working with

The Institute of Cancer Research
Carbon Management Program

Carbon Management Plan (CMP)

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Foreword from the Chief Executive

The Institute of Cancer Research has two strategic goals:

- To continue to be one of the best cancer research centres in the world; and
- To continue to make a major contribution to the education and training of the next generation of leaders in cancer research.

To achieve these goals we provide excellent research and education facilities. In providing these we recognise our responsibility to the environment and commit, as far as reasonably practical, to promote protection of the environment and minimise the impact of our activities upon the local, regional and global environment. We have already demonstrated this commitment by joining the first cohort of Universities in the EcoCampus Scheme to develop our Environmental Management System and we believe this Carbon Management Plan will further enable us to cut our carbon emissions to the target levels we have set. We have a duty to act in this socially responsible way and our reputation will be increasingly linked to progress in this area.

The achievement of our carbon emissions targets will be a significant challenge as the majority of our estate comprises highly serviced and densely equipped laboratory accommodation with the associated high energy use and carbon footprint. However, we believe that significant reductions in energy use can be made without compromising our operational requirements, by using both tried and tested approaches and innovative solutions, including partnership working and collaboration with other organisations. This will not only provide environmental improvements but also financial and reputational benefits.

To achieve the reductions required will not only require continuing management and monitoring of performance against the targets and objectives, but more importantly the ongoing commitment of our staff and students. The completion of energy saving infrastructure projects is continuing. However it is the contribution of each individual making shifts in their behaviour which, with these energy saving projects will collectively make a significant difference.

We are therefore seeking the commitment of all staff and students to support this Carbon Management Plan, which will make a vital contribution to ICR's future sustainability and thus our strategic goals.

Professor Alan Ashworth FRS

Chief Executive

Foreword from the Carbon Trust

Cutting carbon emissions as part of the fight against climate change should be a key priority for Universities and Colleges - it's all about getting your own house in order and leading by example. The UK government has identified the Higher Education sector as key to delivering carbon reduction across the UK in line with the Climate Change Act targets, and the HE Carbon Management programme is designed in response to this. It assists Higher Education institutions in saving money on energy and putting it to better use elsewhere, whilst making a positive contribution to the environment by lowering carbon emissions.

The Institute of Cancer Research partnered with the Carbon Trust on this ambitious programme in 2010 in order to realise substantial carbon and cost savings. This Carbon Management Plan commits the University to a target of reducing CO_2 by 23% by April 2015 and underpins potential revenue savings to the institution of around £2.72 million by that date.

There are those that can and those that do. Universities can contribute significantly to reducing CO_2 emissions. The Carbon Trust is very proud to support the Institute of Cancer Research in their ongoing implementation of carbon management.

Richard Rugg

Head of Public Sector, Carbon Trust

Management Summary

Objective

This plan sets a framework to assist the Institute of Cancer Research in managing and reducing its carbon dioxide (CO_2) emissions from the use of electricity and gas within its estate. These energy sources cost the Institute over £1.2m in 2009/10.

Drivers

The necessity for a carbon management plan is driven by:

Legislation

- HEFCE have consulted and agreed on a sector-wide CO_2 reduction of 43% by 2020, against a 2005/06 baseline;
- The Institute is obliged to produce Display Energy Certificates for all building over 1,000 m^2 in floor area, and must respond to tightening Building Regulations and local planning targets for new buildings and major renovations.

Finance

- Since 2005/06, the Institute has seen electricity prices rise, on average, by almost 20% per year for electricity, and over 10% per year for gas. While it is recognised that energy costs are volatile, a continuing upward trend in prices is expected. If recent trends continue, the Institute's energy bill in 2014/15 will approach £3m;
- Funding from HEFCE will be reduced in the absence of a carbon management strategy as part of CIF2 compliance;
- The Institute qualifies as a participant for the CRC Energy Efficiency Scheme under which it is required to annually purchase allowances for every tonne of CO_2 emitted. The value of the first payment in 2012 is expected to be approximately £120,000;
- It is likely that the higher education sector will be experiencing budget cuts from central government.

Reputation

- The Institute needs to act in a socially responsible way to achieve its strategic goals and attract both public and private funding.

Targets

The Institute has set two CO_2 reduction targets – one long term, one short term – which are set out in the box below. These targets have been set taking into consideration the intensity of on site apparatus use, existing energy efficiency progress, and the potential energy saving projects available. The targets are believed to be stretching but achievable. This plan responds to the shorter term target against 2009/10.

Long term 22% reduction by April 2020 from a 2005/06 baseline year

Short term 23% reduction by April 2015 from 2009/10

The Institute recognises that its long term reduction target is lower than the HEFCE sector wide target of 43% by 2020. The Institute is unique in comparison to the wider sector due to its research based activities and associated intensive energy use, which is conducted 365 days a year without semester breaks. The Institute's building portfolio contains several buildings that are of relatively recent construction or have had significant refurbishment undertaken within the past 10 years and therefore have a better energy performance than older buildings, limiting the scope for significant improvements. Other organisations within the sector have comparatively older building stock and therefore have potentially greater scope for improving energy performance. Their function also differs to that of the Institute in that they benefit from semester breaks and are on the whole based on general teaching functions without intensive high energy consuming research activities.

The targets set can be realistically met and more importantly have been set in the context of the Institute's unique activities and historical performance.

The scope of the baseline CO_2 emissions are confined to the reduction of electricity and gas use within the Institute's owned buildings. CO_2 emissions from these sources in 2009/10 equated to 9,315 tonnes (tCO_2). The cost of electricity that year was over £950,000, while gas costs were £276,000. CO_2 emissions are evenly spread between the two main sites: Sutton and Chelsea.

Value at stake

An analysis named the 'value at stake' has forecast the financial and CO_2 implications for the Institute if it chose not to manage carbon, and continued to increase its energy consumption in line with recent trends. This analysis predicted that if the Institute continued forward on a business as usual (BAU) path, energy costs would rise to almost £3m. Even if the Institute reduces CO_2 emissions in line with the short term target, costs in 2014/15 are predicted to rise 50% above the 2009/10 levels to £1.8m, as illustrated below. Achieving the short term target could see the Institute avoid £2.7m of cumulative cost increases between 2009/10 and 2014/15.

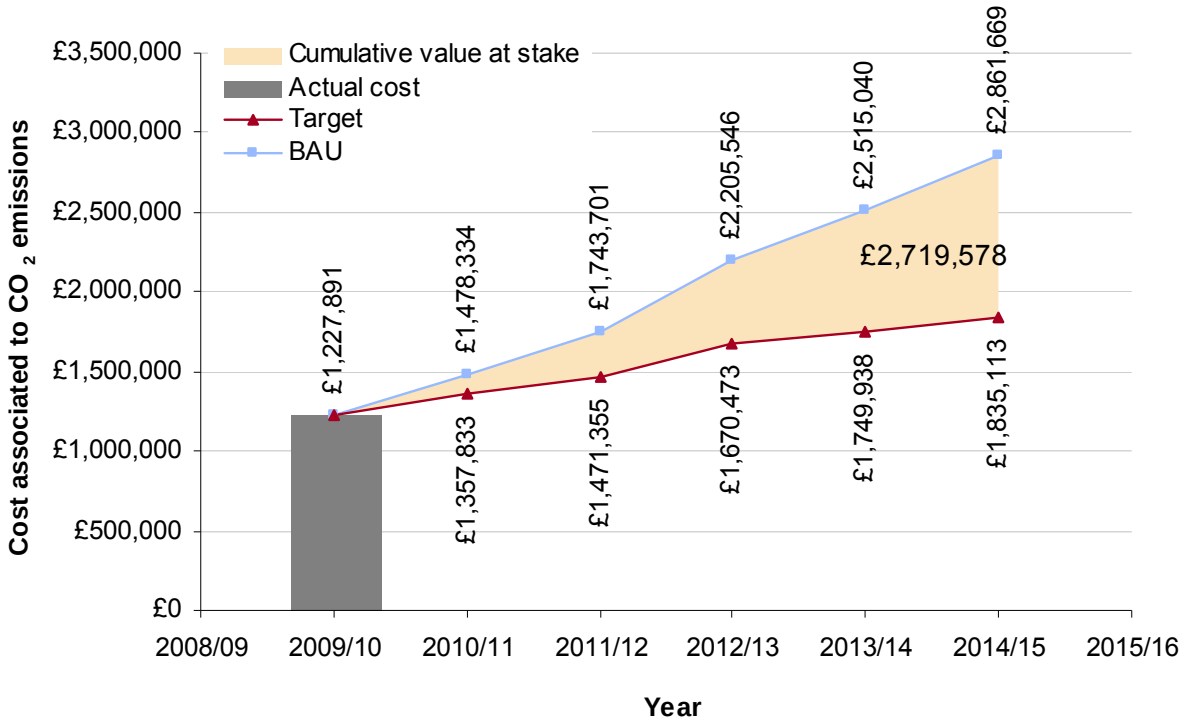


Figure 1: Financial value at stake – central scenario

A sensitivity analysis identified the predicted BAU rise in electricity cost and consumption as having the most significant impact upon the value at stake. Doubling either one of these rates would see the value at stake rise to at least £3.7m.

The Institute is almost certainly not going to incur cashable savings as a result of their carbon management efforts; rather it will minimise cost rises as it battles against increasing energy prices. It should be noted that the capital investment required to realise the CO_2 and cost reductions is not included in the value at stake analysis, but is set out below and in chapter 5.

Carbon reduction projects

Key personnel within the organisation have collaborated to develop a portfolio of carbon reduction projects which will help the Institute realise its target. Many of the projects are approved and funded, others are longer term and aspirational, but deemed realistic.

These projects are forecast to:

- Achieve 42% of the CO_2 reduction required in 2014/15[1];
- Require £1m of capital investment (around 50% of which has committed funding);
- Create £3.9m of undiscounted lifetime savings (which could be realised as equipment, staffing or capital);
- Provide an averaged payback of 4.2 years
- Go half way to paying back the total capital investment between April 2010 and April 2015 in the same period.

The Institute is seeking to incorporate many projects into existing capital and maintenance budgets. It has also secured a dedicated carbon management fund worth a total of £775,000 over 5 years. This is designed to be a 'revolving fund' into which the savings from funded projects are recycled, creating a perpetuating pot to invest in short payback projects.

Management and embedding

Many more projects will be needed over the coming years to close the gap. The following actions and responsibilities have been put in place to embed carbon management and ensure that the gap is closed:

- The overall responsibility of Carbon Management lies within the Corporate Management Group, which is chaired by Professor Alan Ashworth, Chief Executive of the ICR;
- A project leader and deputy have been allocated to coordinate delivery of the Plan. The current Project Board and Energy Group will be reconstituted as a Carbon Management Team: a multi-disciplinary body who are responsible for delivering the Plan;
- A risk register has been developed to identify plausible barriers to the Plan's implementation, and identify mitigating actions that could be taken;
- Energy data will be collected, monitored, benchmarked, and trend reviewed to identify carbon reduction opportunities;
- The existing Competence, Training and Awareness procedure will be utilised as a framework for communication and training, and ensuring that awareness campaigns reach all staff members.

[1] This equates to a 79% reduction when compared to the 2009/10 baseline which assumes no BAU growth.

1 Introduction

From its foundation in 1909 as a small research department of the Royal Marsden Hospital, the Institute of Cancer Research has grown to become one of the world's leading cancer research organisations and is internationally renowned for the high quality of its science. The Institute is a college of the University of London and works in partnership with the Royal Marsden NHS Foundation Trust.

The Institute operates from three sites, two adjacent to the Royal Marsden locations in Chelsea and Sutton and a third at Old Brompton Road, Fulham. The Institute occupies a total of some 28,800 m^2 (Gross Internal Area) of space. Much of the estate is either new or has recently been refurbished. The Institute employs approximately 1,000 staff, 350 of which work at the London sites.

The Institute recognises its responsibility to the environment in carrying out its work and as far as reasonably practicable, promotes the protection of the environment and minimisation of its impact on the environment. We have developed an Environmental Management System and have achieved the 'EcoCampus' Scheme's Bronze and Silver awards. We aim to achieve Gold and Platinum at the external audit in November 2011. It should be noted however that the Institute Estate mainly comprises highly-serviced laboratory accommodation which in the main has plant and equipment within it which has to run 24 hours a day, 365 days a year.

