

# Climate change: New Zealand's greenhouse gas emissions



Under the Kyoto Protocol, New Zealand will have to limit its levels of greenhouse gas emissions to 1990 levels during the period 2008 to 2012. If we cannot reach this target, we will have to take responsibility for any excess emissions.

## Is New Zealand much over its 1990 greenhouse gas levels?

In 1990, our total annual greenhouse gas emissions were equivalent to almost 62 million tonnes of carbon dioxide (CO<sub>2</sub>)<sup>1</sup>. This amount of gas would be enough to fill about 10 million hot air balloons every year.

The most recent data indicates that total greenhouse gas emissions have risen by about 17% since 1990 and could be more than 24% above our target during the first commitment period from 2008 – 2012 if we do nothing to reduce our emissions.

The two most important points about New Zealand's greenhouse gas emissions are:

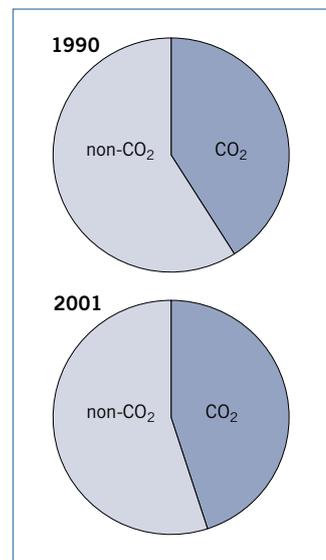
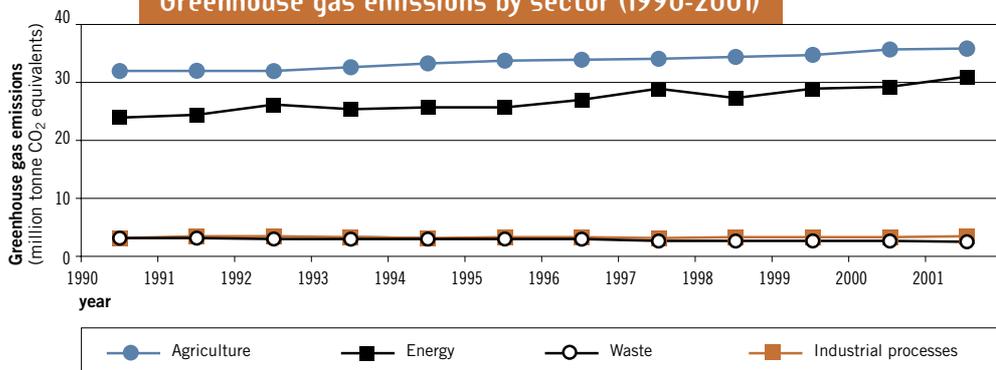
- the principal growth in greenhouse gas emissions comes from increased CO<sub>2</sub> emissions, primarily from the energy sector (particularly electricity generation and transport), which has grown by almost 30% relative to its CO<sub>2</sub> emissions in 1990
- agriculture is the New Zealand sector with the highest total greenhouse gas emissions (comprised of methane and nitrous oxide). About half of our total greenhouse gases come from this sector. According to the latest estimates, emissions from agriculture are about 12% above 1990 levels.

The forestry sector is a net 'sink' of carbon dioxide – in other words, growing forests absorb CO<sub>2</sub> rather than emit it. Trees convert CO<sub>2</sub> from the atmosphere into carbon stored in the form of wood and soil organic matter. In total, New Zealand expects to absorb up to 105 million tonnes of CO in the period 2008 – 2012 in forests planted after 1990.

<sup>1</sup> Each non-CO<sub>2</sub> greenhouse gas is converted to its "CO<sub>2</sub> equivalent" using a "global warming potential" factor.

Trends in New Zealand greenhouse gas emissions are shown in the graph and the pie chart below

Greenhouse gas emissions by sector (1990-2001)

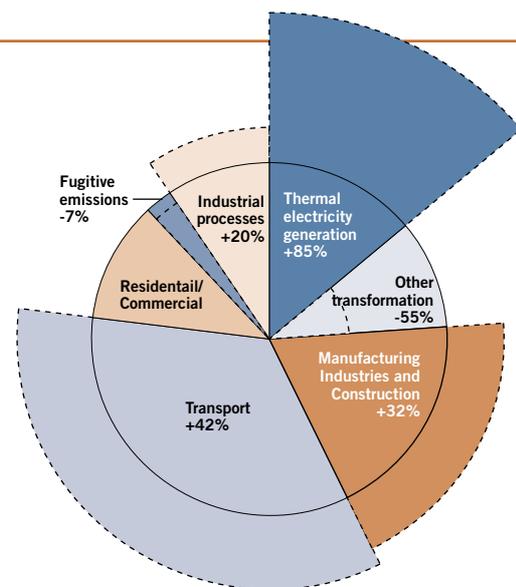


The pie charts at right show the difference between CO<sub>2</sub> and non-CO<sub>2</sub> emissions in New Zealand's greenhouse gas emissions inventory for the years 1990 and 2001.

