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22nd October 2010

IRELAND'S GREENHOUSE GAS EMISSIONS IN 2009

Summary

The EPA has produced provisional estimates of greenhouse gas emissions for 2009. These provisional estimates are published earlier than in previous years and have allowed Ireland to input into the compilation of the European Environment Agency's provisional 2009 inventory for the European Union.

Ireland's provisional estimates will be finalised upon confirmation of the underlying input data, which is provided by key data providers to the EPA. The finalised 2009 inventory will then be submitted to the European Commission in March 2011 and the UNFCCC in April 2011. The purpose of publishing the provisional estimates at this stage is to give an indication of the scale of the change in emissions particularly in the context of the economic downturn in 2009.

For 2009, total national greenhouse gas emissions are estimated to be 62.32 million tonnes carbon dioxide equivalent (Mt CO₂eq) which is significantly lower (7.9% lower or 5.36 Mt CO₂eq) than emissions in 2008.

This further closes the gap to our Kyoto Protocol limit and results in an overall exceedance of the limit, based on the first two years of the Kyoto Period (i.e. 2008 and 2009), of 6.21 Mt CO₂eq when the impact of forest sinks and of the EU-Emissions Trading Scheme are included.

Ireland's Greenhouse Gas Emissions in 2009

Total greenhouse gas emissions in 2009 are estimated to be 62.32 Mt CO₂eq, which is 7.9% (5.36 Mt CO₂eq) lower than the level of emissions in 2008.

Agriculture remains the single largest contributor to the overall emissions, at 29.1% of the total, followed by *Transport* and *Energy* (primarily power generation) both at 21.1%. The remainder is made up by the *Industry and Commercial* at 14.8%, *Residential* sector at 12.0% and *Waste* at 1.9%.

The 2009 estimates of greenhouse gas emissions show a considerable annual reduction compared with 2008 emissions which primarily reflects the downturn in economic activity during 2009. The impact of the measures already adopted under the National Climate Change Strategy and other Government policy documents such as the Energy White Paper are incorporated into these figures. Participants operating under the EU Emission Trading Scheme accounted for 3.16 Mt CO₂eq. of the total annual reduction.

The effects of the economic downturn are mainly evident in

- *Industry and Commercial* sector - emissions are 20.0% (2.31 Mt CO₂eq) lower in 2009 compared with 2008.
- *Energy* sector – emissions (primarily power generation) are 10.7% (1.57 Mt CO₂eq) lower in 2009 compared with 2008.
- *Transport* sector – emissions are 7.7% (1.09 Mt CO₂eq) lower in 2009 compared with 2008.

Industry and Commercial

Industrial and Commercial sector emissions are 20.0% (2.31 Mt CO₂eq) lower in 2009 compared with 2008 estimates. This reflects decreases in CO₂ emissions from, primarily, food processing and from cement production. Data from the EU Emissions Trading Scheme, which has been published annually by EPA since 2005, show that CO₂ emissions from the cement sector peaked in 2007 and decreased by 11% (0.43 Mt CO₂eq) between 2007 and 2008 and a further 38% (1.30 Mt CO₂eq) between 2008 and 2009.

Energy

Emissions in 2009 were 1.57 Mt CO₂eq lower than in 2008 which represents a 10.7 % decrease. This reflects a reduced demand for electricity from end-users in Ireland. In addition, the share of renewables in gross electricity consumption increased to 14.1% in 2009 from 11.7% in 2008 whilst carbon-intensive fuels in power generation decreased in 2009 relative to 2008.

Transport

Transport emissions were 1.09 Mt CO₂eq lower in 2009 than in 2008. This represents a decrease of 7.7 %, following sustained increases in this sector since 1990. This is the second year in a row that a decrease in transport sector emissions has been reported following significant growth up to 2007; transport emissions in 2008 were 0.6% lower compared with 2007. The decrease primarily reflects the impact of the economic downturn as well as the changes in vehicle registration tax and road tax introduced in mid-2008. Emissions in 2009 were 156 % higher than the 1990 transport emissions.

Agriculture

The emissions from agriculture decreased by 1.5% (0.27 Mt CO₂eq) in 2009, continuing the downward trend from the 1998 peak. The decline in emissions primarily reflects lower sheep and swine numbers as well as a reduction in gasoil use on farms.

