

## Carbon Dioxide Emissions

<b>General details</b>	Modelled emissions of Carbon Dioxide (CO <sub>2</sub> )
<b>Area output</b>	Local authority and 1 km grid square
<b>Time period</b>	Data compiled annually
<b>Source</b>	CO <sub>2</sub> emissions estimates for DEFRA by AEA and NETCEN
<b>Provider</b>	DEFRA
<b>Comments</b>	Emissions inventories use different data sources to describe emissions by different geographies.

### 1 Introduction

1.1 Most environmental scientists agree that the world's climate is changing as a result of human activities. This has taken the form of an increase in global temperatures of about 0.6°C over the last 100 years and in England, four of the five warmest years in the 340 year record, occurred during the 1990s. 1999 was the warmest year ever recorded.

1.2 The cause of global warming is the increased trapping of the reflected infrared radiation from the earth's surface by a range of different gases. This is known as the greenhouse effect because these gases do not inhibit the reception of visible radiation (sunlight).

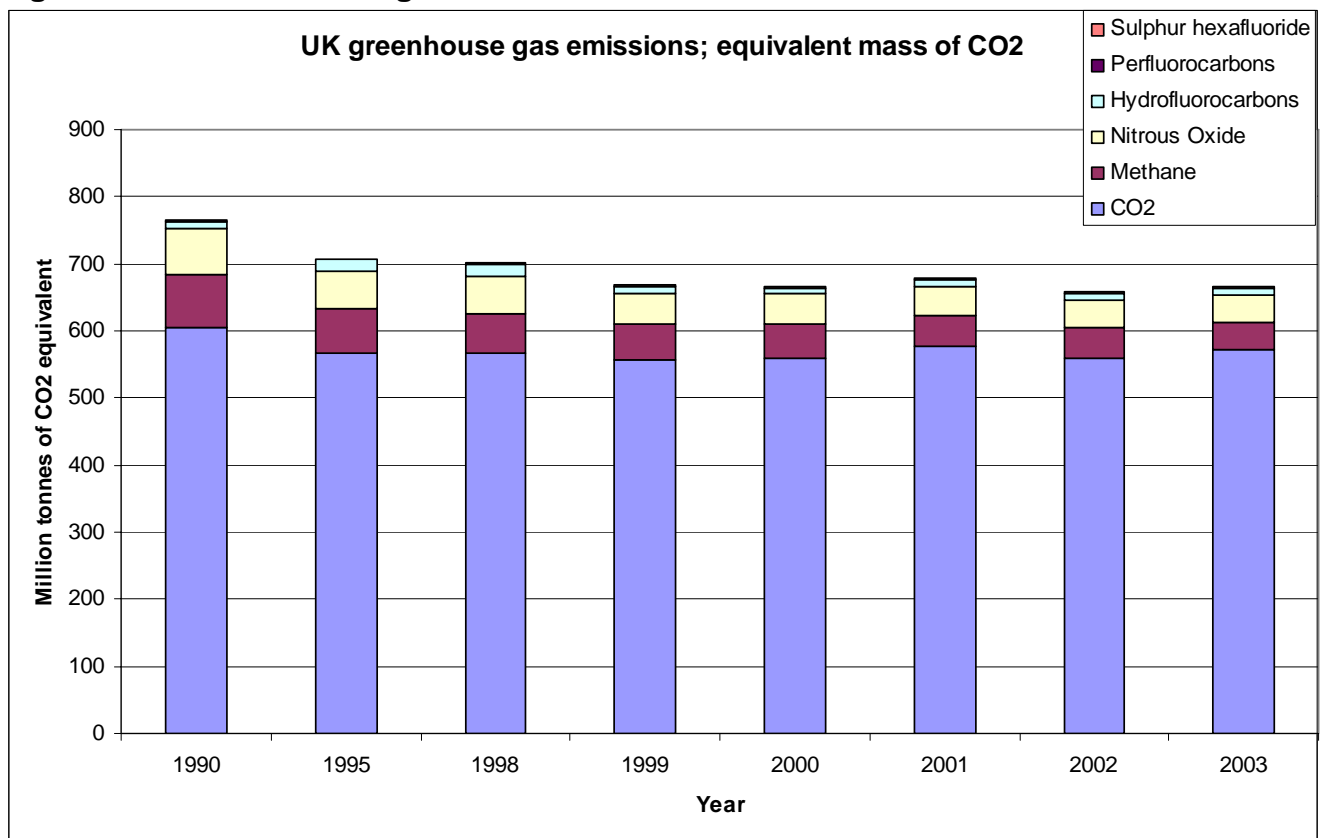
1.3 Carbon dioxide (CO<sub>2</sub>) accounts for about 85% of the total UK greenhouse gas emissions. Most CO<sub>2</sub> emissions come from the burning of fossil fuels such as coal, oil and natural gas. As the production of energy from these sources increases, emissions of greenhouse gases rise and the greenhouse effect is increased.

