University of Bristol Carbon Management Plan – Update Mar 2013

Summary

This document is a March 2013 update on the University of Bristol's 2010 Carbon Management Plan and its February 2012 re-appraisal.

The main drivers for an update are:

- The University now plans for strong growth
- Non-commodity charges on electricity are increasing to provide investment in new infrastructure. Controlling when we use electricity better can reduce costs and also help the grid accommodate higher flows and different generators, playing our part in ushering in a low carbon grid.
- Technologies have matured further since 2010. Changes to technologies available, particularly the advent of LED lighting and fully addressable lighting & heating control, will allow us to increase the savings we expect from refurbishment.
- For the first time we include an estimate for the reduction of the carbon intensity of electricity, as coal stations begin to close. We assume this reduction to be 20g/kWh a year from 2015.
- We therefore aim to reduce our emissions by 38% from 2005 to 2020 rather than the previous estimate of 36.5%, so 3.1% a year rather than the previous 2.4% a year, on average.
- Our "Greening Events II" project, undertaken with funding from JISC, and other surveys, have allowed us to assess staff and student business travel better than 2010. We feel confident to continue to with a reduction target of 5% from 2012 to 2020.
- We have been analysing the impact of the student daily commute and termly travel. Again, we have felt able to set a reduction target of 5% from 2012 to 2020.
- Inclusion of Scope 3 emissions including procurement related carbon emissions.

Background

In the HEFCE publication "Carbon Reduction Target and Strategy for Higher Education in England"[1], a target is set for the sector to reduce Scope 1 and 2 emissions by 34% by 2020 against a 1990 baseline, which translates to a 48% reduction on a 2005/6 baseline.

The University of Bristol's carbon emissions in 1990 are reported[2] to be 25,513tCO_2 and we calculate that our emissions in 2005/6 were 47,587 tonnes from consumption in buildings and electricity, plus an estimated 140 tonnes from University-owned vehicles. The basis for the preparation of the 1990 figure has been lost, so we have a much higher level of confidence in the 2005 figure.

The growth is ascribable to an increase in student numbers and an increase in the quantity and energy-intensity of the research now undertaken. The period 1990-2005 saw the building of Synthetic Chemistry, the Dorothy Hodgkin Building, Merchant Venturers' Building, and Barn One, which are all energy-intensive sites. We have also seen the amount of IT in use increase dramatically to saturation – a computer on every desktop – a situation often bringing with it a concomitant demand for cooling.

The increase we have seen is similar to that of some of our Russell Group peers: for example, Cambridge, Oxford, Imperial, LSE and Leeds have all seen a near doubling of their emissions over this period. However, there are differences across the sector as a whole, with some institutions

[1] HEFCE – January 2010/01 section 23

[2] SQW Energy "Carbon baselines for Individual Higher Education Institutions in England" Draft January 2010.

showing modest reductions. These differences are an indication of the wide spread of activities undertaken across the sector, and the differences between the buildings that support them.

We aim to play as complete a role as we can in contributing to reaching the sector-wide targets. Our updated Carbon Management Plan shows how University of Bristol aims to reduce its Scope 1 and 2 carbon dioxide emissions[3] in the period from 2005/6 to 2020/21 by 38% and how we intend to extend carbon management to Scope 3 over the next three years.

The plan is an updated and extrapolated version of the Carbon Management Plan adopted by UPARC in November 2009, and the updates in June 2010 and February 2012.

