

IRELAND'S EMISSIONS OF GREENHOUSE GASES

FOR THE PERIOD 1990-2004

March 2006

Summary

The Environmental Protection Agency (EPA) has finalised its latest inventory of Ireland's Greenhouse Gas (GHG) emissions. The inventory covers the period 1990 – 2004 and takes account of new methodological guidance, the outcome of recent national research, revised information on energy use, and further information received, mainly in respect of the process and waste sectors, subsequent to the release of provisional figures in February 2006.

The following are some key features of the figures for 2004:

- The agriculture, energy industries, and transport sectors remain the principal sources of GHG emissions, together accounting for just over 70% of total national emissions.
- Following two successive years of reductions there was a slight increase in overall emissions of GHG in 2004.
- Overall GHG emissions in 2004 were 68.46 Mt (million tonnes) CO₂ (carbon dioxide) equivalent.
- This is 0.15% higher than in 2003.
- This reflects changes in sectors as follows between 2003 and 2004:
 - Emissions from the *transport* sector increased by 6.1%; this continues a significant long term trend of increased emissions from transport;
 - Emissions from the *residential* sector increased by 7.3%; this increase follows a number of years when emissions from this sector showed little change;
 - Emissions from the *processes* sector increased by 6.8%; this followed a sharp reduction in the 2002 to 2003 period resulting from the closure of ammonia and nitric acid plants;
 - Emissions from the waste sector increased by 4.8%.

While on the positive side:

- Total emissions from *energy industries* (power generation & oil refining) decreased by 5.6 %, due to reduced fugitive emissions, more efficient plants and some reduction in peat use (combustion emissions from this sector were down 2.5%);
- there were slight reductions in emissions from the *industry* (-2%) and *agriculture* (-1%) sectors.
- Based on the latest inventory figures, Ireland's emissions in 2004 were 23.1% higher than in 1990.

Ireland's target in relation to the Kyoto Protocol is to limit emissions to 13% above the 1990 level in the period 2008-2012.

Ireland's total allocation of greenhouse gases for the period 2008-2012 will be 315 Mt CO₂ equivalent, i.e., an average of 63 Mt per annum over the five-year period. Emissions in excess of that total would require use of the flexible mechanisms that are provided for under the Kyoto Protocol.

Introduction

The Environmental Protection Agency has the responsibility to compile the inventories of GHG emissions for Ireland. These inventories are compiled on an annual basis using international best practice guidelines established by the Intergovernmental Panel on Climate Change (IPCC). The 2006 submission to the United Nations Framework Convention on Climate Change (UNFCCC) must contain the final and definitive estimates for 1990 for the purpose of setting the baseline and the allowable emissions in the period 2008-2012 under the Kyoto Protocol.

Based on the latest revised IPCC best practice guidelines for GHG inventories, the EPA has prepared the 1990-2004 time series of emission estimates employing more detailed methodologies and taking on board the findings of major EPA sponsored research studies completed during 2005 and revised energy balances provided by Sustainable Energy Ireland (SEI). The research work had been one of the key actions assigned to the EPA under the National Climate Change Strategy (NCCS).

Following the submission of preliminary estimates in January to the European Commission and the subsequent general release of an information bulletin on the provisional figures, revised data obtained in respect of some emission sources have been taken into account and in-depth checking of calculations and inputs has been conducted to arrive at the final estimates.

The finalised 2004 figures are first outlined, followed by an account of how these differ from 2003 and a discussion of the longer-term trends and finally the significance of the figures in relation to Ireland's commitments under the Kyoto Protocol.

Ireland's Greenhouse Gas Emissions in 2004

The latest data indicate that emissions of greenhouse gases in Ireland in 2004 were 68.46 million tonnes CO₂ equivalent. Figure 1 shows the contributions from each of the sectors (using the sector categories as set out in the National Climate Change Strategy). *Agriculture* remains the single largest contributor to the overall emissions, where emissions of methane and nitrous oxide account for 29% of the national total of CO₂ equivalents, followed by *energy* (power generation & oil refining) at just over 23% and *transport* at 18.4%.

