

# Inventory

## National Greenhouse Gas Inventory

INFORMATION FROM THE AUSTRALIAN GREENHOUSE OFFICE—JULY 2000

### Industrial Processes

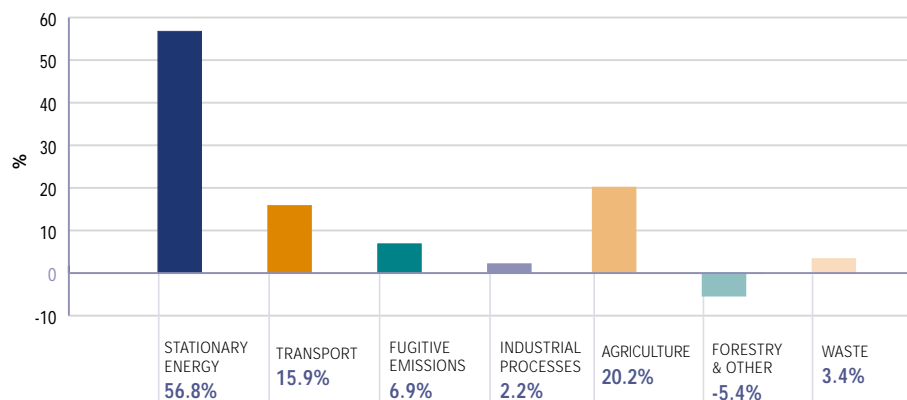
#### 1998 inventory and trends

1998 emissions	Changes in emissions 1990–1998
<p><b>Australia's estimated greenhouse gas emissions</b> in 1998 totalled 455.9 million tonnes of carbon dioxide equivalent* (Mt CO<sub>2</sub>-e), excluding emissions from land clearing.<sup>#</sup></p>	<p>This represents an increase of 5.2% on 1997 national greenhouse gas emissions and a 16.9% increase on 389.8 Mt in 1990. This does not equate to the Kyoto Protocol accounting requirements.</p>
<p><b>Industrial processes emissions</b> in 1998 totalled 9.8 Mt, accounting for 2.2% of total national net emissions.</p>	<p>Industrial emissions in 1998 increased by 11.3% from 1997, due to increased production. However, 1998 emissions are 18.4% less than the 1990 level.</p>
<p>The industrial processes sector is a minor source of emissions. Emissions from energy used in industrial processes are included in the stationary energy sector.</p>	<p>Although production has increased from 1990, emissions have declined due to technology improvements in aluminium smelting.</p>

\* Carbon dioxide equivalents, CO<sub>2</sub>-e, provide the basis for comparing the warming effect of greenhouse gases such as methane, nitrous oxide, the perfluorocarbons, etc

<sup>#</sup> Including the current best estimate of land clearing emissions, Australia's total emissions would be 519.9 Mt in 1998 and 493.3 Mt in 1990, representing a 5.4% increase. This does not equate to the Kyoto Protocol accounting requirements.

1998 Estimated emissions by sector (excluding land clearing)  
Total 455.9 Mt CO<sub>2</sub>-e



FACT SHEET  
1998

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## The National Greenhouse Gas Inventory

Australia has produced an annual inventory of national greenhouse gas emissions since 1990 as part of its commitments under the Framework Convention on Climate Change. The 1998 Inventory provides the latest report on Australia's greenhouse gas emissions. This Inventory incorporates improvements in methods that have been used to update emission estimates in the 1990-1997 inventories.

The total emissions reported in the national inventory do not represent Australia's performance against the Kyoto Protocol. Guidelines for reporting on the Kyoto Protocol are still being negotiated. For example, some of the land-based emissions and sinks that are reported in the national inventory will not be included or will be reported differently for the Kyoto Protocol.

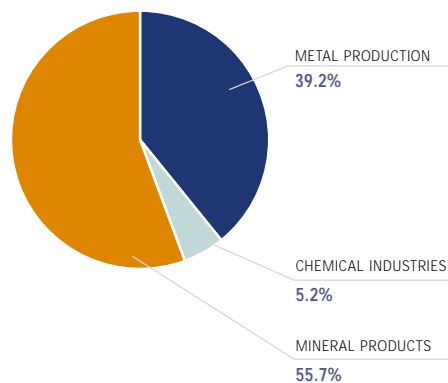
Australia's National Greenhouse Gas Inventory is based on international guidelines established by the Intergovernmental Panel on Climate Change and reports on human-induced greenhouse gas emissions in six sectors:

1. Energy
2. Industrial Processes
3. Solvent and Other Product Use
4. Agriculture
5. Land Use Change and Forestry
6. Waste

The numbers presented in the text and figures may not add up to the reported total due to rounding errors. Inclusion of the decimal place does not necessarily indicate a level of precision in the estimates.



