Carbon Management and Implementation Plan

Queen Mary University of London

Version 3

February 2015

Approved By
Date

Date Produced	Title	Produced By	Revision
November 2010	Carbon Management Plan	Carbon Trust	1
April 2011	Carbon Management and Implementation Plan	Arup	2
February 2015	Carbon Management and Implementation Plan	Estates and Facilities	3

This plan will be reviewed annually for suitability and a progress report will be produced. In conjunction with this an annual Project Plan will be produced and quarterly updates will also be provided where possible. These reports and updates will be presented to the Carbon Reduction Group and Sustainability Committee for approval. If the overall Carbon Management and Implementation Plan needs to be revised this will be detailed in the above table in order to monitor developments.

Contents

1.0 Introduction

1.1 General

Queen Mary University of London (QMUL) is one of the UK's leading research-focused higher education institutions. With around 17,840 students, 4,000 staff and an annual turnover of £300m, we are one of the biggest University of London colleges.

We teach and undertake research across a wide range of subjects in the humanities, social sciences, law, medicine and dentistry, and science and engineering. Based in a creative and culturally diverse area of East London, we are the only London University able to offer a completely integrated residential campus, with a 2,000-bed student village at our Mile End home.

QMUL has made a strategic commitment to the highest quality of research. We have invested in this principle by systematically recruiting the best academics in their disciplines from around the world. Also QMUL is one of 24 leading UK universities represented by the Russell Group, that are committed to maintaining the very best research, an outstanding teaching and learning experience, excellent graduate employability and unrivalled links with business and the public sector.

A central part of our work is to ensure QMUL positively contributes to the decarbonisation of the sector and QMUL has set a series of reduction and reporting targets. Table 1.0 details the scopes and reduction targets included in this Carbon Management and Implementation Plan (CMIP).

Table 1.0 Scope of Emissions Baseline

Scope	HEFCE Requirement	Reduction Target (2020)	Baseline year
Scope 1 Building Fuels- Natural Gas	Required	34% scope 1 and 2 emissions (Electricity and Gas) (cap at 15,634 tCO_2/year)	2005/06
Scope 1 Transport fuels- fleet consumption	Required	50% (cap at 5.31 tCO_2e)	2009-10
Scope 2 Electricity	Required	34% scope 1 and 2 emissions (Electricity and Gas) (cap at 15,634 tCO_2/year)	2005/06
Scope 3 Water and Waste Water	Required	30% (cap at 187.22 tCO_2e)	2009/10
Scope 3 Waste Disposal	Required	30% (cap at 6047.86 $tCO_2e_)$	2010/11
Scope 3 Procurement	Required	Target yet to be confirmed	
Scope 3 Transport- Business Travel	Required	10%(cap at 952 tCO_2e)	2012/13
Scope 3 Transport- Commuter Staff	Optional	Target yet to be confirmed	2012/13
Scope 3 Transport- Commute Students	Optional	Excluded - to be addressed in 2014/15	

The draft Carbon Trust Carbon Management Plan was presented to the Estates and Services Committee at its meeting on 23 November 2010. The CMIP was produced by Arup in March 2011 and approved in April 2011. Following on from this the CMIP was revised to include scope 3 emissions and record progress to date.

The CMIP will be reviewed annually for suitability and a report will be produced detailing the findings and progress to date. Quarterly briefings will also be provided to monitor progress. These reports and updates will be presented to the Carbon Reduction Group and Sustainability Committee for approval.

1.2 Background

It is an aim of the Estates and Facilities Directorate to ensure that QMUL is regarded as a centre of excellence in carbon management. In addition to achieving full statutory compliance, it aims to improve QMUL's energy efficiency and use of resources by integrating sustainability with corporate strategies, policies and operational procedures. This revised Carbon Management and Implementation Plan (CMIP) addresses the College's emissions, Figure 1.0 details the different scope emissions which are included in this CMIP.

Scope 1 (Direct emissions)	Scope 2 (Energy indirect)	Scope 3 (Other indirect)
• Activities owned or controlled by your organisation that release emissions straight into the atmosphere. They are direct emissions. • Examples of scope 1 emissions include emissions from combustion in owned or controlled boilers, furnaces, vehicles.	• Emissions being released into the atmosphere associated with your consumption of purchased electricity, heat, steam and cooling. • These are indirect emissions that are a consequence of your organisation's activities but which occur at sources you do not own or control.	• Emissions that are a consequence of your actions, which occur at sources which you do not own or control and which are not classed as scope 2 emissions. • Examples of scope 3 emissions are transport (business, commuting etc), waste disposal, water use, waste water production, procurement.

Figure 1.0 Emissions Definitions

This CMIP seeks to embed good practice within the organisation by encouraging and supporting a number of departments in QMUL to take ownership and responsibility for projects and initiatives to reduce the various carbon emissions. This will not only ensure we reach the reduction targets detailed within this CMIP but also will result in a financial saving as energy, water and waste disposal costs are expected to continue increasing for the duration of this plan. This CMIP will also contribute to improving QMUL's standing in influential external indices etc.

1.3 Scope 1 and 2 Emissions

The CMIP scope 1 and 2 emissions sub sections have been developed from an analysis of QMUL prepared by Arup, dated March 2011[1]. The Arup study sets out the proposed measures to reduce carbon, the anticipated costs of implementation and the predicted cost savings.

The scope 1 and 2 emissions relating to electricity and gas usage are recorded by QMUL using data obtained from utilities bills and historic records (where bills are not available). The majority of the bills being used are based on accurate readings from automatic meter readers meaning reliable data is being analysed.

Emissions related to electricity and gas consumption will be measured by multiplying the amount of kWh's used, which will be obtained from the bills, by the conversion factor supplied by Defra. This will be reported in tCO_2e.

Since the original CMIP was published the method Defra uses to calculate the carbon conversion factors has changed from a 5 year rolling average to a 1 year assessment. Due to this the original scope 1 and 2 electricity and gas emissions have been rebaselined. This means the carbon emissions reported in this CMIP will be different from the original. However, the original reduction target of 34% CO_2e by 2020 will remain in place.

