

University of Birmingham
Carbon Management Implementation Plan
2010 to 2020

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Foreword

Our strategic framework commits us to an absolute reduction in carbon emissions of 20% by 2020 whilst sustaining our position as a leading global university and expanding our research base.

This document sets out practical measures that will deliver this goal and articulates our determination to fully integrate carbon management in all our activities. These actions reflect an energy intensive research base, the historic nature of our Estate and a desire for our research on energy efficiency to be adopted in daily business.

The actions include capital investment in infrastructure projects, improvements to the fabric and interior of buildings, the equipment they contain, and initiatives that enable all members of the University community to contribute to delivering our ambitions.

We accept the challenges to achieve and exceeded this target as our contribution to the impact of carbon emissions on society.

Professor John Heath

Pro Vice Chancellor - Infrastructure

Executive Summary

This implementation plan sets out how the research led University of Birmingham will reduce its scope 1 and 2 greenhouse gas emissions by 20% by 2020¹. This target is set out in the “University of Birmingham’s Carbon Management Strategy 2010-2020” that was accepted by the University’s Executive Board on 12th July 2010 and Council on 28th September 2010.

The focus of this plan is on reducing scope 1 and 2 CO_{2e} emissions that result from the activities where the University has direct operational control, including energy consumed, fugitive releases of refrigerants and fuel used by the directly owned fleet.

In 2005/6, the baseline year, scope 1 and 2 emissions amounted to 62k tonnes CO_{2e} reducing to 55.8k tonnes CO_{2e} in 2009/10. This represents an absolute reduction of 10% and a reduction relative to income (adjusted for GDP) of 25%.

To achieve the 2020 target a reduction in emissions, from 2009/10 levels, of 6.2k tonnes CO_{2e}/year is required, and when the impact of known and projected new activities is included this increases to 7.7k tonnes and 11k tonnes CO_{2e}/year², respectively. These reductions will be delivered by projects to improve the fabric of buildings, install more efficient plant, ensure efficient operation of equipment and via a behavioural change campaign. The plan identifies projects that account for 97% of the carbon reduction target at current activity levels, and identifies measures that will secure the additional savings necessary to accommodate significant growth in activity to strengthen the research base and enhance the student experience.

The plan also covers scope 3 emissions (water, procurement, waste management, grey fleet, business travel, international and exchange student travel and commuting). Potential methodologies of calculation of the 2005/06 baseline are presented. Areas for improvement in data capture are highlighted, projections of likely emissions reductions are discussed and opportunities for reduction provided.

Funding for projects is available through the capital programme, via the energy efficiency small projects fund, and from the Revolving Green Fund.

Established procedures for implementing carbon reduction, monitoring progress and reporting will be utilised to ensure the successful delivery of the carbon reduction target.

This plan will be referred to the Sustainability Task Group for approval who will also be responsible for its implementation.

A sustainability communications strategy will be developed to ensure that all key groups in the University are actively participating in delivering this plan.

¹ An absolute reduction, compared to 2005/06 Scope 1 and 2 emissions

² This equates to a 27% reduction compared to business as usual.

1. Introduction

The University produced a Carbon Management Implementation Plan in 2006 as part of the first phase of the Carbon Trust's Higher Education Carbon Management Programme. The original plan covered the period 2006/7 to 2010/11 and set a target of 6% reduction in absolute terms (or 10% versus business as usual) compared to the 2005/06 baseline. This target has been exceeded for the period to 2009/10 with an absolute saving of 10%.

This Carbon Management Implementation Plan (the Plan) provides the details of the steps required to measure, monitor and reduce our carbon footprint over the period to 2020 by at least 20%. This Plan updates and therefore supersedes the previous Carbon Management Implementation Plan.

This Plan has been developed to respond to a range of drivers, which are outlined in this section together with the scope of the Plan and the key principles for our approach to carbon reduction.

1.1 Background to the University

The University of Birmingham has, for over a hundred years, through its learning and research played a major part in the success of the city and the region, and has made a global impact through its contribution to the advancement and application of knowledge. We are determined to continue to be at the forefront of research and education well into the 21st century.

As a research led University a significant proportion of the energy consumed is for energy intensive applications. Despite this there has been a significant reductions in carbon emissions when compared to growth (financially and in terms of staff/student numbers) with a major contribution from the installation of its gas fuelled Combined Heat and Power (CHP) system in 1990 (section 2.2).

1.2 Need for a CMIP

Scientific evidence shows that global average temperature is continuing to rise in a manner that is causally related to elevated atmospheric concentrations of greenhouse gases, most notably carbon dioxide. The Stern Review proposed that the only effective response is to significantly reduce emissions and a transition to a low carbon economy. This has resulted in the UK Government setting legally binding targets through the Committee on Climate Change for reductions in UK CO_{2e} emissions of 34% by 2020 and 80% by 2050 against a 1990 baseline. These targets are backed up by regulations, carbon trading schemes, taxes and fiscal measures (section 5.6).

The Department for Education and Skills mandated HEFCE (the Higher Education Funding Council for England) to promote sustainable development and to reflect it in the capital funding allocation for Universities. This resulted in HEFCE setting a carbon reduction target for the sector of at least 43% by 2020/21 against a 2005/06 baseline, which represents a 34% reduction against a 1990 baseline. In addition the second Capital Investment Framework requires Universities to have carbon management plans and that they can demonstrate a reduction in scope 1 and 2 carbon emissions from either 1990 or 2005. Furthermore Universities should be able to identify projects that will produce a reduction in carbon emissions by 2020.

Environmental sustainability is identified as an underpinning principle of our 'Strategic Framework to 2015'³. We will continue to maintain the University's reputation for taking action to reduce carbon emissions which will be promoted through effective communication of our strategy. This will allow the University to leverage action through its students, staff and the wider community.

It is widely anticipated that security of energy supply and the resulting impact on energy and carbon prices will become an increasingly important driver to reduce consumption in order to protect the core business.

This plan is produced to meet the above challenges and as part of our Corporate Social Responsibility agenda and the Sustainable Excellence programme.

1.3 Scopes of emissions

There are three scopes of emissions referred to in the Greenhouse Gas Protocol Initiative, "A Corporate Accounting and Reporting Standard"⁴ as:

- *Scope 1*: Direct emissions produced from sources that are owned or controlled by the University. This includes the combustion of fuels in boilers, the Combined Heat and Power Scheme in the vehicle fleet and fugitive emissions such as leaks of refrigerants from air conditioning systems.
- *Scope 2*: Indirect emissions caused through purchase of grid electricity.
- *Scope 3*: Covers all other indirect emissions which are a consequence of the activities of the University, but from sources it does not own or control. For example waste disposal, water supply, business travel, staff/student commuting and procurement of goods and services.

1.4 Scope of the Plan

The figure on the following page illustrates the relationship between *European Union Emissions Trading Scheme* (EU ETS), the UK's *Carbon Reduction Commitment Energy Efficiency Scheme* (CRC) and the scope of emissions in this Plan. It illustrates that the scope 1 and 2 emission sources included in Plan are those where the University has direct operational control over the emission sources. Namely the University of Birmingham and the wholly owned company Alta Estate Services Limited which operates the Combined Heat and Power (CHP) based energy centre.

Excluded from the emissions reported are:

