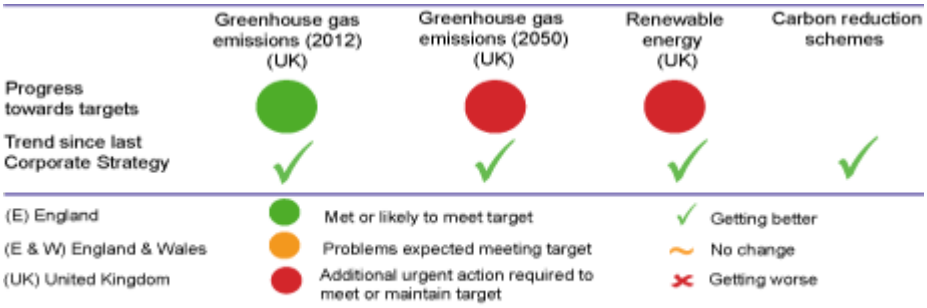
Evidence: climate change

See also: air, land and farming, water and the water environment, waste, people and sustainable places, flooding, coastal erosion

Where are we now?



Progress towards climate change targets and trends since our last Corporate Strategy. Indication of trends based on 2005 baseline

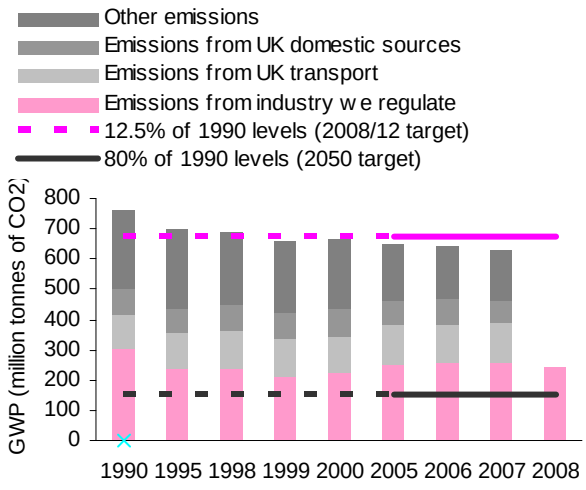
Climate change is already happening. For example:

- The 15 warmest years on record have all occurred since 1990.[1]
- Severe windstorms around the UK have become more frequent in the past few decades.[2]
- Rainfall appears to have decreased in summer and increased in winter since records began in 1766. Winter rain has been increasingly falling as heavy events over the past 45 years (rather than longer, more gentle rainfall). This kind of intense rainfall is a key factor in river and surface water flooding.[3]
- Sea-surface temperatures around the UK coast have risen over the past three decades by about 0.7 ºC.[4]
- Sea levels around the UK rose by about 10 cm in the 20th century.[5]

In 2007 the UK accounted for 13 per cent of the EU total[6] emissions of greenhouse gases (GHGs) - the second highest in Europe. UK releases of the basket of six GHGs[7] have reduced gradually but steadily – emissions are about 20 per cent lower than in 1990.[8]

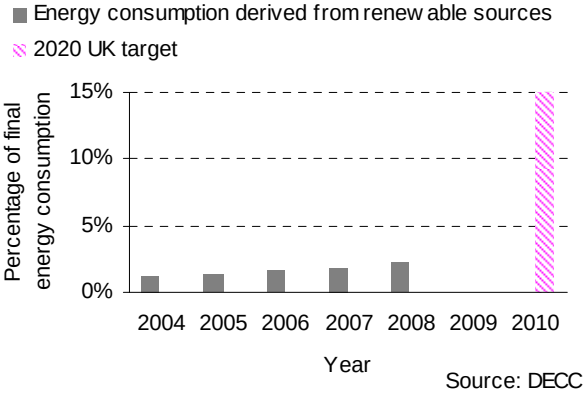
In 2008 the UK generated only 5.4 per cent of its electricity from renewable sources (hydro, wind, energy from waste, solar and biomass).[9] The majority of this was from waste.

UK greenhouse gas emissions 1990 - 2008



Source: Environment Agency, NAEI

Final energy consumption derived from renewable sources in the UK 2004 -2008



Source: DECC

Why do we need to act now?

Climate change is one of the greatest threats to people and the environment. Some climate change is now inevitable and adaptation to its effects is essential.

