



***EPA Headquarters***

PO Box 3000  
Johnstown Castle Estate  
County Wexford, Ireland

T +353 53 9160600  
LoCall 1890 33 55 99  
**www.epa.ie**

**15<sup>th</sup> April 2014**

**IRELAND'S GREENHOUSE GAS EMISSIONS IN 2012**

**KEY HIGHLIGHTS**

- The EPA has produced final estimates of greenhouse gas emissions for the time period 1990 - 2012.
- For 2012, total national greenhouse gas emissions are estimated to be 58.53 million tonnes carbon dioxide equivalent (Mt CO<sub>2</sub>eq). This is 1.4% higher (0.78 Mt CO<sub>2</sub>eq) than emissions in 2011.
- In 2012, emissions in the ETS sector increased by 6.9% or 1.08 Mt CO<sub>2</sub>eq whereas non-ETS emissions decreased by 0.7% or 0.30 Mt CO<sub>2</sub>eq.
- Emissions from Energy (principally electricity generation) increased by 7.1% (0.85 Mt CO<sub>2</sub>eq) in 2012. This reflects increases in coal and peat used in conventional fossil fuel fired power stations for electricity generation, by 27% and 16% respectively, and a corresponding decrease in natural gas use of 12% in 2012. Electricity generated from wind decreased by 8.4% between 2011 and 2012.
- Greenhouse gas emissions from the residential sector are 5.9% lower (0.39 Mt CO<sub>2</sub>eq) in 2012 compared with 2011 levels. This reflects higher than average temperatures in 2012 with consequently lower heat demand from households.
- Industry and Commercial emissions increased by 2.5% (0.22 Mt CO<sub>2</sub>eq) in 2012. This is due primarily to an increase of almost 18% in CO<sub>2</sub> emissions from cement production.
- Agriculture emissions are 3.1% higher (0.55 Mt CO<sub>2</sub>eq) in 2012 compared with 2011 levels. Increases in emissions are due to a 4.4% increase in cattle numbers and a 9.0% increase in sheep numbers.
- Greenhouse gas emissions from the transport sector are 3.5% lower (0.39 Mt CO<sub>2</sub>eq) in 2012 compared with 2011 levels. In 2012, gasoline use decreased by 9.1% while diesel use increased by 0.1%, reflecting the continued economic downturn in 2012 as well as the impact of policies and measures such as linking VRT and motor tax to CO<sub>2</sub> emissions.
- Transport and Agriculture account for 50.5% of total emissions in 2012, or 71% of non EU ETS emissions.

- Under the Kyoto Protocol, Ireland's total emissions are limited to an average of 62.8 Mt CO<sub>2</sub>eq per annum in the period 2008-2012. By 2012, Ireland was 5.68 Mt CO<sub>2</sub>eq below the Kyoto limit. However, when the impact of the EU Emissions Trading Scheme and forest sinks are taken into account, Ireland exceeded the Kyoto limit by 2.1 Mt CO<sub>2</sub>eq. A decision on how this compliance gap will be closed will be made once the inventories have been subject to their final review.

## **Introduction**

The Environmental Protection Agency is responsible for compiling the inventories of greenhouse gas 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 which is subsequently finalised and submitted to the European Commission and the UNFCCC in March and April respectively of the following year.