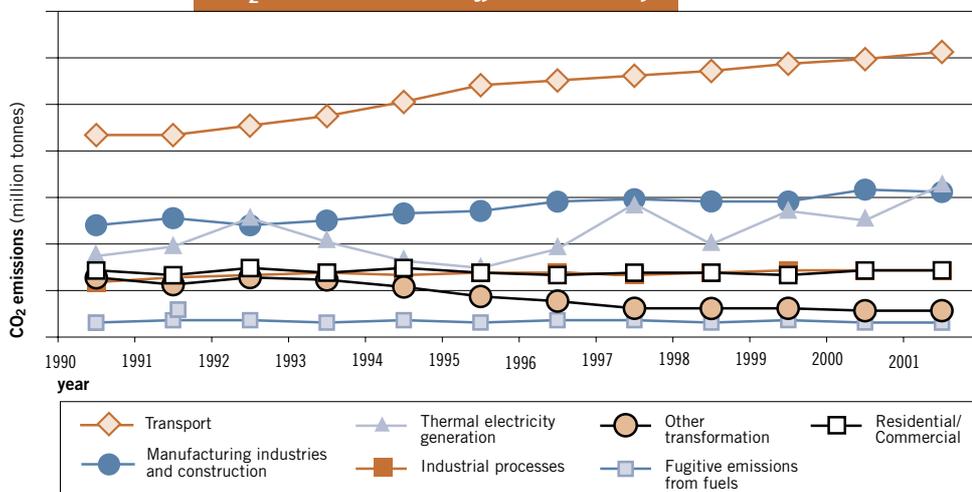
### Breakdown of CO<sub>2</sub> emissions

Most CO<sub>2</sub> emissions come from energy and industrial processes. The graph below and associated pie chart at right show that there are:

- substantial increases in the transport sector (42%), thermal electricity generation (85%) and manufacturing industries and construction (32%).
- decreases in "other energy transformation" which occurs mainly because methanol manufactured from natural gas is no longer used for synthetic petrol production; methanol is now contributing to industrial emissions.



CO<sub>2</sub> emissions - energy and industry



The pie chart above shows percentage increases and decreases in CO<sub>2</sub> emissions from categories in the energy and industrial processes sectors. Overall the CO<sub>2</sub> emissions from these sectors have increased by about 30% since 1990. Year-to-year trends are shown in the chart at left.

Economic development forecasts suggest that if nothing is done to reduce emissions, CO<sub>2</sub> emissions will rise between 38% and 52% over 1990 levels by the year 2010. These projections are based on a Gross Domestic Product growth to 2010 in the range of 2% to 4% per year.



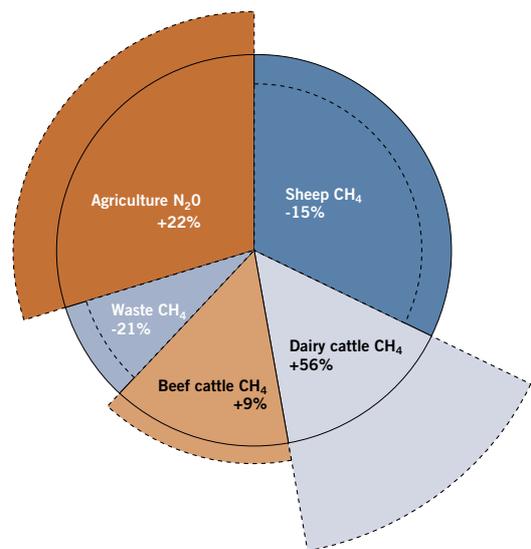
## Breakdown of non-CO<sub>2</sub> emissions

Most emissions of the key non-CO<sub>2</sub> gases (methane and nitrous oxide) come from agriculture, with minor contributions from waste (landfills), energy and industry. In the agriculture sector, methane emissions come from ruminant animals and their waste, and nitrous oxide emissions come from animal excreta and nitrogen fertilisers.

The pie chart at the right shows how the total emissions of methane and nitrous oxide have changed since 1990. The most important changes are the large increase of methane emissions from dairy cows (increase by about 55%) and the significant decrease of emissions from landfills (reduction of 20%).

