG emissions all students



GHG emissions of sample students



Number of students surveyed



Total number of students

<u>Trip Activity</u>	<u>Total GHG Emissions (tonnes per year)</u>	<u>Total GHG Emissions (tonnes per year, per student)</u>
Daily Commuting	5157.0	0.19
Home Trips	16,119.9	0.58
Study Trips South Wales	3,212.2	0.12
UK Study Trips Outside South Wales	677.6	0.02
Study Trips To Europe	341.3	0.01
Study Trips Worldwide*	275	0.01
Total	25,783 tonnes	0.93 tonnes

- Overall students' travel produces **25,783** tonnes of carbon emissions per year.
- Each student produces on average **0.93** tonnes of carbon emissions per year through their travel

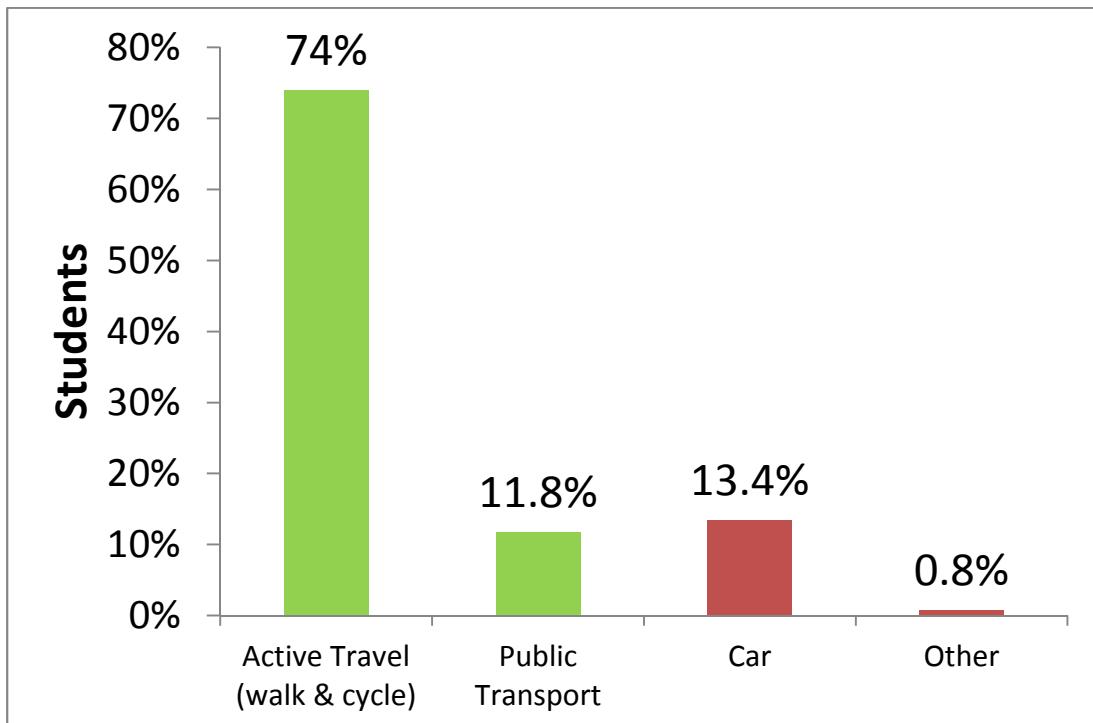
Home trips account for the most emissions at 16,119.9 tonnes of CO₂ as expected as there is increasingly more international students studying at Cardiff University. Plane and car are the most significant emitters of carbon and thus we need to look at what can be done to encourage other modes of transport instead of flying and driving for journeys home.

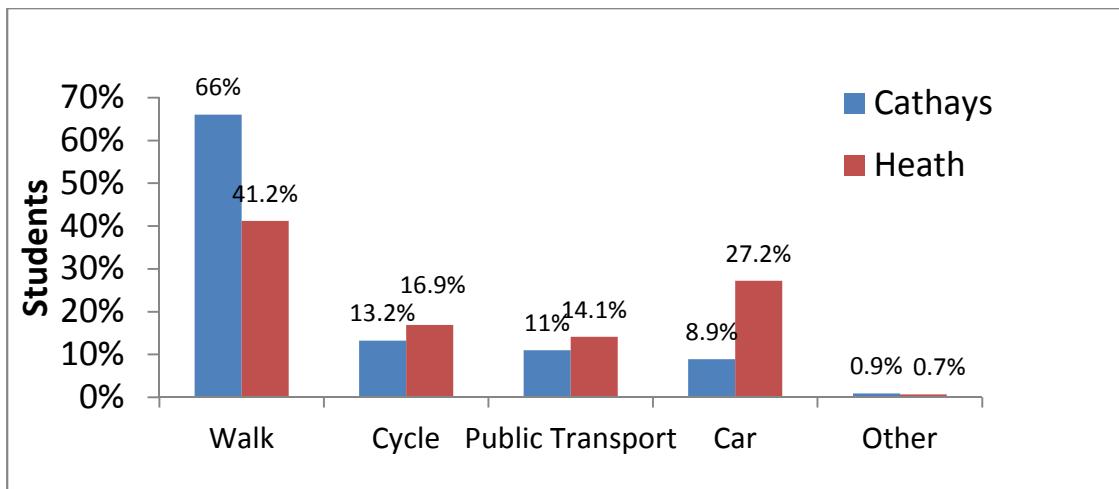
Cardiff University is increasingly encouraging more students to study abroad and international students to study at Cardiff. It is therefore likely that it will be difficult to reduce our emissions from student travel. As this is a base year for calculations of carbon emissions related to travel it is also difficult to put any specific targets in place for reduction of carbon emissions in this area. We believe a realistic target is to aim to maintain our carbon emissions at current levels from student travel until we have a greater understanding of travel patterns and therefore targets will be reviewed next year.

Daily student commuting carbon emissions

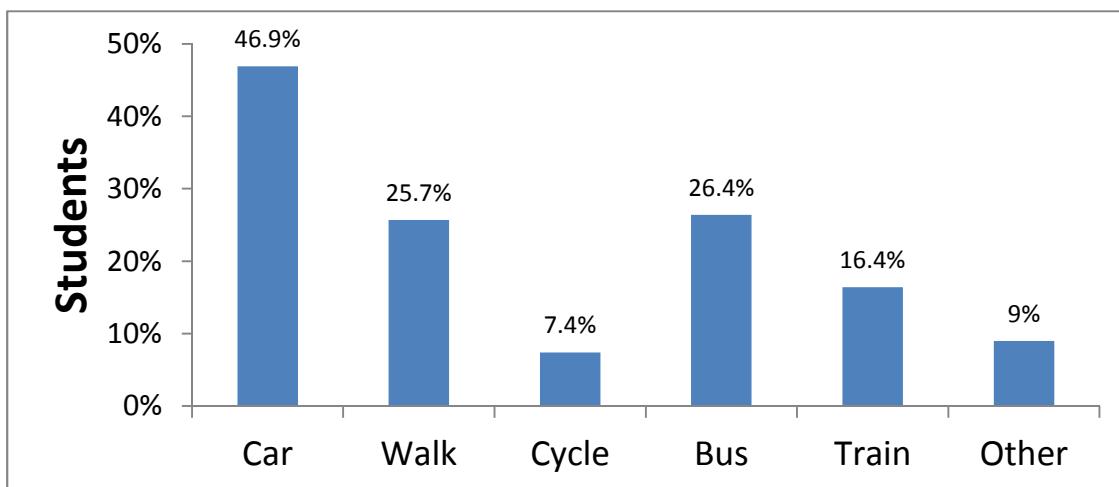
Daily Commuting Trips by Mode	Total GHG Emissions (tonnes per year)
Walk	0.00
Cycle	0.00
Car	3638.94
Bus	105.77
Train	317.99
Bus/Train	233.17
Bus/Train & Walk/Cycle	804.84
Other motorised	56.32
ALL MODES	5,157 tonnes

Daily commuting makes up a large amount of carbon emissions from students, after home trips, which is very significant considering the distance students have to travel is minimal in comparison to home trips. Students travelling by car are the largest emissions by far at 3638 tonnes per year and thus our University Travel Action Plan aims to encourage greater use of active travel modes and public transport. However, the majority of students use sustainable modes of travel for their daily commute with only 14% of students using cars or motorbikes. This is largely down to convenience as more than 90% of undergraduate students and almost 80% of postgraduate students live within 5 kilometres of the University.





