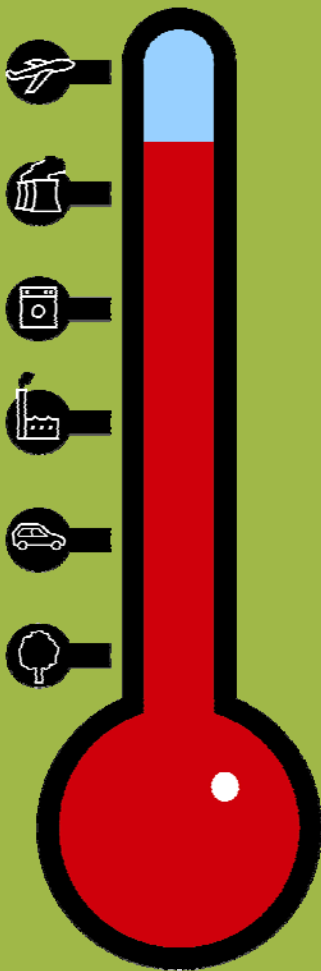


Demonstrable Progress

The United Kingdom's Report on Demonstrable Progress
under the Kyoto Protocol



TOMORROW'S CLIMATE
Today's Challenge

Demonstrable Progress

**The United Kingdom's Report on Demonstrable
Progress under the Kyoto Protocol**

Contents

Foreword	5
Executive Summary	6
Headline message	6
Background	6
The UK's progress to date	7
Chapter One - Domestic Policies and Measures	9
Introduction	9
Government structure	9
Planning System	10
The UK Climate Change Programme	10
Domestic policies and measures by sector	11
Energy supply	11
Business	13
Industrial processes	16
Transport	18
Residential	19
Public sector	21
Agriculture	21
Land use, land use change and forestry	23
Waste management	24

Chapter Two - Greenhouse Gas Emission Trends and Projections	25
Introduction	25
Greenhouse gas emission trends 1990 to 2004	25
Greenhouse gas emission projections to 2020	26
Chapter Three - Analysis of the Contribution of Domestic Measures and Use of the Kyoto Mechanisms	29
Introduction	29
Use of the Kyoto mechanisms	30
Emissions trading	30
The Climate Change Projects Office	31
National authority for the Clean Development Mechanisms	31
Focal point for Joint Implementation	31
National system to account for emissions	31
National registry to account for assigned amount	32
Compliance measures	32
Carbon sinks	33
Evaluation of projected progress in emissions reduction by measure	33
Analysis of existing policies and measures introduced under the UK Climate Change Programme in 2001	33
Achievement of the UK Kyoto Protocol target	37

Chapter Four - Progress on Other Commitments	38
Introduction	38
International action on climate change negotiations	38
Improvement of the UK national greenhouse gas inventory	40
Impacts of response measures	40
Measures for adapting to climate change	40
Adaptation : The challenge	40
UK adaptation policy framework	41
UK Climate Impacts Programme (UKCIP)	42
Other research into adaptation	42
Co-operation in scientific and technical research	43
Scientific research	43
Systematic Observations	45
Participation in intergovernmental observation	45
Contributions to adaptation in developing countries	46
Capacity-building in developing countries	46
Financial assistance and technology transfer	47
Information, awareness raising and public participation	49
Glossary of terms	50

Foreword

By the Secretary of State for Environment, Food and Rural Affairs

I am pleased to present the UK's Report on Demonstrable Progress under the Kyoto Protocol. This report sets out the real progress that the UK has already made towards meeting our Kyoto target for the first commitment period, 2008-2012, and the steps we have taken to implement our wider commitments under the Protocol.

The threats posed by climate change have never been more apparent and the need for serious concerted action by the global community has never been greater. The challenge is for today's generation to act now to ensure a sustainable future for generations to come.

This report demonstrates that this is not a challenge to be feared, but to be faced. Economic development and implementation of the Kyoto Protocol are in no way direct opposites. If we harness the combined efforts of government, at all levels, business, the research community, non-governmental organisations and the public, we can reduce our greenhouse gas emissions while increasing our prosperity.

This report clearly demonstrates that the steps that the UK government has taken over recent years have put us firmly on track to achieve our Kyoto target. However, we recognize that Kyoto is only the beginning, and that more and wider efforts are needed if we are to prevent dangerous human-induced climate change. We will continue to play an active role in shaping the future of the United Nations Framework Convention on Climate Change, as shown in the recent international discussions in Montreal.

We will also continue to work to reduce our greenhouse gas emissions and we will continue to provide the international leadership that helps other countries do likewise. A review of the UK Climate Change Programme will be published shortly, and further greenhouse gas emissions reductions arising from policies implemented following this review will be outlined in our Fourth National Communication to the UNFCCC, to be published later this year.

In the meantime, this report clearly demonstrates the seriousness with which we view the threat of climate change and the scale of the action we have taken in the UK to fulfil our international commitments under the Kyoto Protocol.

A handwritten signature in black ink that reads "Margaret Beckett". The signature is written in a cursive, flowing style.

The Rt Hon Margaret Beckett MP
March 2006

Executive Summary

Headline message

UK greenhouse gas emissions were 14.6 per cent below base year levels in 2004 and, with current policies and measures, are projected to be about 19.4 per cent below base year levels in 2010. Under the Kyoto Protocol the UK agreed to ensure that emissions of greenhouse gases were at least 12.5 per cent lower than base year levels, on average, over the period 2008 to 2012. The UK is therefore on track to meet this commitment.

Additional policies and measures to reduce emissions, which will be announced when the UK publishes a revised Climate Change Programme later this year, will ensure that the UK goes even further in reducing greenhouse gas emissions and moves towards its more challenging domestic goals.

Background

The threats posed by climate change demand serious, concerted action by the international community. Though no country can solve the problem on its own, all countries must show what they can achieve by their own actions, which should be consistent with their national circumstances. They can also help the international process to secure future agreements. These precepts are the core of the UK's strategy in tackling climate change.

This report sets out the progress that the UK has made in implementing its commitments under the Kyoto Protocol. Some of these commitments have been driven by national policy initiatives and some have been implemented following measures adopted at European Union (EU) level. The latter are described in the EU's report on demonstrable progress submitted to the United Nations Framework Convention on Climate Change in December 2005.

The UK has a legally binding commitment under the Kyoto Protocol to reduce greenhouse gas emissions by 12.5 per cent below base-year levels, on average, over the first commitment period, 2008-2012¹. The UK has also adopted a domestic goal to reduce carbon dioxide emissions to 20 per cent below 1990 levels by 2010. The 2003 UK Energy White Paper, *Our energy future - creating a low carbon economy*, introduced a further, long-term aim of achieving a carbon dioxide emissions reduction of some 60 per cent by 2050, with real progress by 2020. The UK has set these ambitious goals because it recognises that if climate change is not tackled, the consequences will be very damaging for the global environment, the economy and security. This report

¹ The Kyoto commitment is monitored against a basket of emissions of carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride. The base year emissions level is derived using 1990 emissions for the first three gases and 1995 for the fluorinated compounds.

focuses on action taken by the UK to deliver on its Kyoto Protocol commitments and in particular on its greenhouse gas reduction target.

The UK's progress to date

The UK's emissions of the basket of six greenhouse gases fell by 14.6 per cent between the base year and 2004. This reduction has been driven by the restructuring of the energy supply industry; energy efficiency and energy intensity improvements; pollution control measures in the industrial sector and other policies that reduced emissions of non-carbon dioxide greenhouse gases.

The UK is well on track to meet its target for the first commitment period with current policies and measures. Without introducing any additional measures the UK's greenhouse gas emissions are expected to be about 19.4² per cent below base year levels in 2010.

The UK Government and Devolved Administrations are currently completing a review of the UK Climate Change Programme. When published later this year, the revised Programme will set out the package of policies and measures needed to deliver our more challenging domestic goal by 2010, and pave the way for further carbon reductions to 2020 and beyond.

In addition to putting itself on track towards meeting its emissions reduction commitments through its National Climate Change Programme and other national policies, the UK has also put in place institutional structures and other provisions to enable delivery of its wider Kyoto commitments. These include:

- Establishment of a national registry for holding, transferring, and acquiring EU allowances and Kyoto units
- Implementation of the EU Emissions Trading Scheme. The scheme started on 1 January 2005. The first phase runs from 2005-2007 and the second phase will run from 2008-2012 to coincide with the first Kyoto Commitment Period. The Scheme will continue beyond 2012 with further five year phases
- Cooperation with interested Member States to develop EU/United Nations compliant registry software in order to facilitate the start of the EU Emissions Trading Scheme - a project known as the Greenhouse gas Registry for Emissions Trading Arrangements or GRETA

² This figure includes the effect of the mandatory Art 3.3 activities in the LULUCF sector and the forest management cap in accordance with the choices that the UK has made under Article 3.4 of the Kyoto Protocol

- Transposition of the EU linking directive³ into UK law which specifies use of project credits in Phase I (2005-2007) of the EU Emissions Trading Scheme, as well as project approval processes and authorisation to participate in the flexible mechanisms

Private sector interest in emissions trading and the Kyoto Mechanisms is considerable and the establishment of the City of London as a substantial centre for carbon trading with an estimated €1bn available in private finance funds is to be warmly welcomed.

Further actions include :

- Development of a national system for greenhouse gas inventory estimation, reporting and archiving, which includes new legal powers for national inventory purposes
- Establishment of the UK's Adaptation Policy Framework which will provide the structure in which climate change considerations can be integrated into policies developed at every level across a range of sectors of the economy
- Contribution to the United Nations Global Climate Observing System via meteorological and atmospheric observations made across the UK and its Overseas Territories, together with scientific participation on the Global Climate Observing System international steering committee
- The continued funding of world-class climate research at the Hadley Centre and other UK research centres
- Establishment of a £12M Climate Change Communications Initiative to inform the British public about climate change issues, and to give them the tools to make individual actions to reduce it
- Making a financial contribution to the Global Environment Facility, including a sum of £320 million between 1997 and 2004, and to bilateral development projects across the world
- Promotion of technological development in developing countries, including participation in the Climate Technology Initiative

The UK has appointed Kyoto authorities required under the Marrakesh Accords. The Department for Environment, Food and Rural Affairs has been appointed as the Single National Entity for the UK national system, the Designated Focal Point for Joint Implementation projects and the Designated National Authority for Clean Development Mechanism projects. The UK is currently in the process of appointing the National Registry Administrator.

³ Details available at:

<http://www.defra.gov.uk/environment/climatechange/trading/eu/kyoto/index.htm>

Domestic Policies and Measures

Introduction

1.1 The United Kingdom ratified the Kyoto Protocol (KP) in its own right on 31 May 2002, at the same time as ratifying as part of the European Union (EU). The KP entered into force on 16 February 2005 after at least 55 Parties to the Convention (representing at least 55 per cent of carbon dioxide (CO₂) emissions in 1990 from Annex I Parties) had deposited instruments of ratification. The UK Government is in the process of extending its ratifications of the UNFCCC and the KP to a number of the UK's Overseas Territories⁴ (OTs) and Crown Dependencies⁵ (CDs). Of the OTs, Bermuda, the Cayman Islands, the Falkland Islands and Montserrat have indicated that they wish to be associated with the UK's ratifications. There is a strong possibility that The British Virgin Islands and Anguilla will also do so. The UK's CDs (Isle of Man, Guernsey, Sark and Alderney) have formally requested to join the UK ratifications of the UNFCCC and the KP. Jersey has already joined the UK's ratification of the UNFCCC, but has not yet confirmed whether it will join the UK's ratification of the KP.

1.2 The EU agreed to an 8 per cent reduction in greenhouse gas (GHG) emissions as part of its Kyoto commitment. This was redistributed between Member States to reflect their national circumstances. The redistribution agreement was reached during the UK's 1998 Presidency of the EU, and a 12.5 per cent reduction is the UK's share.

Government structure

1.3 Achieving the UK's Kyoto commitment and national goals for emissions reduction is the overall responsibility of the UK Government, which shares policy development with the Devolved Administrations (DAs) for Scotland, Wales and Northern Ireland. The DAs can also introduce their own policies using devolved powers. Policies cover all sectors of the economy and are described in from paragraph 1.10 onwards.