Other areas have to continuously maintain and provide environmental conditions and pressure regimes to meet Home Office and Health & Safety Requirements and specific legislative and statutory requirements. It is therefore not sensible to benchmark the Institute's energy usage in general with other non research intensive HEI's. Although we may appear to be less energy efficient when compared with other pure teaching HEI's, this is mainly due to the energy intensive nature of our activities rather than the characteristics of our relatively modern building portfolio. Our aim is to reduce carbon production and energy use whilst maintaining our operational requirements and meeting the regulatory framework within which we must operate.

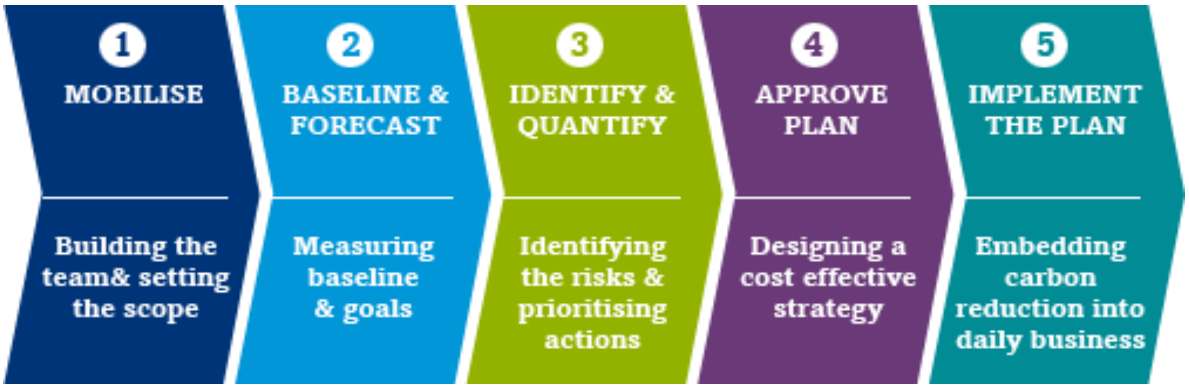
In addition to other strategic policies and guidance it is intended that the Carbon Management Plan will positively support the continuing sustainable, flexible, adaptable leading-edge growth and success of The Institute of Cancer Research.

The Institute of Cancer Research as a socially and environmentally aware organisation recognises that climate change is an issue which has to be tackled immediately and as such has enrolled on the Carbon Trust Higher Education Carbon Management Programme.

The purpose of the programme is to identify current carbon emissions and then quantify opportunities to reduce this use in line with its own good management practices and HEFCE guidance.

The Programme commenced in May 2010 and is due to complete in March 2011, following the Carbon Trust's comprehensive 5-step process as illustrated in Figure 2.

Figure 2: The Carbon Trust's 5-step carbon management process



By undertaking the programme, the Institute, in conjunction with the Carbon Trust, aims to achieve the following:

- Establish a set of baseline emissions for all buildings and activities associated with the operation of the Institute;
- Promote wider understanding and knowledge of carbon use throughout the Institute;
- Embed the practice of carbon reduction within the Institute;
- Establish and quantify short, medium and long term carbon reduction strategies and projects;
- Demonstrate the ethical and financial benefits of carbon reduction to budget holders and senior management;
- Develop a waste management strategy and quantify the savings that are achieved;
- Undertake and complete carbon reduction projects and report the savings to all members of the Institute;
- Monitor and collate Scope 3[2] emissions data.

1.1 Past Achievements

The Institute has already undertaken various carbon reduction strategies including:

- Building Management System (BMS) control system installation to the whole of the Institute;
- Green travel plan;
- Green procurement strategies;
- The installation of new high efficiency cooling plant;
- Recycling;
- Membership of EcoCampus and achievement of Bronze and Silver Awards;
- Energy Policy (May 2010), set out in Appendix E on page 49;
- Analysis and modification of the control of heating and cooling systems;
- The installation of intelligent lighting control to all new developments;
- Compliance with new building regulations Part L requirements;
- New sub-metering for comprehensive data collation;
- Participation within the Salix Revolving Green Fund;
- Low Zero Carbon study for future Sutton development site; and
- Collaboration with the Royal Marsden Hospital for site-wide CHP scheme.

[2] Refer to Table 1 on page 14 for a description of scopes

2 Strategy

The Institute of Cancer Research is committed to reducing Carbon Emissions as stated in the updated Energy Policy approved by the Corporate Management Group in May 2010. The policy, set out in Appendix E, pledges that the Institute will commit to continuous improvements in energy usage by implementing the following measures where reasonably practical:

- Minimise energy consumption and costs;
- Minimise water consumption and costs;
- Reduce dependency on finite fossil fuels;
- Reduce emissions of pollutants such as CO_2;
- Give high priority to energy efficiency investments;
- Increase investment in clean technologies;
- Promote sustainable sources of energy use where practical; and
- Reduce significant environmental impacts arising from energy and water consumption.

2.1 Context and drivers for Carbon Management

There are three key themes which drive the principle of carbon management within the Institute:

1. Legislative;
2. Financial; and
3. Reputational.

2.1.1 Legislative

Government Energy Policy

Since the previous issue of the Institute's Energy policy and guidance in February 2008, legislative changes have taken place whereby the Climate Change Act (CCA) 2008 was introduced. This Act required CO_2 emissions to be reduced to 26% of 1990 levels by 2020 and to 80% of 1990 levels by 2050. The 2020 figure of 26% was subsequently increased in the 2009 budget to 34%.

Sector Targets and HEFCE Requirements

Since data from 1990 is difficult to establish for many organisations, HEFCE are utilising the period of 2005-2006 for the "baseline" data year and energy reduction targets are to be measured against this datum.

HEFCE have advised that as an innovative sector, we should look to improve on the Climate Change Act reduction figure of 34%. The sector's emissions have increased between 1990 and 2005. To compensate for this increase and achieve the national 2020 target, a reduction of 43% across the sector by 2020 from the 2005-2006 baseline is required. This target has been agreed by the sector in a consultation process.

Display Energy Certificates

The EU Energy Performance of Buildings Directive requires that all public buildings over 1000 m^2 have a Display Energy Certificate (DEC) displayed in a prominent place.

Building Regulations Part L

These require all new buildings to be designed to meet stringent energy emissions targets and these are to be monitored through the design and implementation process. Building Regulations Part L 2010 presents more challenging energy targets, requiring an aggregate improvement of 25% beyond 2006 targets. A timetable has been published that takes Part L through increasingly challenging iterations in 2013 and 2016 moving to a 'zero carbon' requirement by 2019. The definition of 'zero carbon' is not yet agreed.

London Borough of Sutton Planning Obligations

The London Plan (2008) seeks to promote healthcare provision within the London Borough's (Policy 3A.21) and continue to promote London as a 'national and international centre of medical excellence and specialised facilities' (policy 3A.22). The London Plan also seeks for development to be located within existing boundaries without encroaching on open spaces (Objective 1) and to improve accessibility (Objective 5). Policy 3C.1 states that new development should integrate transport access by reducing the need to travel.

In terms of Sustainable Design, Policy 4A.3 states that future developments must meet the highest standards of sustainable design and construction, which includes reducing the use of natural resources, enhance the natural environment and promote sustainable waste behaviour.

Policy G/SD3 seeks to protect the environmental quality where possible through a number of measures including safeguarding nature conservation and promoting energy conservation and promoting energy efficiency.

The Mayor's London Plan

The Mayor's London Plan (and related local planning policy, has historically set stretch targets for building energy performance beyond that required as a minimum by Building Standards Part L (Conservation of Fuel and Power).

The Mayor's Replacement London Plan has recently completed its Examination in Public, and is due for publication in 2011. This will set the planning context for any future developments. The Mayor's Replacement London Plan continues to set targets in advance of Building Regulations Part L until 2016.

2.1.2 Financial

Energy Costs Inflation

The costs of electricity and gas are volatile and projected to rise[3]. The nature of the Institute's research activity means it is an intensive user of energy. It is important that the Institute minimises these financial liabilities associated to energy, to ensure that the maximum funding available is focussed on achieving the Institute's goals in cancer research.

HEFCE and other Funders Requirements

It is increasingly likely that our funders will require us to prove that we are using our resources sustainably. An example of this is the requirement of HEFCE for a fully implemented Carbon Management Plan to achieve CIF2 compliance and therefore receive full and not reduced capital funding. The future level of funding may also be influenced by our progress in reducing carbon emissions. The Institute will be expected to contribute towards HEFCE's overall carbon reduction targets across the HE sector.

Carbon Reduction Commitment

The Government has introduced the CRC Energy Efficiency Scheme (CRC) under which the Institute is required to annually purchase allowances for every tonne of CO_2 emitted. The scheme is perceived as a 'carbon tax' and is estimated to cost the Institute approximately £120,000 when the first payment is due in 2012, creating a significant step change in energy costs. The value paid per tonne of CO_2 is expected to rise in future years. This again reduces monies available for cancer research.

Sector budget cuts

Over the coming years, the HE sector will be experiencing budget cuts from central government and the Institute is expecting reduced central funding. It is likely that other grants and funding streams will also become more difficult to obtain. The funding environment is challenging and cost efficiency is paramount.

[3] Further analysis of energy cost trends and projections can be found in chapter 3.4 on page 18

2.1.3 Reputational

The Institute has a strategic goal to continue to be one of the best cancer research centres in the world. This requires not only maintenance of our excellent research and facilities but also the fulfilment of a duty to act in a socially responsible way i.e. to ensure our operations are sustainable.

Both the public and our funders require the Institute to act in this way – reputation and consequently future funding depend on it. ICR are required to publish its environmental performance by way of HEFCE Estates Management Statistics, and it is likely that performance tables will be made available under the CRC Energy Efficiency Scheme. Therefore our performance measures will be available to all stakeholders.

2.2 Strategic themes

The ICR Carbon Management Plan has been formulated in order to reduce the impact on the environment by our research activities.

Primarily, this plan aims to set out a series of objectives which will allow us to reduce our carbon footprint in a measured and logical manner.

The Institute aims to achieve the following:

- Reduce the use of energy within the buildings in terms of heating, cooling, ventilation and equipment utilisation;
- Review the control systems of the current buildings and ensure that these are all correctly functioning in order to ensure that maximum efficiency is achieved for the requirements of occupants and research requirements;
- Ensure that all new buildings and refurbishments are in full compliance with regulations and achieve a minimum of BREEAM ‘Excellent’ rating;
- Ensure efficient use of all space.

Reduce scope 3 emissions associated with travel and vehicles by:

- Encouraging continued implementation of the Green Travel Plan;
- Reducing the need for both inter-site and external travel by encouraging increased use of video-conferencing technology;
- Monitoring and encouraging green procurement strategies for the internal Purchasing departments and ensuring sustainability through the supply chain.

To further embed carbon management within the organisation we will:

- Continually review policies and processes which directly impact upon the carbon footprint of the Institute and update these as frequently as required;
- Communicate with and involve key stakeholders in order to develop and implement the plan;
- Actively communicate with staff and students over the use of energy and promote energy awareness in use within the Institute and continually identify opportunities to reduce this energy use in a partnership with the users.

3 Baseline, targets & projections

This chapter sets out the scope of the Institute's carbon management plan, the baseline CO_2 emissions, carbon reduction targets and future carbon and cost projections. The headlines are:

- The plan confines it scope to the reduction of electricity and gas use within the Institute's owned buildings;
- CO_2 emissions were 8,151 tonnes in 2005/06, and a longer term target has been set to reduce this by 22% in absolute terms by April 2020;
- CO_2 emissions were 9,315 tonnes in 2009/10, and a shorter term target has been set to reduce this by 23% in absolute terms by April 2015;
- This plan responds to the shorter term target. If this target were met, the Institute could realise revenue savings of £2.7m between April 2010 and April 2015, although this figure does not include the capital investment required to realise the CO_2 and cost reductions.

3.1 Scope

The WBCSD/WRI[4] have produced an internationally recognised protocol for the reporting of greenhouse gas emissions, incorporating a three scope framework. These scopes are introduced in Table 1, which sets out the CO_2 sources which the Institute has included within this Plan. Excluded sources are either considered under alternative ICR strategies, or are deemed minimal in terms of their impact or too difficult to address as part of the carbon management programme.