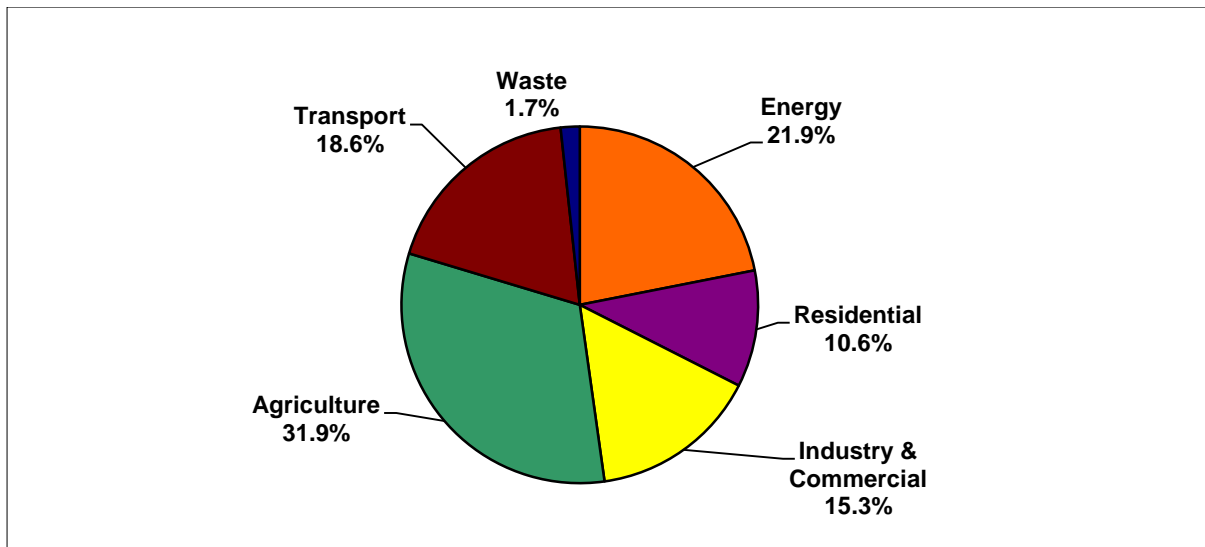
The greenhouse gas inventory is undergoing continuous development and improvement. As a result, previously published estimates are revised on an annual basis, as appropriate, to account for improved methods, revisions in national input data used by the EPA and the outcome of UNFCCC review processes. The final estimates for 2012 published here are subject to change following the outcome of the UNFCCC review in September 2014.

The 2012 estimates are given below, followed by an account of how these differ from the 2011 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 2012**

The latest data indicate that emissions of greenhouse gases in Ireland in 2012 were 58.53 Mt CO<sub>2</sub>eq. This represents an increase of 1.4% (0.78 Mt CO<sub>2</sub>eq) on emissions in 2011 and reverses a trend of decreasing emissions since 2006.

*Agriculture* remains the single largest contributor to the overall emissions at 31.9% of the total. *Energy* and *Transport* are the second and third largest contributors at 21.9% and 18.6% respectively. The remainder is made up by the *Industry and Commercial* at 15.3%, *Residential* sector at 10.6% and *Waste* at 1.7%. Figure 1 shows the contributions from each of the sectors.



*Figure 1. Greenhouse Gas Emissions in 2012 by Sector*

### Changes in Emissions from Sectors between 2011 and 2012

The major changes in sectoral emissions in 2012 compared to 2011 are:

- Emissions from *Energy* (principally electricity generation) increased by 7.1% (0.85 Mt CO<sub>2</sub>eq) in 2012. This reflects increases in coal and peat used in conventional fossil fuel fired power stations for electricity generation, by 27% and 16% respectively, and a corresponding decrease in natural gas use of 12% in 2012. Declining electricity consumption through both recession and more energy efficient practices and associated reductions in greenhouse gas emissions is, therefore, being off-set by changes in the fuel mix in power generation.
- Greenhouse gas emissions from the *Residential* sector are 5.9% lower (0.39 Mt CO<sub>2</sub>eq) in 2012 compared with 2011 levels. This reflects higher than average temperatures in 2012 with consequently lower heat demand from households. Kerosene and peat use decreased by 15% and 11% respectively in 2012 whereas coal and natural gas use in homes increased by 4% and 5% respectively.
- *Industry and Commercial* emissions increased by 1.6% (0.13 Mt CO<sub>2</sub>eq) in 2012. Industrial emissions from large combustion sources within the EU-ETS comprise the largest source of emissions in this category. For example, emissions from all industrial categories; non-ferrous metals, chemicals, food and drink show increases of between 1% and 2% whilst the cement industry shows an increase of almost 18% in 2012 on 2011 levels. These increases were offset somewhat by lower emissions from industrial gases in 2012.
- *Agriculture* emissions are 3.1% higher (0.55 Mt CO<sub>2</sub>eq) in 2012 compared with 2011 levels. Increases in emissions are due to a 4.4% increase in cattle numbers and a 9.0% increase in sheep numbers in the same period.
- *Transport* emissions decreased by 3.5% from 11.29 Mt CO<sub>2</sub>eq in 2011 to 10.90 Mt CO<sub>2</sub>eq in 2012. This is the fifth year in a row that a decrease in transport sector emissions has been reported following significant growth up to 2007 - transport emissions in 2012 were 24.8% 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. In addition, the Biofuels Obligation Scheme started operation in mid-2010 with biofuels displacing petrol and diesel use in the transport sector. Emissions in 2012 were 113% higher than the 1990 transport emissions.