1.4 The United Nations Framework Convention on Climate Change (FCCC) was ratified by the United Kingdom in December 1993 and came into force in March 1994. Parties to the Convention are committed to develop, publish and regularly update national emission inventories of greenhouse gases (GHG). This allows the UK Government to monitor the progress against domestic and international targets. (For example the UK's legally binding target under the Kyoto Protocol is to reduce its greenhouse gas emissions to 12.5% below 1990 levels by 2008-2012 and its domestic goal is a 20% reduction in carbon dioxide emissions below 1990 levels by 2010;

1.5 Greenhouse gas inventories are compiled annually by the National Environmental Technology Centre on behalf of the Department for the Environment, Food and Rural Affairs (DEFRA).

1.6 Figure 1 shows both the overwhelming contribution of CO<sub>2</sub> to total greenhouse gases emissions in the UK and the relative decline in total emissions since 1990

**Figure 1: UK Greenhouse gas emissions 1990 to 2003**



Source: NETCEN

## 2 National and Regional Figures

2.1 In September 2005, the Department for Food and Rural Affairs reported on work to allocate CO2 emissions to local authorities.

2.2 Briefly, the local emissions have been derived from energy consumption calculated in the following way:

- Electricity: largely by the unit postcode location of electricity meters for both domestic and industrial consumers
- Gas; by the postcode sector of consumers although consumption for some large users is withheld as confidential information and this had to be estimated from other sources
- Other fuel use: modelled from survey information and allocated to postcode areas
- Road transport: calculated from road lengths by type and traffic composition derived from counts and emission factors
- Rail transport: calculated from journey type and frequency, line length and emission factors
- Site specific; estimated from existing data for major industrial processes
- Other employment based data: estimated from employee concentrations derived from the ONS Interdepartmental Business Register and Standard Industrial Classification (SIC) code and emissions factors

2.3 DEFRA advises that these statistics of CO2 emissions for local authority areas should be viewed with caution:

- Some of the data could not be located accurately
- Commercial confidentiality prevents data from some large energy consumers from being accurately located
- Some emissions (about one fifth) are located using proxy information such as population

2.4 Even though the data are made available by local authority area, DEFRA also advises against their use as a **performance indicator**, largely because the local authority may have little influence on the volume of greenhouse gases that are emitted.

2.5 There are some small differences between the UK Emissions Inventory and these local estimates such as the exclusion of domestic aviation, fishing and coastal fishing and the offshore oil and gas industry.

2.6 Tables 1 and 2 show the results of the DEFRA estimates for 2003 for West Yorkshire districts. Kirklees has the second highest emissions of CO2 of the 5 districts. Industrial emissions are relatively high, estimated to be almost half of total emissions, reflecting the continuing importance of manufacturing industry in the Kirklees economy.

2.7 Domestic emissions per head of the population are estimated to be just below the national average.

2.8 Road transport emissions are also the second highest for West Yorkshire districts, probably due to the presence of the M62 within the district boundary.

2.9 Despite being the biggest industrial area in Yorkshire and Humberside, West Yorkshire is estimated to contribute only about one fifth of Yorkshire and Humberside's total CO2 emissions. This is presumably due to the number of power generation plants located in other parts of the region and reflected by the region's estimated emissions for solid fuel and commercial oil.

