King's College London

University of London

King's College London

Carbon Management Plan

2010 to 2020

Date: 13th March 2011

Owner: King's College London

Approval status: Adopted

Contents

Management Summary

Climate change mitigation is one of the great challenges for modern society. The basic mechanics of climate change are well understood; the world is warming, much of the warming is due to human emissions of greenhouse gases and the changes are set to accelerate in the future, bringing many and varied impacts around the world.

The UK Government has committed to take action now and has introduced the Climate Change Act: 2008 with a target to cut carbon emissions of 80% by 2050 against 1990 levels with an interim target of 34% by 2020.

The Higher Education Funding Council for England (HEFCE) has announced in its 'Sustainable Development in Higher Education; 2008 update to strategic statement and action plan' that from 2011, capital allocation will be linked to carbon reduction.

King's College London developed its first Carbon Management Plan (CMP) for 2006-2011 under the terms of the Higher Education Carbon Management Programme, sponsored by the Carbon Trust. In response to the challenge from the UK Government and HEFCE the College is now submitting its second Plan. This second Carbon Management Plan will inform and direct the actions to be undertaken by the College in reducing carbon dioxide (CO_2) emissions during 2010-2020. The Plan identifies specific actions for 2010/11 and sets out the actions and framework required to embed carbon management in future College activities.

The College intends to concentrate initially on the emissions from gas and oil used (scope 1) and electricity from the grid (scope 2) and will include only those buildings which the College can influence the operation and carbon emissions from, thus all embedded space within each of the NHS Trusts is excluded. Each of the NHS Trusts has their own Carbon Management Plan and the College will work with them to reduce our collective carbon emissions.

The College's baseline emission of CO_2 for 1990 was calculated at 36,158 tonnes; this set a ceiling of 23,864 tonnes CO2 (tCO_2) for the College to achieve by 2020 to meet the UK Government's target of a 34% reduction.

HEFCE have recommended that the HE sector aspires to a 48% reduction against the 2005/06 carbon baseline, which it has estimated equates to a 34% reduction against 1990 baselines. In 2005/06 KCL actual scope 1 and 2 carbon emissions were 36,186 tCO_2, a 48% reduction in this figure would be 17,369 tCO_2; giving a total emissions ceiling in 2020 of 18,817 tCO_2.

KCL has set a base target for 2020 of 23,864 tCO_2 and a stretch target of 18,817 tCO_2 to be achieved, if practical.

In 2008 – 09 the College's scope 1, 2 and measured scope 3 emissions was 50,260 tCO2, we forecast to reduce this in 2010/11 to 45,365 tCO2 by taking the actions contained in this plan.

1.0 Our low carbon vision

King's College London is one of the world's leading universities with a distinguished history. The College is at the centre of a wide range of leading edge research and high quality teaching and learning. The College's forward strategy is to plan for growth in its research, teaching and learning. King's College London (KCL) believes that protection of the environment is an integral part of good institutional practice and that it has a duty to satisfy itself that all its' operations are environmentally sustainable. KCL is committed to maintaining, and wherever possible, improving its way of operating, to reduce its impact on the environment, both for the people who live and work in the College and for the wider community, now and in the future.

King's College London aims to systematically reduce the organisation's carbon emissions as part of this commitment. This will be done by reducing the energy to operate our buildings through the application of energy efficiency methods and the use of low carbon technologies (such as CHP and renewable energy systems) in existing buildings. Sustainable construction methodologies will be applied where buildings are replaced or new buildings added to the estate, ensuring low energy buildings are commissioned. Our operational team will measure and reduce the water used in buildings and waste produced by our operations. Management systems will be introduced to monitor our performance and engage our stakeholders and estate users to help reduce our organisational carbon footprint in the areas of travel and user action to reduce energy where possible.

We have set out in the enclosed Carbon Management Plan (CMP) our 2020 carbon target and the actions we will take to achieve or exceed this target over the next ten years.

2.0 Background to our 2010 to 2020 Carbon Management Plan

King's College London developed its first Carbon Management Plan (CMP) for 2006-2011 under the terms of the Higher Education Carbon Management Programme, sponsored by the Carbon Trust. The Carbon Management Plan set out the plan for implementing a strategic and operational approach for an energy related CO_2 emissions reduction programme, at all of the College's campuses.

In the first Carbon Management Plan (CMP) eleven projects were identified, seven of which were implemented (with two still ongoing during 2009/10). The target saving, through implementation of all identified projects, was 4,025 tonnes CO2 (tCO2) per annum. Against this target the ongoing and completed projects are achieving a saving of 3,882 tCO2 per annum. The projects that remain outstanding from the previous plan will be absorbed into this plan.

Since the College's first CMP, the UK Government has introduced the 2008; Climate Change Act (CCA) which has committed the UK Government to a long term carbon reduction target of 80% by 2050 against 1990 levels; with an interim target of 34% by 2020. The Committee on Climate Change (CCC) has recommended a further increase to 42% of the 1990 baseline. The higher education sector through the Higher Education Funding Council for England (HEFCE) has responded to this challenge by asking all higher education institutions to prepare a Carbon Management Plan to 2020 to be in place by September 2010. This must cover scope 1 (direct emissions from KCL assets) and scope 2 (emissions from grid purchased electricity for use in KCL buildings) emissions with timescale and resources. Targets for scope 3 emissions (KCL supply chain and other activity) will be announced in 2013. Progress against the College's targets will be measured by the Estate Management Statistics, which all HEIs submit to HEFCE.

King's College London in response to the challenge is now submitting its second Carbon Management Plan. This second Carbon Management Plan will inform and direct the actions taken by the College in reducing CO_2 emissions during 2010-2020.

3. Carbon target, sources and current emissions

3.1 Our 2020 carbon target

In accordance with HEFCE guidance, KCL will initially concentrate on the reduction of emissions of greenhouse gases under its direct control (scopes 1 and 2). HEFCE have recommended a baseline year of 2005/06 for setting the carbon reduction targets for the Higher Education sector, based on research that indicated limited information was available for 1990, the baseline year for the UK Government's 34% carbon reduction commitment in CCA, 2008.

HEFCE have recommended that the HE sector aspires to a 48% reduction against the 2005/06 carbon baseline, which it has estimated equates to a 34% reduction against 1990 baselines. In 2005/06 KCL actual scope 1 and 2 carbon emissions were 36,186 tCO_2, a 48% reduction in this figure would be 17,369 tCO_2; giving a total emissions target in 2020 of 18,817 tCO_2.

To sense check this target we have established a 1990 carbon baseline for KCL. This baseline was calculated using the 1990 data assigned for King's College London in the draft document 'Carbon Baseline for Individual Higher Education Institutions in England' (20,825 tCO_2) and an analysis of data for new schools which joined the College since 1990; the United Medical and Dental School (12,155 tCO_2) and the Institute of Psychiatry (3,178 tCO_2). This indicates the College had a 1990 baseline of 36,158 tCO_2, on a like for like basis with the current estate. A 34% reduction of this 1990 baseline, in line with CCA, 2008 represents a reduction of 12,294 tCO_2; giving a total emissions target in 2020 for KCL of 23,864 tCO_2.

On this basis we are proposing to adopt a base target for 2020 for KCL of 23,864 tCO_2 (a reduction of 12,294 tCO_2) and a stretch target of 18,817 tCO_2 (a reduction of 17,369 tCO_2).

3.2 Our carbon emission sources

The following sources of carbon emission form the basis of the measured carbon footprint for KCL:

Source	Scope	Estimate or Actual
Electricity in buildings and sports grounds	2	Based mainly on actual readings, with any estimated readings being phased out using Automated Meter Reading (AMR).
Gas and oil in buildings	1	Based on actual readings.
Waste to Landfill	3	Based on actual disposal information
Water	3	Based on actual metered measurement
Business Flights	3	Based on actual procurement agency information, with an allowance for flights not procured by this route.
Business travel (surface)	3	Some actual data is available from travel agencies used by the College but the data collection needs to be improved.
Student Commute	3	Estimate from student demographic listing.
Staff Commute	3	Estimate from staff demographic listing.

Note: The scope of buildings to be included in this plan are those building which are owned, leased and managed by the College and excludes 'embedded space', although the latter is recorded in the Estates Management Statistics returns to HEFCE.

