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RESPONSES TO CLIMATE CHANGE

What is climate change?

Global climate change is the result of the enhanced greenhouse effect. The greenhouse effect traps heat re-radiated from the earth's surface in the atmosphere, instead of allowing it to pass into space. In the process a critical role is played by greenhouse gases (GHGs) which trap the long-wave terrestrial radiation. It is the human sources of additional greenhouse gases, carbon dioxide, methane and nitrous oxide that are bringing changes to the global climate. The key source of scientific evidence is from the Intergovernmental Panel on Climate Change (IPCC). The IPCC was established by the United Nations Environment Programme (UNEP) and the World Meteorological Organisation (WMO) in 1988. An overview of their most recent report published in 2007 is shown in Figure 1, and Figure 2 illustrates their data on temperature, sea level rise and decrease in snow cover.

The range of the sources of human global greenhouse emissions, shown in Figure 3, is diverse. This combined with the variation in both the production of greenhouse gases and of the impact of the consequences across the world is at all levels: government, local, national and international.

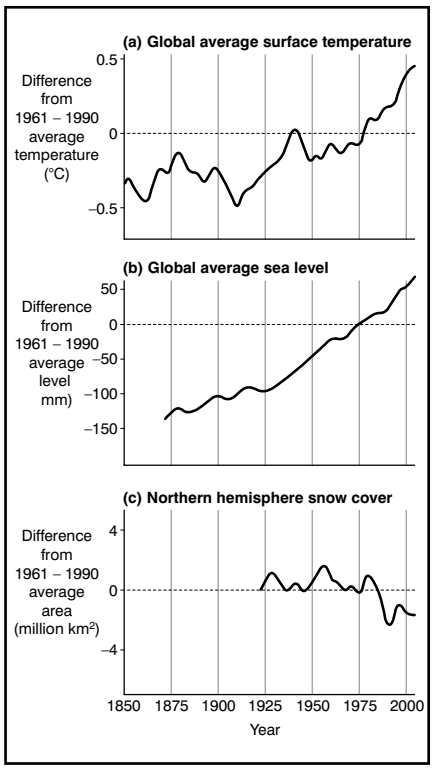

Figure 2: IPCC data on temperature, sea level rise and decrease in snow cover

Source: IPCC

Types of government response

Government response can be divided into two broad approaches 'Prevent and Prepare' which are applied at all levels of government. Much of governments' response has so far been formulated under the heading of 'Prevent', however, as the consequences and impacts of climate change become more apparent responses are being extended to include 'Prepare'.

Prevent
Create policies, strategies and legislation across a range of areas such as;

- targets to reduce GHG emissions
- planning policy focused on sustainable development including transport
- energy strategy to reduce carbon dioxide emissions
- renewable sources of energy
- nuclear energy
- energy efficiency
- raising awareness – creating organisations, promoting responsible action at all levels, publishing data, education curriculums to include climate change
- facilitate and incentivise changes in behaviour e.g. grants for solar panels, kerbside collection for recycling
- create market-led financial solutions e.g. the EU Emissions Trading System (EU ETS).

Figure 1: IPCC Fourth Assessment Report: Climate Change 2007

> Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level.
>
> Eleven of the years from 1995 to 2006 rank among the 12 warmest years in the instrumental record of global surface temperature (since 1850). The 100-year linear trend (1906-2005) of 0.74 [0.56 to 0.92]°C is larger than the corresponding trend of 0.6 [0.4 to 0.8]°C (1901-2000) given in the Third Assessment Report. The temperature increase is widespread over the globe and is greater at higher northern latitudes. Land regions have warmed faster than the oceans.

Prepare
Create strategies for adaptation to, and/or the mitigation of, the impacts of climate change. They include:

- improve the understanding and management of surface water flood risk
- improve sea defences
- safeguard water supplies in a drought, including helping homes use less water
- public education on risks
- emergency services planning
- encourage the use of vegetation and green spaces to provide area-wide cooling and insulation
- monitor impact on biodiversity
- security of food supplies
- impact on forestry.

Figure 3: Sources of human global greenhouse emissions

Sector	% Share of total human greenhouse gas emissions in 2004
Energy supply	25.9
Industry	19.4
Forestry including deforestation	17.4
Agriculture	13.5
Transport	13.1
Residential and commercial buildings	7.9
Waste and wastewater	2.8

Source: IPCC

Responses by international organisations

Prevent

The attempts to address global environmental issues, including impact on the climate, date back to the 1980s when the Montreal Protocol on Substances that Deplete the Ozone Layer was signed in 1987. Many of the gases covered under this are also strong GHGs so the protocol contributed to combating global climate change. This was followed by the Rio 'Earth Summit' in 1992, where a number of agreements were initiated including 'Agenda 21' which aimed to cut environmental pollution, to conserve resources and protect natural habitats and wildlife. In respect of climate change the United Nations Framework Convention on Climate Change (UNFCCC) treaty was agreed.