Assuming that greenhouse gas emissions continue to increase, the UK can expect:

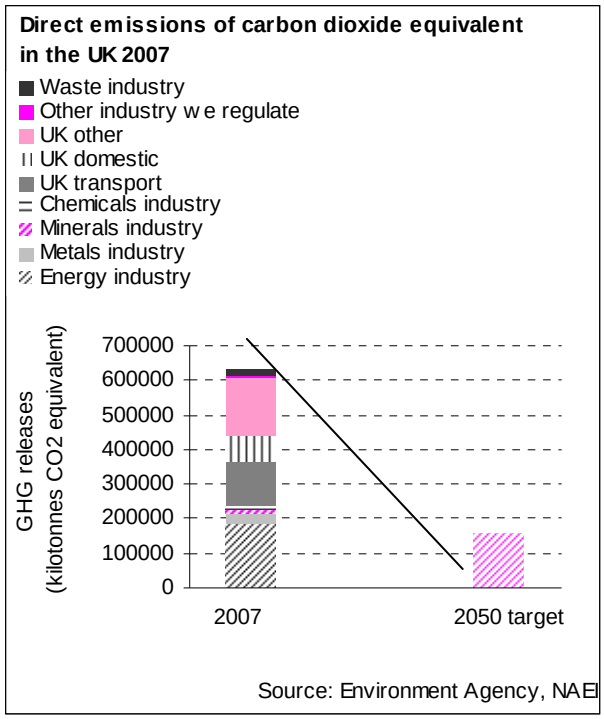
- a warming across the UK of between 2 and 3°C by 2050 (relative to 1961-1990).[10]
- an increase in winter rainfall of 10-20 per cent (lower in the uplands), with average winter river flows increasing by up to 15 per cent in 2050[11] and peak flows by 20 per cent in 2115.
- a decrease in summer rainfall of 10-20 per cent, with the largest decreases in the South West.[12]
- average river flows in summer and autumn could drop by 50 per cent to 80 per cent by 2050 in some parts of the country.[13]
- a general lowering of groundwater levels, most noticeably in aquifers furthest away from rivers. By 2025, the water that replenishes groundwater is likely to decrease by up to nine per cent overall.[14] More than one-quarter of the public water supply comes from groundwater.[15]
- the latest UK Climate Projections (UKCP09) suggest that sea levels could rise by between 12 cm and 76 cm by 2095. However if accelerated ice sheet loss is factored in sea level could rise by one metre, with a plausible worst case scenario of 1.9 metres by the end of the century.[16]

Climate change is mostly caused by burning fossil fuels, deforestation and land use change. The UK has challenging new targets to reduce GHG releases and increase the use of renewable energy.

Greenhouse gases

The UK has a target of reducing GHG emissions by at least 80 per cent compared to 1990 levels by 2050. To achieve this the UK will need to:[17]

- almost fully decarbonise electricity production by 2030 through renewables, nuclear and carbon capture and storage.
- reduce energy consumption in the home (e.g. through better insulation) and reduce traffic emissions.
- move towards using electricity for light transport (cars and motorcycles) and heating in the home. There is 78 GW of electricity generating capacity in England and Wales now, and approximately 28 GW of new electricity capacity is either under construction or planned to replace the 18-20 GW that the Government expects to close by 2018.[18]



Renewable energy

The UK aims to meet 15 per cent of final energy consumption from renewable sources by 2020. The 2009 UK Government Renewable Energy Strategy sets out what needs to happen to meet this target,[19] citing wind power (on and off-shore), biomass, hydro, wave, tidal, solar, biogas and heat pumps as key sources to meet the 30 per cent sought for electricity generation, 12 per cent for heat, and 10 per cent for transport in its lead scenario for change. The Welsh Assembly Government has made a separate commitment for Wales to move to supplying as much electricity from renewable sources to the national grid as it consumes from all sources in total by 2025.[20]

Adapting to climate change

Climate Change is expected to exacerbate many existing environmental problems, and people and ecosystems need to be able to adapt to these additional pressures. See air, land and farming, water and the water environment, waste, people and sustainable places, and flooding and coastal erosion sections for more information.

