



University of Bedfordshire
Higher Education Carbon Reduction Strategy

Carbon Management Plan

July 2010

Forward by the Vice Chancellor

I am pleased to introduce the University of Bedfordshire's revised Carbon Management Plan. This latest carbon reduction report documents our current carbon reduction progress and also documents the University of Bedfordshire's updated carbon reduction targets.

The Carbon Management Plan also sets out to develop a strategy to achieve our necessary carbon reduction targets for 2012 and 2020.

The University has started to make progress towards a reduction in carbon emissions, through ongoing investment in low carbon campus buildings and investment in carbon reduction projects. We are also engaging our dedicated staff and students to use resources with environmental sustainability in mind.

In our continual bid for sustainability, we have so far invested £400k in carbon reduction projects with a further £250k investment planned for 2011.

Even through this tough economic climate it is important that we continue to invest in carbon reduction and sustainability and continue on our journey to a low carbon future.

Professor Les Ebdon

Vice Chancellor & Chief Executive

University of Bedfordshire

Executive Summary

Climate change is one of the greatest challenges facing society today. Evidence shows that the earth is warming and that human activity is making a significant contribution to this. Carbon reduction is a key facet of environmental sustainability.

The government's response to climate change and global warming was to commission the Stern Review on the Economics of Climate Change in 2006, which investigated the effects of global warming on the world economy. The report highlighted that if immediate action was not instigated then climate change would have a devastating effect on the future economic wellbeing on the UK.

The resulting Climate Change Act 2008 empowers the Secretary of State to ensure that the net UK emissions for all six Kyoto greenhouse gases for the year 2050 is at least 80% lower and at least 34% lower by 2020 against a 1990 baseline (or equivalent to a 84% and 48% reduction respectively against the 2005 baseline). The higher education sector is expected to contribute to meeting these targets.

From April 2010, organisations that consume large amounts of energy and therefore contribute more to CO₂ emissions are required to participate in the Carbon Reduction Commitment Energy Efficiency Scheme (CRCEES) or face financial penalties.

The higher education sector is uniquely placed to lead the way as it influences many thousands of minds through its students and graduates; undertakes world leading research which provides solutions to key challenges; controls a very large estate; and procures billions of pounds worth of goods and services.

During 2009, HEFCE undertook consultation within the higher education sector on possible carbon reduction targets. The outcome of the consultation was released in January 2010 (*amended 30th September 2010*) when it announced that the overall higher education sector target is 43% by 2020 and 83% by 2050 against a 2005 baseline.

HEFCE also announced that this target should be measured using milestone targets. HEFCE have recognised the affect of growth on emissions targets and have therefore set the milestone targets thus; a 1% increase by 2012 & an 18% decrease by 2017 against a 1990 baseline.

The full Statement of Policy 'Carbon reduction target and strategy for higher education in England' is available for full viewing at: http://www.hefce.ac.uk/pubs/hefce/2010/10_01/

The original consultation document is also available for full viewing at: http://www.hefce.ac.uk/pubs/hefce/2009/09_27/

1. Introduction

This Carbon Reduction Strategy (Carbon Management Plan) 2010 has been developed in response to the Higher Education Funding Council of England (Hefce) requirement to set governing body approved, carbon reduction targets with an associated implementation plan. This report is both a review and an update of its predecessor the Carbon Management Programme Strategic Implementation Plan.

Since the launch of the University of Bedfordshire's Carbon Management Programme Strategic Implementation Plan in April 2008, there have been many developments in the higher education carbon reduction arena. The most notable development being, the intervention of the Secretary state for Innovation, Universities & Skills via a grant letter to HEFCE in 2009.

The grant letter required the university funding council, to link future capital allocations (CIF 2) with HEI's actual carbon reductions. The Higher Education Funding Council for England have after consultation developed a target for the higher education sector as a whole, the target is in line with the worlds first legally binding target, this adopted UK target is a reduction of Scope 1 & 2 emissions of 43% by 2020 and 83% by 2050 against a 2005 baseline (Hefce Sept 2010).

The funding council is requiring all HEI's in England to set their own carbon reduction targets & implement a Carbon Management Plan by 2011. A recent HEFCE document recognised that HEI's might expect to see an increase of carbon emissions until 2012 whilst institutions develop their carbon reduction plans & implement strategies to reduce carbon.

The University of Bedfordshire has been successful in acquiring £400,000 funding from a scheme called the "Revolving Green Fund" from Salix finance. The actual funding comes from HEFCE & the Carbon Trust. The University will match fund the scheme to the sum of £100,000. This means there is a carbon reduction fund of half a million pounds dedicated to carbon reduction projects. There were four main projects completion in 2010 that will generate carbon reductions for the university year on year, with the added benefit of upgrading existing facilities.

It is an unfortunate fact that the global economic downturn will affect future funding for carbon reduction projects & given the recently announced reduction in HEFCE's University funding (£915m 2011 to 2013), large scale carbon reducing projects may be delayed until the so called "green shoots of recovery" actually bear fruit.

