

7th February 2012



STATISTICAL RELEASE

2010 UK GREENHOUSE GAS EMISSIONS, FINAL FIGURES

DECC today publishes final 2010 estimates of UK greenhouse gas emissions.

Greenhouse gas emissions - headline results

- In 2010, UK emissions of the basket of six greenhouse gases covered by the Kyoto Protocol were estimated to be 590.4 million tonnes carbon dioxide equivalent (MtCO₂e). This was 3.1 per cent higher than the 2009 figure of 572.5 million tonnes. Between 2009 and 2010 the largest increases were experienced in the residential sector, up 15.1 per cent (11.8 MtCO₂e), and the energy supply sector, up by 2.8 per cent (5.6 MtCO₂e). Emissions from all other sectors were relatively stable, compared to 2009 levels.
- Carbon dioxide (CO₂) is the main greenhouse gas, accounting for about 84 per cent of total UK greenhouse gas emissions in 2010. In 2010, UK net emissions of carbon dioxide were estimated to be 495.8 million tonnes (Mt). This was around 3.8 per cent higher than the 2009 figure of 477.8 Mt. There were notable increases in emissions from the residential sector, up by 15.8 per cent (11.8 Mt), and from the energy supply sector, up 3.1 per cent (5.8 Mt). Again, emissions from all other sectors were relatively unchanged from 2009.
- The overall increase in emissions has primarily resulted from a rise in residential gas use, combined with fuel switching away from nuclear power to coal and gas for electricity generation. In 2010, these factors mainly affected emissions of carbon dioxide, rather than other gases, and since CO₂ makes the largest contribution to the UK total, any change in CO₂ emissions is likely to drive a similar change in total emissions.
- All the sectoral breakdowns included in this statistical release are based on the source of the emissions, as opposed to where the end-user activity occurred. Emissions related to electricity generation are therefore attributed to power stations, the source of these emissions, rather than homes and businesses where electricity is used.

The headline results are shown in Table 1 and Figure 1 below. Note that the 2009 figures have been revised since the previous publication in February 2011; further details of this revision can be found later in this statistical release.

The time series for selected years since 1990 is shown in Table 10 towards the end of this statistical release.

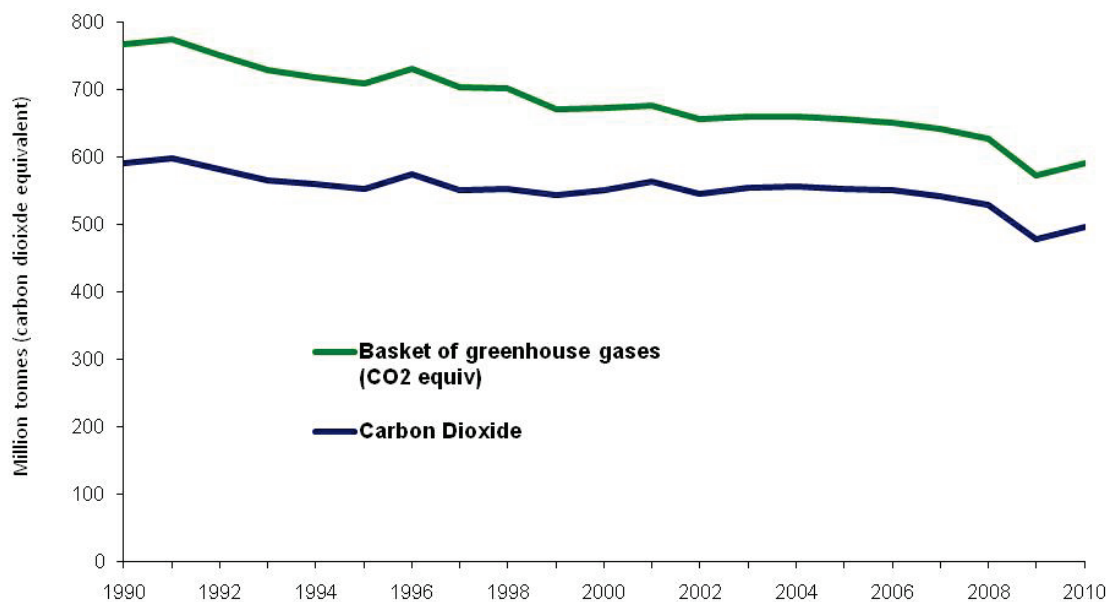
Table 1: Emissions of greenhouse gases (MtCO₂e)

	2009	2010	Change
Total greenhouse gas emissions	572.5	590.4	+3.1%
Net carbon dioxide emissions	477.8	495.8	+3.8%

CO₂ emissions figures are for the UK and Crown Dependencies; Total greenhouse gas emissions figures also include some Overseas Territories.

Carbon dioxide emissions are reported as net emissions, to include removals from the atmosphere by carbon sinks. This also affects some of the other greenhouse gases, but to a lesser extent.

Figure 1: Emissions of greenhouse gases, 1990-2010



Source: AEA

Coverage of emissions reporting

The basket of greenhouse gases covered by the Kyoto Protocol consists of six gases: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride. These last three gases are collectively referred to as fluorinated compounds. In accordance with international reporting and carbon trading protocols, each of these gases is weighted by its *global warming potential* (GWP), so that total greenhouse gas emissions can be reported on a consistent basis. The GWP for each gas is

defined as its warming influence relative to that of carbon dioxide. Greenhouse gas emissions are then presented in *carbon dioxide equivalent* units.

Carbon dioxide is reported in terms of *net* emissions, which means total emissions minus total removals of CO₂ from the atmosphere by *carbon sinks*. Carbon sinks are incorporated within the Land Use, Land Use Change and Forestry (LULUCF) sector, which covers afforestation, reforestation, deforestation and forest management. They are defined by the United Nations Framework Convention on Climate Change (UNFCCC) as “any process, activity or mechanism which removes a greenhouse gas, an aerosol or a precursor of a greenhouse gas from the atmosphere”.

Unless otherwise stated, any figures included in this release represent emissions within the UK and its Crown Dependencies (Jersey, Guernsey, and the Isle of Man).

Reporting of greenhouse gas emissions under the Kyoto Protocol is based on emissions in the UK, its Crown Dependencies, and those Overseas Territories (Bermuda, Cayman Islands, Falkland Islands, Gibraltar and Montserrat) that are party to the UK ratification of the Kyoto Protocol. This now includes emissions from direct flights between the UK and these Territories. The Kyoto Protocol also uses a narrower definition of carbon sinks than that applied for domestic UK CO₂ reporting, which therefore results in a slightly different total. These adjustments mean that the greenhouse gas basket reported for Kyoto differs slightly from the sum of the individual gases as shown.

Reporting of greenhouse gas emissions for the UK's Carbon Budgets only includes emissions within the UK, and excludes both Crown Dependencies and Overseas Territories.