1.4 The UK Department for Environment, Food and Rural Affairs (Defra) coordinates policy on climate change at the official level through interdepartmental committees chaired by Defra. Decisions at the political level are made by Cabinet Committee chaired by the Prime Minister, seeking agreement of the DAs where appropriate. Some policies are the responsibility of Defra directly while others are the responsibility of Her Majesty's Treasury, the Department of Trade and Industry (DTI), the Department for Transport, the Office of the Deputy Prime Minister, the Foreign and Commonwealth Office, and the Department for International Development. Some policies are the responsibility of the DAs. Other agencies or groups involved in the UK's

⁴ <http://www.fco.gov.uk>

⁵ <http://www.dca.gov.uk/constitution/crown/crwdep.htm>

Climate Change Programme (CCP) include the Greater London Assembly, the Environment Agency for England and Wales, the Scottish Environment Protection Agency (SEPA), the Environment and Heritage Service in Northern Ireland and the Forestry Commission.

Planning system

1.5 The Government has focussed the planning system on helping to produce significant long-term cuts in carbon emissions. The Government's Planning Policy Statement 1⁶ has put sustainable development at the heart of the planning system for the first time. It requires policies concerning development planning to take account of the need to reduce greenhouse gas emissions and derive more energy from renewable sources.

The UK Climate Change Programme

1.6 In 2000 the UK Government launched a Climate Change Programme designed to enable the UK to meet, and go beyond its commitment for a 12.5 per cent greenhouse gas emissions reduction for the first commitment period of the KP.

1.7 The programme reflected the importance of tackling climate change by setting an ambitious domestic goal. This aims to reduce CO₂ emissions by 20 per cent below 1990 levels by 2010. The programme took a balanced approach, with all sectors and all parts of the UK playing their part, and focused on flexible and cost effective policy options to deliver carbon emission reductions most economically.

1.8 A major review of the 2000 Programme including a thorough evaluation and appraisal of policies and measures was launched in 2004. The revised Programme will be published shortly following a public consultation completed in 2005 and subsequent detailed analysis. A description of the revised Programme, together with any new policies and measures proposed by the review will be included in the UK's Fourth National Communication to the UNFCCC, to be published later this year.

1.9 This Demonstrable Progress report reflects updated estimates of the policies and measures in the 2000 Programme, and policies and measures introduced up to the launch of the review in 2004, but it does not contain additional policies that will be introduced as a result of the publication of the revised Programme or any that will be brought forward through the review of the European Climate Change Programme (ECCP).

⁶ <http://www.odpm.gov.uk/index.asp?id=1143804>

Domestic policies and measures by sector

1.10 This report focuses on domestic policies and measures to reduce emissions in nine broad sectors consistent with the UNFCCC guidelines for national communications. These sectors are the energy supply industry; business; industrial processes; transport; residential; public; agriculture; land use, land use change and forestry; and waste management. Each sector is dealt with in turn, with a brief description of policies and measures introduced since 1997 to reduce emissions and included in the UK's baseline projections.

Energy supply

1.11 The Government set out a long-term framework for energy policy in the 2003 Energy White Paper with four goals for energy policy. These are to:

- put the UK on a path to cut CO₂ emissions by some 60 per cent by about 2050, with real progress by 2020
- maintain the reliability of energy supplies
- promote competitive markets in the UK and beyond
- ensure that every home is adequately and affordably heated

1.12 In the period to 2010 emissions reductions will come from:

- the impact of the CCP on energy using sectors
- an increased share of gas in place of coal in the generation of electricity from fossil fuels
- an increase of up to 10 per cent in the share of electricity generation taken by renewables
- an increase in the capacity of combined heat and power (CHP) plant of up to 10GW by 2010

1.13 The Government believes that secure, diverse, and sustainable supplies of energy at competitive prices can best be achieved by the operation of competitive markets in energy production and supply, in which commercial pressures ensure that companies strive at all times to improve their efficiency. The rapid increase in the conversion efficiency of combined cycle gas turbine power stations is one example of this, and inclusion of large combustion plant in the European Union Emissions Trading Scheme (EU ETS) should help maintain the long term incentive to improve efficiency of operation.

1.14 The UK Government's CHP target is to achieve an installed capacity of at least 10GW by 2010, as outlined in *The Government's Strategy for Combined Heat and Power to 2010*⁷

⁷ <http://www.defra.gov.uk/environment/energy/chp/pdf/chp-strategy.pdf>

1.15 The Government has introduced a target requiring that 10 per cent of the UK's electricity requirements should be met from renewables by 2010, subject to the costs to consumer being acceptable. The Government aims to transform renewables from a fledgling industry to a mainstream business activity. The non-fossil fuels obligation (NFFO) in England and Wales, the Scottish Renewables Order (SRO) in Scotland and the Northern Ireland NFFO required public electricity supplier licensees to secure electricity from a specified capacity of renewable electricity generating plant. Between 1990 and 2000 the NFFO/SRO provided over £600 million of support. This has since been replaced with the Renewables Obligation, introduced in April 2002 to England, Wales and Scotland and April 2005 in Northern Ireland

1.16 The Renewables Obligation requires licensed electricity suppliers to source a specific and annually increasing percentage of the electricity they supply from renewable sources. The current obligation is 5.5 per cent for 2005/06 rising to 15.4 per cent by 2015/16.

1.17 In addition to the Renewables Obligation, the UK Government has announced substantial investment for demonstration projects and support for research and development in a wide range of areas including offshore wind, biomass, marine energy, solar energy, microgeneration technologies and fuel cells. In total around £500m of additional support is being provided over the period 2002-8. This support aims to help bring forward the development and commercialisation of a range of new renewable energy and low carbon technologies.

1.18 The Welsh Assembly Government *Energy Saving Wales* Action plan⁸ was published in 2004 after a wide-ranging public consultation. The Welsh Assembly Government work with partner organisations such as Carbon Trust Wales and The Energy Saving Trust, to help deliver the key objectives of the action plan and to ensure that the energy efficiency message reaches all sectors of society.

1.19 One of the commitments within *Energy Saving Wales* was to establish an internet portal. The concept of the *Energy Saving Wales Portal* is to help provide easy access for business, domestic and public sector users, and help focus on the services, help and support that is presently available from a wide range of organisations.

⁸ <http://www.businessenvironment.wales.gov.uk/documents/esw-e.pdf>

Energy supply in the longer term

1.20 In 2005 the UK launched a review of UK energy policy (the Energy Review⁹) that will bring forward proposals to help the UK meet its medium and long-term policy goals as set out in the 2003 Energy White Paper. The Review has a broad scope and will consider aspects of both energy supply and demand, focusing on medium and long-term policy measures beyond 2010 including transport and energy efficiency.

1.21 The Review will consider all options including the potential role of current generating technologies, such as renewables, coal, gas and nuclear power, and new and emerging technologies, for example Carbon Capture and Storage. It will be taken forward in the context of the Government's commitment to sound public finances and will take account of all short-term, medium-term and long-term costs and liabilities both to the taxpayer and energy user. The Review is taking place against a background of strengthening evidence on the nature and extent of climate change and increasing concerns about the future security of UK energy supplies.

1.22 Given the substantial challenge posed by climate change, Sir Nicholas Stern has also been asked to produce a report to the Prime Minister and Chancellor by Autumn 2006 on the economics of climate change¹⁰. The work undertaken as part of the Stern Review will be closely co-ordinated with the Energy Review.

Business

1.23 The UK's policy to reduce greenhouse gas emissions from business focuses on the Climate Change Levy (CCL) package and emissions trading. The CCL applies to the use of energy in industry, commerce and the public sector, with offsetting cuts in employers' National Insurance Contributions, and additional support for energy-saving kit through Enhanced Capital Allowances. The levy entails no increase in the tax burden on industry as a whole and no net gain for the public finances. The reforms are intended to promote energy efficiency, encourage employment opportunities and stimulate investment in new technologies.

1.24 The government has also encouraged UK businesses to agree to reduce their emissions through Climate Change Agreements (CCAs). CCAs were originally agreed between Defra and 44 energy-intensive sectors under the Pollution Prevention and Control (PPC) criteria set up to 2001. New energy intensity eligibility criteria based on energy costs as a proportion of production values came into effect in January 2006. The agreements are due to last until 31 March 2013 and set quantitative targets for 2010, with milestone targets at two-yearly intervals. Sectors (and constituent firms) could choose whether their targets related to GHG emissions or to primary energy

⁹ <http://www.dti.gov.uk/energy/review/index.shtml>

¹⁰ http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/sternreview_index.cfm

consumption, and whether they were defined in absolute or relative terms. Provided that CCA participants achieve their milestone targets, they are entitled to receive an 80 per cent reduction in the CCL.

1.25 The agreements have a two-tier structure, with an umbrella agreement between Defra and the relevant sector association, and a series of underlying agreements with the constituent target units. Targets are set at both levels. If the sector target is achieved, all constituent target units are deemed to have met their individual targets and are re-certified to receive the CCL reduction for the following two-year period (i.e., until the next milestone). If the sector target is not met, only those target units that have achieved their individual milestone targets are re-certified.

1.26 Participants in the CCAs can purchase allowances through the UK ETS to help meet their targets. Overachievement can be converted either into saleable allowances (subject to verification by an accredited verifier), or can be ring-fenced for future conversion. CCAs delivered emission reductions by 1MtCe in excess of the targets in the first target period in 2002 and by 1.4MtCe in the second, in 2004. Targets for the remaining three target periods have been reviewed and in the light of the early performance the targets have been tightened in the majority of sectors.

1.27 The UK Carbon Trust¹¹ was launched in April 2001, as a component of the CCL package. The aims for the Trust are to encourage the research and development and take up of low GHG emissions technologies and energy saving measures. Since its establishment, the Trust's activities have developed and grown significantly, and its services are grouped into three 'pillars':

- Reducing greenhouse gas emissions now
- Developing low greenhouse gas emissions technologies
- Helping to understand the impacts of climate change

1.28 The first of these comprise a variety of services, which, to a significant degree, build on the activities of the earlier Energy Efficiency Best Practice Programme, but with an enhanced focus on customer service.

1.29 The primary objective of the second pillar is to maximise GHG emissions savings over the medium and long term through investments in low-GHG emissions technologies. This is achieved by increasing the development of low-GHG emissions intellectual property, meeting market needs, and accelerating commercialisation of low-GHG emissions technologies.

1.30 In the third pillar, the Carbon Trust helps business understand the opportunities and risks associated with climate change. It also works to help policy-makers accelerate progress towards a low-GHG emissions economy in a way that enhances UK competitiveness. The outcomes from these activities

¹¹ <http://www.thecarbontrust.co.uk>

are important in informing the work carried out in the other two pillars and in creating the conditions where organisations are more willing to reduce their emissions.

1.31 In April 2002, the UK launched the first voluntary, economy-wide emissions trading scheme (UK ETS). In return for commitments to absolute emissions savings relative to historical baselines, 33 direct participants receive a share of Government incentive money totaling £215m over the five years of the scheme (2002–06). The aims of the scheme are to:

- secure cost-effective GHG emissions reductions
- give UK companies early experience of emissions trading
- encourage the establishment of emissions trading centres and expertise in the City of London

1.32 The annual targets are equivalent to emissions reductions totaling 1.08 MtCe¹² relative to the ETS baseline. The incentive payments equate to a price of £195.69/tCe. In the first three years of the Scheme it has delivered an estimated 1.61MtCe of emissions reductions.

1.33 Several sectors come under the remit of the PPC regulatory regime, which implements the requirements of the Directive on Integrated Pollution Prevention and Control (96/61/EC)¹³. PPC applies an integrated environmental approach to the regulation of certain industrial activities to ensure a high level of environmental protection by preventing emissions or, where this is not practicable, reducing emissions to acceptable levels. Regulators (the Environment Agency in England and Wales, SEPA in Scotland and the Environment and Heritage Service in Northern Ireland) set permit conditions based on the use of best available techniques, which balance the cost to operators against benefits to the environment.

