

Inventory

National Greenhouse Gas Inventory

INFORMATION FROM THE AUSTRALIAN GREENHOUSE OFFICE—JULY 2000

Energy: Transport

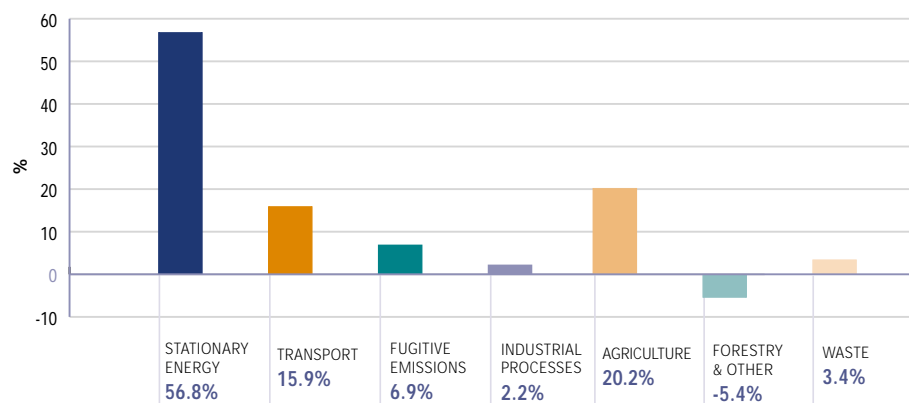
1998 inventory and trends

1998 emissions	Changes in emissions 1990–1998
Australia's estimated greenhouse gas emissions in 1998 totalled 455.9 million tonnes of carbon dioxide equivalent* (Mt CO ₂ -e), excluding emissions from land clearing.#	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.
The energy sector including transport accounted for about 79.6% or 362.9 Mt of total national net CO ₂ -e emissions in 1998.	1998 energy emissions, including transport, increased 5.7% above 1997 levels and 21.1% above those recorded in 1990.
Transport accounted for 15.9% or 72.6 Mt of total national net emissions in 1998.	Transport emissions in 1998 were 0.3% above 1997 levels and 18.1% above those recorded in 1990.
Road transport contributed 89.3% or 64.8 Mt of transport emissions in 1998. This represents 14.2% of total national net emissions.	Road transport emissions in 1998 were 1.8% higher than in 1997 and 18.2% higher than in 1990.
Of this, cars contributed 41.0 Mt or 9.0% of national emissions. Trucks and light commercial vehicles contributed 22.4 Mt of emissions in 1998.	The fuel used by cars increased by 12% from 1990 to 1998 but the emissions increased by 16.6% in the same period. Emissions from trucks and light commercial vehicles increased by 22.4% from 1990 to 1998.

* Carbon dioxide equivalents, CO₂-e, provide the basis for comparing the warming effect of greenhouse gases such as methane, nitrous oxide, the perfluorocarbons, etc

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 CO₂-e



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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 international 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 data collection 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.

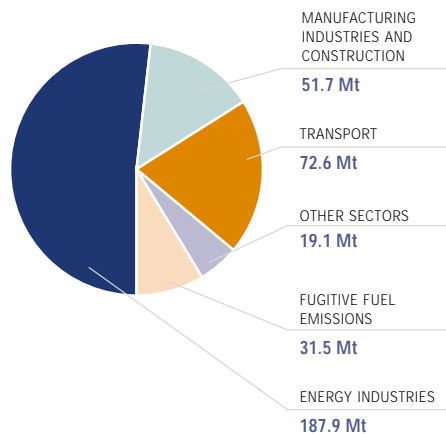
Transport accounted for 20% of greenhouse gas emissions from the energy sector.

Transport — includes estimated emissions from:

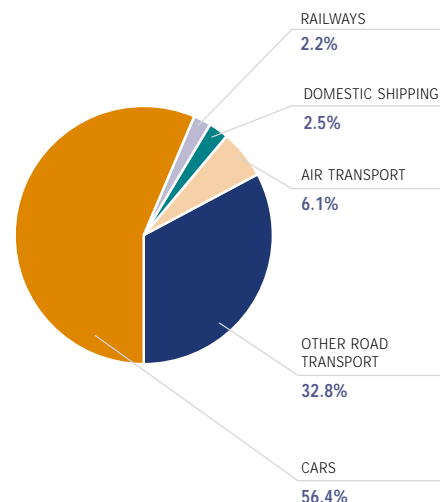
- **Road transport** — passenger vehicles, light commercial trucks, heavy trucks, buses and motorcycles.
- **Domestic air transport** — commercial passenger and light aircraft using either aviation gasoline or jet kerosene. International air transport is reported but not included in Australia's total emissions.
- **Coastal shipping** — domestic shipping and small craft. International shipping is reported but not included in Australia's total emissions.
- **Rail transport** — domestic railways, but not including electric rail.