A more detailed summary of the coverage and breakdown can be found in the data tables which accompany this release, which can be accessed via the Climate Change Statistics pages of the DECC website.

Emissions by gas and source sector

Total greenhouse gases

In 2010, 35 per cent of greenhouse gas emissions were from the energy supply sector, 21 per cent from transport, 15 per cent from both the residential and business sectors and 9 per cent from agriculture.

Since 1990, emissions from the energy supply sector and from business have reduced by 25 per cent and 21 per cent respectively. However, residential emissions have increased by around 11 per cent over the period. Emissions from transport were around the same level in 2010 as they were in 1990.

Details of changes over time in the main greenhouse gases are set out in the following sections of this statistical release. Details of emissions of fluorinated

compounds, together with the full breakdown by gas, can be found in Table 10 towards the end of this release.

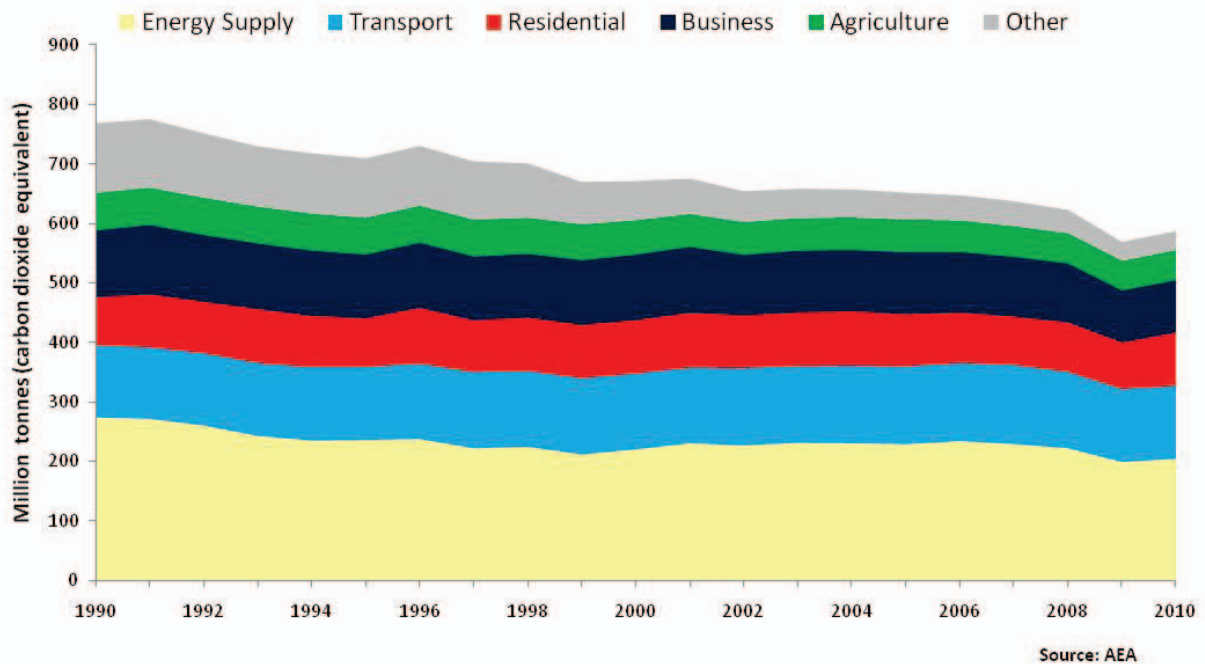
Table 2 and Figure 2 below show the breakdown of greenhouse gas emissions into the main source sectors.

Table 2: Sources of greenhouse gas emissions, 1990-2010 (MtCO₂e)

	1990	1995	2000	2005	2008	2009	2010
Energy Supply	273.4	235.8	220.1	228.7	221.9	198.7	204.3
Transport	121.5	122.0	126.7	130.4	127.7	122.2	121.9
Residential	80.8	82.3	90.1	87.8	83.4	78.1	89.9
Business	113.2	108.2	111.3	105.3	100.3	89.0	89.0
Agriculture	63.1	61.8	58.0	55.1	50.9	50.2	50.7
Waste Management	45.9	40.0	29.3	19.0	17.6	17.1	16.5
Industrial Process	54.4	44.9	24.6	18.2	16.3	10.2	10.9
Public	13.1	12.8	11.6	11.1	9.4	8.3	8.5
LULUCF	3.9	2.5	0.4	-2.9	-3.9	-4.2	-3.8
Total	769.4	710.4	672.0	652.5	623.6	569.6	587.8

All figures are for the UK and Crown Dependencies only, and exclude Overseas Territories.

Figure 2: Greenhouse gas emissions by source, 1990-2010



Carbon dioxide

Carbon dioxide accounted for about 84 per cent of the UK's man-made greenhouse gas emissions in 2010.

In 2010, 39 per cent of carbon dioxide emissions were from the energy supply sector, 22 per cent from road transport, 17 per cent from the residential sector and 15 per cent from business.

Since 2009, there has been an increase in emissions in some of the main sectors. Emissions from the residential sector have increased by 16 per cent, while emissions from the energy supply sector have increased by 3 per cent. Emissions from industrial processes are also up slightly, by 5 per cent, although this sector is relatively small in absolute terms. Emissions from the business sector and road transport are relatively unchanged since 2009.

There are a number of reasons for the increase in emissions between 2009 and 2010. The large increase in the residential sector resulted almost entirely from an increase in the use of natural gas. Residential emissions are heavily influenced by external temperatures, and 2010 was, on average, the coldest year since 1987. In particular, temperatures in both the first and last quarter of the year were very low; the first quarter was the coldest since 1987, and the last quarter was the coldest since at least 1970. This caused an increase in demand for space heating in 2010, which resulted in a significant increase in emissions from domestic gas use.

The increase in emissions from power stations was mainly because of technical problems at some nuclear power stations. In 2010, due to maintenance outages, there was less nuclear power available for electricity generation, and more coal and gas were used instead. In particular, Sizewell B, the largest nuclear power station, was offline for six months. This contributed to an increase of around 4 per cent in emissions from electricity generation between 2009 and 2010.

Since 1990, emissions from the energy supply sector have reduced by 19 per cent and business emissions have reduced by 32 per cent. However, emissions from the residential sector have increased by 10 per cent, while emissions from road transport have increased by 2 per cent over this period.