Our plans have been produced to ensure:

- That we have a response to the requirements of HEFCE's Capital Investment Framework
- We are seen to fulfill our moral obligation to act on Climate Change and Peak Oil
- That the University plays its part in achieving HEFCE's national sector targets
- That the University has a strategic tool to reduces its exposure to volatile energy markets and to carbon trading schemes such as the Carbon Reduction Commitment
- That carbon is considered at the earliest planning stages of new buildings, refurbishment and procurement, when mitigation can be implemented most cost effectively.
- That we have a framework for considering carbon emissions outside our direct control

For the purposes of the exercise we have assumed that:

- The types and balance of research does not alter dramatically
- That buildings' size and quality, and the processes they house are the key determinants of how much carbon we emit. However, there is also a 3% increase of Precinct electricity to reflect higher student numbers.
- The gross internal area of the University increases
- The new Lifescience building and new accommodation for Maths all go ahead and savings are realised by re-assigning space not suitable for 21st century science to other, less intensive uses.
- Our current High Performance Computing facility is filled, and energy demand doubles over the following ten years.
- The residential stock increases by 339 places, supplied through BREEAM excellent new-build, refurbishment is achieved to Part-L of the building regulations and BREEAM Very Good.

Against this background, we propose an energy investment programme of costing £21m over ten years, which should deliver:

- Carbon dioxide savings of over 17,000 tonnes
- A 30% reduction in gas and 20% reduction in utilities costs
- A simple payback period of all works taken together of 7 years, at 2013 prices. We expect electricity prices to increase by 100% between 2013 and 2020, so paybacks will improve.

Some of the money for this will come out of previously-agreed budgets, such as the £1.5m spend on voltage optimisation, the awareness budget within UTIL and the capital maintenance budget. Other savings will come from budgets agreed for refurbishments and buildings such as Bioscience and the

[3] Scope 1 & 2 emissions are from owned transport, boilers and the generation of purchased electricity. 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. The staff and student commute is an example of Scope 3 emissions.

Queens Rd refurbishment. Where individual projects need to be funded, business cases will be made to the Capital Infrastructure Programme Board.

1. The University of Bristol's Carbon Management Plan

The Carbon Management Plan lists priorities for short and medium term carbon mitigation measures in the context of the University's strategic aims and the local, national and global legislative tropes.

It looks at the relative costs of action and inaction from financial and legislative viewpoints, and describes a best value way to achieve reductions.

1.2 Our low carbon vision

As previously stated, the University of Bristol's carbon emissions in 1990 are reported[4] to be 25,513tCO_2 and we calculate that our emissions in 2005/6 were 47,587 tonnes from consumption in buildings and electricity, plus an estimated 140 tonnes from University-owned vehicles.

We aim to play as complete a role as we can in contributing to reaching the sector-wide targets. However, a 34% reduction on our 1990 carbon emissions to 16,800 tonnes from our current emissions of 47,000 tonnes would require investment beyond that which is cost-effective, or reductions to energy-intensive research. Therefore, our Carbon Management Plan shows how University of Bristol aims to reduce its Scope 1 and 2 carbon dioxide emissions[5] in the period from 2005/6 to 2020/21 by 38%. This plan also includes a scope 3 baseline of 52,417 tonnes with an aim to reduce emissions by 10% by 2020/21 and how we intend to extend carbon management to Scope 3 over the next three years.

The University of Bristol's vision is to follow a path to an 80% reduction in Scope 1 & 2 CO_2 emissions from 2005/6 levels by engaging in measures which actively support the quality of learning, research and enterprise and staff and student accommodation at the University. This will require a 38% cut by 2020. We will also seek to reduce our Scope 3 emissions.[6]

1.3 The situation since 2005/6

The following tables describe the way the University's emissions have changed over recent academic years.

tCO_2 emitted by source	05/06	06/07	07/08	08/09	09/10	10/11	11/12
Electricity	32,935	30,585	30,959	31,361	30,807	30,788	31,314
Gas	14,784	14,313	15,735	15,981	15,804	15,534	14,909
Steam	268	165	99	0	0	0	0
Oil	333	165	317	256	107	107	80
Total	48,320	45,228	47,110	47,598	46,718	46,429	46,303

[4] SQW Energy "Carbon baselines for Individual Higher Education Institutions in England" Draft January 2010.
[5] Scope 1 & 2 emissions are from owned transport, boilers and the generation of purchased electricity. 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. The staff and student commute is an example of Scope 3 emissions.
[6] Scope 1 & 2 emissions are from owned transport, boilers and the generation of purchased electricity. 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. The staff and student commute is an example of Scope 3 emissions.

