

Guernsey Annual Greenhouse Gas Bulletin

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POLICY COUNCIL

THE STATES OF GUERNSEY

1.1 Introduction

The Greenhouse Gas Bulletin provides annual updates of Guernsey's greenhouse gas emissions inventory. The data is provided by AEA Technology, a UK-based company which calculates greenhouse gas emissions for the UK and British Isles on behalf of the Department of Energy and Climate Change.

Guernsey has signed up to the Kyoto Protocol, which entered its second commitment period in 2013. The target for the second period is yet to be finalised; a reduction of 20% between 1990 and 2020 has been proposed. The analysis provided in this bulletin uses 1990 as a base year for comparison.

1.2 Headlines

- Greenhouse gas emissions decreased by 3.1% in 2013, when they totalled 528.2kt of carbon dioxide (CO₂) equivalent, compared to 544.8kt in 2012.
- The cumulative percentage change in Guernsey's greenhouse gas emissions between 1990 and 2013 was a decrease of 6.6% (or 37.3kt of CO₂ equivalent).
- Similar to 2012, power generation contributed the largest proportion (26.9%) of the greenhouse gases emitted in 2013. (In 2011, the largest proportion came from transport.) This was due to a fault in the cable link to France which resulted in the need to generate electricity on Island (see [page 5](#)).
- The majority (73.3%) of the emissions were in the form of carbon dioxide.

Figure 1.2.1: Total emissions

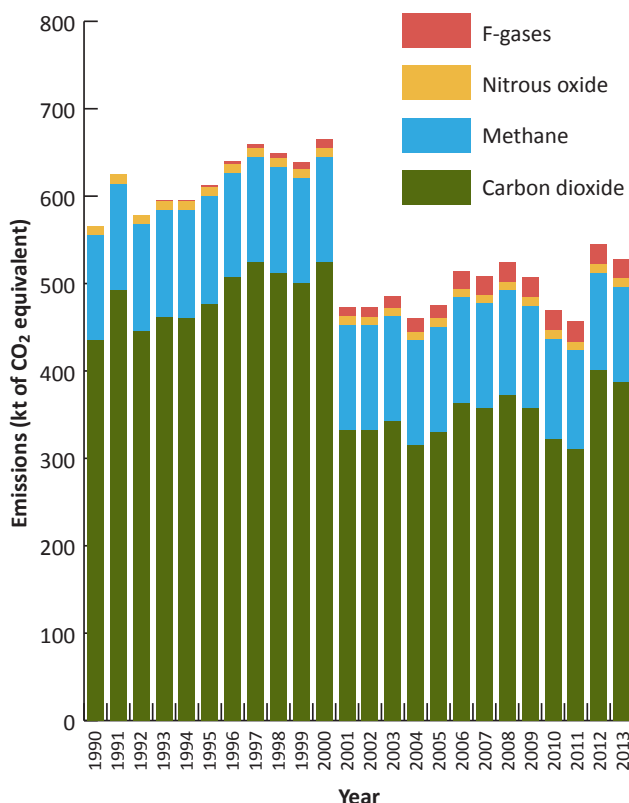


Table 1.2.1: Key data

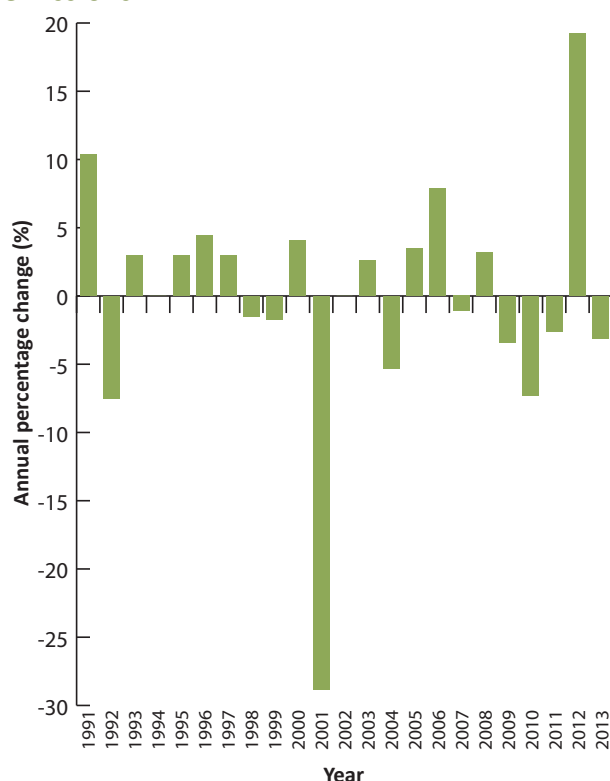
| | Total emissions (kt of CO ₂ equivalent) | Annual % change | Cumulative % change |
|------|--|-----------------|---------------------|
| 1990 | 565.5 | | |
| 1991 | 624.3 | 10.4 | 10.4 |
| 1992 | 577.6 | -7.5 | 2.1 |
| 1993 | 595.0 | 3.0 | 5.2 |
| 1994 | 595.1 | 0.0 | 5.2 |
| 1995 | 612.9 | 3.0 | 8.4 |
| 1996 | 640.1 | 4.4 | 13.2 |
| 1997 | 659.4 | 3.0 | 16.6 |
| 1998 | 649.6 | -1.5 | 14.9 |
| 1999 | 638.7 | -1.7 | 12.9 |
| 2000 | 664.7 | 4.1 | 17.5 |
| 2001 | 473.1 | -28.8 | -16.3 |
| 2002 | 473.0 | -0.0 | -16.4 |
| 2003 | 485.2 | 2.6 | -14.2 |
| 2004 | 459.7 | -5.3 | -18.7 |
| 2005 | 475.8 | 3.5 | -15.9 |
| 2006 | 513.5 | 7.9 | -9.2 |
| 2007 | 508.0 | -1.1 | -10.2 |
| 2008 | 524.4 | 3.2 | -7.3 |
| 2009 | 506.8 | -3.4 | -10.4 |
| 2010 | 469.6 | -7.3 | -17.0 |
| 2011 | 457.2 | -2.6 | -19.2 |
| 2012 | 544.8 | 19.2 | -3.7 |
| 2013 | 528.2 | -3.1 | -6.6 |