Students based at the University Heath Hospital are more likely than Cathays campus based students, to undertake travel for study related to their course, with 60% of Heath students travelling for study compared to 11% in Cathays. This is due to the amount of students from the Heath who will travel to hospitals around Wales for placement. The graph above shows that for these trips almost 47% of students use car and therefore this is an area where actions will be put in place to encourage car share or greater use of public transport to reduce student carbon emissions.

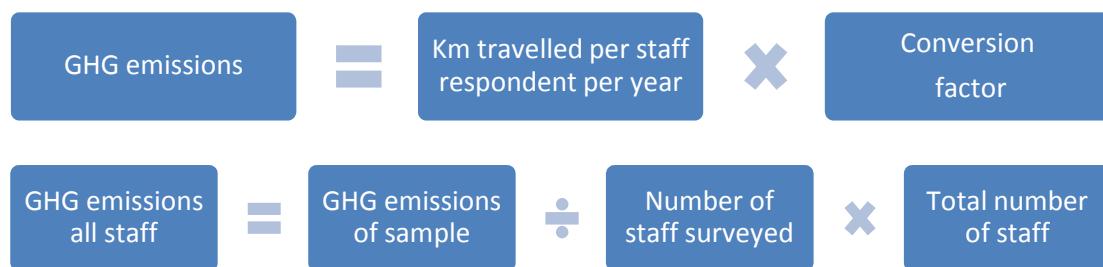


We have also collected data from the Students Union fleet of vehicles which include 10 minibuses and a van, all of average weight 3.5 tonnes. These vehicles are used daily for sports clubs and societies activities and travel all over the UK and Europe. Emissions from the Student Unions fleet are 47.5 tonnes of CO₂. We have also calculated the emissions from coaches hired for sports games played away who overall travel approximately 15860 miles a year and therefore emit about 23 tonnes a year alone. This calculates to a total of 70.5 tonnes of carbon emissions from students sports and societies activities in 2012/13.

Staff Travel

Staff emissions have been calculated with the assumptions that full time staff work 5 days a week, minus 5 weeks holiday, minus bank holidays = 228 workdays per year and that part time staff work 3 days a week (due to average responses) minus 5 weeks holiday, minus bank holidays = 94 workdays per year. Some assumptions have also been made to gather a more rounded picture such as if a respondent claims to use both car and bus to travel to work, the average conversion factor for both modes was used. It is possible that one mode is used more often than the other. Another assumption was also that if a respondent claims to make 6 work related trips per year, and travels to London and Dundee, it is assumed that 3 trips are made to each. However it is possible that 5 trips were made to London and one to Dundee. The large response rate increases the likely precision of the results.

Carbon emissions have been calculated in the same way for staff travel as for student travel.



The carbon emissions produced by staff is outlined below.

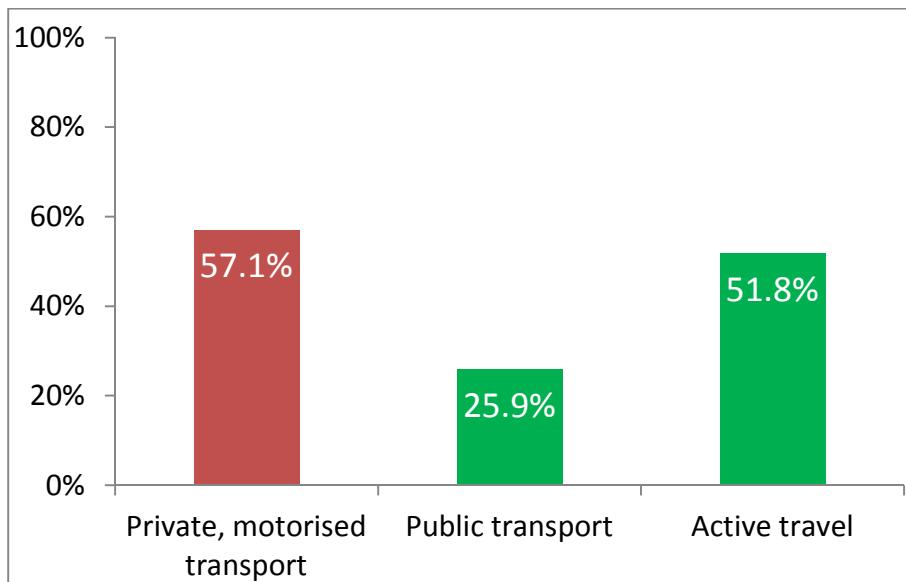
Trip Activity	Total GHG Emissions (tonnes per year)	Total GHG Emissions (tonnes per year, per staff member)
Daily Commuting	4261.1 <i>Students: 5157.0</i>	0.74 <i>Students: 0.19</i>
Work-related travel within UK	169.0 <i>Students: 3,889.8</i>	0.03 <i>Students: 0.14</i>
Work-related travel within Europe	88.0 <i>Students: 341.3</i>	0.02 <i>Students: 0.01</i>
Global work-related travel	1341.3 <i>Students: 275.0</i>	0.23 <i>Students: 0.01</i>
Total	5,859 tonnes <i>Students: 9663.1</i>	1.02 tonnes <i>Students: 0.35</i>

Total staff emissions in 2012/13 were 5,859 tonnes of CO₂.

Staff Commuting Results

Daily commuting makes up the largest amount of staff travel at 4,261 tonnes of CO₂ a year, three times the amount of global work related travel.

Despite development of a travel plan and much guidance on sustainable travel, still 57% of staff chooses to uses their cars to commute regularly for at least part of their commute to and from work. Only 4.5% of respondents to the travel survey were active members of the University's lift share scheme. Actions to address these issues form part of the University Travel Action Plan which aims to encourage greater use of active travel modes, car sharing and use of public transport.



Currently guidance for sustainable transport is available on the OSHEU website in the 2012 travel plan which can be found here
<http://www.cardiff.ac.uk/osheu/environment/greentransport/index.html>

Further initiatives to reduce emissions from staff commute can be found within the Universities 2013 travel plan.
<http://cardiff.ac.uk/sustainability/sustainableuniversity/sustainabletravel/index.html>

Business Travel

The second largest carbon emission at 1,341 tonnes comes from global work-related travel which we believe to be linked the University expanding and building international connections and relationships.

88 tonnes of CO₂ is produced from staff business travel in Europe. 85% of the 8.5% of staff that travel to Europe at least once a month on university business said that their primary mode of transport is plane.

Currently guidance for sustainable transport is available on the OSHEU website in the 2012 travel plan which can be found here

<http://www.cardiff.ac.uk/osheu/environment/greentransport/index.html>

Further action being taken to reduce emissions from business travel can be found here within the Universities 2013 travel plan.

<http://cardiff.ac.uk/sustainability/sustainableuniversity/sustainabletravel/index.html>

As this is a base year for calculations of carbon emissions related to travel it is difficult to put any specific targets in place for reduction of carbon emissions. We believe it is sensible to put in place a target to maintain emissions at current levels until we have a better understanding of staff travel patterns and therefore we will review this target next year.