The College's 'embedded space' is located within NHS Trust buildings and forms part of their Carbon Management Plan. The College will work with Guy's and St Thomas' NHS Foundation Trust, South London and Maudsley NHS Foundation Trust and Kings College London NHS Foundation Trust to reduce our collective carbon emissions.

3.3 Our current carbon emissions, 2008/09

In 2008/09, the most recent year for which data is available, KCL emitted 50,260 tCO2 as summarised in the table 1 and figure 1 below:

Sources	tCO2 2008-09
Energy in Buildings (Electricity)	31,378
Energy in Buildings (Gas)	11,181
Energy in Buildings (Oil)	2,395
Waste to Landfill	10
Water	133
Business Flights	1,315
Business travel (surface)	301
Student Commute	2,398
Staff Commute	1,149
Total	50,260

Table 1 - Total CO2 emissions 2008-09

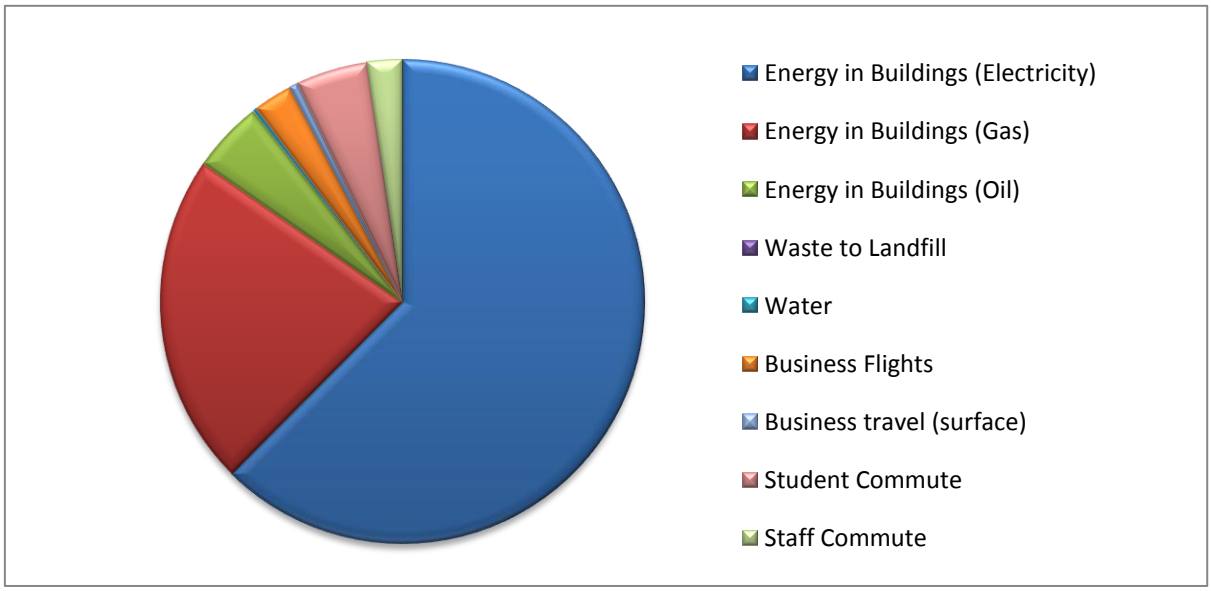

Figure 1 – Total CO2 emissions 2008-09

4.0 Carbon governance at King's College London

4.1 Carbon responsibility at King's College London

- Every individual member of KCL staff carries a responsibility for carbon management.

- The Sustainability & Environmental Management Working Group (SEMWG) will action, monitor, review and report on carbon reduction activity across the College

- The Estates and Facilities Department has responsibility for implementing the low carbon agenda, across the areas of construction, energy, waste and water.

4.2 The Programme Board – responsibility, ownership and engagement

King's College London recognises the need for good governance of this Programme, including senior level ownership and accountability for the carbon reduction target. The Sustainability & Environmental Management Working Group (SEMWG) who will meet a minimum of once per term, will engage College stakeholders to agree and achieve the carbon reduction target.

SEMWG will be responsible for overseeing the Programme to encourage delivery, ensuring coherence and coordination of carbon reduction activity, the identification and removal of barriers and the allocation of resource.

SEMWG will allocate resources to ensure the following College stakeholders are communicated with;

- Staff and Students, through seminars, webpage and meetings
- New Staff through the induction process
- New students, through welcome literature and Fresher's Fair
- Technical Staff in charge of high energy users, through monthly consumption reports by the Energy Team
- Real Estates Operation Board
- The NHS Health Trusts, via King's Health Partners
- Other Universities via the London Universities Environment Group and the Environmental Association for Universities and Colleges

4.2 The Project Groups – delivering the building energy, sustainable construction waste and water reduction targets

The Energy Project Planning Group who meet monthly and the Estates & Facilities Operation Team will be responsible for the delivery of the projects identified in Appendix A for reducing the energy to operate KCL buildings and the waste produced in running the estate.

The Energy Project Planning Group and the Infrastructure Project Group will update the plan and report both progress and updates to SEMWG who in turn will report to the Real Estate Operating Board (REOB) incorporating the progress from the other areas of focus.

The Energy Project Planning Group will be responsible for communicating and engaging with the following College stakeholders;

- Estates Managers through monthly consumption reports
- Technical Staff in charge of high energy users, through monthly consumption reports

- Sustainability & Environmental Management Working Group by monthly, annual and ad - hoc reports

4.3 Risk Management

The Risk of failure of the CMP fall into two main categories:

1. Risks that the Plan may fail to fully deliver due to poor projects design and/or management

2. Managing Risks that the plan may fail to fully deliver due to lack of support and/or funding.

4.3.1. Managing Risks that the Plan may fail to deliver due to poor design

Causes of poor design will be largely due to poor estimates of the effectiveness of measures, leading to a shortfall in the quantity of measures needed or their longevity.

This risk will be managed by

- Using nationally-agreed Carbon Trust tools for determining the likely effect of measures
- Regular review of the efficacy of installed measures, and expansion of our metering system to understand our performance in more detail.

4.3.2. Managing Risks that the plan may fail to deliver due to lack of support

The key risk that the carbon management plan might fail due to lack of support is if measures are “cherry-picked” to prioritise short payback times, and subsequent funding is refused for elements with longer paybacks.

Scrutiny of progress against CMP actions under the Goverance structure will ensure that actions progress is timely. Reporting under the Carbon Reduction Commitment (CRC) also provides another forum for the College to both demonstrate it’s adherence to the CMP and benchmark its performance against peers both within and outside the HE sector.

4.4 Annual Progress review

An annual progress report will be prepared by SEMWG and submitted to the Real Estates Operation Board and this information will be made publically available via the internet.

The review will cover:

- CO2 savings against target

- Lessons learnt and key actions to be taken to improve our performance

5. Our Carbon management activity and actions

5.1 Areas for Carbon reduction

King's College London wishes to position itself as a leader in preparing for the low carbon economy of the future. There is increasing stakeholder interest in carbon management, particularly from prospective and current students, staff and members of the local community. The development of a comprehensive Carbon Management Plan will help to address the concerns of stakeholders and engage them is helping KCL reduce its' carbon emissions.

KCL will focus our carbon management activity in the following areas, which offer the largest potential for substantial carbon emission reductions in the short term;

Area	Approach	Responsible Leader
Building energy reduction	Operate efficiently Upgrade systems Improve space Efficiency	Director of Facilities Management (FM) Energy and Environment Manager Director of Space and MIS
Sustainable construction	Efficient new build Efficient Refurbishment	Director of Projects Director of Projects / FM
Travel reduction	Awareness and Feedback	SEMWG chairman
Waste and water reduction	Reduce use	Director of FM
User action assistance	Awareness and Feedback	SEMWG chairman

KCL will also adopt, comply with, and seek to exceed carbon legislation which currently includes the Carbon Reduction Commitment and building Display Energy Certificates.

Reputational drivers towards carbon management include various league table positions and benchmarks, such as the Carbon Reduction Commitment league table, Green League and Green 500. The College will monitor and seek to improve its' position relative to its HE sector peers in these league tables to measure its improvement and relative performance.

5.2 Building energy reduction actions

The scope of buildings to be included in this plan are those building which are owned, leased and managed by the College and excludes 'embedded space', although the latter is recorded in the Estates Management Statistics returns to HEFCE.

The College's 'embedded space' is located within NHS Trust buildings and forms part of their Carbon Management Plan. The College will work with Guy's and St Thomas' NHS Foundation Trust, South London and Maudsley NHS Foundation Trust and Kings College London NHS Foundation Trust to reduce our collective carbon emissions.