The effects of weather and new facilities are key to understanding trends in the table above: in 2005/6 we had the coldest winter in 20 years, and in 2006/7 we had the warmest winter in 10 years, reducing gas demand even though large CHP units came on stream that year.

"Fugitive emissions" from non-energy sources are estimated to add another 471 tonnes of equivalent CO_2 a year and emissions from University-owned transport another 140 tonnes.

The key factors at play during this period divided into actions which reduced carbon and those that increased it. The commissioning of new, energy-intensive buildings such as High Performance Computing (HPC) and Medical School's H-Floor added to our burden, whereas the implementation of the University's first combined heat and power plants (CHP) reduced it. Sharp rises in energy prices, beginning in 2006 and increasing awareness of the desirability of climate change mitigation, and the need to comply with incoming legislation, brought carbon management issues firmly onto the University's strategic agenda.

2.0 Implementation for Scopes 1 & 2

This plan proposes that the following measures will be implemented over the ten years to 2020. For each element of our implementation plan, there will be some irreducible uncertainty as to the amount of energy that will actually be saved. However, taken as a whole, we believe that these measures will enable us to meet our vision of a 38% cut in carbon emissions from a 2005/6 baseline by 2020.

The programme is being delivered as follows, over ten years. It must be borne in mind that the earlier projects are implemented, the earlier savings can be delivered, though implementing everything early can incur additional project management costs which extend payback times.

2.1 Small Works - Energy Efficiency and Conservation Measures

We will invest in an energy investment programme to address specific energy issues as they arise. This will have a value of £300k/year. We have conservatively estimated that these projects will have a mean payback time of 5 years, saving 300 tonnes CO2 a year, which will accumulate. Projects could include better insulation; improvements to heating plant; better control of air-conditioning; the incorporation of variable speed drives into ventilation systems.

The Energy Manager and BMS Manager will continue to operate a housekeeping programme to ensure heating, ventilation and air conditioning systems are working optimally, and that the CHP units on the Precinct and at Langford are always running when it is carbon- and cost-effective to do so.

We will undertake projects to reduce exposure to non-commodity charges out of this fund.

Total cost over ten years: £3m

Annual carbon reduction by 2020: 3,000tCO_2

Simple payback time across all projects: 5 years

2.2 Voltage Reduction

The voltages measured at the University's electrical outlets were higher than those for which modern equipment is designed to run at. The University is 80% complete on a programme of voltage reduction at our major sites which will reduce the power drawn by many pieces of equipment, without affecting performance.

The project was 80% complete by Dec 2012. The total programme costs £1.5m and will save around £560k a year, resulting in carbon savings of around 3,300tCO_2 a year, but both costs and savings may

eventually be reduced. There may be further opportunities in this area from implementing active voltage management.

Total cost over ten years: £1.5m – already funded from capital budgets.

Annual carbon reduction: 1,500tCO_2 Simple payback time: 5 years

2.3 Behavioural Changes

We have gained a great deal of experience of running successful awareness campaigns over the last five years, and have found that schemes tied to rewards and/or celebration of success for participants work best. The high churn rate of University students and, to a lesser extent, staff, mean that awareness work will need to be supported throughout the period to 2020.

We envisage two strands of awareness activity at the Halls, building on the success of the Student Switch-Off campaign and amongst staff, following on from the first two years of implementation of the Green Impact Awards. The effect of these will be a one-off reduction in halls' electricity consumption by 2% and academic and administrative electricity consumption by 2%, costing £200k over 10 years, and delivering savings of 200tCO_2 per year.

Total cost over ten years: £200k – ten equal annual spends, currently spent out of the UTIL budget

Annual carbon reduction: 200tCO_2 by 2020.