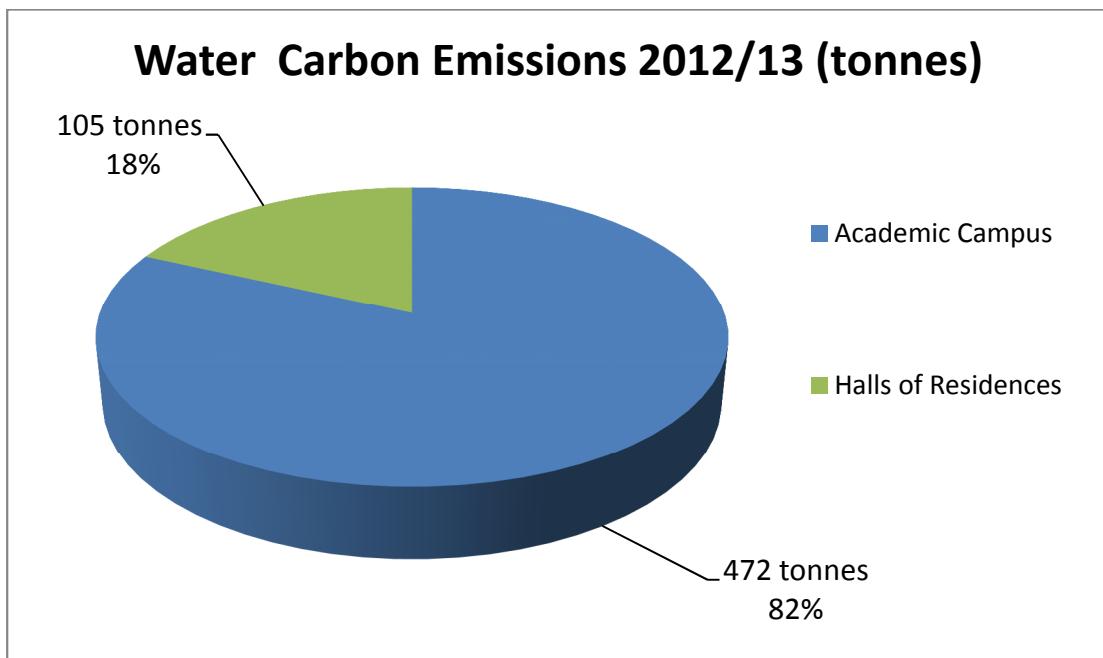
The NUS Green Impact programme encourages departments to proactively advise visitors to the University on sustainable transport options available to visitors on getting to the University. Visitors are currently guided to the sustainable travel pages on our website about how to get to the university.

The University is currently going through a large period of change, with a new strategic plan and “The Way Forward” document and a new direction concerning Cardiff University becoming an internationally renowned University, becoming which is in the top 100 Universities in the world. Along with this ambition, the Vice Chancellor would like 17% of all full time students to spend some time studying abroad while at Cardiff University. This is a challenge which will have to be addressed so that we can reduce our carbon emissions while expanding such opportunity for students.

Water

There are small Scope 3 emissions due to our use of water.

Total Water carbon emissions for the academic year 2012/13 is 577 tonnes which includes water consumption in University owned Halls of Residences and the buildings we own at the Heath Park campus and the Cathays Park Campus.



These figures were calculated using the DEFRA tool using figures from the academic year 2012/2013.

This amount is one of the lowest within the Russell Group. We aim to reduce the environmental impact and costs arising from water use in the buildings through the better management of resources.

The overall reduction target is a 3% reduction per m² per annum, approximately 18,000kg of CO₂ per annum on current 2012/2013 figures.

To reduce our water consumption, many energy saving technologies are being installed when replacement is necessary. Some of these projects include low flush toilets being installed in University owned residences, percussion time flow taps being installed in bathrooms on campus and in bathrooms/en-suites in University owned residences, and water restricting valves are being installed to kitchen / bath taps.

Costs for water usage have been increasing annually for the past few years due to increasing energy prices. Larger student and staff numbers have also increased our water consumption meaning that the implementation of water saving initiatives is a good financial investment.

Waste

Carbon emissions from waste and recycling amount to 314.3 tonnes of CO₂.

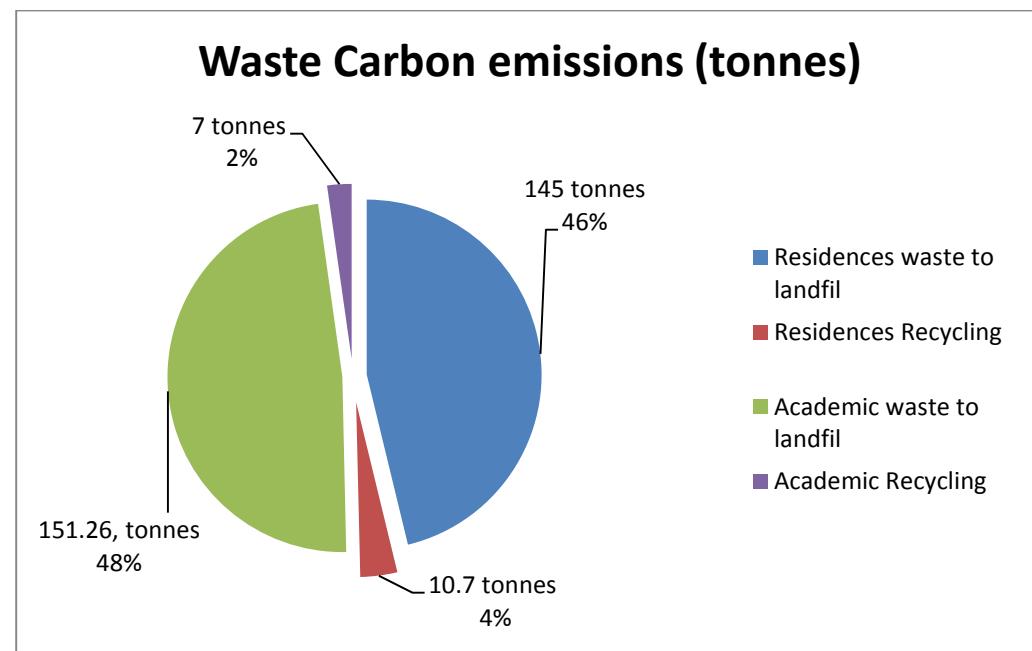
Cardiff University is committed to limiting the amount of waste produced through its activities. The University will seek to minimise general and hazardous waste generated by the University that is sent to landfill, and increase the proportion of waste that is recycled.

Individual waste streams are managed within different areas. Hazardous wastes (clinical, chemical and radiation) are managed within OSHEU, confidential waste is managed by Security, general waste, WEEE waste streams and recycling from the academic campus is managed by Estates and general waste, recycling and WEEE waste streams from University owned Halls of Residence are managed by the Campus Services Division.

Waste and recycling is a key aspect within the University Environmental Management System and one of the most visible areas for environmental improvement to staff, students and visitors.

Currently the University sends 1024.37 tonnes of waste to landfill from both the academic campus and residences which is 296 tonnes of CO₂ emissions. We currently carry out a mixed recycling system within halls of residences and the academic campus amounts to 839.53 tonnes overall which produces only 17 tonnes of CO₂.

The Pie Chart and table below shows the split in emissions from the academic campus and University owned Halls of Residence – which is fairly even and therefore behavioural change campaigns are needed for both staff and students.



	Tonnes of Waste & Recycling	Tonnes of CO₂
Academic Campus Waste to Landfill	521.88	151
Academic Campus Recycling	329.53	7
University owned Halls of Residence Waste to Landfill	504.39	145.6
University owned Halls of Residence Recycling	510	10.7
TOTAL =	1,569.73	314.3

The University set a target to increase recycling on the Academic campus from the 2009/2010 baseline of 45% to 58% by 2013 (52% is target set by Welsh Assembly Government by March 31st 2013) and increase by a further 5% per annum, thereafter. Campus Services targets are in line with Welsh Assembly Government targets.