2.1 Emissions Inventory - Type

Table 2.1.1: Emissions by type

| | Carbon Dioxide (kt) | Methane (kt of CO ₂ equivalent) | Nitrous Oxide (kt of CO ₂ equivalent) | F-Gases (kt of CO ₂ equivalent) |
|------|---------------------|--|--|--|
| 1990 | 434.9 | 120.3 | 10.3 | 0.0 |
| 1991 | 492.9 | 121.0 | 10.4 | 0.0 |
| 1992 | 445.6 | 121.5 | 10.4 | 0.1 |
| 1993 | 461.9 | 122.0 | 10.5 | 0.6 |
| 1994 | 460.8 | 122.5 | 10.6 | 1.3 |
| 1995 | 477.0 | 122.9 | 10.7 | 2.2 |
| 1996 | 507.0 | 119.9 | 9.9 | 3.3 |
| 1997 | 524.2 | 120.4 | 10.1 | 4.8 |
| 1998 | 512.4 | 120.7 | 10.0 | 6.5 |
| 1999 | 500.1 | 121.0 | 10.0 | 7.5 |
| 2000 | 524.0 | 121.2 | 10.2 | 9.4 |
| 2001 | 332.9 | 119.9 | 9.4 | 10.9 |
| 2002 | 332.2 | 119.5 | 9.2 | 12.1 |
| 2003 | 342.3 | 119.9 | 9.2 | 13.8 |
| 2004 | 315.5 | 120.1 | 9.1 | 15.1 |
| 2005 | 329.6 | 120.9 | 9.3 | 15.9 |
| 2006 | 362.9 | 121.2 | 9.4 | 20.1 |
| 2007 | 357.1 | 120.3 | 9.3 | 21.2 |
| 2008 | 372.5 | 119.4 | 9.9 | 22.7 |
| 2009 | 357.1 | 116.9 | 9.8 | 23.0 |
| 2010 | 321.6 | 114.7 | 9.9 | 23.4 |
| 2011 | 310.7 | 112.4 | 10.0 | 24.0 |
| 2012 | 401.1 | 110.5 | 10.3 | 22.9 |
| 2013 | 387.3 | 108.5 | 10.3 | 22.1 |

Figure 2.1.1: Annual percentage change in total emissions



Greenhouse gas emissions need to be calculated in a consistent manner across all jurisdictions to ensure comparability and avoid double counting or omissions.

The content and structure of the inventory is based on the categories defined by the United Nations Economic Commission for Europe (UNECE). See www.unece.org for more information.

The methodology used to calculate the data is refined each year and the whole data set is revised to ensure comparability between one year and the next. As such, the figures published here should not be compared with those previously published.

Emissions of the greenhouse gases; carbon dioxide, methane, nitrous oxide and fluorinated gases (hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride) are all estimated for the inventory. They are all presented in the form of carbon dioxide (CO₂) equivalents for ease of comparison.

The Guernsey emissions inventory is compiled by AEA Technology, the company which calculates emissions for the whole of the UK and British Isles on behalf of the Department of Energy and Climate Change (DECC). More information on the work of the DECC can be found via their website: www.decc.gov.uk.

In 2013, Guernsey's emissions totalled 528.2kt of CO₂ equivalent, which equates to 8.4 tonnes per capita. The total was 3.1% lower than in 2012 (see [Table 1.2.1](#)) and 6.6% lower than in 1990.

[Table 2.1.1](#) shows that the majority of Guernsey's emissions are in the form of carbon dioxide (CO₂). The main source of these emissions is combustion of fossil fuels for power generation, transport and heating i.e. energy.

The variability in recent years as shown in [Figure 2.1.1](#) is largely due to changes in the amount of power being generated on island.

3.2 Emissions Inventory - Source

Figure 3.2.1 and Figure 3.2.2 show the proportions of emissions contributed by different sources. This data is also provided in **Table 3.2.1** overleaf.

Power generation contributed the largest proportion of emissions in both 1990 and 2013 (at 25.4% and 26.9% respectively). Its contribution to greenhouse gas emissions was 1.5 percentage points higher in 2013 than in 1990.

Waste contributed the second largest proportion in 2013 and the third largest proportion in 1990 (at 21.6% and 20.8% respectively). Its contribution to greenhouse gas emissions was 0.8 percentage points higher in 2013 than in 1990.

Transport contributed 19.6% in 2013 compared with 23.0% in 1990, a decrease of 3.4 percentage points.

The proportions contributed by commercial and domestic combustion, industrial combustion and agriculture, land use, land use change and forestry decreased by 1.4, 1.1 and 0.5 percentage points respectively.

F-Gases, which contributed less than 0.1% in 1990, contributed 2.1% in 2013.

The changes in terms of emissions by mass, rather than proportions, are given on **pages 5 to 11**.