2. Drivers of Carbon Reduction

Carbon management is an area of increasing importance, and rapidly becoming a high priority. This is for a number of reasons, including cost, legal compliance, financial planning, corporate responsibility and reputation.

Pressure on finite fossil fuel sources is also driving energy costs upwards, and there are therefore also strong financial reasons for cutting the University's energy demands. Utilities spend in 2009/10 was 3% of the University's total non-staff spend, so without action, increasing prices will make a significant difference to the bottom line.

Growing awareness of the need to make the reduction of greenhouse gas emissions a high priority also means that the University's reputation will be affected by the existence of, and ultimate success or failure of, its carbon management programme. This in turn affects our ability to attract both students and potential partners.

Public sector funding bodies are increasingly asking for the University's Environment Policy, just as they ask for documents such as the Equal Opportunities Policy.

The opportunity exists for the University to achieve a high standard and thus become a beacon of good practice in the East of England region.

At the European level, legislation including the European Union Emissions Trading Scheme (EUETS), and the EU Energy Performance of Buildings Directive (EPBD), both of which affect the University of Bedfordshire, are aimed at reducing emissions from industry, commerce and the public and domestic sectors. The EPBD requires the University to display an energy performance certificate (EPC) at the entrance to over 12 of its buildings by October 2008. It is expected that the public display of energy performance certificates will increase energy awareness across campus, and provide a platform for positive engagement with both staff and students.

At the national scale, in the Climate Change Bill 2007 the UK Government committed to a 60% reduction in CO₂ emissions by 2050. The Committee on Climate Change has been tasked with considering the latest scientific evidence to determine whether this target needs to be increased to 80% by 2050. Either target is hugely challenging; all organisations must begin to consider how they will achieve emissions reductions on this scale.

Over coming years further legislation will be introduced to drive emissions down in support of government targets. For example, in 2010 the government intends to introduce the Carbon Reduction Commitment (CRC), a national carbon trading scheme which will include emissions from both gas and electricity.

3. Emissions Baseline

Baseline Scope and Dates

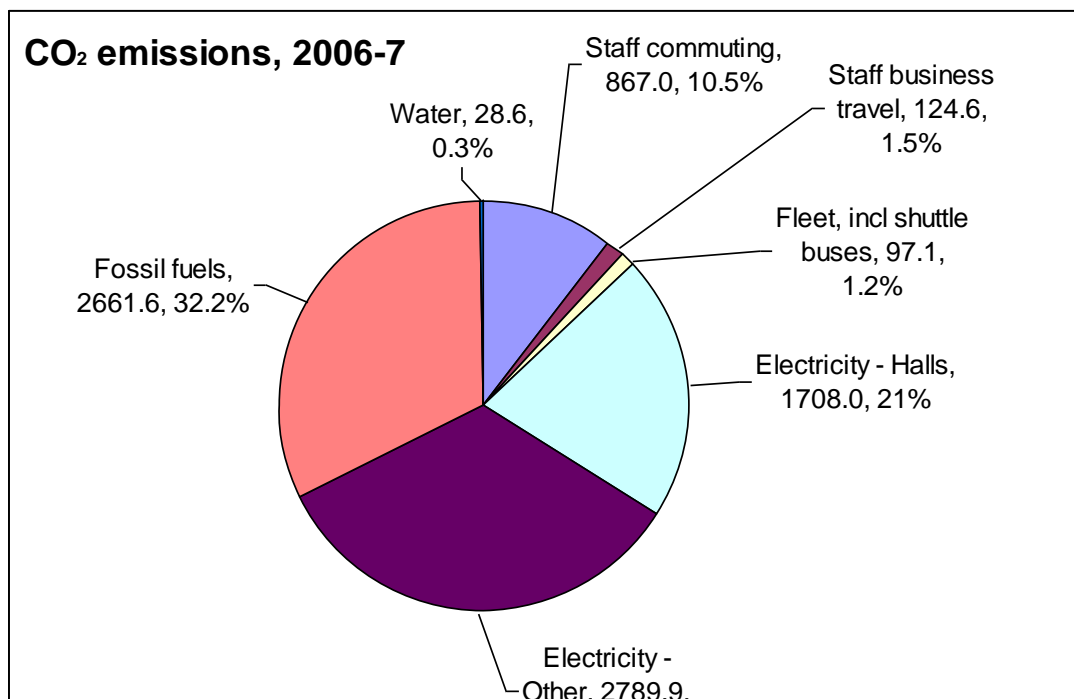
In order to manage its carbon footprint, the University must first calculate the implications of its existing activities.

The University is responsible for its carbon emissions both through its direct and indirect activities, otherwise known as Scopes 1, 2 and 3 (appendices table 1.) This includes but is not limited to staff commuting and business travel, student travel, space and water heating, lighting and indirectly through its procurement supply chain network, including transport emissions of goods and services, and emissions from packaging and other waste.

The period on which all Scope 3 calculations are based is the academic year of 2006/07, the first year in which the University of Bedfordshire existed. Staff and Student commuting figures for the Bedford campus and Luton campus are based on responses from the transport surveys of 06/07.