At the end of the academic year 2012/13 we had exceeded our target to increase percentage of waste recycled from 48% in 2011/12 to 52% in 2012, in line with the targets set by the Welsh Assembly Government. We are currently recycling 66% of all waste and therefore are working towards increasing recycling on the Academic campus from the 2009/2010 baseline of 45% to 70% by June 2014.

A co-mingled office recycling scheme was introduced in the Academic Campus in 2002 which accepts paper, cardboard, plastics and tins. Glass was also originally included but has been withdrawn on health and safety grounds. Battery recycling has been recently been introduced across campus, lab glass is being recycled. We are currently reviewing alternative waste streams such as food waste and redundant furniture being donated to a local charity.

We are also looking into having all our waste incinerated at a local incinerator within the Cardiff area which will reduce our emissions from waste to landfill, to zero with the possibility of also being able to purchase the energy produced from the incinerator.

The People and Planet Green league identified that Cardiff University for the academic year 2011/2012 has a waste production of 139.72kg per head, making it the 3rd best in the Russell group.

Over the past 3 years our waste cost has stayed relatively constant despite a large increase in campus size, student numbers and the landfill tax. Within the last year, we have also started being charged for recycling and thus costs have risen despite an increase in recycling and a decrease in waste to landfill.

Academic Year	Academic Campus	Residences	Total
2010/2011	£100,189	£90,000	£190,189
2011/2012	£109,145	£90,000	£199,145
2012/2013	£118,466	£100,000	£200,466

Campus Services also runs an annual end of year re-use/recycling scheme alongside the Students Union and local council called “Get It Out For Cardiff”. The scheme enables students to donate unwanted goods at 18 “Green Zones” set up in University owned Halls of Residence and across the city. Students can donate clothing, food, books, CDs, DVDs and kitchen items. A number of charities benefit from the scheme with food being collected for a local food bank, clothing, electrical items and media given to the YMCA Housing Association and kitchen items collected and stored over the summer to be sold back to students through a bric a brac fayre at the start of term at heavily discounted prices with all proceeds going to another local charity. At the end of the academic year 2012/13, 10 tonnes of bric a brac was collected and a total of £2360.33 was donated to a local charity from the sales at the fayre.

External Halls of Residence

Scope 3 emissions are also produced by our students in external halls of residence which we arrange for them. The University has a contract with a national private sector, halls of residence organisation, "Liberty Living", which produces a significant amount of carbon emissions. Cardiff University has a 25 year contract with Liberty Living which is 110 rooms in Liberty House, occupied by Cardiff University students.

Cardiff University therefore has a responsibility to work with this organisation to encourage a reduction in carbon emissions. This could possibly be achieved through engagement activities with students such as the end of year recycling "Get It Out for Cardiff" scheme and the NUS "Live Greener" programme.

Liberty Living has zero emissions for gas as there are no gas services at these Halls of Residence.

The Carbon Emissions produced from electricity by rooms occupied by Cardiff University Students at Liberty House, calculate to 227 tonnes in the academic year 2012/13.

In the Academic year 2012/13, 79% of all waste was recycled, meaning that only 21% of waste was sent to Landfill. Guidance on recycling is provided to students in their information pack before they arrive at this hall of residence and recycling bins are provided in every bedroom and communal space.

In the "Guide to Living" provided to students when they arrive at Liberty House hall of residence, there is a section on their aim to reduce their energy consumption and guidance of how to do so. There is also a suggestion for students to provide feedback on opportunities where energy could be saved.

New Energy Saving Projects

To ensure we meet our carbon reduction target of a 20% reduction in emissions per square metre by 2020, against our 2005/06 baselines we will be implementing many energy saving projects across Campus. We have outlined some of the key projects which will be implemented in the coming academic year which can be found in Appendix A, however there will be many more projects identified over the coming few years to meet our target.

The projects in Appendix A is not an exclusive or inflexible list of projects as we expect further opportunities to appear as technologies develop and come down in price, but also following a review of the entire campus of Cardiff University, where more or better projects may be identified to be implemented.

Financial savings in Appendix A are generally conservative and are based on the best available knowledge. We will ensure that energy saving projects continue to be implemented every year to meet a carbon reduction of 3% reduction per square metre on average and a reduction overall of 20% per square metre by 2020.

This year to engage more students and staff in the creation of this Carbon Management Plan, we have launched the “energy saving initiatives competition” which we hope will encourage students to think about a project which could be implemented within the University and save a significant amount of carbon emissions. There will be a prize for the best proposal and will be presented the award by the Vice Chancellor at the Green Impact Awards at the end of the academic year 2013/2014.

Business as Usual Scenario for Scope 1 and 2

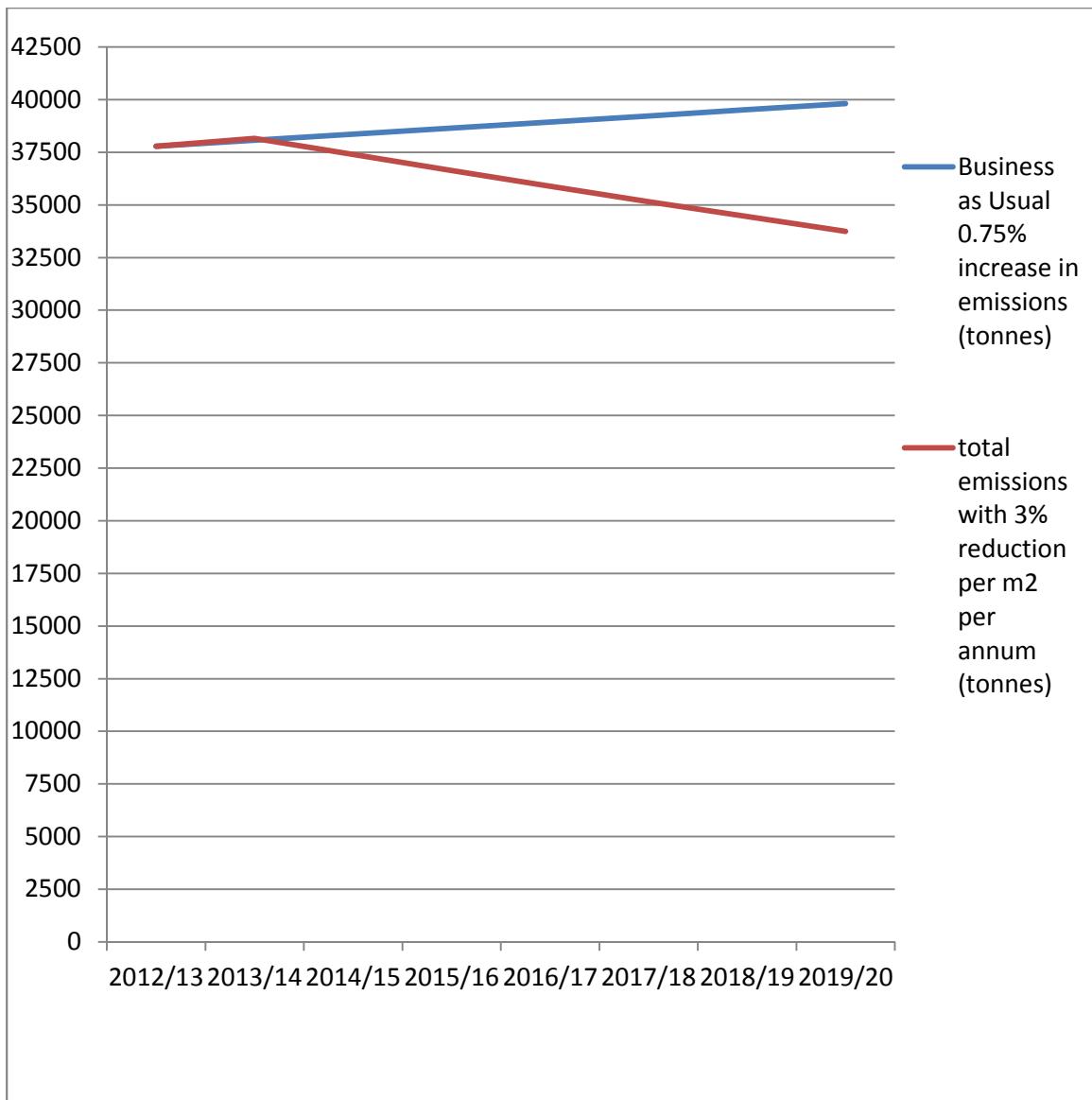
The graph below shows the carbon emissions prediction if the university carried on as normal without implementing any energy saving projects. This Business as Usual scenario is shown alongside the predicted reduction in emissions from reducing our emissions per m² by 3% per annum from the academic year 2014/15 to the academic year 2019/20 which will ensure we meet our carbon reduction target of a 20% reduction per m² by 2019/20 from our 2005/06 base year.