Table 1: Scope of CO_2 emissions for this plan

	Scope 1	Scope 2	Scope 3
Definition	Direct greenhouse gas (GHG) emissions from company owned vehicles and facilities	Net indirect emissions from energy imports and exports, particularly imported and exported electricity and steam	Other indirect GHG emissions that are a consequence of the activities of the organisation but occur from the sources not owned or controlled,
Included	Natural gas	Grid electricity	
Excluded	Water*		Employee business travel
	ICR owned vehicles*		Embodied CO_2 of goods
			Supplier CO_2 emissions
			Waste disposal

*It should be noted that Scope 1 transport emissions are excluded from the plan due to the fact that the institute only operates a single inter-site van. Similarly, water emissions have been excluded as these only account for less than 0.2% of the Institutes Scope 1 emissions.

The level of control that the Institute wields reduces as it moves from Scope 1 to Scope 3. Scopes 1 and 2 are carefully defined so that the organisation is solely responsible for those emissions, hence WBCSD/WRI recommend that organisations account for and report on these scopes as a minimum. Scope 3 emissions are usually influenced by third parties and can be optionally reported.

Despite their exclusion from this Plan, the Institute is committed to reducing Scope 3 emissions. These are inherently difficult to measure, however work is being undertaken to implement methodologies where possible and set targets where practicable. A brief example is efforts to reduced waste and

[4] The World Business Council for Sustainable Development and World Resource Institute (www.ghgprotocol.org)

single occupancy car journeys to the Sutton site. This forms part of the Institute's Environmental Management System.

3.2 Baseline CO_2 emissions

The baseline emissions have been calculated from raw data in the Institute's Environmental Management System (EMS). It is important to note that as this data is ultimately sourced from utility level billing data (based on accurate meter readings) the risk associated from data quality issues is negligible. The Institute primarily uses gas for heating and hot water production and electricity for the provision of lighting, power and cooling.

3.2.1 Historic trends

Historic consumption, cost and CO_2 emissions are set out in Table 2 and Figure 3 for the sources within the scope of this document.

Table 2: CO_2 emissions 2005/06 to 2009/10

		2005-06	2006-07	2007-08	2008-09	2009-10
Gas	MWh	10,647	8,524	8,367	10,389	11,458
	£	£163,102	£249,880	£227,525	£240,580	£275,857
	tCO_2	1,959	1,568	1,539	1,911	2,108
Electricity	MWh	11,328	11,484	11,633	12,346	13,183
	£	£650,036	£704,259	£622,106	£1,226,147	£952,035
	tCO_2	6,193	6,278	6,359	6,749	7,207
Total £		£813,138	£954,139	£849,631	£1,466,727	£1,227,891
Total tCO_2		8,151	7,846	7,899	8,661	9,315

Figure 3 illustrates some of the key data present in Table 2. The stacked bars show the CO_2 emissions split by electricity and gas. Electricity consumption has risen at a steady rate and is the most significant source of CO_2, accounting for between 76% and 81% of emissions in any single year. Gas use has oscillated during this period, reducing to its smallest contribution in 2007/08 but rising rapidly in the most recent two years, and peaking in 2009/10. Annual gas consumption will vary depending on seasonal weather and temperature conditions.

The associated costs have shown a more erratic and pronounced change. While CO_2 emissions are solely influenced by consumption, the total cost of buying electricity and gas is additionally influenced by the unit prices charged by utility companies. In 2008/09, the cost of buying these utilities was 80% higher than in 2005/06, despite only a 3.4% increase in energy use. In 2009/10, CO_2 emissions continued to rise, yet total costs fell, exemplifying the volatility of purchasing costs for electricity and gas. The Institute intends that a strategic approach to carbon management will help reduce energy consumption and hence mitigate the impact of significant cost increases in the future.

Further analysis of historic trends can be found in chapter 3.4.

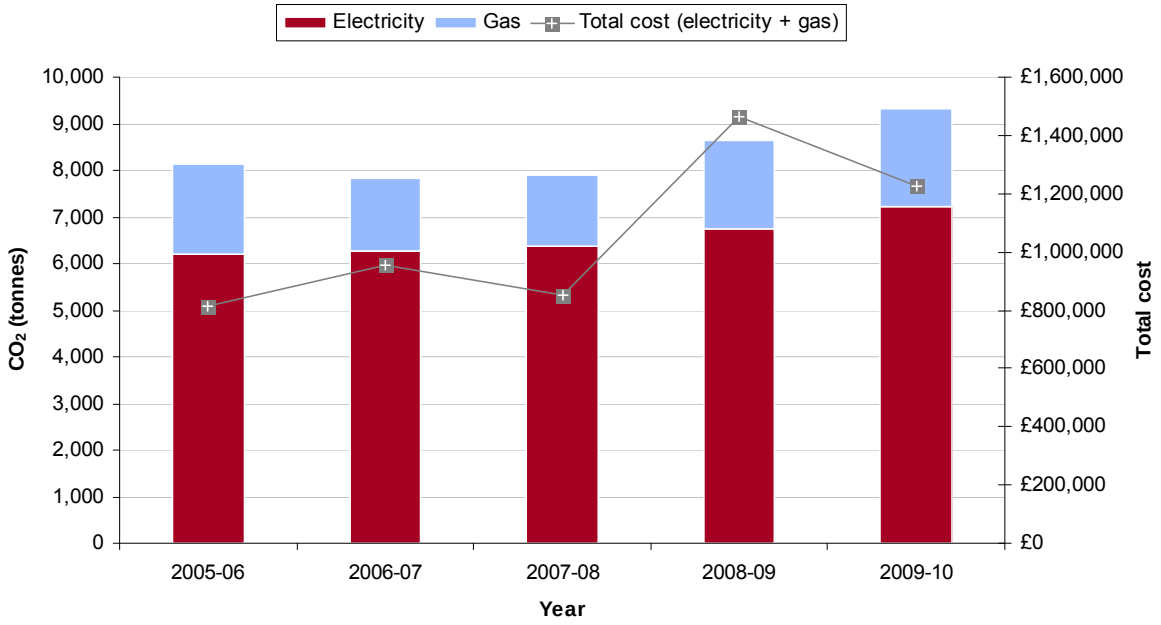


Figure 3: Historic CO_2 emissions and cost trends

3.2.2 Baseline year 2009/10

For the purposes of this document, the 'baseline year' is 2009/10. Figure 4 provides a break-down of the energy, emissions and cost by source for 2009/10, and the full EMS is set out in Appendix A. Electricity accounts for 54% of the Institute's energy use (shown in mega-watt hours, MWh). However, the weighting of electricity is much more significant in terms of both CO_2 emissions and cost, contributing over three quarters of the value in both cases. This is due to:

- The difference in CO_2 factors for electricity (0.55 kg of CO_2 for every kilo-watt hour of energy used, or $kgCO_2/kWh$) compared to gas (0.18 $kgCO_2/kWh$)[5];
- The difference in cost for electricity (7.22 p/kWh weighted average) compared to gas (2.41 p/kWh weighted average).

While carbon reduction projects that reduce the use of natural gas will not be ignored, it is clear that electricity reduction offers the most significant CO_2 and financial gains to the Institute.

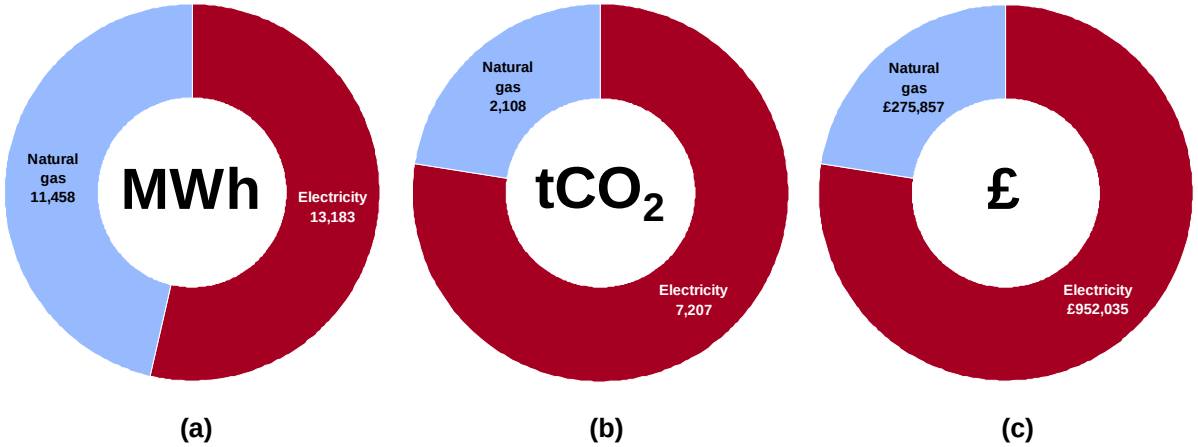


Figure 4: Energy us (mega-watt hours) (a); emissions (tonnes of CO_2) (b); and cost (c) by emissions source for 2009/10

[5] The full list of CO_2 factors used can be found in Appendix A

Figure 5, below, depicts the split of CO_2 emissions at the Institute's two sites – Sutton and Chelsea – and splits these by electricity and gas. Chelsea is the larger energy consumer, although absolute gas consumption here is 26% lower than at Sutton. This is negated by the 700 tCO_2 of additional electricity used at Chelsea compared to Sutton. It is important to note that in the case of Sutton, a large proportion of the campus wide energy consumption is associated to buildings that were designed and constructed to Part L 2002 energy standards and as such incorporate an improved level energy efficiency compared to the relatively older building stock at Chelsea.

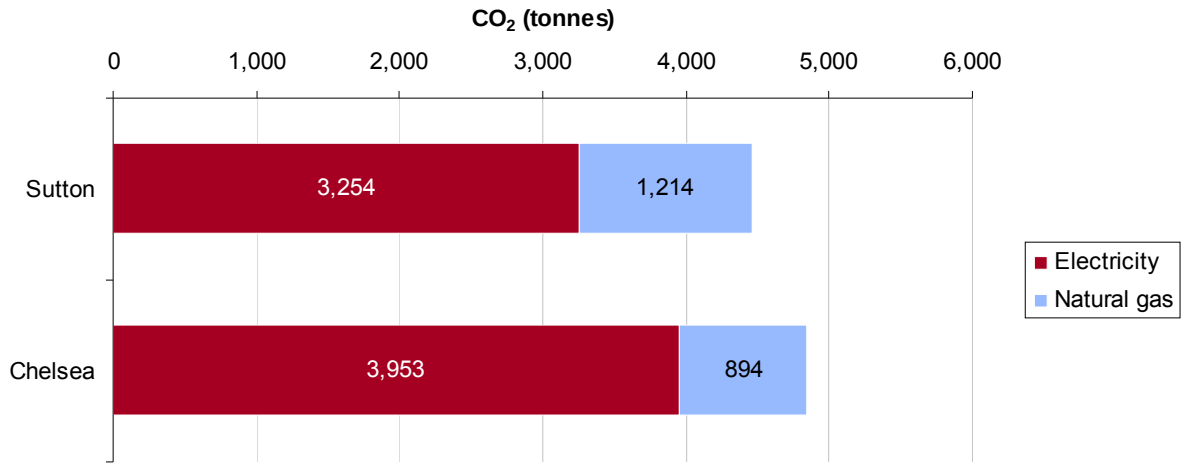


Figure 5: CO_2 emissions in 2009/10 split by source and site

3.3 Targets and objectives

The Institute of Cancer Research aims to meet the CO_2 reduction targets shown in the box below.

Long term 22% reduction by April 2020 from a 2005/06 baseline year

Short term 23% reduction by April 2015 from 2009/10

The long term target is driven by HEFCE ambitions for the sector. The short term target has been set as an intermediary in response to the:

- Growth in emissions between 2005/06 and 2009/10; and the
- Necessity to plan carbon reduction activities on a shorter term cycle.

These targets have been set taking into consideration the intensity of on site apparatus use, existing energy efficiency progress, and the potential projects available.

The Institute recognises that its long term reduction target is lower than the HEFCE sector wide target of 43% by 2020. The Institute is unique in comparison to the wider sector due to its research based activities and associated intensive energy use, which is conducted 365 days a year without semester breaks. The Institute's building portfolio contains several buildings that are of relatively recent construction or have had significant refurbishment undertaken within the past 10 years and therefore have a better energy performance than older buildings, limiting the scope for significant improvements. Other organisations within the sector have comparatively older building stock and therefore have potentially greater scope for improving energy performance. Their function also differs to that of the Institute in that they benefit from semester breaks and are on the whole based on general teaching functions without intensive research activities.