The QMUL Strategic Plan 2010-2015 (CSP) required that 30% of the overall scope 1 and 2 electricity and gas carbon reduction target should be delivered by 2015. This was to reduce the overall risk profile of QMUL associated with carbon. The original Arup CMIP therefore split the overall carbon reduction programme into two phases; the first phase targeting a 30% carbon reduction to be achieved by the end of 2015. However, this target is no longer achievable due to the lower than anticipated levels of investment being made available. A revised interim target of 30% by the end of the financial year 2017/18 has now been introduced to help militate against the risk resulting from failing to meet the 2020 carbon reduction target. A revised 2 phase reduction plan is detailed in Section 4.0.

The Arup CMIP did not include scope 1 emissions relating to transport these will be included in the overall transport related emissions reported in the scope 3 transport sub sections.

1.4 Scope 3 Emissions
1.4.1   Water and Waste Water

Emissions from water use are associated with the energy use from supplying water and from the wastewater treatment processes. From the 2012/13 Estates Management Record (EMR) onwards, QMUL will report on its water use and waste water production at a residential and non-residential level.

Emissions related to water and wastewater use will be measured by multiplying the volume of water used (m^3), which will be obtained from the bills, by the conversion factor for water supply supplied by Defra. This will be reported in t CO_2e.

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[1] A copy of the Arup study is available on request from the Director of Estates and Facilities.

1.4.2 Waste Disposal

Emission associated with waste management operations arise from a number of activities in the waste management cycle, such as transportation, treatment and disposal. From 2012/13 the waste emissions will be reported on non-residential and residential level through the EMR. HEFCE sets out a three tiered reporting system depending on the level of data available to an organisation; this is available via the following link http://www.hefce.ac.uk/pubs/year/2012/201201/ .

Some of the new reporting requirements include reporting for waste produced, amount of waste sent to landfill, amount of waste composted and the quantity of waste sent for energy recovery etc. This also includes reporting on project related waste. QMUL are currently calculating its waste production and disposal method using a 'basic' estimation approach.

1.4.3 Procurement

Procurement emissions are the embedded emissions of the goods and services consumed by an institution, excluding building energy (Scope 1 & 2) and travel (dealt with separately). Scope 3 procurement emissions are calculated using a 'consumption based' approach by assigning carbon intensity to the various spend profiles.

Scope 3 emissions related to procurement will be reported through the Annual Returns Database (ARD) and in the EMR and will be aligned with the existing reporting period.

QMUL will be able to analyse the procurement footprint results, obtained through the London Universities Purchasing Consortium (LUPC), to identify carbon intensive spends and introduce measures to reduce the emissions in line with the HEFCE targets and our own targets.

1.4.4 Transport

HEFCE has initiated the measuring, monitoring and reporting of scope 3 emissions related to transport at an institutional level through the EMR from 2012/13. This will include transport emissions from fleet fuel used in vehicles owned or leased by QMUL, business travel and commuter travel (Staff and Students).

1.4.5 Fleet Fuel

QMUL has a number of vans and cars. Spend and consumption is recorded on the fuel cards which will be used to calculate the annual consumption. This is considered a Scope 1 emission under the HEFCE guidelines. However, to ensure a consistent approach is adopted at QMUL, all transport emissions and the related carbon reduction target will be reported in the scope 3 transport category.

1.4.6 Business travel

Business travel is travel undertaken by staff and students that is paid for by QMUL.

This includes mandatory reporting for business travel undertaken by air, rail, company car, hire car, grey fleet, motorcycles and mopeds, vans and leased buses. Reporting of business travel from bus, underground, tram, taxi, coach & ferry would be optional. This data and the related emission will be calculated based on the records maintained by the two travel companies through which all business travel is booked.

1.4.7 Commuter travel

Commuter travel is travel undertaken by staff to and from their home to QMUL, travel undertaken by students from their home at the time of joining QMUL and term time travel to and from QMUL to their term time accommodation.

Reporting of emissions from commuter travel is considered optional within the HEFCE requirements. However, QMUL has begun data collection and analysis to provide a full account of emissions in this area.

2.0 Drivers

2.1 Sustainability

2.1.1 Environmental

As understanding about the impact of raising carbon dioxide emissions on the global climate increases, more organisations are beginning to address their contribution to anthropogenic climate change. Also with growing consensus among the scientific community about what causes climate change and related global warming, it is becoming increasingly important for businesses to minimise their adverse environmental impacts.

A priority area for most businesses is reducing their energy consumption. This has clear environmental benefits (as related greenhouse gas emissions will decrease) but also a significant financial incentive. Energy security is also a growing concern with demand outstripping supply and the threat of 'peak oil' increasing.

In addition to energy security, resource availability is also rising up the agenda creating greater incentives to introduce sustainable procurement practices to address life cycle costing and the associated environmental impacts.

To help QMUL address these environmental drivers in a holistic way all future work will be captured in an Environmental Management System (EMS) aligned to ISO 14001 guidelines. This system provides a structured method to address all impacts and helps ensure continuous environmental improvement, prevention of pollution and legal compliance.

2.1.2 Social

As knowledge and awareness about the importance of sustainability increases and the higher education sector responds to demands from HEFCE, students and other stakeholders, QMUL is determined to demonstrate it takes the issue of sustainability seriously.

QMUL considers itself part of an international community of HEIs and as such understands the importance of reducing its contribution to climate change.

Education for Sustainable Development forms part of QMUL's curriculum. The university accepts that it must lead our students by example whilst providing them with the knowledge required to include sustainability in their future lives and careers.

2.1.3 Financial

A key driver for most businesses in regard to sustainability is the financial risk associated with not acting and the benefits which result from efficiencies generated through positive action.

Energy prices charged to QMUL have increased by approximately 14% over the last 2 years. This, coupled with an increase in the use of energy consuming equipment i.e. computers, audio visual equipment and lab equipment etc. means QMUL's costs and consumption are increasing. Reducing scope 1 and 2 electricity and gas emissions will therefore not only have environmental and social benefits but also a clear financial benefit.

In addition, reducing energy consumption will result in a lower Carbon Reduction Commitment fee. Currently, the CRC carbon price is £12 per tonne, however, from 2014/15 this will increase to circa £16 per tonne, depending on the purchasing period adopted. The price will then increase annually in line with the retail price index introducing increased risk in forecasting the overall compliance costs. A lower CRC fee provides an added financial incentive to reduce energy consumption and related emissions.

There is also a financial incentive to introduce efficiencies within the scope 3 reporting areas.