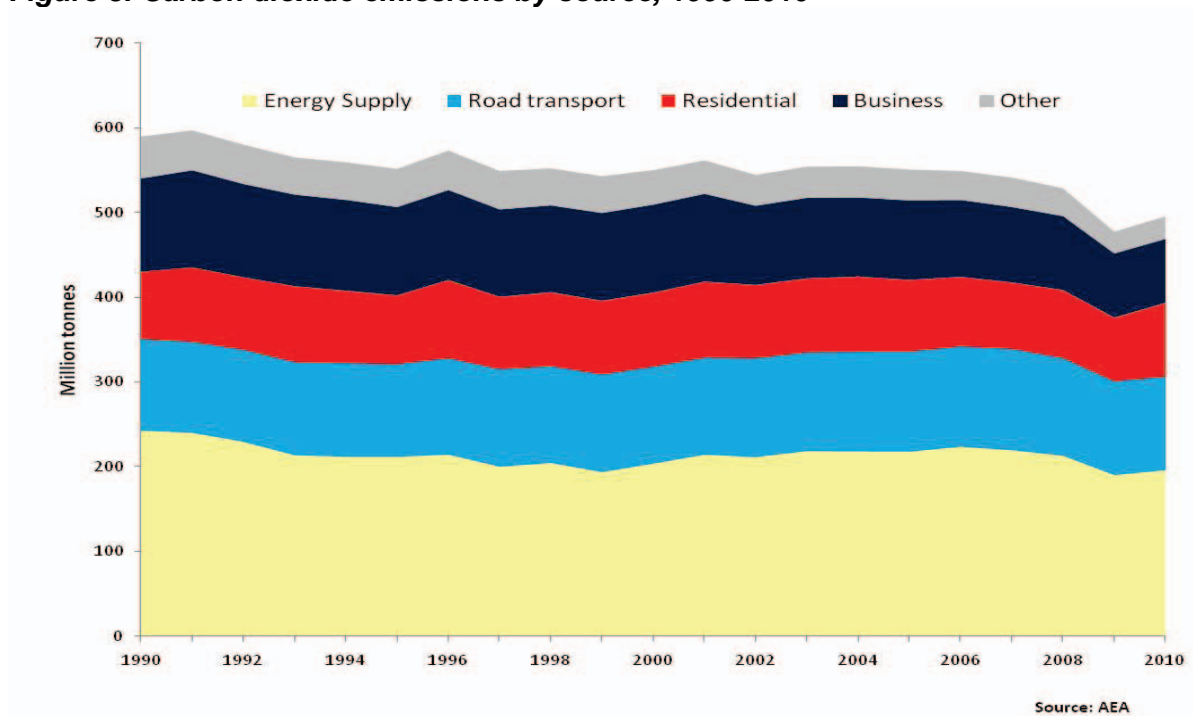
Table 3 and Figure 3 below show the breakdown of carbon dioxide emissions into the main source sectors.

Table 3: Sources of carbon dioxide emissions, 1990-2010 (Mt)

	1990	1995	2000	2005	2007	2008	2009	2010
Energy Supply	242	211	203	218	219	213	190	196
Road Transport	108	110	115	119	120	116	111	111
Residential	79	81	87	84	78	80	75	87
Business	111	104	104	94	89	87	76	76
Other	50	45	41	37	35	33	26	27
Total	590	552	550	551	542	529	478	496

All figures are for the UK and Crown Dependencies only, and exclude Overseas Territories.

Figure 3: Carbon dioxide emissions by source, 1990-2010



Methane

Weighted by global warming potential, methane accounted for about 7 per cent of the UK's greenhouse gas emissions in 2010.

In 2010, the main sources of methane were agriculture (44 per cent of the total) and landfill sites (36 per cent). Between 2009 and 2010 there was a small decrease (of 2 per cent) in total emissions of methane, primarily from the landfill waste sector.

Methane emissions in 2010, excluding those from natural sources, were 58 per cent below 1990 levels. Emissions from landfill have reduced by 66 per cent and emissions from agriculture by 20 per cent since 1990. Emissions from coal mines have also reduced significantly over the period, by 90 per cent.

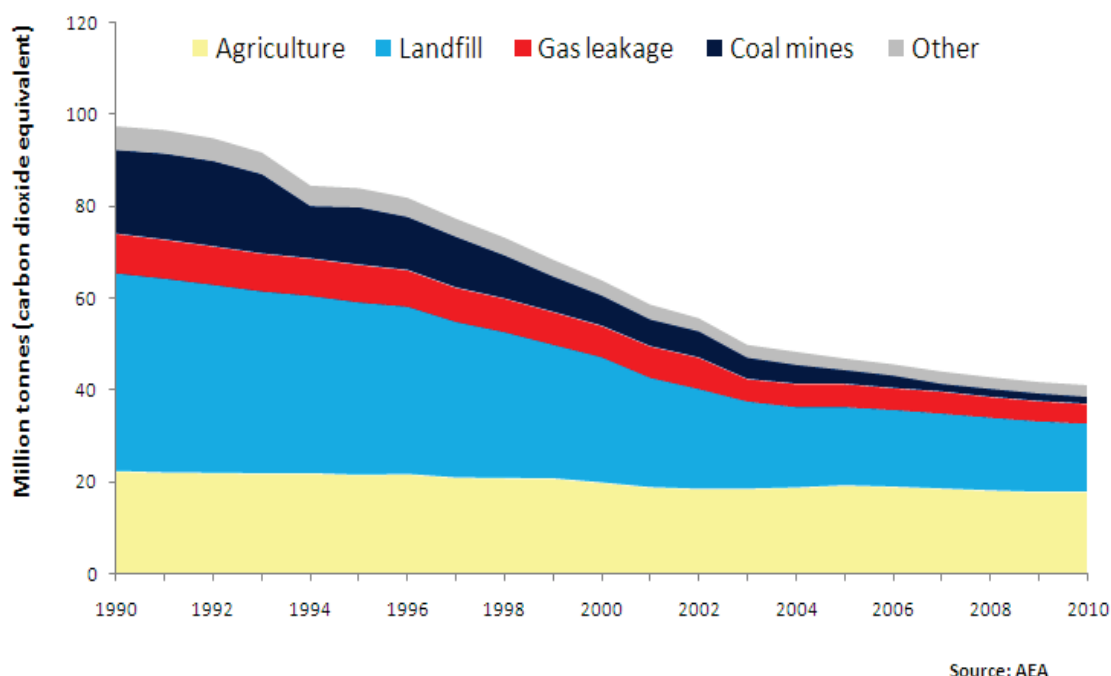
Table 4 and Figure 4 below show the breakdown of methane emissions into the main source sectors.

Table 4: Sources of methane emissions, 1990-2010 (MtCO₂e)

	1990	1995	2000	2005	2007	2008	2009	2010
Agriculture	22.4	21.6	19.9	19.3	18.6	18.2	17.9	18.0
Landfill	43.1	37.5	27.2	17.0	16.3	15.8	15.3	14.7
Gas leakage	8.5	8.1	6.7	4.9	4.7	4.4	4.3	4.2
Coal mines	18.3	12.6	6.8	3.3	1.9	2.0	2.0	1.8
Other	5.2	4.2	3.3	2.5	2.7	2.6	2.5	2.6
Total	97.4	84.0	64.0	47.1	44.2	43.0	42.0	41.3

All figures are for the UK and Crown Dependencies only, and exclude Overseas Territories. Gas leakage also includes other emissions from the exploration, production and transportation of gas.