1998 Emissions from industrial processes by subsector  
Total 9.8 Mt CO<sub>2</sub>-e



## Industrial Processes

Greenhouse gas emissions from industrial processes are a by-product of the various production processes. For example, high temperature processing of calcium carbonate to produce quicklime gives rise to carbon dioxide emissions. Emissions from this sector vary with rate of production and the type of process used in manufacture. Over time technological change in production processes can also have a significant impact on industrial process emissions, such as where better process monitoring and control can reduce process emissions. Emissions from energy used in industrial processes are included in the stationary energy subsector.

Greenhouse gas emissions from industrial processes are mostly carbon dioxide. Smaller quantities of PFCs, nitrous oxide and methane are also emitted. The major sources of industrial process emissions are:

- **Mineral products** – CO<sub>2</sub> from cement clinker and lime production, the use of limestone and dolomite in industrial smelting processes, and soda ash use.
- **Metal production** – CO<sub>2</sub> and PFCs from aluminium smelting.
- **Chemical industry** – nitrous oxide from the production of nitric acid for use in fertiliser and explosives manufacturing, and as a cleaning agent.

Several other small sources of emissions from industrial processes are not included in the inventory because of a lack of reliable data. There is potential for some of these emissions to increase in the future. Specifically, emissions of hydrofluorocarbons (HFCs) will increase as they progressively replace ozone depleting substances. Magnesium smelting is an infant industry in Australia with substantial growth potential and sulphur hexafluoride emissions could become significant. However, a major research effort is being directed to developing a replacement for sulphur hexafluoride in the process.

Further research is being undertaken by the Australian Greenhouse Office as part of Australia's National Greenhouse Strategy to improve information and estimates. Future inventories will reflect the outcomes of this work.

# Use Gas Inventory

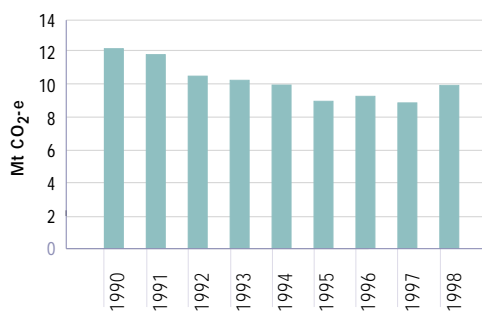
The Kyoto Protocol allows countries to use 1990 or 1995 as the base year for HFCs, perfluorocarbons (PFCs) and sulphur hexafluoride (SF<sub>6</sub>). No decision has yet been made about the base year to be used by Australia.

## Emissions estimates and trends from 1990 to 1998

Emissions from industrial processes showed a declining trend from 1990 to 1995. This is substantially due to a large fall in PFC emissions from aluminium smelting as a result of technological improvements in process control and monitoring.

Emissions in 1998 increased by 11.3% from 1997 due to increased production. However, emissions were still 18.4% less than in 1990. Significant growth in aluminium production (14%), lime production (11%) and cement clinker production (10%) occurred from 1997 to 1998. The growth in aluminium production was due to a substantial increase in smelting capacity with the commissioning of a new pot line at Boyne Island, Queensland.

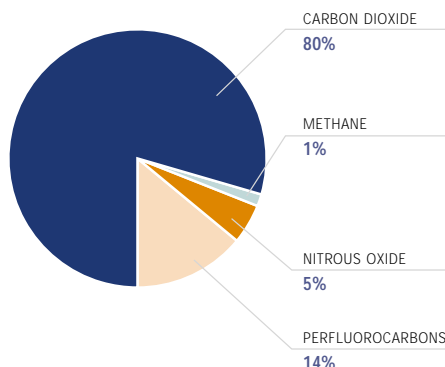
Trend in emissions from industrial processes 1990 – 1998



PFC emissions from aluminium production in 1998 totalled 1.4 Mt CO<sub>2</sub>-e. This represents an increase of 24.7% from 1997, due mainly to increased capacity and a slight rise in average emission factor. PFC emissions have declined by 70.7% since 1990.