**Table 1:Local CO2 emissions estimates for 2003 (kilotonnes)**

	Bradford	Calderdale	Kirklees	Leeds	Wakefield	York & Humb
Industrial Electricity	581.7	230.1	<b>453.8</b>	1103.5	441.2	7255.7
Industrial Gas	556.8	240.3	<b>880.8</b>	769.4	374.1	7415.9
Industrial Gas (Exclusions)	0.0	0.0	<b>0.0</b>	0.0	0.0	387.4
Industry Commercial Oil	91.5	63.0	<b>175.9</b>	239.3	154.5	6216.4
Industry Commercial Solid Fuel	5.2	7.6	<b>81.2</b>	10.3	15.0	2243.6
Industry Commercial Wastes And Biomass	7.3	7.3	<b>43.8</b>	12.2	7.8	197.7
Industry Process Gases	5.7	5.3	<b>6.1</b>	3.0	2.6	6279.8
Industry Non Fuel	2.9	0.0	<b>0.5</b>	7.3	19.7	1029.0
Industry Off-Road Machinery	25.4	13.5	<b>26.8</b>	30.5	15.0	266.4
Agriculture Oil	0.7	0.5	<b>0.9</b>	1.0	0.5	35.8
Agriculture Solid	0.0	0.0	<b>0.0</b>	0.0	0.0	0.9
Agriculture And Deforestation	0.4	0.4	<b>0.9</b>	2.5	2.5	98.1
Railways	1.9	1.6	<b>2.8</b>	6.6	7.9	89.3
<b>Sub total</b>	<b>1279.7</b>	<b>569.6</b>	<b>1673.5</b>	<b>2185.5</b>	<b>1040.9</b>	<b>31515.9</b>
Domestic Electricity	460.6	205.8	<b>387.8</b>	766.2	302.7	5081.2
Domestic Gas	743.1	351.6	<b>624.4</b>	1090.8	511.2	7753.5
Domestic Oil	13.7	10.5	<b>11.4</b>	15.4	10.1	486.9
Domestic Solid Fuel	10.3	7.9	<b>16.5</b>	21.7	101.7	521.7
Domestic Home And Garden Machinery	1.9	0.8	<b>1.7</b>	3.1	1.4	21.2
<b>Sub total</b>	<b>1229.7</b>	<b>576.6</b>	<b>1041.8</b>	<b>1897.3</b>	<b>927.2</b>	<b>13864.5</b>
Road Transport Petrol	288.9	233.6	<b>372.3</b>	825.5	354.2	5454.5
Road Transport Diesel	204.8	239.5	<b>368.1</b>	795.8	384.0	5572.4
Road Transport Other	7.1	5.6	<b>9.7</b>	19.5	9.4	136.7
<b>Sub total</b>	<b>500.7</b>	<b>478.8</b>	<b>750.1</b>	<b>1640.8</b>	<b>747.6</b>	<b>11163.6</b>
Land Use Change	6.1	22.8	<b>14.8</b>	26.8	29.6	1278.2
<b>Total</b>	<b>3016.2</b>	<b>1647.8</b>	<b>3480.1</b>	<b>5750.5</b>	<b>2745.2</b>	<b>57822.2</b>
Population Count	477.8	193.2	<b>391.4</b>	715.2	318.3	5009.2
Total emissions per capita	6.3	8.5	<b>8.9</b>	8.0	8.6	11.5
Total domestic emissions per capita	2.6	3.0	<b>2.7</b>	2.7	2.9	2.8