1.34 In 2005 the UK implemented the EU Emissions Trading Scheme with the first phase running to 2007. The second phase will coincide with the first Kyoto Commitment Period (2008-2012). The UK's approved National Allocation Plan (NAP) was published on 24 May 2005 and is set to help reduce carbon dioxide emissions by between 12 and 18 MtCe (around 5-8 per cent) below projected emissions (of UK installations covered by the Scheme) over the next 3 years. Furthermore the total number of allowances allocated to industry is based on progress beyond the KP target and towards our national goal of a 20 per cent cut in CO₂ emissions on 1990 levels by 2010. **Emissions reductions achieved under the EU ETS are not included in the baseline projections described in Chapter 2.** Further information on the EU ETS can be found in the EU Report on Demonstrable Progress¹⁴.

¹² GHG emissions are expressed throughout this document as million tonnes of carbon equivalent (MtCe). One tonne of carbon is contained in equivalent to 3.67 tonnes of carbon dioxide which is the ratio of the molecular weight of carbon dioxide to the atomic weight of carbon (i.e. 44/12). Other gases are expressed in terms of carbon equivalent by multiplying their emissions by their global warming potential (GWP) and dividing by 3.67.

¹³ <http://europa.eu.int/comm/environment/ipcc>

¹⁴ <http://unfccc.int/resource/docs/dpr/eur1.pdf>

1.35 Improvement in the energy efficiency of buildings, including implementation of the EU Energy Performance of Buildings Directive (see paragraph 1.56), will reduce the amount of energy used by, and hence the reduce the GHG emissions created by, businesses in the UK.

1.36 Loan Action Scotland, launched in 1999, provides interest-free loans from £5,000 to £50,000 to Scottish small and medium-sized enterprises (SMEs) for investments that reduce energy consumption. Loans are repayable over a maximum of five years. The aim of Loan Action Scotland is to reduce CO₂ emissions in the non-domestic sector in Scotland by reducing energy consumption and improving the energy efficiency of SMEs. In addition, the scheme contributes to Scottish economic growth by cutting the energy bills of participating SMEs.

1.37 The Government has also worked to encourage and help business to develop products with reduced environmental impacts. The UK has taken the lead in the establishment of an international task force to help deliver commitments made at the G8 Summit in Gleneagles and, through the Marrakesh Process, to promote more international co-operation on sustainable products. The UK is also playing an active part in the implementation of the eco-design of Energy Using Products directive¹⁵.

1.38 The Government has also developed 'Environmental Reporting Guidelines - Key Performance Indicators' (KPIs).¹⁶ The Guidelines aim to help businesses address their most significant environmental impacts, and report on these impacts in a way that meets the needs of a range of stakeholders. They set out 22 environmental KPIs that are significant to UK businesses and describe which KPIs are most significant to which business sectors. The first KPI sets out how companies should record and report on their GHG emissions.

Industrial processes

1.39 The GHG emissions reductions under the KP apply to CO₂, methane, nitrous oxide and three types of fluorinated gas, collectively known as 'F-gases'. In the UK the most commonly used class of F-gas is a group of chemicals known as hydrofluorocarbons (HFCs). The UK Government recognises that the successful phase out of ozone-depleting substances under the Montreal Protocol¹⁷ is being achieved with a range of technologies, and accepts that HFCs are necessary to replace ozone-depleting substances in some applications. In view of this, the Government's position on HFC use is as follows:

- HFCs should only be used where other safe, technically feasible, cost-effective and more environmentally acceptable alternatives do not exist

¹⁵ http://europa.eu.int/comm/enterprise/eco_design/

¹⁶ <http://www.defra.gov.uk/environment/business/envrp/guidelines.htm>

¹⁷ http://hq.unep.org/ozone/Treaties_and_Ratification/2B_montreal_protocol.asp

- HFCs are not sustainable in the long term – the Government believes that continued technological developments will mean the HFCs may eventually be able to be replaced in the applications where they are used
- HFC emission reduction strategies should not undermine commitments to phase-out ozone depleting substances under the Montreal Protocol
- HFC emissions will not be allowed to rise unchecked

1.40 This policy takes account of the fact that HFCs are used in a wide range of applications and that they will continue to have a role in these applications where there are no acceptable alternatives. At the same time, industry and users are being given a clear signal to look closely at all the alternatives and to select those that are more acceptable where they do exist.

1.41 The policy also takes account of energy efficiency. The Government recognises that, over recent years, industry has made significant improvements in the energy efficiency of equipment but it believes there are opportunities for further gains. The scope for improving energy efficiency mainly depends up on the size, design and the maintenance and operation of equipment. The choice of refrigerant can have an impact but it is less significant.

1.42 The other F-gases covered by the KP are perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆). In the UK PFCs are used in the fire fighting and electronics sectors, and SF₆ is used in diverse applications such as the manufacture of training shoes, high-voltage switchgear and as a cover-gas in magnesium casting operations.

1.43 Negotiations on a proposed EC Regulation on certain fluorinated greenhouse gases¹⁸ and a Directive relating to emissions from mobile air conditioning systems were concluded on 31st January 2006. The overall objective of the proposal is to make a significant contribution towards the European Community's Kyoto target by introducing cost effective containment measures for these gases.

1.44 The main provisions in the Regulation cover:

- Containment through responsible handling during use
- Recovery, recycling and destruction
- Training and certification for personnel involved in the containment and recovery of F-gases
- Reporting on quantities produced, supplied, used and emitted
- Labelling of products and equipment
- Certain application specific controls on use
- Certain placing on the market prohibitions

¹⁸ <http://www.dti.gov.uk/sustainability/fgases.htm>

1.45 The proposed EC Directive relating to emissions from air condition systems in cars¹⁹ will place restrictions on the types of mobile air conditioning (MAC) systems which may be fitted to new cars. These measures will minimise fluorinated greenhouse gas emissions from MACs by ensuring only environmentally responsible technologies may be fitted to any vehicle. The Regulation may enter into force in the Spring of 2006 and shall apply from 12 months after the date of entry into force.

1.46 The Government will work with key stakeholders to ensure that the key information relating to these proposals is targeted to those who need it in a timely way and has developed project plans to ensure that the Regulation is properly applied and implemented in the UK. Further information on these proposals can be found on the DEFRA website.²⁰

Transport

1.47 In July 2004, the UK Government set out its transport strategy in "The Future of Transport: a network for 2030" White Paper²¹. This made clear that while good transport is central to a prosperous economy, and facilitates access and mobility, increasing demand for travel needs to be balanced against the twin goals of protecting the environment effectively and improving the quality of life for everyone.

1.48 The Powering Future Vehicles (PFV) Strategy²², published in July 2002, aims to deliver emissions reductions in the transport sector by promoting the uptake of new and cleaner vehicle technologies and fuels. The Government aims that by 2012:

- 10 per cent of all new cars sold will emit 100gCO₂/km or less from the tailpipe
- 600 or more buses coming into operation per year will be low carbon, defined as 30 per cent below current average carbon emissions.

Progress of the PFV Strategy and its targets are reported on annually by the Department for Transport.

1.49 The Renewable Transport Fuels Obligation, which was announced in November 2005, will ensure that by 2010 at least 5 per cent of transport fuel sold in the UK will have to come from renewable sources. We estimate that this will lead to around a one million tonne reduction in carbon per year, roughly equivalent to taking one million cars off the road. In the short term, these fuels are likely to be mainly biodiesel, which is already commercially available in the UK today and can be used as a blend in conventional diesel. This type of fuel can be used in ordinary diesel vehicles without the need for any special modifications. In the longer term, it is intended to mainstream into

¹⁹ http://www.dti.gov.uk/sustainability/f-gas_MAC_Directive_amendments.pdf

²⁰ <http://www.defra.gov.uk/environment/climatechange/internat/fluorinated.htm>

²¹ http://www.dft.gov.uk/stellent/groups/dft_about/documents/divisionhomepage/031259.hcsp

²² http://www.dft.gov.uk/stellent/groups/dft_roads/documents/divisionhomepage/032482.hcsp

the UK fuel market other types of biofuels such as bioethanol and biogas or renewably produced hydrogen.

1.50 The UK government strongly supports the Voluntary Agreements on new car fuel efficiency between the European Commission and the automotive industry, which aim to reduce tailpipe emissions to 140 grams per kilometre by 2008/9. These have already led to major improvements and we are pushing for new and better Agreements as soon as possible.

1.51 In recent years, the Government has reformed its main vehicle taxation policies to reward the purchase of clean, low carbon vehicles. In 2001, the Government reformed the vehicle excise duty (VED) system – the annual road tax. Drivers of fuel-efficient cars now pay less road tax than drivers of other cars. The system is based on the car's CO₂ emission level and fuel type, and has six bands.

1.52 Since April 2002, the company car tax system has been based on vehicles' CO₂ emissions. This allows company car drivers to save money by choosing the most fuel efficient cars.

1.53 Emissions from international aviation and international shipping fall outside the quantified commitments for the first commitment period, although the KP does require Parties to take action to limit or reduce emissions. The UK Air Transport White Paper, published in December 2003²³, forecast that by 2030 CO₂ emissions from international aviation could represent about a quarter of the UK's total contribution to climate change. The UK Government therefore supports proposals to bring aviation into the EU ETS and, working through the International Civil Aviation Organization, continues to press for the development and implementation of emissions trading at the international level. Working within the International Maritime Organization, the UK supported adoption of Interim Guidelines for Voluntary Ship CO₂ Emission Indexing for Use in Trials. Ships under the UK flag are being encouraged to participate in these trials, which will help identify a ship's greenhouse gas index.

Residential

1.54 The UK Government is committed to taking action to cut CO₂ emissions in the household sector, which, through greater efficiency, can bring real social and economic benefits, especially to people on low incomes, in addition to reducing carbon emissions. *Energy Efficiency: The Government Plan for Action*²⁴ was published in April 2004, setting out a broad package of policy measures to deliver significant CO₂ savings per year by 2010. The main policies delivering savings in the baseline projections are described below. The package of measures, including information and awareness-raising campaigns, to improve energy efficiency in UK homes will be described more fully in the UK's revised CCP.

²³ http://www.dft.gov.uk/stellent/groups/dft_aviation/documents/sectionhomepage/dft_aviation_page.hcsp

²⁴ <http://www.defra.gov.uk/environment/energy/review/>

1.55 The Energy Efficiency Commitment (EEC) is the principal policy mechanism driving increases in the energy efficiency of existing homes. Under EEC, electricity and gas suppliers are required to achieve targets for promotion of energy efficiency improvements in the household sector. Suppliers have flexibility in how to attain these improvements. Energy suppliers met their targets in the first phase of EEC which ran from April 2002 to March 2005 and were able to bank additional activity into the second phase of the scheme which is currently running from April 2005 to March 2008. There is a commitment to continue EEC until 2011 to build on the success of the first phases. The second phase is expected to deliver roughly double the level of activity of phase 1 by 2010.

1.56 Building Regulations are devolved. The 2002 and 2005 English and Welsh regulations are steadily driving up the minimum energy standards of new build and refurbished buildings in the UK. The new measures applying from April 2006, including implementation of Articles 3 to 6 of the EU Energy Performance of Buildings Directive, taken together with the 2002 revisions, will improve new build standards by 40 per cent and cut fuel bills by up to 40 per cent for new homes built in the UK from 2006 onwards compared to pre-April 2002 stock. In Northern Ireland these measures will be implemented by amendments to the Northern Ireland Building Regulations. For the last four years, Scotland has had the best standard of thermal insulation in the UK and the new measures that are due to come into effect in spring 2007 will provide a similar level of improvement. Since 2002, the regulations have also covered window and boiler replacement in existing dwellings, with a requirement for condensing boilers in England and Wales since 2005.

1.57 UK Government Programmes that will deliver energy efficiency in housing, and combat fuel poverty, include the 'Decent Homes' standard in England (created in 2000), The Warm Front scheme in England (launched in 2000) and the Community Energy Programme (launched in January 2002).

1.58 The 'Decent Homes' standard requires social housing to meet a prescribed set of criteria by 2010. These include the provision of efficient heating and effective insulation. The standard was extended in 2002 to cover vulnerable households in the private sector, requiring a reduction in the proportion of such households living in "non-decent homes". The DAs are looking at developing similar types of standard, but no details have yet been finalised.