Simple payback time: 4 years

2.4 Re-appraisal of Building Energy Management in Highly-Serviced Areas

Analysis suggests that highly serviced Type 3 Space – typically laboratories with a large throughput of conditioned air – is responsible for the emission of nearly 15,000 tonnes of CO_2.

4a Fume Cupboards We propose a £4m programme of recommissioning and control of fume cupboard systems, which currently consume over 10% of our electricity a first tranche in 2013/4 and a second, involving infrastructure costs, in 2015/6.

Fume cupboard work - total cost to 2015/6: £4,000k. Project will be bid for from capital funding.

Annual carbon reduction: 4,500tCO_2

Simple payback time: 4 years

4b Other Type 3 Space & Freezers For other Type 3 spaces, including use of -80C freezers, we will identify projects and bring them to CIPB on a case by case basis.

Total cost to 2020: £1,500k. Projects will be bid for from capital funding.

Annual carbon reduction: 1,000tCO2

Simple payback time: 8 years

2.5 Green ICT

One of the main drivers for growth in the University's electricity consumption over the last five years has been the implementation of the University's High Performance Computers, and over the previous fifteen, we've gradually reached saturation with desktop IT and peripherals, such as printers.

We propose improvements to the University's Computer Centre, which has a poor performance, pending a firm decision about its future.

Total cost over ten years: £1,200k. Will be bid for from capital funds.

Annual carbon reduction: 750tCO_2

Simple payback time: 6.2 years

2.6 University-owned vehicles

We will continue to prioritise low carbon outcomes in Staff and Student Travel Plans.

University-owned transport currently accounts for only 140 tonnes (<1%) of our Scope 1 & 2 carbon, but we need to improve the capture of carbon information. This is most easily facilitated by the adoption of the Fuel Card for all fuel purchases – we currently estimate we have 80% coverage. We expect the owned fleet to remain at roughly this size and for efficiency to increase as vehicles are replaced, leading to a 10% reduction in CO2 from this source by 2020.

Total cost over ten years: Embedded within current projects

Annual carbon reduction: 14tCO_2

About 75 tonnes CO2 is incurred by the operation of the Stoke Bishop.

2.7 Monitoring and Targeting

The University employs a full time Sustainability Analysis Manager to track Utility spend and the attendant carbon emissions, to make recommendations for change based on the performance of each building and to forecast changes to costs and carbon based on a variety of parameters including weather, fuel prices and estate disposals and acquisitions. This work has formed the basis for the University's Carbon Descent Plan.

The University will continue its roll-out of half-hourly metering on the Precinct and Langford to better understand the time profile of their buildings. This helps us to ascertain, for example, when equipment has been left on unnecessarily out of hours, and is also useful for providing information for Display Energy Certificates and gauging the effectiveness of energy saving measures. We will work with energy providers to provide half-hourly data at fiscal metering points.

We will ensure that halls are adequately metered, so that we can identify and eradicate spurious loads. Eventually we will be able to use these as awareness tools amongst the residents, too. There will be no savings per se from these measures, but they will support other efficiency actions

Non staff costs over ten years: £100k

2.8 Growth and Refurbishment

Growth in student numbers and floorspace through the acquisition of new buildings will increase our energy demand.

Conversely, in the next ten years, the University will be refurbishing a number of buildings, with the Queen's Rd Building and residences both undergoing major changes. Sustainability will work to ensure that any envelope improvements and actions which will increase the efficiency of space heating, lighting and domestic hot water systems, with a pay back time of ten years or less, are considered from the outset of any refurbishment plans. There is a great potential for cost and carbon savings via refurbishment, though some areas may be able to be more densely populated as a result. We predict that savings on buildings brought up to Part L of the building regulations and BREEAM "Very Good" as part of capital refurbishment programmes will save 3,600tCO2 a year.

Due to the new growth agenda, no reduction in space is assumed in this version of the plan.