The targets set can be realistically met and more importantly have been set in the context of the Institute's unique activities and historical performance.

Figure 6 illustrates these targets. CO_2 emissions in 2005/06 were 8,151 tonnes, and a 22% reduction on this figure by 2020 will see a drop to 6,358 tCO_2. Since 2005/06, emissions dipped before rising

steeply to 9,315 tCO_2 in 2009/10, as set out in chapter 3.2. This is the most recent full-year data at the time of writing.

From 2009/10, the Institute has set a short term 5 year target of 23%, which would see CO_2 reduce to 7,172 tonnes in 2014/15. If this reduction were to be achieved, the Institute would have made significant progress towards the longer term target, and the trend of increasing emissions will have been bucked. This document focuses on the strategy for saving the 2,143 tCO_2 required in the year 2014/15 to meet the short term target.

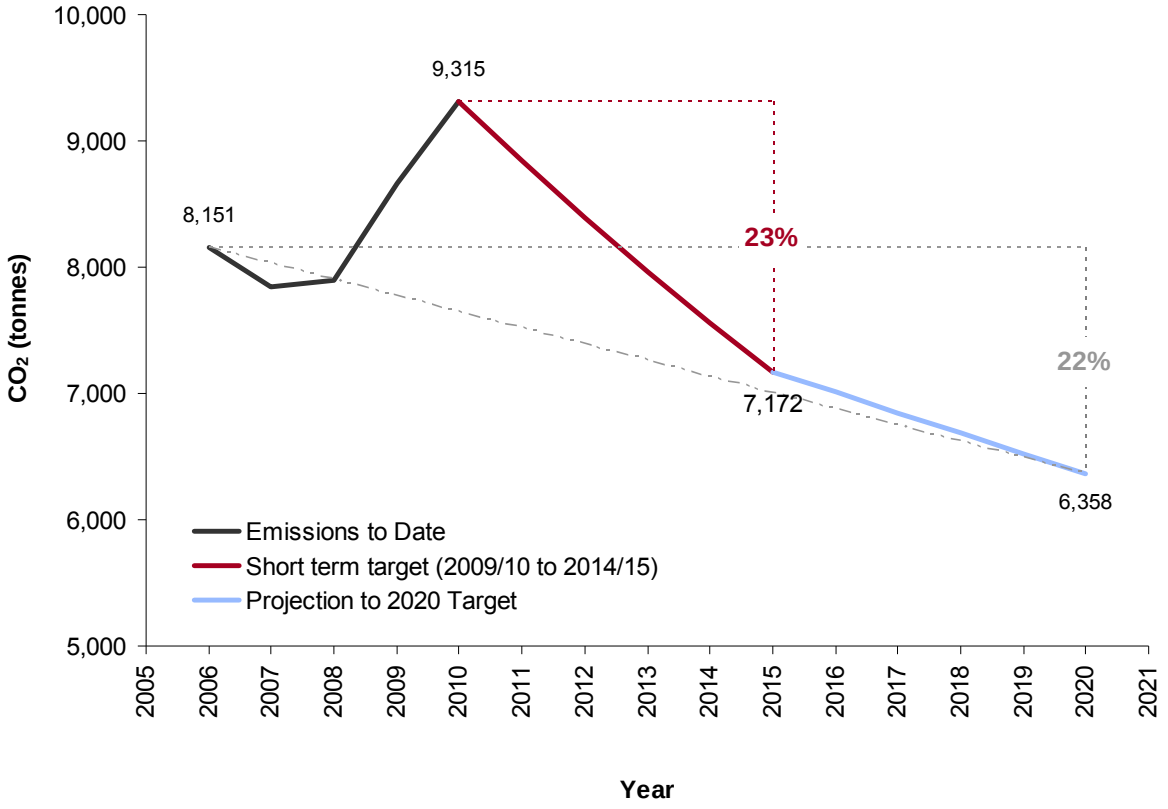


Figure 6: Carbon reduction targets

3.4 Projections and Value at Stake

This chapter forecasts the financial and CO_2 implications for the Institute under two circumstances:

1. *Business as usual*, where energy consumption is unmanaged; and
2. *Carbon managed*, where energy consumption is managed and the 23% short term target is achieved at a linear rate.

In summary, achieving the short term target could see the Institute avoid £2.7m of cost increases between 2009/10 and 2014/15. This could rise to approximately £3.7m if the assumed increases in electricity cost or consumption double.

3.4.1 The concept of value at stake

The Value at Stake (VaS) is a metric used to forecast the financial and CO_2 implications for not undertaking carbon management. It compares the cost and CO_2 emissions for the Institute under two circumstances:

1. *Business as usual*, where energy consumption is unmanaged; and
2. *Carbon managed*, where energy consumption is managed and the 23% short term target is achieved at a linear rate.

Figure 7 demonstrates the CO_2 value at stake for ICR. Emissions in 2009/10 were 9,315 tonnes of CO_2 (tCO_2), as set out in chapter 3.2.2. From this point, the blue line forecasts *business as usual* (BAU) CO_2 escalations, resulting in 11,156 tCO_2 emitted in 2014/15. This is due to the following assumed factors[6]:

- Consumption of electricity rises linearly at a rate of 3.86% of 2009/10 levels per year, derived from trends since 2005/06;
- Consumption of gas rises linearly at a rate of 1.25% of 2009/10 levels per year, derived from trends since 2005/06; and
- 2,732 m^2 of new laboratory space added to the estate in 2012/13 as part of Sir Richard Doll extension[7]. Plans for the development of the North Site suggest that this site will not 'switch on' before April 2015.

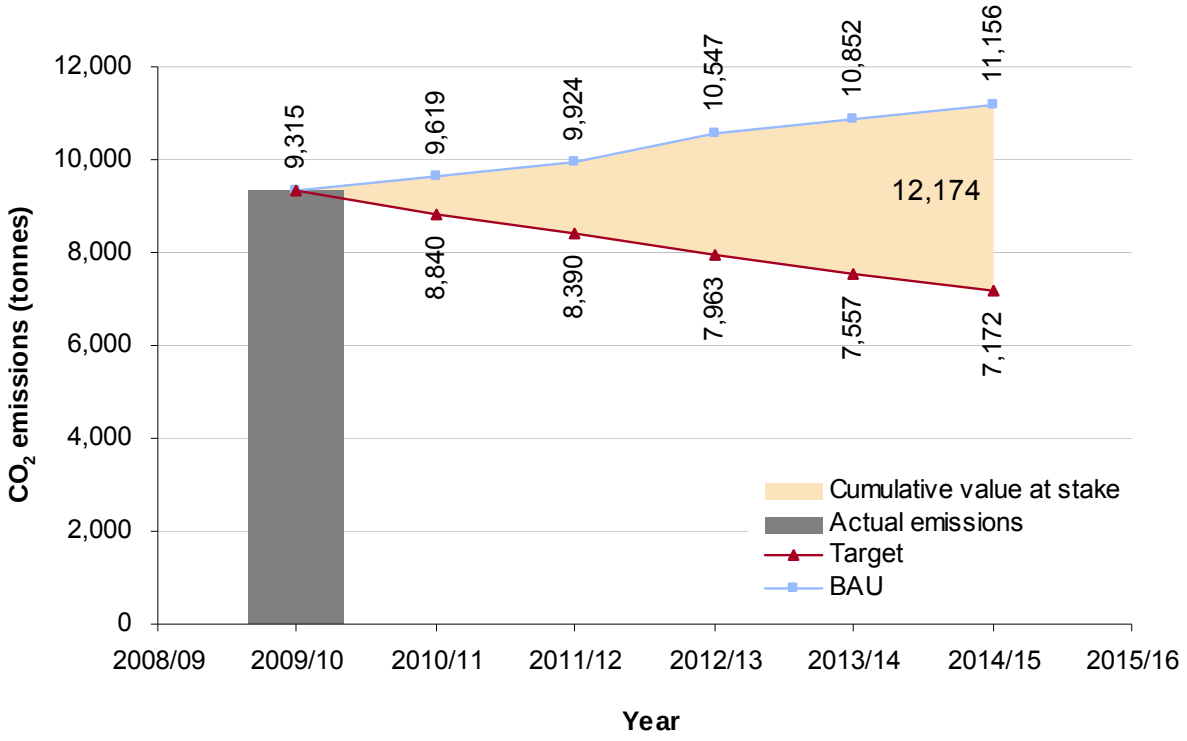


Figure 7: Carbon value at stake – central scenario

The red line forecasts *carbon managed* CO_2 reductions in line with the 23% target between 2009/10 and 2014/15 resulting in a reduction to 7,172 tCO_2, matching the short term targets set in chapter 3.3.

The carbon value at stake is the cumulative difference in CO_2 between the two projections – in this case 12,174 tCO_2 (this can be thought of as the area between the two lines).

The value at stake can also be expressed in financial terms, as illustrated in Figure 8. This considers the cost of buying electricity and gas. Following the same format as above:

- The cost of purchasing electricity and gas in 2009/10 was £1,227,891;
- Under a *business as usual* scenario, these costs would rise to almost £2.9m in 2014/15;
- Under a *carbon managed* scenario, where the short term target was met, these costs would still increase to over £1.8m, but the rise is considerably less pronounced.
- The financial value at stake is the cumulative difference in cost between these two projections, totalling £2.7m over the period 2009/10 through to 20014/15.

[6] Background data can be found in Appendix B on page 39

[7] The energy consumption has been estimated using CIBSE TM46 benchmarks for laboratories.

Even if the Institute reduces CO_2 emissions in line with the short term target, costs in 2014/15 are predicted to rise 50% above the 2009/10 levels. In addition to the three factors which influence the carbon value at stake, the financial value at stake is also affected by6:

- The unit cost of electricity rising linearly at a rate of 19.84% of 2009/10 levels per year, derived from trends since 2005/06;
- The unit cost of gas rising linearly at a rate of 11.3% of 2009/10 levels per year, derived from trends since 2005/06; and
- The introduction of CRC[8] payments in 2012/13, in which the Institute must buy allowances for every tonne of CO_2 emitted.

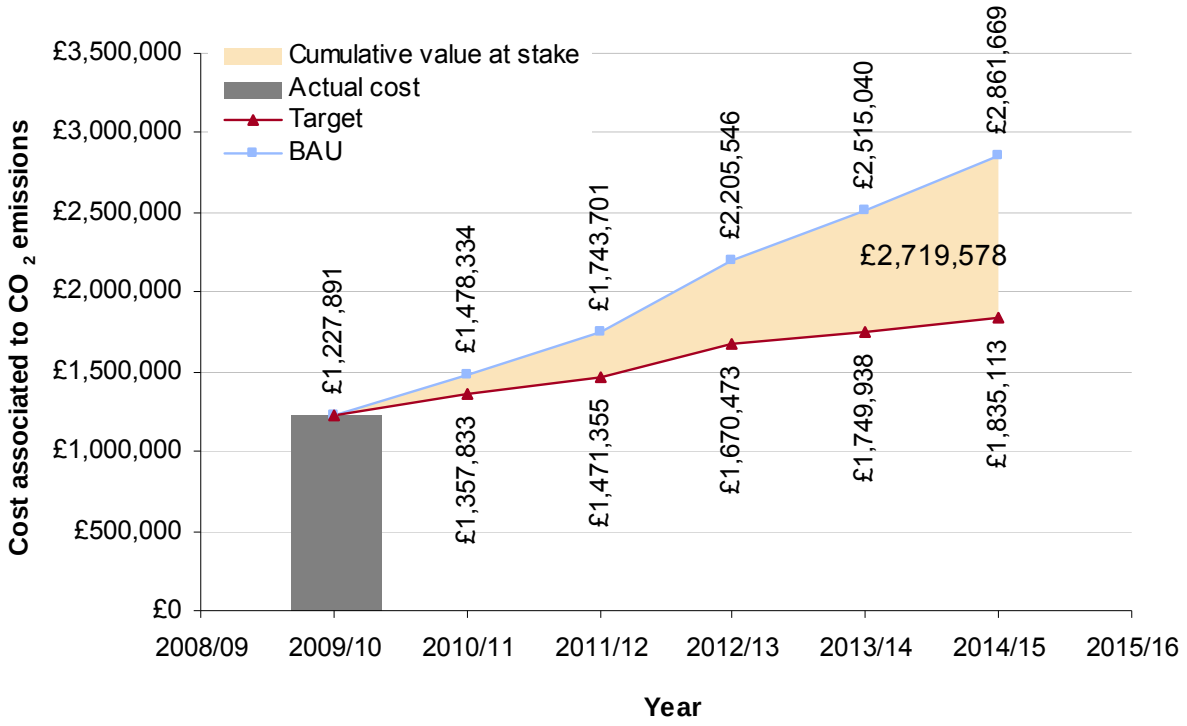


Figure 8: Financial value at stake – central scenario

Note that no financial discounting is included in the value at stake analysis. By being *carbon managed*, the Institute of Cancer Research could avoid £2.7m in energy and CRC costs compared to the *business as usual* case, under the central scenario modelled. The Value at Stake represents the revenue savings available if the carbon reduction target is met on a linear basis between 2009/10 and 2014/15. It does not include the investment required to realise these savings, which are set out in chapter 4 on page 23.