Source: DEFRA

**Table 2:Local CO2 emissions estimates for 2003 (selected percentages)**

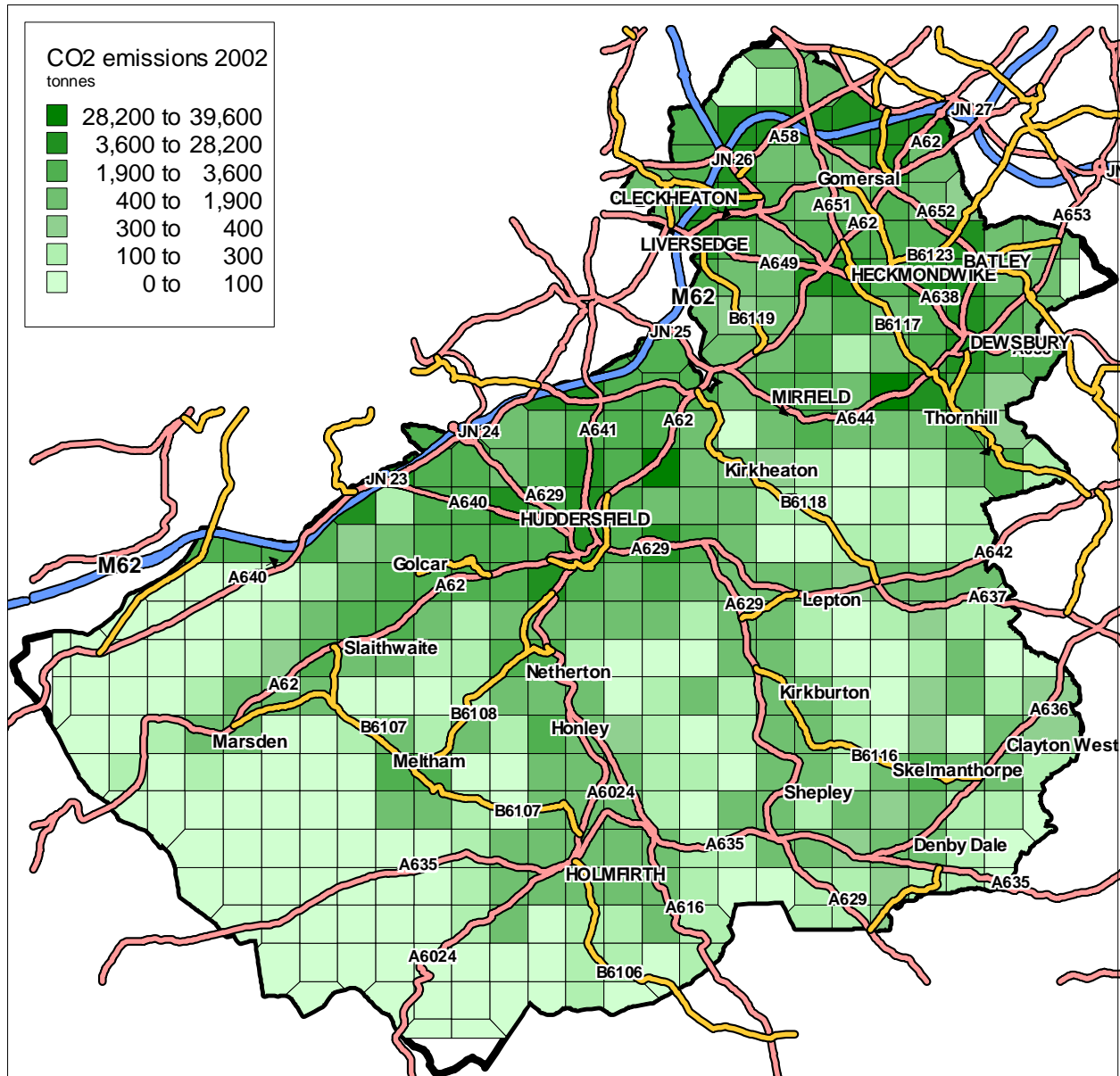
	Bradford	Calderdale	Kirklees	Leeds	Wakefield	York & Humb	UK
Industrial Electricity	19.3	14.0	<b>13.0</b>	19.2	16.1	12.5	19.2
Industrial Gas	18.5	14.6	<b>25.3</b>	13.4	13.6	12.8	11.0
<b>Industrial and Agricultural Total</b>	<b>42.4</b>	<b>34.6</b>	<b>48.1</b>	<b>38.0</b>	<b>37.9</b>	<b>54.5</b>	<b>46.1</b>
Domestic Electricity	15.3	12.5	<b>11.1</b>	13.3	11.0	8.8	11.5
Domestic Gas	24.6	21.3	<b>17.9</b>	19.0	18.6	13.4	14.8
<b>Domestic Total</b>	<b>40.8</b>	<b>35.0</b>	<b>29.9</b>	<b>33.0</b>	<b>33.8</b>	<b>24.0</b>	<b>28.8</b>
Road Transport Petrol	9.6	14.2	<b>10.7</b>	14.4	12.9	9.4	11.9
Road Transport Diesel	6.8	14.5	<b>10.6</b>	13.8	14.0	9.6	10.4
<b>Road Transport Total</b>	<b>16.6</b>	<b>29.1</b>	<b>21.6</b>	<b>28.5</b>	<b>27.2</b>	<b>19.3</b>	<b>22.6</b>

### 3 Kirklees Figures

3.1 AEA Technology maintains the National Atmospheric Emissions Inventory. This is accessible via a searchable database on the NAEI web site.

3.2 Emissions data for 1km grid squares is available for a number of pollutants including CO2 and these data for 2002 have been mapped in Figure 2.

**Figure 2: CO2 emissions by 1km grid square**



Source: National Atmospheric Emissions Inventory, AEA Technology

3.3 Many of the grid squares with high CO2 emissions contain busy roads. The map also identifies the high CO2 emissions in the grid squares with the Thornhill Power Station and Leeds Road manufacturing plants

#### 4 Links and further information

Office for National Statistics

<http://www.statistics.gov.uk/default.asp>

Local and Regional CO2 Emissions Estimates for 2003: DEFRA

Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland 1999 - 2003: DEFRA/Netcen

National Atmospheric Emissions Inventory

[http://www.naei.org.uk/data\\_warehouse.php](http://www.naei.org.uk/data_warehouse.php)

#### 5 Indicator archive

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