Total cost over ten years: embedded within refurbishment costs

Annual CO2 increase due to growth: 9,700tCO2

Annual carbon reduction due to refurbishment: 3,600tCO_2

2.9 Reboilering

The previous Carbon Management Plan proposed a re-boilering programme costing £1.05m over three years to save 1,000 tonnes CO2. We believe this will need to continue through the decade as newer boilers eventually become time-expired.

Reboilering has many drivers, with the impending total failure of the equipment the usual trigger for replacement, early reboilering will reduce energy and maintenance spend and reduce the risk of early failure. Reboilering has quite a long payback time if fuel is considered to be the only saving, usually over ten years. However, this reduces to less than ten years if the avoided costs of maintenance and denial of service are factored in.

Total cost until 2015/6: £4.2m – divided into ten equal annual spends.

Annual carbon reduction: 1,600tCO_2

Simple payback time (energy only): 14 years

Simple payback time (including avoided maintenance costs): 9 years

2.10 Combined Heat and Power (CHP)

We have CHP installed at Chemistry, Medical and Langford. Richmond Building will use CHP to heat the swimming pool. At Mar 13 this is being commissioned.

The widening spread between gas and electricity prices is increasing the viability of CHP schemes.

We now believe there may be scope for CHP at the Wills Hall Residence. Gas Consumption here is a good match for electrical demand for heat at Badock and Hiatt Baker.

We will also further optimise the use of CHP already installed on the Precinct

Total cost over ten years: £1m – likely to involve a bid from capital funds when identified.

Annual carbon reduction: 400tCO_2

Simple payback time: 13 years at 2013 prices

2.11 Renewable Energy

By the beginning of 2014 we expect to have over 300kW of Photovoltaics installed at the University, doubling the present amount. These will produce 0.5% of our current electricity demand. The new build at Stoke Bishop will add to this, and future building projects will have their own planning requirements for renewables.

Several buildings, including Arts & Social Science Library, are heated using air-source heat pumps.

Many Universities plan to use renewable energy sources as a tangible signal that they are reducing carbon emissions. We will try to identify further projects which may be cost effective, but, even with incentives, paybacks are usually >10 years, and so our funds are better spent projects with greater carbon benefits – Feed-In Tariffs make projects financially attractive that otherwise would have been untenable, but do not improve the carbon performance of the project per capital pound spent.

The University has no good wind sites, and biomass is difficult to deliver to the City Centre. Renewables are likely to be limited to air-source heat pumps, solar electricity (PV) and solar thermal. We hope to see prices drop and efficiencies increase.

In this Plan, we propose a further 300kW of PV costing £650k. This includes a large public facing installation at Coombe Dingle.

Total cost over ten years: £650k – will be bid for from capital funds. This is a large reduction from the £4m considered in the previous plan.

Annual carbon reduction: 150tCO_2

Simple payback time: 12 years

We expect to be a key player in the Bristol City Council Elena Project, and expect some low carbon and renewable heat & electricity to be available from district heating by 2020, cost neutrally or better.

2.12 Electrically Heated Halls

Our electrically heated halls are Hiatt Baker, Badock and Goldney. These currently cost around £500/person/year in electricity, and this may double by 2020. In the previous version of the Carbon Management Plan, it was assumed that it would be possible to fuel switch to gas at electrically heated halls. We now believe that this is unlikely to be cost effective.

Instead we plan to use web-based control systems to run storage heaters and water heating outside of expensive periods without compromising comfort. We would seek to integrate consumption here with production of cheaper, lower carbon electricity by the CHP at Wills Hall, if that went ahead.

We will also reduce the amount of stored water at the halls using data currently being collected; early indications are that most hot water tanks are oversized.

We will work with colleagues responsible for residential refurbishment to ensure that the highest cost-effective levels of insulation are achieved at these halls during refurbishment.