Figure 4: Methane emissions by source, 1990-2010



Nitrous oxide

Weighted by global warming potential, nitrous oxide emissions accounted for about 6 per cent of the UK's man-made greenhouse gas emissions in 2010.

Agriculture is the main source of these emissions, accounting for 80 per cent of the total, mainly from agricultural soils. Between 2009 and 2010, emissions from nitrous oxide remained relatively stable. There was a slight increase in industrial process emissions (of 11 per cent, but small in absolute terms), primarily due to increases in nitric acid production.

Nitrous oxide emissions fell by 48 per cent between 1990 and 2010. The largest reductions were in emissions from adipic acid production between 1998 and 1999 (down 95 per cent, 11 MtCO₂e), which is reflected in the reduction in emissions from industrial processes between these years.

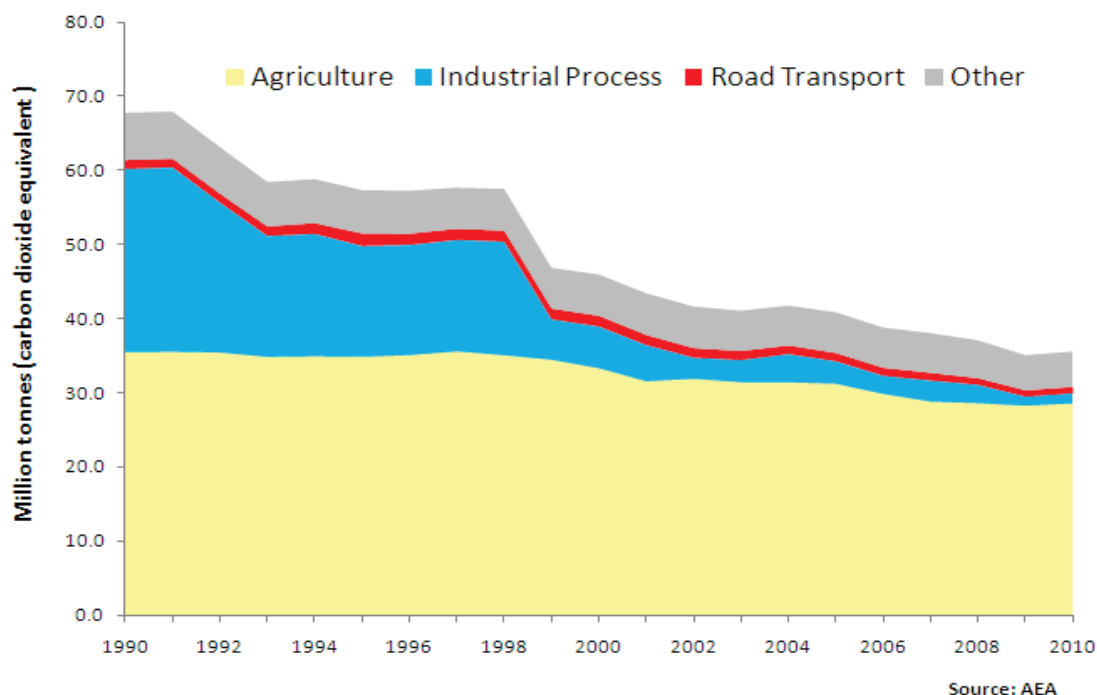
Table 5 and Figure 5 below show the breakdown of nitrous oxide emissions into the main source sectors.

Table 5: Sources of nitrous oxide emissions, 1990-2010 (MtCO₂e)

	1990	1995	2000	2005	2007	2008	2009	2010
Agriculture	35.5	34.9	33.3	31.2	28.8	28.6	28.2	28.6
Industrial process	24.7	14.9	5.6	3.0	2.8	2.5	1.2	1.4
Road transport	1.2	1.7	1.4	1.1	1.0	0.9	0.8	0.8
Other	6.4	5.9	5.6	5.5	5.4	5.2	4.8	4.8
Total	67.8	57.4	46.0	40.9	38.1	37.1	35.1	35.6

All figures are for the UK and Crown Dependencies only, and exclude Overseas Territories.

Figure 5: Nitrous oxide emissions by source, 1990-2010



Emissions from UK-based international aviation and shipping bunkers

Emissions from international aviation and shipping can be estimated from refuelling from bunkers at UK airports and ports, whether by UK or non-UK operators. Under the reporting guidelines agreed by the UNFCCC, these emissions are not included in the UK's emissions total, but are reported as memo items in national greenhouse gas inventories. Parties to the UNFCCC are required to act to limit or reduce emissions from international services working through the International Civil Aviation Organisation (ICAO) and International Maritime Organisation (IMO).

In 2010, emissions from international aviation fuel use were estimated to be 31.8 million tonnes carbon dioxide equivalent. This was 4.4 per cent lower than the 2009 figure of 33.3 million tonnes. Between 1990 and 2006, these emissions increased by around 130 per cent, although since 2006 they have been steadily falling. Nevertheless, in 2010 these emissions are still more than double the 1990 level. High altitude aviation also has a greenhouse effect over and above that of carbon dioxide alone, but this is not reflected in these estimates.

In 2010, emissions from UK international shipping bunkers were estimated to be 8.8 million tonnes carbon dioxide equivalent. This was 13.3 per cent lower than the 2009 figure of 10.1 million tonnes. Since 1990, emissions from UK shipping bunkers have been highly variable. There was an increase of around 18 per cent between 1990 and 1998, followed by a fall of 48 per cent between 1998 and 2002. Emissions then more than doubled between 2002 and 2008, but