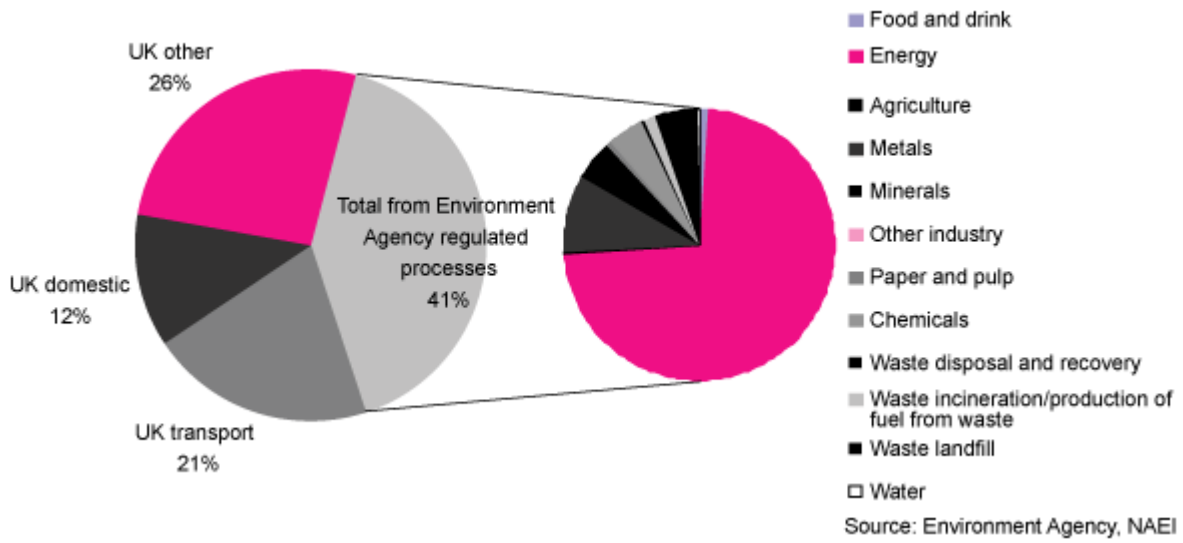
The benefits of action

It will be about five times more expensive to deal with the impacts of climate change, such as floods, droughts and heatwaves, than taking measures to avoid it. Further Government modelling suggests that the costs of action will vary between one per cent and three per cent of GDP each year compared to five per cent or more of GDP each year, now and for ever, if action isn't taken. [21]

The source of the problem

About 40 per cent of greenhouse gases (GHGs) are released by industry we regulate under the Environmental Permitting Regulations, one-third from transport and homes, and about one-quarter from other sources (including from industry not regulated by us and from the soil due to the natural cycling of nutrients and decomposition).

Greenhouse gas emissions in the UK and from Environment Agency regulated industry

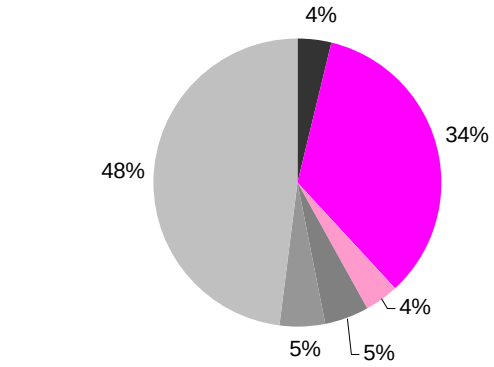


Source: Environment Agency, NAEI

Bio-wastes sent to landfill generate methane gas which is more than 20 times more potent than CO_2 as a GHG. In 2007 landfills accounted for 41 per cent of UK methane releases, emitting one million tonnes into the atmosphere.[22]

Whilst the UK's direct emissions of carbon dioxide have been on a gradual downward trend since 1990, total carbon dioxide emissions resulting from consumption of goods and services in the UK, including emissions embedded in imported goods and the UK's share of emissions from international aviation and shipping, are estimated to have increased from 647 to 762 Mt CO_2 - an 18 per cent increase - between 1992 and 2004 (the most recent year for which there is data).[23] This includes GHGs released during the manufacture of goods imported into the UK, and during the transport of those goods to the UK. It is an amount equivalent to the GHG emissions released directly into the environment within the UK.

Proportion of greenhouse gas emissions covered by regulatory schemes



NOTE: Data comes from modelled and estimated sources. Compiled from most recent data available - ranging from 2006 to 2008. Geographical range covers England, Wales and UK

Source: Environment Agency, AEA, Defra, BIS, EC

The solution so far…

The Environment Agency administrates the European Union Emissions Trading Scheme and will run the Carbon Reduction Commitment Energy Efficiency Scheme, two of the main regulatory regimes to reduce greenhouse gas emissions. The limits for carbon emissions are set by the European Union.

The **EU Emissions Trading Scheme** (EU ETS) is a cap and trade scheme that applies to CO_2 emissions from those installations with particularly high energy use – primarily electricity generation, iron and steel, mineral processing and paper and pulp sites. We run the EU ETS for the UK. Between 2005 and 2008, sites covered by the EU ETS reduced CO_2 emissions by nearly two per cent.

The new **Carbon Reduction Commitment** (CRC) Energy Efficiency Scheme is a similar emissions cap and trade scheme for large organisations not already covered. It will start in 2010.

We are working to reduce methane emissions from landfill sites. At just 15 operational sites, 19,400 tonnes of methane (407,000 tonnes of CO_2 equivalent) has been treated, mainly through electricity generation. An annual equivalent of an extra 28,000 tonnes of methane (588,000 tonnes of CO_2 equivalent) could be captured.