1.59 The Warm Front Scheme provides a range of energy-efficient heating and insulation measures, as well as energy advice, to private homeowners in England. Similar schemes run in Wales (Home Energy Efficiency Scheme and Home Energy Efficiency Scheme Plus) and Scotland (Warm Deal and the Central Heating Programme). Local authorities in Scotland also administer schemes for local authority-owned housing. In Northern Ireland, the Warm Homes and Warm Homes Plus schemes were launched in 2001. Warm Homes Plus offers greater funding for an enhanced package of measures, which can include central heating. The Northern Ireland Housing Executive in partnership with other agencies is piloting a range of renewable technologies

on “hard to heat” homes. The installations include solar PV panels, solar water heating, solar air heating, wind turbine, ground source heat pumps and a prototype high efficiency oil-condensing boiler.

1.60 The Community Energy Programme aim is to help support the refurbishment and development of community heating throughout the UK, primarily in the form of combined heat and power (CHP). Targets set for the programme include the installation of 130MW of ‘good quality’ CHP. The programme is expected to deliver GHG emissions reductions of around 40ktCe per annum.

1.61 Improvements in appliance standards and labeling are to be delivered by the Market Transformation Programme initiative. Assessing the environmental performance of domestic and non-domestic products and systems, the Programme currently publishes analysis of 12 major sectors, covering 27 product types, which account for 96 per cent of domestic and 19 per cent of non-domestic UK energy consumption. The introduction of energy efficiency standards under the Programme, together with efficiency information provided to, including EU energy labels and eco-labels, allow consumers to make decisions based on the energy efficiency of the products they are purchasing.

Public sector

1.62 The UK Government is committed to reducing CO₂ emissions and increasing energy efficiency in its own estate and in the wider public sector, including local authorities, education and the national health service. There are a number of cross-cutting policies that will help to improve energy efficiency standards across the public sector, including implementation of the building regulations and the Energy Performance of Buildings Directive (paragraph 1.56), and the EU ETS and product policy and support from the Carbon Trust. The DAs are taking similar action, sourcing electricity from renewable sources or embedded generation, and specifying high standards of energy efficiency in new or refurbished public buildings. In addition in the DA Scotland has committed £20 million to the Central Energy Efficiency Fund. Launched in 2004 this an interest free, revolving loan fund to assist the public sector make the initial capital investment to achieve energy savings.

Agriculture

1.63 Defra’s Strategy for Sustainable Farming and Food (SSFF), published in 2003, aims to improve environmental performance in agriculture by reducing energy consumption, minimising resource inputs, and promoting use of renewable energy. CCAs have helped to improve energy efficiency in the intensive pig and poultry sectors. An updated Forward Strategy for Scottish Agriculture, to be published in March 2006, and the *Farming for the Future* strategy in Wales, promote similar aims. The horticulture sector, whose 50 per cent reduction in the CCL is due to end on 1 April 2006, are also eligible to enter the CCAs under new criteria subject to state aid approval.

1.64 The Government and DAs sponsor a research on improving practices across arable, livestock and horticultural sectors to help reduce emissions of CO₂, methane and nitrous oxide and enhance carbon uptake by agricultural soils. As part of the SSFF, the Government has a target to halt the decline of soil organic matter caused by agricultural practices in vulnerable soils by 2025. The Common Agricultural Policy reform agreement sets out standards and requirements, known as Cross Compliance, which farmers have to meet as a condition of receiving their Single Farm Payment. These Cross Compliance requirements and measures concern the promotion of a more environment-friendly and sustainable approach to farming and specifically relate to the preservation of soil organic matter. The Government's research programme includes work to assess the impacts of climate change on agriculture and the potential for adaptation responses including flood management strategies.

1.65 The Government and DA's also provides advice to land managers encouraging the optimum use of nutrients to reduce nitrous oxide emissions. The Government is currently examining a suitable policy framework, ranging from voluntary initiatives and economic instruments, to well-designed and targeted regulation, as part of the Catchment Sensitive Farming Programme, aimed at tackling diffuse water pollution from agriculture to help meet objectives of the Water Framework Directive.

1.66 The Strategy for Non-Food Crops²⁵, published jointly by Defra and DTI in November 2004 underpins the Government's commitment to the sustainable development of the non-food crops sector. The strategy is divided into 50 specific actions, and overall delivery of objectives will be based on a combination of incentives, particularly in the energy sector, regulation and other forms of dissemination and promotion.

1.67 In order to highlight the challenges of climate change for land managers and to provide leadership in developing a policy framework that will encourage practical action, in March 2005 the Government set up the Rural Climate Change Forum²⁶. This is a high level stakeholder forum that provides input into policy development and promotes communication with land managers on climate change mitigation and adaptation.

²⁵ <http://www.defra.gov.uk/farm/acu/non-food/non-food.htm>

²⁶ <http://www.defra.gov.uk/environment/climatechange/uk/agriculture/rccf/>

Land use, land use change and forestry

1.68 Grant schemes administered by the Forestry Commission and the Northern Ireland Forest Service provide a range of support grants for people to create and manage woodlands all over the United Kingdom, because of the benefits they bring to society. The Commission and the Service manage about a third of the UK's woodlands on behalf of UK Government and the Devolved Administrations.

1.69 In England Defra's Farm Woodland Premium scheme aims to enhance the environment through the planting of farm woodlands, thereby improving the landscape, providing new habitats and increasing biodiversity. It supports the creation of farm woodland by encouraging farmers to convert productive agricultural land to woodlands through annual payments to compensate for agricultural income forgone. Payments are made for 10 years (for mainly conifer woodlands) or 15 years (for mainly broadleaved woodlands). In Wales woodlands are managed through the Wales Woodland Strategy.

1.70 The proportion of land under woodland in the UK has increased from 5 per cent in 1924 to nearly 12 per cent in 2003. These woodlands contain 150 MtC in tree biomass and are currently removing about 4 MtC annually. Our commitment under the UNFCCC to protect and enhance forest sinks is built into the forestry policies of all 4 administrations via the UK Forestry Standard²⁷ which governs all forestry practice in woodland managed by, or grant-aided by, government, and provides the framework for sustainability.

1.71 UK forest soils contain significantly more carbon than the trees. This can become a carbon source if it is disturbed by forestry operations, a particular concern in the highly organic soils of the Scotland and Wales. Such emissions are minimised by good management practice, set out in the UK Forestry Standard and its supporting Forests and Soil Conservation Guidelines²⁸ which are currently being updated.

1.72 Forestry can contribute to mitigating climate change by providing wood as a renewable energy source and by substituting for materials that have a higher fossil fuel input required for their production. The Biomass Taskforce has reviewed potential in this area and made recommendations²⁹ which are currently under consideration by the Government.

²⁷ [http://www.forestry.gov.uk/pdf/fcfc001.pdf/\\$FILE/fcfc001.pdf](http://www.forestry.gov.uk/pdf/fcfc001.pdf/$FILE/fcfc001.pdf)

²⁸ FC (1998). Forests and soil conservation guidelines. Forestry Commission, Edinburgh.

²⁹ <http://www.defra.gov.uk/farm/acu/energy/biomass-taskforce/>

Waste management

1.73 Waste Strategy 2000³⁰ set out the Government's aim to reduce the amount of waste produced, and recover value from waste in line with the waste hierarchy. This prioritises waste minimisation, followed by reuse and materials recovery through recycling and composting, then energy recovery before disposal to landfill. The Government published a consultation paper as part of its current review of Waste Strategy on 14 February 2006.

1.74 The EU Landfill Directive requires a significant reduction in the mass of biodegradable municipal waste going to landfill, (to 35 per cent of the amount produced in 1995, by 2020). Landfill allowance schemes have been introduced across the UK, with a landfill trading scheme introduced in England. The Government has also committed to increase the standard rate of landfill tax by at least £3 per tonne each year until it reaches a rate of £35 a tonne.

1.75 The treatment requirements of the Waste Electrical and Electronic Equipment Directive³¹ provide for the recovery of F-gases from both the refrigeration circuit and the foam in separately collected waste electrical appliances, and treatment in accordance with EC Regulation 2037/2000 on ozone depleting substances. Since over 75 per cent of direct F-gas emissions occur during the disposal of an appliance, the Directive is likely to have a significant impact. Similarly, the End of Life Vehicles Directive³² requires removal of HFCs (from mobile air-conditioning systems) at final disposal of the vehicle.

³⁰ <http://www.defra.gov.uk/environment/waste/strategy/cm4693/>

³¹ <http://www.defra.gov.uk/environment/waste/topics/electrical/>

³² <http://www.defra.gov.uk/environment/waste/topics/elvehicledir.htm>

Greenhouse Gas Emission Trends and Projections

Introduction

2.1 This chapter includes information on historical trends of the UK's greenhouse gas emissions since 1990 and sets out projections to 2020. These projections are defined as *baseline with measures*. They include the ongoing impact of existing policies and the effect of some of the measures that the Government has introduced since the KP was signed. The projections do not include the impact of the additional policies and measures that are currently subject to review and which will be reported on fully in the UK's revised Climate Change Programme, to be published shortly. Nor do they include the impact of the EU ETS.

Greenhouse gas emission trends 1990 to 2004

2.2 In the base year³³, the UK's emissions of the six greenhouse gases (GHG) covered by the KP were estimated to be 209.5MtCe. Action in the UK is already driving a significant reduction in emissions, with annual emissions falling by 14.6 per cent between the base year and 2004. Carbon dioxide emissions were 161.5 MtC in 1990 and fell by 5.6 per cent between 1990 and 2004. The historical time series of emissions presented in Table 1 is based on the UK GHG inventory,³⁴ due to be submitted to the UNFCCC in April 2006, covering estimates for the period 1990 to 2004.

2.3 The UK's emissions of the basket of six GHG fell by 14.6 per cent between the base year and 2004. This reduction was driven by the restructuring of the energy supply industry; energy intensity improvements (including energy efficiency and structural change) and pollution control measures in the industrial sector and other policies that reduced emissions of non-CO₂ GHG.

2.4 Without energy efficiency, fuel switching and reductions in non-CO₂ greenhouse gas emissions, it is estimated that emissions in 2004 would have been some 15 per cent higher, rather than around 15 per cent lower, than in the base year. The total annual reduction of all GHG since the base year is from these causes is therefore estimated at about 30 per cent of base year emissions, roughly 65 MtC/yr in 2004. Of this it is estimated that :

³³ The UK's base year comprises emissions of CO₂, methane and nitrous oxide in 1990 and emissions of the fluorinated compounds in 1995. In addition, and in accordance with the Annex to the draft decision attached to 19/CP.7, since land use, land-use change and forestry were a source of emissions for the UK in 1990, it also includes deforestation emission estimated to have been 0.1 MtC/yr in 1990.

³⁴ Summary data were published in January 2006 (<http://www.defra.gov.uk/news/2006/060123b.htm>) and UK Greenhouse Gas Inventory 1990 to 2004 will be published in full in April 2006.

- improved energy efficiency represents about 35 per cent of the total reduction
- fall in emission of non-CO₂ greenhouse gases contributed about 30 per cent
- restructuring of the energy supply sector in the mid-1990s, with fuel switching from coal to gas, which led to an increase in the proportion of gas in the energy mix, contributed around 25 per cent
- greater use of other lower carbon fuels, higher nuclear output, more renewable energy and other fuel switching, contributed around 10 per cent

Greenhouse gas emission projections to 2020

2.5 The UK's emissions of the basket of six GHG are expected to be about 19.4 per cent below base year levels in 2010. The tables below show historical greenhouse gas emissions data and baseline with measures projections classified in two different ways – by gas and by sector. The first table includes historical greenhouse gas emissions for the UK's base year, 1990, 1995 and 2000 and baseline 'with measures' projections for 2005, 2010, 2015 and 2020, disaggregated by gas.

2.6 The same historical data and baseline 'with measures' projections³⁵ from Table 1 are set out in Table 2, grouped by sectors consistent with the UNFCCC's reporting guidelines³⁶. Table 2 shows how historical and projected greenhouse gas emissions are distributed across the UK economy. In this classification, the emissions from the energy supply sector which includes emissions from power stations, refineries and other energy supply industries are shown separately.