The gross internal area of the campus is around 380,000m². This includes all buildings owned by the University, where all energy bills are paid for and therefore does not include buildings used and occupied but not owned by the University at the Heath Park.

We expect the expansion in the University gross internal area to be around 1% per annum, meaning that in 2019/20 the gross internal area is expected to be around 410,000m². With this growth in the campus by 1% a year we therefore expect an increase our absolute emissions on average by 0.75% each year if no action to curb our emissions is taken. This is based on the assumption that additional buildings will be more energy efficient than buildings on the current campus. This would mean that our emissions in this Business as Usual Scenario would be 39,817 tonnes in 2019/20.

This Business as Usual scenario is demonstrated alongside our target emissions reduction of 3% per m² per annum from the academic year 2014/15. We expect our emissions per m² to have reduced from 98.7kg in 2012/13 to 83.8kg in 2019/20. This means that total emissions in 2019/20 is expected to be 33,746 tonnes of CO₂.

This shows that by reducing our emissions by 3% per m² and implementing many energy saving projects, we will save 6,071 tonnes of CO₂ which is an absolute reduction of 4042 tonnes of CO₂ since 2012/13 and an absolute reduction of 3,827 tonnes since 2005/06. This is an absolute reduction of 10.6% since 2005/06.



Behavioural Change

To help reduce the current level of emissions, Cardiff University will continue to conduct engagement activities with staff and students to help build a behavioural change within the University where all staff and students are concerned about the environment and help play their part to reduce our carbon emissions. We will continue to undertake annual awareness raising events and build on the numerous ongoing campaigns.

This year we are currently launching the “Live Greener” programme throughout the University. This is an NUS (National Union of Students) run project’s which contains 4 main projects. One of these projects is the ongoing Students Switch Off campaign in University owned Residences which has recruited 1000 students this year to promote saving energy in University owned Residences. In previous years, a reduction of 6% of energy consumption has been achieved each year which is a reduction of almost 60 tonnes of CO₂ over the past 2 years.

New engagement projects as part of “Live Greener” is that of Blackout and “Snap It Off”. Blackout is a one off event where students take part in the switching off of all possible plugged in equipment for one night to make staff understand how much money and energy could be saved by switching off what is not being used. Snap It Off is a campaign to encourage staff and students to take photos of wasted energy, mostly lights around campus which is then switched off by our maintenance engineer once noted about the wasted energy.

The “Live Greener” project which we hope will make the most difference is “Green Impact” which is where a group of staff and students within every department will work on a workbook on how to reduce their energy and carbon footprint within their own department, encouraging staff across the University to change their behaviour.

We will continue to build on “Sustainability Week”, Positive Health and Environment Week and Fairtrade Fortnight, as well as continue to support students with “Go Green Week” the Fruit & Veg Co-op and the student allotments as well as the Student Unions “Environmental Champions – the student volunteering and recycling and litter pick project.

Implementation

The implementation of energy saving projects will be driven through the Environmental Management Systems (EMS) group and the Estates Department within the University. It will be the responsibility of the Director of Estates to ensure energy saving projects are implemented and completed and to ensure we are on track to meet our target of a 20% reduction per square metre by 2020 against our 2005/06 baseline for scope 1 and 2 emissions. Estates will also lead the university to reduce part of our scope 3 emissions – water and waste.

Carbon management of travel is the responsibility of Campus Services and procurement emissions are the responsibility of the Finance Department. Both these areas will be reviewed during the year to understand the next steps following the introduction of a base year of 2012/13, in the hope we will have a better understanding of patterns in travel and procurement by then.

The Assistant Director of Environment will also play a significant role in Behavioural change throughout the University, co-ordinating the “Live Greener” project as will the Campus Services Division with engagement activities with students in university owned halls of residence. The Students Union will also contribute to behavioural change through running regular engagement activities with students each year.

The Estates Director will provide regular updates on this carbon management programme at the bi-monthly EMS meetings which will ensure the ongoing concern and priority of carbon management at a high level within the university.

This Carbon Management Plan will provide the basis of an energy saving initiatives programme to implement energy saving projects on a regular basis throughout the next 6 years to ensure we meet our targets.

Appendix

Appendix A

2014 Key Carbon Saving Projects for Academic Campus

<u>Project</u>	<u>Cost</u>	<u>Payback</u>	<u>Carbon Saving</u>
lighting presence detector sensors and thermostatic radiator valves to areas where not fitted	10k	1 to 2 years	10-50% dependent on levels of housekeeping
Replacement of 8, 6 & 5 ft tubes with high efficiency light fittings throughout campus	30k+	1 to 2 years	Minimum 30% more efficient - up to 50% more efficient for LED schemes
Replacement of Obsolete R22 refrigerant gas equipment (approx 300) with new more efficient units	150k annually	2-3 years	40% reduction in consumption. Totally dependent upon numbers changed.
Replacement large chillers with Turbo miser technology in Life Sciences & JBIOS areas	650k	5-7 years	Approx. 370 tonnes pa
Window draught proofing – sealing “leaky” windows separate from any replacement windows programme and Bute building window repairs.	25k	2 to 3 years	20-40% of heating in areas that are draught-proofed
Boiler replacements: Replacement of non-condensing boilers with more efficient condensing types at various sites.	240k	3 to 4 years	15 -20% per boiler changed
Trial sites for Micro Combined Heat and Power, (Stirling engine technology) in Corbett Road Gymnasium	10k	5 to 7 years	Based on 65kW boiler, 0.25tonne p.a.
Replacement Lighting to LED's in Libraries and older style light fittings.	30k	1 year	40-50% more efficient
Chemistry department – replace equipment which wastes water to more efficient equipment			TBA
Replace water chillers to more energy efficient non-chilled mains water dispensers when needed	2k	1-2 years	100% saving of chilled water element.
Photovoltaic Panels in Trevithick, Law; Psychology; Humanities and Maths	200k	7-10 years	25 tonnes p.a.

Replacement of large chillers with Turbomiser technology at ARCCA/HPC Wales/INSRV datacentre	£160k		
Server Consolidation - Moving University IT services to a much smaller number of physical servers, while maintaining/improving service (2009-2014 initial programme)	Capital saving of around £800k	Immediate	Approx 500 tonnes p.a.
Measurement of electricity consumption, and redesign of airflow and cooling in Park Place datacentre.	£5-10k	6 months	100-250 tonnes p.a.
Windows 7 PC power management and settings	£0	Immediate	500 tonnes (estimated) CO ₂ PA for Windows XP Powerdown.
Park Place Server Replacements - Replacement of old 19 inch rack-mounted servers with more efficient blade servers	£0		20 tonnes CO per annum
Pool room efficiency and remote management - Remote monitoring and power down of IT and audio-visual equipment.	£0	Long term	Savings to be decided
INSRV alternatives to travel	£0	Medium - Short term	Savings unknown expected to be large scope 3 emissions
Behavioural Change Campaigns – “Live Greener” programme	£0	Short term	Savings unknown expected to be large scope 3 emissions

Appendix B

Outlined below are some of the details of the energy saving projects which have been funded since the academic year 2006/2007 on the academic campus and an update on the energy saving initiatives which have been implemented within University owned Halls of Residence since the academic year 2010/11.