Thames Water prices have increased annually by 3-6% over the last 5 years. This rise, along with increased demand on the catchment, means QMUL has to reduce consumption to ensure the university's demand does not result in having to purchase additional supplies.

Landfill tax increases annually and the cost of waste collection is also expected to rise. This means there is a clear financial incentive to move up the waste hierarchy by increasing our rates of reuse and recycling by and reducing the amount of overall waste produced.

As previously mentioned the introduction of sustainable procurement practices and life cycle analysis will produce savings over the lifetime of the project.

The promotion of sustainable transport options will also produce savings for QMUL by freeing up car parking space, reducing the amount of travel claims and better management of our fleet vehicles.

2.2 Legal Compliance
2.2.1 Climate Change Act 2008

The UK Climate Change Act (2008) sets legally binding targets to reduce greenhouse gas emissions by at least 80% by 2050 and at least 34% by 2020 from 1990 levels. In order to meet its international obligations on climate change the United Kingdom Government has sought to ensure that universities play their part and set a carbon target to deliver a 43% reduction in carbon emissions on 2005/06 levels across the sector by 2020.

This target is being implemented through the Higher Education Funding Council for England (HEFCE) and compliance with the target has been linked to the funding grant under the Capital Investment Framework (CIF2). It was announced on 14 March 2011 that £11M of capital funding is available to the College if it meets the requirements of CIF2 of which delivering carbon reductions through a carbon management and implementation plan represents a significant milestone.

In 2011 HEFCE required all universities to set their own targets to 2020 for reducing scope 1 & 2 emissions[2] based on their own circumstances and to agree carbon management plans as to how they will achieve this[3]. This was submitted as part of CIF2 requirements by QMUL in March 2011.

In 2012 HEFCE produced a series of reports which introduced mandatory reporting of Scope 3 emissions for HEIs, related to procurement, transport, water and waste. Since August 2013 HEFCE has required all HEIs to 'Monitor and Report' on all Scope 3 emissions. In addition, the People and Planet Green League require organisations to set reduction targets against a baseline year in the same way that we do for Scope 1 and 2 emissions. This means as part of the Higher Education Statistics Agency (HESA) Estates Management Returns (EMR) the College is expected to submit its overall carbon footprint figures including emissions from energy, procurement, transport, waste and water as well as making them a matter of public record.

2.2.2   Carbon Reduction Commitment Energy Efficiency Scheme

Under the Carbon Reduction Commitment Energy Efficiency Scheme[4] (CRC EES) and the EU Energy Performance of Buildings Directive[5] QMUL is required to reduce its carbon emissions The CRC EES has also announced that the price of carbon is going to increase annually, as detailed in section 2.1.3.

3.0 Targets and Impacts

3.1 Scope 1 and 2 Emissions

Through this CMIP QMUL commits to reducing its scope 1 and 2 electricity and gas CO_2e emissions by **34% against the 2005/6 baseline using 2008/9 levels** in line with the HEFCE sector target for HEIs.   The baseline was established by analysing QMUL's consumption data for electricity and gas. Carbon dioxide is expressed in tonnes of carbon (tCO_2).

The College's scope 1 and 2 emissions for 2005/06 totalled **23,914 tCO_2e**. This cost the College approximately £1.88M[6]. By 2008/09 the College's emissions had risen slightly to 24,352 tCO_2e but at a significantly elevated cost of approximately £4.72M[7]. This clearly demonstrates the impact of rising tariffs on the College and supports the objectives of the CMIP to reduce carbon emissions and limit exposure to further increases in utility costs.

In order to meet the carbon reduction target of 34%, the College must **cap its carbon emissions at 15,634 tCO_2/year by 2020** as shown in Figure 2.0. An interim target of 30% by 2017/18 has been agreed in order to reduce the risk of not meeting the overall reduction target.

The Scope 1 and 2 Data Summary Sheet (page 13) displays the annual consumption and related emissions for scope 1 and 2 emissions based on the current conversion factors.

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[2] Refer to Figure 1.0 for an explanation of scope emissions.
[3] HEFCE (2010) *Carbon Reduction Target and Strategy for HE in England* http://www.hefce.ac.uk/pubs/hefce/2010/10_01/
[4] For further details: http://www.decc.gov.uk/en/content/cms/what_we_do/lc_uk/crc/crc.aspx
[5] For further details: http://www.diag.org.uk/
[6] Figure retrieved from the 2005/06 EMS Return which was derived from utility bills.
[7] Figures retrieved from the 2008/09 EMS Return which was derived from utility bills.

The electricity and gas data has been collated from the utility bills and historic records where billing data is not available. The 2008/9 year data is used to identify the reduction required on the 2005/6 baseline year, these years where selected as they meet the HEFCE requirements. However annual trends are also analysed to identify annual progress.

Figure 2.0 demonstrates the 34% reduction target and the orange bars demonstrate percentage reduction required each year to meet this absolute reduction. Figure 3.0 & 4.0 display the emissions when normalised against student numbers and income. Student numbers and income have been selected to normalise that data as the figures provided are auditable and are released annually in the financial statements. Gross Internal Area (GIA) has not been used as the overall change in GIA annually has not historically been maintained so validity cannot be checked. Both graphs show how as student numbers and income have increased the normalised emissions have decreased and overall the trend appears more favourable then the absolute reduction. However student numbers appear to impact emission less than income.

Whilst there are some positive trends, the absolute emissions need to decrease to meet HEFCEs requirements.

Normalising against student numbers and income takes account of QMUL's growth. It is a better metric than GIA as we know the data presented is complete and accurate. Also student numbers and income better represent the way we manage and use the estate whereas GIA does not show this.