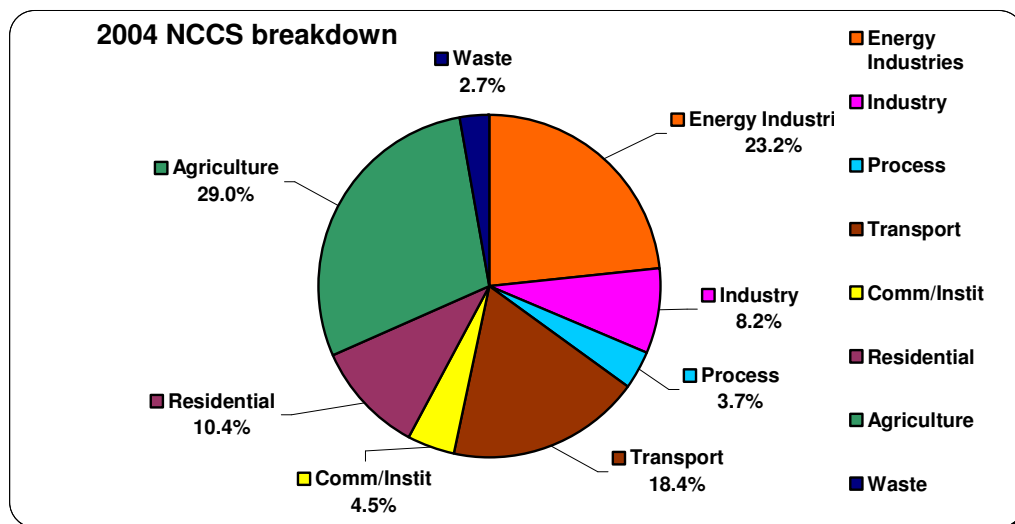


Figure 1. Greenhouse Gas Emissions 2004 by Sector

Changes in Emissions from Sectors between 2003 and 2004

Key changes in sectors (using the National Climate Change Strategy sector categories) between 2003 and 2004 are summarised below. The emissions from the sectors are expressed as Mt of CO₂ equivalent and the year on year percentage changes are also given.

- Emissions from *agriculture* decreased from 20.07 Mt in 2003 to 19.88 Mt in 2004, a decrease of 193 kilotonnes (kt) or 1%, due largely to a slight reduction in emissions of nitrous oxide from fertilizer use.
- Emissions from the *residential* sector increased from 6.61 Mt in 2003 to 7.10 Mt in 2004 (up 7.3%). This reflects increases in population and housing stock.
- *Transport* emissions increased from 11.85 Mt in 2003 to 12.58 Mt in 2004 (up 6.1%). This reflects increases in population and road traffic.
- Emissions from the *processes* sector increased from 2.35 Mt in 2003 to 2.50 Mt in 2004 an increase of 0.16 Mt or 6.8%. This increase was due to increased emissions from the cement industry. The increase, however, was substantially less than that indicated in the provisional figures.
- Emissions from the *waste* sector increased in 2004 from 1.75 Mt to 1.83 Mt, an increase of 0.08 Mt or 4.8%. Approximately 90% of the emissions in this sector were due to methane gas released from landfill waste disposal sites.
- Total emissions from *energy industries* (power generation & oil refining) decreased from 16.85 Mt in 2003 to 15.9 Mt in 2004, a decrease of 0.95 Mt (5.6%), due to reduced fugitive emissions, more efficient plants and some reduction in peat use (combustion emissions from this sector were down 2.5%).

Long-term Changes in Emissions from Sectors 1990-2004

The emissions from the sectors over the full time series 1990-2004 are set out in Figures 2 and 3. The graphs show the trends and the relative contributions from each sector, broken down by the categories set out in the 2000 National Climate Change Strategy. The figures for 1990 and for the years 2000-2004 are also given in Table 1 (all figures are in kt). From these, some longer-term changes and trends are clear.

The most significant and sustained increase in emissions has been in the *transport* sector. For the sector overall, the emissions are well over double what they were in 1990 (an increase of 144%). This increase is due almost entirely to road transport and it occurred mainly between 1994 and 2004 when emissions increased from 5.66 Mt to 12.13 Mt of CO₂ equivalent.

Emissions from the *energy industries* sector in 2004 were almost 35% above 1990 levels, but a downward trend is evident since 2001.

Emissions in the *agriculture* sector increased over the course of the 1990s - but since the end of that decade have reduced, resulting from a decline in both livestock populations and fertiliser use, with the net result that emissions from agriculture in 2004 were marginally lower than in 1990.

The variations in emissions from the *residential* sector over the period reflected a shift from coal and peat to oil and natural gas, tending to reduce emissions, but countered, particularly in more recent years, by increases in population and housing stock, tending to increase emissions.

Emissions from the *industry* sector, following increases over the latter part of the 1990s have stabilised somewhat in recent years.

The *process* sector includes industrial processes such as cement and lime manufacture. It also includes production of ammonia and nitric acid at the former IFI plants, the closure of which led to a substantial reduction in emissions from the sector after 2001. Process emissions from clinker production in cement manufacturing increased from 0.86 Mt in 1994 to 2.29 Mt of CO₂ in 2004. The nett result, including the closures referred to above, is that the process sector overall is down 20% since 1990.