Cost £1m

CO2 saving 700tCO2

Simple payback time: 6 years

3.0 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. These can vary from commuter travel to the carbon consequences of food miles or the carbon footprint for a stationery supply.

The challenge of Scope 3 is to assess the magnitude of each component. Unlike Scope 1 and 2 emissions, Scope 3 emissions must be estimated indirectly from proxy measures. This makes it difficult to do more than to prioritise areas for action, and it can obscure the effect of mitigating activity.

However, we have established a baseline for Scope 3 activity of 83,190tCO2e and set targets for reducing it.

We aim to:

- **Do further work refine the 83,190tCO2 figure**
- **Reduce this relative figure of 150tCO2e per £1m spend by 10% between 2017/18 and 2022/23**

Key areas for reducing emissions are:

- **Construction** – using the pre-existing BREEAM process
- **Food & Catering** – using current internal policies to favour local produce and reduce waste
- **Business Flights** – by promoting alternatives such as video conferencing
- **Staff and student commute** – via the current Staff and Student Travel Plans
- **Termly Travel** – this is difficult to influence, but it is so large that we need to investigate how communications could help students make low carbon choices.
- We are reducing the impact of our procurement of **other products** through Sustainable Procurement policies and supplier engagement.

The estimated baseline figures for the University's Scope 3 emissions, are, with key areas in bold:

	Emissions (tCO2e)		Source
Procurement	**Construction**	**14,774**	SUPC model based on spend in each area, 2015-16
	Food and catering	**9,653**	
	Other products	8,849	
	Business services	7,621	
	Paper products	6,558	
	Other procurement	4,273	
	IT & Comms tech	2,726	
	Med & precision tech	1,597	
	Fuel chemicals & glass	628	
	Total	**56,680**	
Staff and Student Travel for Business	**Flights**	**7,216**	From ISO14064 return 15-16 (externally audited)
	Bus	26	
	Ferry	1	
	Train		
	368		
	Taxi	14	
	University Bus	77	
	Mileage	275	
	Total 7,977		
Staff and Student Daily Commute	**Staff commute**	**2940**	Estimate from 2009. We will revisit this in 17/18
	Student Commute	**357**	
Termly Student Travel	**14,900**		Estimate from 2006/7. This is dominated by air travel, and does not contain the effect of radiative forcing. We will revisit this in 17/18
Waste	Zero (no waste to landfill)		From ISO14064 return 15-16 (externally audited)
Water	336		From ISO14064 return 15-16 (externally audited)

It can be seen that some aspects are quite rigorously measured via the ISO 14064 process, but other quantities, such as staff and student travel, rely on sampled data and are therefore less accurate.

The sum of these is 83,190 tonnes. Our turnover in 15/16 was £553.6m, so our Scope 3 emissions are 150tCO2e per £1m of spend.

3.1 Procurement

There is a role for Procurement in ensuring the purchasing of the most energy efficient equipment, and the Head of Sustainability will be working closely with the Head of Procurement to implement good practice here. ICT is likely to be an early area for investigation with this approach.

Scope 3 emissions from procurement are estimated to be 56,680tCO2e for 15/16, estimated via a Southern Universities Purchasing Consortium (SUPC) method that assigns spend in different areas different weightings in a set of DEFRA co-efficients which are in turn estimates of the carbon intensity of various sectors of the Economy.

The issue in here is that spending more money inevitably leads to an apparent increase in emissions by this method. For example, if engagement with suppliers leads to an item of equipment having a higher price but lower footprint when measured by a process such as PAS 2050[7], this would not be reflected by the DEFRA/SUPC methodology. The categories are also quite wide – "paper goods" includes books, which may nowadays include subscriptions to e-journals. Also, the relatively high price of short-run academic books compared with long-run popular books makes them more expensive, and pushes their apparent footprint higher.