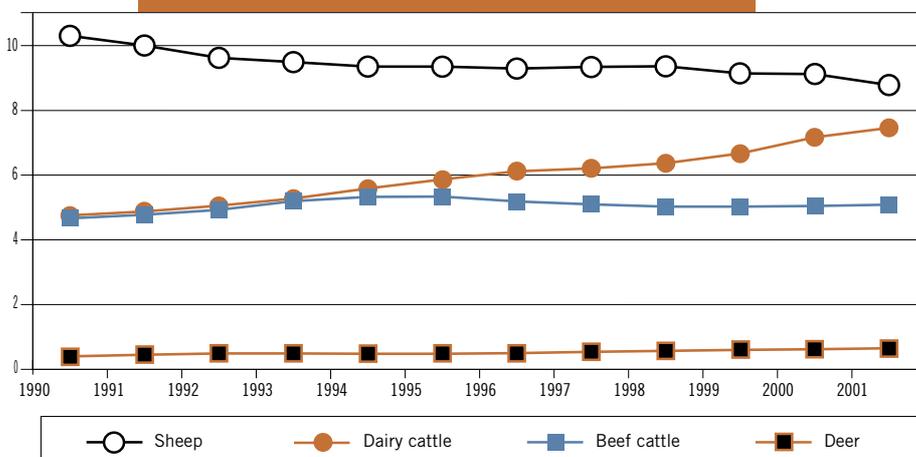
In addition to methane and nitrous oxide, non-CO<sub>2</sub> emissions include perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), and sulphur hexafluoride (SF<sub>6</sub>). These gases together make up less than 1% of total emissions.

Overall, latest figures show that the total non-CO<sub>2</sub> greenhouse gas emissions are almost 10% above 1990 levels



Percentage increases and decreases in methane and nitrous oxide emissions from key agriculture categories and waste. The solid lines indicate 1990 emissions, and the dotted lines indicate estimated current emissions.

### Methane emissions from livestock (1990-2001)



Of all non-CO<sub>2</sub> greenhouse gas emissions in New Zealand, about 60% are agricultural methane emissions from ruminant animals. The graph at the left shows changes in methane emissions from different livestock in New Zealand since 1990, reflecting both increases in animal performance and changes in animal numbers. Dairy cattle and deer numbers have increased since 1990, beef cattle numbers have not changed much at all, and sheep numbers have decreased. Animal performance has increased for all key livestock classes since 1990, and it is likely to continue to increase. It is estimated that non-CO<sub>2</sub> emissions from the agriculture sector are likely to be about 15% above 1990 levels by 2010.



## What is New Zealand's task?

Under the Kyoto Protocol, New Zealand's task is to limit its total emissions of greenhouse gases to 1990 levels, on average, over the period 2008 – 2012. Otherwise it must take responsibility for emissions in excess of that target.

New Zealand's approach to meeting its target is to use a combination of foundation policies – for example the National Energy Efficiency and Conservation Strategy – together with policies introduced to address greenhouse gas emissions. These policies include Negotiated Greenhouse Agreements (NGAs) for firms considered to be “competitiveness at risk”, emission reduction projects, and a research strategy for agricultural emissions. A carbon charge on CO<sub>2</sub> emissions will be introduced in 2007. New Zealand will also use sink credits from forests planted since 1990 to ensure we are able to meet the target.

### Inventory commitments

When New Zealand compiles its greenhouse gas inventory each year, data from previous years is revised where methods have improved, or new information becomes available. This continual process of inventory improvement is encouraged under the United Nations Framework Convention on Climate Change (UNFCCC). In this document we have used the most up to date information available for the entire inventory, which in some instances is different from data previously reported to the UNFCCC. Under the UNFCCC developed countries are required to report their total greenhouse gas emissions caused by human activities. These reports are submitted on an annual basis and the information is freely available on the internet (see <http://www.unfccc.int/resource/>).

This information allows countries to monitor each other's progress in reducing their greenhouse gas emissions and to calculate the total contribution of developed countries to the global human-caused emissions of greenhouse gases. These greenhouse gas inventories are crucial under future legally binding frameworks such as the Kyoto Protocol to ascertain whether countries are meeting their agreed emission targets.

The Climate Change Response Act (2002) provides for the preparation and reporting of New Zealand's greenhouse gas inventory. The Ministry for the Environment, through the New Zealand Climate Change Office is the agency responsible for the inventory. The Climate Change Office compiles the greenhouse gas inventory from a variety of sources including Government departments such as the Ministry of Agriculture and Forestry, the Ministry of Economic Development and Statistics New Zealand, and from expert advice from scientists in Crown Research Institutes and universities in New Zealand.



New Zealand Climate Change Office  
Te Hōtaka Rerekētanga Āhuarangi o Aotearoa

[www.climatechange.govt.nz](http://www.climatechange.govt.nz)