Scope 1 and 2 Electricity and Gas Emissions Summary Data Sheet

Table 2.0 Scope 1 and 2 Electricity and Gas Annual Consumption and Emissions (2005/6 is the baseline year)

| Scope 1 and 2	Units	Reporting Year							
		2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Electricity Consumption	kWh	32830291	32967061	32959932	34767924	35447931	36452619	37764769	39537277
Electricity Emissions	tCo₂e	17164	17094	16585	18589	18891	19115	18530	19625
Gas Consumption	kWh	34795575	28241794	31104418	31152773	34807340	34950527	29218090	38973466
Gas Emissions	tCo₂e	6750	5479	5754	5763	6403	6474	5377	7173
Total Emissions	**tCo₂e**	**23914**	**22573**	**22339**	**24352**	**25294**	**25589**	**23908**	**26797**
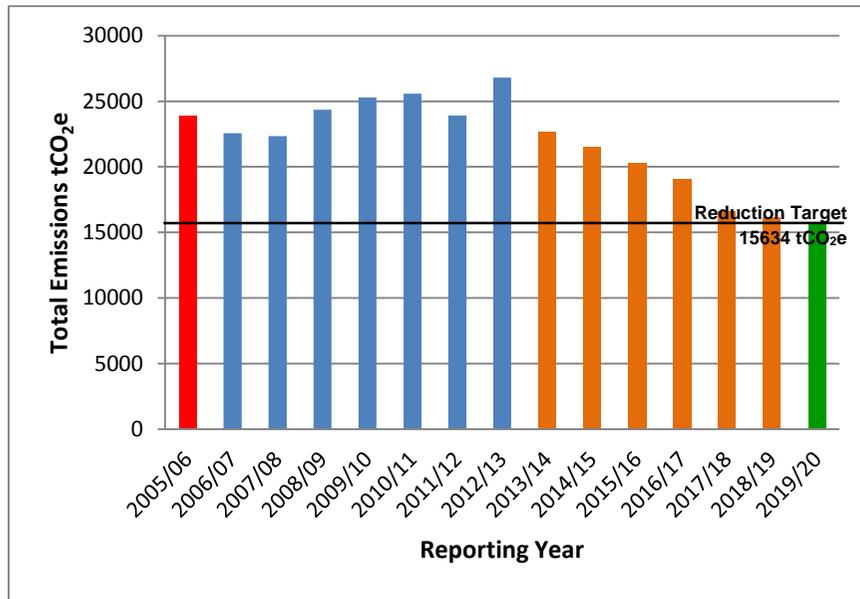
Figure 2.0 Total Annual Scope 1 and 2 Emissions (tCO₂e)
(The red bar is the 2005/6 baseline year, blue bar represents data obtained from the billing, orange bars represent the predicted annual emissions required in order to achieve the 2020 and 2017/18 targets and the green bar represents the 2020 reduction target)
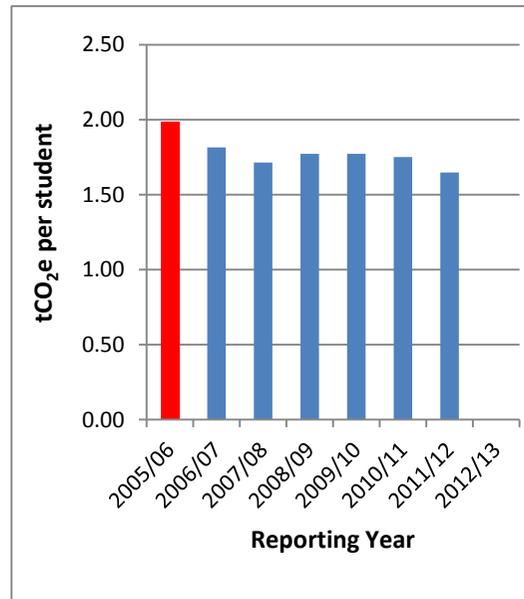
Figure 3.0 Normalised Emissions per student (tCO₂e)
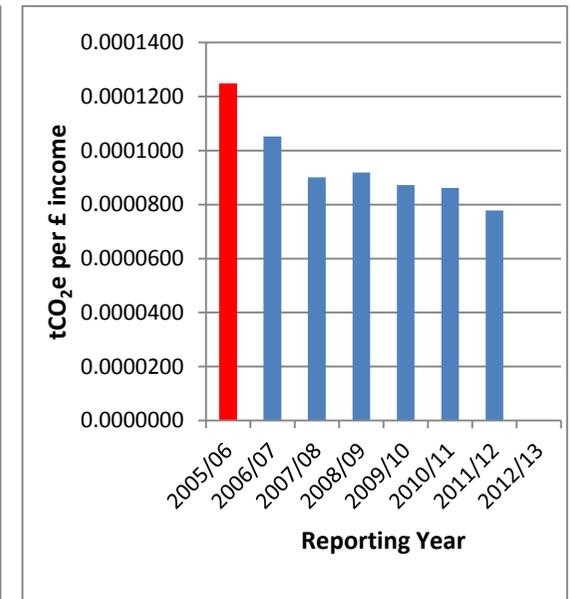(Student numbers taken from financial statements)

Figure 4.0 Normalised Emissions per £ of income (tCO₂e)
(Income taken from financial statements)

3.2 Scope 3 Emissions

3.2.1 Water and Waste Water

The 2020 scope 3 water and waste water emissions reduction target is 30% based on a 2009/10 baseline year. This amounts to a total reduction of 80.24 tCO$_2$e which means our 2020 emissions would need to fall to 187.22 tCO$_2$e.

The water and waste water data has been collated from utility bills. The 2009/10 year was selected as the baseline year as full data records were available.

Figure 5.0 demonstrates the 30% reduction target and the orange bars demonstrate percentage reduction required each year to meet this absolute reduction.

Figure 6.0 & 7.0 display the emissions when normalised against student numbers and income. Both graphs show how as student numbers and income have increased the normalised emissions have decreased. However, we believe that a larger increase in water use in 2012/13 will result in this downward trend not continuing. The current trend is positive, however, the absolute emissions need to decrease by approximately 2% a year from 2013/14 onwards to meet the absolute reduction of 30% by 2020.

The 30% reduction target identified, based on the current trend, will be achieved before the 2020 deadline, once this occurs for two consecutive years a revised target will be calculated.