The baseline year for scope 3 emissions has been set at 2006/07, this is due to the lack of sufficient data relating to scope 3 emissions from the academic year 2005/06. Scopes 1 and 2 carbon emissions are being measured against 2005 emissions.

Fig.1.



Energy Use in Buildings

The University's current provision of facilities to generate green electricity on-site is growing. In November 2010 the university began to generate its own electricity from Photovoltaic Cells which drives fans in the E-Stack system, and a Combined Heat & Power plant is generating energy for use in the new campus centre Luton. All remaining electricity requirements are therefore drawn from the National Grid.

Data for the baseline energy consumption and subsequent carbon emissions was drawn from utilities bills for the academic year 2006/07. These give actual figures for cost and for consumption in kWh, though some earlier gas bills were in therms, and oil is delivered in litres. These figures were then converted into tonnes of carbon dioxide using carbon trust approved conversion formulae. These figures will change in future years, depending on the mix of fuels used to produce grid electricity.

All electricity meters have now been retro-fitted with automatic meter reading devices are read automatically, supplying half-hourly data; so annual energy consumption figures are 100% accurate, the AMR meters are able to break down energy consumption into half hour divisions which enable the university to pin point and measure energy use in buildings. Automatic meters reading (AMR) devices have been retrofitted to all gas meters in the Luton campus, as soon as the opportunity arises all other gas meters will be fitted with AMR devices.

Likewise, water consumption is derived from bills for the academic year of 2006/07. It is based on actual consumption in cubic metres.

It should be noted that the University's (oil-heated) swimming pool closed in August 2007, and this should be taken into account when comparing water and oil usage.

University Transport

Transport data comes from three sources;

Staff commuting data is based on responses to the travel surveys of April 2006 (for Bedford-based staff) and April 2007 (for other staff). Student journeys have not been included, as too little is known about their movements; however all halls of residence are within easy walking distance of campus.

Business travel is based on mileage claimed on expenses. It does not include air travel, as this proved too difficult to calculate from the data recorded in the time allowed for this project. Ideally, this data should be recorded in future calculations, given the importance of air travel to the emissions of greenhouse gases.

Finally, fleet travel is based on mileage logged by the University's small fleet of vans and minibuses, and reported by the contractors who run the University shuttle buses.

Coaches hired for one-off trips have not been included. This data needs to be collected for future reports.

As with buildings energy consumption, this data was then analyzed using formulae provided by the Carbon Trust.

Purchasing Policy

The University's purchasing department have a policy of asking for environmental accreditations and policies when putting new purchases and contracts out to tender, and take these into account when making decisions.

However it has not been feasible to calculate the university's indirect carbon footprint through materials and services bought in. This is an opportunity for a future project.

Waste disposal

Recycling collections have recently been introduced at Luton, and include paper, plastic and cans. At Bedford, paper, cardboard and glass are collected for recycling. Unwanted furniture, and electronics including information technology equipment is also collected for re-use where possible or recycling. Used cooking oil goes to form bio-diesel.

However since the total amount sent to landfill and for recycling is not known, it has not been possible to calculate the carbon cost of waste produced by the University. This data needs to be collected for future analysis.

There are at present only Putteridgebury conference facility segregates food waste which is sent to an Anaerobic Digestion plant in Bedford.

is used for a range of activities including, but not limited to, provision of information technology, lighting, and (for most halls of residence) space and water heating. The University uses almost no electricity from renewable sources; the carbon footprint per kWh of electricity is therefore greater than for fossil fuels (from which it is chiefly ultimately derived).

4. Carbon Reduction Strategy & Implementation Plan

Targets for the Future

As highlighted in the Environmental Policy 18th November 2010 the University of Bedfordshire has set the following carbon reduction targets, the Carbon Reduction Strategy (Carbon Management Plan) will be ratified by the universities board of governors on 16th July 2010

The University of Bedfordshire aims to achieve a 20% reduction of scope 1 and 2 carbon emissions by 2012 and 48% reduction of scope 1 and 2 emissions by 2020, against a 2005 baseline.

The principle targets for carbon emissions have been laid down in statute under the Climate Change Act 2008, and further work has been carried out by HEFCE and its appointed consultants to establish baselines and targets, but without complete success especially with regard to a 1990 baseline. There has been recognition that the growth in the sector since 1990 will have had some effect and therefore suggest using a 2005 baseline.

Scope 1 & 2 Carbon Reduction Milestone Targets:

The carbon emissions for the 2005 baseline year are taken from the Hefce SQW document, "*Carbon baselines for individual Higher Education Institutions in England January 2010*". The carbon emissions for all other years 2006/7 and onwards have been and will be taken from the Hefce Estates Management Statistics (EMS), annual submissions spreadsheet.