2006/2007 Energy Saving Projects

Energy Saving Project	Cost £K
4 new boilers	60
Teaching Rooms – changing lighting controls	65
New Lighting Dissecting Suite	11.5
TOTAL =	£136.5K

2007/2008 Energy Saving Projects

Energy Saving Project	Cost £K
New boilers Glamorgan Building	50
New lighting ASSL	180
New boilers and F/Place h/ Exchr	74
New Boiler Aberconway	105
New boilers Gym	53
Energy Metering Project Phase 1	200
Energy Metering Project Phase 1	218
New boilers and DHWS Chemistry	30.5
Replace windows main building	31
New boilers and hot water 118 Maindy rd	25
Replace fans and add VSD HW building	35
Replace inefficient water heaters Gordon Hall	23
Replace IT room cooling with new	40
Boiler replacement campus	136
Tower Window ceiling	3
Queens clean room AHU's with free clg	153
Replace boilers Senghenydd Court	12.5
Replace LAN Rm clg	25
Lecture theatre new lighting controls UHW	10
TOTAL =	£1404K

2008/2009 Energy Saving Projects

Energy Saving Project	Cost £K
Brit Arces lecture theatre lighting replacement	24
Replace controls at HW building	35
Phase 1 AHU replacements main building	160
Replacement Air Handling Unit - Physics	139
TOTAL =	£358K

2009/10 Energy Saving Projects

<u>Energy Saving Project</u>	<u>Cost £K</u>
Replacement Air Conditioning in Main Building	86
Replacement Boiler in Aberconway Building	15
Replacement Boilers Main Building	35
Improved Air Conditioning, East Gate House	7
Replacement Boiler Park Place	40
Replacement Trevithick Building	85
Improved Air Conditioning Main Building room 1.88	11
Improved Air Conditioning BioSci	12
Phase 2 AHU replacements main building	60
Replace inefficient Calorifier HW building	33
Lighting controls Julian Hodge Building	5.4
TOTAL =	£389.4K

2010/11 Energy Saving Projects

<u>Energy Saving Project</u>	<u>Cost £K</u>
Replacement Hot Water Boiler Main Building	35
Replacement Boiler Park Place	30
Replacement Boiler Julian Hodge Building	43.5
Replacement Air Conditioning in Park Place	57
Replacement burner & controls to steam boiler	15
Replacement Air Conditioning Humanities building	4
Replacement Air Conditioning bute & park place	17.5
Upgrade chilled water system	203
TOTAL =	£405K

2011/12 Energy Saving Projects

<u>Energy Saving Project</u>	<u>Cost £K</u>
Replacement Over-sized Water Cooler	25
Replacement Boiler at Llanrhymney	100
Replacement Boiler in Humanities Building	10
Replacement Boiler Park Place	60
Replacement Boiler Law School	50
Replacement Boiler Tenovus Building	9
Replacement Air Conditioning Bute	7.5
Replacement Air Conditioning Main Building	6
Replacement Air Conditioning Earth Sciences	2.5
Lighting Refurbishment for JBIOS	9.3
TOTAL =	£279.3K

2012/13 Energy Saving Projects

Energy Saving Project	Cost £K
Secondary Glazing to Queens	4.2
Replacement Boilers	65
Replacement Air Conditioning in lan rooms	13.2
Replacement Water Cooler	25
Replacement Air Conditioning in BioSci	3.5
Replacement Air Conditioning in school	4
TOTAL =	£114.9K

Carbon Footprint Saving Projects

New Cycle Stands at Deri House	3
Bike Stands Deri House	1.6
New Recycling Bins Heath Park Campus	7.5
Cycle Shelter for Humanities Building	20
New Cycle Stands EUROS	5
TOTAL =	£34.1K

Energy Saving Projects in Residences

2012/13

Lighting Upgrade	£290,831
Low carbon Extract fans	£49,667
Upgrade Loft & Wall insulation	£23,256
Replace single glazing with double	£29,835
BEMS wiring and equipment	£67,097
High efficiency boilers / cylinders	£124,539
Thermostatic radiator valves / Radiator replacements	£40,647
Percussion taps and restrictor valves	£54,169
TOTAL =	£680,041

2011/12

Lighting Upgrade	£175,428
Low carbon Extract fans	£54,810
Upgrade Loft & Wall insulation	£17,592
Replace single glazing with double	£8,159
BEMS wiring and equipment	£56,732
High efficiency boilers / cylinders	£116,811
Thermostatic radiator valves / Radiator replacements	£57,722
Percussion taps and restrictor valves	£22,494
TOTAL =	£509,748

2010/11

Lighting Upgrade	£99,598
Low carbon Extract fans	£36,848
Upgrade Loft & Wall insulation	£20,435
Replace single glazing with double	£9,260
BEMS wiring and equipment	£88,040
High efficiency boilers / cylinders	£136,932
Thermostatic radiator valves / Radiator replacements	£89.878
Percussion taps and restrictor valves	£40,946
TOTAL =	£521,937

Appendix C

Update in 2007 CMP opportunities

Opportunity 1 –Information Services and ARCCA have implemented a wide range of projects including a nationally-leading PC power-saving system, a programme of reducing the number of central computer servers while simultaneously improving user service, the provision of a nationally-leading advanced research computing facility (in partnership with ARCCA) which received multiple award nominations for its environmental efficiency and leading-edge design. More information can be found here <http://www.cardiff.ac.uk/insrv/sustainability/>

Opportunity 2 – A policy and guidance for Heating, Ventilation and Domestic Hot Water heating has been put in place to save energy – which can be found here <http://www.cardiff.ac.uk/estat/maintenance/heating.html>

Opportunity 3 – A comfort cooling policy and guidance has also been put in place <http://www.cardiff.ac.uk/estat/maintenance/Comfort%20Cooling%20Document.pdf>

Opportunity 4 An audit of Building Energy Management Systems (BEMS) was carried out by an independent HEFCW consultant who located locations for more utility meters to be introduced.

Opportunity 5 – Numerous boiler replacements have occurred.

Opportunity 6 – Significant savings have been made on our vending machines. Overall electricity consumption has reduced dramatically on our Hot Drinks Machines, snack machines and cold drinks machines. In 11 of our vending machines, LED lighting has been fitted as well as an environmental management system has been fitted which means that when there is no one near the vending machines, day or night, they power down. Vending machines in Humanities and JCR buildings have fitted with timer controls to turn the lights off overnight.

Opportunity 7 – We have only implemented a couple of double glazing projects, costing just over £k4 and therefore double Glazing and Insulation has is an area which we may look into in the future.

Opportunity 8 - Many lighting projects have been implanted such as in the Arts and Social Science Library which was the largest project and more recently the Stanley Paris Lecture Theatre in tower building was converted to LED lighting which will have made a large financial saving to the University in the long run along with large carbon savings.

Opportunity 9 – Some fume cupboards have been replaced with low velocity cupboards, however many more still need replacing.

Opportunity 10 - High energy using buildings have been reviewed, finding that Main building, Henry Welcome building and Computer Centre consume the most gas and electricity meaning that more funding and meters could make a small difference to reducing emissions.

Opportunity 11 - No more meters have been funded bar for those being fitted under new works or refurbishments.

Opportunity 12 – Many cycling facilities have been introduced across campus, however the introduction of more facilities is likely to come out of the current travel survey and plan.