Residential

Emissions in 2009 decreased by 0.9% (0.07 Mt CO₂eq) from the 2008 level. This reflects a slight reduced demand for energy from the residential sector despite 2009 having as cold a Winter as 2008 i.e. heating degree days were similar for both years.

Waste

Emissions for this sector show a decrease 4.2% (0.05 Mt CO₂eq) below the 2008 level which reflects increased methane flaring relative to 2008. Landfill gas utilisation and on-site flaring offset around 60% of methane production in 2009. The EPA continues to take account of data received from operators on the proportion of methane that is flared and utilised and therefore not included in emissions reported under the waste sector.

Implications for Kyoto Protocol Compliance

- Ireland's limit in relation to the Kyoto Protocol has been set as 314.18 Mt CO₂eq for the five-year commitment period 2008-2012. This equates to an average of 62.84 Mt CO₂eq per annum over the period (i.e. 13% above the baseline estimate). Compliance with the Kyoto Protocol limit is achieved by ensuring that Ireland's total greenhouse gas emissions in the

period 2008-2012, less any offsets from approved forest sinks as well as any surrender of purchased Kyoto Protocol credits, are below the Kyoto limit at the end of the five year period.

- To estimate the current distance to Ireland's Kyoto Protocol Limit it is necessary to take account of total national emissions in 2008 and 2009 (i.e. the first two years of the Kyoto Period commitment period) as well as the impact of the EU Emissions Trading Scheme in 2008 and 2009 and forest sinks. Table 1 shows Ireland's current distance to target using provisional data from the 1990-2009 inventory.

Table 1. Estimation of distance above Kyoto limit after first two years of Kyoto Protocol period

	Mt CO ₂ eq		
	2008	2009	2008 + 2009
Total National Emissions	67.68	62.32	130.00
Less Verified Emissions for ETS	20.38	17.22	37.60
Total Non-ETS Emissions	47.30	45.10	92.40
Kyoto Limit	62.84	62.84	125.67
Less ETS Allocation	22.28	22.28	44.56
Total Non-ETS Limit	40.56	40.56	81.11
Distance above Kyoto limit after first two years of Kyoto Protocol period (excluding forest sinks)	6.74	4.55	92.40-81.11 = 11.29
Forest sinks	-2.76	-2.32	-5.08
Distance above Kyoto limit after first two years of Kyoto Protocol period (including forest sinks)	3.99	2.23	6.21

It is important to note that not all of 22.28 Mt CO₂eq was actually allocated to ETS sectors in 2008 and 2009. The remainder is mainly reserved for New Entrants over the 5 year period 2008-2012 and if not fully utilised will revert to the national account. In both 2008 and 2009, the actual allocation to installations was 19.97 Mt CO₂eq which compares to verified emissions of 20.38 Mt CO₂eq in 2008 (i.e. the EPA under-allocated in the ETS in 2008) and 17.22 Mt CO₂eq in 2009.

Whilst Ireland's total national emissions for 2009 of 62.32 Mt CO₂eq are just below our Kyoto Protocol limit of 62.84 Mt CO₂eq, in order to properly assess Ireland's current distance to the Kyoto Protocol limit it is necessary to consider both the EU Emissions Trading (ETS) sectors and non-ETS sectors (e.g. transport, agriculture and residential). Ireland's *National Allocation Plan for Emission Trading 2001-2012* allocated 22.28 Mtonnes/a of CO₂ to the trading sector. Therefore, when assessing Ireland's current distance to the Kyoto Protocol limit it is necessary to subtract trading sector emissions from total national emissions and compare non-ETS sector emissions with the 'effective' target of 62.84 – 22.28 = 40.56 Mt of CO₂e.

Introduction

The Environmental Protection Agency is responsible for compiling the inventories of greenhouse gas (GHG) emissions for Ireland and for reporting the estimates to the European Commission and the UNFCCC. These inventories are compiled on an annual basis according to the UNFCCC reporting guidelines and the good practice guidance of the Intergovernmental Panel on Climate Change (IPCC).

Each year the EPA publishes a draft greenhouse gas inventory in December which is subsequently finalised and submitted to the European Commission and the UNFCCC in March and April respectively of the following year. This year the Agency has published provisional data earlier which allowed Ireland to input into the compilation of the European Environment Agency's 2009 provisional inventory for the European Union.