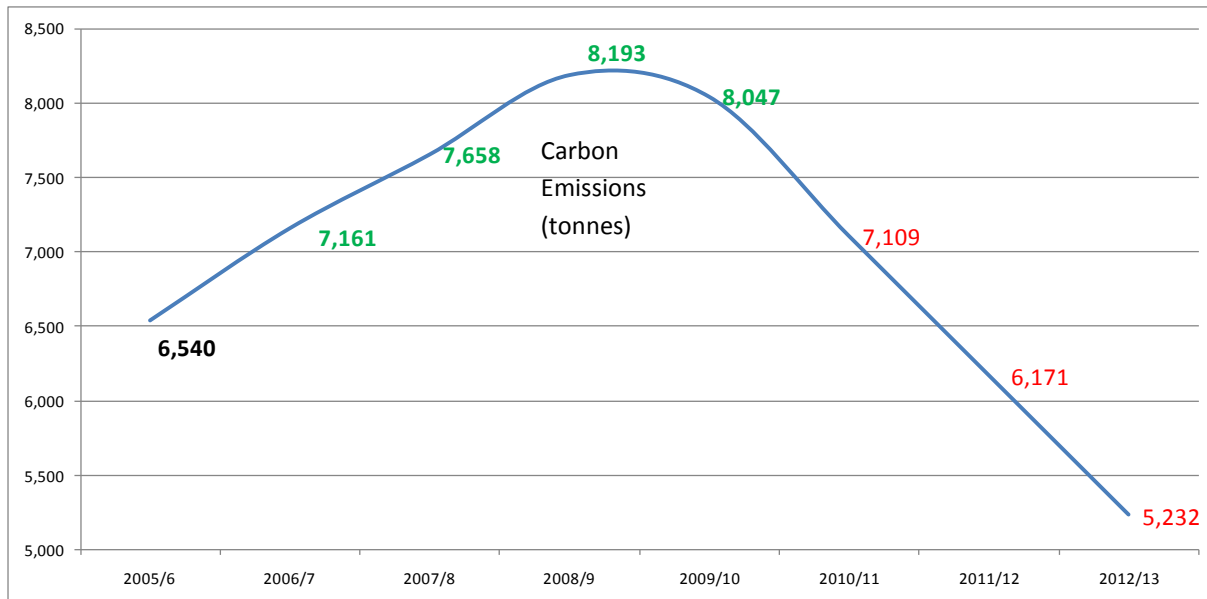
To comply with the requirements of the Climate Change Act we will need to reduce our emissions by 48% by 2020 against a 2005 baseline and based on plausible milestones as outlined in the Statement of Policy we need to target 20% by 2012, again based on the 2005 baseline.

Given our current emissions performance, this represents approximately 5232 tonnes reduction by 2012 from today's position equal to a significant 35% reduction. By continuing on this trend we can achieve the 48% required reduction by 2020 and ultimately 84% by 2050.

It is proposed that the University should therefore set an emissions target of 5,232 tonnes of CO₂ by 2012 and further reports will be presented to adjust this and any future targets up to 2020 as more information becomes available (fig.1.).

Scope 1 & 2 Carbon Reduction Milestone Targets:

fig.1.



Key:

Hefce SQW 2005 Baseline **BLACK**

Historical carbon emissions **GREEN**

Carbon Reduction targets **RED**

Implemented Scope 1 and 2 Carbon Reduction Project

Since April 2008 the university has been working to a carbon reduction plan as outlined in the 2008 Carbon Trust Higher Education Carbon Management Programme. Table 2 below is taken from the afore mentioned CMP and updated to demonstrate the progress that has been achieved to date.

Table 1: 2008 Carbon Management Programme Prioritised Actions 09/10 update

Priorities, Costs and Savings					
Project	Cost	Annual Savings: £	Annual Savings: CO ₂	Payback Time	Updated Status
Communications Plan	£2,000	£10,000	4 tonnes	0.2 years	New environmental sustainability In-Beds website
Energy Monitoring & Management	£17,500	£30,000	12 tonnes	0.6 years	Smart Meters installed 2009/10
Automatic Computer Switch-off	Actual cost £40,000	£12,000	64 tonnes	2 years	Purchased 3,000 PC Power Management licences, installed on university servers Nov 2010
Lighting Occupancy Controls	Actual cost £98,000	£30,000	150 tonnes	5 years	Installed at park square June 2010
Re-lamping	Actual Cost £97,000	£5,000	53 tonnes	5 years	Installed at Polhill Campus June 210
Voltage Optimisation	Actual cost £60,000	£18,000	140 tonnes	5 Years	Installed at Vicarage Street June 2010
Thermostatic Radiator Valves	Actual cost £60,000	£6,500	85 tonnes	5 Years	Installed at Park Square Main Campus Building July 2009

Planned Scope 1 and 2 Carbon Reduction Projects

The university has so far invested £300,000 of the £500,000 Salix revolving green fund. The remaining £200,000 & £50,000 carbon reduction capital funds will be invested in carbon reduction projects to be completed in the 2010/11 academic financial calendar year ending 31st July 2011.

