

# Guernsey's Carbon Emissions

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## Briefing Paper

### Background:

This briefing paper is intended as an updated analysis of Guernsey's annual carbon emissions using the latest Greenhouse Gas Inventory data provided by AEA. For the first time, historical data showing the carbon content of fuel types are also included. Since Guernsey joined the UK in 2002 to ratify the Kyoto Protocol and UN Convention on Climate Change the Island has established with the support of Defra a local emissions inventory. This is now updated annually providing estimates of the six designated greenhouse gases and carbon equivalents.

### Headlines:

- 618 kilotonnes (kt) of greenhouse gases (expressed as Carbon Dioxide equivalent) were emitted in 2007 compared with 622 in the previous year. This is a **drop of 4 kts or 0.64%**.
- The annual average emissions figure for the last 18 years is 668.7kts. This is 104.3kts higher than the target average requiring a reduction of 15.6%.
- To fulfil the Island's commitment to the UK's Kyoto Protocol target, emissions would need to drop by 80.6kt per annum to 2012.
- CO<sub>2</sub> and Methane (CH<sub>4</sub>) are the most prevalent greenhouse gases which in 2007 contributed 96% of all six pollutants.
- Since 1990, emissions of carbon from stationary combustion, which includes emissions from boilers, combustion turbines, engines, incinerators, and process heaters have decreased from 82 to 60 kt Carbon, in 2008. Total emissions from stationary combustion accounted for between 46 and 100kts of carbon per annum, for the last 18 years. A significant source of stationary combustion in Guernsey is the Island's main electricity generating station, which in 2007 accounted for around 20 kt Carbon. However since the turn of the century total emissions have broadly halved which is largely due to the submarine electricity cable link with France.

## Kyoto Protocol and UN Convention on Climate Change:

- Guernsey has signed up to the UK's instruments of ratification of the Kyoto Protocol. The UK's target under the Kyoto Protocol is a 12.5% decrease in emissions of the basket of 6 Greenhouse Gases from the Base Year by 2008-2012.
- Emissions inventories calculated under the Kyoto Protocol are Source Based – which means that the emissions are included at the point of release.
- Based on the 1990-2007 greenhouse gas inventory for Guernsey, emissions have fallen by 4.4% since the 1990/1995 Base Year. In order for Guernsey's emissions to achieve the same decrease in emissions as the UK target, emissions would need to fall to around 566 kt CO<sub>2</sub> equivalent.
- This would require an average per capita reduction of 9.2 tonnes over the next four years.

*Data from Guernsey's Greenhouse Gas Inventory are presented in Appendix 1.*

## Carbon Emitted by Source:

The emissions data presented here are not taken directly from the Greenhouse Gas Inventory, but are calculated using similar methods and source data.

## Electricity Generation

*Table 1: Total Fuel Burnt and Emissions*

Year	Fuel burnt (litres)	Fuel burnt (tonnes)	CO <sub>2</sub> emitted (tonnes)
2003/4	13,673,057	13,167.15	42,245
2004/5	11,376,023	10,955.11	35,148
2005/6	16,955,733	16,328.37	52,389
2006/7	33,700,022	32,453.12	104,120
2007/8	24,215,795	23,319.81	74,818

*Source: Guernsey Electricity Ltd*

## Imported Electricity

The Greenhouse Gas Inventory for Guernsey does not include emissions associated with imported electricity, following the guidelines set out by the IPCC. The following table presents an estimate of emissions for the imported portion of electricity in Guernsey for information.

**Table 2: Carbon Content of Imported Electricity**

Year	Units imported at Barkers Quarry (MWh)	Units exported at La Haye (6% losses)	EDF carbon content (KgCO <sub>2</sub> /kWh)	Total CO <sub>2</sub> emissions (tonnes)
2003/4	266,163	282,132	0.051	14,379
2004/5	288,463	305,771	0.042	12,781
2005/6	276,812	293,421	0.052	15,277
2006/7	197,020	208,841	0.044	9,189
2007/8	257,093	272,518	0.047	12,790

Source: Guernsey Electricity Ltd

**Table 3: Total Imported and Locally Generated CO<sub>2</sub> Emissions**

Year	Import (tonnes CO <sub>2</sub> )	Generate (tonnes CO <sub>2</sub> )	Total (tonnes CO <sub>2</sub> )	Units imported and generated (MWh)	KgCO <sub>2</sub> /kWh
2003/4	14,379	42,244.58	56,623.91	329,451	0.172
2004/5	12,781	35,147.64	47,928.87	341,556	0.140
2005/6	15,277	52,386.84	67,664.29	356,267	0.190
2006/7	9,189	104,120.43	113,309.43	355,195	0.319
2007/8	12,790	74,817.71	87,607.89	367,748	0.238

Source: Guernsey Electricity Ltd

The five year rolling average for KgCO<sub>2</sub>/kWh is 0.2118.