Table 3.0 Scope 3 Annual Water Emissions (2009/10 Baseline Year)

| Scope 3 Type	Units	Reporting Year			
		2009/10	**2010/11**	**2011/12**	**2012/13**
Water Consumption	m^3	373930.00	280668.00	219714.00	281590.00
Water Emissions	kgCo$_2$e	127136.20	95427.12	74702.76	96895.12
Waste Water Production	m^3	200460.38	174632.11	145595.18	164511.30
Waste Water Emissions	kgCo$_2$e	140322.27	123988.80	101916.63	116556.26
Total Emissions	**tCo$_2$e**	**267.46**	**219.42**	**176.62**	**213.45**
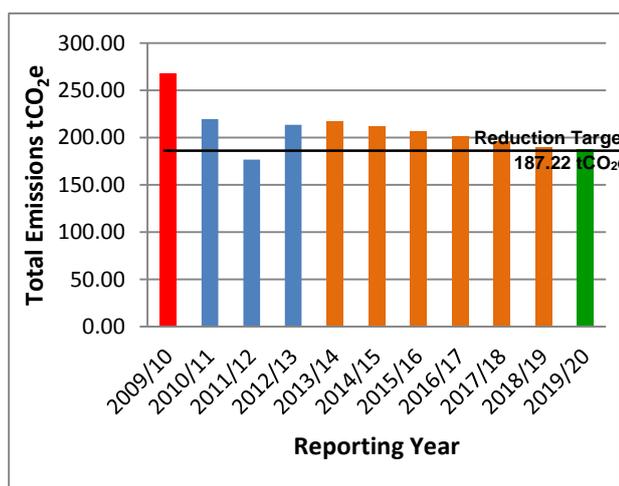
Figure 5.0 Total Annual Scope 3 Water Emissions (tCO$_2$e)

(The red bar is the 2005/6 baseline year, blue bar represents data obtained from the billing, orange bars represent the predicted annual emissions required in order to achieve the 2020 and the green bar represents the 2020 reduction target)
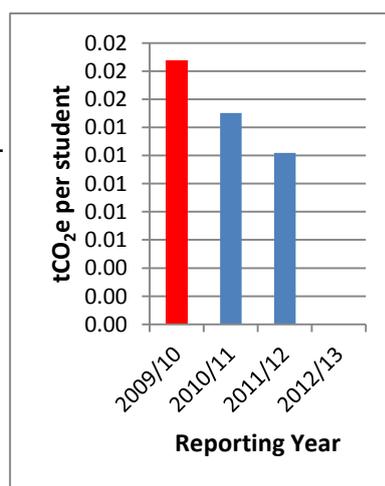
Figure 6.0 Normalised Water Emissions per student (tCO$_2$e)
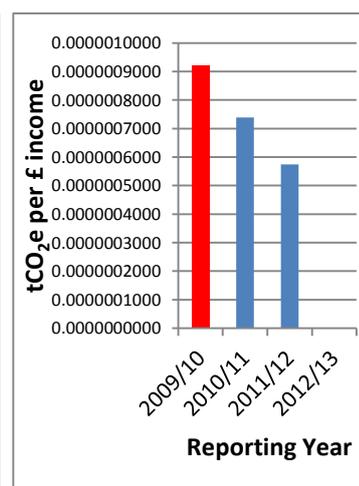
(Student numbers taken from financial statements)

Figure 7.0 Normalised Water Emissions per £ of income (tCO$_2$e)

(Income taken from financial statements)

3.2.2 Waste Disposal

The 2020 scope 3 waste related emissions reduction target is 30% based on a 2010/11 baseline year. This amounts to a total of 2591.94 tCO_2e which equates to our 2020 emissions needing to fall to 6047.86 tCO_2e. This target has been calculated based on tier 1 basic reporting estimation data as categorised by DEFRA. This data is not considered to be a completely accurate reflection of waste production and disposal on site and we continue to work to improve the data collection methods. Following this a revised target will be identified.

Figure 8.0 demonstrates the 30% reduction target and the orange bars demonstrate percentage reduction required each year to meet this absolute reduction.

Figure 9.0 & 10.0 display the emissions when normalised against student numbers and income. Both graphs show how as student numbers and income have increased the normalised emissions have decreased. This is a positive trend, however, absolute emissions need to decrease by approximately 3% a year to meet HEFCE's requirements.

Table 4.0 Scope 3 Annual Waste Emissions (2010/11 Baseline Year)

| Scope 3 Type	Units	Year			
		2008/09	2009/10	2010/11	2011/12
Residential Waste	tonnes	2459	1000	1029	1220
Residential Waste Emissions	$kgCO_2e$	5741961.72	2335080	2402797.32	2779544.289
Non Residential Waste	tonnes	3422	400	1740	1850
Non Residential Waste Emissions	$kgCO_2e$	7990643.76	934032	4063039.2	4214882.733
Construction Waste	tonnes	1496	1050	931	434
Construction Waste Emissions	$kgCO_2e$	3493279.68	2451834	2173959.48	958827.52
Total Emissions	**tCO_2e**	**17225.89**	**5720.95**	**8639.80**	**7953.25**
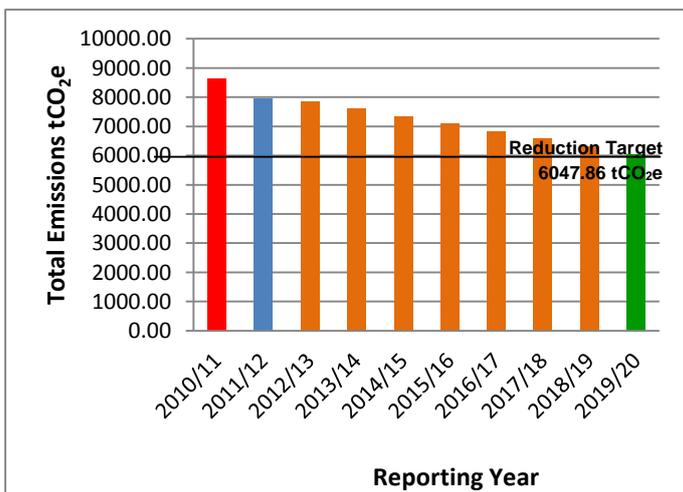
Figure 8.0 Total Annual Scope 3 Waste Emissions (tCO₂e)

(The red bar is the 20010/11 baseline year, blue bar represents data obtained from basic tier estimation, orange bars represent the predicted annual emissions required in order to achieve the 2020 and the green bar represents the 2020 reduction target)
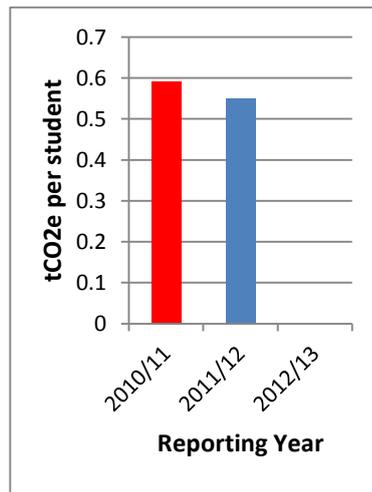
Figure 9.0 Normalised Waste Emissions per student (tCO₂e)