- Emissions from the *Waste* sector, primarily methane gas released from landfills and urban wastewater treatment plants, amounted to 1.0 Mt CO<sub>2</sub>eq in 2012 and showed a 5.7% decrease from 1.07 Mt CO<sub>2</sub>eq in 2011. This reflects a 7.4% reduction in methane emitted at landfill sites in 2012. Landfill gas utilisation and on-site flaring continues to offset 68% of total methane production in 2012.

### **Long-term Changes in Sectoral Emissions 1990 – 2012**

The trend in emissions from 1990 to 2012 is shown in Figure 2 and Figure 3. The share of CO<sub>2</sub> in total greenhouse gas emissions has increased to 64.9% of total greenhouse gas emissions in 2012 compared to 58.7% in 1990. In contrast, CH<sub>4</sub> and N<sub>2</sub>O emissions, primarily from the agriculture sector, have fallen from 41.2% of total greenhouse gas emissions in 1990 to 33.3% in 2012.

Between 1990 and 2012, *Transport* shows the greatest overall increase at 113%. However, transport emissions have decreased for five consecutive years and are now 24.8% below peak levels in 2007. This is 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. The annual rate of decrease is slowing with 3.5% decrease in 2012 compared to an average annual reduction of 6.0% over the period 2008-2011.

*Energy* also shows an increase in emissions over the period 1990 – 2012 which reflects increasing demand for electricity. Over the time series, CO<sub>2</sub> emissions from electricity generation have increased by 12.7% whereas electricity output has increased by 105%. This reflects the improvement in efficiency of modern gas fired power plants replacing older peat and oil fired plants and the increased share of renewables, primarily, wind power.

Emissions from *Agriculture* reached a peak in 1998 and have decreased to below their 1990 level since 2004, reflecting long-term decline in livestock populations and in fertiliser use due to the Common Agricultural Policy. Emissions from Agriculture in 2012 are now 8.4% below their 1990 levels. The increase in agriculture emissions in 2012 represents the first significant increase over the 13 year period since 1999. This increase is underpinned by increasing animal numbers with dairy cows 2.3% higher in 2012 compared with 2011. This reflects national plans to expand milk production under Food Harvest 2020 and following removal of milk quota in 2015. ‘Other cattle’ numbers, which include beef cattle, have increased by 4.8% in 2012. In addition, sheep numbers have increased by 9.4% which is the second year that this animal category has shown an increase and is consistent with favourable sheep market conditions in recent years. In contrast, pig numbers decreased by 1.2%.

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 2012 emissions in this sector show 5.9% decrease on 2011 levels and are 16.9% lower than their 1990 level. Winter heating demand is the most important variable determining emissions from this sector.