Figure 3.2.1: Percentage contribution of emissions by source in 1990

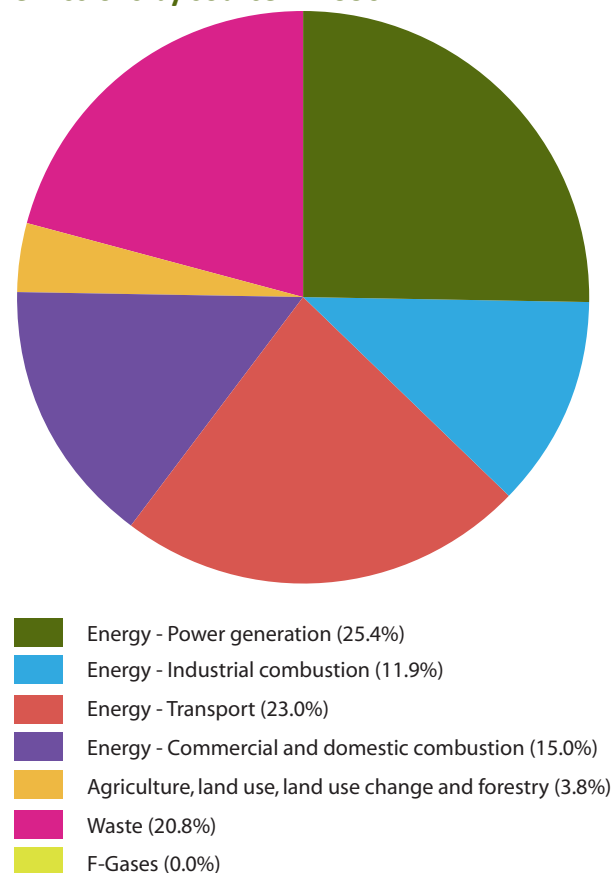
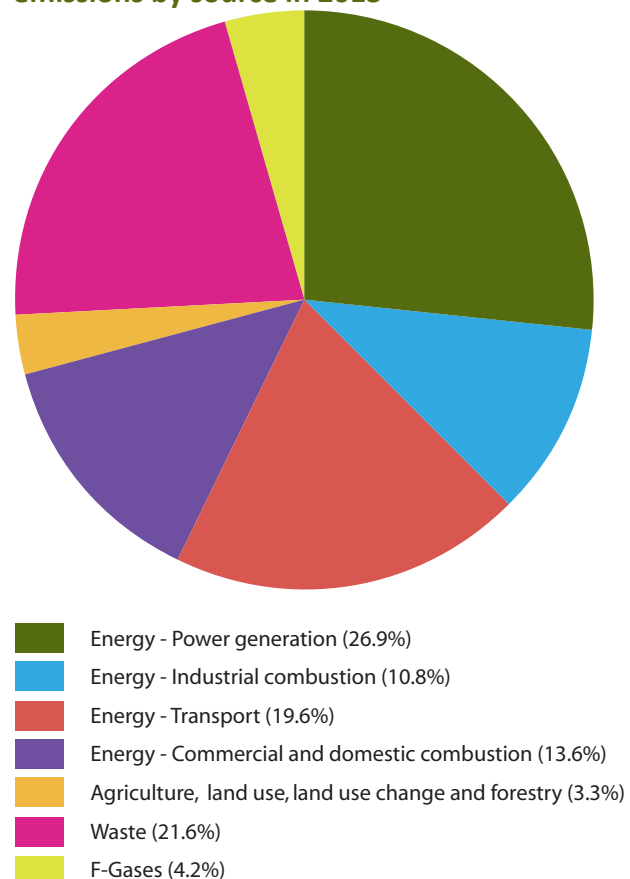


Figure 3.2.2: Percentage contribution of emissions by source in 2013



3.2 Emissions Inventory - Source

Table 3.2.1: Percentage contribution of emissions by source

| | Energy - Power generation (%) | Energy - Industrial combustion (%) | Energy - Transport (%) | Energy - Commercial and domestic combustion (%) | Agriculture, land use, land use change and forestry (%) | Waste (%) | F gases (%) |
|------|-------------------------------|------------------------------------|------------------------|---|---|-----------|-------------|
| 1990 | 25.4 | 11.9 | 23.0 | 15.0 | 3.8 | 20.8 | 0.0 |
| 1991 | 27.6 | 12.9 | 20.9 | 16.2 | 3.4 | 18.9 | 0.0 |
| 1992 | 25.5 | 12.0 | 22.8 | 15.3 | 3.7 | 20.6 | 0.0 |
| 1993 | 25.8 | 12.1 | 22.8 | 15.4 | 3.6 | 20.1 | 0.1 |
| 1994 | 26.0 | 12.2 | 22.4 | 15.4 | 3.6 | 20.2 | 0.2 |
| 1995 | 26.3 | 12.4 | 22.1 | 15.7 | 3.5 | 19.7 | 0.4 |
| 1996 | 26.0 | 13.0 | 22.3 | 16.6 | 2.7 | 18.9 | 0.5 |
| 1997 | 25.5 | 13.1 | 23.4 | 16.3 | 2.6 | 18.4 | 0.7 |
| 1998 | 27.1 | 12.3 | 22.5 | 15.7 | 2.7 | 18.8 | 1.0 |
| 1999 | 28.2 | 11.3 | 22.7 | 14.7 | 2.7 | 19.2 | 1.2 |
| 2000 | 25.4 | 12.8 | 23.5 | 15.8 | 2.6 | 18.5 | 1.4 |
| 2001 | 8.6 | 12.6 | 29.9 | 17.2 | 3.4 | 26.1 | 2.3 |
| 2002 | 7.6 | 13.9 | 28.5 | 18.0 | 3.3 | 26.2 | 2.6 |
| 2003 | 8.7 | 13.9 | 27.7 | 18.1 | 3.2 | 25.6 | 2.8 |
| 2004 | 7.7 | 12.3 | 29.0 | 17.3 | 3.4 | 27.1 | 3.3 |
| 2005 | 10.8 | 11.7 | 28.1 | 16.4 | 3.5 | 26.3 | 3.3 |
| 2006 | 20.3 | 9.7 | 24.6 | 13.9 | 3.3 | 24.4 | 3.9 |
| 2007 | 14.7 | 12.1 | 25.8 | 15.5 | 3.3 | 24.5 | 4.2 |
| 2008 | 22.3 | 10.9 | 21.2 | 14.4 | 3.2 | 23.7 | 4.3 |
| 2009 | 20.2 | 11.2 | 21.9 | 14.8 | 3.4 | 24.0 | 4.5 |
| 2010 | 12.1 | 13.3 | 23.1 | 17.3 | 3.6 | 25.5 | 5.0 |
| 2011 | 14.8 | 11.8 | 23.4 | 15.3 | 3.7 | 25.8 | 5.3 |
| 2012 | 29.0 | 10.4 | 19.1 | 12.9 | 3.2 | 21.3 | 4.2 |
| 2013 | 26.9 | 10.8 | 19.6 | 13.6 | 3.3 | 21.6 | 4.2 |

Combustion of fuels for energy (including electricity generation, heating, industrial processes and transport) has contributed the largest proportion of emissions since 1990. The majority of the emissions are in the form of carbon dioxide, but methane and nitrous oxide are also released in the combustion processes. In 2013, emissions from fuels for energy constituted 70.9% of the total emissions.