The greenhouse gas inventory is undergoing continuous development and improvement. As a result, previously published estimates are revised on an annual basis, as appropriate, to account for improved methods, revisions in national input data used by the EPA and the outcome of UNFCCC review processes. The provisional estimates for 2009 published here are subject to change following finalisation of the underlying input data from key data providers and following a review of the 2008 inventory by the UNFCCC in September 2010. The purpose of publishing the provisional estimates at this stage is to give an indication of the scale of the change in emissions in 2009.

The 2009 estimates are given below, followed by an account of how these differ from the 2008 estimates. The longer-term trends in greenhouse gas emissions and their significance in relation to Ireland's target in the first commitment period of the Kyoto Protocol are also assessed.

Ireland's Greenhouse Gas Emissions in 2009

The latest data indicate that emissions of greenhouse gases in Ireland in 2009 were 62.32 Mt CO₂eq. This represents a reduction of 7.9% (5.36 Mt CO₂eq) on emissions in 2008.

Agriculture remains the single largest contributor to the overall emissions, at 29.1% of the total, followed by *Transport* and *Energy* (primarily power generation) both at 21.1%. The remainder is made up by the *Industry and Commercial* at 14.8%, *Residential* sector at 12.0% and *Waste* at 1.9%. Figure 1 shows the contributions from each of the NCCS sectors.

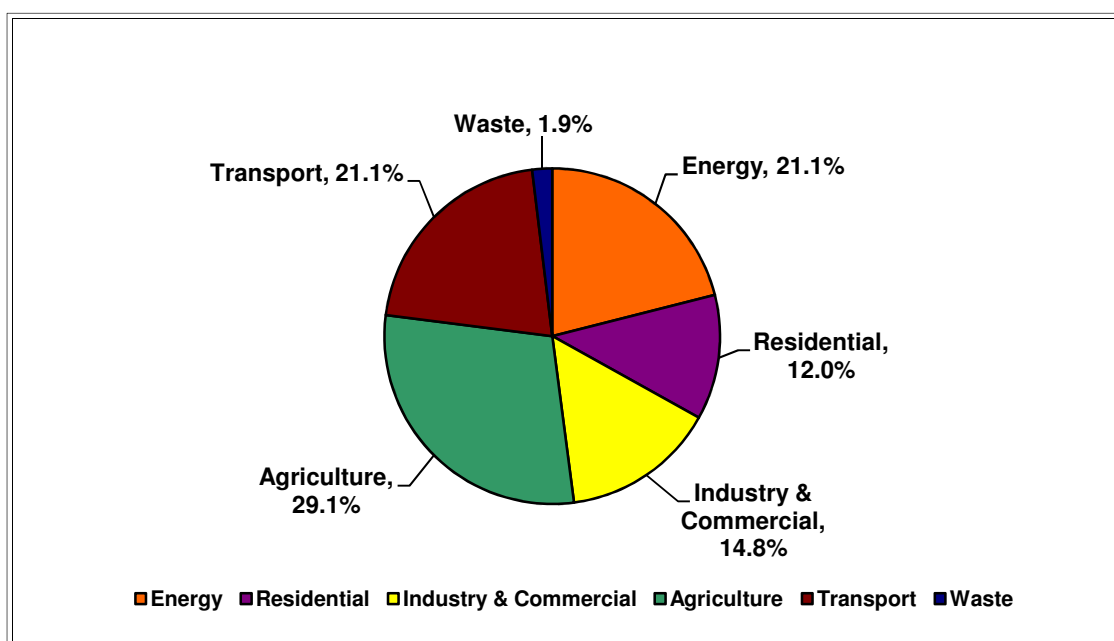


Figure 1. Greenhouse Gas Emissions in 2009 by Sector

Changes in Emissions from Sectors between 2008 and 2009

The major changes in sectoral emissions in 2009 compared to 2008 are shown in Figure 3 and are:

- Emissions from *Industry and Commercial* decreased by 20.0% from 11.56 Mt CO₂eq in 2008 to 9.25 Mt CO₂eq in 2009, reflecting decreases in CO₂ from, primarily, food processing and from cement production. Data from the EU Emissions Trading Scheme, which has been reported to the EPA since 2005, show that CO₂ emissions from the cement sector peaked in 2007 and decreased by 11% (0.43 Mt CO₂eq) between 2007 and 2008 and a further 38% (1.30 Mt CO₂eq) between 2008 and 2009.
- Emissions from *Energy* (principally electricity generation) decreased by 10.7% from 14.69 Mt CO₂eq in 2008 to 13.12 Mt CO₂eq in 2009. This reflects a reduced demand for electricity from end-users in Ireland. In addition, the share of renewables in gross electricity consumption increased to 14.1% in 2009 from 11.7% in 2008 whilst carbon-intensive fuels in power generation decreased in 2009 relative to 2008.
- *Transport* emissions decreased by 7.7% from 14.21 Mt CO₂eq in 2008 to 13.12 Mt CO₂eq in 2009. This is the second year in a row that a decrease in transport sector emissions has been reported following significant growth up to 2007; transport emissions in 2008 were 0.6% lower compared with 2007. The decrease primarily reflects the impact of the economic downturn plus the changes in vehicle registration tax and road tax introduced in mid-2008. Emissions in 2009 were 156 % higher than the 1990 transport emissions.
- Emissions from *Agriculture* decreased by 1.5% from 18.40 Mt CO₂eq in 2008 to 18.13 Mt CO₂eq in 2009, continuing the downward trend from 1998. The decline in emissions primarily reflects lower sheep and swine numbers as well as a reduction in gasoil use on farms.
- Emissions in the *Residential* sector decreased by 0.9% from 7.57 Mt CO₂eq in 2008 to 7.50 Mt CO₂eq in 2009. This reflects a slight reduced demand for energy from the residential sector despite 2009 having as cold a Winter as 2008 i.e. heating degree days were similar for both years.
- Emissions from the *Waste* sector, primarily methane gas released from landfills, amounted to 1.20 Mt CO₂eq in 2009 and showed a 4.2% decrease from 1.25 Mt CO₂eq in 2008. This reflects increased methane flaring relative to 2008. Landfill gas utilisation and on-site flaring offset around 60% of methane production in 2009. The EPA continues to take account of data received from operators on the proportion of methane that is flared and utilised and therefore not included in emissions reported under the waste sector.

Long-term Changes in Sectoral Emissions 1990 – 2009

The trend in emissions from 1990 to 2009 is shown in Figure 2 and Figure 3. Emissions of CO₂ accounted for 68.1% of total greenhouse gas emissions in 2009 compared to 59.1% in 1990. The proportion from *Agriculture*, where CH₄ and N₂O are the relevant greenhouse gases, to total emissions has fallen from 36.4% in 1990 to 29.1% in 2009.

Between 1990 and 2009, *Transport* shows the greatest overall increase at 156%. However, transport emissions decreased for the first time in 2008 and again in 2009 primarily due to the economic downturn. The increase up to 2007 can be attributed to general economic prosperity, increasing population with a high reliance on private car travel as well as rapidly increasing road freight transport.

Other sectors showing substantial increases on 1990 are *Energy* at 15.4% which reflect increasing demand for electricity.

Emissions from *Agriculture* reached a peak in 1998 and have decreased to below their 1990 level since 2002, reflecting long-term decline in livestock populations and in fertiliser use due to the Common Agricultural Policy.

Increased housing stock drove the gradual upward trend in the emissions from the *Residential* sector after 1998 following a sharp reduction in the early 1990s and stabilisation that resulted from fuel switching. The 2009 emissions in this sector show 0.9% decrease on 2008 and are 0.6% higher than their 1990 level.