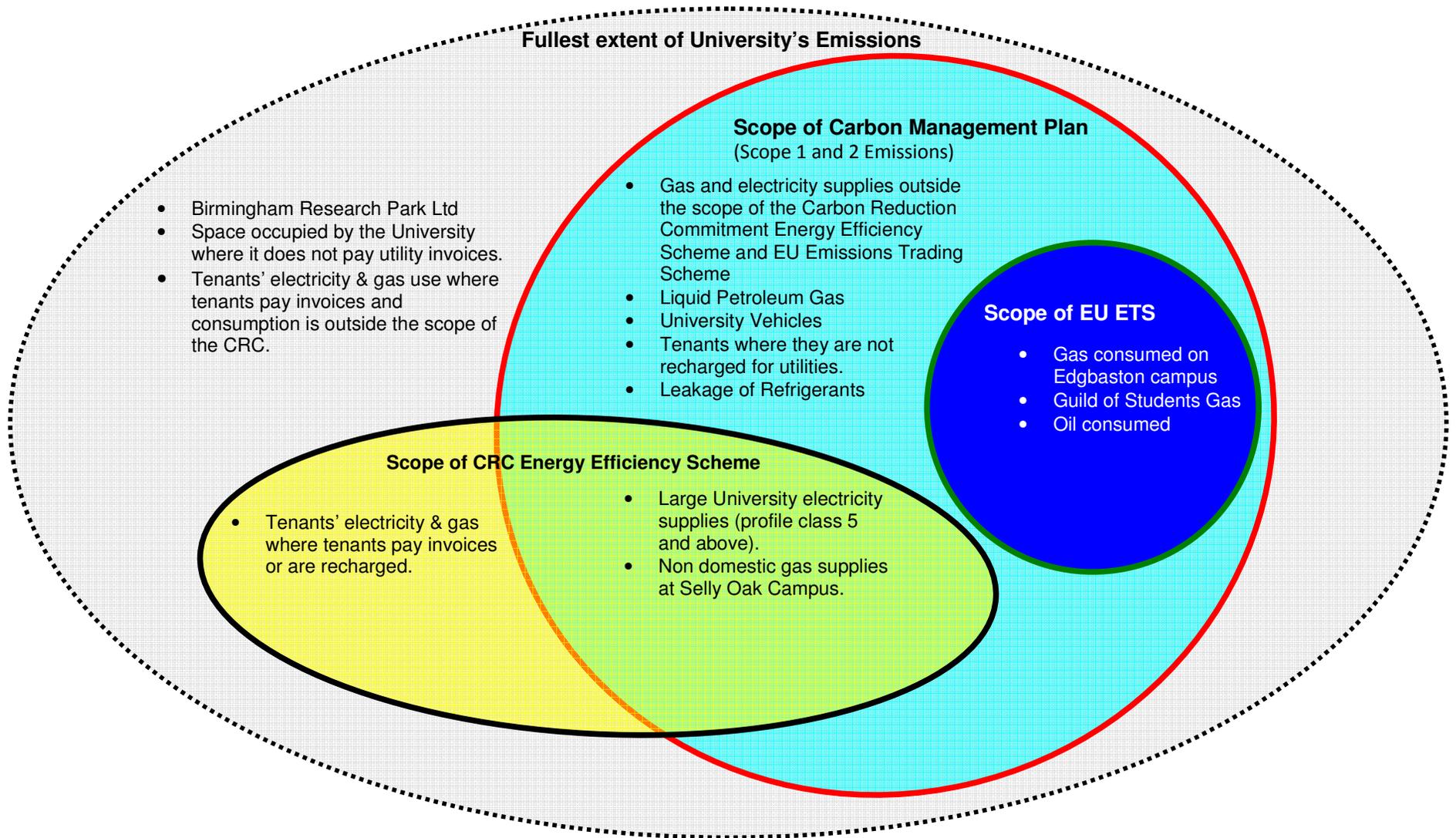
- tenants, where they pay for their consumption of energy;
- Birmingham Research Park Limited (BRPL) a joint venture between Birmingham City Council and the University; and
- embedded space in third party buildings where the University does not have operational control, including partnering NHS Trusts and operations at Ironbridge.

³ Shaping our Future Birmingham 2015 page 14.

<http://www.birmingham.ac.uk/Documents/university/shaping-future.pdf>

⁴ Produced by the World Resources Institute and World Business Council for Sustainable Development, available from <http://www.ghgprotocol.org/files/ghg-protocol-revised.pdf>

Relationship between EU Emissions Trading Scheme, Carbon Reduction Commitment Energy Efficiency Scheme and the scope of emissions in the Carbon Management Implementation Plan (for scopes 1 and 2)



1.5 Key principles

This Plan is part of our wider sustainability framework and actions will be considered in this context, including lifecycle carbon benefits and wider environmental impacts, for example, the progeny of any bio-fuel would be carefully checked to ensure that it does not result in any adverse land use, water depletion or food availability issues. Projects which have a lower cost per tonne of carbon saved will be prioritised.

The University will undertake due diligence to ensure that measures implemented will result in a net reduction in emissions rather than an apparent reduction due to accounting. This is particularly important in the early years of the Plan where reporting of emissions will focus on scope 1 and 2 and not scope 3 emissions.

Further, the general principle for implementation will be to focus on, in priority order, projects that:

- Reduce energy consumption, including
 - Improving fabric of buildings (reducing air leakage and solar gain).
 - Ensuring efficiency of energy using equipment.
 - Ensure efficient operation of energy consuming equipment (correct control, maintenance, training and awareness of the energy implications of its use).
 - Reduce emissions from University vehicles.
- Onsite renewables (opportunities are limited)
- Offsite renewables
- In line with HEFCE guidance carbon offsetting will not form part of the carbon reduction strategy to 2020.

1.6 Target adopted

The target formally adopted is a 20% reduction in emissions by 2020, compared to 2005/06 for Scope 1 and 2 as detailed in the University of Birmingham's Carbon Management Strategy 2010 – 2020 which was accepted by the University Executive Board (UEB) on 12th July 2010 and Council on 28th September 2010.

Work is being undertaken to gain a greater understanding of the University's scope 3 emissions (section 2). At this stage quantification of a baseline for scope 3 emissions will be the first target. Subsequently, meaningful reduction targets will be established for scope 3 against the baseline.

In terms of Scope 3 emissions HEFCE (2010/01 106) have called for *'a commitment to undertake work to assess what is required in order to monitor and report scope 3 emissions, including the measurement of a baseline of carbon emissions from procurement by December 2012 and setting target(s) for scope 3 emissions by December 2013'*

2. Carbon Footprint

This section presents the methodology used to calculate the University's carbon footprint for scope 1 and 2 emissions and is followed by estimates for the Scope 3 emissions. Finally the effects of known changes in emissions through to 2020 are presented with projected reductions in energy use.

2.1 Scope 1 and 2 methodology and data

Energy consumption data collected from invoices has been used as the basis for establishing the carbon footprint. Where invoices are missing or disputed our own meter readings have been used. These records together with the appropriate emissions factors taken from the Defra / DECC's guidance⁵ have been used to calculate scope 1 and 2 component of our carbon footprint. The electricity emissions factors are updated periodically at which time the University will revise the actual emissions figures from its activities. The details of the emissions factors used are summarised in the following table:

<i>Utilities</i>	Emissions factor (kg CO _{2e} /kWh)				
	2005/06	2006/07	2007/08	2008/09	2009/10
Electricity	0.53744	0.54073	0.54509	0.54522	0.54522
Gas (gross CV)	0.18523	0.18523	0.18523	0.18523	0.18523
LPG	0.21445	0.21445	0.21445	0.21445	0.21445
Gas Oil	0.27533	0.27533	0.27533	0.27533	0.27533
Steam*	0.234	0.234	0.234	Not applicable	Not applicable

* The steam factor was derived from a supply of steam produced by a third party using gas fired CHP and coal fired boilers.

Included in scope 1 emissions are leakage of refrigerant used on site (e.g. in air conditioning systems). The emissions factor associated with each type of refrigerant is listed below.

<i>Refrigerant Type</i>	Emissions factor (kg CO _{2e} /kg)
All years	
R22	1,810
R407C	1,526
R410A	1,725
R417A	1,805
R134A	1,000
R407A	1,650

All conversion factors used are CO_{2e}, carbon dioxide equivalent; that is they include the impact of other greenhouse gasses and for natural gas the conversion factor based upon the gross calorific value of the fuel but exclude the scope 3 component.

⁵ 2010 Guidelines to Defra / DECC's GHG Conversion Factors for Company Reporting Version 1.2.1 Final 06 October 2010

<http://www.defra.gov.uk/environment/business/reporting/pdf/101006-guidelines-ghg-conversion-factors.pdf>

Details of the consumption data used is summarised in the following table:

	Energy Consumption (kWh/year)					
	1989/90	2005/06	2006/07	2007/08	2008/09	2009/10
Electricity	33,717,783	45,194,179	33,499,672	43,586,827	37,923,315	38,550,689
Gas	41,997,014	170,303,893	162,608,393	140,223,953	180,553,199	181,225,508
LPG	0	51,000	51,008	51,008	51,171	51,000
Gas Oil	4,657,605	598,561	795,212	1,727,740	1,782,781	2,062,644
Steam*	8,169,278	22,576,611	22,357,875	23,827,345	0	0
Coal**	48,114,339	0	0	0	0	0
Total	136,656,019	238,724,244	219,312,160	209,416,873	220,310,466	221,889,841
Refrigerant loss (kg)						
R22	<i>Data not available</i>			67.2	18.0	67.2
R407C				119.2	67.5	172
R410A				16.2	16.8	20.3
R417A				0	3.0	6.0
R134A				5.0	0	0
R407A				5.0	0	0

* Steam supply from 3rd party discontinued in 2008

** Coal boilers replaced with gas fired Combined Heat and Power (CHP) plant in 1990

The calculated CO_{2e} emissions are shown in the following table:

Emissions (tonnes CO _{2e} per year)	1989/90	2005/06	2006/07	2007/08	2008/09	2009/10
Electricity	26,012	24,289	18,114	23,759	20,677	21,019
Gas	7,726	31,545	30,120	25,974	33,444	33,568
LPG	0	11	11	11	11	11
Gas Oil	1,356	165	219	476	491	568
Coal	15,847	0	0	0	0	0
Steam	1,704	5,283	5,232	5,576	0	0
Fleet*	357	429	376	391	274	278
Refrigerant loss	N/A	345**	345**	345	170	430
Total	53,002	62,067	54,417	56,532	55,067	55,874

*Fleet data from 1989/90 to 2007/8 is based upon 0.7% total emissions as per SQW report for HEFCE. 2008/09 and 2009/10 are from Estates Management Statistics returns.