To supports the reduction of energy in running KCL buildings and to deliver the College's Energy and Carbon Management Policy (see appendix D), the following actions will be implemented:

Energy Management System – the College will undertake external assessment and achieve the recognised BSI EN 16001 national certification; under this standard the College will be able to demonstrate that the energy used is managed, policies and processes are fully formalised and integrated. Ongoing assessments will ensure conformance with internal and external requirements and that everything is in place for us to meet our aims.

Environmental Management System –the College is striving towards the Higher Education recognised Ecocampus Scheme; an externally certified Environmental Management System and Award Scheme. The aims of the scheme is to encourage, reward and provide tools to assist institutions in moving towards environmental sustainability through good operational and management practises

Re-appraisal of Building Energy Management in Highly-Serviced Areas – highly serviced laboratories, such as those in the Medical Schools, can use several times the energy of office space, giving them an importance in carbon management disproportionate to their size. In the first CMP 2005 -2011; auditing and reprogramming of Building Energy Management Systems (BEMS) to office and teaching areas was undertaken and this has shown that carbon emission reductions are achievable. The next phase is to extend the programme to Highly Serviced areas.

Green ICT - the College is re-assessing its ICT needs. The College's Information Services and Systems (ISS) are reviewing the management of our computer facilities to improve efficiency and reduce waste.

Monitoring and Targeting – all meters for electricity, gas and water will be replaced or adapted to enable automatic half hourly monitoring. This is known as Automatic Meter Reading (AMR). Once this is completed, targeting software will be added which will allow immediate identification of energy wastage.

Space Utilisation – management of the efficient use of space by monitoring statistical and operational ratios is to be undertaken and subsequent development of space management procedures. A new director has been appointed to the role of Director of Space and Management Information Systems within the Estates Directorate to focus on this outcome.

5. 3 Sustainable Construction actions

To further support the reduction of energy in running KCL buildings and reduce the environmental impact of construction, the College will use BREEAM at design and post construction on all projects over £1million, achieving a rating of at least "excellent" for new builds and extensions and at least "very good" for refurbishments.

In addition to the above KCL will take the following actions;

1. New buildings to target an EPC rating <=40.

2. Reduce carbon emissions for all types of refurbished buildings by at least 20% against relevant benchmarks.

3. Provide a sustainable fund within each project of 5% of total build cost (excluding fees).
4. Develop King's College London targets that go beyond BREEAM in areas such as recycling, materials and waste management by July 2011.
5. Develop guidelines, targets and procedures for introducing sustainability issues into projects smaller than £1million by July 2011.

5.4 Travel reduction actions

The College is located in central London and users travel mainly by public transport, bicycle or walking. A Green Transport Policy was adopted in 2006, (see appendix D). The College has a limited number of parking spaces and these are mainly designated as either disabled spaces or contractor's vehicles. The College has seven hybrid working vehicles and average 9,000 km per annum which equates to 27.5 tCO_2 per annum.

The College will set out to

- promote the use of public transport to and between College campuses
- promote cycling through the provision of more facilities
- promote video conferencing over travel
- review the 2006 travel policy by July 2011

In addition the College will take the following action to support the reduction of carbon emissions due to travel

1. Quantify the amount and mode of the College's travel activities related to business travel by July 2011 (most aviation miles are recorded via the College's procurement agency, other individual business mileage is not currently recorded).
2. Reduce the need for business travel by providing alternative working practices, including video and tele-conferencing.
3. Review the College's supply and demand for fleet vehicles and develop and implement a fleet management plan by July 2012.

5.5 Waste reduction actions

Waste is a small contributor to our overall carbon burden (<1% of total, from waste to landfill) but the Waste Management Policy (WMP) adopted in 2006 (see appendix C) will support the aims of the College's Environment and Sustainability Policy (2010). The WMP will facilitate better management of resources, to meet and exceed the requirements of legislation.

The key driver for low carbon activity will be legislation requiring a reduction of waste to landfill, particularly the biodegradable elements. The Waste Strategy for England 2007 (WSE) sets ambitious targets to change the management of household waste in England, increasing the target for the amount recycled or composted to 45% by 2015. Commercial waste targets will be set shortly and KCL will strive to adopt these when they are published. The WSE 07 also indicates the Government's intention, subject to further consultation, to ban biodegradable and recyclable waste from landfill.

Reducing the amount of waste produced and disposed of to landfill at the College is a key objective in the College's Environmental and Sustainability Policy. The following targets have been set for reducing KCL waste in support of this policy;

1. Reduce College waste sent to landfill by 70%, by July 2013 against the 2009 HEFCE Estates Management Statistic returns. This will be achieved by increased reuse, recycling and resource recovery.
2. Review the carbon dioxide emissions from waste management by July 2011 and set a reduction target by July 2012.
3. King's College London will aspire to achieve direct zero waste to landfill by 2020. To support this, a Waste Descent Plan will be developed by July 2013.
4. Adopt a monitoring, reporting and review regime for waste which will include publishing an annual waste report in August which will detail

    - The amount of waste disposed of through each of the College's waste management systems.
    - An estimation of the amount of carbon dioxide emitted by each disposal system.
    - An estimation of the amount of carbon dioxide emitted per FTE equivalent (staff and student) as a result of waste management.

Gaps in the College's waste data were identified in 2009, and a need for a Waste Data Improvement Plan was identified, which will be put in place for the 2011/12 EMS returns.

5.6 Water reduction actions

KCL can further reduce its carbon emissions by reducing its demand for and use of water. Demand will be managed through user engagement and we will focus on reducing water used by looking at using low water sanitary fittings and grey water reuse where possible.

5.7 User action assistance actions

The College has achieved a score of 28 (out of 35) in the Carbon Management Matrix (appendix B), communication & training and procurement are the areas which scored lowest, and in which most progress needs to be made. The official adoption of the Environment and Sustainability Policy, certification of the Environmental Management System and Energy Management Sytem will go a long way to embedding low carbon activity into the College's thinking.

We will focus on explaining the energy and carbon cost of operating our estates and facilities to help our users understand what steps they can take to make the largest impact on the energy used in buildings. Motivating people to change their behaviour will be achieved through the implementation of a staff and student communication and engagement programme based on leading practices.

6.0 KCL Carbon Projections

6.1 Our building energy and sustainable construction projections

As confirmed in section 3.1, KCL has set a carbon emission base target for 2020 of 23,864 tCO_2 (a reduction of 12,294 tCO_2 over the 1990 baseline) and a stretch target of 18,817 tCO_2 (a reduction of 17,369 tCO_2 over the 1990 baseline).

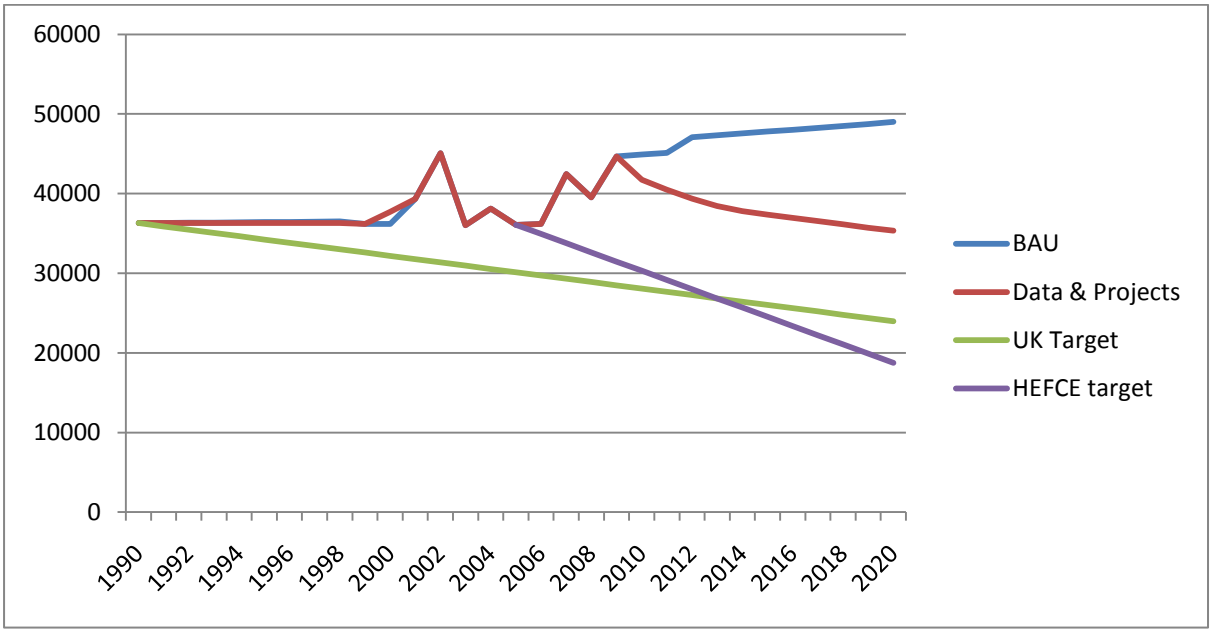

Figure 2

Over the last few years the carbon emissions in the KCL estate has increased as the College has expanded its energy intensive research activity as indicated by the red line between 2000 and 2009 in figure 2 above.