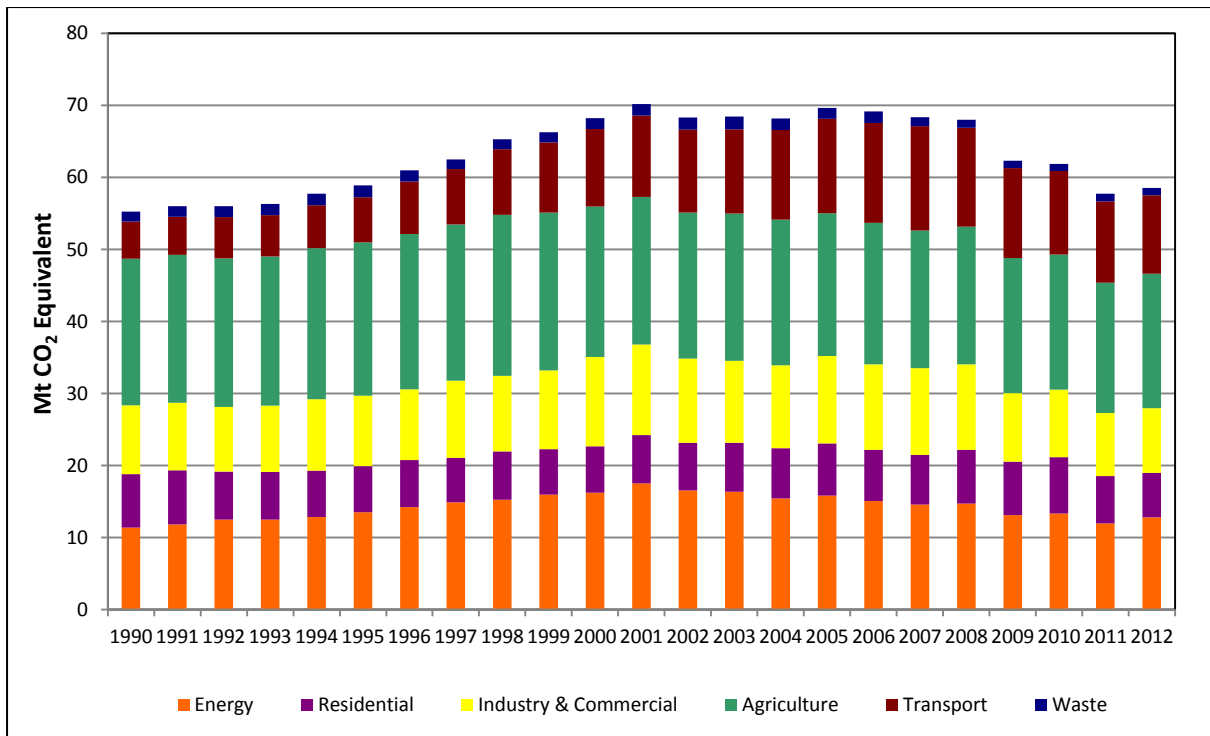


Figure 2. Trends in Greenhouse Gas Emissions 1990-2012

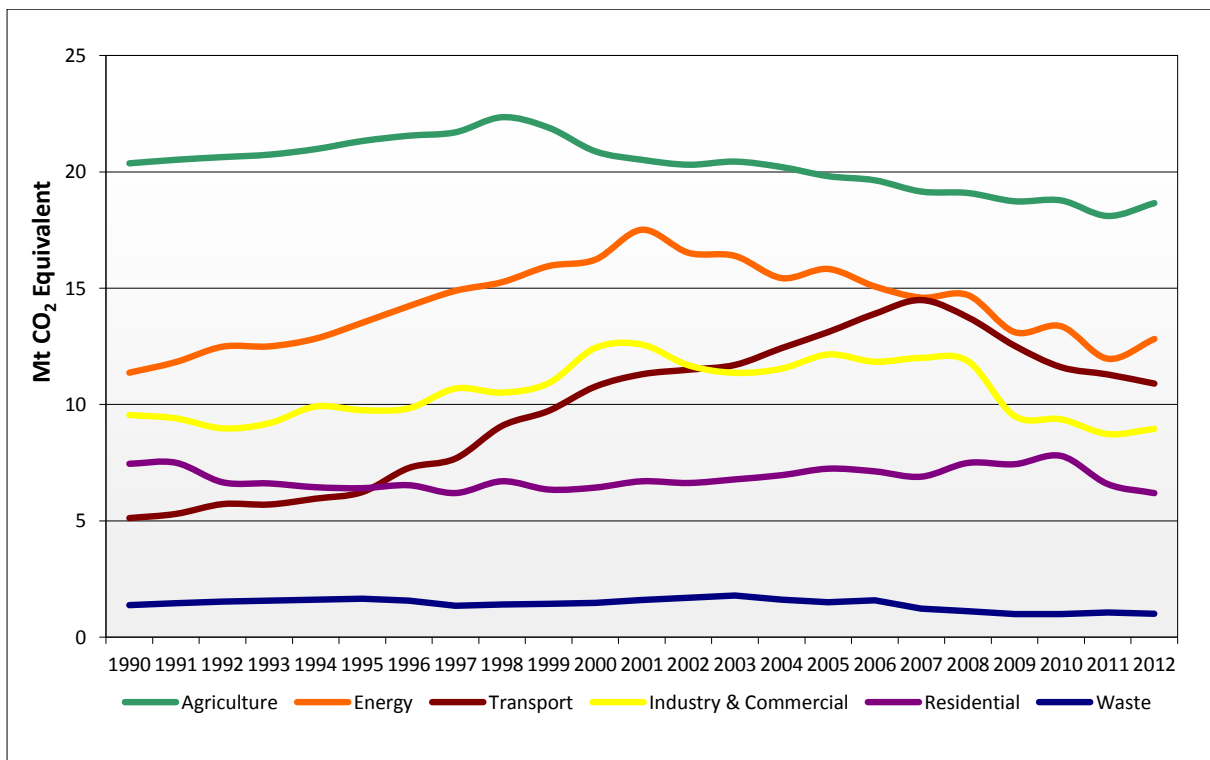


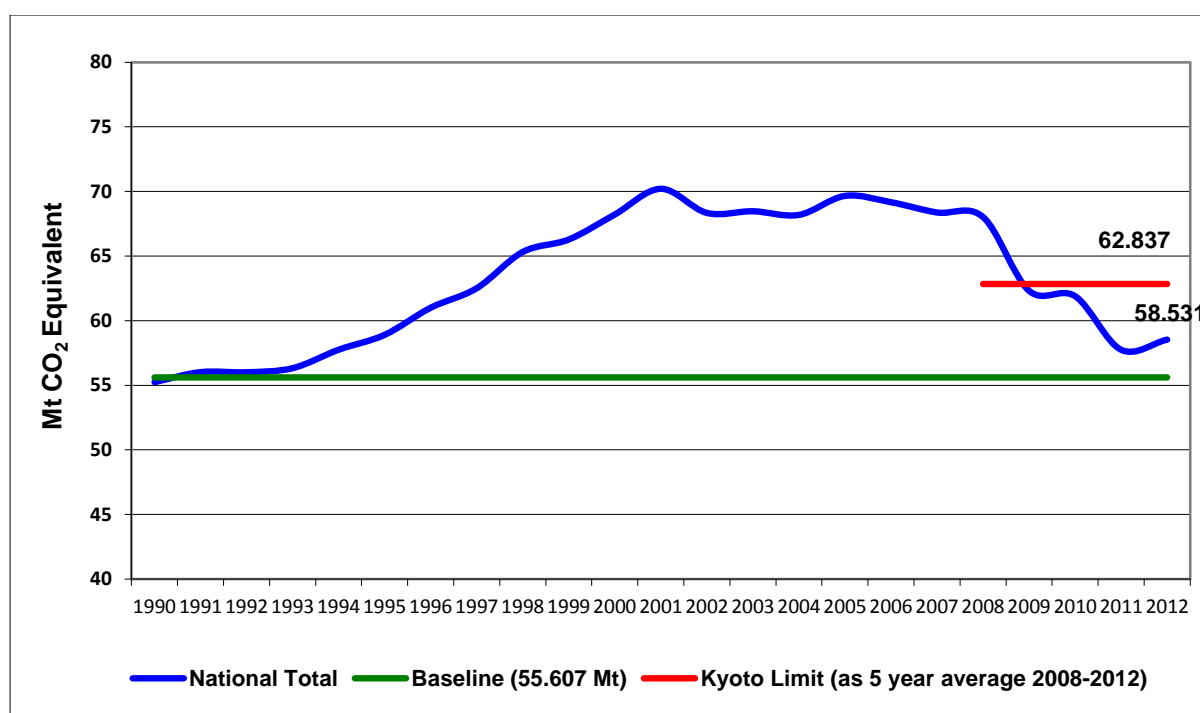
Figure 3. Trends in Greenhouse Gas Emissions 1990-2012

## Ireland's Kyoto Limit

Ireland's limit in relation to the Kyoto Protocol has been set as 314.18 Mt CO<sub>2</sub>eq for the five-year commitment period 2008-2012. This equates to an average of 62.84 Mt CO<sub>2</sub>eq 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.