The objective of UNFCCC is to 'stabilise greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous human interference with the climate system'. The treaty aimed for nations to consider what they could do to bring about these ends co-operatively. However by 1995 it became apparent that binding targets were required. The result was The Kyoto Protocol, signed by more than 100 countries in 1997.

The Kyoto Protocol set binding targets for 37 industrialised countries and for the European community to reduce their greenhouse gas emissions by an average of 5% against 1990 levels over the period 2008-2012. The protocol did not come into force until February 2005, due to delays in getting legislation agreed by parliaments in the interested countries. The USA is not party to the protocol; they signed the treaty but did not get it ratified by their legislative bodies. China also fell outside the protocol since at this time they were still considered a developing nation. Thus, the key international agreement between governments did not include the two major producers of GHGs. Further damage was done to the credibility of the Protocol in 2011, by Canada, Japan and Russia stating that they would not meet further targets under Kyoto. In 2009 Canada's GHG emissions were estimated to be 17% higher than those in 1990.

The G8 members are France, the United States, the United Kingdom, Russia, Germany, Japan, Italy and Canada. G8 members represent 15% of world population, 65% of GDP and two-thirds of international trade.

The G20 is a group of 20 major economies: 19 countries plus the EU. The 19 are Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Mexico, Russia, Saudi Arabia, South Africa, South Korea, Turkey, the UK and the USA.

The MEF is an initiative led by the USA to generate an on-going dialogue between developed and developing major economies in order to bring about agreement at the climate change conferences.

Figure 4: The G8, G20 and MEF

With the Protocol due to expire in 2012 negotiations were held over a number of years to attempt to create a new meaningful international treaty, including both developed and developing countries. This has yet to happen and the life of the Kyoto Protocol was extended at a conference in Doha, capital of Qatar, in December 2012. The extension runs from 1 January 2013 until 2020, involves the 27 members of the EU and 10 other countries who, between them, only account for approximately 15% of world GHG emissions. At the same conference it was announced that 'Governments have agreed to speedily work toward a universal climate change agreement covering all countries from 2020, to be adopted by 2015, and to find ways to scale up efforts before 2020 beyond the existing pledges to curb emissions so that the world can stay below the agreed maximum 2 degrees Celsius temperature rise.'

At an international level the UK Department for Energy and Climate Change (DECC) also acknowledges the role of discussions and agreements made in other forums including the G8, G20 and the Major Economies Forum on Energy and Climate (MEF) (Figure 4).

As part of its Europe 2020 growth strategy the EU has committed to cutting its emissions beyond Kyoto requirements to 20% below 1990 levels. This will be brought about by binding laws. The EU has also offered to increase this reduction to 30% by 2020, if other major GHG emitters of both developed and developing countries agree to take their fair share in reducing global emissions.

The EU Emissions Trading System (EU ETS) is the largest multi-country, multi-sector GHG emission trading scheme in the world. This system sets a limit on the total amount of three GHG's, including Carbon Dioxide, which can be emitted in the EU. Within the limit or 'cap' companies receive or buy quotas that they can trade. The cap is reduced over time to bring about a reduction in total emissions.

Renewable Energy Directive 2009 sets ambitious targets for all Member States. Its aim is that the EU will get 20% of energy from renewable sources by 2020 and in addition 10% of energy used in the transport sector must be from a renewable source. For the UK the directive sets a target of achieving 15% of its energy consumption from renewable sources by 2020, this will be an increase of 12% from levels in 2009.

The EU is also:

- Setting a target to increase Europe's energy efficiency by 20% by 2020 by improving the energy efficiency of buildings and an array of equipment and household appliances.
- Setting binding targets to reduce CO_2 emissions from new cars and vans.
- Supporting the development of carbon capture and storage (CCS) technologies to trap and store CO_2 emitted by power stations.

Prepare

At an international level the plans for adaptation to climate change have occurred through a number of channels within the United Nations and World Bank.