The emissions inventory is “source based”, which means it reflects only emissions released from Guernsey. As such, emissions resulting from the generation of electricity in Europe, which is imported for consumption in Guernsey, are not included. Electricity has been imported via a cable link to France since 2001, resulting in a significant decrease in the amount of power generated on-Island.

Landfilled waste is the next largest contributor to Guernsey’s total emissions and the proportion it has contributed has increased slightly since 1990. The emissions are mostly in the form of methane gas, which is released by decomposing material.

Agriculture, land use, land use change and forestry combined contribute a small proportion of total emissions. The majority of the emissions are methane released by the digestive processes of cattle.

Nitrous oxide is also released as a result of the combustion of fuels for energy and as a result of waste disposal and agricultural processes, but at comparatively low levels.

The fluorinated gases (“F-gases”) are not estimated by source in the same way as the other three gases mentioned above. They are associated with chemicals used in refrigeration, air-conditioning and heat pump systems and can be released as greenhouse gases if the systems leak or are disposed of improperly.

More detail and analysis of Guernsey emissions by source is provided over the next pages.

4.1 Emissions by Source - Energy

Combustion of fuels for power generation contributed 26.9% of Guernsey's total greenhouse gas emissions in 2013 (see [Table 3.2.1](#)). The majority of the emissions are in the form of carbon dioxide, but methane and nitrous oxide are also released in the combustion processes.

Electricity has been imported via a cable link to France since 2001, reflected by a 75.9% decrease in power generation emissions between 2000 and 2001 (see [Table 4.1.1](#)).

Excepting this large change, levels of greenhouse gas emitted from Guernsey as a result of fuel combusted for power generation have generally been trending upwards since 1990 (see [Figure 4.1.1](#)). The red line on the chart shows the historic three year average.

Prior to 2000, when all of Guernsey's electricity was generated on island, power generation was the single largest component contributor to Guernsey's total emissions. Some electricity is still generated on Island and it is this amount which impacts most noticeably on the total level of emissions.

The amount of electricity generated on island varies from year to year. In 2012, a fault in the cable link to France resulted in the need to generate electricity on Island, resulting in an increase in power generation emissions between 2011 and 2012 of 133.5%. This fell by 9.9% (or 15.7kt of CO₂ equivalent) between 2012 and 2013.

In total, the emissions from power generation decreased by 1.1% (or 1.5kt of CO₂ equivalent) between 1990 and 2013.

Figure 4.1.1: Energy emissions - Power generation

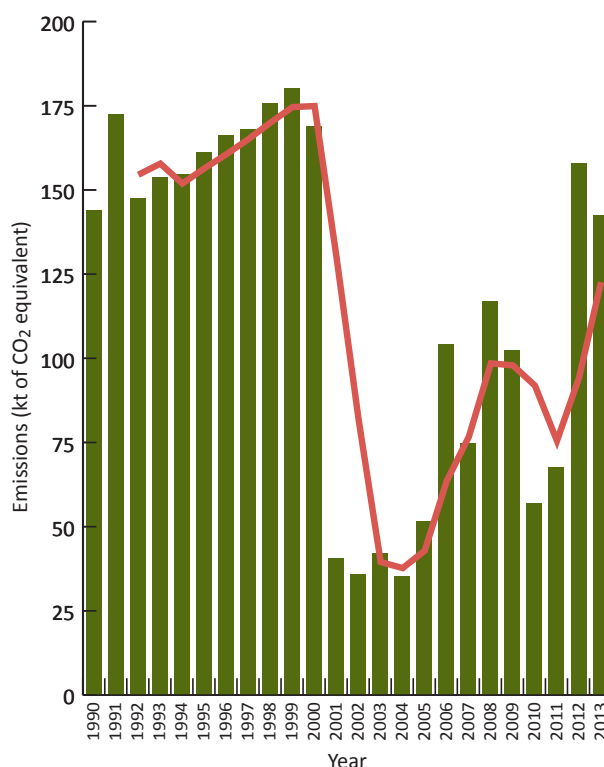
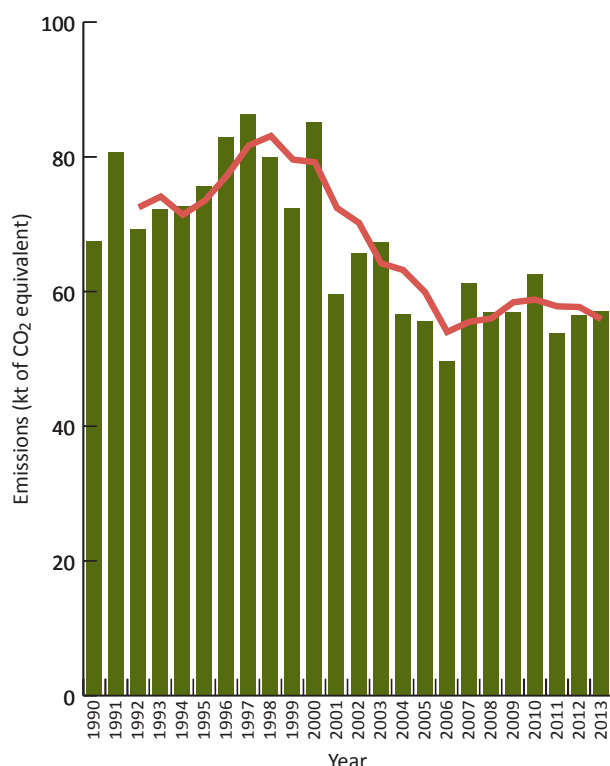