2.7 The UK reports all land-use, land-use change and forestry (LULUCF) emissions to the UNFCCC in accordance with the Revised 1996 IPCC Guidelines for National Greenhouse gas Inventories, the IPCC 2003 Good Practice Guidance and the UNFCCC requirements contained in FCCC/SBSTA/2004/8. Progress towards the national 20 per cent goal for CO₂ emissions reduction by 2010 is assessed on the basis of all emissions and removals of CO₂ including LULUCF.

2.8 The UK reports progress its commitments under the Kyoto Protocol taking into account only LULUCF emissions and removals associated with mandatory activities under Article 3.3 (Afforestation, Reforestation and Deforestation occurring since 1990), and Forest Management which is an

³⁵ CO₂ energy projections are based on the inventory published in 2005 which agrees with the inventory published in 2006 to about 0.01% for total CO₂ emissions on average over the period 1990 to 2003, with individual years differing by up to about 0.4%. The energy projections will be updated to the inventory published in 2006 following the current consultation. Other projections have already been updated for consistency with the inventory published in January 2006.

³⁶ Guidelines for the preparation of national communications by Parties included in Annex I to the Convention FCCC/CP/1999/7 (UNFCCC, 2000)

elective activity under Article 3.4. The UK has decided not to account for the other options under Article 3.4 (Cropland or Grazing Land Management and Revegetation) because of the additional uncertainties associated with the detailed monitoring of these activities required under the Protocol.

Table 1 : Baseline with measures projections of UK GHG emissions, disaggregated by gas, MtC

Gas	Base year	1990	1995	2000	2005	2010	2015	2020
Total CO₂ emissions by sources minus removals by sinks	161.5	161.5	149.9	149.0	148.3	144.3	149.0	146.6
Methane	25.1	25.1	21.8	16.3	12.3	10.8	10.0	9.5
Nitrous oxide	18.6	18.6	15.5	12.1	11.3	11.0	11.0	11.0
HFCs	4.2	3.1	4.2	2.5	3.1	2.7	2.6	2.5
PFCs	0.1	0.4	0.1	0.1	0.1	0.1	0.1	0.1
SF₆	0.3	0.3	0.3	0.5	0.5	0.4	0.3	0.3
Total GHG emissions by sources minus removals by sinks	209.9	209.0	191.9	180.5	175.5	169.2	173.0	170.0
Total GHG emissions by sources minus removals by sinks including only Art 3.3 activities and forest management under Art 3.4 LULUCF³⁷	209.5	208.2	191.6	180.3	175.5	168.9	172.1	168.5
Change from base year levels (for row above)			-8.5%	-13.9%	-16.2%	-19.4%	-17.9%	-19.6%

Percentage changes and emission estimates may differ slightly due to rounding

³⁷ Totals include the forest management cap of 0.37 MtC agreed for the UK under Art 3.4 of the Kyoto Protocol and emissions from UK overseas territories to which the UK's instruments of ratification for the UNFCCC and the Kyoto Protocol are being extended, as well as the Crown Dependencies that are already included in the UK's inventory.

2.9 The calculation of the UK's base year for reporting under the KP includes a small allowance representing emissions from Deforestation in 1990. The UK's 'D' estimate included in the base year in Table 1 is 0.1 MtC. This allowance is calculated in accordance with rules associated with the second sentence of Article 3.7 of the KP and forms part of a Party's assessment of progress towards meeting its Kyoto target.

Table 2 : Baseline with measures projections of UK GHG emissions by source, disaggregated by sector, MtC

Sector	Base year	1990	1995	2000	2005	2010	2015	2020
Energy supply	74.4	74.4	63.1	58.2	62.0	56.2	56.0	51.1
Business	30.7	30.4	29.4	30.3	23.0	24.3	26.2	27.0
Industrial processes	16.4	15.9	13.2	6.7	9.4	9.6	9.7	9.7
Transport	34.1	34.1	34.3	36.0	37.3	38.6	40.1	40.7
Residential	22.3	22.2	22.5	24.6	23.7	21.8	22.0	22.2
Public	3.7	3.7	3.6	3.2	3.0	3.0	3.1	3.2
Agriculture	16.2	16.2	15.6	14.8	13.2	12.0	11.9	11.9
LULUCF (net)	0.8	0.8	0.3	-0.1	-0.6	-0.5	0.1	0.7
Waste management	11.3	11.3	10.0	6.8	4.5	4.2	3.9	3.6
Total GHG emissions by sources minus removals by sinks	209.9	209.0	191.9	180.5	175.5	169.2	173.0	170.0

Percentage changes and emission estimates may differ slightly due to rounding

Analysis of the Contribution of Domestic Measures and Use of the Kyoto Mechanisms

Introduction

3.1 The UK established its baseline for assessing progress against its Kyoto target in the report determining the UK's assigned amount that was sent to the European Commission in January 2006³⁸. The report also includes decisions on reporting and accounting activities in LULUCF for the first commitment period. Article 3.3 of the KP requires that afforestation and reforestation minus deforestation since 1990 are accounted for. The UK also intends using forest management to help meet its commitment, which is an option under KP Art 3.4. The UK has decided not to use cropland or grazing land management or revegetation, which are other options under the KP rules for LULUCF because of the additional uncertainties associated with emissions from soils and the detailed monitoring required under the KP. All anthropogenic CO₂ emissions from LULUCF will be counted towards the domestic 20 per cent reduction goal.

3.2 The baseline with measures projections set out in Table 1 of this Report indicate that the UK's emissions will be about 19.4 per cent below the level in the base year by 2010. The UK is therefore well on track to meet its 12.5 per cent emissions reduction commitment under the KP on the basis of domestic measures alone.

3.3 The UK, in common with the EU as a whole, recognises that the Kyoto Mechanisms play an essential role in meeting commitments in the first and subsequent commitment periods under the Protocol and has put in place the necessary institutions and accounting framework to facilitate their use including development of a registry, which has been licensed to date for use in sixteen countries as well as the UK.

3.4 The UK has implemented Kyoto reporting, accounting and compliance requirements in respect of both emissions and assigned amount, as laid down in EU legislation: the EU Monitoring Mechanism (EUMM) Decision³⁹, and the EU Registry Regulation⁴⁰. The UK's report determining assigned amount represents fulfilment of the UK's obligation under Article 23 of the implementing provisions⁴¹ to the EUMM Decision and was submitted in accordance with the guidelines set out under the KP.

³⁸ <http://www.defra.gov.uk/environment/climatechange/pubs/index.htm>

³⁹ Council Decision 280/2004/EC of the European Parliament and of the Council of 11 February 2004

⁴⁰ Commission Regulation (EC) 2216/2004 of 21 December 2004

⁴¹ Commission Decision of 10 February 2005 laying down rules implementing Decision 280/2004/EC (2005/166/EC)

Use of the Kyoto mechanisms

3.5 The UK has decided not to adopt a domestic Joint Implementation (JI) programme but should this be considered in future, its role would need assessing in the context of wider policies and measures, such as the ongoing EU and UK Emission Trading Schemes. In particular issues of double-counting, emission reductions, the application of other financial and incentive instruments, and the impact of crediting on the UK's targets, will need to be taken into account.

3.6 All Clean Development Mechanism (CDM) projects must be registered with the CDM Executive Board which oversees the operation of the mechanism. Defra, as the UK's Designated National Authority (DNA), has approved participation of a number of UK companies in a range of projects and receives a steady stream of requests for letters of approval. Afforestation or reforestation projects under the CDM contribute to sustainable development and the UK will consider participating in projects of this type.

Emissions Trading

3.7 A thriving and competitive carbon market is needed to give industry a clear incentive to reduce carbon emissions at least possible cost. The UK has therefore implemented the EU ETS, as a precursor to broader international emissions trading, using experience it has gained from the UK ETS. The EU ETS is the world's largest carbon trading scheme and is recognised internationally as one of the most cost-effective and efficient ways of reducing CO₂ emissions. It allows operators to balance their environmental commitments with their need to be competitive in a global market. EU Member States have now approved plans for how to make emissions reductions and approximately 12,000 EU operators, covering almost half of Europe's CO₂ emissions, are able to trade allowances. The UK NAP for Phase I is set to help reduce emissions by between 45 and 65 million tonnes CO₂ below projected emissions for the UK traded sector. The second phase NAP (2008 – 2012) is also in development; a final NAP, with installation allocations, is due to be submitted to the European Commission by 31 December 2006, while a draft policy NAP will be published in the Spring.

3.8 The EU has implemented the Linking Directive, so that credits issued from project activities under the Kyoto project mechanisms can be used for compliance in the EU ETS or traded.

3.9 To facilitate a prompt start to the first phase of the EU ETS (2005-2007), the Directive does not set any limit for use of project credits during that period. However, there is a requirement to set an upper limit on use of project credits for the second phase (2008-2012), in order to enforce the principle that use of the mechanisms should be supplemental to domestic effort to reduce emissions. This limit will be set out in the UK's NAP for the EU ETS.

The Climate Change Projects Office

3.10 In May 2001 the UK launched the Climate Change Projects Office⁴² (CCPO), jointly established by Defra and the DTI, to facilitate and promote the UK's participation in Joint Implementation and Clean Development Mechanism projects. It also aims to enhance the UK's ability to capitalise on other significant anticipated commercial climate change opportunities. The CCPO will develop and provide general advice, and signpost project developers to other sources of more specific assistance where appropriate. Over time, it is anticipated that the CCPO will act as project broker between Governments internationally.

3.11 It has been estimated that there is around €1bn available in private finance funds for the project mechanisms in London, and the UK is likely to be a substantial centre for carbon trading. This includes UK private investors and also bodies like the European Carbon Fund who are managing their CDM investment operations in London.

National authority for the Clean Development Mechanisms

3.12 Defra was appointed as the UK's DNA in July 2004 to approve UK companies' participation in CDM projects. The DNA has approved participation of a number of UK companies in a range of projects and receives a steady stream of requests for letters of approval. Defra's guidance on approval of participation in CDM projects can be found online⁴³.

Focal point for Joint Implementation

3.13 Defra was appointed as the UK's Designated Focal Point (DFP) in July 2004 to approve UK companies' participation in JI projects. The DFP can approve UK entities participation in JI projects abroad. The UK has decided not to adopt a JI programme but should this be considered in future, its role would need assessing in the context of wider policies and measures, such as the ongoing EU and UK Emission Trading Schemes. The UK's guidance on approving projects is online.⁴³

National system to account for emissions

3.14 The UK has implemented KP rules for setting up its national system for greenhouse gas emissions estimation, reporting and archiving. Defra has been appointed as the Single National Entity (SNE) with responsibility for the overall management and strategic development of the UK greenhouse gas inventory. Defra will set up an inter-departmental steering committee to consider and approve the national inventory prior to submission to the EU and

⁴² <http://www.dti.gov.uk/ccpo/>

⁴³ <http://www.defra.gov.uk/environment/climatechange/trading/eu/kyoto/index.htm>

the United Nations (UN) each year. Reporting to the committee will be a series of expert panels tasked with reviewing sectoral activity data, emission factors, methodological choices and uncertainty estimates to ensure the UK inventory fulfils the requirements of the IPCC 1996 guidelines and Good Practice Guidance⁴⁴. New legal powers⁴⁵ to ensure the Government is supplied with information it needs to compile the national inventory were introduced in November 2005 simultaneously with regulations transposing the EU Linking Directive into UK law.

National registry to account for assigned amount

3.15 The UK has implemented the procedures for accounting of assigned amounts required by the EUMM Decision and the EU Registry Regulation.

3.16 Following its success in creating a registry for the UK ETS, Defra has cooperated with interested EU Member States to develop EU/UN compliant registry software in order to facilitate the start of the EU ETS, a project known as the Greenhouse Gas Registry for Emissions Trading Arrangements⁴⁶ (GRETA). The UK/GRETA Registry software has so far been licensed to 16 countries (in addition to the UK)⁴⁷, with a number of other countries also showing interest. Defra and its licensees continue to share experience and expertise, and discuss registry implementation issues.

Compliance measures

3.17 Both the EUMM Decision and the EU Registry Regulation incorporate two early compliance measures:

- **Annual Retirement of Assigned Amount to Meet Emissions:** Article 7.2 of the EUMM Decision requires annual retirement of assigned amount equivalent to the UK's net emissions for that year (as reviewed by UNFCCC experts) for each year of the first commitment period.
- **Annual Retirement of Assigned Amount to cover EU ETS Emissions:** Article 59 (b) of the EU Registry Regulation provides for retirement of assigned amount equivalent to the number of allowances surrendered to cover emissions from EU ETS.