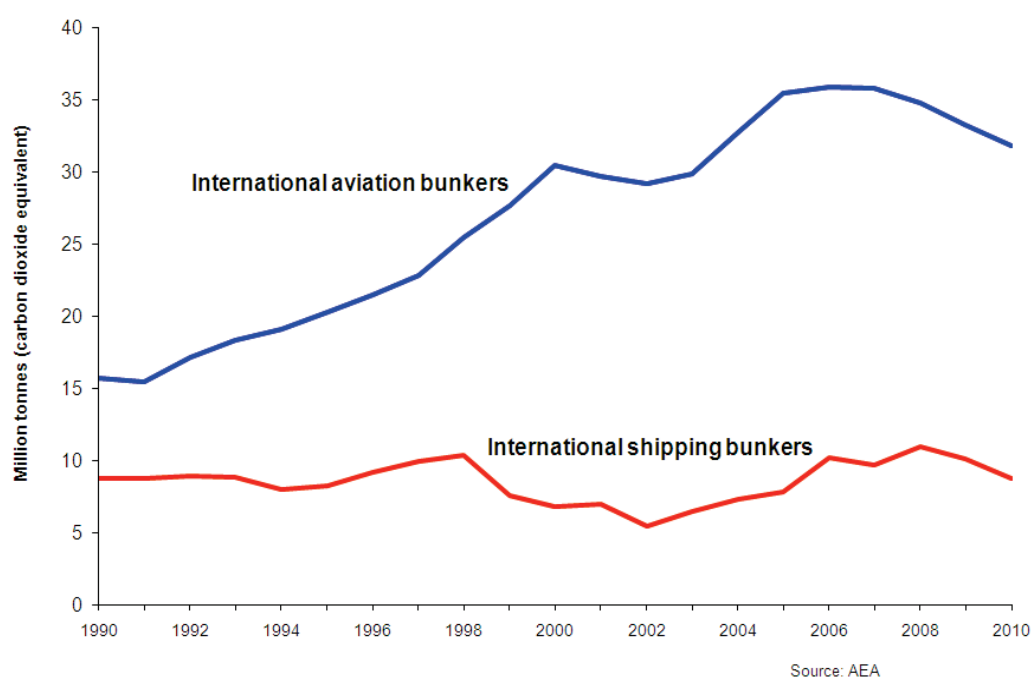
have since fallen by 20 per cent, and they are now at the same level as in 1990. It should be noted that UK operators purchase most of their fuel outside the UK.

Table 6 and Figure 6 below show the international aviation and shipping emissions series from 1990 to 2010.

Table 6: Greenhouse gas emissions from UK-based international aviation and shipping bunkers, 1990-2010 (MtCO₂e)

	1990	1995	2000	2005	2007	2008	2009	2010
International aviation	15.8	20.3	30.5	35.5	35.7	34.8	33.3	31.8
International shipping	8.8	8.2	6.8	7.8	9.7	11.0	10.1	8.8
Total	24.6	28.6	37.3	43.3	45.5	45.8	43.4	40.6

Figure 6: Greenhouse gas emissions from UK-based international aviation and shipping bunkers, 1990-2010



Revisions to the Inventory

The UK Greenhouse Gas Inventory is reviewed every year, and the whole historical data series is revised to incorporate methodological improvements and new data. This takes into account revisions to the datasets which have been used in its compilation, most notably the UK energy statistics published in the Digest of UK Energy Statistics (DUKES). It is therefore not appropriate to compare the Inventory from one year with that from another. However, the latest Inventory represents a single consistent data series going back to 1990, and this therefore allows year-on-year comparisons to be made.

In preparing the 2010 Inventory, the most notable changes to the historical series since the 2009 Inventory was published are linked to new research which has become available in relation to a number of specific sectors, as follows.

Estimates of methane emissions from landfill waste, which were revised in the 2009 inventory to reflect new research available at the time, have now been further revised following additional investigation relating to this research. Inconsistencies were identified between the research results and how they had been fed through into the emissions estimates, and these have now been corrected. These emissions are now lower than previously estimated for all years from 1990 to 2003 and relatively unchanged for all years from 2004 onwards.

Estimated emissions of hydrofluorocarbons (HFCs) from refrigeration and air conditioning have been revised to reflect new research. As a consequence, we have moved from a modelling approach based on total refrigerant sales data to develop estimates based on factors such as numbers of equipment and refrigerants used. Other improvements include the addition of small emission sources such as heat pumps and marine transport refrigeration, and including estimates from non-greenhouse gas refrigerants such as ammonia and hydrocarbons. These emissions are now higher than previously estimated from 1998 onwards.

Finally, there were revisions to the estimates of emissions from refineries and other energy industries, relating to the use of data from the EU Emissions Trading System (EU ETS) and the UK Petroleum Industry Association (UKPIA) in place of data from the Digest of UK Energy Statistics (DUKES) for some specific fuels. In both cases, estimated emissions have been revised upwards across almost the entire time series.

All the revisions to the Inventory have resulted in revisions to the figures, for all years up to and including 2009. The total of all UK greenhouse gas emissions reported for the Kyoto Protocol in 2009 has been revised upwards from 566.3 to 572.5 million tonnes carbon dioxide equivalent. The figure for UK CO₂ emissions in 2009 has also been revised upwards, from 473.7 to 477.8 million tonnes. Comparing the 2010 figures with the 2009 figures published a year ago will therefore give a different year-on-year percentage change, but one which is incorrect and should not be used.

Revisions from provisional estimates

Provisional estimates of 2010 UK greenhouse gas and carbon dioxide emissions were published in March 2011, based on early estimates of energy consumption for the year.

At that time, it was provisionally estimated that total UK greenhouse gas emissions in 2010 would be 582.4 million tonnes carbon dioxide equivalent, which represented an increase of 3 per cent from the 2009 figure. Although the final 2010 figure of 590.4 million tonnes is around 1½ per cent higher than the provisional estimate, this still represents an increase from 2009 to 2010 of

around 3 per cent. This difference is due to changes in the historical data series. Importantly, the trend anticipated by the provisional estimates has now been seen in the final figures.

It was also provisionally estimated that net UK carbon dioxide emissions would be 491.7 million tonnes, representing an increase of 4 per cent from the 2009 figure. The final 2010 figure of 495.8 million tonnes is around 1 per cent higher than the provisional estimate, but again, this does indeed represent an increase from 2009 to 2010 of around 4 per cent.

Differences between the provisional and final estimates arise from a combination of the range of uncertainty inherent in the provisional estimates (of the order of +/-1½ per cent), and revisions to other statistics on which these estimates were based.

UK emissions reduction targets

The UK has a number of targets, both international and domestic, for reducing greenhouse gas emissions.

These can be summarised as follows:

Kyoto Protocol target The Kyoto Protocol uses a base year which is comprised of 1990 for carbon dioxide, methane and nitrous oxide, and 1995 for fluorinated compounds. To meet its commitment under the Protocol, the UK has agreed a legally binding target to reduce its greenhouse gas emissions to 12.5 per cent below the base year level over the period 2008-2012.

In July 2007, on completion of the review of the UK Inventory, the UK's Kyoto base year figure was set at 779.9 million tonnes CO₂ equivalent, based on the 2006 UK Inventory submission. This means that to meet the UK's Kyoto commitment, greenhouse gas emissions must be below 682.4 million tonnes CO₂ equivalent on average per year over the first five year commitment period of the Protocol (2008-2012).

In accordance with this average yearly target, the Kyoto Protocol target for the UK was then set at 3,412 million tonnes carbon dioxide equivalent over the full five year period - this is now the UK's *Assigned Amount*.