Table 4.1.1: Energy emissions - Power generation

| | Total emissions (kt of CO ₂ equivalent) | Annual % change | Cumulative % change |
|------|--|-----------------|---------------------|
| 1990 | 143.8 | | |
| 1991 | 172.3 | 19.8 | 19.8 |
| 1992 | 147.4 | -14.5 | 2.5 |
| 1993 | 153.6 | 4.2 | 6.8 |
| 1994 | 154.7 | 0.7 | 7.5 |
| 1995 | 161.0 | 4.1 | 12.0 |
| 1996 | 166.2 | 3.2 | 15.5 |
| 1997 | 168.0 | 1.1 | 16.8 |
| 1998 | 175.8 | 4.6 | 22.2 |
| 1999 | 180.1 | 2.5 | 25.3 |
| 2000 | 168.7 | -6.4 | 17.3 |
| 2001 | 40.7 | -75.9 | -71.7 |
| 2002 | 35.8 | -12.0 | -75.1 |
| 2003 | 42.0 | 17.3 | -70.8 |
| 2004 | 35.2 | -16.2 | -75.5 |
| 2005 | 51.5 | 46.4 | -64.2 |
| 2006 | 104.1 | 102.1 | -27.6 |
| 2007 | 74.6 | -28.3 | -48.1 |
| 2008 | 116.8 | 56.4 | -18.8 |
| 2009 | 102.2 | -12.5 | -29.0 |
| 2010 | 56.8 | -44.4 | -60.5 |
| 2011 | 67.7 | 19.1 | -52.9 |
| 2012 | 158.0 | 133.5 | 9.9 |
| 2013 | 142.3 | -9.9 | -1.1 |

4.1 Emissions by Source - Energy

Figure 4.1.2: Energy emissions - Industrial combustion



Energy emissions also include industrial combustion emissions (relating to building processes, use of generators etc), which decreased by 15.3% (or 10.3kt of CO₂ equivalent) between 1990 and 2013 (see **Figure 4.1.2** and **Table 4.1.2**). The red line on the chart shows the historic three year average.

The majority of the emissions are in the form of carbon dioxide, but methane and nitrous oxide are also released in the combustion processes.

This source was the fifth largest contributor to emissions in 2013, at 57.1kt of CO₂ equivalent (10.8% of the total).

Levels of greenhouse gas emitted from Guernsey as a result of industrial fuel combustion had generally trended downwards since a peak in 1997 (see **Figure 4.1.2**). However, levels began to increase again after 2006.

In 2013, emissions from industrial combustion were 1.0% (0.6kt of CO₂ equivalent) higher than in 2012.

Table 4.1.2: Energy emissions - Industrial combustion

| | Total emissions (kt of CO ₂ equivalent) | Annual % change | Cumulative % change |
|------|--|-----------------|---------------------|
| 1990 | 67.5 | | |
| 1991 | 80.7 | 19.7 | 19.7 |
| 1992 | 69.3 | -14.2 | 2.7 |
| 1993 | 72.2 | 4.2 | 7.1 |
| 1994 | 72.7 | 0.7 | 7.8 |
| 1995 | 75.7 | 4.1 | 12.2 |
| 1996 | 83.0 | 9.7 | 23.1 |
| 1997 | 86.4 | 4.0 | 28.0 |
| 1998 | 79.9 | -7.5 | 18.4 |
| 1999 | 72.4 | -9.4 | 7.3 |
| 2000 | 85.1 | 17.6 | 26.2 |
| 2001 | 59.6 | -30.0 | -11.6 |
| 2002 | 65.7 | 10.2 | -2.6 |
| 2003 | 67.3 | 2.4 | -0.3 |
| 2004 | 56.7 | -15.7 | -15.9 |
| 2005 | 55.6 | -2.0 | -17.6 |
| 2006 | 49.7 | -10.6 | -26.3 |
| 2007 | 61.3 | 23.4 | -9.1 |
| 2008 | 56.9 | -7.2 | -15.6 |
| 2009 | 57.0 | 0.0 | -15.6 |
| 2010 | 62.6 | 9.9 | -7.2 |
| 2011 | 53.9 | -13.9 | -20.1 |
| 2012 | 56.5 | 4.9 | -16.2 |
| 2013 | 57.1 | 1.0 | -15.3 |

4.1 Emissions by Source - Energy

Emissions from transport decreased between 1990 and 2013 by 20.4% (26.5kt of CO₂ equivalent) to 103.4kt of CO₂ equivalent (see **Figure 4.1.3** and **Table 4.1.3**). The red line on the chart shows the historic three year average.

Despite this decrease, emissions from this source constituted the third largest proportion of the total in 2013, when it contributed 27.6% of energy emissions and 19.6% of total emissions.

Similar to previous years, approximately 80% of transport emissions resulted from on Island road transport in 2013.

Levels of greenhouse gases emitted as a result of transport have generally been trending downwards since a peak in 2000 (see **Figure 4.1.3**).

The majority of greenhouse gas emissions resulting from transport are carbon dioxide. Other non-greenhouse gas air pollutants, such as nitrogen dioxide, sulphur dioxide are also present in vehicle exhaust emissions.