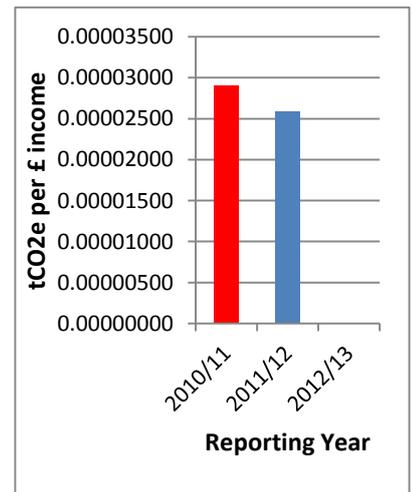(Student numbers taken from financial statements)

Figure 10.0 Normalised Waste Emissions per £ of income (tCO₂e)

(Income taken from financial statements)

3.2.3 Procurement

The 2020 scope 3 emissions reduction target for procurement cannot currently be identified as we have insufficient data to identify a suitably robust yet achievable target.

Procurement data is collected from the annual LUPC reports and based on the coming year's data - either 2011/12 or 2012/13 will be selected.

Table 5.0 and Figure 11.0 demonstrate the current data we have for procurement. A suitable target will be identified in 2015/16. In the interim we have set a target to reduce the percentage unclassified to 5% by 2015/16 (Figure 12.0) to help ensure all spend is appropriately represented and therefore analysed.

Table 5.0 Scope 3 Annual Procurement Emissions (Baseline not identified)

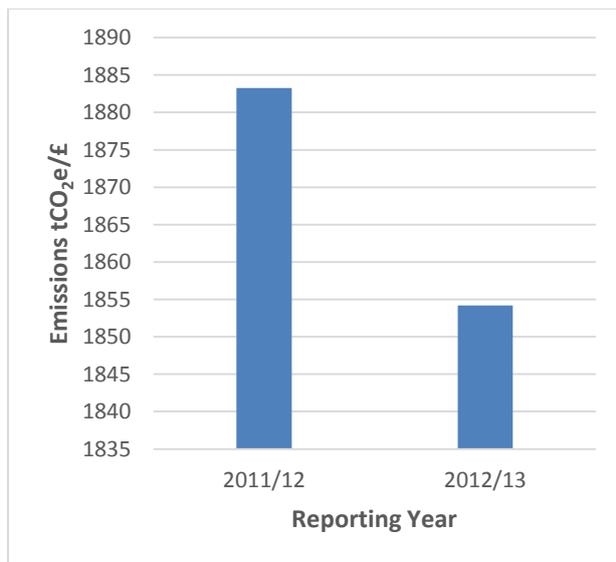| Scope 3 Type	Units	Year	
		2011/12	2012/13
Procurement Spend	£	152,536,443	71,920,494
Total Emissions	tCo$_2$e	80,996	38,788
Percentage Unclassified	%	12	6

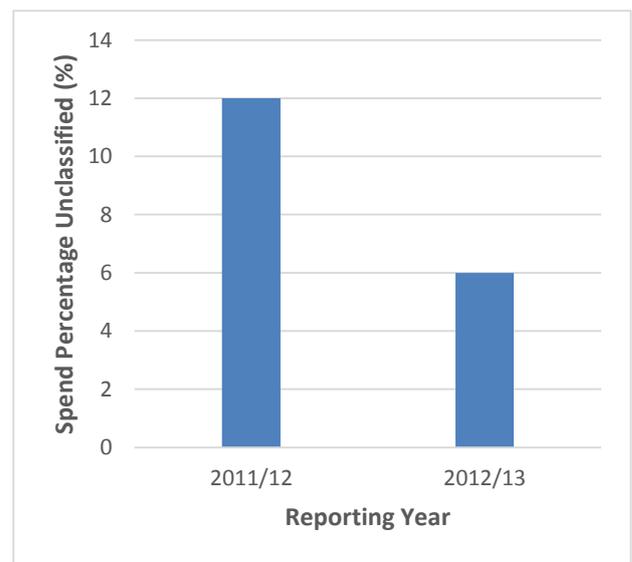**Figure 11.0 Total Annual Scope 3 Procurement Emissions (tCO$_2$e/£)**

Figure 12.0 Spend Percentage Unclassified

3.2.4 Transport
3.2.3.1 Fleet emissions

The 2020 scope 3 fleet fuel emissions reduction target is 50% based on a 2009/10 baseline year. This amounts to a total of 5.31 tCO$_2$e meaning our 2020 emissions must equal 5.31 tCO$_2$e.

The fleet fuel data is collated from fuel cards which are centrally managed at QMUL. The 2009/10 year was selected as the baseline year as full data records were available.

Figure 12.0 illustrates the 50% reduction target with the orange bars showing the percentage reduction required annually to meet this absolute reduction.

Figure 13.0 & 14.0 display the emissions when normalised against student numbers and income. Both graphs show that as student numbers and income have increased so the normalised emissions have decreased. Even though the students do not directly impact fleet use there is an expectation that as student numbers increase fleet activity may also increase to ensure that service provision is maintained. The correlation is stronger with income.