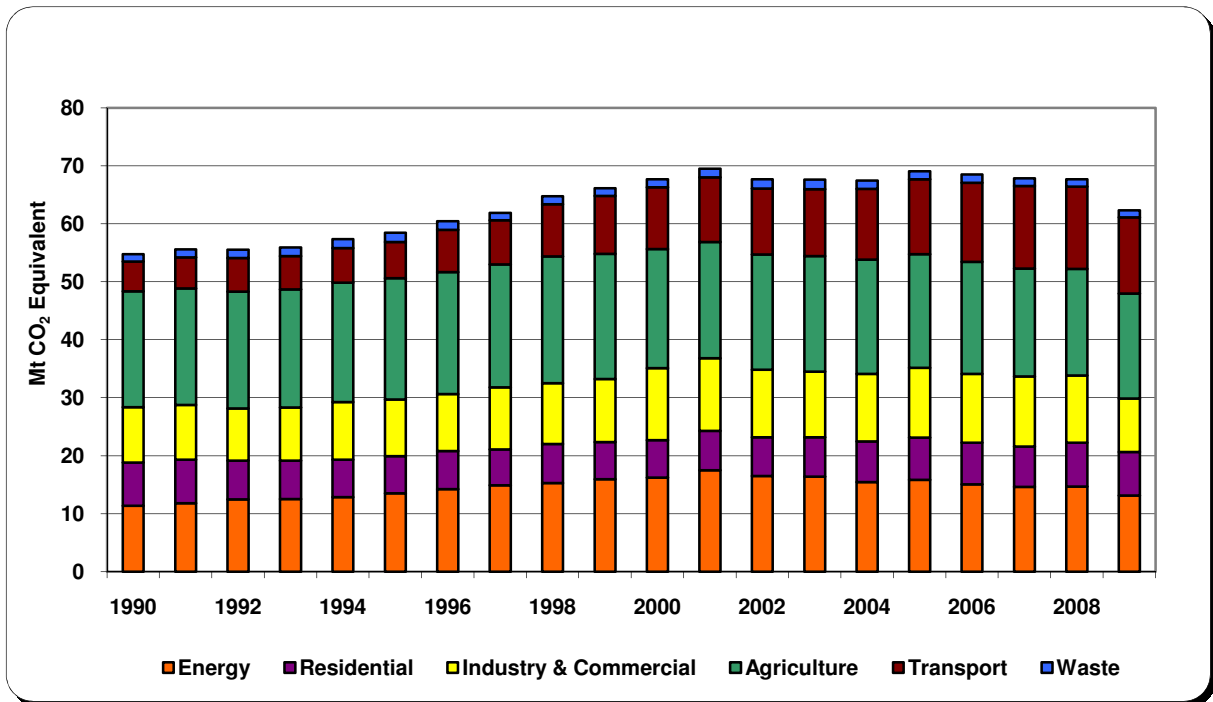


Figure 2. Trends in Greenhouse Gas Emissions 1990-2009

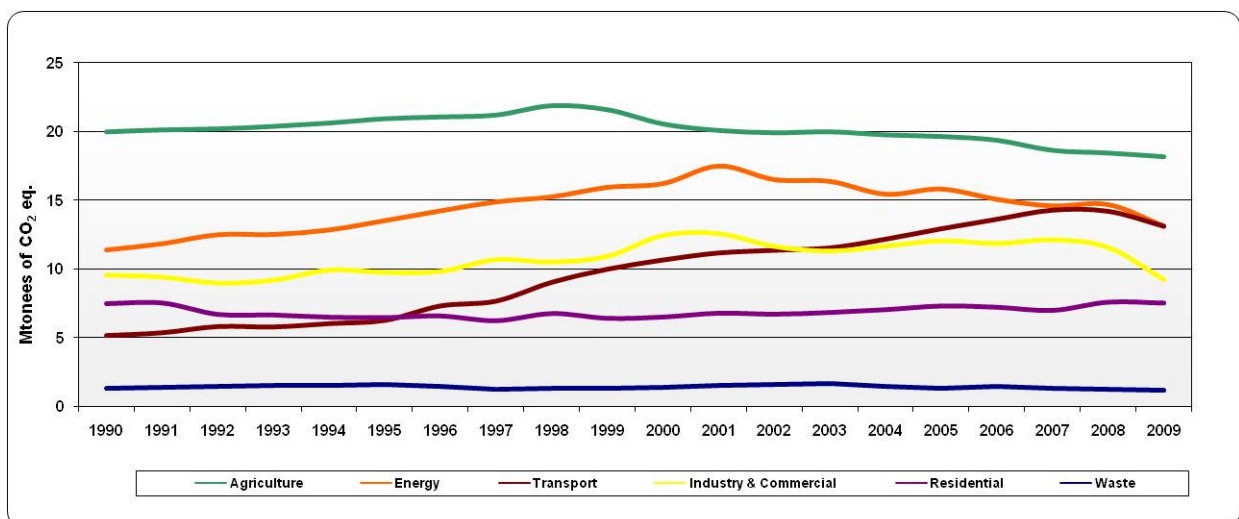


Figure 3. Trends in Greenhouse Gas Emissions 1990-2009

Ireland's Kyoto Limit

The baseline emissions total for Ireland is calculated as the sum of CO₂, CH₄ and N₂O emissions in 1990 and the contribution from fluorinated gases in 1995. The baseline value was established at 55.607 Mt CO₂eq following in-depth review of Ireland's 2007 submission to the UNFCCC and results in total allowable emissions of 314.18 Mt CO₂eq in the commitment period 2008-2012 under the Kyoto Protocol. This equates to an average of 62.84 Mt CO₂eq per annum (i.e. 13% above the baseline estimate). Compliance with the Kyoto Protocol limit is achieved by ensuring that Ireland's total greenhouse gas emissions in the period 2008-2012, adjusted for any offsets from approved