In Figure 2, the blue line indicates the tonnes of carbon emissions for business as usual assuming 0.5% year on year growth from 2012 when a new research facility comes online. The required paths to achieve the UK Government reduction of 34% against 1990 baseline, is indicated by the green line and the HEFCE 48% reduction against the 2005 baseline, in indicated by the purple line. The red line from 2010 to 2020 show the carbon emissions from the KCL estate if all of the energy efficiency projects shown in Appendix A are implemented by the Estates Directorate on behalf of the College.

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
a	36079	36186	42473	39539	44954	44891	45116	47073	47308	47545	47783	48022	48262	48503	48745	48989
b	36079	36186	42473	39539	44954	41746	40472	39343	38448	37790	37365	36954	36552	36131	35710	35354
c	30127	29716	29305	28894	28483	28072	27661	27250	26839	26428	26017	25606	25195	24784	24373	23864
d	36079	34924	33769	32614	31459	30304	29149	27994	26839	25684	24529	23374	22219	21064	19909	18817
e						3145	4644	7730	8860	9755	10418	11068	11710	12372	13035	13635
f						2922	1274	1129	895	658	425	411	402	421	421	356

Table 2 – tCO2 emissions limits for energy in buildings, scenarios a-f

a- Business As Usual

b- Actual data to 2008 and projected carbon emission reductions from projects from 2010 – 2020

c- Path to meet UK target of 34% from 1990 baseline

d- Path to meet HEFCE target of 48% from 2005 baseline

e- Value at Stake; Carbon Emission Gap between BAU and CMP

f- Annual Carbon Reduction from CMP projects

Table 2 is a numerical demonstration of the graph in figure 1 with the added rows illustrating the Value at Stake between the Business As Usual and the projected emissions reductions achievable from the Carbon Management Plan (e) and the actual annual carbon emissions achievable (f). The Value at Stake (VAS) is the difference in emissions between the Business as Usual Scenario (BAU) and the Reduced Emissions Scenario (RES) (based on the carbon emission reduction achievable from the CMP); that is the potential value that could result from carbon reduction measures that reduce baseline emissions by 38 % (in absolute terms) from 2005/6 levels by 2020.

Business as usual would mean KCL emitting 44,891 tCO_2 in 2010, the project identified in this CMP will reduce that to 41,746 tCO_2 .Over the course of 2010 automated meter reading will be installed which will allow us to break this target into a building by building target and monitor performance and trend on a monthly basis, see appendix B for details of our 2008/09 building carbon performance.

The above forecast would leave a gap of 11,490 tCO_2 and 16,537 tCO_2 to achieve our 2020 base and stretch scope 1 and 2 targets. This gap will need to be made up by action in the following areas:

- Shrink the existing estate and operate the remaining space more efficiently
- Identify and investigate projects to improve the performance of the building fabric from a heat loss and infiltration perspective
- Identify further projects and technologies that can be applied to the existing estate
- Engage the exiting users of the estate to reduce their energy demand by switching off lights, reducing heating and increasing cooling temperatures; and by using more energy efficient equipment in departments (i.e. computers, fridges etc.)

Targets for these areas will be set in July 2011 when this plan is reviewed and these targets forecast at a building by building level for 2011 and subsequent years to 2020.

6.2 Our 2010 Carbon forecast

In 2008/09, KCL emitted 49,974 tonnes of CO2, our forecast carbon emissions for August 2010 to July 2011 based on implementing the projects identified in Appendix A and reducing our other identified scope 3 emissions by 5%, is a total of 45,102 tCO_2, a reduction of 4,872 tCO_2 , or 9.75% on our 2008/09 emissions. The details behind these figures are identified in the figure below:

Sources	tCO2 2008-09 actual	tCO2 2010-11 forecast
Energy in Buildings (Electricity)	31,378	28,146
Energy in Buildings (Gas)	11,181	10,030
Energy in Buildings (Oil)	2,395	2,148
Waste to Landfill	10	9.5
Water	133	126.4
Business Flights	1,315	1,249.3
Business travel (surface)	301	286.0
Student Commute	2,398	2,278.1
Staff Commute	1,149	1,091.6
Total	50,260	45,365

7.0 CMP review and alignment

The next review of the CMP will take place in July 2011, in order to capture lessons learnt and update the plan and detail the actions for 2011/12 to keep us positioned to deliver our 2020 carbon emmissions target.

Appendix A: Carbon Management Projects

A.1 Action Plan 2010 - 2011

Action Plan 2010 – 2011

The recommendations below are in order of priority with respect to energy management including whole life carbon saving using the Carbon Trust Marginal Abatement Cost Curve Tool.

Number	Recommendations	Estimated annual savings			Estimated cost (£)	Payback period (years)	Timescale	Project Manger
		(£)	tCO_2	(kWh)				
1	Replace the Centralised Boiler Plant at Strand Campus	12,000	123	500,000	1,500,000	n/a	0 – 4 months	Strand Estates Manager (Ian Armitage)
2	Replace the Boiler Plant at Weston Education Centre Denmark Hill	12,000	123	500,000	660,000	n/a	0 – 4 months	Denmark Hill Estates Manager (James Martin)
3	Install CHP and distributed heating and electrical ring main at Denmark Hill West	215,384	895	1,978,960	1,400,000	6.5	4 – 8 months	Director of Projects (Kevin Little)
4	Implement a staff awareness / behaviour change campaign to raise the level of energy awareness to staff and students throughout the College	135,000	139	472,947	120,000	0.9	6-12 months	Energy and Environment Manager (Keith McIntyre)
5	Install voltage Optimisation to Franklin Wilkins Building.	75,703	666	1,241,034	310,000	3.5	6-12 months	Energy and Environment Manager (Keith McIntyre)
6	Develop an automatic Monitoring and Targeting (aM&T) System and install sub metering.	77,000	80	272,200	200,000	2.6	6-12 months	Energy and Environment Manager (Keith McIntyre)
7	Review server room set point temperatures and improve temperature control.	12,100	80	160,000	25,000	2	0-3 months	Assistant Director of Estates and Facilities (John O'Brien)

Number	Recommendations	Estimated annual savings			Estimated cost (£)	Payback period (years)	Timescale	Project Manger
		(£)	tCO_2	(kWh)				
8	Remote Power down of desktop PCs when not use.	110,000	825	1,577,437	100,000	0.9	3-6 months	Energy and Environment Manager (Keith McIntyre)
9	Reinstate the Franklin Wilkins chiller sequence control and control the installation via the BEMS - Schedule the chilled water flow temperature against outside temperature.	15,096	132.9	247,469	5,000	0.3	0-3 months	PPP Manager (Kevin Hoffman)
10	Review time programmes for Teaching rooms Air Handling Units at Franklin Wilkins Building.	3,065	27.0	50,240	2,500	0.8	0-3 months	PPP Manager (Kevin Hoffman)
11	Install Variable Speed Drives to control AHU Plant No.7 fan motors; Franklin Wilkins Building.	3,658	32.2	59,970	4,000	1.1	12-18 months	PPP Manager (Kevin Hoffman)
12	Replace tungsten halogen decorative lighting with LED equivalent lamps; Franklin Wilkins Building.	976	8.6	16,000	2,000	2.0	3 – 12 months	Energy and Environment Manager (Keith McIntyre)
13	Review operation of air compressed air installation; Franklin Wilkins Building.	661	5.8	10,832	0	Immediate	0-3 months	PPP Manager (Kevin Hoffman)
14	Insulate exposed pipework, valves and flanges in the basement and roof top plant rooms Franklin Wilkins Building.	1,402	11.8	63,727	4,000	2.9	3 – 12 months	Energy and Environment Manager (Keith McIntyre)
15	Phase 1 Install lighting controls to control the lighting in the toilets and corridors; College wide.	3,111	27.4	51,000	15,000	4.8	3 – 12 months	Energy and Environment Manager (Keith McIntyre)
16	Phase 1 Replace lighting in non refurbished areas with energy efficient types; College Wide	36,905	324.9	605,000	390,000	10.6	3 – 12 months	Energy and Environment Manager (Keith McIntyre)