Table 6.0 Scope 3 Annual Fleet Fuel Emissions (2009/10 Baseline Year)

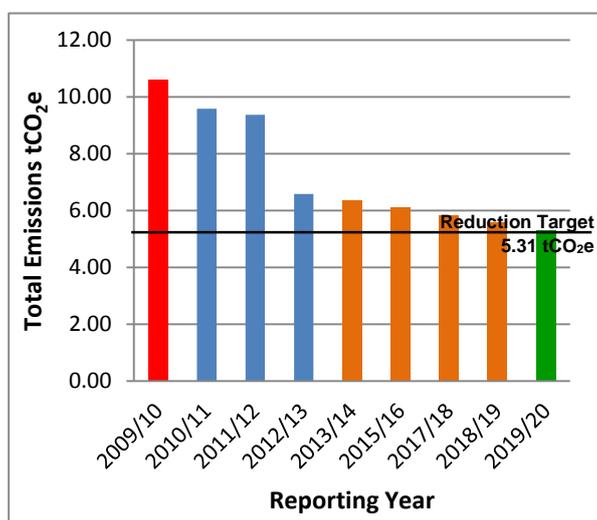| Scope 3 Type	Units	Reporting Year			
		2009/10	2010/11	2011/12	2012/13
Petrol Consumption	Lt	1090.56	1178.82	1521.21	1089.40
Petrol Emissions	kgCo$_2$e	2908.52	3143.91	4057.07	2442.76
Diesel Consumption	Lt	2829.16	2367.00	1949.36	1602.32
Diesel Emissions	kgCo$_2$e	7702.95	6444.63	5307.52	4139.59
Total Emissions	tCo$_2$e	10.61	9.59	9.36	6.58

Figure 12.0 Total Annual Scope 3 Fleet Emissions (tCO$_2$e)

(The red bar is the 2009/10 baseline year, blue bars represent data obtained from fuel card statement, orange bars represent the predicted annual emissions required in order to achieve the 2020 and the green bar represents the 2020 reduction target)
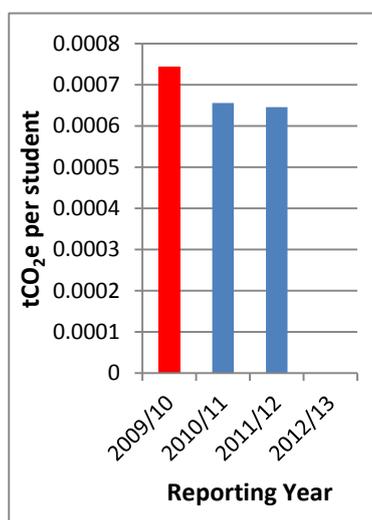
Figure 13.0 Normalised Fleet Emissions per student (tCO$_2$e)

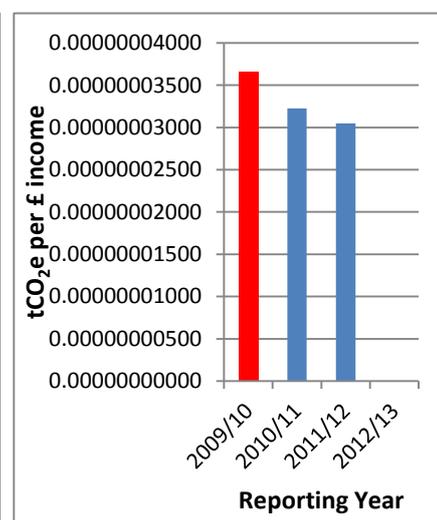(Student numbers taken from financial statements)

Figure 14.0 Normalised Fleet Emissions per £ of income (tCO$_2$e)

(Income taken from financial statements)

3.2.3.2 Business Travel

The 2020 scope 3 business travel emissions reduction target is 10% based on a 2012/13 baseline year. This amounts to a total reduction of 483.11 tCO2e meaning our 2020 emissions would equal 4348 tCO$_2$e. Our 2012/13 emissions from rail and air travel are obtained from our transport providers and equals 4831 tCO$_2$e. When a full two-year's worth of data is available this data will be normalised against staff numbers, student numbers and income to identify the strongest correlation.

3.2.3.3 Commuting
Staff
The 2020 scope 3 business travel emissions reduction target is 10% based on a 2012/13 baseline year. This amounts to a total of 105.80 tCO_2e meaning our 2020 emissions would need to reduce to 952 tCO_2e.

Our 2012/13 emissions from staff commuting travel was estimated at 1058 tCO_2e.

Staff commuter travel was estimated by conducting a travel survey which 813 staff completed, calculating the average distance most staff travel based on area code calculations and then applying the modal transport split to this distance.

The estimation technique adopted will be reviewed and improved when the survey is repeated every other year.

Student
A student commuter survey will be undertaken in 2014/15 and an estimation technique will be implemented to calculate student commuting emissions. As the data is not yet available a reduction target has not currently been identified.

4.0 Implementation Plan

4.1 Engagement
Engaging relevant stakeholders in the organisation's CMIP and energy saving programmes of activity will positively contribute to the 34% tCO_2e carbon reduction target from scope 1 and 2 emissions.

The Carbon Trust[8] identified that a 1-2% investment in engagement and core behaviour change can result in a 10% overall reduction in energy consumption. Futerra[9] have also researched sustainability engagement and have identified that people are more likely to adopt new or changed behaviours when going through a significant period of change in their lives so targeting first year students has the potential to produce a larger impact. The Futerra study also highlights the importance of 'catalyst action', meaning a big event which triggers change in one behaviour can lead to smaller changes in other areas. However smaller actions very rarely build to wider behaviour change.

With this research in mind, all scope emissions are addressed through coordinated campaigns that seek to maximise the reach and impact of these campaigns and the 'catalyst action' opportunities. However energy efficiency and reduction will be central to the campaign benefiting from the largest investment as we believe it is more effective to focus on the most significant area of impact and not 'water down' the core message that saving energy is crucial.

There will also be an emphasis on ensuring everyone throughout QMUL understands their impacts and how they can contribute to the carbon reduction performance of the organisation. This is the only way to ensure long term sustainable change and development in regard to carbon emissions.

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[8] Carbon Trust (2013), Low Carbon Behaviour Change: the £300 million opportunity (http://www.carbontrust.com/resources/reports/advice/low-carbon-behaviour-change last updated 2013),Carbon Trust
[9] Futerra (2013) New Rules, New Game, Communication Tactics for Climate Chang (http://www.futerra.co.uk/work#go=new-rules-new-game-2279), Futerra

4.2 Policy and Management

In order to effectively embed carbon management operationally we recognise that the approach adopted must be robust. Annually the existing policy and management structures will be reviewed and updated as part of our Environmental Management System which is based on the requirements of ISO 104001 and ISO 50001.

QMUL's performance against the CMIP targets and related EMS policies and procedures will be reported on annually. This will help inform the creation of additional supporting policies, procedures and management approaches.

The planned list of policy and management projects will be included in the Annual Project Plan.

4.3 Projects

QMUL maintains a capital and revenue projects list detailing all projects identified which, if implemented and resourced, will positively contribute to the CMIP and the wider sustainability performance of the organisation.