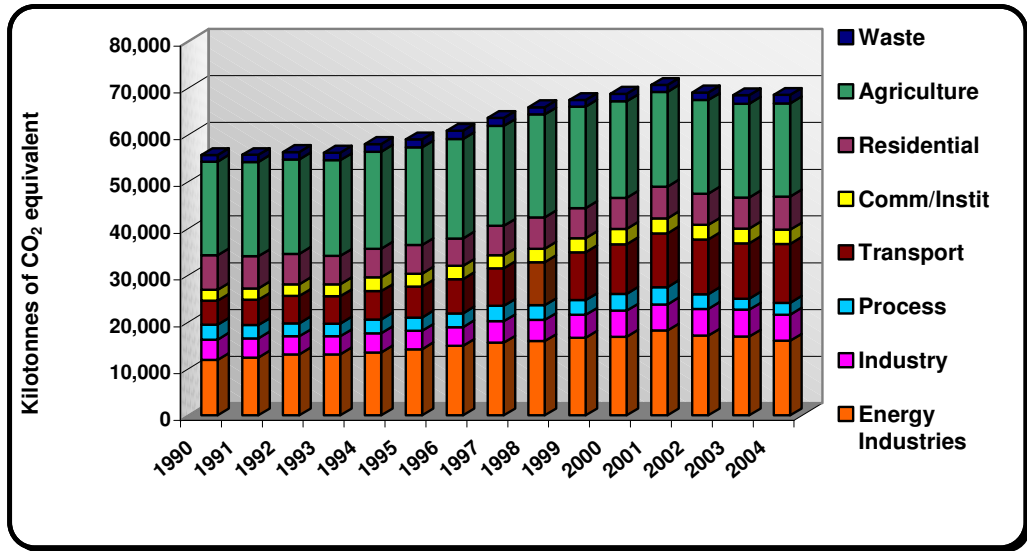


Figure 2. Relative Contributions to Greenhouse Gases by Sector 1990-2004

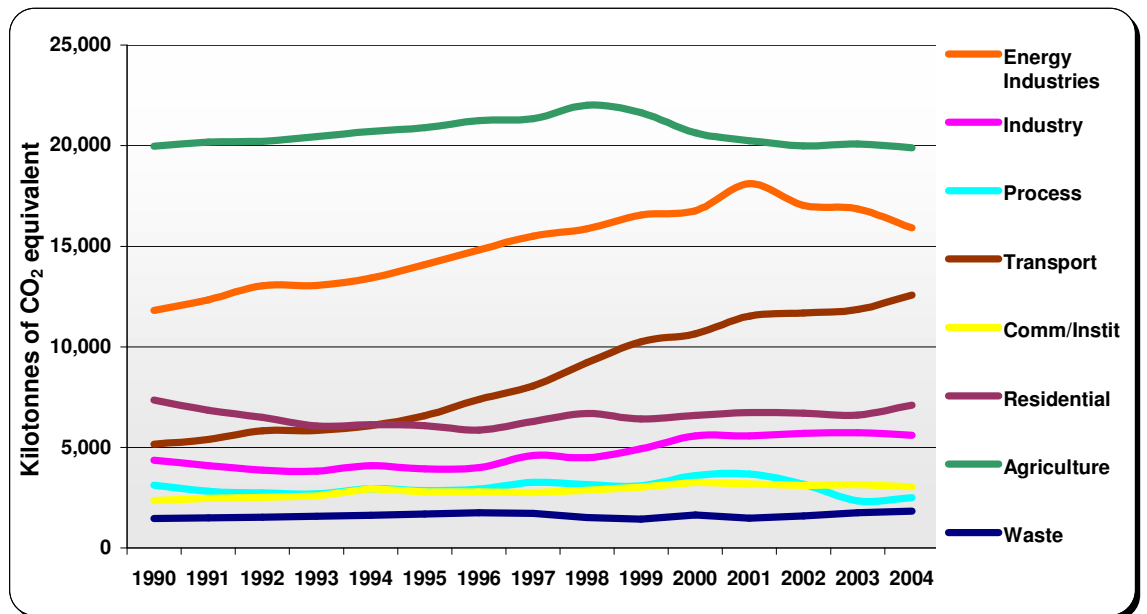


Figure 3. Trends by Sector 1990-2004

Table 1 Greenhouse Gas Emissions in 1990 and in recent Years (kt)