⁴⁴ <http://www.ipcc-nggip.iges.or.jp/public/public.htm>

⁴⁵ Greenhouse Gas Emissions Trading Scheme (Amendment) and National Emissions Inventory Regulations 2005, available at: <http://www.opsi.gov.uk/si/si2005/20052903.htm>

⁴⁶ <http://www.defra.gov.uk/environment/climatechange/trading/eu/registry/pdf/registryoverview-worldpower.pdf>

⁴⁷ Norway, Sweden, Denmark, Ireland, Italy, Slovenia, Lithuania, Finland, Estonia, the Netherlands, Hungary, Latvia, Cyprus, Bulgaria and Romania.

Carbon sinks

3.18 In addition to the mandatory accounting under Article 3.3 of the KP of Afforestation, Reforestation and Deforestation since 1990, the UK has decided also to account for Article 3.4 Forest Management in meeting its emissions reduction commitment. The UK has made the relevant choices for minimum values of tree height, canopy cover and forest area, and has also selected a minimum width for forest accounting under these Articles, consistent with the requirements of IPCC Good Practice Guidance. These definitions⁴⁸ have been set out in the UK's assigned amount report³⁸, as submitted to the European Commission in January 2006, and are consistent with information provided historically by the UK to the Food and Agriculture Organization.

3.19 The UK has chosen not to account for cropland management, grazing land management or revegetation because of the additional uncertainties associated with emissions from soils and the detailed monitoring required under the KP. However the inventory prepared for reporting emissions and removals under the UNFCCC contains estimates for all anthropogenic emissions and removals associated with LULUCF which will be used to assess progress against the domestic 20 per cent CO₂ reduction goal.

Evaluation of projected progress in emissions reduction by measure

Analysis of existing policies and measures introduced under the UK Climate Change Programme in 2001

3.20 An evaluation of the policies and measures included in the baseline projections of the UK CCP was carried out during 2005 as part of the on-going review of the UK's climate change programme. Results from this evaluation are presented in the table below, and are compared with previous estimates of carbon savings from baseline policies and measures published in the Consultation Paper for the review of the CCP⁴⁹ in December 2004.

⁴⁸ The UK has chosen a definition of forest comprising a minimum area of 0.1 hectares, a minimum width of 20 metres, tree crown cover of at least 20 per cent, or the potential to achieve it, and a minimum height of 2 metres, or the potential to achieve it.

⁴⁹ <http://www.defra.gov.uk/environment/climatechange/uk/ukccp/review.htm>

Table 3 : Policies and Measures included in baseline ‘with measures’ CO₂ projections, MtC

Total carbon savings in 2010 (MtC)	2004 evaluation⁵⁰	Latest evaluation
Energy Supply Renewables Obligation	2.5	2.5
Households Policies include EEC, Warm Front, Building Regulations (2002 and 2005) in England and Wales, Appliance standards and labeling and Community Energy	3.01	3.6 ⁵¹
Business Policies include Climate Change Agreements, Climate Change Levy package, UK ETS, Carbon Trust programmes and Building Regulations in England and Wales (2002 and 2005)	5.19	4.7
Public	0.50	0.2
Transport Policies include Voluntary Agreements, 10 year plan and sustainable distribution but excludes fuel duty escalator	4.42	3.2
Land Use Change and Forestry From afforestation since 1990 under grant schemes	0.65	0.7
Scottish Executive Policies include Scottish building regulations, new central estate and National Health Service in Scotland targets	0.09	Not evaluated
Waste Policies include EU Landfill Directive, Landfill Tax	Not evaluated	0.2
Total savings	16.4	15.1

3.21 Savings in non-CO₂ gas emissions, achieved through the UK ETS, F-gas, IPPC and voluntary agreement are projected to be 1.9MtCe per annum in 2010. The savings under the CCP represent a significant part of the UK’s actions to meet the Kyoto commitment.

⁵⁰ Published in the Consultation Paper “Review of UK Climate Change Programme” in 2004

⁵¹ This figure applies to emissions savings achieved by installations *completed* in 2010. For emissions *within* the calendar year 2010, the ‘Households’ savings figure is slightly lower – 3.3MtC – since installations completed after the beginning of the year do not deliver a full year’s savings until the following year. See www.defra.gov.uk/environment/energy/review/pdf/savingsinceapril2004.pdf for more details

3.22 There has been a significant change in the way that electricity is generated in the UK since 1990, and this has been an important contributor to reductions in the UK's greenhouse gas emissions. There has been a shift away from more carbon intensive fuels such as coal and oil towards lower or zero carbon emission fuels such as gas, nuclear and renewables.

3.23 Emissions from power stations have steadily decreased since 1990. This is against a general rise in the demand for electricity over the same period. Emissions are expected to decline further, falling to around 41 MtC by 2010, a reduction of 26 per cent below 1990 levels, as older coal plant is retired and the proportion of electricity supplied from renewables increases. Although high gas prices have made coal stations more competitive in the past few years, pushing back up emissions, new gas-fired power stations are expected to replace some of the existing coal capacity as it reaches the end of its economic life or its closure is accelerated by other environmental legislation, such as the EU Large Combustion Plants Directive.

3.24 The main sources of methane emissions in the UK are landfill sites, agriculture, coal mining, gas distribution, and oil and gas production. The UK Government and DA's have introduced a number of policies and measures to reduce methane emissions, resulting in a fall in annual UK methane emissions every year since 1990. By 2004 emissions had dropped to about half of 1990 levels and in 2010 are projected to have fallen to about 43 per cent of the 1990 level.

3.25 Landfill site operators in the UK that continue to accept waste must fulfil the requirements of the Landfill Directive including taking appropriate measures to collect, treat and use landfill gas to produce useful energy or, where that is not possible, to flare it. Other government measures to reduce the levels of biodegradable waste being sent to landfill include the landfill tax escalator, the Landfill Allowance Trading Scheme in England (designed to meet the Landfill Directive targets), and public awareness campaigns. Together these measures have resulted in a decrease of about 63 per cent in landfill methane emissions between 1990 and 2004 and by 2010 the fall will be about 70 per cent.

3.26 The nature of emissions from agriculture make them a more difficult to target for reduction than in other sectors. Nonetheless, improvement in animal diet and productivity has produced an 11 per cent decrease in methane emissions from animals since 1990, and further reductions are expected reaching 24 per cent by 2010.

3.27 UK Coal signed up to the UK ETS in 2002, with the target of reducing methane emissions from their installations by 400,000 by 2006. Furthermore, methane extracted from abandoned coal mines and used as fuel has been exempt from the climate change levy since 2003. This exemption encourages the owners of mining facilities and decommissioned mines to invest in systems that capture methane that would otherwise be released into the atmosphere. In addition, the coal authority and the Department of Trade and Industry are developing a scheme further to encourage the mitigation of methane from abandoned mines. Methane emissions from coal mining (including closed mines) fell by some 73 per cent between 1990 and 2004 and are projected to have fallen by 80 per cent by 2010.

3.28 Fugitive emissions from natural gas distribution in the UK dropped by about 39 per cent between 1990 and 2004, and methane emissions from offshore production of oil and gas fell by 53 per cent between 1990 and 2004 in line with trends in numbers of installations and production levels. National Grid Gas plc, which owns and maintains the UK gas distribution network, is continuing to make improvements to the UK gas network. The planned replacement of 91,000km iron gas mains with polyethylene pipes will lead to a further reduction in methane emissions from gas transmission. Overall, emissions of methane from oil and gas production and distribution are projected to be 50 per cent below base year levels in 2010.

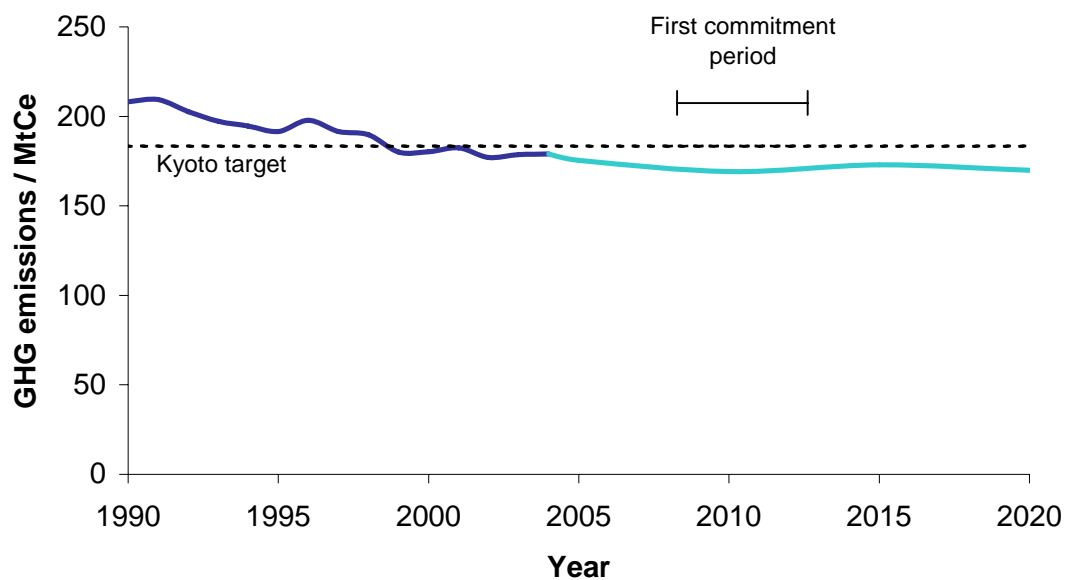
3.29 The main sources of nitrous oxide in the UK are agriculture and certain industrial processes. Nitrous oxide emissions from the agriculture sector have fallen by about 20 per cent since 1990, mainly because of reduced fertiliser use, while emissions from industrial processes fell by over 85 per cent to 2004. Emissions from the manufacture of adipic acid (used in the production of nylon) accounted for emissions of 6.8MtCe in 1990. DuPont (UK) Ltd, which operates the only adipic acid plant in the UK, commissioned a common off gas abatement unit in 1998. This reduced nitrous oxide emissions from this plant by 92 per cent in its first year of operation.

Achievement of the UK Kyoto Protocol target

3.30 Figure 1 shows emissions of the basket of all six GHG included in the KP target, over the period 1990 to 2012.

3.31 The UK's greenhouse gas emissions are estimated to have been 14.6 per cent below base year levels in 2004, and are projected to be about 19.4 per cent below base year levels in 2010. The UK is therefore well on track to meeting its Kyoto emission reduction commitment on the basis of existing measures only.

Figure 1 : UK progress towards meeting Kyoto Commitment



Progress on other commitments

Introduction

4.1 The KP is more than just an emissions reduction treaty. The UK is fully aware of our other commitments under the Protocol and the UNFCCC, and actively strives to meet them. The following sections describe how the UK is meeting its commitments under Articles 10 and 11 of the KP, which refer specifically to Article 4 of the UNFCCC. In particular, we outline steps the UK is taking to adapt to climate change, steps we have made to aid other countries meet their UNFCCC commitments, steps to minimise the any adverse effects of response measures, and describe UK research and observations programs, at a national, and international level.

4.2 Additional information on these activities will be made available in the UK's Fourth National Communication on Climate Change.

International action on climate change negotiations

4.3 In 2005 the UK placed climate change at the top of the international agenda through its dual presidencies of the G8 leading industrial nations and, in the second half of the year, the EU. This encouraged unprecedented debate on climate change by scientists, parliamentarians, businesses, non-governmental organisations and other areas of civil society.