forest sinks as well as any surrender of purchased Kyoto Protocol credits, are below 314.18 Mt CO₂eq at the end of the five year period.

Figure 3 shows the emissions for the period 1990 to 2009 relative to Ireland's Kyoto limit, expressed as a five year average. Also shown for reference purposes is Ireland's baseline of 55.607 Mt CO₂eq. To estimate the current distance to Ireland's Kyoto Protocol limit it is necessary to take account of total national emissions in 2008 and 2009 (i.e. the first two years of the Kyoto Period commitment period) as well as the impact of the EU Emissions Trading Scheme in 2008 and 2009 and the net result of forest sinks.

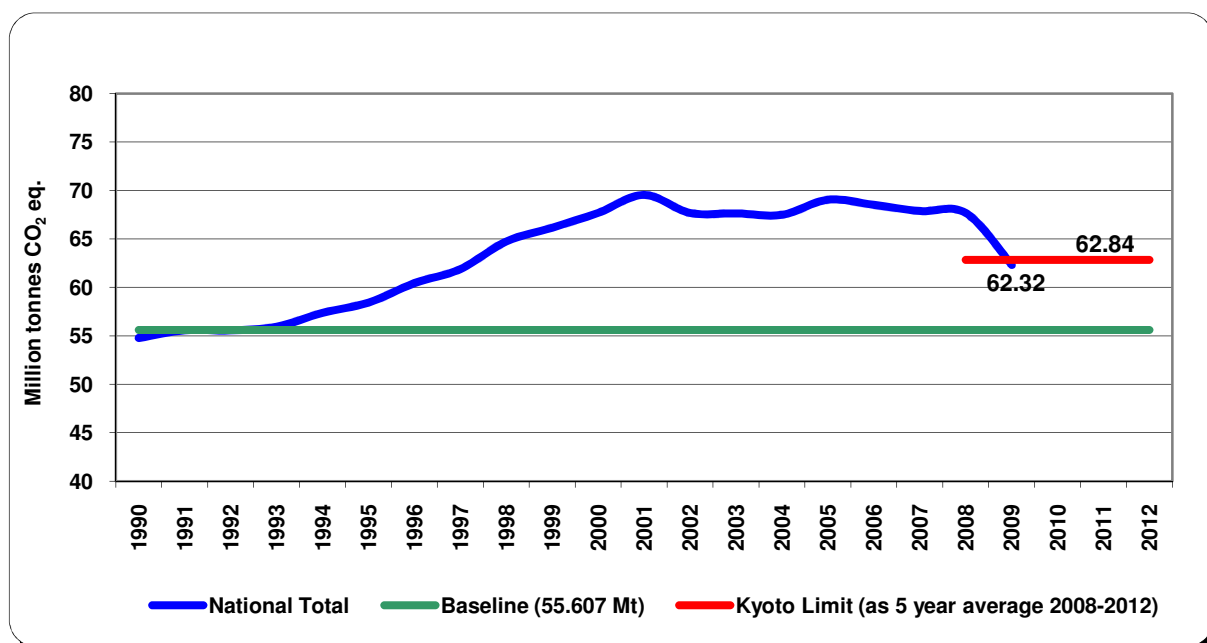


Figure 3. Total Greenhouse Gas Emissions (1990-2009) and Ireland's Kyoto Limit

Table 1 overleaf shows Ireland's current distance to target using provisional data from the 2009 inventory.