CO<sub>2</sub> emissions rose by 9.6% from 1997, and by 17.6% from 1990, due to increased production of aluminium, lime and cement clinker.

1998 Industrial processes emissions by gas



### Mineral products

Mineral products contribute the majority of industrial process emissions (55.7%). In 1998, mineral products generated 5.5 Mt emissions, an increase of 7.7% from 1997, and 13.3% from 1990. Cement clinker contributed 59.0% of emissions from mineral products and lime contributed 26.7%. Limestone and dolomite use produced 13.7% of emissions.

### Metal production

In 1998, metal production generated 3.8 Mt emissions. Virtually all process emissions in metal production arise from aluminium smelting and comprise 2.4 Mt CO<sub>2</sub> and 1.4 Mt CO<sub>2</sub>-e from PFCs. All PFC emissions currently included in the Australian inventory are produced in aluminium smelting.

### Chemical industry

Nitric acid production is the only process included in the estimates of emissions from the chemical industry subsector. Emissions from nitric acid were 0.5 Mt in 1998. These emissions have remained virtually unchanged since 1990 due to slow growth in nitric acid production.

## Reliability of emissions estimates

The uncertainty associated with carbon dioxide and perfluorocarbon emissions from industrial processes is relatively low and is estimated to be less than 10%. Estimates of methane emissions from iron and steel and nitrous oxide emissions from nitric acid production are highly uncertain, with uncertainty ranges of 60%.



# Greenhouse

## Reducing greenhouse gas emissions in the industrial processes sector

Australia is undertaking a range of activities that, by the year 2010, are expected to reduce emissions compared to the levels that would otherwise have been reached.

Industry is actively involved in developing and compiling information needed for the National Greenhouse Gas Inventory, especially in relation to process emissions. In compiling information, the industry sector is able to monitor and determine priority areas where action is required.

The Greenhouse Challenge program is a joint voluntary initiative between Australian industry and the Commonwealth Government that aims to encourage industry to reduce their greenhouse emissions by improving efficiency in energy use and processing.

The Commonwealth and State governments are introducing a national framework for the implementation of cleaner production *Towards Sustainability*:

### *Achieving Cleaner Production in Australia.*

This framework encourages better management of industrial processes to reduce waste and emissions, including greenhouse gas emissions, while improving productivity.

The National Greenhouse Strategy, released by the Commonwealth and State and Territory governments in 1998, provides a framework for coordinated action by all levels of government. Implementation plans are currently being finalised for this Strategy which focuses action on three fronts: improving our awareness and understanding of greenhouse issues; limiting the growth of greenhouse gas emissions and enhancing sink capacity; and developing adaptation responses.

The Commonwealth Government has established the \$400 million Greenhouse Gas Abatement Program to further assist Australia in meeting its commitments under the Kyoto Protocol to the United Nations Framework Convention on Climate Change. This program aims to deliver cost-effective and large-scale abatement across all sectors of the economy, particularly in the first commitment period under the Protocol (2008 - 2012).



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Information about the National Greenhouse Gas Inventory and initiatives to reduce greenhouse gas emissions from the industrial processes sector can be obtained from the Australian Greenhouse Office web site:

<http://www.greenhouse.gov.au/inventory>

Copies of the 1998 Inventory and related documents can be obtained by contacting AGO Publications:

**Telephone: 1300 130 606**

**Facsimile: 02 6299 6040**

National Greenhouse Gas Inventory 1998 with Methodology Supplements.

National Greenhouse Gas Inventory Land Use Change and Forestry Sector 1990-1998.

National Greenhouse Gas Inventory: Analysis of Trends and Greenhouse Indicators 1990 to 1998.

Australian Methodology for the Estimation of Greenhouse Gas Emissions and Sinks: Workbook for Industrial Processes and Solvent and Other Product Use, Workbook 7.1 reprinted with supplements 1998.

Fact Sheets — 1998 National Greenhouse Gas Inventory — Frequently Asked Questions, Overview and other sectors in this series.