Table 2: 2010/11 Carbon Reduction (Salix) Projects (Scope 1 & 2 emissions)

Priorities, Costs and Savings					
Project	Cost	Annual Savings: £	Annual Savings: CO ₂	Payback Time	Current Status
Alexander Sports Hall lighting improvement scheme	£6,000	£1,274	6.95 tonnes	4.7 Yrs	Planned for Summer 2011 from Revolving green fund
Learning Resources Centre lighting improvement scheme	£60,000	£11,532	62.87 tonnes	5.2 Yrs	Planned for Summer 2011 from Revolving green fund
Bio-mass boiler replacement of oil fired boiler at Putteridge Bury	£109,000 (£140,000)	£6,281	174.65 tonnes	22.2 Yrs	Planned from windfall capital bid projects co funded by Salix
Fairview House lighting improvement scheme	£32,000	£6,249	34.0 tonnes	5.1 Yrs	Planned for Summer 2011 from Revolving green fund
Blocks A,B & C undercroft hot water pipe lagging	£26,000	£4,898	26.7 tonnes	5.3 Yrs	Planned capital works from University Environmental Capital
Lea Court Hall of residence loft insulation improvements	£17,000	£2,490	13.5 tonnes	6.8 Yrs	Planned capital works from University Environmental Capital

Future sustainability Objectives

Whilst much of the current activity is focussed on carbon reduction measures, other factors affect our environment and therefore we also propose to:

- Review procurement of energy from sources not dependent upon fossil fuels
- Ensure all existing staff are training in “Basic Environment Awareness” which includes an element of energy efficiency in the workplace.
- Increase student energy efficiency through various media and the curriculum
- Reduce water consumption through instillation of more efficient equipment and by locating and fixing leaks as soon as they occur.
- Reduce quantities of general waste being sent to landfill by increasing the recycling rates of food, plastics, metals, cardboard and paper.
- Reduce staff & student travel for example by championing distance e-learning, video conferencing and providing improved cycling facilities.
- Comply with requirements of the Carbon Reduction Commitment & other energy specific legal requirements
- Ensure all building or energy consuming projects or purchases are designed or procured to achieve the highest possible rating in schemes such as BREEAM, Building Energy Performance Certification, Energy Star Compliance, and others

Table 3: Reduction of Scope 3 carbon emissions

Project	Cost	Carbon Reduction Aspect	Responsibility	Notes	Completion Dates
My Phone conference Facilities		Reduction of transportation emissions between campuses	Gary Nye ISD	New telephones are to be enabled with My Phone conference facilities	2010
Video Conference Facilities		Reduction of national and international transportation emissions	John Wells ISD	Video conferencing facilities all staff at both Luton & Bedford campuses on request.	2010
Water reduction	£5,000	Reduction of water usage in halls of residence	Rob Johnston Accommodation	Water saving devices are to be fitted to WC's, showers and taps in every student flat in Luton and Bedford	2010
Water reduction	£5,000	Reduction of water usage in campus building	Steve Hedges Estates	Water saving devices to be fitted to WC's, Urinals, Taps and Showers	2010
Waterless & reduced flush urinals	£12,000	Reduction of water use	Alan Burch Estates	Reduced flush only for high usage urinals	2011
University wide under desk bins removal scheme	£4,500	Increase of office recycling rates	Ian James Facilities	A trial in HR, Finance, MARC, and international office, was successful the scheme will be rolled out starting in Summer 2011	2011

Table 3: Reduction of Scope 3 carbon emissions

Project	Cost	Carbon Reduction Aspect	Responsibility	Notes	Completion Dates
Cycle to work Scheme	Internal Resource cost	Reduction of staff commuting related emissions	Heeren Prabhoo Finance	The university is working on joining the cycle to work scheme as soon as possible	2011
Internal and external website improvements	Internal Resource cost	Reduction of staff energy thought use effective communication	Kevin Cunningham MARC	The existing external environmental sustainability web pages need updating	2011
Environmental Awareness Induction workshop & training	Internal Resource cost	Reduction of staff energy thought use effective training	Ameena Sultana ODTU	The current new staff induction process needs to include environmental awareness training	2010
Environmental Awareness training	Internal Resource cost	Reduction of staff energy thought use effective communication	Ameena Sultana ODTU	All existing staff should have environmental awareness training	2010
Go Green Week	Internal Resource cost	Reduction of student energy use thought effective communication	Lyndsay Murphy UBSU	Switch off Interhall recycling Awareness Campaign	2011
Sustrans free bike loan scheme	Free of Charge	Reduction of staff commuting related emissions	Heeren Prabhoo HR	The university will include Sustrans in the induction process so as to promote the scheme to all new staff.	2011