4.4 At the Gleneagles summit in July 2005, G8 leaders agreed that climate change is a serious and long-term challenge, that it is caused by human activity and that urgent action will be taken to make reductions in greenhouse gas emissions.⁵² The summit also agreed a package of actions to combat climate change, including improvements in energy efficiency, cleaner vehicles, reducing emissions from aviation, work on developing cleaner fuels, renewable energy, promoting research & development and the financing of future projects. G8 leaders together with the leaders of other interested countries with significant energy needs launched a new dialogue on Climate Change, Clean Energy and Sustainable Development, which will report back to Japan's Presidency of the G8 in 2008. The Gleneagles communiqué sets out the objectives of the Dialogue as follows:

- addressing the strategic challenge of transforming our energy systems to create a secure and sustainable energy future
- monitoring implementation of the Gleneagles plan of action and exploring how to build on this progress
- sharing best practice between participating governments

⁵² http://www.fco.gov.uk/Files/kfile/PostG8_Gleneagles_CCChapeau.pdf

4.5 The Dialogue complements the international negotiations under the UNFCCC and the KP, by providing an informal space to discuss practical measures to reduce GHG emissions; to share experiences with making the transition towards a low carbon future; and to foster international cooperation on the technologies that will be needed to deliver the necessary reductions. In addition to the country partners, the International Energy Agency (IEA) and the World Bank are actively involved through their work on alternative energy scenarios and alternative finance for climate friendly technologies and adaptation measures. The World Bank and regional development banks are also involved through their work to develop an Investment Framework aimed at accelerating investment in clean energy and energy efficiency. The UK co-hosted an event to launch the Framework at the World Bank's 2005 Annual Meetings, and is providing technical assistance to the regional development banks to help them deliver their contributions to the Framework. The World Bank will be reporting back on progress made at its Spring Meetings in April 2006.

4.6 In 2005, the UK hosted the Energy Research and Innovation Workshop to discuss ways to improve collaboration on research and development into clean energy with a view to accelerating technological development and deployment. Delegates from 12 countries considered a number of areas including enhancing research links in solar energy, carbon capture and storage, bioenergy, the built environment and transport.

4.7 The EU's 2005 summit with China resulted in the successful agreement of the EU-China Partnership on climate change⁵³ – which included the UK-led near-Zero Emissions Coal project⁵⁴ to develop and demonstrate advanced, near-zero emissions coal technology based on carbon capture and storage by 2020. The EU-India summit⁵⁵ produced the EU-India Initiative on clean development and climate change, and the EU-Russia Summit considered what experiences the UK and Russia can share with regard to the implementation of the KP.

4.8 At the UNFCCC Conference of the Parties and Meeting of the Parties in Montreal (COP11/MOP1) in December 2005, the UK played a pivotal role in ensuring the global community, including the United States, India and China, agreed to work together through the United Nations process to examine the way forward. Other notable successes achieved at COP11/MOP1 were:

- adopting the Marrakesh Accords – the rule book for the KP
- achieving a functioning Kyoto compliance mechanism
- adopting operational guidance for the Least Developed Countries Fund
- developing further the Five Year Work Programme on adaptation
- launching processes to analyse strategic long term cooperation under the UNFCCC and for fixing targets beyond 2012 for Annex I Parties under the KP

⁵³ <http://europa.eu.int/rapid/pressReleasesAction.do?reference=MEMO/05/298>

⁵⁴ <http://www.defra.gov.uk/news/2005/051101b.htm>

⁵⁵ http://europa.eu.int/comm/external_relations/india/sum09_05/index.htm

4.9 While international aviation and international maritime transport emissions do not fall under the remit of the KP, the UK has been working hard to establish measures by which the climate change impacts of these forms of transport are tackled.

Improvement of the UK national greenhouse gas inventory

4.10 The UK's greenhouse gas inventory is submitted annually to the EU and the UNFCCC and reviewed by teams of experts appointed by the UNFCCC secretariat. The UK undertakes research to ensure that the inventory is complete, has up-to-date emission factors and activity data, and is prepared in accordance with IPCC Good Practice Guidance⁴⁴. This research includes studies on inverse modelling for the purpose of inventory verification. The developments are set out in the UK's National Inventory Report⁵⁶ (NIR) which is published annually. The UK's NIR covering the period 1990 to 2004, which contains the latest available GHG emissions data for the UK, will be published in April 2006.

Impacts of response measures

4.11 The UK has undertaken research to determine the extent of impacts of response measures. The UK implements policies in a way that takes into account the impacts of response measures on all developing countries, including through the implementation of the world's first major international carbon trading scheme, the use of the flexible mechanisms and continued liberalisation of its energy markets. The UK has also ensured that response measures are as diverse as possible, and include:

- measures to reduce emissions of GHG other than CO₂ from fossil fuels
- emissions trading
- measures to enhance carbon sinks
- action to encourage carbon capture and storage

Measures for adapting to climate change

Adaptation : The Challenge

4.12 Some degree of climate change resulting from past and present emissions of greenhouse gases is already inevitable. In order to cope with the impacts of climate change we therefore need to adapt – this action is complementary to our efforts to reduce emissions to limit the longer term scale of climate change.

⁵⁶ <http://www.naei.org.uk>

4.13 Climate change scenarios for the UK, published by Defra in April 2002, show that:

- Annual temperatures averaged across the UK may rise by between 2 and 3.5°C by the 2080s, depending on the future scale of global emissions of greenhouse gases. Warming will generally be greatest in parts of the southeast, where temperatures may rise by up to 5°C in summer by the 2080s. High summer temperatures will become more frequent and cold winters will become increasingly rare
- Winters will become wetter and summers will become drier across all of the UK. The largest relative changes will be in the south and east where summer precipitation may decline by up to 50 per cent by the 2080s. Heavy winter precipitation will become more frequent, but the amount of snow may decline by 60 per cent or more in parts of Scotland and up to 90 per cent elsewhere by the 2080s
- Sea-levels are expected to rise around the UK, in line with global changes but with local variations due to land movement. In southeast England sea-levels could rise by between 26 and 86 cm by the 2080s. This means that, at some east coast locations, extreme sea-levels that currently have a 2 per cent chance of occurring in any given year, could occur between 10 and 20 times more frequently by the 2080s. No contribution from the melting of Greenland or Antarctic ice is assumed on this timescale
- Storminess may increase during the winter

4.14 These changes in climate are likely to have far-reaching effects on our environment, economy and society and in some cases these are already being felt.

UK adaptation policy framework

4.15 The Government is developing a climate change Adaptation Policy Framework (APF). A consultation exercise⁵⁷ began in November 2005 and ran to the end of January 2006. This framework aims to provide a consistent approach to building adaptation into policies, a coherent way to identify cross-cutting risks and opportunities and is intended to assist in prioritisation of action across Government.

4.16 The APF will initially take place in three stages. This first stage aims to capture the national picture of climate change adaptation as it currently stands across the UK. It will focus on priority sectors where climate change will have a significant impact, or where considerable co-ordination between Departments or with other bodies will be needed to make progress on adaptation. During the second stage there will be an analysis of activities taking place and the reasons why some sectors are adapting more successfully than others. The third stage of the APF will consider why adaptation is not occurring in certain areas and what incentives and assistance are required in order to ensure that it is considered in future planning and development.

⁵⁷ <http://www.defra.gov.uk/corporate/consult/cc-nap-framework/>

UK Climate Impacts Programme (UKCIP)

4.17 UK Government set up the UK Climate Impacts Programme (UKCIP) in 1997 to provide information to help decision-makers plan their response to the impacts of climate change. From an initial focus on impacts research studies, there has been a progression towards developing stakeholder partnerships that share information, identify research needs and pursue work on climate impacts and adaptation in their regions and sectors.

4.18 The UKCIP office team helps others to commission and fund research and actively supports all studies and partnerships. The UKCIP has provided numerous tools to equip stakeholders to develop their own adaptation responses. All the tools and reports are available from the UKCIP website⁵⁸.

4.19 In 2005, Defra and the DAs established a new five-year contract for the UKCIP. The new programme of work retains two main aims and five objectives. The aims are to *improve knowledge and understanding of the impacts of climate change among stakeholders*, and to help stakeholders to be *better equipped to undertake adaptation to climate change*. The objectives are to improve knowledge and understanding of the impacts of climate change at a regional and national level among stakeholders, through the *co-ordination, integration and communication of research*; to provide stakeholders with *tools and methods and training and guidance*, to promote a consistent *programme of work on impacts and adaptation across the UK*, working through partnerships with stakeholders and other researchers, to *provide a focal point for information on climate change impacts in the UK*, through the UKCIP Programme Office and strategic communications activities and to learn from the *research and experience of other countries*, through appropriate links.

4.20 An integrated summary of findings from studies carried out for the UKCIP was published in 2005⁵⁹.

Other research into adaptation

4.21 As part of the UK Presidency of the EU, the UK Government hosted a meeting of the European Platform for Biodiversity Research Strategy to review the status of knowledge on impacts of climate change and to identify knowledge gaps which are hindering implementation of adaptation strategies. EU Agriculture and Environment Ministers also met to discuss climate change and agriculture. The UK also hosted a meeting on the future of climate change adaptation in Europe.

⁵⁸ <http://www.ukcip.org.uk>

⁵⁹ A comprehensive synthesis of the work achieved under the UK Climate Impacts Programme is provided in *Measuring Progress: Preparing for climate change through the UK Climate Impacts Programme*, UKCIP, 2005, available from <http://www.ukcip.org.uk>

4.22 The Government has several research programmes ongoing to continue to build the evidence base on the impacts of climate change and adaptation.

- A collaborative research programme on flood and coastal erosion risk management
- A long-standing programme of research of some £0.33m per annum on climate change impacts and adaptation in agriculture
- A research programme on biodiversity and climate change
- A review of climate change impacts on migratory species was published recently⁶⁰

4.23 Other future projects included the formal establishment of a Marine Climate Change Impacts Partnership for the UK, the generation of an updated set of UK climate change scenarios (planned for 2008), further work on flooding and coastal defence and an updated review of climate change impacts in the UK through the Climate Change Impacts Review Group.

Co-operation in scientific and technical research

Scientific research

4.24 The UK funds world-leading research into climate change detection and attribution and climate prediction at the Hadley Centre of the UK Met Office⁶¹. Much of this Hadley Centre research involves international collaboration. A large proportion of the Hadley Centre's published research is co-authored with scientists at other institutions, many of them overseas.

4.25 The Hadley Centre has undertaken internationally renowned research, which is expected to be reviewed and assessed in the IPCC Fourth Assessment Report (AR4). Also, several Hadley Centre Scientists are authors working on the AR4 and the Hadley centre hosts the Technical Support Unit for Working Group II of the IPCC⁶².

4.26 The Hadley Centre has the only non-U.S. authors within the U.S. Climate Change Science Program. The first report of the Program concentrated on upper air and surface temperatures⁶³.

4.27 The UK government funds Hadley Centre international collaboration for the International Geosphere-Biosphere Programme⁶⁴. The Programme studies the interactions between biological, chemical and physical processes and human systems and collaborates with other programmes to develop and impart the understanding necessary to respond to global change.

⁶⁰ <http://www.defra.gov.uk/wildlife-countryside/resprog/findings/climatechange-migratory>

⁶¹ <http://www.metoffice.com>

⁶² <http://www.ipcc.ch>

⁶³ <http://www.climatescience.gov>

⁶⁴ <http://www.igbp.kva.se>

4.28 The UK also contributes to the Ensemble-based prediction of climate changes and their impacts (ENSEMBLES) program. ENSEMBLES⁶⁵ is half EU-funded and half funded through Hadley Centre funding streams. The research is coordinated by the Hadley Centre and its aim is to quantify the uncertainty in long-term predictions of climate change. It also considers climate change impacts on time frames ranging from seasonal to decadal and longer at global, regional, and local spatial scales. Other EU research projects in which the Hadley Centre participates include CarboEurope⁶⁶, SCOUT-3⁶⁷, DYNAMITE⁶⁸ and NitroEurope.⁶⁹

4.29 In February 2005, the UK hosted the International Symposium on Stabilization of Greenhouse Gas Concentrations - *Avoiding Dangerous Climate Change*. The conference provided new scientific evidence on the impacts of climate change on human and natural systems from work sponsored by the UK Government at the Hadley Centre. The message of the conference was that the impacts of climate change looks set to be worse than previously expected, that we need to act urgently to avoid the considerable risks by these impacts and that the long term costs of mitigation are less than previously stated.

4.30 The scientific findings presented at the conference were published in January 2006 in a book on *Avoiding Dangerous Climate Change*. The book presents a global picture of the impacts of climate change on natural and human systems, reflects on emission pathways that can lead to the stabilisation of greenhouse gas concentrations in the atmosphere and identifies technological options that can be deployed to achieve significant emissions reductions. The book underlines the need for urgent action. It provides essential underlying science for the forthcoming international debate and will contribute to the 4AR, which is due to be published in 2007.