**Refrigerant data from 2007/08 has been used for previous years except for 1989/90.

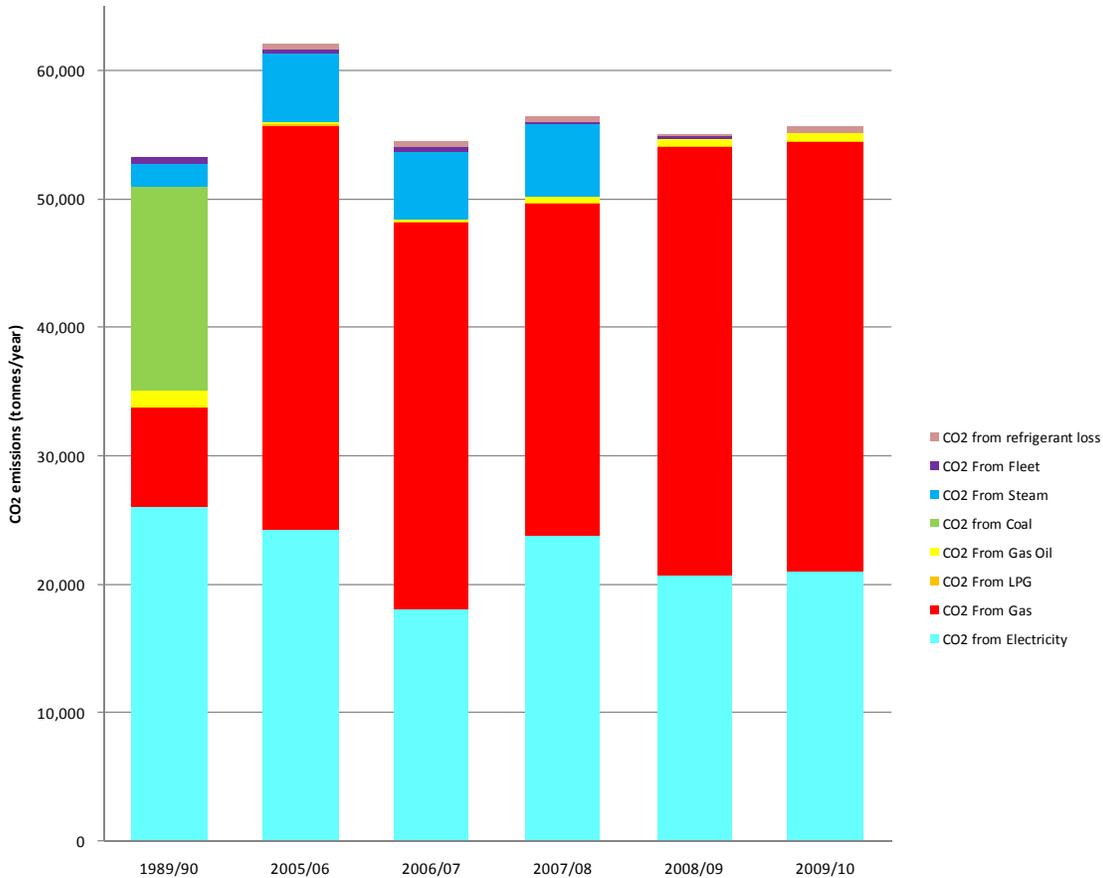
Data on student and staff numbers has been gathered from HR and Student Records and turnover from published Annual Accounts prepared by the Finance Office. This has been adjusted for the effect of inflation using the GDP deflator and is summarised in the following table. The staff/student numbers data and the turnover data being used as the growth metric.

	1989/90	2005/06	2006/07	2007/08	2008/09	2009/10
Total FTE (Staff and Students)	11,855	27,566	27,841	27,817	28,443	28,479
Income (£ million)	116	355	389	412	441	462
Inflation (GDP deflator)	60.3	91.2	93.1	95.7	98.5	100
Income GDP adjusted (£ million)	192	389	418	430	448	462
Tonnes CO₂ per FTE	4.47	2.25	1.95	2.03	1.94	1.96
Tonnes CO₂/£m income GDP adjusted	276	159	130	131	123	121

2.2 Scope 1 and 2 baseline and carbon footprint

The following figure illustrates the composition of the University's Scope 1 and 2 carbon footprint for financial years (August – July) 1989/90, 2005/06 to 2009/10. This covers the total emissions from both core activities and residences.

Scope 1 and 2 carbon footprint



The above graph illustrates how scope 1 and 2 emissions have decreased in absolute terms between 2005/6 and 2009/10 by 10%.

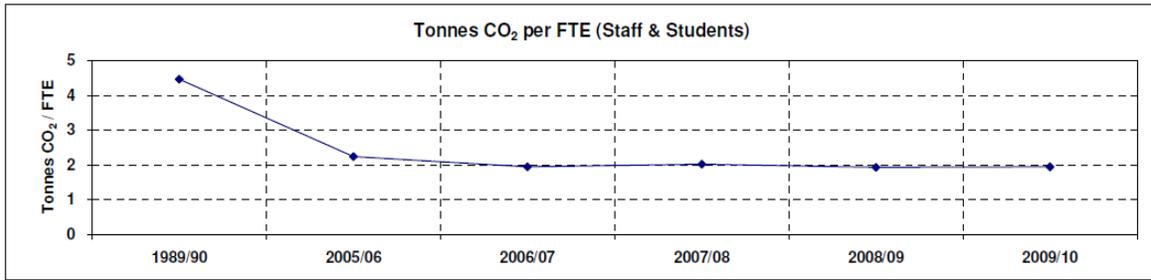
Since 2005/06 the key change to the estate was the sale of halls of residence (two of which were electrical heated) located away from the Edgbaston Campus which are being replaced with new energy-efficient residences located on the Edgbaston Campus.

The graph also shows the changes in the energy sources used by the University, in particular:-

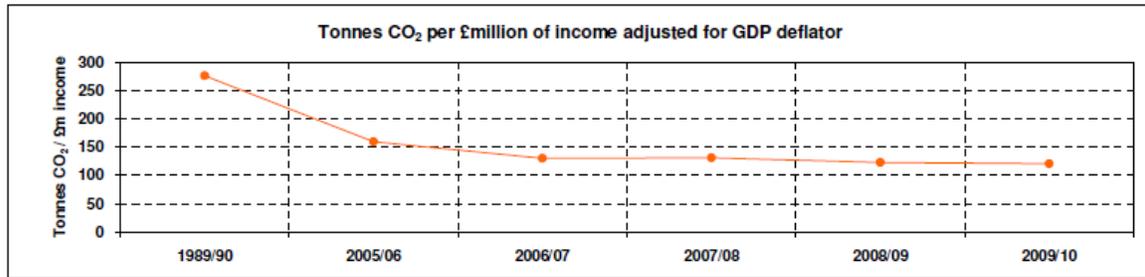
- The replacement of heat generated by coal fired boilers with a gas fired Combined Heat and Power station providing electricity and heat to the campus in 1990.
- The discontinuation of the supply of steam to the Medical School from a third party in 2008 and its replacement with gas fired boilers on a temporary basis. From the summer of 2011 the Medical School will be provided with heat from the Combined Heat and Power Station.
- The carbon intensity of grid electricity has decreased by a third between 1990 and 2005 and increased slightly (1.4%) since 2005.