Table 1. Estimation of distance above Kyoto limit after first two years of Kyoto Protocol period

	Mt CO ₂ eq		
	2008	2009	2008 + 2009
Total National Emissions	67.68	62.32	130.00
Less Verified Emissions for ETS	20.38	17.22	37.60
Total Non-ETS Emissions	47.30	45.10	92.40
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As stated earlier, greenhouse gas estimates are subject to constant revision in the annual reporting cycle to take account of new methodological guidance, the outcome of national research, revised information on energy use and improved data from other sectors. This will explain any differences between the changes presented here and those reported in previous years.

Notes:

Units: 1 Mt = 1,000 Kilotonnes = 1,000,000 tonnes

CO₂ Equivalent: greenhouse gases other than CO₂ (i.e. methane, nitrous oxide and so-called F-gases) may be converted to CO₂ equivalent using their global warming potentials.

F-gases: These gases comprise HFCs (Hydrofluorocarbons), PFCs (Perfluorocarbons) and SF₆ (Sulphur Hexafluoride). They are much more potent than the naturally occurring greenhouse gas emissions (carbon dioxide, methane and nitrous oxide).

National Climate Change Strategy Sectors: The Government Strategy to combat Climate Change uses the following six sectors for analysis:

1. Energy (electricity generation and oil refining)
2. Residential (combustion for domestic heating)
3. Industry and Commercial (combustion emissions from industrial and commercial activities, industrial process emissions, f-gas emissions),
4. Agriculture (ruminant digestion, agricultural soils, manures, gasoil used on farms)
5. Transport (road, rail, navigation and domestic aviation)
6. Waste (solid waste disposal, wastewater treatment)

Table 3. Emissions by National Climate Change Strategy Sectors (kt CO₂eq)

	Energy	Residential	Industry & Commercial	Agriculture	Transport	Waste	Total
1990	11,369.63	7,456.30	9,566.80	19,956.36	5,134.91	1,301.78	54,785.78
1991	11,826.38	7,506.32	9,422.34	20,104.89	5,340.13	1,382.10	55,582.17
1992	12,486.44	6,670.62	8,993.59	20,177.53	5,788.82	1,447.56	55,564.57
1993	12,500.35	6,625.93	9,207.42	20,367.06	5,760.36	1,494.55	55,955.66
1994	12,834.71	6,464.29	9,928.12	20,609.13	6,004.92	1,539.80	57,380.97
1995	13,515.58	6,426.46	9,763.82	20,925.03	6,237.19	1,575.59	58,443.67
1996	14,230.68	6,553.64	9,833.14	21,054.39	7,294.10	1,480.00	60,445.95
1997	14,887.81	6,210.25	10,682.03	21,194.98	7,648.42	1,274.77	61,898.25
1998	15,259.33	6,733.40	10,511.99	21,884.91	9,020.00	1,334.78	64,744.42
1999	15,949.91	6,383.17	10,919.63	21,588.98	9,979.26	1,351.23	66,172.18
2000	16,225.53	6,475.35	12,418.44	20,542.90	10,654.00	1,385.12	67,701.36
2001	17,511.94	6,755.98	12,550.66	20,063.47	11,165.03	1,495.71	69,542.79
2002	16,522.24	6,682.93	11,635.87	19,892.45	11,357.97	1,591.62	67,683.08
2003	16,387.57	6,810.98	11,295.06	19,964.59	11,537.28	1,651.11	67,646.58
2004	15,449.28	7,017.43	11,654.18	19,736.67	12,170.50	1,462.69	67,490.75
2005	15,827.88	7,281.93	12,034.82	19,619.12	12,935.05	1,350.97	69,049.75
2006	15,073.87	7,191.70	11,835.20	19,343.14	13,628.08	1,440.24	68,512.24
2007	14,593.39	6,962.99	12,103.78	18,598.59	14,292.14	1,331.39	67,882.28
2008	14,691.95	7,566.70	11,558.05	18,402.70	14,208.32	1,252.72	67,680.43
2009	13,119.17	7,497.59	9,251.26	18,129.92	13,120.05	1,199.97	62,317.95