This project list is formulated from energy audits, project planning sessions with stakeholders and through asset verification activities etc. The cost and payback is calculated and this is used to inform the projects priority. In order to assign priority; resources, operational disruption, student impact and organisational needs etc. are also considered. Each building's consumption per meter squared (GIA) will also be used to help identify the potential impact of the projects with the buildings being assigned three priority levels, red (high priority), amber (medium priority) and green (low priority).

Based on the availability of funding, resources and project prioritisation an Annual Project Plan is created. This plan is approved by the Carbon Reduction Group, Sustainability Committee and Estates Strategy Board. The implementation of this plan is monitored quarterly and formally then the reported on at year end. Each year lessons learnt are identified which inform future plans and approaches.

5.0 Monitoring and Reporting

The Table 7.0 summarises the monitoring and reporting for the CMIP, Annual Project Plans and each scope. In the annual review a comparison to our peers will be included to monitor how we are performing when compared to the sector. The Estates Management Return data will contribute to this analysis.

Table 7.0 Monitoring and Reporting

Area	Reporting	Presented to	Public
CMIP	Annual Review	Finance and Investment Committee	Yes
Annual Project Plans	Annual Plan	Estates Strategy Board	Yes
	Year End	Sustainability Committee	Yes
	Quarterly Review	Carbon Reduction Group	No
All Emissions	Year End	Estates Strategy Board	No
Scope 1 & 2 Emissions	Quarterly Update	Carbon Reduction Group	Yes
Scope 3 Water and Travel	Quarterly Update	Carbon Reduction Group	Yes
Scope 3 Waste	Year End	Waste Management Group	No
Scope 3 Procurement	Year End	Sustainable Procurement Group	No

6.0 Finance

The Annual Project Plans and the overall project list will identify the predicted capital and revenue expenditure required to meet the 2020 scope 1 and 2 reduction target.

A number of projects will also be identified to address scope 3 emissions. However, the costing of these will be largely dependent on uptake and are more likely to need staff resourcing rather than capital investment. It should be noted that prior to this CMIP update the capital investment in carbon reduction initiatives has not reached the required level, meaning funding going forward will have to be higher than previously forecast to meet the HEFCE reduction target.

In order to maximise the return for the investment the proposed threshold cost-benefit for projects to be deemed cost-effective is a net lifecycle cost-benefit of £50/tCO$_2$. The limit correlates to a simple payback period of 8-12 years for capital expenditure. SALIX expenditure requires a 5-10 year payback period so is more stringent. It has been shown elsewhere that substantial carbon reductions through infrastructure projects can be achieved at around this level of cost-benefit, so significant carbon savings should be achievable within this time limit.

Project prioritisation will be influenced by the lifecycle cost-benefit of each project. If projects exceed the 12 year payback requirements they will be included on the project register but given a lower priority. Investment should be focused on the higher priority projects with a lower payback period to realise the savings earlier and therefore allow reinvestment. It is proposed that any savings realised from energy revenue spend due to the capital investment should be invested in additional carbon reduction projects and programs which may not have been allocated funding to further increase each projects positive impact.

6.1 Capital Expenditure

In order to achieve the carbon reduction target capital investment is needed. QMUL has committed to fund carbon reduction projects for the current CMIP reporting period to a minimum value of £500K a year. This equals a total committed capital expenditure of £2 million in 4 years. QMUL was also awarded SALIX revolving green funding in 2008/09 which means we have and additional £200K a year (approx.) to reinvest in energy efficiency works, with a focus on lighting and heating upgrades and controls.

All projects, which impact carbon, must follow the Sustainability and Carbon in Capital Projects Policy. This specifies that projects are required to make an operational CO$_2$e saving of 40% and consider the introduction of renewable energy generation to offset carbon as well. This is further supported by the implementation of BREEAM across a number of our projects which links with the planning requirements. Planned large scale refurbishment projects which will positively contribute to the carbon reduction targets include The Graduate Centre Energy Centre, Maths, Engineering and John Vance Science Centre projects. The Long Term Maintenance (LTM) capital budget will also contribute to the reduction target with poor performing plant being upgraded producing operational efficiencies of 30% in most cases, when an area is currently adequately serviced.

External funding, such as HEFCE RGF and Refit, will also be considered in the future for large scale energy efficiency works and renewable generation projects to meet the carbon target and future proof the Estate.

7.0 Governance

The responsibility for monitoring the Carbon Management & Implementation Plan will rest with the Director of Estates and Facilities. The Assistant Director of Estates and Facilities (Sustainability) will lead on the delivery of the CMIP, the related Annual Project Plans and annual review. The CMIP targets are ambitious and some additional ground has been lost that will also need to be recovered. Whilst they remain achievable, these targets can only be fully realised by putting sustainability at the heart of the QMUL's operational and decision-making processes. The CMIP governance structure is detailed in Figure 15.0. The yearly project plans will be approved by the Estates Strategy Board, unless they require additional funding or resourcing.

Figure 15.0 Carbon Management and Implementation Plan Governance Structure

8.0 Conclusion

There are significant financial and reputational benefits to be gained through the successful implementation of the CMIP. Not only will utility cost savings be achieved, thereby reducing the QMUL's exposure to increases in utility and Carbon Reduction Commitment charges but also significant improvements can be made in the operation and maintenance of the Estate and its related facilities. The production of the CMIP, and its endorsement by QMUL, will help raise the profile of energy and carbon management and broader sustainability across the organisation. The effective delivery of the Annual Project Plans will require the need for additional funding and resourcing. Implementation of the CMIP is considered to be a significant reputational issue for QMUL with Central Government, HEFCE and our other stakeholders, including peers and our students all looking for us to support the HEI sector in reducing its overall carbon footprint for the benefit of both the current and future generations.

We are confident that with the implementation of the projects outlined in the annual plans and the ongoing behaviour change initiatives coupled with the Estates Strategy 2011-2020 will help achieve QMUL's carbon reduction targets. This CMIP is in line with HEFCE's requirements for HEI's to set their own targets for 2020 for scope 1 and scope 2 emissions against a 2005/6 baseline and then to introduce scope 3 targets and reporting.

For further information about carbon management or sustainability at QMUL email sustainability@qmul.ac.uk.