These factors have resulted in a modest increase in emissions since 1989/90 despite the expansion of the activities of the University. This is illustrated in the graphs overleaf that show when scope 1 and 2 carbon emissions are adjusted for a) staff/student numbers and b) turnover, that the carbon intensity of the University's operations has reduced by more than 50% since 1989/90.

a) Scope 1 and 2 carbon footprint corrected for staff/student numbers:



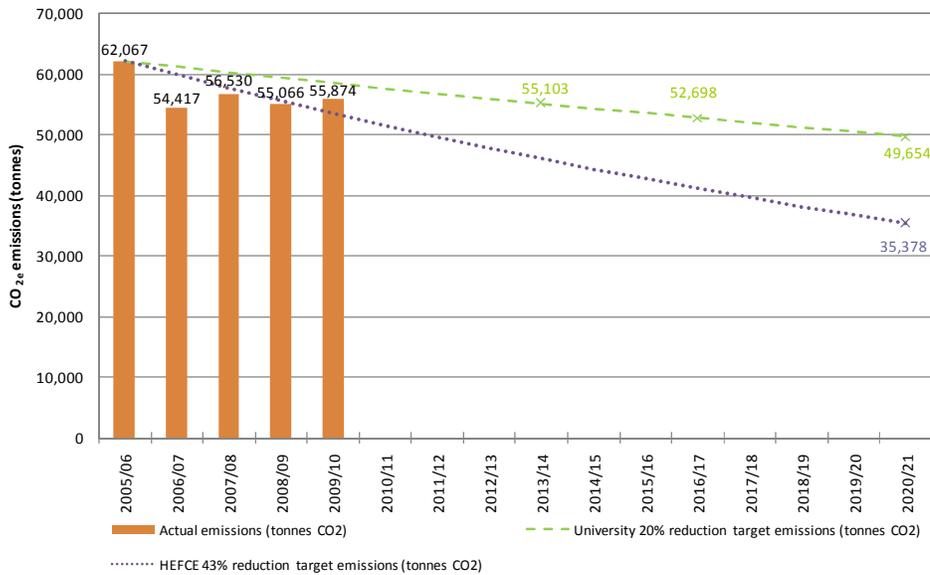
b) Scope 1 and 2 carbon footprint corrected for turnover:



2.3 Scope 1 and 2 projected emissions and target

The following graph shows actual scope 1 and 2 emissions from the 2005/6 base year (solid orange bars), the savings required to achieve the 20% reduction by 2020/21 on a linear basis (green dashed line) and the HEFCE sector target of 43% (purple dotted line).

Actual scope 1 and 2 CO₂ emissions compared with target emissions trajectory and sector target.



The graph shows that to achieve its target the University needs to reduce its emissions from 2009/10 levels by 6.2k tonnes/year. The measures required to achieve this target and their effect are summarised in section 3.

2.4 Scope 3 emissions methodology and data

This section reports on progress in measuring scope 3 baseline emissions which cover a wide range of sources. Data for sources, such as waste sent to landfill and water consumption is readily available however for others such as procurement and commuting data is not yet available. For sources, relating to travel, a series of assumptions have been made and these are detailed in appendix 1.

Data for some scope 3 emissions sources is summarised in the following table together with the appropriate emissions factors produced by DEFRA/DECC⁶. These have been used to produce an initial estimate of our scope 3 carbon footprint from the base year of 2005/6. The University has been working with its waste and recycling contractor to determine the emissions for the disposal of general waste.

	2005/6	2009/10	Emissions factor	Emissions 2005/6 (tonnes CO _{2e})	Emissions 2009/10 (tonnes CO _{2e})
Water (supply and disposal)	650,166 m ³	518,956 m ³	1.05 kg CO _{2e} /m ³	682.7	544.9
General waste to landfill	974 tonnes	752 tonnes	81 kg CO _{2e} /tonne	78.9	60.9
Paper recycling	16 tonnes	262 tonnes	-713 kg CO _{2e} /tonne	-11.4	-186.8
Mixed recycling	Not applicable	40 tonnes	-2857 kg CO _{2e} /tonne **	-	-114.3
Cardboard recycling	6 tonnes	101 tonnes	-713 kg CO _{2e} /tonne	-4.3	-72.0
Glass recycling	7 tonnes	62 tonnes	2 kg CO _{2e} /tonne	0.01	0.1
Grey Fleet	1,877,225 km	1,787,275 km	0.20825 kg CO _{2e} /km	390.9	372.2
Domestic Air Travel	*	84,986 km	0.17328 kg CO _{2e} /km	*	14.7
International Air Travel	*	10,064,562 km	0.11431 kg CO _{2e} /km	*	1,150.5
Domestic Rail Travel	*	309,257 km	0.05651 kg CO _{2e} /km	*	17.5
International Rail Travel	*	69,430 km	0.01512 kg CO _{2e} /km	*	1.0
International Students	50,099,463 km	50,853,769 km	0.11431 kg CO _{2e} /km	5,726.9	5,813.1
Exchange Students	*	582,948 km	0.09797 kg CO _{2e} /km	*	57.1
Taxis	150,628 km	143,770 km	0.15352 kg CO _{2e} /km	23.1	22.1
Staff Commuting by Car	*	*	0.20825 kg CO _{2e} /km	*	*
Staff Commuting by Rail	*	*	0.05651 kg CO _{2e} /km	*	*
Students Commuting by Car	*	*	0.20825 kg CO _{2e} /km	*	*
Students Commuting by Rail	*	*	0.05651 kg CO _{2e} /km	*	*
Procurement	*	*	*	*	*
Total				6886.8	7681.0

* Not yet available or requires further investigation

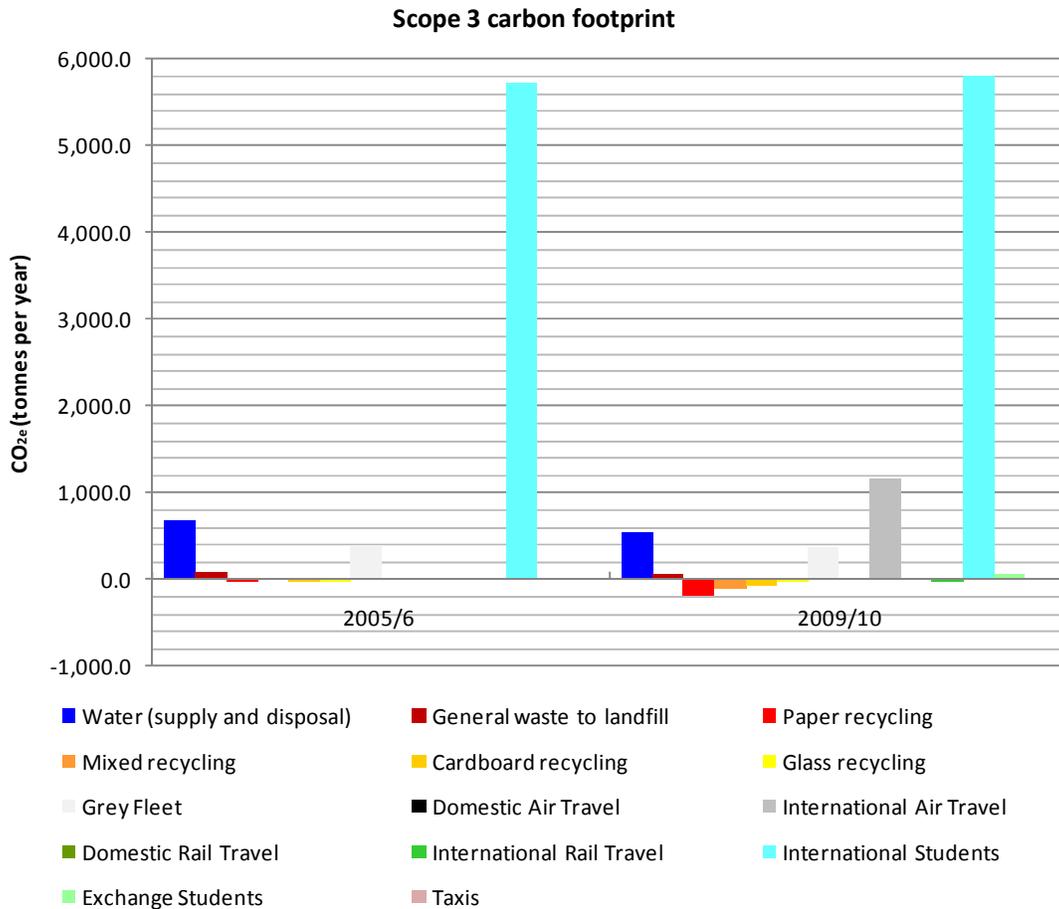
**Average of emissions factors for component materials recycled.

⁶ As footnote 4

Further details of how these estimates can be improved and the scope of reported emissions sources expanded is provided in section 3.

2.5 Estimate of scope 3 emissions

The following graph illustrates the composition of elements of the University's Scope 3 carbon footprint which total at the current estimate for 2005/6 is 6.9k tonnes CO_{2e} and 7.7k tonnes CO_{2e} for 2009/10. The data shows that there has been a small increase as more travel emissions sources were included in 2009/10.



3. Carbon reduction measures

Significant reductions in CO_{2e} emissions are required to deliver the carbon reduction target. This will require the implementation of a range of measures including retrofit projects, ICT and space utilisation improvements, delivering a smaller, smarter, more sustainable estate and enabling measures such as improved metering. The overall effect of these measures is presented to show their cumulative effect on reducing our carbon footprint.

3.1 Building retrofit projects

A range of carbon reduction projects have been identified across the University Estate as retrofit changes to the buildings which will be implemented by the Estates Office. These are summarised in a series of tables covering projects from 2010-13, 2013-16 and projects requiring further feasibility checks.