The baseline emissions total for Ireland is calculated as the sum of CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions in 1990 and the contribution from fluorinated gases in 1995. The baseline value was established at 55.607 Mt CO<sub>2</sub>eq following in-depth review of Ireland's 2007 submission to the UNFCCC.

Figure 4 shows the emissions for the period 1990 to 2012 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 CO<sub>2</sub>eq.



*Figure 4. Total Greenhouse Gas Emissions (1990-2012) and Ireland's Kyoto Limit*

To assess compliance with Ireland's Kyoto Protocol limit it is necessary to take account of total national emissions in 2008 to 2012 (i.e. the five years of the Kyoto Period commitment period) as well as the impact of the EU Emissions Trading Scheme in 2008 to 2012 and the net result of forest sinks. Table 1 shows Ireland will exceed the Kyoto target based on the data presented in this report.

**Table 1. Estimation of distance to Kyoto limit for the five year period 2008-2012**

	Mt CO <sub>2</sub> eq					
	2008	2009	2010	2011	2012	2008 - 2012
Total National Emissions	68.02	62.31	61.89	57.75	58.53	308.51
Less Verified Emissions for ETS	20.38	17.22	17.36	15.77	16.85	87.58
Total Non-ETS Emissions	47.64	45.09	44.53	41.98	41.68	220.93
Kyoto Limit	62.84	62.84	62.84	62.84	62.84	314.19
Less ETS Allocation	22.28*	22.28*	22.28*	22.28*	22.28*	111.40
Total Non-ETS Limit	40.56	40.56	40.56	40.56	40.56	202.79
Distance above Kyoto limit after five years of Kyoto Protocol period (excluding forest sinks)	7.08	4.54	3.98	1.42	1.12	18.14
Forest sinks	-2.72	-3.09	-3.42	-3.38	-3.47	-16.08
<b>Distance above Kyoto limit after five years of Kyoto Protocol period (including forest sinks)</b>	<b>4.36</b>	<b>1.44</b>	<b>0.56</b>	<b>-1.96</b>	<b>-2.35</b>	<b>2.06</b>

\* It is important to note that not all of 22.28 Mt CO<sub>2</sub> was allocated to ETS sectors in 2008 to 2012. 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. It is currently estimated that this will amount to around 6.55 million tonnes of CO<sub>2</sub> over the five year Kyoto period. The actual allocation to installations was 19.97 Mt CO<sub>2</sub> in 2008, 20.03 Mt CO<sub>2</sub> in 2009, 20.96 Mt CO<sub>2</sub> in 2010, 21.58 Mt CO<sub>2</sub> in 2011 and 21.75 Mt CO<sub>2</sub> in 2012 which compares to verified emissions of 20.38 Mt in 2008, 17.22 Mt CO<sub>2</sub> in 2009, 17.37 Mt CO<sub>2</sub> in 2010, 15.77 Mt CO<sub>2</sub> in 2011 and 16.90 Mt CO<sub>2</sub> in 2012.

≠ Small numerical discrepancies in Table 1 are due to rounding.

Whilst Ireland's total national emissions for the years 2009, 2010, 2011 and 2012 are below our Kyoto Protocol limit of 62.84 Mtonnes of CO<sub>2</sub>eq, it is necessary to look at the relative impact of both the EU Emissions Trading (ETS) sectors and non-ETS sectors to assess Ireland's current distance to the Kyoto Protocol limit.