For more details of the UK's Kyoto commitment, see the [UK Initial Report under the Kyoto Protocol](#).

UK Climate Change Act This Act includes a legally binding target for the UK to reduce its greenhouse gas emissions by at least

80 per cent below base year levels by 2050. It also establishes a system of binding five-year carbon budgets to set the trajectory towards these targets.

Like the Kyoto Protocol, the Act uses a base year which is comprised of 1990 for carbon dioxide, methane and nitrous oxide, and 1995 for fluorinated compounds. However, this base year figure differs from that used for reporting against the Kyoto Protocol in that the baseline is revised each year to incorporate revisions made subsequent to the UK's Kyoto Protocol assigned amount having been fixed.

The Government set the first three carbon budgets in May 2009, covering the periods 2008-12, 2013-17 and 2018-2022. The fourth carbon budget, covering the period 2023-27, was set in June 2011. The first of these budgets requires that total UK greenhouse gas emissions do not exceed 3,018 million tonnes CO₂ equivalent over the five-year period 2008-12, which is about 22 per cent below the base year level on average over the period. The fourth carbon budget was set so as to require a reduction in emissions of 50 per cent below base year levels over the period 2023-2027, although this figure is now slightly below 50 per cent due to revisions to the base year figure.

Table 7 below shows details of the first four carbon budgets.

Table 7: Summary of UK Carbon Budgets, 2008-2027

	Base year (actual emissions)	Budget 1 2008-12	Budget 2 2013-17	Budget 3 2018-22	Budget 4 2023-27
Budget level (MtCO ₂ e)		3018	2782	2544	1950
Equivalent average annual emissions (MtCO ₂ e)	770.8	603.6	556.4	508.8	390.0
Percentage reduction below base year levels		22%	28%	34%	49%

The levels of all four carbon budgets expressed as a percentage reduction have changed from the values which have been referred to previously. This is because the base year figure is not fixed, but is revised each year to incorporate revisions to the inventory.

Further details of how the Kyoto Protocol and Carbon Budget baseline emissions figures have been derived, can be found on the DECC website in the [Record of UK base year emissions](#) table.

Emissions Trading

Emissions trading results, including those from the European Union Emissions Trading System (EU ETS), are not published as National Statistics, and any results which incorporate emissions trading figures should therefore not be treated as National Statistics.

Under the UNFCCC and Kyoto Protocol, three *flexible mechanisms* were established to provide for trading of national allowances and project-based credits by Governments and emitters. These are *International Emissions Trading*, the *Clean Development Mechanism* (CDM) and *Joint Implementation* (JI). International Emissions Trading allows Government-to-Government trading of Assigned Amount Units (AAUs) between developed (*Annex I*) countries. The CDM allows Annex I countries with a target under the Kyoto Protocol to fund carbon reduction projects in developing (*non-Annex I*) countries and earn carbon credits for the avoided emissions. JI allows Annex I countries to implement emissions reduction projects in other Annex I countries, generating carbon credits which can be used for compliance with targets by the investor country.

In reporting emissions reductions against all of its targets, the UK needs to take account of emissions trading through these flexible mechanisms. At the present time, the scope of the UK's emissions trading does not extend beyond the European Union Emissions Trading System (EU ETS), although it should be noted that EU ETS participants may also use credits generated under CDM and JI projects, subject to certain limits, in order to comply with their obligations.

However, the Government will be able to include any units or credits generated through any of the Kyoto Protocol's flexible mechanisms in its future assessment of the UK's progress towards its emissions reduction targets.

The EU ETS operates as a *cap and trade* system, which means that, currently, any installation within the System in the EU is given an allocation of emissions allowances each year. If the installation's actual emissions are above this initial allocation for the year in question, then the installation must either purchase allowances through the System, or bring forward some allowances from the following year's allocation, so as to cover the deficit. Conversely, installations with a surplus of emissions compared with their cap are allowed to either sell allowances or carry them over into the following year's allocation, thus providing a financial incentive to reduce emissions. As there is a finite limit of allowances in the System (i.e. the cap), any allowances purchased should come from installations which have reduced emissions.

The System is now in the last year of Phase II, covering the five year period 2008-2012. Final results are currently available for each year of Phase I, which covered the three year period 2005-2007, and also for the first three years (2008-2010) of Phase II. Phase III, which begins in 2013, will change some of the parameters of the system, but will not change the ultimate cap and trade basis of the EU ETS.

In 2010, for the second consecutive year, the UK has been a net seller of allowances. This effectively means that installations between them either sold or carried over more emissions allowances than they purchased or brought forward. Taking emissions trading into account within the context of the UK's reported emissions, this will affect the results by increasing the level of emissions by the amount of EU ETS allowances sold in the year.

It should be noted that at the end of Phase I, the UK Government sold a small number of unallocated allowances from the new entrant reserve on the open market. Since it would not have been appropriate to incorporate these sales in the 2007 results alone, they were spread equally over each of the three years in Phase I.

In November 2011, the Environment Agency published a report summarising the [2010 EU ETS results](#). Further details of the System can also be found at the [EU ETS section of the DECC website](#).

Table 8 below shows the UK's net trading position in each year since the System commenced in 2005. For example, in 2010 the UK sold allowances totalling 7.7 MtCO₂e, which should be taken into account when reporting emissions against the Kyoto Protocol target.

Table 8: EU ETS net trading position, 2005-2010 (MtCO₂e)

	2005	2006	2007	2008	2009	2010
Net purchases/(sales) by UK installations	27.1	33.2	27.5	19.9	(13.7)	(7.7)
Net purchases/(sales) by UK Government	(1.9)	(1.9)	(1.9)	-	-	
Net UK purchases/(sales)	25.2	31.3	25.6	19.9	(13.7)	(7.7)

It should be noted that, for the purposes of reporting for UK Carbon Budgets under the Climate Change Act, the figure for net UK purchases/(sales) in 2010 will be slightly lower, at 7.6 MtCO₂e. This is due to differences in both the coverage of the Act and the way in which the annual cap in 2010 has been calculated.

Further details of progress towards the UK carbon budgets will be included in the annual statement of emissions, required under section 16 of the Climate Change Act. In respect of 2010, this must be laid before Parliament no later than 31st March 2012.

The statement will provide a clear and thorough explanation of how the “net UK carbon account” – which is what we use to determine compliance with the carbon budgets – was calculated, and what it amounts to. It will contain details of UK emissions and removals on a carbon budgets (i.e. UK only) basis, and the details of where carbon units have been used, in accordance with the methodologies contained in the Carbon Accounting Regulations 2009 and Carbon Accounting (Amendment) Regulations 2009.