The Global Environmental Facility was first created in 1991 and then enhanced by the Rio Earth Summit. It is a means of offering financial support to developing countries to allow them to meet the additional costs of environmental policies. It manages the Special Climate Change Fund (SCCF) which supports adaptation and technology transfer

Figure 5: The Carbon Plan: Delivering our low carbon future,

From:	First carbon budget (2008–12)	Second carbon budget (2013–17)	Third carbon budget (2018–22)	Fourth carbon budget (2023–27)
Carbon budget level (million tonnes carbon dioxide equivalent (MtCO2e))	3,018	2,782	2,544	1,950
Percentage reduction below base year (1990) levels	23%	29%	35%	50%

Source: Department of Energy &

in all developing country parties to the UNFCCC. By the end of June 2012, the SCCF adaptation program had co-ordinated $162.24 million for projects and programmes.

The United Nations has also focused attention on adaptation to climate change through both United Nations Environment Programme (UNEP) and United Nations Development Programme (UNDP). Examples include:

- Millennium Development Goals – Number 7 - Ensure environmental sustainability.
- UNEP assists vulnerable countries - in particular Least Developed Countries and Small Island Developing States - to access adaptation finance.
- In the European Union, responses are largely being agreed at a national level within the EU member states but driven by the European Commission though its 2009 White Paper 'Adapting to climate change: towards a European framework for action' and in the Europe 2020 strategy for smart, sustainable and inclusive growth.

Responses by national government

Prevent
As a leading world economy the UK is involved in both International and EU measures to combat climate change. The key body involved in translating these international agreements into UK policy is the Department of Energy and Climate Change. In addition, they lead the way in formulating and encouraging national schemes.

The Climate Change Act of 2008 has key provisions including a legally binding target of at least an 80% cut in GHGs by 2050, with a reduction of 34% by 2020. To progress towards these targets, the Act introduces a system of carbon budgets which provide legally binding limits on emissions that may be produced in successive five-year periods (Figure 5).

Climate Change December 2011. This Carbon Plan has required the introduction of new more efficient condensing boilers and the installation of cavity wall insulation in eleven million homes. If you are having a new gas boiler fitted, you now have no choice but to have the condensing type. They can be expensive to install and their life expectancy is only 5 to 10 years. Their advantage is their energy efficiency.

The Act also created the Committee on Climate Change (CCC) which is an independent body to advise the Government on setting and meeting carbon budgets and on preparing for the impacts of climate change.

Under separate policies the Government want smart energy meters installed in every home and many private and public sector businesses. Smart meters give consumers real-time information on their energy consumption to help them control and manage energy use, save money and reduce emissions. The large scale fitting of smart meters should run from 2014 to 2019.

They are also encouraging householders and businesses to make energy-saving improvements to their properties. These include:

- insulation – e.g. loft or cavity-wall insulation
- heating
- draught-proofing
- double glazing
- renewable energy technologies – e.g. solar panels or wind turbines.

Through the 'The Green Deal' the property is assessed to see what could be done to improve efficiency and how much the owner could save through energy efficiency. The cost of installation would be paid off through the electricity bill.

The Carbon Reduction Commitment Energy Efficiency Scheme (CRC) is a mandatory scheme for large public and private sector organisations, which are responsible for 10% of the UK's GHG emissions.
The Renewables Obligation (RO) is the governments' main way of encouraging major renewable electricity generation projects. The funding is granted for 20 years and is worth approximately £2 billion a year. Introduced in 2002, it has led to an increase in the generation of renewable energy from 3.1 Gigawatts to 13 Gigawatts in 2012.

Prepare
The Government published the UK Climate Change Risk Assessment (CCRA) on 25 January 2012. The Department for Environment, Food and Rural affairs (DEFRA) is responsible for developing a National Adaptation Programme to address the risks set out in the assessment and the first National Adaptation Programme will be published in 2013. Its aim is to help UK businesses, local authorities and civic society to become more 'climate ready' i.e. to be prepared for the impacts of climate change.

Prevent and prepare in Scotland
Scotland has created its own distinct legislation and plans, especially in relation to renewable energy. Its legislation and initiatives include:

- Climate Change (Scotland) Act 2009 sets an interim 42% reduction target for 2020, and an 80% reduction target for 2050. The Act also requires that the Scottish Ministers set annual targets for Scottish emissions from 2010 to 2050.
- 2020 Routemap for Renewable

Energy in Scotland – Alex Salmond, the Scottish First Minister, wants renewable sources to generate the equivalent of 100% of Scotland's annual electricity consumption by 2020. Similarly, a target has been set for renewables sources to provide the equivalent of 11% of Scotland's heat demand by 2020. Scotland does have great renewable energy potential, with wind, HEP, and developing wave and tidal technologies.

The website www.greenerscotland.org provides an information point on all aspects of living in a 'greener' way including information on energy, recycling, travel and food. Its preparations are detailed in the Scotland's Climate Change Adaptation Framework, December 2009.