Opportunity 13 – Since the last carbon management plan, we have significantly increased our recycling, saving a large amount of carbon emissions.

Opportunity 14 - EPC's or DEC's have been introduced in all buildings over 500m² GIA, all academic buildings over 1,000m² and couple of residences buildings.

Opportunity 15 – all new buildings are designs to BREAAAM building construction standards as required from the Welsh government so that the whole life cycle of buildings are minimal.

Opportunity 16 – Large Energy Awareness campaigns for staff and students have occurred annually since the 2007 CMP, more detail can be found in the “behavioural change” section.

Opportunity 17 – There is ongoing co-operation between other local HEI's in the area and our community engagement is improving.

Opportunity 18 – IT pool rooms – INSRV IT have installed remote pool room management across the University which has enabled greatly speeded up and improved support to staff using IT and audio/visual equipment in pool rooms. It will also enable INSRV to monitor the status of equipment and remotely power the data projectors down if necessary. Pool room projectors are set to turn off at a set time to avoid projectors being left on overnight or over the weekend. They are also being fitted with movement detectors (PIRs) provided by Estates Division, so that the lights are automatically turned off if no movement is detected after a set period. Other equipment is being upgraded with sustainability features, including Energy Star-compliant audio amplifiers which not only use less power when they are running, but also automatically go into ultra-low power standby (less than one watt) when not in use. More information can be found here -

www.cardiff.ac.uk/insrv/aboutus/sustainability/ourinitiatives/sustainableit.html#poolrooms

Opportunity 19 – Since the 2007 CMP, all CRT computer monitors have been replaced with flat screen monitors in professional services.

Opportunity 20 - A survey was conducted of Bute building to see how it could be made more energy efficient. No meters were installed following the survey but a paper was produced which allowed us to compare a detailed study vs a couple of different ways of predicting energy use against the actual consumption.

Opportunity 21 - Many district heating schemes were looked at but pipework losses meant that it was ruled out at the moment.

Opportunity 22 – Currently looking in to colleges paying their own energy bills.

Opportunity 23 - The purchasing of solvent purification systems for chemistry to be able to reduce their energy and water consumption has not occurred due to a mix up of staffing roles and therefore it is an area we will look at again.

Appendix D

Cardiff University's Sustainable Procurement Policy Statement

Corporate Social Responsibility (CSR) and Sustainable Development should contribute to a better quality of life for everyone, now and for future generations to come. This policy statement underpins the following objectives by the University:

- Social progress
- Effective protection of the environment
- Prudent use of natural resources
- The maintenance of high and stable levels of economic growth and development.

Sustainable procurement is about embedding the principles of sustainable development into spending and investment decisions. Cardiff University is committed to meeting its needs for goods, services, works and utilities in a way that achieves value for money on a whole life basis in terms of generating benefits not only to the University, but also to society and the economy, whilst minimising damage to the environment.

The purpose of the Sustainable Procurement Policy Statement is to set out the principles for the Strategy and action plan on which sustainable procurement activity within the University will be based.

Cardiff University's Environmental Management System (ISO14001) outlines its current and future environmentally sustainable agenda, and commits it to a process of continuous improvement across its research, teaching and operations. Taking sustainable development issues into account during the procurement cycle can support the process of meeting the above objectives. This means looking beyond the initial price to take account of whole life costs, quality and other benefits.

In particular, account will be taken of the following:

- Environmental impacts
- Social and Economic Issues
- Health and Safety
- Equality and Diversity, including Accessibility

This Sustainable Procurement Policy Statement serves to prompt all staff and postgraduate students involved in the procurement of goods and services to include sustainability as a factor in their purchasing decisions. The policy will impact on the activities of all buyers, and those staff and postgraduate students involved in purchasing. Tenders must take into account the considerations of this policy statement, where applicable and reasonably practicable. This will include any legislation relevant to the purchase. The policy statement is applicable to all University Colleges and Professional Services. University staff will develop specifications, in conjunction with the Purchasing Section as necessary, which assist in ensuring that:

- ⊕ The Purchasing Section will be involved at the earliest opportunity to provide advice & information about relevant requirements, processes and procedures.
- ⊕ Goods that can be used and disposed of in an environmentally responsible way are considered. Also Services that are structured and carried out in an environmentally responsible way.
- ⊕ Items with a high recycled content are used wherever practicable
- ⊕ Whole-life cost and energy usage is considered prior to purchase in line with the University carbon Management Plan

In determining how specific aspects of sustainability can be incorporated within major contracts, Sustainability Risk Assessments will be undertaken. The University will use the Welsh Assembly's 'Sustainable Procurement Assessment Framework' (SPAf) to set goals for improvement across the organisation. The Purchasing Section will monitor progress and

contribute towards procurement related objectives and actions within the University's Environmental Management System.

This Policy statement is supported by a Sustainable Procurement Strategy and Action Plan available via <http://www.cardiff.ac.uk/purch/sustainableprocurement/sustainable-procurement.html>

Cardiff University Sustainable Procurement Strategy

The University will comply with all relevant environmental legislation, and will expect and promote such compliance in its procurement of goods and services.

The Purchasing Section will endeavour to manage environmental and social impacts as recommended by Higher Education Institutions' (HEI) Sustainable Purchasing Guidance (see diagram below)

- Investigate expenditure on a commodity basis to develop appropriate procurement strategies for goods, services, utilities and works.
- Make suppliers aware of the University's sustainable policy and seek compatible policies.
- Encourage the use of Whole Life Costing including environmental factors and sustainability policy impacts in major (over £30,000) procurement decisions.
- Work with users and suppliers to reduce environmental impact by offering alternative or recycled products and return for recycling/environmentally aware purchasing processes, stock management, waste minimisation, and waste disposal options.
- Work with others on energy and waste options within the University.
- Work with others on Health and Safety aspects within the University.
- Consider the impact of new legislation on improving sustainability eg Equality, Freedom of Information, Environmental Information Act, changes to EU public sector procurement requirements.
- Consider ethical procurement initiatives e.g CIPS ethical standards, ethical trading.
- Work with others on Fair Trade options within the University.
- Participate in the National Assembly's "Value Wales" Sustainability and Environmental Advisory Group.
- Participate in wider local community activities to promote sustainable procurement
- Participate in University consortia and support national strategic objectives, which promote sustainable procurement and share experiences, and learn from others.
- Provide a progress report annually and endeavour to continuously improve sustainable procurement.
- Those responsible for delegated purchasing in the University will endeavour to manage environmental and social impacts as recommended by HEI Sustainable Purchasing Guidance (see diagram)

Details at <http://www.forumforthefuture.org.uk/node/957>

Higher Education strategy

The Higher Education partnership for sustainability (HEPS) published Purchasing for Sustainability Guidance for HEIs in April 2003.

Cardiff University's environmental policies and procedures, which this procurement sustainable strategy fully supports, is available at: <http://www.cf.ac.uk/osheu/environment/index.html>

The University's collaborative purchasing policy, via the Purchasing Section, subscribes to the UK Higher Education Procurement Strategy with the vision of:

"Working together to develop and promote efficient and effective procurement practices and procedures throughout higher education taking into account social, ethical and environmental issues."