Ireland's National Allocation Plan for Emission Trading 2008 – 2012 allocated 22.28 Mtonnes of CO<sub>2</sub>eq to the trading sector. The remainder are covered by non-ETS sector emissions for which the State is responsible (e.g. transport, agriculture, residential and waste). 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 CO<sub>2</sub>eq.

As noted 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

**CO<sub>2</sub> Equivalent:** greenhouse gases other than CO<sub>2</sub> (i.e. methane, nitrous oxide and so-called F-gases) may be converted to CO<sub>2</sub> equivalent using their global warming potentials.

**F-gases:** These gases comprise HFCs (Hydrofluorocarbons), PFCs (Perfluorocarbons) and SF<sub>6</sub> (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, Fluorinated 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 and waste incineration)

**Table 2. Emissions by National Climate Change Strategy Sectors (kt CO<sub>2</sub>eq)**

	Energy (A)	Residential (B)	Industry & Commercial (C)	Agriculture (D)	Transport (E)	Waste (F)	Carbon sinks	Total (A-F)
1990	11,369.81	7,454.19	9,550.26	20,367.29	5,121.45	1,383.27	25.24	55,246.27
1991	11,826.56	7,498.06	9,407.52	20,518.81	5,300.54	1,465.99	- 26.93	56,017.48
1992	12,486.64	6,660.07	8,977.83	20,634.28	5,721.83	1,525.67	- 88.56	56,006.31
1993	12,500.53	6,610.84	9,195.50	20,739.67	5,703.62	1,572.54	- 145.66	56,322.71
1994	12,834.94	6,447.20	9,916.93	20,978.65	5,957.20	1,617.46	- 227.48	57,752.38
1995	13,515.80	6,407.46	9,756.83	21,326.12	6,238.97	1,658.03	- 257.74	58,903.21
1996	14,230.89	6,532.07	9,839.35	21,554.40	7,275.10	1,569.42	- 406.22	61,001.23
1997	14,888.09	6,196.90	10,689.69	21,700.77	7,680.44	1,354.47	- 559.13	62,510.37
1998	15,259.63	6,703.50	10,512.30	22,348.64	9,081.88	1,411.52	- 718.99	65,317.47
1999	15,950.18	6,346.47	10,918.97	21,899.73	9,729.35	1,437.18	- 853.18	66,281.89
2000	16,225.86	6,431.27	12,430.64	20,883.40	10,771.72	1,473.45	- 865.82	68,216.34
2001	17,512.27	6,702.53	12,576.58	20,518.36	11,299.91	1,597.85	- 1,196.60	70,207.50
2002	16,523.06	6,629.37	11,688.06	20,305.94	11,496.53	1,694.74	- 1,423.92	68,337.70
2003	16,388.20	6,784.86	11,362.52	20,441.68	11,703.05	1,786.81	- 1,695.29	68,467.13
2004	15,434.96	6,965.23	11,542.33	20,206.88	12,425.38	1,609.69	- 1,956.37	68,184.47
2005	15,827.05	7,243.55	12,152.54	19,814.35	13,116.93	1,501.24	- 2,233.57	69,655.66
2006	15,075.39	7,129.03	11,840.95	19,638.51	13,901.11	1,580.76	- 1,138.56	69,165.75
2007	14,595.11	6,901.00	12,005.69	19,153.61	14,490.86	1,224.48	- 2,116.53	68,370.74
2008	14,704.32	7,492.51	11,866.27	19,092.33	13,747.51	1,117.56	- 2,719.46	68,020.49
2009	13,113.00	7,435.76	9,507.11	18,736.18	12,527.45	992.75	- 3,091.51	62,312.26
2010	13,364.79	7,792.70	9,366.50	18,772.89	11,605.30	992.73	- 3,420.24	61,894.90
2011	11,969.18	6,581.49	8,734.52	18,103.91	11,292.87	1,067.99	- 3,380.58	57,749.96
2012	12,817.85	6,193.35	8,955.49	18,656.87	10,900.42	1,007.26	- 3,468.62	58,531.24

\*Only those carbon sinks that are highlighted in yellow are accounted for when assessing Kyoto Protocol compliance