## Oil based products

**Table 4: Total Imported Oil Based Products**

Year	Transport (000's litres)	Heating/Electricity (000's litres)	Total (000's litres)
2003	38,224.00	75,797.00	114,621.00
2004	38,360.00	63,825.00	102,185.00
2005	40,984.00	68,372.00	109,356.00
2006	45,000.00	79,673.00	124,673.00
2007	44,362.00	81,176.00	125,538.00
2008	46,420.59	64,695.93	111,116.52

Source: Customs and Excise

Note: Methodological changes in the way diesel is classified in 2008 resulted in 10,000,000 litres being transferred from heating/electric to the transport category – in real terms there has been a significant decrease in fuel imported for transport since 2007. Included in the Heating/Electricity category is a small proportion (approximately 2% -2008 ) of diesel for electricity generation, the majority is used for commercial and domestic heating requirements.

**Table 5: CO2 Emissions from Transport and Heating/Electricity**

Year	Transport CO <sub>2</sub> emissions (tonnes CO <sub>2</sub> )	Heating/Electricity CO <sub>2</sub> emissions (tonnes CO <sub>2</sub> )	KgCO <sub>2</sub> /kWh
2003	90,236	196,962	0.244
2004	90,559	165,853	0.244
2005	97,041	177,645	0.244
2006	107,109	208,153	0.245
2007	105,835	212,316	0.245
2008	110,744	169,211	0.244

Source: AEA

## Liquid Petroleum Gas

**Table 6: Consumption of Mains and Bottled Gas**

Year	Mains Gas (000's kWh)	Bottled Gas (000's kWh)	Total (000's kWh)
2003	103,690	23,170	126,860
2004	103,100	29,100	132,200
2005	100,565	28,975	129,540
2006	101,994	30,840	132,834
2007	85,959	25,218	111,177
2008	-	-	-

Source: Guernsey Gas

Note: 2008 data currently not available

**Table 7: Total CO2 Emissions**

Year	CO <sub>2</sub> Emitted (tonnes)	KgCO <sub>2</sub> /kWh
2003	27,148.04	0.214
2004	28,290.80	0.214
2005	27,721.56	0.214
2006	28,426.48	0.214
2007	23,791.88	0.214
2008	-	-

Source: AEA

## Calculation Methodology

### Greenhouse Gas Inventory:

Guernsey together with Jersey and the Isle of Man are included in the UK National Atmospheric Emissions Inventory which is updated annually by AEA and is published by the Department of Energy and Climate Change ([www.decc.gov.uk](http://www.decc.gov.uk)). Emission estimates are calculated by applying emission factors (carbon content of fuels) on processes producing emissions as opposed to measurements at the point of emission. Greenhouse gas emissions are calculated in the format required by the Intergovernmental Panel on Climate Change (IPCC). The UK inventory is reviewed every year, and the whole historical data series is revised to incorporate methodological improvements and the new data.

### Carbon Intensity of Energy Sources:

#### *Electricity:*

Using Defra's Greenhouse Gas conversion tables each local fuel type (electricity, LPG gas and petroleum based products) is converted to measure its carbon emissions based on the gross calorific content. For local fuel types, the base data for electricity is sourced from Guernsey Electricity Ltd which is the quantity of fuel burnt for power generation together with electricity imported from France via EDF. Adjustments are made to take account of an average 6% per annum transmission losses between the point of despatch at La Haye and the point of entry at Barkers Quarry.

Due to fluctuations in imported power supply and to more effectively monitor trends over time a five year rolling average is calculated. This will reduce the distorting effect of the despatch regime in any one year.

#### *Oil Based Products:*

The calculation for determining the carbon content of transport and heating/electricity is based on a weighted average of the carbon content of fuels imported to Guernsey.

Transport fuels comprise aviation spirit, jet fuel and unleaded petrol. Fuels used for Heating/ Electricity comprising Kerosene, gas oil (diesel) and fuel oils.

#### *LPG Gas:*

To produce an annual carbon intensity figure for LPG gas, both bottled and mains are amalgamated providing an overall carbon emissions figure which is based on consumption data rather than imports. All data are supplied by Guernsey Gas Ltd.