The value at stake conclusions stated above represent a 'central' scenario. When making forecasts, it is prudent to consider a range of scenarios which consider the impact of adjusting each of the variables. Chapter 3.4.2 offers alternative scenarios for the financial value at stake.

3.4.2 Scenario setting

Table 3 consolidates the five factors which influence the financial value at stake. These assumptions represent the 'central' scenario which was presented in chapter 3.4.1.

[8] Further details about the Carbon Reduction Commitment Energy Efficiency Scheme can be found in chapter 2.1.2 on page 12

Table 3: Factors influencing the value at stake – central scenario

Factor	Description	Value	Reference
Electricity consumption	Rate of electricity consumption (kWh) rise per year. This is a linear increase at a constant rate above 2009/10 levels.	3.86%	Trends have been established by analysing ICR's historic energy use and associated costs between 2005/06 and 2009/10. The underlying data can be found in Appendix B on page 39.
Gas consumption	Rate of gas consumption (kWh) rise per year. This is a linear increase at a constant rate above 2009/10 levels.	1.25%	
Electricity cost	Rate of electricity cost (p/kWh) rise per year. This is a linear increase at a constant rate above 2009/10 levels.	19.84%	
Gas cost	Rate of gas cost (p/kWh) rise per year. This is a linear increase at a constant rate above 2009/10 levels.	11.30%	
CRC cost8	Rate of CRC cost rise per year as of 2014/15, when the CRC allowance prices are traded in an open market.	20%	A market value is impossible to predict. 20% is seen as a reasonable estimate for the purposes of this analysis.

Each of these factors has been scaled within a range of -200% to +200% to understand the effect that this variation has upon the financial value at stake figure. For example, if the rate of the electricity consumption increase is doubled to 7.72% (i.e. a variation of +100%) from the baseline figure of 3.86% shown in Table 3, how would this affect the VaS?

Figure 9 illustrates the results of this analysis. This shows that the most sensitive factor is the electricity consumption, as this is (fractionally) the steepest line and hence has the most significant effect upon the value at stake. Doubling the electricity consumption rate (i.e. +100% of the central value) results in the VaS rising to almost £3.7m. However, if the electricity consumption rate was inverted to -3.86% (i.e. a reduction in energy use year on year, and a factor of 200% lower than the central scenario) then the value at stake drops to £750,000.

Electricity cost is almost as significant as electricity consumption. However, significant changes in gas price and consumption have a minimal effect upon the value at stake. The Institute could see the rate of gas price increase double (+100%) and would only see a £50,000 increase in the value at stake. Similarly, the rise in CRC price has a negligible effect.

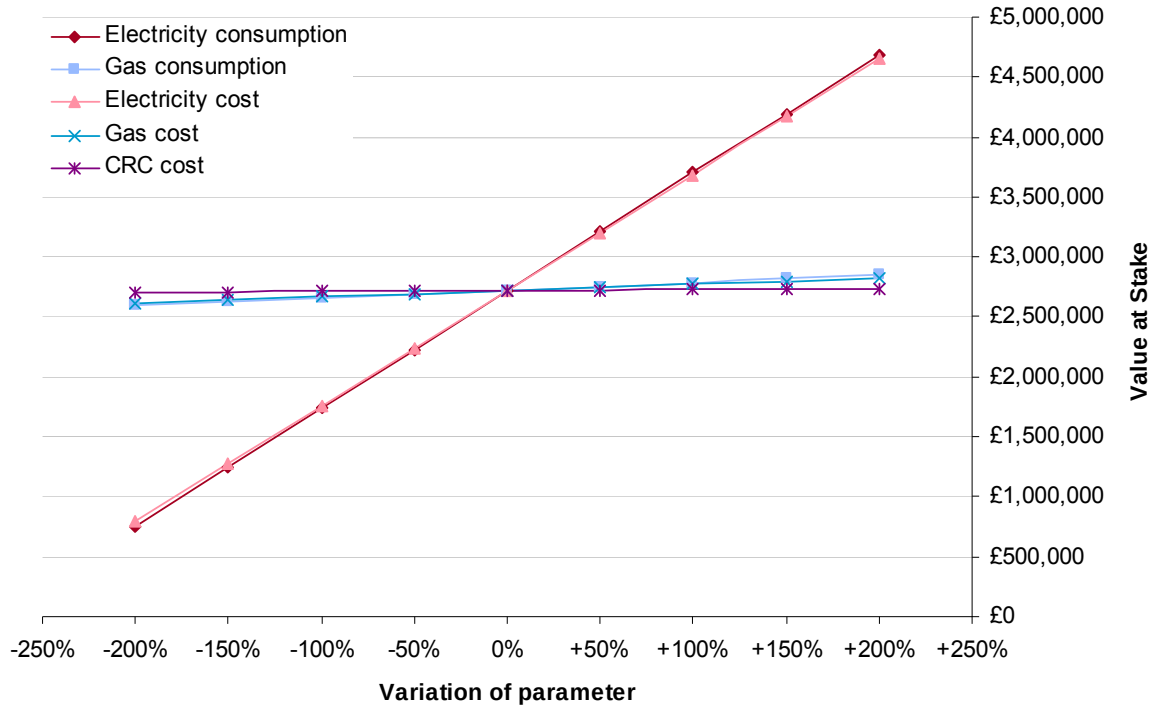


Figure 9: Value at stake sensitivity analysis

Therefore, the Institute must seek to minimise their electricity use as their top priority, since increases in consumption and unit cost have significant financial effects within the period leading to April 2015.

4 Projects

This chapter sets out the list of projects which, at the time of writing this plan, will assist the Institute in meeting the targets set out in chapter 3.3. These projects are at varying levels of completion and funding, and should be regarded as an initial list which will constantly be reviewed and updated up to April 2015. While some projects may be abandoned as part of further investigations into feasibility, undoubtedly many others will be added as the Institute constantly seeks to find further ways to reduce electricity and gas use. Chapters 6 and 7 detail the mechanisms in place to ensure carbon reduction projects continue to come forward.

The projects below achieve 1,683 tonnes of CO_2 savings in 2014/15 – achieving 42%[9] of the CO_2 reduction required to bridge the gap between the target and the business as usual projections in 2014/15, as illustrated in Figure 10. It is assumed that the carbon reduction projects achieve the same CO_2 savings in the last year of their lifetime compared to their first.

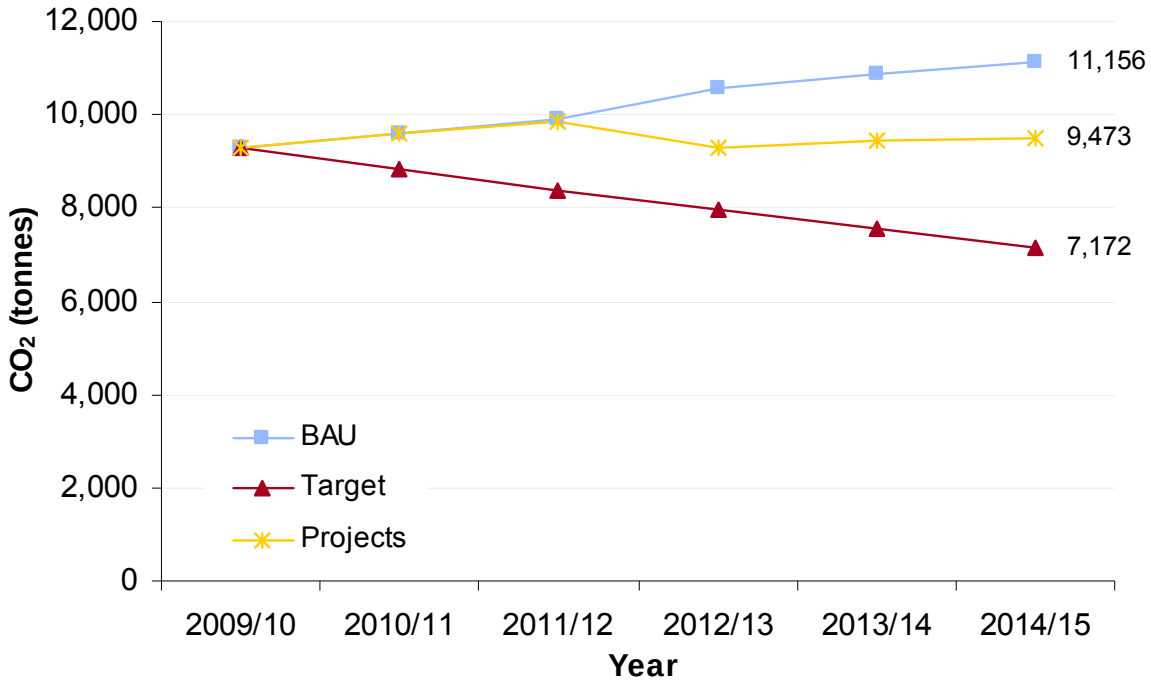


Figure 10: Progress against the target for the carbon reduction projects

The following sub-chapters provide headline details of the individual projects, split into four different categories based upon the funding:

- **Salix** funded projects, where the capital cost is taken from a dedicated fund, and the revenue savings from each project are paid back into the fund to replenish the balance for future initiatives. Further details about this 'ring fenced' fund can be found in chapter 5;
- **Maintenance** projects which see the replacement or upgrade at end of life;
- Projects which relate to enhanced **management/revenue** of energy use and data; and
- Large **capital** projects.

The following tables indicate the projects associated to each funding stream. For each project the capital cost, maintenance cost, savings, and simple payback are estimated. These also indicate the proportion of the short term target that each project contributes, and it should be noted that the target is the 3,984 tCO_2 difference between the BAU and target projections in 2014/15. Qualitative details about those projects which have been agreed and funded at the time of writing can be found in Appendix D.

[9] This equates to a 79% reduction when compared to the 2009/10 baseline which assumes no BAU growth.