3.2 Transport

We have been working with Procurement and Finance to provide firmer data on business travel and travel undertaken by staff members in their own cars. We are also working on surveys to provide more robust estimates for the staff and student commute, and travel from home for students. We need more work in these areas, and completing the methodology will be a big step towards quantifying our Scope 3 emissions.

Proactis and centralised business mileage claims have taken us much further on towards putting firm figures on Scope 3 emissions from transport. Our best estimates for CO2 emissions from different activities are now:

Flights	7,216
Bus	26
Ferry	1
Train	368
Taxi	14
University Bus	77
Mileage	257
Total	7,719

These are verified via the ISO 14064 process

Tools available to reduce this would be increasing video conferencing and continuing to promote alternatives to single-occupancy cars for commuting. Technology may help here too: the efficiency of the UK car fleet will increase as new cars – even electric cars – are introduced over the next ten years, which would reduce emissions. Homeworking could help, though a staff member homeworking in winter and using central heating all day just for themselves could quite easily produce emissions greater than a single occupancy car journey.

An alternative may be to provide hot desks for staff at Langford and Stoke Bishop, so that not all staff have to commute to the Precinct every day, but would still enjoy good IT facilities and support, including video conferencing with the main precinct, and the social benefits of a communal

[7] PAS 2050 is a method for assessing the lifecycle carbon emissions of a product

atmosphere for work. We will explore the distribution of where staff live, using data from staff travel surveys, to explore the viability of this.

Other factors may overtake us – for example, the housing developments planned for South Bristol and the city fringes may make increase the number of affordable, attractive living environments close to the main Precinct, reducing staff commuting distances.

We expect that pro-active measures on our part and efficiencies in the transport network described above will mean that we can expect a reduction of carbon emissions from these activities to be 5% by 2020.

Termly Student Travel

We also estimated the burden due to the travel by students to and from their homes, using data from the Student travel survey. The carbon burden from this is estimated to be 14,900 tonnes in 2006/7, 70% of which is due to flights originating in East Asia.

A risk in this work is that some studies suggest that the global warming effect of fossil fuel burning in

the air is greater than that it is on the ground[8], though Government does not yet have a settled view on how great this effect is[9] but could double the effect of the emission of CO2.

It was found that:

- Students return home more often than we expected, taking 3 return flights on average a year, and students from Singapore and Australasia making up to 5 long haul journeys a year. We could reduce the number of long-haul journeys by using various methods to make staying in Bristol more attractive over break periods, particularly where students will have already paid for accommodation. Relatively simple projects integrating students with families and support groups in the local community could go some way towards facilitating this.
- It is likely that more East Asian students may be educated more locally over the next 10 years,
- We envisage that airliners will become more carbon-efficient over the coming years.
- We also expect that rising oil prices will introduce price signals which will make discretionary flying less attractive.

We therefore feel confident in being able to set a target of a 5% reduction in the carbon burden of termly travel to 2020.

3.3 Waste

As part of ISO14001 we estimated emissions due to waste as being zero, as no waste goes to landfill, and reuse and recycling are much more carbon-efficient than using virgin materials. We will continue to improve our methods for measuring and managing waste generation.

3.4 Water

There are small Scope 3 emissions due to our use of water. We estimate these to be in the region of 336 tCO2 a year. Many of our schemes intended to rationalise and improve domestic hot water systems will also reduce our water consumption, and our infrastructure refurbishment programmes are being shown to reduce leaks substantially'

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[8] http://www.direct.gov.uk/en/Environmentandgreenerliving/Greenertravel/DG_064429

[9] http://www.publications.parliament.uk/pa/cm200607/cmhansrd/cm070502/text/70502w0005.htm

3.5 Other

Our largest tranche of other emissions comes from our sheep and cattle herds. We will wait to see how the needs of our vet school evolve before making a judgment on this issue, and are also taking advice from our ISO 14064 consultants.