The projects for 2010-13 are summarised in the following table:

Measure	Buildings applicable	Energy saving pa (kWh)	Financial saving pa (£)	CO _{2e} saving pa (tonnes)	Capital cost including VAT and fees (£)	Payback period (years)
Cavity wall insulation	Physics West, Watson, Civil Engineering Labs, Medical Physics Building & Biosciences.	133,488	3,711	19.5	38,324	10.3
Draught proofing	Harding Law Library, Frankland, Poynting Physics, Law, Chemical Eng, BioChemEng, Aston Webb Semi-Circle (West), Hills, Physics West, Arts, Watson, Geography, Ashley, Education, Physics East, Medical Physics, Medical School, HSRC, Priorsfield House & Denis Howell.	741,160	22,455	131.8	185,542	8.3
Solar shading	Chemical Engineering, BioChemEng, Hills Building, Mechanical & Civil Engineering.	37,786	3,405	20.6	29,187	8.6
Other Insulation (pipework)	Geography, Biosciences, Law, Civil Engineering Labs, Mechanical & Civil Engineering, HSRC, Education, Priorsfield House, Poynting Physics, Denis Howell Building, Medical School, Chemical Engineering, Physics West, BioChemEng, Physics West, Arts, Biomedical Services Building, J G Smith & Harding Law Library.	410,159	12,387	79.0	99,336	8.0
Air conditioning temperature set points	Geography, Chemical Eng, BioChemEng, Haworth Chemistry, Poynting Physics, J G Smith, Frankland, Physics East, Mechanical & Civil Eng, The Denis Howell Building, Elms Road Data Centre, Physics West, Physics East, Watson, Chemistry West, Law Building, BioChemEng, Medical School, Medical Physics Building, Biosciences, Watson & Aston Webb B Block.	351,948	31,711	173.4	26,421	0.8
Light fitting upgrades and/or controls	Geography, Physics East, Denis Howell Building, Priorsfield House, Law, Arts, Shackleton Hall, Robert Aitken Institute of Clinical Research, Physics West, Ashley, Watson, Education, Frankland, Medical School, Great Hall, Poynting Physics, IBR, Chemistry West, Computer Science, BioChemEng, Student Facilities, Medical Physics, Poynting Physics, Mechanical & Civil Engineering, Education, Chemical Engineering, Strathcona, Haworth Chemistry, Learning Centre and Primary Care, Watson, Geography, Aston Webb Semi-Circle (West), Biosciences, IBR West, Priorsfield House & Great Hall.	1,627,077	145,955	839.0	1,774,628	12.2
Variable speed drives	Chemical Engineering & Frankland.	39,152	1,659	10.0	15,863	9.6
Thermostatic radiator valves	Civil Engineering Labs, Physics West, Chemistry West, Robert Aitken Inst. of Clinical Research, Watson, Hills Building, The Denis Howell Building, Education, Ashley & Poynting Physics.	190,985	5,309	19.4	14,657	2.8
Total		3,531,755	226,592	1,293	2,183,958	9.6

The projects for 2013-16 are summarised in the following table:

Measure	Buildings applicable	Energy saving pa (kWh)	Financial saving pa (£)	CO _{2e} saving pa (tonnes)	Capital cost including VAT and fees (£)	Payback period (years)
Cavity wall insulation	Physics East	48,000	1,334	8.0	13,959	10.5
Draught proofing	Great Hall, Mechanical & Civil Engineering & Biosciences.	854,797	23,763	142.8	68,843	2.9
Light fitting upgrades and controls	Medical Physics Building, Aston Webb Semi-Circle (West), Civil Engineering Labs, Haworth Chemistry, Biosciences, Harding Law Library, Frankland Annex, Physics West, Watson & Hills Building.	289,600	26,093	157.9	704,219	27.0
Total		1,192,397	51,191	308.7	787,021	15.4

Projects requiring further feasibility checks are summarised in the following table:

Measure	Buildings applicable	Energy saving pa (kWh)	Financial saving pa (£)	CO _{2e} saving pa (tonnes)	Capital cost including VAT and fees (£)	Payback period (years)
Cavity wall insulation	Old Gymnasium, Ashley, Strathcona, Munrow Sports Centre & Chemistry West.	448,697	12,474	74.9	116,431	9.3
Draught proofing	Aston Webb A Block, Aston Webb C Block, Aston Webb Domes & Semi-Circle, Old Gymnasium & Munrow Sports Centre.	755,785	21,104	126.8	137,401	6.5
Secondary glazing	Aston Webb A Block, Aston Webb Domes & Semi-Circle, Poynting Physics, Aston Webb C Block, Chemistry West, Chemical Engineering, Medical School, Aston Webb Semi-Circle (West) & Great Hall.	1,831,798	51,796	308.3	999,325	19.3
Heating zoning	Frankland, Arts, Aston Webb A Block, Aston Webb C Block, Aston Webb Domes & Semi-Circle, Harding Law Library, Law Building, Biosciences, Great Hall, Medical School, Chemical Engineering, Hills & Education.	112,824	8,836	53.4	0	0.0

University of Birmingham, Carbon Management Implementation Plan 2010

Air conditioning temperature set points	Haworth Chemistry & Biosciences	91,410	8,236	49.8	126,900	15.4
Heating zoning	Arts, Medical School, Law building, Chemical Engineering, Hills Building & Education.	252,268	7,062	43.5	61,547	8.7
Lighting controls and fittings	Nuffield Building, Munrow Sports Centre, Aston Webb A Block, Aston Webb C Block, Aston Webb Domes & Semi-Circle & Old Gymnasium	133,136	11,996	72.6	54,427	4.5
Total		3,625,918	121,504	729	1,496,031	12.3

Summary of projects from previous three tables:

Energy saving pa (kWh)	Financial saving pa (£)	CO_{2e} saving pa (tonnes)	Capital cost including VAT and fees (£)	Payback period (years)
8,350,069	399,287	2,331	4,467,010	11.2

Together these account for a significant proportion, 37%, of the reduction from 2009/10 levels required to achieve the target reduction.

The following measures give projected CO₂ savings for refurbishment of buildings and infrastructure projects. The first four are on site and the remainder subject to further investigation:

- Over-cladding and double glazing of Gisbert Kapp/52 Pritchatts Road buildings which is estimated to reduce heat requirements by 30%. The Energy Performance Certificate for this project was a 'B'.
- The refurbishment of the Metallurgy and Materials building is expected to achieve a 'B' rated Energy Performance Certificate and will improve the efficiency of space use. The above two projects are estimated to save 550 tonnes CO_{2e} /year.
- Extension of the University's district heating system is in progress which will enable the combined heat and power station to provide heat to the Medical School. This is estimated to save more than 1,400 tonnes CO_{2e} /year from the summer 2011.
- A trial of LEDs (Light emitting diodes) for street lighting and lighting corridors is being undertaken on campus. If this is successful it has the potential to save about 44 tonnes CO_{2e} per year when implemented with a potential for wider replication.

- A feasibility study is being undertaken into low carbon cooling using high efficiency chillers for the IBR building. The capital cost is estimated as being about £400k and this project is estimated to save about 300 tonnes CO_{2e} per year.
- CHP at the Mason Residence would produce a projected saving of 400 tonnes CO_{2e} pa for a capital cost estimated at £400k. The works are subject to feasibility study and funding approval.
- A steam turbine to complement the CHP Station. Indicative figures are that it will save about 200 tonnes CO_{2e} per year and have a capital cost of about £400k.
- Measures were identified in the University's Air Conditioning Inspection Reports which will lead to carbon reduction. Some have already been implemented.
- An estimated 620 tonnes CO_{2e} per year (equating to about 1% of the baseline emissions) will be saved from the behavioural change strategy identified in section 6 of this Plan. This will be supported by the £250k capital costs associated with implementation of improved metering and display of information (see section 3.2).

3.2 Metering and information provision

Improved metering is a key component of this Plan as it supports many behavioural change measures described in section 6.

Being a campus based University determination of the consumption of individual buildings is dependent upon the University having its own meters to measure electricity, heat, steam and water. The University has therefore developed a smart meter reading system which has been/is being incorporated into new and refurbished buildings and when upgrading the electrical distribution system.

To further develop the metering system funding of £250k has been approved with completion due in 2011. Buildings over 250m² will be metered for all utilities (except laboratory gas) and additional sub metering installed on large items of plant (e.g. large air conditioning plants, furnaces and larger IT loads). Web based tools are being developed that will enable the display of energy and carbon information (both historic and real time) on the computers of key staff (in Estates, those in charge of Residences and the Facilities and Operational Managers) and on information screens in public areas.

3.3 ICT

ICT is a major area of energy consumption and has resulted in a significant growth in power consumption, typically accounting for 15% of electricity use at Universities⁷. With the rapid changes in the development in ICT it has not been possible to attribute a long term carbon reduction figure to this area and evaluate how the increasing demands for ICT will be balanced against the reduction in energy use for cooling and processing.