4.1 Salix

Table 4: Identified Salix projects

Ref	Project	Lead	Cost		Annual Savings (yr 1)		Pay back (yrs)	Net Present Cost(£)	% of Target	Implementation Year
			Capital	Operational	Financial (Gross)	CO_2 (tonnes)				
1	CBL Basement Toilet Extract Controls	Sean Higgins	£2,389		£625	4.7	3.8	-£2,811	0.12%	2010/11
2	Sutton Valve and Flange Insulation	Sean Higgins	£5,847		£2,319	17.7	2.5	-£29,325	0.44%	2010/11
3	OBR Valve and Flange Insulation	Sean Higgins	£2,804		£1,338	10.2	2.1	-£10,978	0.26%	2010/11
4	CRUK Variable Volume Fume Cupboard	Sean Higgins	£9,021		£1,511	11.5	6.0	-£8,377	0.29%	2010/11
5	CBL Calorifier Replacement	Sean Higgins	£7,965		£884	6.8	9.0	-£1,684	0.17%	2010/11
6	BLB Daylight Control	Sean Higgins	£4,538		£1,842	13.9	2.5	-£10,782	0.35%	2011/12
7	CBL AHU Inverter Controls	Sean Higgins	£147,165		£47,582	361.1	3.1	-£248,554	9.07%	2011/12
			£179,729	£0	£56,100	426.0			10.69%	

4.2 Maintenance

Table 5: Identified maintenance projects

Ref	Project	Lead	Cost		Annual Savings (yr 1)		Pay back (yrs)	Net Present Cost(£)	% of Target	Implementation Year
			Capital	Operational	Financial (Gross)	CO_2 (tonnes)				
9	CBL Chilled Water Pump Replacement	Sean Higgins	£35,122		£4,593	34.8	7.6	-£17,774	0.87%	2011/12
14	BLB Corridor Lighting T8 to T5 - maintenance roll out programme	Sean Higgins	£8,252		£355	2.7	does not payback	£5,301	0.07%	2011/12
15	CBL Canteen Lighting - Daylight Control	Sean Higgins	£500		£345	2.6	1.5	-£2,366	0.07%	2011/12
16	Haddow Corridor Lighting T8 to T5 - maintenance roll out programme	Sean Higgins	£5,534		£238	1.8	does not payback	£3,554	0.05%	2013/14
21	Review and recommission occupancy sensors in SDOLL.	Sean Higgins	£500		£144	1.1	3.5	-£1,163	0.03%	2011/12
22	Review and recommission occupancy sensors in BLB.	Sean Higgins	£500		£144	1.1	3.5	-£1,163	0.03%	2011/12
24	BLB heat recovery systems: Complete repair and commissioning	Sean Higgins	£12,000		£2,293	17.5	5.2	-£14,412	0.44%	2011/12
26	McElwain Corridor Lighting T8 to T5 - maintenance roll out programme	Sean Higgins	£6,213		£668	5.1	9.3	-£1,481	0.13%	2014/15
			£68,621	£0	£8,780	66.6			1.67%	

4.3 Management/Revenue

Table 6: Identified management/revenue projects

Ref	Project	Lead	Cost		Annual Savings (yr 1)		Pay back (yrs)	Net Present Cost(£)	% of Target	Implementation Year
			Capital	Operational	Financial (Gross)	CO_2 (tonnes)				
12	Sutton External Lighting Control Changes - LUX Level reduction	Sean Higgins	£250		£555	4.2	0.5	-£6,137	0.11%	2010/11
17	Metering strategy/review of AMR data and implementation of energy reduction measures not covered by specific projects. Low capital measures such as time clock changes	Sean Higgins	£5,000		£47,602	360.3	0.1	-£671,535	9.05%	2011/12
18	Metering strategy/review of AMR data and implementation of energy reduction measures not covered by specific projects. Low capital measures such as time clock changes	Sean Higgins	£5,000		£20,689	158.1	0.2	-£289,044	3.97%	2011/12
25	Haddow - modify flue dilution fan controls	Sean Higgins	£22,000		£7,644	57.9	2.9	-£41,571	1.45%	2011/12
29	Desktop Switch	Terry Woolfries	£1,000		£6,297	47.7	0.2	-£51,370	1.20%	2011/12
30	CBO Heat Recovery		£4,000		£4,187	32.0	1.0	-£30,825	0.80%	2012/13
32	BLB VAV Repair and Re-commissioning		£4,000		£3,611	27.3	1.1	-£37,586	0.69%	2012/13
			£41,250	£0	£90,585	687.5			17.26%	

4.4 Capital

Table 7: Identified capital projects

Ref	Project	Lead	Cost		Annual Savings (yr 1)		Pay back (yrs)	Net Present Cost(£)	% of Target	Implementation Year
			Capital	Operational	Financial (Gross)	CO_2 (tonnes)				
8	123 OBR AHU Replacement	Sean Higgins	£50,000		£6,987	53.0	7.2	£1,973	1.33%	2012/13
10	CRUK Calorifier Replacement	Sean Higgins	£8,000		£481	3.7	does not payback	£2,751	0.09%	2012/13
11	Solar PV	Sean Higgins	£450,000		£32,828	46.5	13.7	-£91,059	1.17%	2013/14
13	CRUK Boiler Replacement	Sean Higgins	£100,000		£2,407	18.4	does not payback	£65,784	0.46%	2011/12
19	BLB Stairwell Lighting Sensors	Sean Higgins	£350		£295	2.2	1.2	-£2,105	0.06%	2011/12
20	Haddow Stairwell Lighting Sensors	Sean Higgins	£175		£51	0.4	3.4	-£250	0.01%	2011/12
23	CBL Main Chiller Replacement	Sean Higgins	£100,000		£28,243	213.8	3.5	-£225,287	5.37%	2013/14
27	Server Virtualisation Phase 1		£27,500		£10,110	76.5	2.7	-£88,941	1.92%	2011/12
28	Server Virtualisation Phase 2		£27,500		£10,110	76.5	2.7	-£88,941	1.92%	2012/13
31	McElwain Check and modify AHU operation - Energy saving		£2,000		£2,239	17.1	0.9	-£23,787	0.43%	2011/12
			£765,525	£0	£93,751	508.1			12.76%	

5 Financing

The implementation of this plan will reduce the Institute's carbon emissions, help mitigate any carbon related overheads and bring reputational benefits.

The overall cost of implementing all recommended carbon reduction projects between 2009/10 and 2014/15 is £1,055,000, generating savings of £605,000 over the same period. Many projects have lifetimes extending well beyond 2014/15, and the same projects will save almost £3.9m (undiscounted) by 2029/30, resulting in lifetime savings 3.7 times larger than the capital expenditure.

However cashable savings will be less than this as a result of:

- Savings from Salix funded projects being re-invested in the HEFCE/Salix Revolving Green Fund (see chapter 5.1.1 below);
- Rising energy costs[10];
- The CRC payments starting in 2012[11]

5.1 Sources of funding

5.1.1 Salix

The Institute has secured funding from the Salix Revolving Green Fund of £220,000 to which the Institute has added a further £55,000. The carbon reduction projects funded through the Salix Revolving Green Fund will release funds for reinvestment in further scheme compliant projects.

The total £275,000 fund will initially be allocated on suitable projects during years 2010/11 and 2011/12 with recycling payments in excess of £50,000 being reinvested from 2012/13 onwards. The Institute will seek to identify further Salix compliant projects during the period to 2014/15.

5.1.2 Maintenance

Projects identified as maintenance projects will be funded through the yearly maintenance budget.

5.1.3 Management/Revenue

Projects identified as management/revenue projects will be funded through their implementation by budgeted staff resources.

5.1.4 Capital

Alongside any capital funding allocated through the CIF2 funding stream the Institute has included £100,000 per annum for carbon reduction activity in its 5-year forecast, beginning 1 August 2010.

CIF2 capital funding for the 4 year period 11/12 to 14/15, is likely to be in the region of £5 million. Carbon projects will be fully considered when determining the use of this capital funding stream.

Other opportunities for external funding will be considered as and when they become available in future.

5.1.5 Other Funding

A further £120,000 per annum is included in the 5-year plan for CRC carbon allowances and any unspent portion will be considered for virement to the carbon reduction project budget.

Where a large capital project is identified, the options for financing will be considered on a case-by-case basis once the investment proposal has been appraised through both financial and non-financial measures.

[10] See chapter 3.4 on page 18

[11] See chapter 2.1.2 on page 12

5.2 Project costs & savings

Table 8 below summarises the capital costs, maintenance costs, and financial savings for the carbon reduction projects set out in chapter 4. The table provides an annual breakdown for each of the key funding streams. It should be noted that this analysis does not discount any future cash flows, and assumes that individual projects come online and offline at the start and end of financial years[12].

[12] This means that a project's financial and CO_2 savings are realised for a full year, even if the project is only online for a part of that year. This simplification is for ease of calculation purposes, and it is predicted that real-world losses and gains will broadly balance themselves over the 5 year period.

Table 8: Funding availability for carbon reduction projects

	2010/11	2011/12	2012/13	2013/14	2014/15	Totals
Salix						
Available fund	£28,025	£240,299	£51,000	£50,000	£46,000	£415,324
Capital required	£28,025	£151,703	£0	£0	£0	£179,729
Maintenance required	£0	£0	£0	£0	£0	£0
Savings (gross)	£0	(£6,676)	(£56,100)	(£56,100)	(£56,100)	(£174,976)
Capital surplus / (shortfall)	£0	£88,596	£51,000	£50,000	£46,000	£235,596
Maintenance						
Available fund	£0	£56,874	£0	£5,534	£6,213	£68,621
Capital required	£0	£56,874	£0	£5,534	£6,213	£68,621
Maintenance required	£0	£0	£0	£0	£0	£0
Savings (gross)	£0	£0	(£7,874)	(£7,874)	(£8,112)	(£23,861)
Capital surplus / (shortfall)	£0	£0	£0	£0	£0	£0
Management/Revenue						
Available fund	£250	£33,000	£8,000	£0	£0	£41,250
Capital required	£250	£33,000	£8,000	£0	£0	£41,250
Maintenance required	£0	£0	£0	£0	£0	£0
Savings (gross)	£0	(£555)	(£82,787)	(£90,585)	(£90,585)	(£264,510)
Capital surplus / (shortfall)	£0	£0	£0	£0	£0	£0
Capital						
Available fund	£100,000	£100,000	£100,000	£100,000	£100,000	£500,000
Capital required	£0	£130,025	£85,500	£550,000	£0	£765,525
Maintenance required	£0	£0	£0	£0	£0	£0
Savings (gross)	£0	£0	(£15,103)	(£32,680)	(£93,751)	(£141,534)
Capital surplus / (shortfall)	£100,000	(£30,025)	£14,500	(£450,000)	£100,000	(£265,525)
TOTALS						
Available fund	£128,275	£430,173	£159,000	£155,534	£152,213	£1,025,196
Capital required	£28,275	£371,602	£93,500	£555,534	£6,213	£1,055,125
Maintenance required	£0	£0	£0	£0	£0	£0
Savings (gross)	£0	(£7,231)	(£161,863)	(£187,239)	(£248,548)	(£604,881)
Capital surplus / (shortfall)	£100,000	£58,571	£65,500	(£400,000)	£146,000	(£29,929)

6 Embedding

Having established a baseline and targets for the Institute it is necessary to establish a structure within the organisation to ensure that the plans are implemented and effectively communicated. In order to ensure that there is effective and ongoing ownership of the Carbon Management Programme the governance structure set out in chapters 6.1 to 6.6 will be used. These are broadly themed around the Carbon Trust's embedding matrix which is included in Appendix C on page 38.

6.1 Policy Alignment

The Carbon Management Plan is endorsed by ICR's Chief Executive Professor Alan Ashworth, its Board of Trustees and its Corporate Management Group. The Carbon Management Plan and the CO2 reduction target are also to be published and made available on the intranet and internet for access by all interested stakeholders. This will ensure that ICRs commitment is clear, and reinforces the need for action within the organisation.

The Institute's Strategic Plan 2010-15 includes an Annual Operating Statement within it for 1st August 2010 - 31st July 2011, which includes as key tasks the completion of the Carbon Trusts HE Carbon Management Programme and the gaining of the EcoCampus Gold award.

The Carbon Management Plan and CO_2 targets will also be referred to in future Strategic Plans, the revised Estates Strategy, the Environmental Management System and other high level policies when next reviewed e.g. future revisions of the Energy Policy, Environmental Policy, Sustainable Procurement Policy etc.

6.2 Programme Management

This factor of embedding Carbon Management is covered in section seven of this plan.

6.3 Main Roles and Responsibility

The overall responsibility of Carbon Management lies within the Corporate Management Group, which is chaired by Professor Alan Ashworth, Chief Executive of the ICR. Responsibilities for Carbon Management are part of the job roles of many staff as detailed in chapter 7.4.

Continued communication to all staff and students via energy saving campaigns, environmental awareness campaigns, the ICR intranet site and the IRC's environmental newsletter 'Your Environment' will develop their awareness of the need for Carbon Reduction. We have 'environmental champions' who assist the Health, Safety and Environment Team and the Carbon Management Team to raise awareness in individual teams.

6.4 Data Management

Meter reading is currently carried out monthly by the Energy Manager and PPM Contractor and includes some sub-metering of utilities within buildings with Smart Meters. This allows sub-metering to be accessed remotely and ensure that figures are more robust and exact. Additional smart metering has also been implemented.

The weights for waste sent to landfill are currently collated annually by the Site Managers from data supplied by ICR's waste contractors. Emissions data for the ICR's owned vehicles are also available from fuel bills and expense claim forms, held by the Site Management and Finance Departments.

The monitoring will be improved as detailed in the later section.