4.31 The Science Budget administered by the DTI provides funding to UK Research Councils to support basic, strategic and applied research and related postgraduate training. Research Council expenditure on climate change and energy related research in 2004-5 accounted for over £130 million. Included within this budget is funding for a variety of research work addressing aspects of adaptation to climate change and which has the potential to impact a broad range of sectors. This funding includes support for the Tyndall Centre for Climate Change Research; for research programmes on flood risk and management, for research to support the adaptation of UK buildings and infrastructure (built environment, transport and utilities) to changing climate patterns and aspects of research in energy, crops, soils, biodiversity and water management; as well as scientific expertise contributed to the Natural Hazard Working Group.

⁶⁵ <http://www.ensembles-eu.org>

⁶⁶ <http://www.carboeurope.org>

⁶⁷ http://www.ozone-sec.ch.cam.ac.uk/scout_o3/index.html

⁶⁸ <http://dynamite.nersc.no>

⁶⁹ <http://www.neu.ceh.ac.uk/about.html>

Systematic observations

4.32 Systematic observations in the UK and its overseas territories are made by a number of national agencies and organizations. For making and collecting meteorological and atmospheric observations the lead agency is the UK Met Office, but observations are also made by the Natural Environment Research Council's (NERC) Centres and Surveys among others. A collection of oceanographic (and marine) observations is widely distributed throughout the UK with many government departments and laboratories, universities and commercial companies involved. Terrestrial observations are made or coordinated by NERC, the Forestry Commission and others. The UK also contributes to space-based observations through the European Space Agency and the European Organization for the Exploitation of Meteorological Satellites.

Participation in intergovernmental observation

4.33 The UN Global Climate Observing System (GCOS) defines those variables that are essential for climate purposes, with the UK fully participating in the GCOS Surface Network, the GCOS Upper Air Network and the Global Atmospheric Watch. In 2001 the UK submitted a *Report on systematic observations for climate for the Global Climate Observation System (GCOS)* to the UNFCCC.⁷⁰ This report outlines the way in which the UK Government contributes to the GCOS networks and the way in which UK research institutes adhere to the policy of free and unrestricted exchange, particularly in relation to the essential climate variables.

4.34 The UK is actively studying the GCOS Implementation Plan (which identifies where further action is needed, globally, to fully complete the GCOS) to see if and where further activity is needed. A list of those UK stations and systems that are part of the national commitment to GCOS will be included in the UK's Fourth National Communication.

4.35 Hadley Centre scientific staff are on the international steering committee aimed at ensuring the integrity of future climate observing systems through the *Global Climate Observing System (GCOS) Implementation Plan of the GCOS*⁷¹.

4.36 New work is being initiated, in conjunction with US partners, to digitise ocean observations contained in ships' log books from the 1940s.

⁷⁰ http://www.metoffice.com/research/interproj/gcos/climate_3nc_gcoss.pdf

⁷¹ <http://www.oco.noaa.gov/workshop/>

Contributions to adaptation in developing countries

4.37 Mindful of the need to address capacity needs in relation to climate monitoring in Africa, an outcome of the UK's Presidency of the G8 in 2005 was an allocation, by the Department for International Development (DFID), of £5 million over 5 years to support the integration of climate risk information in decision-making processes and to increase the long-term availability of climate observations in Africa. This is dependent upon similar contributions from G8 partners.

Capacity-building in developing countries

4.38 The UK's development assistance programme is increasing. Additional resources have been made available to deal with global environmental problems such as climate change. The UK intends to meet its share of the commitment made by donors in Bonn in July 2001.

4.39 DFID has committed £10 million over 3 years to the UNFCCC Special Climate Change Fund, available to all developing countries, to mainstream climate change responses into development planning, policies and implementation.

4.40 DFID's Central Research Department has officially committed £15 million over three years for a collaborative research and capacity development programme on climate adaptation, and is considering extending the research programme for an additional two years.

4.41 DFID is providing £6 million over 5 years to support United Nations Development Programme and Government of Bangladesh to establish the Comprehensive Disaster Management Programme in Bangladesh. This programme aims to enable the transition of disaster management from relief to a risk reduction focus, including longer-term climate risks.

4.42 DFID is preparing its policy and implementation plan on reducing the risks of disasters, the majority of which are climate-related. The goal of the policy is to contribute to sustainable development through reducing the burden of disasters on the poor and most vulnerable. It aims to better integrate disaster risk reduction into development policy and programming. DFID has allocated around £18 million for the next two years to disaster risk reduction.

4.43 The UK is the fourth largest contributor to the Global Environment Facility (GEF) with a commitment of over £320 million between 1997 and 2004. The UK supports an increase in GEF in the fourth replenishment.

4.44 Over £200 million was committed in the three year period 1997-1998 to 1999-2000 on climate change related activities through bilateral projects.

Financial assistance and technology transfer

4.45 The UK provides support on climate change related technology transfer through its multilateral activities and a range of different programmes.

4.46 The UK has also been active in the Renewable Energy and Energy Efficiency Partnership (REEEP), recently announcing funding of around £6 million between 2006 and 2008. The funding will help increase the take-up of energy efficiency and renewable energy technologies through capacity building, tackling barriers to the take-up of new technologies and through supporting innovative financial instruments. These activities will contribute to the UK's commitment to aid other countries address the challenge of climate change through the take-up of cleaner technologies.

4.47 Within the Foreign and Commonwealth Office, The Climate Change and Energy Programme is one of six Global Opportunities Funds. One of the objectives of the Programme is to promote greater uptake of renewable energy and more efficient use of energy, to help address climate change and enhance energy security. In 2005/6, this was achieved mainly through a contribution of £1 million to the REEEP, although the Programme also contributed around £1.6 million to 47 ongoing projects from previous years, covering at least 12 countries.

4.48 The UK Technology Partnership Initiative was launched in 1993. Through its information network, it aims to encourage the transfer of environmental technology and know-how to developing countries on a commercial basis. It facilitates access to UK sources of environmental technology and services, as well as providing regular information through a quarterly newsletter and case studies.

4.49 The UK also supported the development of the IEA Greenhouse Gas Technology Information Exchange, which concluded in 2005. The website⁷² provides access to the wide range of information collected since 1995.

4.50 The UK participates in the Climate Technology Initiative (CTI),⁷³ which was launched by the Organisation for Economic Co-operation and Development and IEA countries at the First Conference of Parties to the UNFCCC in Berlin in 1995. The CTI's mission is to bring countries together to foster international co-operation in the accelerated development and diffusion of climate-friendly and environmentally sound technologies and practices. The CTI works closely with the UNFCCC process, including its Secretariat and the Expert Group on Technology Transfer, relevant IEA Implementing Agreements and other international organisations or initiatives.

⁷² <http://www.greentie.org>

⁷³ <http://www.climatetech.net>

4.51 Defra makes a contribution on behalf of the UK to the core budget of the UNFCCC annually, and as of 2005 we also make a contribution to the KP fund. We also make a variety of voluntary payments annually to the Trust Fund for Developing Country Participation and the Trust Fund for Supplementary Activities.

4.52 Payments since 2002 are as follows:

Table 4 : UK Payments to the UNFCCC 2002 – 2005

Fund	2002	2003	2004	2005
UNFCCC core budget	£474,434	£331,438	£541,821	£556,125
UNFCCC Trust Fund for Supplementary Activities	£10,000	£200,000	£10,000	£15,000
UNFCCC Trust Fund for developing country participation	£100,000	£100,000	£100,000	£110,000
KP Fund	N/A	N/A	N/A	£235,806

4.53 As well as these regular payments, the UK makes one-off payments for particular work strands which vary from year to year. In 2004 Defra contributed the following:

- £20,000 towards Article 6 of the Convention (education, training and public awareness)
- £50,000 towards the Compilation and Accounting database
- £133,884 towards the Clean Development Mechanism

In 2005, Defra contributed the following:

- £45,165 towards the International Transaction Log
- £169,300 towards the Clean Development Mechanism
- £11,300 towards Joint Implementation
- £39,500 towards the Compilation and Accounting database

Information, awareness raising and public participation

4.54 In 2005, Defra launched a three-year £12 million Climate Change Communication Initiative *Tomorrow's Climate, Today's Challenge* to highlight the need for collective action, at a grassroots level, to tackle the problems which climate change poses. The initiative comprises a package of new communications materials - including a short film telling the story of climate change; radio adverts focusing on the fact that climate change is a here and now issue; a new website portal⁷⁴; a climate change communications fund; and a climate change guide, designed to help local authorities, non-governmental organisations, the business community and successful fund applicants explain climate change and communicate the main concepts. A £6m Climate Challenge Fund, open to organisations to communicate climate change is currently open for applications and Defra has also announced a Climate Change Youth Competition to enable nine young people (10-18 years old) to become regional climate change champions.

4.55 The initiative complements and builds on the existing behaviour change communications and marketing activity carried out by Government and through our key delivery partners including the Carbon Trust, the Energy Saving Trust, the Environment Agency and UKCIP. The climate challenge website links to the united efforts of our partners.

4.56 The Government provides financial support to the Carbon Trust, which in 2005 ran an £4 million integrated multi-media campaign to raise awareness of climate change - and the need to do something about it - among business audiences. The Energy Saving Trust, also a Government supported organisation, works with households, businesses and the public sector to increase awareness of how to reduce greenhouse gas emissions through energy efficiency and the promotion of renewable technologies. Climate change, and related issues such as energy efficiency and sustainable development, are also covered through the National Curriculum in schools in the United Kingdom.

⁷⁴ <http://www.climatechallenge.gov.uk>

Glossary of terms

APF	Adaptation Policy Framework
AR4	IPCC Fourth Assessment Report
CCAs	Climate Change Agreements
CCL	Climate Change Levy
CCP	United Kingdom Climate Change Programme
CCPO	Climate Change Projects Office
CDM	Clean Development Mechanism
CDs	United Kingdom Crown Dependencies
CHP	Combined Heat and Power
CO ₂	Carbon dioxide
COP/MOP	Conference of the Parties and Meeting of the Parties
CTI	Climate Technology Initiative
DA(s)	Devolved Administration(s)
Defra	Department for the Environment, Food and Rural Affairs
DFID	Department for International Development
DFP	Designated Focal Point
DNA	Designated National Authority
DTI	Department of Trade and Industry
EEC	Energy Efficiency Commitment
ENSEMBLES	Ensemble-based prediction of climate changes and their impacts
EU	European Union
EU ETS	EU Emissions Trading Scheme
EUMM	EU Monitoring Mechanism
F-gas(es)	Fluorinated gas(es)
G8	G8 Group of leading industrial nations and Russia
gCO ₂ /km	Grams of CO ₂ per kilometre
GCOS	Global Climate Observing System
GEF	Global Environment Facility
GHG	Greenhouse Gas(es)
GRETA	Greenhouse Gas Registry for Emissions Trading Arrangements
HFC	Hydrofluorocarbon
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
JI	Joint Implementation
KP	Kyoto Protocol
KPIs	Key Performance Indicators
LULUCF	Land Use, Land-Use Change and Forestry

MtC	Million tonnes of Carbon
MtCe	Million tonnes of Carbon equivalent
MtCO ₂	Million tonnes of Carbon dioxide
MW	Million Watts
NAP	National Allocation Plan
NERC	Natural Environment Research Council
NFFO	Non-fossil fuels obligation
NIR	National Inventory Report
NIRO	Northern Ireland Renewables Obligation
OTs	United Kingdom Overseas Territories
PFC	Perfluorocarbon
PPC	Pollution Prevention and Control
REEEP	Renewable Energy and Energy Efficiency Partnership
SEPA	Scottish Environment Protection Agency
SF ₆	Sulphur hexafluoride
SMEs	Small and Medium-sized Enterprises
SNE	Single National Entity
SRO	Scottish Renewables Order
SSFF	Strategy for Sustainable Farming and Food
tCe	Tonnes of Carbon Equivalent
UK	United Kingdom of England, Scotland, Wales and Northern Ireland
UK ETS	UK Emissions Trading Scheme
UKCIP	UK Climate Impacts Programme
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change