Current activities to variously develop, facilitate, monitor and/or promote commodity sustainable/environmental policies and agree monitoring targets:

Catering

- Continuing adoption and wider use of appropriate Fair Trade products, subject to availability, via contracted catering suppliers

Computing

- Computer re-use/ recycling /disposal in accordance with WEEE Directive
- Monitor & manage arrangements for packaging reductions and take-back by suppliers

Estates

- Waste services procurement
- Energy and utilities procurement

Furniture (Office & Residential)

- Supply chain monitoring & management from renewable sources

Printing

- Print procurement (outsourced work)

Stationery Supplies

- Recycling of toner cartridges/ recycled supply; encourage use of least environmentally damaging products
- Wider use of competitively-priced recycled paper

Travel

- Business travel management and contract arrangements
- Vehicle procurement

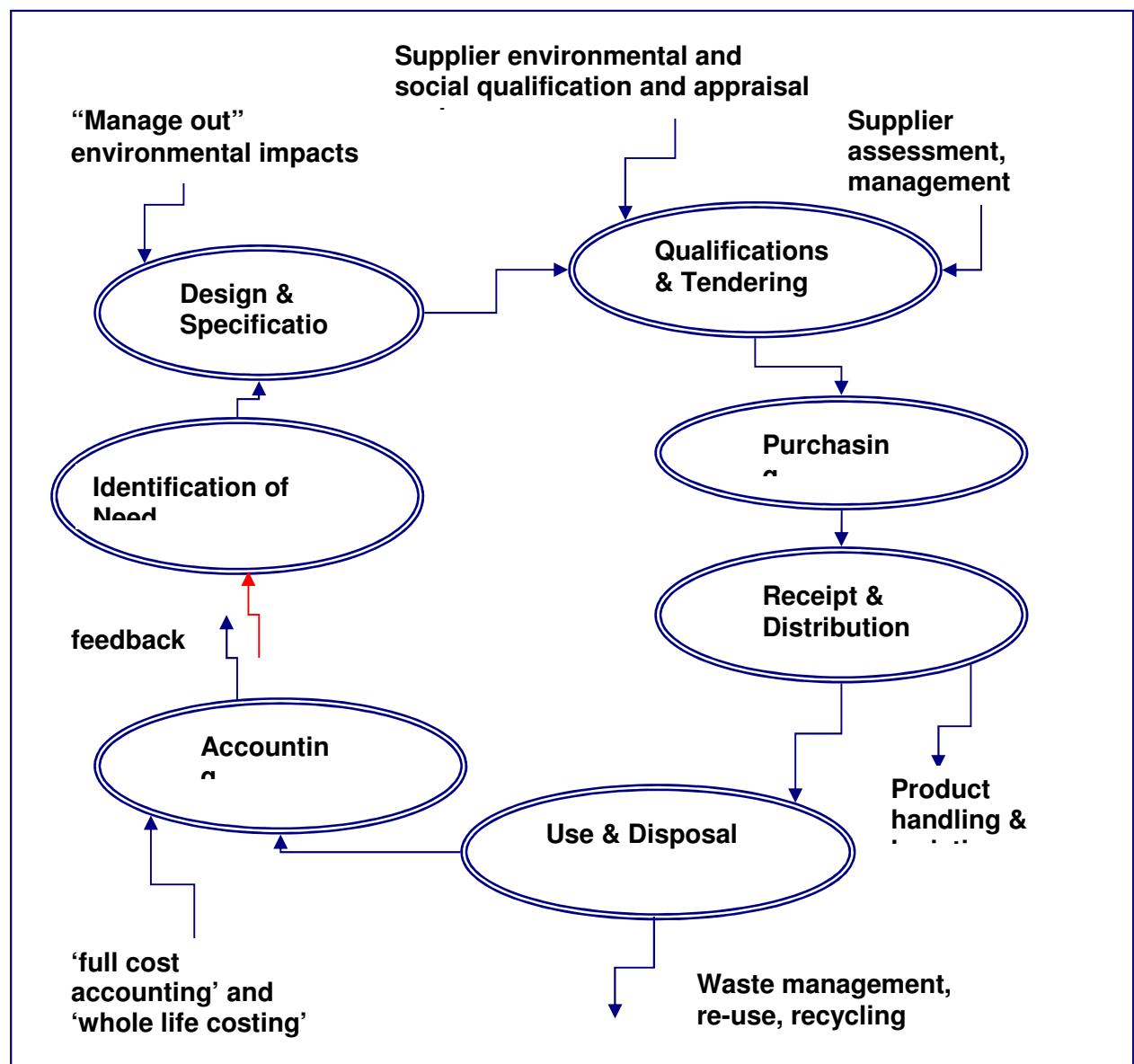
Policy development

- Work with HE sector guidance on Race Equality in procurement
- Work with Governance & Compliance Division (GOVRN) on Freedom of Information
- Work with Occupational Safety, Health & Environment Unit (OSHEU) on a range of sustainability aspects including WEEE-related procedures, and corporate sustainability initiatives (eg: Sustainable Performance Assessment Framework SPAF).
- Promote training of procurement staff on impact of new EU procurement legislation
- Promote development of eProcurement including eTendering etc. – reducing process/paperwork
- Work with National Assembly “Value Wales” on developing partnerships for sustainability both formally and informally.

4.2 Purchasing for Sustainability Guidance for Higher Education Institutions

HEPS/Forum for the Future

Details available at: <http://www.forumforthefuture.org.uk/node/957>



Current version: Sept 2009

Appendix E

1. Cardiff University's Sustainable Procurement Action Plan

Cardiff University has developed a Sustainable Procurement Policy and Sustainable Procurement Strategy. These documents can be accessed via:

<http://www.cardiff.ac.uk/purch/sustainableprocurement/sustainable-procurement.html>

In order to ensure implementation of the Sustainable Procurement Strategy this Action Plan has been developed and agreed by the Environment Compliance Officers (ECOs) and the Environment Management Systems (EMS) group.

<u>Sustainable Procurement Action Plan</u>
➤ Include the following statement in the Financial Procedures: “All domestic white goods to have at least an ‘A’ rating or, where ‘A’ rating is not applicable to a particular product, the highest rated version of the product that is least damaging to the environment.”
➤ Research the effects of changing freezer temperature from -80 C to -70 C and implement the change wherever practicable.
➤ Work towards achievement of an average score of 4 on the Sustainable Procurement Assessment Framework (SPAF).
➤ Ensure that SPAF is the subject of an annual report to the EMS Group by 1 October each year prior to submission to HEFCW
➤ Ensure that information on Sustainable Development, including Sustainable Procurement is embedded in the Induction Training provided by all Colleges and Divisions.
➤ Identify the top ten suppliers (in relation to packaging remaining on site) and: <ul style="list-style-type: none">- Work with the suppliers to reduce the amount of packaging being left with the University wherever practicable- Identify where reusable packaging can be taken back by the supplier for reuse.
➤ Seek to decrease use of virgin paper by setting targets for increasing the ratio of recycled papers purchased for photocopiers and printers. Consider whether a “cradle to grave” approach can be taken to paper recycling. ➤ As far as possible, track progress via Management Information in support of University policies/targets.
➤ Seek to reduce the use of paper for printing and photocopying by promoting the purchase of Multifunctional printing and copying service (MDFs) ➤ Advising those Schools/Colleges and Divisions showing an interest in investing in this service.
➤ Where appropriate ensure that procurement processes (eg tenders) are made as SME-friendly as possible, for example by streamlining the supplier assessment process wherever practicable, and/or advertising tenders that are considered to be suitable for competition by SMEs.
➤ Seek to implement an e-marketplace for Cardiff University in order to increase paperless invoicing and other related environmental savings.

<ul style="list-style-type: none"> ➤ Put targeted supplier engagement programme in place. Consider fully implementing the Opening Doors charter
<ul style="list-style-type: none"> ➤ Seek to ensure recycled content is specified as widely as possible, eg construction materials, aggregates etc.
<ul style="list-style-type: none"> ➤ Ensure that the Sustainable Procurement Strategy and Action Plan are review annually, with PURCH to propose targets linked to SPAF targets.
<ul style="list-style-type: none"> ➤ Raise awareness of the Financial Procedure that all purchases must consider whole-life cost basis. For example, consider reviewing the Oracle Requisition Request form to include wording such as “Please ensure your purchase request complies with University Financial Procedures and Regulations available at www.cardiff.ac.uk/fince . In particular, purchases must be based on best value for money for the <i>whole life cost</i> of the required product or service.”