An IT strategy has recently been approved by the University Executive Board (UEB), one of the key objectives of the strategy being to reduce carbon emissions. In addition there are plans for a new data centre which would enable the latest low energy technology to be incorporated and allow further concentration of processing. The savings that improvements in ICT might yield are covered in section 3.7

ICT will also make a significant contribution to scope 3 carbon emissions. The Sustainable Procurement Policy (3.12) the energy performance will be an important factor in procuring ICT.

3.4 Space utilisation

One aspect of the Sustainable Excellence programme is to further increase the efficiency of space use and focus on a smaller, smarter, more sustainable estate. This will allow capital investment and maintenance to be targeted to improve the quality of existing estate and ensure new developments achieve excellent standards. This includes:-

- Reviewing space requirements when refurbishments are undertaken to ensure that maximum use is made of space. For example, the Aston Web B block is part of an iconic grade II star listed building constructed in the 1900s and the number of people housed in the building could be significantly increased through measures such as converting to open plan.
- Significant CO_{2e} savings are expected from improvements in space utilisation which are aimed at removing or improving high cost/carbon buildings and concentrating activities in efficient buildings. The savings that this will yield are covered in section 3.7.
- A further area regarding space utilisation is the feasibility of consolidating buildings which are serviced 24 hours a day, through use of dedicated spaces.

3.5 Refrigerants

Data on refrigerant loss from University systems will be monitored by the Estates Office to ensure that it is minimised. The University of Birmingham Sustainable Cooling Policy already limits the use of air conditioning and comfort cooling.

⁷ See Sustainable ICT in further and higher education JISC January 2009
<http://www.jisc.ac.uk/publications/programmerelated/2009/sustainableictfinalreport.aspx>

3.6 Fleet

A fleet review by the Energy Saving Trust is planned for spring 2011. Following its recommendations the University's Transport Manager plans to develop an action plan to minimise the emissions from the University fleet. Starting in early 2011 Transport Services will be sending drivers on a 'Fuel Efficient Driving' course which is targeting savings of 8% in fuel use (a reduction in emissions of about 18.5 tonnes CO_{2e} pa). This will complement previous driver skills training which has reduced accidents (mostly minor) by 40%. Opportunities for procurement of lower emissions vehicles are being taken as the current fleet reaches its end of life; this includes increasing the number of electric vehicles and even a hydrogen vehicle. In addition a Vehicle Management Business system to record the fuel consumption of fleet and hired vehicles will be procured.

3.7 Significant estate changes & increased activity

There are significant estate changes planned in the period to 2020, these include:

- A new CRF building (biobank and gene therapy pharmacy) is estimated to add about 300 tonnes CO_{2e} pa and will be in use in 2011.
- Bramall Music Building which incorporates a concert hall and is estimated to add about 400 tonnes CO_{2e}/year; scheduled for completion in 2012.
- Plans to replace the currently vacant Chamberlain Hall with an additional 700 bed spaces, with sustainability and low carbon performance being key aims for the development.
- Individual research projects, which have been estimated as generating an additional 200 tonnes CO_{2e} /year

Together, these changes will have a significant impact on the University's emissions and have been accounted for by means of a predicted increase of 2.5% on the scope 1 and 2 baseline carbon footprint.

In addition, significant growth in the research base must be accommodated over the 10 year period, including research in bio-medical and physical sciences, much of which is necessarily energy-intensive. This plan assumes that significant carbon savings that will be secured through providing highly energy-efficient ICT and the planned replacement of existing facilities such as the Library, Sports Centre and Haworth Chemistry Building with highly efficient buildings will be off-set by growth in research activity and student facilities.

3.8 Effect on scope 1 and 2 carbon footprint

The measures outlined in this section are anticipated to have a significant effect on the University's scope 1 and 2 carbon footprint. In summary they are:

Emissions in 2009/10	55,874 tonnes CO _{2e}	(Section 2.1)
Known additional emissions	+ 1,552 tonnes CO _{2e}	(Section 3.7)
Reduction from building retrofit projects	- 2,331 tonnes CO _{2e}	(Section 3.1)
Reduction from other projects	- 3,533 tonnes CO _{2e}	(Section 3.1)

Estimated emissions in 2020	51,563 tonnes CO _{2e}
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2005/6 emissions	62,067 tonnes CO _{2e}
Less 20% target gives:-	

Target emissions in 2020	49,654 tonnes CO _{2e}
---------------------------------	--------------------------------

Assumptions

Emissions are not predicted to fall significantly over the next three years due to the impact of new developments offsetting projected savings.

There is always a risk to delivery of carbon reduction projects due to the assumptions made. The key assumptions made are that:

- the current carbon intensity of the energy supply will remain constant to 2020. This assumption will be reviewed prior to major investment decisions.
- current technology is used;
- current estate strategy is used;
- projects are not subject to excessive additional costs for example related to asbestos or planning issues that results in them becoming uneconomic; and

As a research-led university the imperative to conduct energy intensive research will remain and is expected to result in innovations that deliver significant carbon reduction and general benefits to society, but increase our carbon footprint. These can be referred to as scope 4 emissions and are covered in section 5.5.

Scope 3 Emissions

3.9 Water

The University was shortlisted for the Water UK & Environment Agency Water Efficiency Award in 2000 for a programme of water reduction measures that resulted in a 50% reduction in non-residential water consumption via metering, reduction in leakage and water conservation projects in laboratories. In achieving this, the University successfully decoupled water use from the growth in the number of students.

The key opportunities remaining in reducing water consumption are:

- continuing vigilance in identifying leaks via survey and monitoring of consumption (logged on a 30 minute basis);
- continued improvements to water efficiency in toilets and washrooms;
- continued attention to use of water in laboratories.

A further 5% reduction in water consumption will result in a saving of 27.2 tonnes CO_{2e} per year.

3.10 Waste Reduction and Recycling

Waste management and particularly recycling is a very visible aspect of the University's environmental performance. Staff and students increasingly expect to have recycling facilities provided for their use in all buildings Recycling can therefore be easily used to engage staff/students and drive cultural change, leveraging further action.

In September 2009 Environmental Services piloted the Binless Office (Mixed Recycling Scheme) in the newly refurbished Muirhead Tower installing central recycling points for users of the building to segregate their general waste and mixed recycling. The scheme proved successful during a six month pilot and a phased roll out of the scheme across campus commenced in March 2010. The scheme is currently generating in the region of 4.5 tonnes of mixed recycling per month. This will require additional funding to ensure campus wide coverage of the scheme.

Data provided during the tender process for the new contract for waste reduction and recycling showed that the University could reduce its emissions by diverting its waste from landfill to incineration with energy recovery. This resulted in general waste being switched from landfill disposal to energy from waste plant decreasing scope 3 emissions by 106 to 114 tonnes CO_{2e}/year and avoided emissions⁸ reduced from 208 to 289 tonnes CO_{2e}/year.

The implementation of a Sustainable Procurement Strategy and action plan in support of the policies set out in the University's Sustainable Procurement Policy (see section 3.12) would impact upon waste management with coordination of deliveries leading to a reduction in packaging waste for items delivered to the University and the potential for the introduction of a policy requiring suppliers to use packaging that meets specific requirements of the University.

If recycling is to be optimised on campus, source segregation of recycling materials will typically provide the most cost effective route to waste management. This will require that a suitable waste compound is developed to enable the necessary scale to be delivered to make such a proposition economically viable.

Linking with section 3.3, ICT, there are significant opportunities for waste minimisation in the areas of WEEE (Waste Electronic and Electrical Equipment) through optimisation of the replacement rate of ICT equipment and paper waste. Development of printing on demand strategies has shown that a significant reduction in paper usage can be achieved and are being introduced in parts of the University.

3.11 Travel (business and commuting/student travel)

The University's Travel Plan covers a five-year period from 2010 to 2015 and aims to achieve a change in culture at the University to more sustainable travel during this period. The Travel Plan is a living document and as such will continuously develop as necessary to address the changing needs of the University and the environment in which it operates. Currently, the Travel Plan focuses on the Edgbaston campus with a view to rolling out of the measures to other locations where appropriate.

From a 2009/10 baseline by 2011/12 the aim is to achieve a 5% reduction in the proportion of staff and student single occupancy journeys to, between and from all University sites by means of:

- increasing the proportion of staff and students walking and/or cycling to the University;
- increasing the proportion of staff and students using public transport to access the University;
- increasing the proportion of staff car sharing to the University; and
- managing the demand for car parking at the University.

The Travel Plan's longer term targets will include:

- assessing all business travel by mileage;
- reducing the proportion of work-related travel claims that are associated with car and air journeys; and
- setting targets based on the University's carbon footprint to establish a target which is based on reduction in CO_{2e} emissions rather than car trips.

Sustainable travel information is published at <http://www.bham.ac.uk/travel/>

⁸ The avoided emissions are those which are associated with recovery of materials (metals) from the incineration process and the electricity and heat, generated by incineration which is then fed into a district heating system.