At the moment, about 40 per cent of the UK's GHGs are from installations covered by regulatory and economic schemes (the Environment Agency set limits for non-GHGs which have other environmental effects, and we deal with CO_2 through the EU ETS and the new CRCs). This will grow to 47 per cent for England and Wales by 2012 once the CRC scheme becomes fully operational and aviation is part of the EU ETS.

Our response: the future

The Environment Agency works with many organisations, including governments at the UK, Wales and EU levels and their agencies; the Committee on Climate Change; the Welsh Assembly Government Climate Change Commission; the Carbon Trust and Energy Saving Trust; regional and Local Authorities and climate change partnerships; Ofgem and Ofwat; energy, water and other critical infrastructure and essential service providers; professional and trade associations and other major interest groups.
Our corporate strategy outlines how we will:

- Mitigate climate change by playing our part to ensure that GHG emissions are reducing in line with Government targets in a way that minimises other environmental impacts.
- Help people and wildlife adapt to climate change.

If the UK is to develop new energy capacity while meeting carbon targets, rapid deployment of low carbon technologies (renewables, carbon capture and storage and nuclear power) is also needed.

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[1] Based on global mean temperature. Met office, 2008. Press release: 2008 Global temperature. Available from www.metoffice.gov.uk/corporate/pressoffice/2008/pr20081216.html
[2] UK Climate Projections, 2009 The climate of the UK and recent trends Revised edition, January 2009 ISBN 978-1-906360-05-4
[3] UK Climate Projections, 2009 The climate of the UK and recent trends Revised edition, January 2009 ISBN 978-1-906360-05-4
[4] UK Climate Projections, 2009 The climate of the UK and recent trends Revised edition, January 2009 ISBN 978-1-906360-05-4
[5] UK Climate Projections, 2009 The climate of the UK and recent trends Revised edition, January 2009 ISBN 978-1-906360-05-4
[6] From data contained in the Annual European Community Greenhouse gas inventory 1990-2007 and inventory report 2009
[7] The basket of greenhouse gases consists of carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride, all of which are weighted by global warming potential (GWP). The GWP for each gas is defined as its warming influence relative to that of carbon dioxide.
[8] Defra Sustainable Development National Indicators http://www.defra.gov.uk/sustainable/government/progress/national/1.htm
[9] Department for Business, Innovation and Skills (BIS) 2009. Digest of UK Energy Statistics (DUKES) Quarterly Tables: Energy Trends. http://stats.berr.gov.uk/energystats/et5_1.xls
[10] Winter mean temperature, medium emissions scenario, central estimate (50% probability). UK Climate Projections, 2009. UKCP09 Briefing report. Available at ukclimateprojections.defra.gov.uk/content/view/826/519/
[11] Environment Agency (2008) Climate Change and River Flows in the 2050s. Science Report SC070079/SS1.
[12] UKCP09. Range given is based on medium emissions scenario.
[13] Environment Agency (2008) Climate Change and River Flows in the 2050s. Science Report SC070079/SS1.
[14] Environment Agency (2009) Water for people and the environment, Water Resources Strategy for England and Wales
[15] UK abstraction data, available at www.defra.gov.uk/evidence/statistics/environment/inlwater/iwabstraction.htm
[16] The Environment Agency's flood defence schemes are based on the 1m projection. UK Climate Impacts programme, 2009. Marine and coastal projections. Available at ukclimateprojections.defra.gov.uk/content/view/825/518/.
[17] Committee on Climate Change 2008.Building a low-carbon economy - the UK's contribution to tackling climate change. Available at www.decc.gov.uk/en/content/cms/consultations/clean_coal/clean_coal.aspx
[18] A framework for the development of clean coal: consultation document, Department of Energy and Climate Change, June 2009 Available at www.decc.gov.uk/en/content/cms/consultations/clean_coal/clean_coal.aspx
[19] Department of Energy and Climate Change www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/renewable/res/res.aspx
[20] Welsh Assembly Government 2009 One Wales: One Planet. The Sustainable Development Scheme of the Welsh Assembly Government
[21] HM Treasury and the Cabinet Office, 2006. The Stern Review: Report on the Economics of Climate Change. Available at www.hm-treasury.gov.uk/sternreview_index.htm
[22] Defra 2009. e-Digest statistics about: Climate Change www.defra.gov.uk/environment/statistics/globatmos/gagccukem.htm
[23] Defra, 2008. Development of an embedded carbon emissions indicator. Available from randd.defra.gov.uk/Document.aspx?Document=EV02033_7333_EXE.pdf