Number	Recommendations	Estimated annual savings			Estimated cost (£)	Payback period (years)	Timescale	Project Manger
		(£)	tCO_2	(kWh)				
17	Building Management System Fine Tuning	5,069	254	448,717	3,200	0.6	3 – 12 months	Director of Operations, Estates (John O'Brien)
TOTAL		719,130	3,756	8,255,533	4,740,700	7		

A.2 Action Plan 2010 - 2020

Action Plan 2010 – 2020

The following tables show the planned programme for energy conservation measures to 2020. The action plan for period 2010/11 is planned in detail. An updated annual action plan will be submitted by May of each year for ratifying and funding decisions to be made.

Recommendations	Estimated savings				Estimated cost (10 years) (£)
	Per annum (£)	Lifetime (£)	tCO2 Per Annum	Lifetime tCO2	
Replace the Centralised Boiler Plant at Strand Campus	12,000	120,000	123	1,230	1,500,000
Replace the Boiler Plant at Weston Education Centre Denmark Hill	12,000	120,000	123	1,230	660,000
Install CHP and distributed heating and electrical ringmain	215,384	2,153,840	895	8,950	1,400,000
Heating Controls System	5,692	56919	94	940	231,917
Heating Zoning	8,991	89,913	49	490	91,236
Pipework Insulation.	98	984	21	210	3,932
Replace /upgrade Boilers/CHP	7,000	70,000	257	2,570	3,000,000
IT Management Software (Powerdown)	11,826	118,260	1,270	2,540	100,000
Printer Rationalisation	3,000	30,000	322	3,220	1,000
Automatic Lighting Controls	7,916	79,160	195	1,950	619,131
Retrofit/replace Lighting with T5/LED lighting	50,000	558,630	2,690	28,000	2,950,000
Awareness/Behaviour Change	148,295	1,482,950	2,414	25,000	795,000
Equipment Timer controls	2,420	24291	26	270	11,787

Recommendations	Estimated savings				Estimated cost (10 years) (£)
	Per annum (£)	Lifetime (£)	tCO2 Per Annum	Lifetime tCO2	
Building Management System Fine Tuning	5,069	50,690	254	2,540	15,215
Voltage Optimisation	75,703	757,030	666	6,660	310,000
Loft Insulation	17,052	170,520	105	1,050	17,052
	582,446	**5,883,187**	**9,504**	**86,850**	**11,706,270**

A.3 2010 – 2011 Project Plans

The majority of the following project has funding and project timetable in place. Of the **£5,617,500** identified **£474,000** funding is still to be identified.

Project 1 **Replace Centralised Boiler Plant at Strand Campus**	
Description and notes	The Strand Centralised Boiler Plant serves over 75% of the heating and domestic hot water within the Strand Campus. The plant is beyond its economical life. The replacement of the plant is seen as the first phase of a new centralised energy centre identified in the first Carbon Management Plan. This project will also enhance the downstream carbon projects which have already been undertaken within the Campus.
Financial and environmental	Project Investment: £ 1,500,000 Emission Reduction: 123 tonnes Costs Savings: £ 12,000 Payback (years): n/a
Benefits	This project will enhance the downstream carbon projects which have already been undertaken within the Campus.
Resources	Funding has been agreed through the infrastructure fund
Ownership and accountability	Project Manager: Ian Armitage Operations Manager
Ensuring success	**Known key success factors** • Reduction in annual consumption and costs • Better control of stakeholders working environment **Principal risks** • Completion of project on time **Main means of risk mitigation** • Good project management
Performance / success measure	The building in performing to its maximum efficiency and meeting the environmental conditions of its occupiers
Timing	Summer recess 2010
Sources of information and guidance	General Information Report 40 ‘Heating Systems and Their Controls’.

Project 2 **Replace Plant at Weston Education Centre Denmark Hill Campus**		
Description and notes	The boiler plant at the Weston Education Centre is beyond its economical life. This project is part of the centralised energy centre scheme for Denmark Hill West. The replacement of the plant is seen as part of a new centralised energy centre at Denmark Hill West.	
Financial and environmental	Project Investment:	£ 660,000
	Emission Reduction:	123 tonnes
	Costs Savings:	£ 12,000
	Payback (years):	n/a
Benefits	This project will provide energy to the refurbished medical facility in ------ and a back up supply to the Cicely Saunders Institute.	
Resources	Funding has been agreed through the infrastructure fund	
Ownership and accountability	Project Manager: James Martin Assistant Operations manager	
Ensuring success	**Known key success factors** • Reduction in annual consumption and costs • Better control of stakeholders working environment **Principal risks** • Completion of project on time **Main means of risk mitigation** • Good project management	
Performance / success measure	The building in performing to its maximum efficiency and meeting the environmental conditions of its occupiers	
Timing	Summer recess 2010	
Sources of information and guidance	General Information Report 40 ‘Heating Systems and Their Controls’.	

Project 3 **Installation of Combined Heating and Power Plant**		
Description and notes	This project is the second phase of the provision of a centralised energy centre at Denmark Hill West, and is combined with the provision of a heating and electricity ringmain on the Campus. This project will provide some risk aversion to the supply of heating and electricity to any of the buildings on the ringmain and also to the rise in electricity price.	
Financial and environmental	Project Investment:	£ 1,400,000
	Emission Reduction:	895 tonnes
	Costs Savings:	£215,384
	Payback (years):	6.5
Benefits	This project will provide some risk aversion to the supply of heating and electricity to any of the buildings on the ring main and also to the rise in electricity price.	
Resources	Funding has been agreed through the infrastructure fund	
Ownership and accountability	Project Manager: Kevin Little Director of Projects	
Ensuring success	**Known key success factors** • Reduction in annual carbon dioxide, electrical energy consumption and costs **Principal risks** • Completion of project on time **Main means of risk mitigation** • Good project management	
Performance / success measure	Success will be measured in an overall reduction in carbon dioxide and electricity supplied by the national grid.	
Timing	To be completed by March 2011	
Sources of information and guidance	Carbon Trust: Combined heat and power	

Project 4 **Implementing a staff and student awareness / behaviour Change Campaign**		
Description and notes	Motivating people to change their behaviour is key to the success of this carbon management programme, this aim will be achieved through the implementation of a staff and student communication and engagement programme based on leading practices Successful energy management needs a good awareness programme and marketing. For the campaign to be successful it requires extensive marketing. Consideration will be given to the involvement of marketing staff and the valued developmental input of staff and students.	
Financial and environmental	Project Investment:	£ 120,000
	Emission Reduction:	490 tonnes
	Costs Savings:	£135,000
	Payback (years):	0.9
Benefits	Awareness / behaviour change campaigns are recognised as being a key factor for the success of an energy / environmental management programme. There are numerous case studies within the HEFCE Energy Management Value for Money Report of successful energy awareness campaigns. Good Practice Guides (GPG) indicates that an effective programme can reduce an organisations energy use by 10 to 20%. The Good Practice Guides also recommended that 1% of your energy costs should be invested in an effective campaign.	
Resources	Funding to be identified	
Ownership and accountability	Project Manager: Keith McIntyre	Energy & Environment Manager
Ensuring success	**Known key success factors** • That student and staff are inducted into the philosophy of energy conservation **Principal risks** • Identifying the media for communications • Requires buy-in from all departments/schools, staff and students, supported by the College • Budget **Main means of risk mitigation** • Senior Management Commitment • Securing a budget • Sufficient time is allowed to carry out the programme effectively	
Performance / success measure	Energy and environmental awareness is part of the College's culture	
Timing	Start of Autumn Semester 2010	
Sources of information and guidance	CTG 001: Creating an Awareness Campaign GPG 251: Maintaining the Momentum, Sustaining Energy Management	