UK performance against emissions reduction targets

Performance measured against targets, *incorporating the net EU ETS trading position*, can be summarised as follows:

- UK emissions of the basket of six greenhouse gases covered by the Kyoto Protocol were 23.3 per cent lower in 2010 than in the base year, down from 779.9 to 598.1 million tonnes carbon dioxide equivalent.
- For the purposes of carbon budgets reporting, UK greenhouse gas emissions were 23.0 per cent lower in 2010 than in the base year, down from 770.8 to 593.9 million tonnes carbon dioxide equivalent.

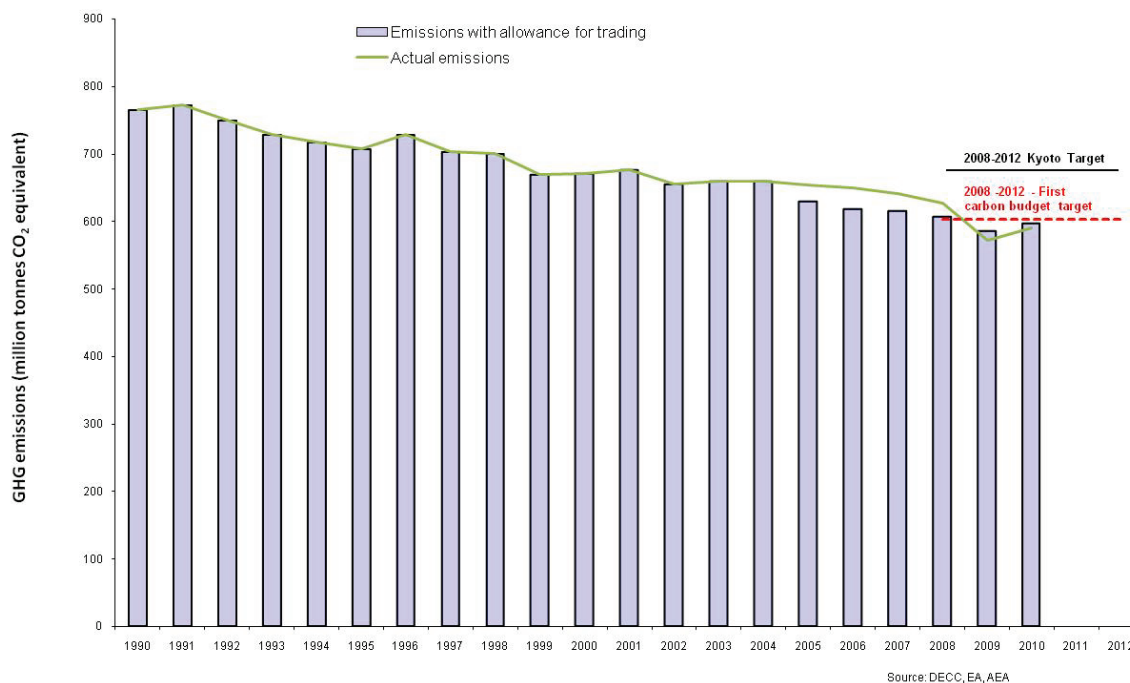
These results are shown in the context of the headline results in Table 9 and Figure 7 below. A more detailed summary of the results can also be found in Table 11 at the end of this release.

Table 9: Performance against emissions reduction targets

		Base year emissions	2010	
			Emissions	Change from base year
All greenhouse gases – Kyoto Protocol coverage (UK, Crown Dependencies & Overseas Territories)	Actual emissions (no allowance for trading)	779.9	590.4	-24.3%
	<i>Emissions with allowance for trading</i>	779.9	598.1	-23.3%
All greenhouse gases – UK Carbon Budgets coverage (UK only)	Actual emissions (no allowance for trading)	770.8	586.3	-23.9%
	<i>Emissions with allowance for trading</i>	770.8	593.9	-23.0%

Emissions are in million tonnes carbon dioxide equivalent.

Figure 7: UK's progress towards meeting each of its targets



Future updates to emissions estimates

On Thursday 29th March 2012 we will be publishing a breakdown of 2010 UK emissions by end-user sector and fuel type, to supplement the source sector breakdown published today.

On the same date we will also be publishing provisional estimates of UK greenhouse gas emissions for 2011 as National Statistics. This will coincide with the publication of *Energy Trends*, which will include the first estimates of 2011 UK energy consumption.

Further information and feedback

Any enquiries or comments in relation to this statistical release should be sent to DECC's UK Greenhouse Gas Emissions Statistics and Inventory Team at the following address:

ClimateChange.Statistics@decc.gsi.gov.uk

Contact telephone: 0300 068 5583

The lead statistician for this publication is John Mackintosh.

Further information on climate change statistics, including Excel downloads of all the data used to compile this statistical release, can be found on the DECC website at:

http://www.decc.gov.uk/en/content/cms/statistics/climate_change/climate_change.aspx

Notes for Editors

1. A full set of data tables can be accessed via the Climate Change Statistics pages of the DECC website.
2. This Statistical Release and the related data tables are the first release of data from the National Atmospheric Emissions Inventory (NAEI) for 1970-2010, produced for DECC and the Devolved Administrations by AEA. Additional results will be released as they become available, including a full report to be published later in the year. For further information on the UK Greenhouse Gas Inventory, see the [NAEI web site](#).
3. Further information about the Kyoto Protocol can be found on the [UNFCCC's website](#).
4. Results from the EU ETS are not currently published as National Statistics. They have therefore not been incorporated in the headline results. Further details of the European Union Emissions Trading System can be found at the [EU ETS section of the DECC website](#).
5. There are uncertainties associated with all estimates of greenhouse gas emissions. Although for any given year considerable uncertainties may surround the emissions estimates for a pollutant, it is important to note that trends over time are likely to be much more reliable. For more information on these uncertainties see the page on [How UK emissions of greenhouse gases are measured](#) on the DECC website.
6. Under the Climate Change Act, the annual statement of emissions for 2010 must be laid before Parliament and published no later than 31st March 2012. This will give details of the net UK carbon account for 2010, which is used to determine compliance with the targets and budgets under the Act.
7. The two headline measures included in this statistical release, "UK greenhouse gas emissions" and "Emissions from UK-based international aviation and shipping bunkers" have previously been reported as two of the indicators supporting the UK Government's Sustainable Development Strategy. The full Sustainable Development indicator set was last updated in 2010, and a new set of indicators are currently under development to support the Government's approach to mainstreaming Sustainable Development, with reporting requirements to be confirmed in due course.
8. Revisions were made to previously published figures in the 2009 greenhouse gas inventory for a number of reasons, including the following:

Details of the research which has led to revisions of our estimates for methane from landfill waste can be found on the [Publications sections of the DECC website](#).

Details of the study which has led to revisions of our estimates of emissions of HFCs from refrigeration and air conditioning can be found on the [Publications sections of the DECC website](#).