3.12 Procurement

The University's Sustainable Procurement Policy recognises the significant impact that its procurement activities has on the environment, society and the economy and, supported by a Sustainable Procurement Strategy and Action Plan, is the primary focus for reducing carbon emissions in the supply chain. The policy commits staff at the University to work together, in addition to working with students, contractors, suppliers and Sector Purchasing Consortia to embed sustainable procurement in the culture of the University.

The Strategy and Action Plan are under development, but activities are already being progressed to deliver on some of the key headlines of the policy, including:

- investing in an electronic market place which provides access to supplier catalogues and accurate details on products (including environmental impacts). This will facilitate improvements in the quality of purchasing decision making and enable environmental impact to be considered in the evaluation process;
- investing in asset registration and management software which will provide access to information on the University's existing portfolio of equipment and resources to maximise the use of existing assets and investments and avoid unnecessary purchases. There are additional plans to provide access to the asset register; stores stock catalogues and the wider portfolio of products and services available through the University's "internal market" through the e-marketplace;
- ensuring that carbon emission and environmental impact data are obtained as part of tender processes (but over time as part of any relevant competitive process) and given adequate weightings in the evaluation and purchasing decision making process;
- promoting the use of whole life costing and seeking ways to place a value on "shadow carbon";
- encouraging staff to accept consolidated deliveries of products in order to reduce the frequency of supplier deliveries to campus;
- providing access to training for core staff involved in procurement and purchasing within the University, initially by means of the sustainable procurement training provided by the HE Sector Sustainable Procurement Centre of Excellence; and
- creating a cross functional Sustainable Procurement Focus Group to develop and take the lead role in the development and delivery of the Strategy and Action Plan to deliver on the commitments set out in the policy.

The investments and actions being made and planned (illustrated above) demonstrate that the University recognises the importance of its procurement and supply chain activities as it strives to reduce its carbon footprint in supporting its core activities.

The University recognises that the emissions associated with the University's procurement (included rented spaces) and supply chain activities will be significant and the expectation is that they will be of a similar order to scope 1 and 2 emissions reported in this Plan. It is therefore essential that the methodology used to quantify the emissions is reliable and provides data that has an appropriate level of integrity. The work to quantify procurement and supply chain emissions is in progress but not yet completed - accordingly these emissions are not included in this Plan.

4. Carbon reduction financing

The University is committed to providing funding to ensure measures to reduce carbon emissions are implemented and its carbon reduction target is exceeded. A combination of the Revolving Green fund (Salix funding), a dedicated Energy Efficiency small projects fund and the University's capital investment procedures are used to ensure success.

4.1 Revolving Green Fund

The University has secured funding from the Salix Finance Limited and HEFCE to establish a Revolving Green Fund of £625k. Criteria for the payback period and the lifetime cost per tonne of carbon saved must be met for the project to be eligible for funding.

4.2 Energy Efficiency small projects fund

The University has set aside additional funding for energy conservation projects of about £100k per annum. This funding is also used to secure specialist advice when required to facilitate projects.

4.3 Other capital investment procedures

The University's capital investment procedures are used in addition to the previous two routes, allowing a wider range of projects to be supported. In this case bids are made for money for capital investment with approval given on a case by case basis. The remaining projects are expected to be funded this way.

4.4 Other additional resource requirements

As this Plan is implemented there may be additional resource requirements in terms of staff resource and specific facilities. These will be addressed by those responsible for implementing the plan, as described in section 5. One key additional resource requirement that will be required will be participation, by all parties, across the University in carbon reduction. The measures which are designed to ensure this are described in section 6 of this Plan.

5. Governance

Good governance is essential if this Plan is to be successfully implemented. This section describes: the measures implemented to ensure that accountability for this Plan is assigned; reporting procedures and routes for mitigation measures established; policies aligned to ensure the success of this Plan, changing legislative requirements and auditing undertaken.

5.1 Governance sign off and reporting

Ultimate responsibility for carbon management lies with the Council of the University as advised by the University Executive Board (UEB) and supported by the Sustainability Task Group, who have delegated responsibility to sign off this implementation plan.

This Carbon Management Implementation Plan is designed to be the practical route for achieving the University's approved carbon management strategy, as set out in the "University of Birmingham's Carbon Management Strategy 2010-2020". The Strategy was accepted by the University's Executive Board on 12th July 2010 and by Council on 28th September 2010.

The Sustainability Task Group is responsible for the development and implementation of the Sustainability Strategy. It is comprised of senior members of the University with key operational responsibilities and is chaired by the Pro Vice Chancellor - Estates and Infrastructure. The Task Group reports to the University Executive Board.

5.2 Implementing the Plan

Personnel with environmental and carbon responsibilities are summarised in the following table:

Responsibility	Personnel
UEB representation Day to day responsibility for carbon management for the University	Pro Vice Chancellor (Estates and Infrastructure) http://www.mgmtgroup.bham.ac.uk/members/heath.shtml
Sustainability Task Group	PVC Estates & Infrastructure Sustainability & Environmental Advisor College Operations Managers Head of Utilities General Manager, HAS Director of Workplace Wellbeing Assistant Director of Finance (Procurement) Ethical and Environmental Officer, Guild of Students
Estates Office The Estates Office is part of Corporate Services http://www.about.bham.ac.uk/structure/services/ which support the operation of the University.	Director Estates Assistant Directors Estates Head of Utilities Operations Manager (CHP) Energy Engineer Energy Analyst Controls Officer & Team Maintenance Personnel Project Managers
Human Resources	Sustainability and Environmental Advisor
Hospitality and Accommodation Services	Policy and Environmental Services Manager (Hospital and Accommodation Services) Sustainable Travel Co-coordinator Sustainable Projects Coordinator Post, Porters and Transport Manager
Academic Colleges	Heads of Colleges Facilities Managers and Operational Managers. Environmental Health and Safety Manager (with lead for the Environment) in the College of Life and Environmental Sciences.
Communications Office	Communications Office staff and Sustainability Communications Group.

5.3 Managing, maintaining and reporting carbon performance

The Estates Office Operational Plan has adopted a series of key performance indicators which it uses to monitor utility use and carbon emissions. These will be used to monitor the performance of the University and in particular in relation to this Carbon Management Implementation Plan. The KPIs are:

- Total CO_{2e} emissions (entire University and non residential estate).
- CO_{2e} emissions per £million turnover adjusted for GDP deflator
- CO_{2e} emissions per FTE staff and students (non residential estate).

The performance in respect to these KPIs, implementation of projects (outlined in section 3 of this plan) and achievement towards our carbon reduction target will be reported annually to the Sustainability Task Group and onwards to University Executive Board and Council.

Annual accounting of carbon emissions is undertaken via the Estate Management Statistics, which are reported to the Higher Education Funding Council for England. They follow guidance produced by DEFRA/DECC. The Higher Education Carbon Management Plan figures are presented on the university's web site at: <http://www.climatechange.bham.ac.uk/update.shtml>.

5.4 Policy alignment

The University's Environmental Policy was written in 2000, updated in 2007 and revised in 2009 to reflect the adoption of a College structure by the University⁹. This policy was approved by the Environmental Health and Safety Executive Committee and includes targets for carbon reduction. The University has also produced a sustainability report¹⁰.

The targets for carbon reduction in the Environmental Policy are taken from the Higher Education Carbon Management Plan which was signed off by the University Senior Management Team, chaired by the Vice Chancellor in May 2006. The targets in the Environmental Policy will be updated to reflect the changes in this document.

The Estates Office Strategic Plan highlights the sustainability of the estate and the need for further reduction in energy use and the key theme of a smaller better estate.

The University has published heating and cooling policies and guidance¹¹ and Energy Standards for new buildings and full refurbishments.

5.5 Scope 4 Emissions

It is recognised¹² that '*Institutions have a valuable role to play in promoting carbon reductions through their other activities including teaching, research and public communications*'. These are sometimes categorised as 'scope 4' activities, and whilst it may not be possible to measure the results of these activities, they will play an important part in the overall communications strategy.

⁹ See <http://www.environment.bham.ac.uk/index.shtml>

¹⁰ See <http://www.environment.bham.ac.uk/sustainability.shtml>

¹¹ See http://www.estates.bham.ac.uk/what/Cooling_Policy.pdf <http://www.estates.bham.ac.uk/what/HeatingStandards.pdf> and http://www.estates.bham.ac.uk/what/Cooling_Guidance.pdf

¹² http://www.hefce.ac.uk/pubs/hefce/2010/10_01/

The University has research activities across a wide range of areas relating to energy demand, generation, distribution and policy, as well as the associated environmental and societal impact of different forms of energy generation and use. This impressive portfolio of energy related research at the University comprises over 150 academic staff and is overseen by the Institute for Energy Research and Policy¹³ and the Energy at Birmingham initiative, which exists to promote, support and enhance energy research across the University. Birmingham is also part of the Midlands Energy Consortium¹⁴ with the Universities of Nottingham and Loughborough.