Project 5 **Install Voltage Optimisation Franklin Wilkins Building**		
Description and notes	Voltage Optimisation is a unique, proven technology. It optimises voltage, dealing with the discrepancy between the actual supply voltage received (207V - 253V) and the optimum voltage electrical equipment needs (220V).	
Financial and environmental	Project Investment:	£ 310,000
	Emission Reduction:	666 tonnes
	Costs Savings:	£ 75,703
	Payback (years):	3.5
Benefits	Voltage Optimisation can cuts energy use and carbon emissions by up to 20%, and creates a more efficient, robust and reliable electrical supply for our site, protecting the buildings electrical infrastructure.	
Resources	Funded through the Salix loan Scheme	
Ownership and accountability	Project Leader: Keith McIntyre	Energy and Environment Manager
Ensuring success	**Known key success factors** • Reduction in annual consumption and costs **Principal risks** • Completion of project on time **Main means of risk mitigation** • Good project management	
Performance / success measure	Success will be measured through reduction in energy consumption	
Timing	To be completed by December 2010	
Sources of information and guidance		

Project 6	**Develop an Automatic Monitoring and Targeting (aM&T) System**	
Description and notes	Currently buildings are metered by the incumbent utility companies but in our embedded space we are reliant on manual sub meter readings. Half-hourly data provided by suppliers has already yielded savings by providing evidence that BMS systems were not working optimally. Automatic Meter Reading with aM&T (using half-hourly resolution and appropriate spatial resolution), will ensure that buildings are well-characterised, that future energy efficiency measures are appropriately targeted, and the resultant savings well understood. The installation of AMR also counts as an early action metric under the Carbon Reduction Commitment (CRC).	
Financial and environmental	Project Investment:	£ 200,000
	Emission Reduction:	80 tonnes
	Costs Savings:	£77,000
	Payback (years):	2.6
Benefits	Automatic Meter Reading with aM&T (using half-hourly resolution and appropriate spatial resolution), will ensure that buildings are well-characterised, that future energy efficiency measures are appropriately targeted, and the resultant savings well understood. The installation of AMR also counts as an early action metric under the Carbon Reduction Commitment (CRC).	
Resources	Funding has been agreed from Infrastructure budget.	
Ownership and accountability	Project Manager: Keith McIntyre	Energy & Environment Manager
Ensuring success	**Known key success factors** • Reduction in annual consumption and costs • Better control of stakeholders working environment **Principal risks** • Completion of project on time **Main means of risk mitigation** • Good project management	
Performance / success measure	Success will be measured through reduction in energy consumption	
Timing	To be completed by March 2011	
Sources of information and guidance	Monitoring and Targeting – In depth management guide CTG 008	

Project 7 **Review Server Room Temperatures**		
Description and notes	There is no set policy or guidance on server room temperatures; many server rooms have their temperature set point at 16^0C resulting in cooling units running 24/7. It is recommended that the control temperature in all server rooms be set at 23 – 24^0C, and that the systems are controlled by the Building Management System (BMS).	
Financial and environmental	Project Investment:	£ 25,000
	Emission Reduction:	80 tonnes
	Costs Savings:	£12,100
	Payback (years):	2
Benefits	In many cases the cost of undertaking this project is minimal with results immediate. Where units are added to the local BMS critical alarms can be set and monitored.	
Resources	Funding available from Green Revolving Fund	
Ownership and accountability	Project Manager: John O'Brien Director of Operations	
Ensuring success	**Known key success factors** • Reduction in annual consumption and costs **Principal risks** • Server rooms increasing in capacity **Main means of risk mitigation** • Good server room management	
Performance / success measure	Success will be measured through reduction in energy consumption	
Timing	Completed by December 2010	
Sources of information and guidance		

Project 8 **Remote Powerdown when Desktop PC's are not in Use**		
Description and notes	Personal computers account for a significant proportion of the overall energy consumption within a building. PC's are often left switched on overnight and even during weekends and holiday periods. The actual number of desktop PCs is unknown but if each of the 5,500 staff have access to their own PC and there are enough to service 20% of our student population this equals approximately 10,000 desktops PCs. The College has also to provide additional air cooling in PAW's rooms because of the heat load generated.	
Financial and environmental	Project Investment:	£ 100,000
	Emission Reduction:	825 tonnes
	Costs Savings:	£ 110,000
	Payback (years):	0.9
Benefits	This project will not only provide energy and carbon reduction, but may also prolong the life of the PCs.	
Resources	Funding to be identified	
Ownership and accountability	Project Manager: Keith McIntyre Energy and Environment Manager	
Ensuring success	**Known key success factors** • Reduction in annual consumption and costs • Better control of stakeholders working environment **Principal risks** • No desktop PC inventory **Main means of risk mitigation** • Asset inventory	
Performance / success measure	Success will be measured through reduction in energy consumption	
Timing		
Sources of information and guidance		

Project 9 **Reinstate Chiller Sequence Control Franklin Wilkins Building**		
Description and notes	The main chiller plant consists of 6 York Chillers located on the Building roof. Currently the chiller plant is controlled by individual integral York controller. The chillers are connected to the BMS for monitoring purposes only. It is recommended that BMS modification is undertaken so that the chillers are controlled by the BMS.	
Financial and environmental	Project Investment:	£ 5,000
	Emission Reduction:	133 tonnes
	Costs Savings:	£ 15,096
	Payback (years):	0.3
Benefits	Better control and a reduction in costs and carbon	
Resources	• Ecovert Maintenance Contract funding agreed	
Ownership and accountability	Project Leader: Kevin Hoffman Senior Projects Manager	
Ensuring success	**Known key success factors** • Reduction in annual consumption and costs **Principal risks** • None foreseen **Main means of risk mitigation** • Good project management	
Performance / success measure	Success will be measured through reduction in energy consumption	
Timing	• Initial works to be carried out in July 2010 – Sept 2010	
Sources of information and guidance		

Project 10 **Review Time Programmes for Teaching Rooms AHU Franklin Wilkins Building**	
Description and notes	The current BMS time programmes are to be reviewed against occupancy patterns for the teaching and office Air Handling Units.
Financial and environmental	Project Investment: £ 2,500
	Emission Reduction: 27 tonnes
	Costs Savings: £ 3,065
	Payback (years): 0.8
Benefits	Due to the size of the plant even small reductions in operating hours of the unit will result in significant savings
Resources	• None
Ownership and accountability	Project Leader: Kevin Hoffman Senior Projects Manager
Ensuring success	**Known key success factors** • Reduction in annual consumption and costs • Better control of stakeholders working environment **Principal risks** • None **Main means of risk mitigation** • Not applicable
Performance / success measure	Success will be measured through reduction in energy consumption
Timing	• December 2010
Sources of information and guidance	

Project 11 **Install Variable Speed Drive to Control AHU no. 7 fan Motor Franklin Wilkins Building**		
Description and notes	A majority of the larger AHUs and extracts fan motors at Franklin Wilkins Building are fitted with Variable Speed Drives (VSD). The exception is AHU 7 the office East AHU, this unit supplies Variable Air Volume boxes on floors 2, 3, 4 and 5. It is recommended that VSD are fitted to supply and extract fans on AHU 7.	
Financial and environmental	Project Investment:	£ 4,000
	Emission Reduction:	32.2 tonnes
	Costs Savings:	£3,658
	Payback (years):	1.1
Benefits	Better control and a reduction in costs and carbon	
Resources	Funding to be identified	
Ownership and accountability	Project Leader: Kevin Hoffman Senior Projects Manager	
Ensuring success	**Known key success factors** • Reduction in annual consumption and costs • Better control of stakeholders working environment **Principal risks** • Funding **Main means of risk mitigation** • Identify source of funding	
Performance / success measure	Success will be measured through reduction in energy consumption	
Timing	• January 2011	
Sources of information and guidance		

Project 12 **Replace Tungsten Halogen Decorative Lighting Franklin Wilkins Building**		
Description and notes	There are a number of tungsten halogen decorative lamps installed throughout the building, stairways, kitchens and café serving areas. Lamps should be replaced with compact fluorescents or LED lamps.	
Financial and environmental	Project Investment:	£ 2,000
	Emission Reduction:	8.6 tonnes
	Costs Savings:	£ 976
	Payback (years):	2
Benefits	Savings of 80% can be achieved against the halogen lamps	
Resources	Funding from Green revolving Fund will be available	
Ownership and accountability	Project Leader: Kevin Hoffman Senior Projects Manager	
Ensuring success	**Known key success factors** • Reduction in annual consumption and costs **Principal risks** • None **Main means of risk mitigation** • N/A	
Performance / success measure	Success will be measured through reduction in energy consumption	
Timing	August 2010 – January 2011	
Sources of information and guidance		