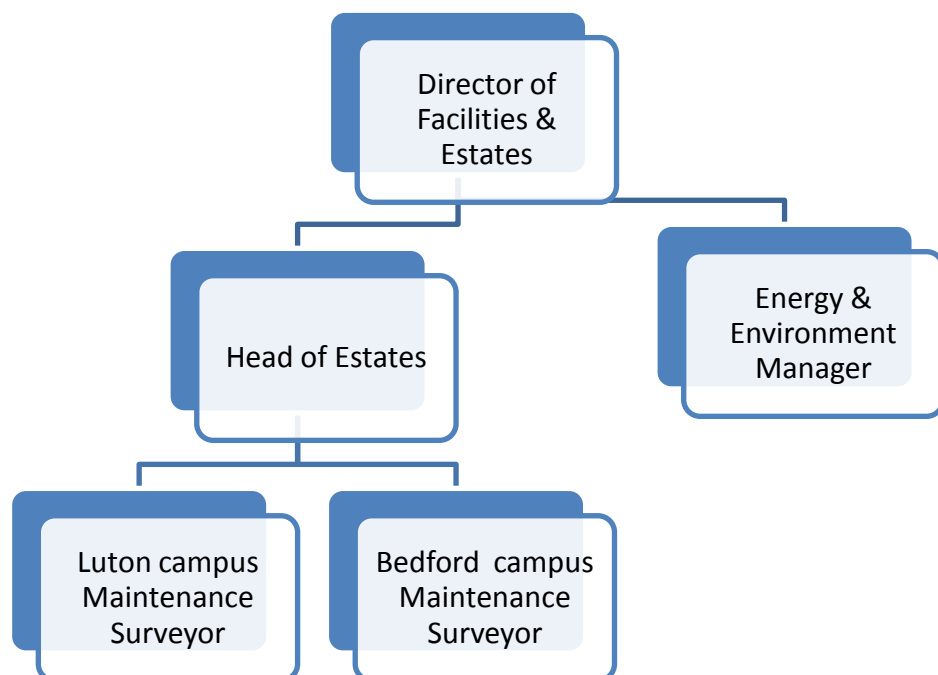
Proposed Carbon Management Structure

To deliver these objectives, the University needs to ensure that the management structure and resources are properly aligned. It is therefore proposed that:

- Environment sustainability matters are reported to and agreed upon at the Vice Chancellors Management Group and Corporate Management Team meetings every three months.
- The responsibility for monitoring progress is vested with the Resources and Employment Committee and reported twice annually
- DVC (Resources) is appointed as key responsibility for Environment Sustainability
- Energy & Environment Manager, Space Planning & sustainability Manager are appointed and fully supported
- University of Bedfordshire Energy Action Team is continued focusing on university wide carbon reduction initiatives
- Departmental and faculty Energy & Environment Champions and Space Champions focusing on energy efficiency, carbon reduction and space utilisation are nominated by department to help achieve local priorities.

Carbon Reduction delivery Team

Fig.2.



5. Monitoring & Measurement

The university has installed so called energy “Smart Meters” which are similar to the domestic smart meters in that they can report their consumption via a web based system. Each and every Smart meter will report on energy consumption every 30 minutes, if required. Whereas historically, to provide a picture of energy consumption across the university campuses, we have always relied on manual meter reads taken on a monthly basis. It is also possible to do the same with gas meters although the same web based infrastructure is not yet in place.

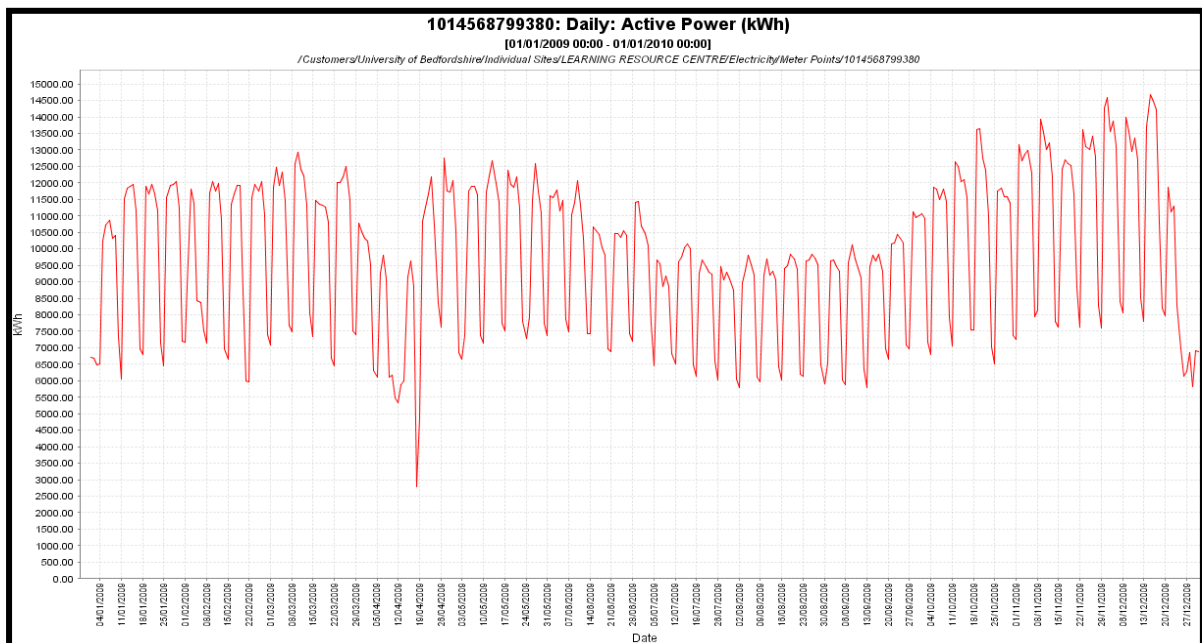
The university is hoping to have all gas meters fitted with Automated Meter Reading devices by the December of 2010 & by having such detailed energy data, we are able to monitor our carbon reduction projects week by week.