## Appendix 1

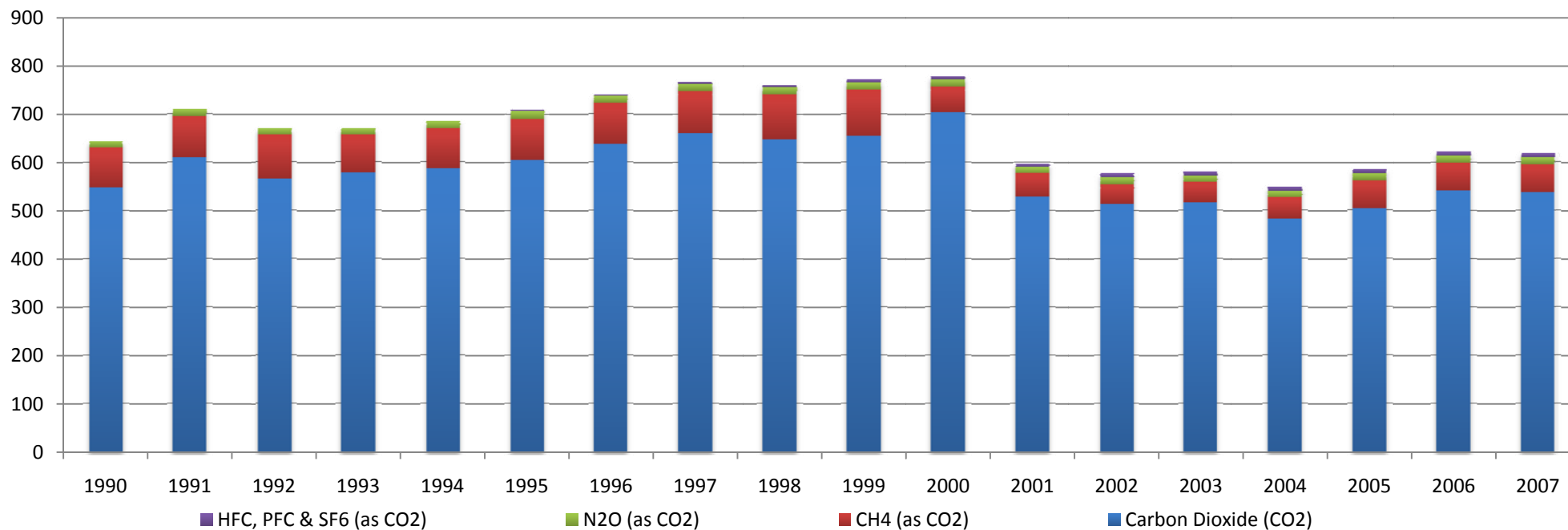
*Table 1: Greenhouse Gas Pollutants (ktonnes)*

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
<b>Carbon Dioxide (CO<sub>2</sub>)</b>	548	609	565	578	587	606	637	660	649	654	703	529	514	516	483	504	541	537
<b>CH<sub>4</sub> (as CO<sub>2</sub>)</b>	83	87	91	78	82	85	86	89	93	96	54	48	41	42	43	58	59	59
<b>N<sub>2</sub>O (as CO<sub>2</sub>)</b>	14	14	14	14	15	16	14	15	15	15	15	13	14	14	14	14	14	14
<b>HFC, PFC &amp; SF<sub>6</sub> (as CO<sub>2</sub>)</b>	0	0	0	0	1	2	3	4	5	6	7	8	8	8	8	9	8	8
<b>TOTAL (as CO<sub>2</sub>)</b>	<b>645</b>	<b>710</b>	<b>670</b>	<b>671</b>	<b>685</b>	<b>708</b>	<b>740</b>	<b>768</b>	<b>762</b>	<b>771</b>	<b>779</b>	<b>598</b>	<b>577</b>	<b>580</b>	<b>549</b>	<b>585</b>	<b>622</b>	<b>618</b>
<b>TOTAL (as Carbon)</b>	<b>176</b>	<b>194</b>	<b>183</b>	<b>183</b>	<b>187</b>	<b>193</b>	<b>202</b>	<b>209</b>	<b>208</b>	<b>210</b>	<b>212</b>	<b>163</b>	<b>157</b>	<b>158</b>	<b>150</b>	<b>160</b>	<b>170</b>	<b>169</b>

*Source: AEA Technology*

*Note: All greenhouse gases (GWP)*

*Chart 1: Guernsey Green House Gas Emissions (as CO<sub>2</sub> equivalents)*



*Table 2: CO2 Emissions by Sector (ktonnes)*

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
<b>1 Energy - stationary combustion</b>	82	98	84	87	88	92	98	100	98	95	100	49	52	54	46	50	60	60
Energy - road transport	26	26	25	25	25	25	25	27	26	28	28	29	25	25	25	27	30	29
<b>Energy - other mobile sources</b>																		
Industrial/domestic machinery	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
Shipping	19	19	19	19	19	19	22	22	22	22	25	25	26	26	26	26	25	25
Aviation	10	11	13	13	16	16	16	18	18	21	26	28	25	22	22	22	19	19
<b>2 Industrial processes</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>3 Solvent use</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>4 Agriculture</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>5 Land use change and forestry</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>6 Waste - MSW</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>TOTAL</b>	<b>149</b>	<b>166</b>	<b>154</b>	<b>158</b>	<b>160</b>	<b>165</b>	<b>174</b>	<b>180</b>	<b>177</b>	<b>178</b>	<b>192</b>	<b>144</b>	<b>140</b>	<b>141</b>	<b>132</b>	<b>138</b>	<b>147</b>	<b>146</b>

*Source: AEA Technology*

*Note: CO2 emissions only*

Chart 2: Carbon Emissions by Sector, 1990 - 2007