6.5 Communication and Training

ICR has a Competence, Training and Awareness procedure as part of its Environmental Management System. It is proposed to use this as a framework for communication and training. We will continue existing awareness campaigns and will include such actions as:

- Creation of environmental pages on the relevant websites to detail current work, what is expected of everyone to save carbon, and how they can get involved;
- Signing up of staff as environmental champions to help save carbon, and detailing how they can get involved;
- Delivery of environmental awareness training to all staff at induction and advanced training to those who have been identified as requiring further training due to their roles;
- Development of awareness raising materials and slogans;
- Training opportunities and presentations to all existing staff in relation to environmental awareness;
- Annual reports on carbon management available to general public on internet;
- The Carbon Management Team and Health Safety and Environmental Committee are responsible for the delivery of communications to staff, students and the stakeholders.

6.6 Finance and Investment

This factor of embedding Carbon Management is covered in section 5 of this Plan.

6.7 Procurement

The Institute's Purchasing Manager, Deputy Director of Estates Services and Finance Director all sit on the Carbon Management Team. They will actively contribute to the development and implementation of the Carbon Management Plan and to new procurement and tendering initiatives and strategies including industry trends and best practice (including whole-life costing, e-procurement etc).

The above parties also attend the Institute Environmental Implementation Group and Health, Safety & Environment Committee Meetings and the Institute is an active participant in the London Universities Purchasing Consortium, Fulham Road Purchasing Consortium and other sustainable procurement and collaborative service provision initiatives.

Sustainability and efficiency of the design and whole-life costing is also integrated within the tendering and briefing criteria for major capital projects.

6.8 Monitoring and Evaluation

Performance and progress against the Plan's targets will be led by the Project Leader, supported by the Project Sponsor and Deputy Project Leader as set out in the Responsibility Matrix (Table 4). This will be delivered and communicated through the Estates Services Team and Carbon Management Team activities and projects.

In addition regular progress review and monitoring of performance and progress against the targets and actions within the Plan will be undertaken through the submission of monthly and annual reports to the Institute Health Safety & Environment Committee, Corporate Management Group and Board of Trustees.

7 Programme Management

The Director of Operations as Project Sponsor has had Corporate Management Group (CMG) responsibility during the planning phase of the plan and this will continue during the implementation. As a member of the CMG and Chair of the Health Safety and Environment Committee he will champion the cause of Carbon Management at these meetings. He and the Director of Finance, also a member of the CMG, will ensue that the financial requirements for the CMP are considered and built into ICRs plans and strategies as appropriate.

7.1 The Programme Board:

The Programme Board comprising Director of Operations (Project Sponsor), Director of Finance, Deputy Director of Estates Services (Project Leader), Chief Engineer (Deputy Project Leader) will continue to meet quarterly to monitor progress on producing the plan until it is complete and signed off in March 2011. It will then merge with the current Energy Group to form the Carbon Management Team who will meet monthly.

7.2 The Carbon Management Team:

The current Project Board and Energy Group will be reconstituted as The Carbon Management Team. The Carbon Management Team comprising Director of Operations, Director of Finance, Deputy Director of Estates Services (Project Leader), Chief Engineer, (Deputy Project Manager), the Site Managers, Purchasing Manager, Maintenance Manager, Energy Manager and IT Change of Configuration Officer will meet monthly to maintain momentum and involvement with plan.

The team is responsible for reporting progress to the Environmental Implementation Group, Health, Safety and Environment Committee (HSE) and CMG through to the Board of Trustees (BofT). It is also responsible for producing bids for funding for progression through the CMG and HSE Committees for approval by the BofT.

The role of the group is to:

- Review and update the Implementation Plans on annual basis;
- Monitor and report progress against plans;
- Monitor and report annual emissions, waste figures etc;
- Monitor the Programme Risk Register and recommend implementation of mitigating actions;
- Maintain the opportunities database;
- Communicate or facilitate communication of updates and increase awareness internally and externally.

7.3 Project Leader

The Deputy Director of Estates Services as Project Leader, supported by the Chief Engineer as Deputy PL, will continue to be responsible for co-ordinating the implementation of the plan as well as producing the annual report update and future development of the plan. It is envisaged that they will be able to call on support and assistance from the Carbon Management Team to achieve this.

7.4 Succession planning of key roles

The Project Leader will be covered by the Deputy PL in the event that the Project Leader is unable to undertake the role at any time. If the Project Sponsor is unable to undertake the role at any time, the Director of Finance will deputise. If any other members of the Carbon Management Team require replacing at any time, the Project Sponsor will nominate another individual.

If at any time, key staff change in role or responsibilities and new staff become responsible for elements of this plan, then the Project Sponsor and Project Leader will ensure that the new staff will have an appropriate induction to the carbon management process.

Table 9: Responsibility matrix

Activity	Person(s) Responsible*			
	PS	PL / DPL	CMT	Others
Carbon Management Implementation Plan				
- Set objective	✓	✓	✓	
- Manage implementation plan		✓		
- Monitor and review progress		✓	✓	
- Annual review			✓	
- Monitor risks and mitigating actions			✓	
- Manage stakeholders and communication	✓	✓	✓	✓ HSE Committee/ ispace Comms / Website developer
- Production of Annual monitoring report		✓		
Obtaining Financing of Carbon Management Activities	✓	✓		✓ Director of Finance
Carbon Management in Buildings – refurbishment, construction and operation		✓		
Liaison with other stakeholders on joint initiatives e.g. Royal Marsden NHSFT combined heat and power	✓	✓		
Green Travel Plan & data collection			✓	✓ Travel Plan coordinator/Site Manager Sutton
Recycling and waste				✓ Deputy Director Facilities Services/Site Management
Water management			✓	✓ Deputy Director of Estates Services/Chief Engineer
Purchasing			✓	✓ Purchasing Manager part of Carbon Management Team
Carbon Management in Travel procurement			✓	✓ Purchasing Manager
Green IT			✓	✓ Director of IT/IT Change of Configuration Officer

* PS = Project Sponsor, PL = Project Leader, DPL = Deputy Project Leader, CMT = Carbon Management Team

7.5 Risks and issues management

The risk register in Table 10 highlights some of the key risks that could arise as the plans implementation progresses and a list of mitigating actions that could be taken. This Risk Register will be regularly reviewed by the Carbon Management Team and recommendations for implementing mitigating actions made to reduce risk.

Table 10: Risk register

Description	Risk To Programme	Impact	Probability	Mitigating actions	Owner
Lack of support from the CMG	Could stop programme from progressing or divert resources	H	L	Regular reporting of progress to CMG via HSE Committee	Project Sponsor / Director of Finance
Inadequate management time for project.	Project could slip and therefore reduce effectiveness	H	L	Key staff require dedicated time and support particularly the project leader	Project Sponsor / Project Leader
Competing Priorities	Could slow progress	M	M	Dedicated time and support to be managed	Project Sponsor / Project Leader
Failure to convince finance and purchasing staff of the benefits of the scheme	Could prevent investment and restrict progress in key areas	M	M	Regular briefings and involvement of staff. Clear financial justification for actions	Project Sponsor / Director of Finance
Institutes financial position	Lack of money to meet programme objectives	H	M	Ensure robust business cases with life cycle costing and reinforce the value at stake. Consider Salix funding if appropriate.	Project Leader / Director of Finance
Loss of key staff	Would probably stall	M	M	Need to have back up staff where necessary and clear	Project Sponsor

Description	Risk To Programme	Impact	Probability	Mitigating actions	Owner
particularly Deputy Director of Estates Services and Chief Engineer	programme			project documentation	
New Institute Strategies being developed – estates, It etc.	New strategies could contradict programme objectives	M	L	Ensure no incompatibilities between new strategy and Carbon Management Plan.	Project Sponsor / Project Leader
New legislation such as Carbon Reduction Commitment	Implementation cost could reduce funding for programme objectives	L	H	Programme objectives will reduce impact of CRC when implemented and improve energy rating for buildings.	Project Leader
Cost Efficiency Review	Diversion of resources away from programme	H	L	Ensure regular updates and highlight the efficiency opportunities	Project Sponsor / Director of Finance
Limited data for transport and procurement impacts	Unable to provide accurate data to measure impact	H	H	Need to establish available data and arrange for its collation	Purchasing Manager
Ongoing support and commitment for programme	Programme looses steam and fades away	M	H	Publicise senior management commitment and ensure resources are applied to programme.	Project Sponsor / Project Leader
Lack of future Capital funding from HEFCE	Lack of money to meet programme objectives	H	H	Ensure completion of Carbon Management Plan to ensure compliance with Capital Infrastructure framework to achieve compliance for full capital funding. Ensure other external funding opportunities are exploited.	Project Leader / Director of Finance

7.6 Benefits Management

In order to measure the benefits from implementing the programme, a number of reporting procedures will need to be developed. Energy and water consumption, cost and emissions data will continue to be reported as they are currently through the estates management statistics. Progress on building related energy saving projects will be reported through the Carbon Management Team Meeting to cover their financial implications and payback.

Improved reporting measures need to be developed for waste management, procurement and transport emissions. A separate project which included re-tendering of the contract is being undertaken for waste management. The action for this is with the Deputy Director of Facilities Services. In the case of transport, this will require the data collection on trips to be improved so that at the very least, the differing modes of transport can be monitored. The same is true for procurement where procedures need to be tightened to record items purchased and to limit alternative sources so more items are procured via our preferred suppliers who are able to undertake some of the reporting on our behalf. These last two items will be actioned by the Purchasing Manager.

7.7 Reporting and evaluation

Reporting of the progress against the plan will be completed on a regular basis. It is proposed that a brief monthly report is produced for the Carbon Management Team Meeting by Project Leader initially to cover the status of projects with a more thorough quarterly update which would include financial and consumption data. This will be reviewed after 6 months and 1 year to see if this is sufficient and will be amended as deemed necessary.

An annual report will also be produced covering the Carbon Management Plan on a similar cycle to the existing annual Energy report and this will look at revising targets, tracking emissions and identifying further measures. It will also look at how other areas of carbon management are brought into the Carbon Management Plan and how this can be accounted for. This will align with the Institute's Environmental Management System.

Reports will initially be to the Environmental Implementation Group, HS&E Committee, CMG and BofT and will include bids for future funding. All reports will be placed on the ICR and Environment webpage on ispace and where appropriate, further communication will be produced to highlight any significant progress.

Appendix A: Background data

Electricity use by meter

Building	Site	Consumption (kWh)	CO_2 (tonnes)	Cost*
Sutton Main	Sutton	5,397,254	2,951	£389,760
McElwain	Sutton	554,257	303	£40,025
Chelsea CBO	Chelsea	7,015,641	3,835	£506,631
123 OBR HH	Chelsea	139,786	76	£10,095
123 OBR NHH	Chelsea	44,485	24	£3,212
125 OBR NHH	Chelsea	32,016	18	£2,312
		13,183,439	7,207	£952,035

* a weighted average p/kWh cost rate is applied, hence this does not reflect different tariffs paid by individual sites or buildings

HH = Half hourly meter

NHH = Non half hourly meter

Gas use by meter

Building	Site	Consumption (kWh)	CO_2 (tonnes)	Cost*
Sutton Main	Sutton	5,662,896	1,042	£136,331
McElwain	Sutton	934,096	172	£22,488
Chelsea CBO	Chelsea	4,673,932	860	£112,522
123 OBR	Chelsea	187,570	35	£4,516
		11,458,494	2,108	£275,857

* a weighted average p/kWh cost rate is applied, hence this does not reflect different tariffs paid by individual sites or buildings