Responses by local government

Prevent and prepare – the Greater London Authority
London is responsible for 8.4% of the UK's carbon dioxide emissions. Under the Greater London Authority Act 2007, the Mayor of London has a statutory duty to contribute towards the mitigation of, and adaptation to, climate change in the UK. The mayor has set a target to reduce London's carbon dioxide emissions by 60% of 1990 level by 2025. In the 2011 London Plan, focus is given to this target in relation to the housing sector. With the control of new housing developments falling to the planning system, this fulfils a key role in the plan (Figure 6). As much of the building stock in London will still be standing by 2050, the 2011 London Plan also includes fitting new energy-efficient equipment in older houses to the same standard as those in newly built properties.

As a city already vulnerable to flooding it is not surprising that London claims to be the first major world city to produce a strategy for climate change adaptation 'Managing risks and increasing resilience – the Mayor's Climate change adaptation strategy October 2011'.

Local authorities
Local authorities across the UK have matched policies created at International and national levels, with policies setting emissions target and adaptation plans.

Examples include:

- Glasgow – in December 2010 Glasgow City Council published its first Climate Change Strategy and Action Plan to help combat the effects of a changing climate within the city.
- Cumbria Climate Change Action Plan 2009-2014.
- Cumbria Climate Change Strategy 2008-2012.
- A Warm Response Our Climate Change Challenge A Devon County Council Strategy for 2005 . . . and the foreseeable future.
- Climate Change Strategy for East Sussex September 2009.
- Manchester Climate Change Call to Action Full Report: January 2009.
- A Climate Change Adaptation Plan for Staffordshire County Council.
- Climate Change Action Plan for Sunderland outlines how city's carbon emissions will be cut by 29% by 2020.

Conclusion

Whilst most people in the UK are aware of climate change and the need to tackle it, they may not realise the variety of rules, agreements and systems already in place to help us cope. The UK is well ahead of many developed countries, but the lack of awareness and action amongst the world's greatest polluters, primarily the USA and China, is of great concern.

References

http://www.ipcc.ch/organization/organization.shtml.
http://www.ipcc.ch/publications_and_data/ar4/syr/en/contents.html.
http://unfccc.int/kyoto_protocol/items/2830.php.
http://unfccc.int/files/press/press_releases_advisories/application/pdf/pr20120812_cop18_close.pdf.
http://www.thegef.org/gef/climate_change.
http://www.thegef.org/gef/SCCF.

Chapter 5 London's response to climate change

Policy 5.2 Minimising carbon dioxide emissions

Planning decisions

Development proposals should make the fullest contribution to minimising carbon

Dioxide emissions in accordance with the following energy hierarchy:

1 Be lean: use less energy

2 Be clean: supply energy efficiently

3 Be green: use renewable energy

Aiming for building regulations that lead to zero carbon residential buildings from 2016 and zero carbon non-domestic buildings from 2019.

Policy 5.3 Sustainable Design and Construction

Planning decisions

Development proposals should demonstrate that sustainable design standards are integral to the proposal, including its construction and operation, and ensure that they are considered at the beginning of the design process.

Figure 6: The London Plan 2011

EU:
http://www.eea.europa.eu/pressroom/newsreleases/eu-greenhouse-gases-in-2011.5?&utm_campaign=eu-greenhouse-gases-in-2011.5&utm_medium=email&utm_source=EEASubscriptions.
http://climate-adapt.eea.europa.eu/web/guest/adaptation-information/general.

UK:
http://www.decc.gov.uk/.
http://www.direct.gov.uk/en/Environmentandgreenerliving/Thewiderenvironment/Climatechange/DG_072901.
http://www.decc.gov.uk/en/content/cms/emissions/crc_efficiency/crc_efficiency.aspx.
http://www.decc.gov.uk/en/content/cms/tackling/explaining/explaining.aspx.

Focus Questions

1. Discuss the responses to global warming on an international scale.

2. Is real reduction in GHG emissions best achieved by government action at an international level or at local level? Discuss.

http://www.decc.gov.uk/assets/decc/11/tackling-climate-change/carbon-plan/3702-the-carbon-plan-delivering-our-low-carbon-future.pdf.
http://www.defra.gov.uk/environment/climate/government/nap/.

Scotland:
http://www.scotland.gov.uk/Topics/Environment/climatechange/scotlands-action/climatechangeact.
http://www.scotland.gov.uk/Topics/Environment/climatechange.
http://www.scotland.gov.uk/Topics/Business-Industry/Energy/Energy-sources/19185/17612.
London
http://www.london.gov.uk/sites/default/files/LP2011%20Chapter%205.pdf.
http://www.london.gov.uk/sites/default/files/Adaptation-oct11-exec-summ.pdf.