Automated meter reading also allows us to spot possible areas for energy reduction & to quantify carbon reductions made by changes in culture & behaviour.

Fig.3. is an example of the weekly energy profile for the Park Square campus for the 12 months of 2009, with this information we can analyse for trends & patterns that can indicate where efficiencies have and can be made within the building but unfortunately not by faculty or department.

The graph below clearly shows the spring, summer & winter breaks & their corresponding reduction in energy consumption.

Fig.3.



6. Completed Higher Education Carbon Management Programme Projects

- Thermostatic Radiator Valves

In the Spring of 2009 the Park Square campus buildings had Thermostatic Radiator Valves retrofitted to all radiators, thermostatic Radiator Valves or TRV's enable the radiator to control the temperature in a given area dependant on the valve setting.

The TRV have been designed to be controllable between ambient temperature & +21°C. These thermostatic radiator controllers go a long way in reducing the energy used by buildings, it has been estimated by the Carbon Trust that fitting TRV's in the Luton Campus would save >156 Mwh per annum.

- Variable Speed Drives

A variable speed drive or VSD is a relatively new system for electronically controlling the spinning motion of an electric motor, in this case the electric motors controls hot water pumps at Park Square & Putteridgebury.

VSD's were fitted in concert with the TRV project above, six VSD's were fitted in place of the existing hot water pump motors, that pump hot water around the radiators at Park Square & Putteridgebury. Non variable or standard electric motors work at 100% capability all the time. Variable speed driven pumps are capable of working at the speed required, that is to say the pump can work anywhere between 5% & 100% of its maximum capacity, rather than being either on or off which is how standard motor driven pumps operate.

The variable speed driven hot water pumps generate a reduction in carbon throughout the year as the new VSD driven pumps rarely operate at 100% capacity & consume far less energy than the standard electric motor driven pumps they have replaced.

- Switch start lighting conversion project

Most of the lighting across the university uses a technology known as Switch Start lighting utilising so called T8 *halo-phosphate* tubes. The most up-to-date lighting technology is known as High Frequency lighting & utilise *tri-phosphor* T5 florescent tubes. The modern lighting technology is much more efficient & the T5 florescent tubes last a third longer than the traditional T8 florescent tubes.

The old switch start fittings are prone to flickering which is thought to cause headaches & could also in some cases where the flickering of an end of life lamp is constant this may lead to an increase risk of epileptic seizures & migraine headaches.

The plan is to convert the existing switch start lightings to utilise the T5 *tri-phosphor* tubes via conversion equipment. Where the light fitting is of a certain age it will be swapped out for the modern high frequency Cat.2. Light fittings, the student centre & Learning resource centre at the Polhill campus will benefit from the more efficient lighting technology.

- Voltage Optimisation

The UK national electricity grid supplies electricity to the university at 240 volts, whereas all other countries in the European Union supply electricity at 220 volts. Voltage optimisation is a technology that reduces the incoming voltage from 240 to 220 thus reducing the amount of energy consumed by electrical devices. All CE marked electrical equipment sold throughout the UK is designed to work at 220 to 240 volts as standard & many IT experts are of the opinion that computer equipment will benefit from the reduced voltage. The voltage optimisation equipment will also benefit the electrical supply by improving power factor & reducing reactive power, the voltage optimisation equipment will be fitted to the main incoming power supply to the Vicarage Street building.

- Discrete Lighting controls

The Carbon Trust has estimated that 40% of an organisations electricity costs are from lighting, and that 20% of that cost can be reduced by fitting discrete lighting controls. The discrete lighting controls proposed for instillation across the Park Square campus are, Passive Infra Red sensors (PIR). PIR sensors or occupancy detectors can detect the presence or absence of persons in a room or a given area. If the sensor detects the lack or presence in the room it will automatically turn off the lights. These are already being used successfully in some areas of the university. Daylight detectors will also be working in concert with the PIR detectors. Where there is a presence in a particular area the daylight detectors will assess the light levels and control the amount of light in the room accordingly.

Reduction of water use

The reduction of potable water consumption does not appear to be high on the carbon reduction agenda, but the university recognises that the waste of potable drinking water has a negative environmental impact, the university also acknowledges our privileged position with regards to readily available clean and safe drinking water and therefore the university has a corporate social responsibility to reduce its consumption and waste of potable water.

The university during many refurbishment projects have replaced the old style cistern toilets with the modern dual flush siphons, these reduce toilet flush volumes from 9 litres to 3/6 litres giving significant water saving year on year.