Next Steps
Key areas for reducing emissions are:

- **Construction** – using the pre-existing BREEAM process to reduce the use of carbon-intensive materials.
- **Food and Catering** – using currently in-force internal policy tools to favour local produce and to reduce waste
- **Business Flights** – by promoting alternatives such as video conferencing
- **Staff and student commute** – via the current Staff and Student Travel Plans
- **Termly Travel** – this is difficult to influence, but it is so large that we need to investigate how communications could help students make low carbon choices.
- We are reducing the impact of our procurement of **other products** through Sustainable Procurement policies and supplier engagement.

4.0 Governance of the Carbon Management Plan (CMP)

The CMP will follow a simple Plan, Do, Check and Act cycle. That is,

- Plan – Measure carbon, design a plan based on priority areas from the data.
- Do – Implement the plans actions and measure their impact.
- Check – Review the impacts and report on these and suggest recommendations.
- Act – Review recommendations, decide on changes, review and update the plan.

4.1 – Planning the CMP

This was initially undertaken in 2009 with the help of the Carbon Trust and involved a wide ranging group made up of all stakeholders from across the University, including the student body. This plan will be reviewed each year.

4.2 Carbon Director

Carbon is the responsibility of the Director of Estates/Bursar (who is also part of the senior management team) and who holds the title of ‘Carbon Director’.

4.3 Delivery of the CMP

Day to day implementation of the CMP is managed by the Sustainability team based in Estates via the Head of Sustainability. This will involve implementing projects and initiatives, engaging with stakeholders and monitoring the impacts of the projects. Sustainability runs two groups to help with this implementation,

- A ‘Carbon Reduction Delivery Team’ made up of key people within the Sustainability team around carbon

- ‘The Carbon Management Plan Group’, which draws in wider stakeholder such as engineers from Capital Maintenance and Infrastructure and Residences Managers.

These two groups help implement key technological programmes.

4.4 Stakeholder Engagement

These include;

- All Staff and Students, the Health Trusts, Local authorities, Local community

Key stakeholders include;

- Technical Staff in charge of high energy users,
    - Research principle investigators
    - Laboratory technicians
- Estates Committee, University Planning and Resources Committee and Capital Infrastructure Planning Board
- ICT Managers
- ASU Managers
- School and faculty managers,
- Students’ Union representatives

Sustainability will directly engage with the key stakeholders above as they are gatekeepers for carbon intensive activities, to get their help in delivering carbon projects within their area as set out in the CMP; these will form a virtual group called the ‘Strategic Carbon Engagement Group’.

Each year staff and students will be asked for carbon reduction ideas (starting November 2013), which can be reviewed by sustainability for inclusion in the Carbon Management Plan.

4.5 Annual Monitoring and Reporting

The CMP will be reported on within the Sustainability Annual Report every September at Estates Committee (who represent all University stakeholders including the student body) and there will also be a separate annual report on the CMP to senior management via the Capital Infrastructure Planning Board.

The report will cover the cost and all benefits from the Programme including:

- financial savings,
- CO2 savings against target
- less quantifiable benefits, such as influencing the student body / local community

4.6 Annual Review

The CMP will be reviewed each year in January by the Estates Committee and where necessary the revised CMP will go to the University’s Executive Board (UPRAC) for review and ratification.

We are also required to report on our carbon emissions annually under the CRC and we also audit our carbon emissions voluntarily under ISO14064-1:2006 (CEMARS).

5.0 Outcome

- By 2020, we estimate that the measures outlines will have carbon emissions by 38%, and saved fuel worth £3.4m a year at today's prices. If, as expected, electricity prices increase by 100% by 2020, these savings could be worth much more.
- We will reduce our Scope 3 emissions by 10% from a 2012 baseline of 52,417tCO2e, and will improve data in this area over the next 5 years.
- We will reduce our emissions from Scope 3 transport by 5% from a baseline of 5,667 tonnes in 2012 by 2020.

John Brenton, Sustainability Manager (Analysis), Martin Wiles, Head of Sustainability

5th Mar 2013.