The latest UK energy statistics, including revisions to earlier years' data, can be found in the [2011 Digest of UK Energy Statistics](#).

9. Detailed UK temperature data can be found on both the [Met Office website](#) and the [Energy Statistics section of the DECC website](#).
10. When emissions are measured on this basis, UK emissions account for around 2 per cent of the global total, based on a range of estimates produced by the UN, the IEA, the World Resources Institute and the EIA, amongst others.
11. Similar results for non-greenhouse gas atmospheric pollutants, covering the period 1970-2010, were published by Defra in December 2011.

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Table 10: UK Greenhouse Gas Emissions 1990-2010, headline results**Greenhouse gas emissions: actual emissions in tonnes**

	Units (tonnes)	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Net CO ₂ emissions (emissions minus removals)	Million	590.3	552.0	550.5	562.1	544.9	554.6	555.0	551.2	549.4	541.8	529.0	477.8	495.8
Methane (CH ₄)	Million	4.6	4.0	3.0	2.8	2.7	2.4	2.3	2.2	2.2	2.1	2.0	2.0	2.0
Nitrous Oxide (N ₂ O)	Million	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Hydrofluorocarbons (HFC)	Thousand	0.98	2.22	4.70	5.34	5.82	6.54	6.83	7.36	7.76	7.96	8.33	8.48	8.60
Perfluorocarbons (PFC)	Thousand	0.20	0.06	0.06	0.05	0.04	0.04	0.05	0.03	0.04	0.03	0.03	0.02	0.03
Sulphur hexafluoride (SF ₆)	Thousand	0.04	0.05	0.08	0.06	0.06	0.06	0.05	0.05	0.04	0.03	0.03	0.03	0.03

Greenhouse gas emissions: weighted by global warming potential (million tonnes carbon dioxide equivalent)

	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Net CO ₂ emissions (emissions minus removals)	590.3	552.0	550.5	562.1	544.9	554.6	555.0	551.2	549.4	541.8	529.0	477.8	495.8
Methane (CH ₄)	97.4	84.0	64.0	58.7	55.8	50.0	48.5	47.1	45.8	44.2	43.0	42.0	41.3
Nitrous Oxide (N ₂ O)	67.8	57.4	46.0	43.4	41.6	41.1	41.8	40.9	38.8	38.1	37.1	35.1	35.6
Hydrofluorocarbons (HFC)	11.4	15.3	9.3	10.2	10.7	11.9	11.1	12.0	12.7	13.0	13.6	13.9	14.3
Perfluorocarbons (PFC)	1.4	0.5	0.5	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.1	0.2
Sulphur hexafluoride (SF ₆)	1.0	1.2	1.8	1.4	1.5	1.3	1.1	1.1	0.9	0.8	0.7	0.7	0.7
Kyoto greenhouse gas basket	766.4	708.4	671.5	676.4	655.7	660.1	659.9	654.7	650.3	640.9	626.7	572.5	590.4

Notes

1. Figures for each individual gas include the Land Use, Land-Use Change and Forestry sector (LULUCF), but exclude emissions from UK Overseas Territories.
2. Kyoto basket total differs slightly from sum of individual pollutants above as the basket uses a narrower definition for LULUCF, and includes emissions from UK Overseas Territories, as well as emissions from direct flights between the UK and these Territories.
3. The entire time series is revised each year to take account of methodological improvements in the UK emissions inventory.
4. Emissions are presented as carbon dioxide equivalent in line with international reporting and carbon trading. To convert carbon dioxide into carbon equivalents, divide figures by 44/12.
5. Figures shown do not include any adjustment for the effect of the EU Emissions Trading System (EUETS), which was introduced in 2005.
6. Carbon dioxide emissions are reported as net emissions, to include removals from the atmosphere by carbon sinks. This also affects some of the other greenhouse gases, but to a lesser extent.

Table 11: UK Greenhouse Gas Emissions 1990-2010, progress towards the Kyoto Protocol and Carbon Budgets Targets

		Baseline	1990	1995	2000	2005	2006	2007	2008	2009	2010
Kyoto Protocol greenhouse gas target											
No allowance for emission trading	All greenhouse gases (<i>including net emissions/removals from LULUCF</i>)	779.9	766.4	708.4	671.5	654.7	650.3	640.9	626.7	572.5	590.4
	Percentage change from baseline			-9.2%	-13.9%	-16.1%	-16.6%	-17.8%	-19.6%	-26.6%	-24.3%
EU ETS	Net purchases/(sales) by UK installations					27.1	33.2	27.5	19.9	-13.7	-7.7
	Net purchases/(sales) by UK Government					-1.9	-1.9	-1.9	-	-	-
	Net UK purchases/(sales)					25.2	31.3	25.6	19.9	-13.7	-7.7
With allowance for emissions trading	All greenhouse gases (<i>including net emissions/removals from LULUCF</i>)	779.9	766.4	708.4	671.5	629.5	619.0	615.3	606.8	586.2	598.1
	Percentage change from baseline			-9.2%	-13.9%	-19.3%	-20.6%	-21.1%	-22.2%	-24.8%	-23.3%
United Kingdom Carbon Budgets											
No allowance for emissions trading	All greenhouse gases (<i>including net emissions/removals from LULUCF</i>)	770.8							622.0	568.0	586.3
	Percentage change from baseline								-19.3%	-26.3%	-23.9%
EU ETS	Net purchases/(sales) by UK installations								19.3	-13.5	-7.6
	Net purchases/(sales) by UK Government								-	-	-
	Net UK purchases/(sales)								19.3	-13.5	-7.6
With allowance for emissions trading	All greenhouse gases (<i>including net emissions/removals from LULUCF</i>)	770.8							602.7	581.5	593.9
	Percentage change from baseline								-21.8%	-24.6%	-23.0%

Notes

1. Kyoto base year consists of emissions of CO₂, CH₄ and N₂O in 1990, and of HFCs, PFCs and SF₆ in 1995. Includes an allowance for net emissions from LULUCF in 1990.
2. Emissions are presented as carbon dioxide equivalent in line with international reporting and carbon trading. To convert carbon dioxide into carbon equivalent, divide figures by 44/12.
3. UK Carbon Budgets were introduced in 2008. Figures include emissions solely from the UK and exclude emissions from Crown Dependencies and UK Overseas Territories. Figures include the Land Use, Land-Use Change and Forestry sector (LULUCF).
4. The Kyoto Protocol target includes emissions from the UK, Crown Dependencies and UK Overseas Territories. The target uses a narrower definition for the LULUCF sector.
5. The entire time series is revised each year to take account of methodological improvements in the UK emissions Inventory. However, the baseline used for the Kyoto Protocol is fixed and therefore does not change when methodological changes are made to the Inventory.