Were we have not replaced the old style 9 litre flush cisterns we have installed "low cost" highly effective "hippo packs" that will reduce the volume of the flush by >1 litre. These continue to be fitted across the university and to date more than 300 of these "Hippo Packs" have been installed across the universities entire estate including accommodation.

April 2010 saw a major leak on Church Street permanently fixed from August 08 to July 09 Park Square used 45,500 cm³ of water this averages out at 125m³ a day. (1,000 cm³ of water equates to one metric tonne) The leak was fixed and the volume of water reduced to 16m³ this equates to a reduction of 12 tonnes of CO² per annum.

Increase recycling & decrease landfill waste

Over the past 24 months a significant amount of time and resources have been dedicated to organising recycling efforts across all of the university campuses. The campaign to recycle waste has now been stepped up a notch & new waste segregation bins have been purchased to help us increase our recycling rates. We hope to be able to install weighing stations at each campus that will allow us to track waste volumes being recycled & land filled.

We have ordered more office waste paper bins and will soon reorganise of waste is stored & disposed, in September we hope to have the universities first cardboard baler located in phase 1b the "Campus Centre", this will allow us to reduce the volume in the red bins and produce an income from the recycling of baled cardboard.

More recycling facilities will be provided throughout the Putteridgebury campus,

The CRC Energy Efficiency Scheme Order 2010

In April 2010 the Carbon Reduction Commitment Energy Efficiency Scheme came into affect requiring all organisations consuming >6,000 megawatts of energy per annum, to register with environment agency and purchase so called "carbon credits", relative to the tonnes of carbon dioxide emissions released to atmosphere each year, from April 2012 the university will incur annual cost of >£125,000 per annum.

Future financing of carbon reduction projects

The private sector is finding new and innovative ways in which to win green business based on new project funding models. A novel method of financing public sector carbon reduction projects is for funding to be generated via utility cost savings, this finance model has been proven in the private sector and is currently being rolled out to the public sector.

Private sector company's have identified a business model that is based on, savings from carbon reduction opportunities. The financing company identify scope and implement a number of carbon reduction projects. Possibly up to 100% of the project cost is met by the financing company based on 100% payback ratio. After the project is implemented the savings identified through pre and post measurement are paid to the financing company over an agreed period.

Models like this already exist in the carbon reduction market place, with the exception that they rely on the organisation financing the carbon reduction projects with the project management company taking a profit share.

7. Summary

The University of Bedfordshire in its quest to be a centre of excellence for higher education & to improve the quality learning and improve the academic experience for all of its students has been continually expanding, consolidating & rationalising its buildings, location, occupancy and use since its formation in August 2006.

HEFCE decided that carbon reduction targets must be absolute to reflect the UK absolute target & not relative i.e. kWh/student, a relative target would reflect an HEI's overall efficiency and would be a good measure by which students could gauge the environmental impact of their education, as is the case with the Estates Management Statistics data on carbon emissions which are collated and submitted annually and expressed as relative & absolute figures.

It is virtually unavoidable for an expanding educational organisation not to increase absolute energy consumption whilst investing in the campuses infrastructure & buildings, in order to entice students to study at this institution. Whilst the population of the country increases & there is an increase in the number of college student going on to study at higher education establishments, HEI's will have to expand with this growth to accommodate the academic requirements of a 21st century population, whilst balancing this with the need wean our selves off non-renewable resources.

For this reason it alone it may be the case for a relative carbon emissions target for use within the University of Bedfordshire, whilst at the same time reporting on an absolute carbon emissions target to HEFCE. Either way it still amounts to a reduction in carbon and that is what is important, targets don't reduce carbon emissions, the efficient use of energy together with funding & investment in new technology will.

Appendices

Table 1. HE sector carbon emissions – scopes 1, 2 and 3 (1990, 2005)¹

Scope	Description	Examples	HE sector
Scope 1: Direct emissions	Direct emissions occur from sources that are owned or controlled by the HEI	Direct fuel and energy use Transport fuel used in institutions' own vehicle fleets	1990: total CO₂ equivalent – 1.782 MtCO₂ Of which: 1.102 MtCO ₂ from electricity (62%), 0.452 MtCO ₂ from gas (25%), 0.173 MtCO ₂ from burning oil (10%) and 0.037 MtCO ₂ from coal (2%); and 0.018 MtCO ₂ from direct transport emissions (1%) 2005: total CO₂ equivalent – 2.046 MtCO₂ <i>(15% increase compared with 1990)</i>
Scope 2: Electricity indirect emissions	Emissions from the generation of purchased electricity consumed by the HEI	Purchased electricity	
Scope 3: Other indirect emissions	Scope 3 emissions are a consequence of the activities of the HEI, but occur from sources not owned or controlled by the HEI	Water Waste Land-based business travel Commuting (both staff and students) Air travel (international students; international student exchange; business	1990: total CO₂ equivalent – 0.738 MtCO₂ 2005: total CO₂ equivalent – 1.293 MtCO₂ <i>(75% increase compared with 1990)</i>
		Procurement	

1. Carbon management strategies and plans (A guide to good practice) Jan2010/2