Figure 4.1.3: Energy emissions - Transport

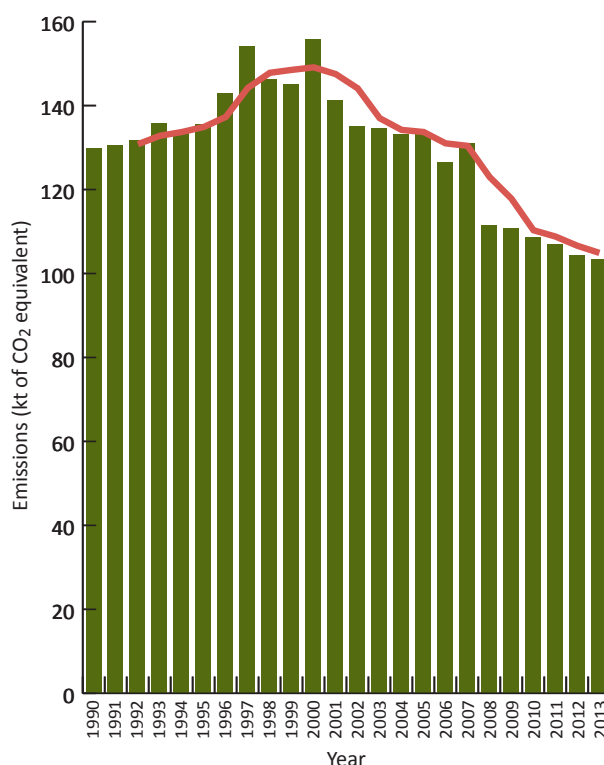
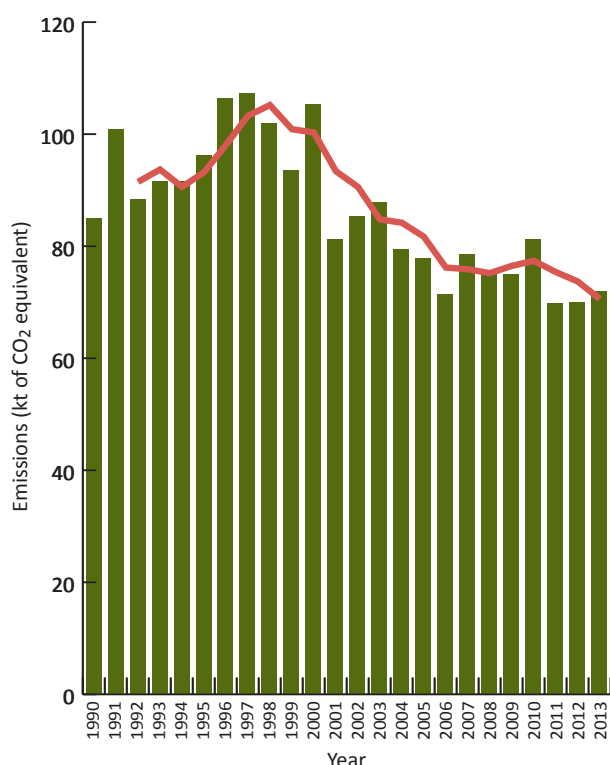


Table 4.1.3: Energy emissions - Transport

| | Total emissions (kt of CO ₂ equivalent) | Annual % change | Cumulative % change |
|------|--|-----------------|---------------------|
| 1990 | 129.9 | | |
| 1991 | 130.5 | 0.5 | 0.5 |
| 1992 | 131.8 | 1.0 | 1.5 |
| 1993 | 135.9 | 3.1 | 4.6 |
| 1994 | 133.3 | -1.9 | 2.6 |
| 1995 | 135.6 | 1.8 | 4.4 |
| 1996 | 142.9 | 5.4 | 10.0 |
| 1997 | 154.2 | 7.9 | 18.7 |
| 1998 | 146.3 | -5.1 | 12.6 |
| 1999 | 145.2 | -0.7 | 11.7 |
| 2000 | 155.9 | 7.4 | 20.0 |
| 2001 | 141.3 | -9.3 | 8.8 |
| 2002 | 135.0 | -4.5 | 3.9 |
| 2003 | 134.6 | -0.3 | 3.6 |
| 2004 | 133.1 | -1.1 | 2.5 |
| 2005 | 133.5 | 0.3 | 2.8 |
| 2006 | 126.5 | -5.3 | -2.7 |
| 2007 | 131.1 | 3.7 | 0.9 |
| 2008 | 111.4 | -15.0 | -14.2 |
| 2009 | 110.9 | -0.5 | -14.7 |
| 2010 | 108.7 | -2.0 | -16.4 |
| 2011 | 106.9 | -1.6 | -17.7 |
| 2012 | 104.3 | -2.5 | -19.8 |
| 2013 | 103.4 | -0.8 | -20.4 |

4.1 Emissions by Source - Energy

Figure 4.1.4: Energy emissions - Commercial and domestic combustion



Commercial and domestic combustion of fuels for heating and hot water in homes and offices etc also contribute a substantial amount of the Island's emissions (13.6% of the 2013 total).

The emissions from commercial and domestic combustion were 72.0kt of CO₂ equivalent in 2013, which was 15.4% lower than in 1990 but 2.7% higher than in 2012 (see [Table 4.1.4](#)).

The emissions from this source have ranged from under 70kt to over 100kt of CO₂ equivalent over the twenty-four years covered by the inventory. The trend (see [Figure 4.1.4](#)) is similar to that for industrial combustion (as in [Figure 4.1.2, Page 6](#)), generally decreasing over the ten year period ending in 2006.

The red line on the chart shows the historic three year average.

Table 4.1.4: Energy emissions - Commercial and domestic combustion

| | Total emissions (kt of CO ₂ equivalent) | Annual % change | Cumulative % change |
|------|--|-----------------|---------------------|
| 1990 | 85.1 | | |
| 1991 | 100.9 | 18.6 | 18.6 |
| 1992 | 88.5 | -12.3 | 4.0 |
| 1993 | 91.7 | 3.6 | 7.8 |
| 1994 | 91.6 | -0.1 | 7.7 |
| 1995 | 96.2 | 5.0 | 13.1 |
| 1996 | 106.4 | 10.6 | 25.1 |
| 1997 | 107.3 | 0.8 | 26.1 |
| 1998 | 101.9 | -5.0 | 19.7 |
| 1999 | 93.6 | -8.1 | 10.0 |
| 2000 | 105.3 | 12.5 | 23.8 |
| 2001 | 81.2 | -22.9 | -4.6 |
| 2002 | 85.3 | 5.0 | 0.2 |
| 2003 | 87.8 | 3.0 | 3.2 |
| 2004 | 79.5 | -9.5 | -6.6 |
| 2005 | 77.9 | -2.0 | -8.5 |
| 2006 | 71.4 | -8.4 | -16.1 |
| 2007 | 78.6 | 10.1 | -7.6 |
| 2008 | 75.7 | -3.7 | -11.1 |
| 2009 | 75.1 | -0.7 | -11.7 |
| 2010 | 81.3 | 8.2 | -4.4 |
| 2011 | 69.8 | -14.2 | -18.0 |
| 2012 | 70.1 | 0.4 | -17.7 |
| 2013 | 72.0 | 2.7 | -15.4 |

4.2 Emissions by Source - Agriculture, land use, land use change and forestry

Other emissions include those from agriculture, land use, land use change and forestry (shown in **Figure 4.2.1**), which contributed 3.3% of the total emissions in 2013. The red line on the chart shows the historic three year average.

The majority of these emissions are methane released by the digestive processes of cattle. The decrease between 1995 and 1996 resulted from a change in the way cattle data were sourced.