Project 13 **Review Operations of Compressed Air Installations Franklin Wilkins Building**		
Description and notes	There are two compressed air installations within the building; compressed air is supplied for use in teaching rooms and research laboratories. Although compressed air represents a small percentage of the total energy consumption with the building a number of steps can be undertaken. • Improve the sequencing of the basement compressors and ensure that one compressor acts as lead. • Look at the pressure requirements.	
Financial and environmental	Project Investment:	£ 0
	Emission Reduction:	5.8 tonnes
	Costs Savings:	£ 661
	Payback (years):	Immediate
Benefits	Better control and a reduction in costs and carbon	
Resources	None required	
Ownership and accountability	Project Leader: Kevin Hoffman Senior Projects manager	
Ensuring success	**Known key success factors** • Reduction in annual consumption and costs **Principal risks** • None **Main means of risk mitigation** • N/A	
Performance / success measure	Success will be measured through reduction in energy consumption	
Timing	September 2010	
Sources of information and guidance	Compressing Air Costs – Generation; ECG 40	

Project 14 **Insulate Exposed Pipework, Valves and Flanges Franklin Wilkins Building**		
Description and notes	On the Carbon Trust Audit a number of valves, flanges and some small pipework in the plant rooms were noted as being un-insulated. It is recommended that these exposed areas be insulated with pipe wrap and insulated jackets for valves and flanges.	
Financial and environmental	Project Investment:	£ 4,000
	Emission Reduction:	11.8 tonnes
	Costs Savings:	£ 1,402
	Payback (years):	2.9
Benefits	Reduction in costs and carbon emissions	
Resources	Ecovert maintenance contract funding has been agreed	
Ownership and accountability	Project Leader: Kevin Hoffman Senior Projects Manager	
Ensuring success	**Known key success factors** • Reduction in annual consumption and costs **Principal risks** • None **Main means of risk mitigation** • N/A	
Performance / success measure	Success will be measured through reduction in energy consumption	
Timing	October 2010 – March 2011	
Sources of information and guidance		

Project 15 **Phase 1 Install lighting Controls to Toilet, Kitchen and Corridors**		
Description and notes	Toilets, Kitchens and corridors throughout the College are lit at all times although some of the areas are infrequently occupied. It is recommended that lighting controls are installed in these areas to switch off the lighting during unoccupied periods.	
Financial and environmental	Project Investment:	£ 15,000
	Emission Reduction:	27.4 tonnes
	Costs Savings:	£ 3,111
	Payback (years):	4.8
Benefits	A reduction in costs and carbon emissions	
Resources	Funding from Green Revolving Fund will be available	
Ownership and accountability	Project Leader: Keith McIntyre Energy and Environment Manager	
Ensuring success	**Known key success factors** • Reduction in annual consumption and costs **Principal risks** • None **Main means of risk mitigation** • N/a	
Performance / success measure	Success will be measured through reduction in energy consumption	
Timing	• August 2010 – July 2011	
Sources of information and guidance	Lighting Fact Sheet; GIL 126	

Project 16 **Phase 1 replace Lighting In Non Refurbished Areas with Energy Efficient Types**		
Description and notes	The majority of the general lighting in the College's buildings is fitted with T8 fluorescent fittings (38w or 18w). In areas where refurbishment is not to be undertaken that a programme of light fitting exchange be undertaken concentrating on old style systems and in corridors integrating controls to maximise the benefits.	
Financial and environmental	Project Investment:	£ 390,000
	Emission Reduction:	324.9 tonnes
	Costs Savings:	£ 36,905
	Payback (years):	10.6
Benefits	A reduction in costs, carbon emissions and maintenance	
Resources	• Project costs to be identified • Revolving Green Fund may be used to supplement some of the projects.	
Ownership and accountability	Project Leader: Keith McIntyre Energy and Environment Manager	
Ensuring success	**Known key success factors** • Reduction in annual consumption and costs • Better stakeholders working environment **Principal risks** • None **Main means of risk mitigation** • N/a	
Performance / success measure	Success will be measured through reduction in energy consumption	
Timing	• August 2010 – July 2011	
Sources of information and guidance	Lighting Fact Sheet; GIL 126 Energy Efficiency in Lighting – An overview; GIR 092	

Project 17 **Phase 1 Building Management System fine tuning**	
Description and notes	The Building Energy Management System (BEMS) is a computerised control system that can implement any programmed control strategy for any item of energy using plant. It is used to control heating, boilers, ventilation, cooling, pumps, lighting etc. In the first CMP the BMS to office and teaching areas was undertaken which was successful in not only reducing the carbon footprint of those areas but also providing a better environmental condition for the occupants. This project is to roll out the programme to highly serviced areas. 1. Alignment of all BMS controls settings to represent building opening hours. 2. Implement a central log of plant operational use and set system to 'track' alterations. 3. Implement plant/ environmental condition revision to BMS controls and software. 4. Remove all over-ride keys and issue to authorised users i.e. Maintenance Managers and Energy Team. 5. Provide BMS and plant training to maintenance personnel and contractors. 6. Monitor the savings of implementing the BMS strategy.
Financial and environmental	Project Investment: £ 3,200
	Emission Reduction: 254 tonnes
	Costs Savings: £ 5,069
	Payback (years): 0.6
Benefits	A reduction in costs, carbon emissions and maintenance
Resources	• Project funding to be identified • Revolving Green Fund may be used to supplement some of the projects.
Ownership and accountability	Project Leader: John O'Brien Director of Operation
Ensuring success	**Known key success factors** • Reduction in annual consumption and costs • Better stakeholders working environment **Principal risks** • None **Main means of risk mitigation** • N/a
Performance / success measure	Success will be measured through reduction in energy consumption
Timing	• August 2010 – July 2011
Sources of information and guidance	

Appendix B - Buildings Energy and Carbon Identified within the Scope of Carbon Management Plan

B1 Electricity

Report Period *12 Months Ending July 2009*

Tonnes CO2 per kWh 0.000523

Location	**Consumption** kWh	**Floor Area (m²)**	**Energy PI (kWh/m²)**	**CO2 PI (kg/m²)**	**CO2 tonnes**
Franklin-Wilkins Building	10,923,454	47,039	232	121	5713
New Hunts House	8,375,279	19,038	440	230	4380
Henriette Raphael	3,042,701	7,085	429	225	1591
Shepherds House	692,304	4,805	144	75	362
Hodgkins Building	1,061,205	16,080	66	35	555
Wolfson House	194,799	7,399	26	14	102
Greenwood Theatre	400,312	3,586	112	58	209
Strand Building	4,960,299	17,763	279	146	2594
Institute of Psychiatry	4,073,511	19,288	211	110	2130
CCIB Building	3,745,552	7,373	508	266	1959
Kings Building	4,938,959	32,913	150	78	2583
Maughan Library	2,803,734	19,069	147	77	1466
Great Dover Street Hostel	2,295,657	18,598	123	65	1201
127 Stamford St	2,363,994	13,881	170	89	1236
SGDPR Centre	1,476,872	5,108	289	151	772
James Clerk Maxwell Bldg	1,314,678	11,432	115	60	688
Rayne Institute DIRECT	952,785	3,247	293	153	498
Macadam Building	776,131	5,673	137	72	406
Champion	667,609	10,614	63	33	349
GDRU (1-9 Newcomen Street)	554,747	5,371	103	54	290
Drury Lane	439,581	4,519	97	51	230
Maynard Rosalind - Hampstead	449,033	1,625	276	145	235
Kidderpore Hall - Hamp	435,712	3,400	128	67	228
FWB Waterloo Bridge wing	386,622	5,129	75	39	202
Half Moon Lane	264,935	7,899	34	18	139
Capital House	398,301	6,934	57	30	208
3/4 Windsor Walk IOP	249,636	2,006	124	65	131
1/2 Windsor Walk IOP	213,040	1,357	157	82	111
5 Lambeth Walk	146,082	1,610	91	47	76
Law Strand	426,732	314	1359	711	223
24 - 41 Surrey Street	460,382	2,164	213	111	241
216a Lambeth Road	104,542	1,290	81	42	55
Doyles House	37,546	731	51	27	20
137 Borough High Street	61,299	346	177	93	32
170 Strand	57,457	1,317	44	23	30
King's College Sports Ground	43,355	996	44	23	23
Griffin Sports Ground	36,812	782	47	25	19
214 Lambeth Road	35,721	596	60	31	19