Birmingham's Hydrogen Fuel Cells Group¹⁵, the UK's biggest, hosts a doctoral training centre with 50 students and demonstrates a number of hydrogen vehicles and a hydrogen narrow boat. The Birmingham Centre for Nuclear Education and Research spans nine schools and three colleges and addresses all aspects of the nuclear power industry, from the physics of reactions to the management of decommissioning and waste. The Centre is expanding and investing in response to the government's commitment to the new build of nuclear reactors. The School of Metallurgy and Materials is equipped with Europe's largest materials laboratory and is leading the field in research into novel high performance materials for future power stations, light materials for aircraft and powder processing techniques that have the potential to reduce waste and energy intensity in aircraft manufacturing by up to 90%. Birmingham also conducts extensive research into biofuels, carbon capture, environmental and electricity economics, sustainable manufacturing processes, resource recovery, climate change and our resilience to it, atmosphere and air pollution, and distribution technologies. Dedicated groups work closely with industry to develop high speed trains¹⁶ and in future power systems¹⁷, where academics are examining the use of alternative fuels and the optimisation of the combustion engine.

The University runs Energy Engineering degrees¹⁸ at Undergraduate level and has entered more groups than any other University in the Npower energy challenge achieving 1st and third place in the 2010 final¹⁹. It also teaches the UK's longest running postgraduate course in Nuclear Reactors²⁰ which is overseen by an industrial steering board composed of almost 20 companies from the sector to ensure relevance to industry, and for over 50 years its graduates have been readily employed in the nuclear sector. From next year the University will offer an additional undergraduate degree in nuclear engineering and postgraduate degrees in nuclear decommissioning and in energy policy. Postgraduates at Birmingham also have access to the resources of the Midlands Energy Graduate School²¹

¹³ See <http://www.ierp.bham.ac.uk/> and

http://www.newscentre.bham.ac.uk/press/2007/09/ETI_consortium_bid_20_09_07.shtml

¹⁴ See <http://www.midlandseneryconsortium.org/index.html>

¹⁵ See <http://www.fuelcells.bham.ac.uk/>

¹⁶ See <http://www.climatechange.bham.ac.uk/research.shtml>

¹⁷ See <http://www.eng.bham.ac.uk/mechanical/fps/research.shtml>

¹⁸ See <http://www.eng.bham.ac.uk/energy>

¹⁹ See <http://www.newscentre.bham.ac.uk/press/2010/03/24Mar10RWEnpowercompetition.shtml>

²⁰ See <http://www.birmingham.ac.uk/students/courses/postgraduate/taught/physics/physics-technology-nuclear-reactors.aspx>

²¹ See <http://www.megs.ac.uk/megs/index.aspx>

5.6 Legal compliance and voluntary schemes.

A range of measures are currently carried out by the University to ensure that legal compliance is achieved and voluntary schemes complied with. These are summarised in the following table:

Area	Details
EU Energy Performance of Buildings Directive DEC EPCs Air Conditioning Inspections Building Regulations	Sets out to 'promote the improvement of the energy performance of buildings within the EU through cost effective measures', implemented through specific measures and standards in the UK; these includes:- Display Energy Certificates (DECs) which set out a methodology for calculating the energy performance of public buildings over 1,000m ² . DECs have been produced for all buildings where they are required and also for some buildings where arguable they are not. Energy Performance Certificates (EPCs) which have been produced where required for new building and lettings. The regular inspections of cooling systems; which have been conducted. Building Regulations Part L sets out requirements for energy efficiency and the effective control of buildings and associated plant. Part F applies to ventilation. These regulations apply to both new buildings and refurbishments which were revised during 2010.
Carbon Trading Schemes EU ETS CRC	The EU Emissions Trading Scheme (EU ETS) is a cap and trade scheme focussing on Scope 1 emissions from combustion of energy. The University currently has a surplus of allowances to cover its emissions. Emissions that fall within the scope of the EU ETS are externally verified on an annual basis. Carbon Reduction Commitment Energy Efficiency Scheme (CRC) applies to any organisation that consumed more than 6,000 MWh of half hourly monitored electricity during 2008 and is a tax on the use of energy. The University has completed its registration and will take part in the scheme.
Climate Change Levy IPPC and ISO14001	Climate Change Levy (CCL) is a tax on the use of gas and electricity used for business purposes. Low and zero carbon technologies are CCL exempt (such as good quality Combined Heat and Power) which incentivises the use of CHP on this Campus. Alta Estate Services Ltd., the wholly owned company that operates the University's CHP station is registered under Integrated Pollution Prevention and Control. It is further accredited under ISO14001 and ISO9001 and is undergoing accreditation for ISO18001. The current certification for ISO14001 and ISO19001 is valid to July 2012.
Waste management	The waste hierarchy prioritises Reduction Reuse; Recovery (recycling, composting and energy from waste), with disposal to landfill as the least preferred option. Policy levers such as site waste management plans, the landfill tax escalator and other producer responsibility legislation are designed to drive the management of waste up the waste hierarchy.
Voluntary Schemes Carbon Trust Standard 10:10 Green Impact	The University has obtained the Carbon Trust Standard (which is valid until July 2011) to ensure that carbon reduction is continuing. The College of Life and Environmental Sciences and the Guild of Students have signed up to the 10:10 carbon reduction campaign. The University participates in the Green Impact Awards and Sound Impacts Scheme and has signed the University Leaders Statement of Intent on Sustainable Development.

6. Communications Strategy and Behavioural change

A key element of ensuring that the carbon reduction target is achieved is through delivering a successful communications strategy to help implement behavioural change across all aspects of the University's activities. It is difficult to estimate an accurate figure of emissions reductions due to behaviour change but it has been identified as one of the six most viable interventions to reduce carbon emissions in Higher Education with potential savings that may be as high as 10% for scope 1 and 2 emissions²².

A Sustainability Communications Group has been formed and will report to the Sustainability Task Group. A major aim of the group will be responsible for developing and implementing the communications strategy for the carbon management plan.

6.1 Current behavioural change activities

There are several activities related to behavioural change across the University. One aim of the communications strategy will be disseminate and expand best practice between the Colleges, including Corporate Services.

Degrees Cooler

The University is one of 20 Universities selected to take part in the Degrees Cooler behavioural change programme, which is funded by DEFRA's Greener Living Fund and managed by National Union of Students. The initiative consists of three strands;

Green Impact

Teams of staff are given a workbook to complete with Bronze, Silver, Gold and Bonus award criteria to work towards. Many of the criteria are related to carbon reduction, including energy saving, resource efficiency, sustainable travel and sustainable procurement. In the first year of the project, 2009/10, 14 teams participated with 5 working towards bronze, 5 achieving bronze, 1 achieving silver and 1 achieving the gold award.

It is anticipated that more teams will submit workbooks in the second year and hoped to able to continue the scheme after funding from defra ends in March 2011.

Studentswitchoff

Now in its 4th year the University was one of the first seven to pioneer the successful scheme. For example in 2009/10 520 'ecopower rangers' at the student villages saved 200 tonnes of CO₂.

Going Greener

Going Green is a general environmental awareness raising campaign including a go green week aimed at students in early February.

Travel plan

The University has developed a sustainable travel plan and initiatives are aimed at moving to lower carbon travel options.

10:10 Campaign

The Guild of Students and the College of Life and Environmental Sciences have signed up to the 10:10 campaign.

²² HEFCE 9 27 Figure 4, Table 1

Appendix 1

Travel data assumptions

All assumptions will be improved as understanding of travel practises improves and as better data becomes available.

Grey Fleet

- Primary data source total amount claimed, £ per mile is known, mileage calculated.
- Same methodology for both years.

Hire Cars

- Requested mileage from supplier.

Air Travel (Domestic)

- 2005/06 is only in hard copies and is yet to be analysed.
- Delta Travel information
- Long and Lat

Air Travel (International)

- As above

Rail Travel (Domestic)

- As above

Rail Travel (International)

- As above

International Students

- Allowed for one return trip, social trips not taken into account.
- Students have been grouped by Country. Travel has been measured from Birmingham to the capital city of the country of residence as exact address is not known.

Exchange Students

- Only University of Birmingham students travelling out have been measured. Students from other universities travelling to Birmingham have not been counted.
- Allowed for one return trip, social trips not taken into account.
- Travel has been measured from Birmingham to the capital city of the country of residence as exact address is not known.
- Awaiting 2005/06 data. The number of students will be available but no destination. Therefore assume same geographical breakdown as 09/10 and use ratio of student numbers for the 2 years.

Taxis

- 2009/10 assumed average taxi tariff per mile was £2.40 (£1.70 per mile plus initial fee) based on figures provided by Birmingham City Council.
- 2005/06 assumed average taxi tariff per mile was £2.12 (£1.50 per mile plus initial fee) based on figures provided by Birmingham City Council.