CO_2 factors

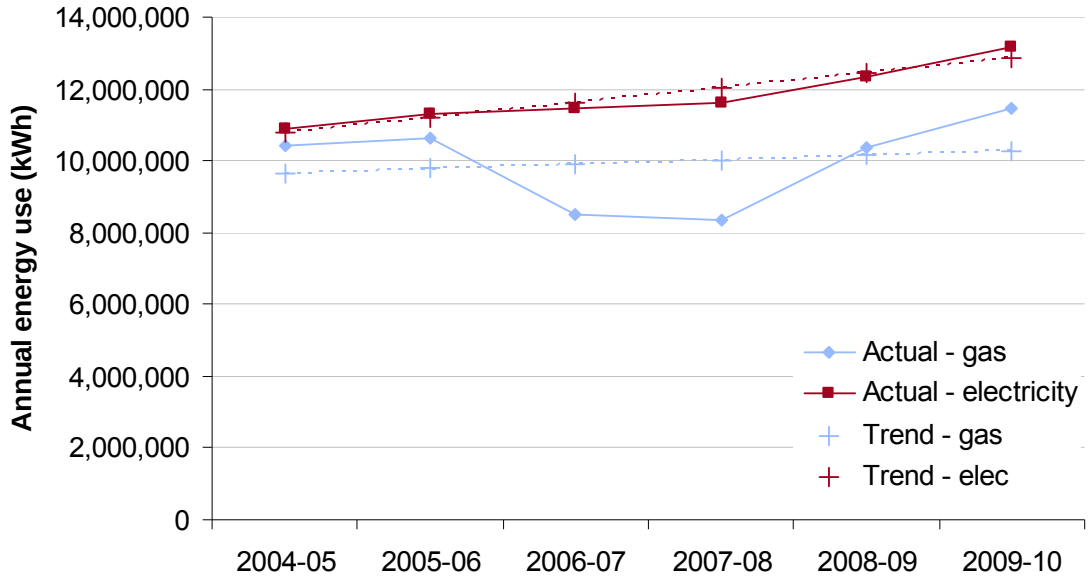
Energy type	Conversion factor ($kgCO_2/kWh$)	Reference
Electricity (grid)	0.54667	Defra / DECC Sept 2009 (gross CV where applicable)[13]
Natural gas	0.18396	

[13] http://www.defra.gov.uk/environment/business/reporting/older-ghg-conversion-factors.htm

Appendix B: Value at stake trends and assumptions

Energy consumption trends (kWh/yr)

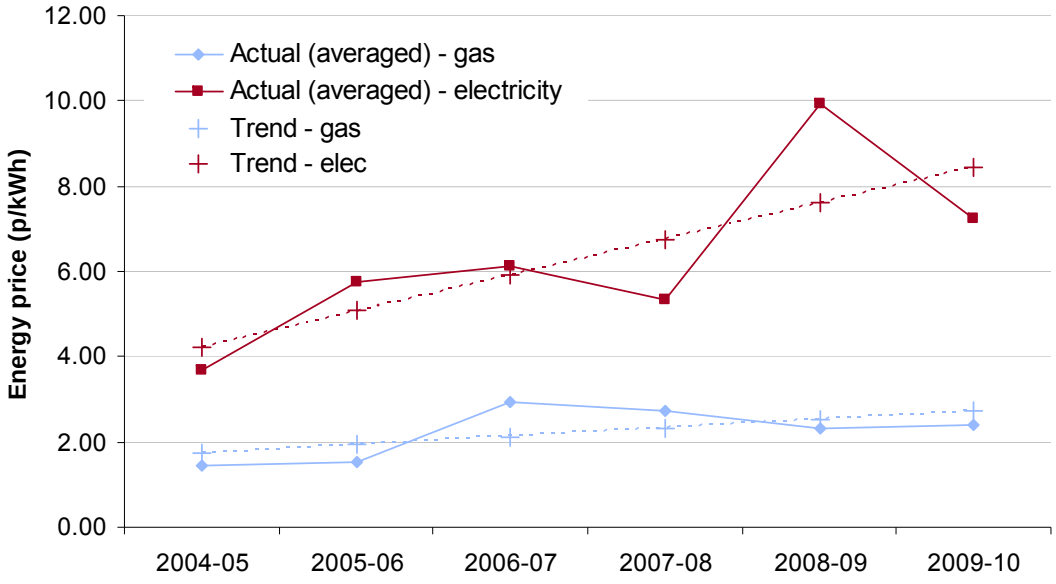
	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	Linear annual increase above 2004-05
Actual - gas	10,427,830	10,646,539	8,524,457	8,367,433	10,388,830	11,458,494	
Actual - electricity	10,914,402	11,327,766	11,483,727	11,632,938	12,346,357	13,183,439	
Trendline – gas	9,667,276	9,787,938	9,908,600	10,029,261	10,149,923	10,270,585	**1.25%**
Trendline - electricity	10,775,474	11,191,193	11,606,912	12,022,631	12,438,350	12,854,069	**3.86%**



Energy cost trends (p/kWh)*

	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	Linear annual increase above 2004-05
Actual - gas	1.46	1.53	2.93	2.72	2.32	2.41	
Actual - electricity	3.69	5.74	6.13	5.35	9.93	7.22	
Trendline – gas	1.74	1.93	2.13	2.33	2.52	2.72	**11.30%**
Trendline - electricity	4.24	5.08	5.92	6.76	7.61	8.45	**19.84%**

* The weighted average p/kWh was calculated by dividing total cost (£) by total consumption (kWh)



Appendix C: Embedding Matrix

	POLICY	RESPONSIBILITY	DATA MANAGEMENT	COMMUNICATION & TRAINING	FINANCE & INVESTMENT	PROCUREMENT	MONITORING & EVALUATION
5	• 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: o Buildings o Waste	• All staff & students given formalised CM: o Induction o Training Plan o Communications • CM matters regularly communicated to: o External community o 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: o Buildings o Transport o waste • Data internally reviewed	• All staff & students given CM: o Induction o Communications • CM communicated to: o External community o 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: o Actions o Profile & Targets o 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: o Training o 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: o Policies / Strategies o Targets o 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 given ad hoc CM: o 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	• No policy • No Climate Change reference	• No CM responsibility designation	• Not compiled: o 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

Red line = 2009/10 assessment; Blue line = 2014/15 aspiration; CM = Carbon Management; M&T = Monitoring and Targeting; ICLEI = International Council for Local Environmental Initiatives

Appendix D: Definition of Projects

For projects in the Institutes portfolio which are agreed and funded at the time of writing, further detail is provided below.

Project reference		1
Project name		CBL Basement Toilet Extract Controls
Owner		Sean Higgins
Department		Estates Services
Description		Installation of high/low speed supply and extract fans with PIR control and time clock to enable complete switch off out of hours. Replacing single speed fans with no controls resulting in 24/7 consumption.
Implementation year		2010
Lifetime (years)		10.25
Benefits	**Financial savings (life)**	£6,319
	Payback (years)	3.9
	CO_2 savings	4.71 tpa
	Proportion of target	0.2%
Funding	**Capital cost**	£2,389
	Source	Salix Fund
	Operational cost	£0
	Status	Funded and Completed
Non-financial resources		Estates Project Team
Ensuring success		n/a
Measuring success		n/a
Timing	**Start date**	September 2010
	Completion date	December 2010
Notes		

Project reference		2
Project name		Sutton Valve and Flange Insulation
Owner		Sean Higgins
Department		Estates Services
Description		Installation of valve and flange insulation to pipework in the Sutton plant rooms.
Implementation year		2010
Lifetime (years)		22.5
Benefits	**Financial savings (life)**	£50,499
	Payback (years)	2.6
	CO_2 savings	17.72 tpa
	Proportion of target	0.7%
Funding	**Capital cost**	£5,847
	Source	Salix Fund
	Operational cost	£0
	Status	Funded and Completed
Non-financial resources		Estates Project Team
Ensuring success		Valve and flange insulation is designed to be removed for maintenance purposes. To ensure on going success, periodical reviews will take place to ensure insulation jackets are in place.
Measuring success		n/a
Timing	**Start date**	17th August 2010
	Completion date	17th August 2010
Notes		

Project reference		3
Project name		OBR Valve and Flange Insulation
Owner		Sean Higgins
Department		Estates Services
Description		Installation of valve and flange insulation to pipework in the Chelsea site plant rooms.
Implementation year		2010
Lifetime (years)		13
Benefits	**Financial savings (life)**	£16,830
	Payback (years)	2.2
	CO_2 savings	10.22 tpa
	Proportion of target	0.4%
Funding	**Capital cost**	£2,804
	Source	Salix Fund
	Operational cost	£0
	Status	Funded and Completed
Non-financial resources		Estates Project Team
Ensuring success		Valve and flange insulation is designed to be removed for maintenance purposes. To ensure ongoing success, periodical reviews will take place to ensure insulation jackets are in place.
Measuring success		n/a
Timing	**Start date**	17th August 2010
	Completion date	17th August 2010
Notes		

Project reference		4
Project name		CRUK Variable Volume Fume Cupboard
Owner		Sean Higgins
Department		Estates Services
Description		System design change and controls to enable variable volume fume extracting instead of constant volume. Sensors on the fume cupboard sashes enable the extract speed to be varied to match the sash height. i.e. sash closed would result in low extract fan speed and sash fully open would result in high extract fan speed.
Implementation year		2010
Lifetime (years)		15.85
Benefits	**Financial savings (life)**	£23,290
	Payback (years)	6.1
	CO_2 savings	11.50 tpa
	Proportion of target	0.4%
Funding	**Capital cost**	£9,021
	Source	Salix Fund
	Operational cost	£0
	Status	Funded and Completed
Non-financial resources		Estates Project Team
Ensuring success		n/a
Measuring success		n/a
Timing	**Start date**	July 2010
	Completion date	September 2010
Notes		

Project reference		5
Project name		CBL Calorifier Replacement
Owner		Sean Higgins
Department		Estates Services
Description		Replacement of old gas fired calorifier with new condensing gas fired water heater with improved efficiency.
Implementation year		2010
Lifetime (years)		14.5
Benefits	**Financial savings (life)**	£12,399
	Payback (years)	9.3
	CO_2 savings	6.75 tpa
	Proportion of target	0.2%
Funding	**Capital cost**	£7,965
	Source	Salix Fund
	Operational cost	£0
	Status	Funded and completed
Non-financial resources		Estates Project Team
Ensuring success		n/a
Measuring success		n/a
Timing	**Start date**	October 2010
	Completion date	October 2010
Notes		

Project reference		6
Project name		BLB Daylight Control
Owner		Sean Higgins
Department		Estates Services
Description		Installation of daylight and time clock control for high level atrium lighting. Lighting is currently on 24/7 regardless of day light level or non occupancy.
Implementation year		2011
Lifetime (years)		10.3
Benefits	**Financial savings (life)**	£18,707
	Payback (years)	2.5
	CO_2 savings	13.88 tpa
	Proportion of target	0.5%
Funding	**Capital cost**	£4,538
	Source	Salix Fund
	Operational cost	£0
	Status	In planning
Non-financial resources		Estates Project Team
Ensuring success		Sufficient planning to enable project to be completed by 26/04/2011 in order to achieve energy savings sooner. Main considerations are around safe access due to high level lighting.
Measuring success		System operates as intended
Timing	**Start date**	March 2011
	Completion date	26/04/2011 (latest)
Notes		

Project reference		7
Project name		CBL AHU Inverter Controls
Owner		Sean Higgins
Department		Estates Services
Description		
Implementation year		2012
Lifetime (years)		10.26
Benefits	**Financial savings (life)**	£478,921
	Payback (years)	3.2
	CO_2 savings	359.93 tpa
	Proportion of target	13.2%
Funding	**Capital cost**	£147,165
	Source	Salix Fund
	Operational cost	£0
	Status	In Planning
Non-financial resources		Estates Project Team
Ensuring success		
Measuring success		
Timing	**Start date**	TBC
	Completion date	23/06/2011 (latest)
Notes		

Appendix E: Energy policy

INSTITUTE OF CANCER RESEARCH: ROYAL CANCER HOSPITAL

POLICY STATEMENT

ENERGY POLICY

The Institute of Cancer Research employs over 1,000 members of staff and educates 300 postgraduate students in a number of laboratories and support buildings on two major sites in Chelsea and Sutton. In providing excellent premises and facilities for research and education the Institute recognizes its responsibility to the environment and commits, as far as is reasonably practical, to promote protection of the environment and to minimize the impact of its activities upon the local, regional and global environment both directly and through what influence might reasonably be brought to bear on other organizations.

The Institute will demonstrate its commitment to continuous improvements in energy usage by implementing the following measures where reasonably practical:

- Minimise energy consumption and costs;
- Minimise water consumption and costs;
- Reduce dependency on finite fossil fuels;
- Reduce emissions of pollutants such as CO_2;
- Give high priority to energy efficiency investments;
- Increase investment in clean technologies;
- Promote sustainable sources of energy use where practical;
- Reduce significant environmental impacts arising from energy and water consumption.

The Institute's Board of Trustees and the Chief Executive have ultimate responsibility for its environmental performance. All staff and students share this responsibility. They are supported by the Institute's Facilities Directorate who will promote best practice and continual improvement and monitor performance.

Chief Engineer.

Approved by the Corporate Management Group May 2010