There was a decrease in the number of cattle in the Island in 2001, when the milk quota was reduced, resulting in a reduction in emissions from cattle. Livestock-related emissions have since remained at a steady level. However, there has been a generally increasing trend in total emissions from this source since 2002, due to increasing emissions resulting from land use change.

The total level of emissions from these sources decreased by 18.5% between 1990 and 2013.

Figure 4.2.1: Agriculture, land use, land use change and forestry emissions

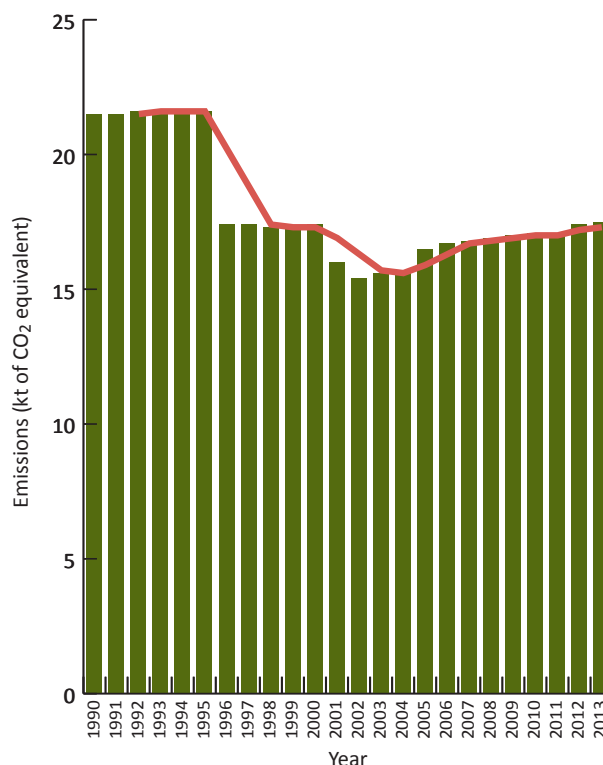


Table 4.2.1: Agriculture, land use, land use change and forestry emissions

| | Total emissions (kt of CO ₂ equivalent) | Annual % change | Cumulative % change |
|------|--|-----------------|---------------------|
| 1990 | 21.5 | | |
| 1991 | 21.5 | 0.0 | -0.0 |
| 1992 | 21.6 | 0.5 | 0.5 |
| 1993 | 21.6 | 0.0 | 0.5 |
| 1994 | 21.6 | -0.2 | 0.3 |
| 1995 | 21.6 | 0.0 | 0.3 |
| 1996 | 17.4 | -19.4 | -19.2 |
| 1997 | 17.4 | 0.1 | -19.1 |
| 1998 | 17.3 | -0.3 | -19.3 |
| 1999 | 17.3 | -0.1 | -19.4 |
| 2000 | 17.4 | 0.4 | -19.1 |
| 2001 | 16.0 | -7.9 | -25.5 |
| 2002 | 15.4 | -3.8 | -28.3 |
| 2003 | 15.6 | 1.2 | -27.4 |
| 2004 | 15.7 | 0.3 | -27.2 |
| 2005 | 16.5 | 5.4 | -23.2 |
| 2006 | 16.7 | 1.3 | -22.2 |
| 2007 | 16.8 | 0.6 | -21.8 |
| 2008 | 16.9 | 0.5 | -21.4 |
| 2009 | 17.0 | 0.6 | -20.9 |
| 2010 | 17.1 | 0.6 | -20.5 |
| 2011 | 17.0 | -0.3 | -20.7 |
| 2012 | 17.4 | 1.9 | -19.2 |
| 2013 | 17.5 | 0.9 | -18.5 |

4.3 Emissions by Source - Waste

Figure 4.3.1: Waste emissions

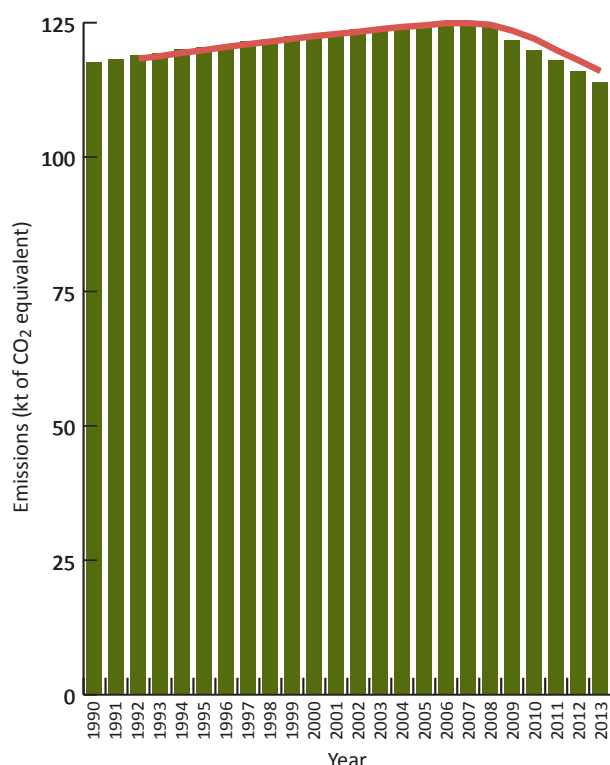


Table 4.3.1: Waste emissions

| | Total emissions (kt of CO ₂ equivalent) | Annual % change | Cumulative % change |
|------|--|-----------------|---------------------|
| 1990 | 117.7 | | |
| 1991 | 118.3 | 0.5 | 0.5 |
| 1992 | 118.9 | 0.5 | 1.0 |
| 1993 | 119.4 | 0.5 | 1.4 |
| 1994 | 120.0 | 0.5 | 1.9 |
| 1995 | 120.5 | 0.4 | 2.3 |
| 1996 | 120.9 | 0.4 | 2.7 |
| 1997 | 121.5 | 0.4 | 3.2 |
| 1998 | 122.0 | 0.4 | 3.6 |
| 1999 | 122.5 | 0.4 | 4.1 |
| 2000 | 122.9 | 0.3 | 4.4 |
| 2001 | 123.3 | 0.4 | 4.8 |
| 2002 | 123.8 | 0.3 | 5.1 |
| 2003 | 124.2 | 0.3 | 5.5 |
| 2004 | 124.5 | 0.3 | 5.8 |
| 2005 | 124.9 | 0.3 | 6.1 |
| 2006 | 125.2 | 0.3 | 6.4 |
| 2007 | 124.5 | -0.6 | 5.7 |
| 2008 | 124.2 | -0.2 | 5.5 |
| 2009 | 121.8 | -1.9 | 3.5 |
| 2010 | 119.9 | -1.6 | 1.9 |
| 2011 | 118.1 | -1.5 | 0.3 |
| 2012 | 116.0 | -1.7 | -1.4 |
| 2013 | 114.0 | -1.7 | -3.2 |