171 Strand	34,716	1,317	26	14	18
Queen Mother Hall	30,959	444	70	36	16
Zenith House	24,862	728	34	18	13
Guys Sports Ground	19,359	5,170	4	2	10
80 Kennington Road	10,423	526	20	10	5
3 Cutcombe Road	7,881	125	63	33	4
19 Maunsel Street	6,319	100	63	33	3
Total	**59,995,889**	**326,787**	**183.59**	**96.02**	**31,378**

B2: Gas

Report Period 12 Months Ending July 2009

Tonnes CO2 per kWh 0.000206

Location	Consumption kWh	GIA (m²)	Energy PI (kWh/m²)	CO2 PI (CO2 kg/m²)	CO2 tonnes
Franklin-Wilkins Building	12,723,874	47,039	270.50	2.34	2621
Kings Building	6,121,404	32,913	185.99	3.34	1261
CCIB Building	5,746,934	7,373	779.46	14.92	1184
HODGKIN BUILDING DIRECT	3,953,638	13,956	283.29	7.88	814
New Hunts House DIRECT	6,057,378	18,888	320.70	5.82	1248
Lord Cameron Building	2,064,151	8,658	238.41	12.71	425
SGDPR Centre	1,469,854	5,108	287.76	21.53	303
Weston Education Centre DIRECT	1,304,288	9,945	131.15	11.06	269
Guys Sports Ground	1,343,690	5,170	259.90	21.28	277
Maughan Library	1,243,858	19,069	65.23	5.77	256
Wolfson House	1,210,921	7,451	162.52	14.76	249
Strand Building	1,075,911	17,763	60.57	6.19	222
James Clerk Maxwell Bldg	911,671	11,432	79.75	9.62	188
Institute of Psychiatry	915,904	19,288	47.49	5.70	189
Shepherds House	792,584	5,046	157.07	21.80	163
Champion	786,309	10,614	74.08	10.36	162
Zenith House	800,391	728	1099.44	151.10	165
3/4 Windsor Walk IOP	556,514	2,006	277.42	54.84	115
Half Moon Lane	544,347	7,899	68.91	13.93	112
FWB Waterloo Bridge wing	515,251	5,129	100.46	21.45	106
Drury Lane	493,968	4,519	109.31	24.34	102
Capital House	365,644	6,934	52.73	15.86	75
New Guy's House	332,419	3,413	97.40	32.23	68
Macadam Building	101,484	5,673	17.89	19.39	21
5 Lambeth Walk	327,024	1,610	203.12	68.32	67
216a Lambeth Road	280,537	1,290	217.47	85.27	58
GDRU (1-9 Newcomen Street)	274,038	5,371	51.02	20.48	56
214 Lambeth Road	216,937	596	363.99	184.56	45
1/2 Windsor Walk IOP	176,588	1,357	130.13	81.06	36
3 Cutcombe Road	175,181	125	1401.45	880.00	36
King's College Sports Ground	163,963	996	164.62	110.44	34
35 Surrey Street	164,536	526	312.81	209.13	34
Henry Welcombe building IOP	156,089	1848	84.46	59.52	32
80 Kennington Road	145,391	526	276.41	209.13	30
Queen Mother Hall - Hamp	137,910	933	147.81	117.90	28
154 Strand	103,891	782	132.85	140.66	21

Griffin Sports Ground	106,493	628	169.57	175.16	22
152/3 Strand	106,524	2421	44.00	45.44	22
Norfolk Building	88,871	1602	55.48	68.66	18
David Goldberg Building IOP	71,019	1549	45.85	71.01	15
33 Surrey Street	63,819	401	159.15	274.31	13
Pavy Gym	51,612	100	516.12	1100.00	11
19 Maunsel Street	33,883	628	53.95	175.16	7
Total	**54,276,693.00**	**299,303.00**	**9,757.69**	**4,584.45**	**11,181.00**

B3: Oil

Report Period 12 Months Ending July 2009

Tonnes CO2 per kWh 0.000265

Location	Consumption kWh	Floor Area (m²)	Energy PI (kWh/m²)	CO2 PI (CO2 kg/m²)	CO2 tonnes
Champion	3,048,994	8360	364.71	96.65	807.98
Kidderpore Hall	1,420,305	4122	344.57	91.31	376.38
Institute of Psychiatry	4,568,402	20516	222.68	59.01	1210.63
Total	**4,469,299**	**12,482**	**358**	**192**	**2,395**

Appendix C: Carbon Management Matrix - Embedding

	POLICY	RESPONSIBILITY	DATA MANAGEMENT	COMMUNICATION & TRAINING	FINANCE & INVESTMENT	PROCUREMENT	MONITORING & EVALUATION
5 BEST	• SMART Targets signed off • Action plan contains clear goals & regular progress reviews • Strategy launched internally & to community	• CM is **full**-time responsibility of a **few** people • CM integrated in responsibilities of **senior** managers • VC support • Part of **all** job descriptions	• **Quarterly** collation of CO_2 emissions for all sources • Data **externally** verified • M&T in place for: ○ Buildings ○ Waste	• All staff & students given formalised CM: ○ Induction ○ Training Plan ○ Communications • CM matters **regularly** communicated to: ○ External community ○ Key partners	• **Granular** & **effective** financing mechanisms for CM projects • **Finance representation on CM Team** • **Robust** task management mechanism • **Ring-fenced fund** for carbon reduction initiatives	• **Senior** purchasers consult & adhere to ICLEI's **Procura+** manual & principles • Sustainability comprehensively integrated in **tendering** criteria • Whole life costing • Area-wide procurement	• Senior management review CM process • Core team regularly reviews CM progress • Published externally on website • Visible board level review
4	• SMART Targets **developed but not** implemented	• CM is **full**-time responsibility of an **individual** • CM integrated in to responsibilities of department **managers**, not all staff	• **Annual** collation of CO_2 emissions for: ○ Buildings ○ Transport ○ waste • Data **internally** reviewed	• All staff & students given CM: ○ **Induction** ○ Communications • CM communicated to: ○ External community ○ Key partners	• Regular financing for CM projects • **Some** external financing • **Sufficient** task management mechanism	• Environmental demands incorporated in tendering • Familiarity with **Procura+** • **Joint procuring** between HEIs or with LAs.	• **Core** team **regularly** reviews CM progress: ○ Actions ○ Profile & Targets ○ New opportunities quantification
3	• **Draft** policy • Climate Change **reference**	• CM is **part**-time responsibility of a **few** people • CM responsibility of department champions	• **Collation** of CO_2 emissions for limited scope i.e. buildings only	• **Environmental** / **energy** group(s) give ad hoc: ○ Training ○ Communications	• **Ad hoc** financing for CM projects • Limited task management • No allocated resource	• **Whole life** costing occasionally employed • Some **pooling** of environmental expertise	• CM team review aspects including: ○ **Policies / Strategies** ○ Targets ○ Action Plans
2	• No policy • Climate Change **aspiration**	• CM is **part**-time responsibility of an **individual** • No departmental champions	• **No CO_2** emissions data compiled • Energy data compiled on a regular basis	• Regular poster/awareness campaigns • **Staff & students** given ad hoc CM: ○ Communications	• Ad hoc financing for CM **related** projects • Limited task coordination **resources**	• **Green** criteria occasionally considered • Products considered in **isolation**	• Ad hoc reviews of CM actions progress
1 Worst	• No policy • **No** Climate Change reference	• No CM responsibility designation	• Not compiled: ○ CO_2 emissions • Estimated billing	• No communication or training	• No internal financing or funding for CM related projects	• No Green consideration • No life cycle costing	• No CM monitoring

Appendix D: KCL policy information

Energy and Carbon Management Policy
http://www.kcl.ac.uk/college/policyzone/index.php?id=411

Environment and Sustainability Policy
http://www.kcl.ac.uk/college/policyzone/index.php?id=191

Green Transport Policy
http://www.kcl.ac.uk/college/policyzone/index.php?id=195

Waste Management Policy
http://www.kcl.ac.uk/college/policyzone/index.php?id=198