	% share	1990	2000	2001	2002	2003	2004	% share	% change 1990-2004
Energy Industries	21.2	11,805.56	16,767.38	18,113.93	17,030.37	16,847.03	15,903.21	23.2	34.71
Industry	7.9	4,367.35	5,574.80	5,584.33	5,700.99	5,723.08	5,611.66	8.2	28.49
Process	5.6	3,130.24	3,596.41	3,675.82	3,162.92	2,345.62	2,504.09	3.7	-20.00
Transport	9.3	5,159.46	10,639.47	11,530.98	11,678.23	11,850.77	12,578.76	18.4	143.80
Comm/Instit	4.2	2,356.17	3,270.00	3,191.68	3,104.83	3,155.45	3,048.81	4.5	29.40
Residential	13.2	7,355.05	6,588.51	6,723.80	6,705.27	6,614.01	7,099.17	10.4	-3.48
Agriculture	35.9	19,979.05	20,641.17	20,251.89	19,995.81	20,074.26	19,881.12	29.0	-0.49
Waste	2.6	1,460.75	1,650.92	1,477.36	1,606.13	1,750.28	1,833.63	2.7	25.53
Total		55,614	68,729	70,550	68,985	68,361	68,460		

Long-term Changes in Total GHG emissions 1990-2004

Ireland's target in relation to the Kyoto Protocol is to limit emissions to 13% above the 1990 level in the period 2008-2012. The latest inventory figures show that Ireland emitted 55.6 Mt CO₂ equivalent in 1990. Based on this value, Ireland's total allocation of greenhouse gases for the period 2008-2012 (which is called the assigned amount) will be 315 million tonnes CO₂ equivalent. This corresponds to an average of 63 Mt per annum over the five-year period, which may be compared to the level of 68.46 Mt in 2004.

Emissions in excess of the total of 315 Mt over the five years would have to be implemented through the flexible mechanisms that are provided for under the Kyoto Protocol, viz., emissions trading, joint implementation and the clean development mechanism.

Figure 4 shows the index of national total emissions from 1990 to 2004 in comparison to the 'straight line' target path from 1990 to 2010 given by the allowable 13% increase. The index for 1990 is set at 100 and that for other years are shown relative to the 1990 index.

Based on the final estimates for the full time-series, Ireland's emissions in recent years in terms of percentage above the 1990 baseline were:

- 26.9% in 2001 (index 126.9)
- 24.0% in 2002 (index 124.0)
- 22.9% in 2003 (index 122.9)
- 23.1% in 2004 (index 123.1)

This again shows how the downward trend observed in 2002 and 2003 has not continued with emissions rising slightly in 2004 (see Figure 4).

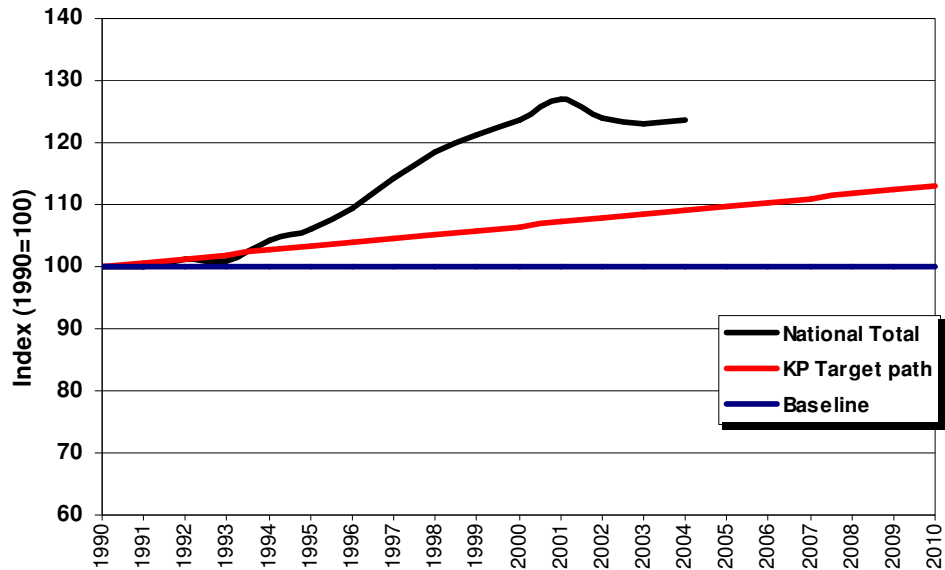


Figure 4. Greenhouse Gas emissions trend compared to Kyoto Target Path

Notes

1 Mt (million tonnes) = 1,000 kt (kilotonnes)

CO₂ Equivalent: CO₂ is the main greenhouse gas. Emissions of other greenhouse gases are converted to CO₂ equivalent on the basis of their global warming potential (GWP). For example, the GWP of methane is 21, which means that one tonne of methane is equivalent to 21 tonnes of CO₂.

National Climate Change Strategy: The Government Strategy from 2000 to combat Climate Change divides the sectors emitting greenhouse gases into eight categories: Transport, Commercial/Institutional (combustion emissions from hospitals, universities, shopping centres, public buildings, businesses and schools), Process (cement, lime, ammonia and nitric acid process emissions only), Energy (power generation), Industry (combustion emissions from industry), Agriculture (ruminant digestion, agricultural soils and manures), Waste (waste disposal), and Residential.