Waste is the next largest contributor to Guernsey's total emissions after energy. It contributed 21.6% (114.0kt of CO₂ equivalent) of the total emissions in 2013.

The emissions are mostly in the form of methane gas, which is released as landfilled matter decomposes. In a weight for weight comparison, methane has a twenty one times higher global warming potential than carbon dioxide i.e. one kilotonne of methane is equivalent to 21 kilotonnes of carbon dioxide.

As a result, relatively small changes in the amount of methane emitted equate to considerably larger changes to emissions in terms of CO₂ equivalents.

There have been decreases in the emissions from this source since 2007 (see [Figure 4.3.1](#) and [Table 4.3.1](#)). This mirrors the trend in waste going to landfill during these years.

The cumulative decrease between 1990 and 2013 was 3.2% (or 3.7kt of CO₂ equivalent). The red line on the chart shows the historic three year average.

Please note that this time series has been revised since the previous publication, due to improvements in the way waste emissions are calculated, which have had a noticeable impact on the trend.

5.1 Emissions - F-Gases

Fluorinated gases (“F-gases”) are not estimated by source in the same way as the other three gases mentioned above, but are included in the total greenhouse gas emissions.

F-gases can be released by refrigeration, air-conditioning and heat pump systems if they leak or are disposed of improperly. They contribute a relatively small, but increasing amount of total emissions (see **Figure 5.1.1**). The red line on the chart shows the historic three year average.

In 2013, they contributed 4.2% of the total, compared to less than 0.01% in 1990, an increase of 22.1kt of CO₂ equivalent.

F-gases have very high global warming potentials compared to carbon dioxide. As such, amounts in the region of one gram in weight could have the same effect as one tonne of carbon dioxide being released into the atmosphere. The result of this is a highly volatile trend in terms of percentage changes.

Figure 5.1.1: F-gases emissions

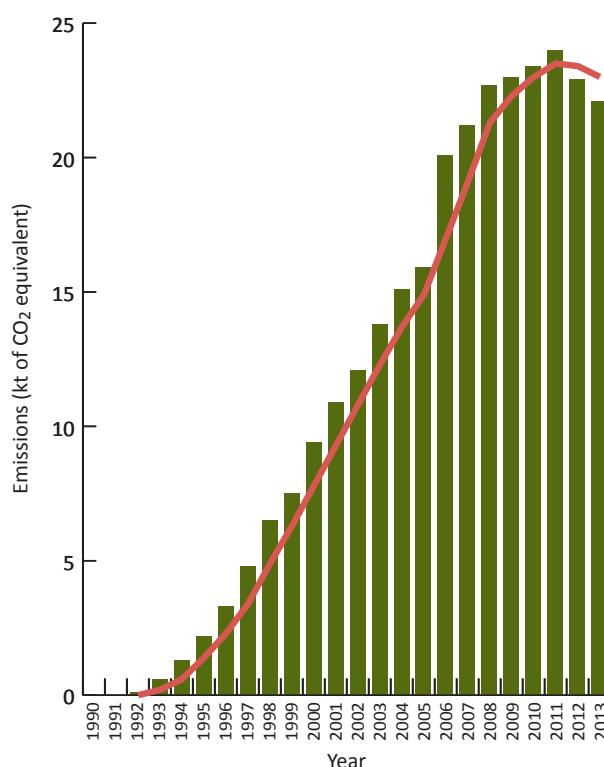


Table 5.1.1: F-gases emissions

| | Total emissions (kt of CO ₂ equivalent) | Annual % change | Cumulative % change |
|------|--|-----------------|---------------------|
| 1990 | 0.0 | | |
| 1991 | 0.0 | 24.2 | 24.2 |
| 1992 | 0.1 | 48.0 | 83.9 |
| 1993 | 0.6 | 897.1 | 1,733.5 |
| 1994 | 1.3 | 132.6 | 4,163.8 |
| 1995 | 2.2 | 69.0 | 7,106.2 |
| 1996 | 3.3 | 46.3 | 10,443.2 |
| 1997 | 4.8 | 45.6 | 15,255.5 |
| 1998 | 6.5 | 36.8 | 20,902.7 |
| 1999 | 7.5 | 15.7 | 24,208.3 |
| 2000 | 9.4 | 24.3 | 30,106.7 |
| 2001 | 10.9 | 16.5 | 35,085.4 |
| 2002 | 12.1 | 11.1 | 39,001.7 |
| 2003 | 13.8 | 13.9 | 44,451.0 |
| 2004 | 15.1 | 9.0 | 48,460.0 |
| 2005 | 15.9 | 5.6 | 51,200.4 |
| 2006 | 20.1 | 26.0 | 64,519.0 |
| 2007 | 21.2 | 5.8 | 68,244.1 |
| 2008 | 22.7 | 6.9 | 72,973.3 |
| 2009 | 23.0 | 1.5 | 74,060.0 |
| 2010 | 23.4 | 1.6 | 75,280.2 |
| 2011 | 24.0 | 2.7 | 77,340.1 |
| 2012 | 22.9 | -4.9 | 73,547.2 |
| 2013 | 22.1 | -3.1 | 71,257.7 |

7.1 Further Information

This bulletin has been compiled by the States of Guernsey Policy and Research Unit. The emissions inventory is calculated by AEA Technology, using data collated from a variety of sources.

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