All emissions from domestic transport will be included in both the 1990 baseline (that will provide a benchmark for comparison of future emissions) and the accounting for the Kyoto Protocol commitment period in 2008-2012.

1998 Energy sector emissions
Total 362.9 Mt CO₂-e



1998 Transport sector emissions
Total 72.6 Mt CO₂-e



Energy sector

In addition to transport, the Energy sector includes emissions from:

- **Stationary sources** – emissions from fuel combustion in energy industries, manufacturing industries and construction and other sectors such as agriculture, fishery and forestry, commercial and residential.
- **Fugitive sources** – waste emissions from the production and distribution of coal and natural gas.

(Emissions from stationary and fugitive sources are covered by Fact Sheet 2 in this series)

Emissions estimates and trends from 1990 to 1998

Road transport

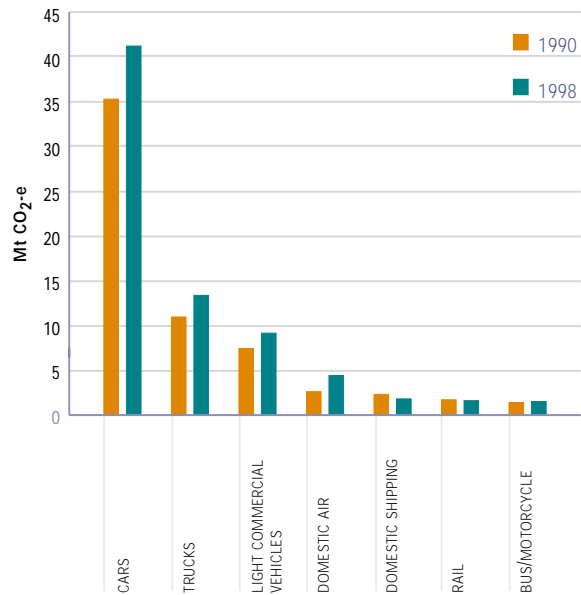
Road transport was the main source, some 89.3%, of transport emissions in 1998. In 1998, road transport emissions were 64.8 Mt, representing an increase of 18.2% since 1990. Road transport accounted for almost 14.2% of total national emissions in 1998.

56.4% of transport emissions in 1998 came from passenger vehicles, mostly petrol driven cars. Emissions from cars increased by 16.6% from 1990 to 1998. While the number of vehicles and distance travelled has increased, the on-road fuel efficiency of passenger vehicles has improved. Available data shows a 3% improvement from 11.9 litres per 100 km in 1991 to 11.5 litres per 100 km in 1995.

Use of liquid petroleum gas (LPG) as a fuel for passenger cars has more than doubled from 1990 to 1998. LPG produces less greenhouse gases per unit of energy than petrol. In 1998, LPG provided 6.9% of the fuel to the passenger car fleet but these cars produced only 5.7% of the passenger car emissions. Petrol provided 89.4% of the fuel and produced 90.6% of the car emissions.

Truck travel declined between 1990 and 1993, resulting in a decline in truck emissions by nearly 11% for this period. By 1998, emissions from trucks, at 13.3 Mt, were 21.9% above the 1990 level. The fuel efficiency of rigid trucks*, which account for 60% of the truck vehicle kilometres travelled, fell by about 4% between 1988 and 1995. This deterioration in fuel-efficiency is evident in both urban

Transport emissions by category 1990-1998



and non-urban travel, and may be related to greater engine capacities and an increase in average load. Fuel-efficiency of articulated trucks improved between 1988 and 1995. Between 1988 and 1995, the average load increased by about 25% for rigid trucks and about 15% for articulated trucks.

Emissions from light commercial vehicles (LCVs) in 1998 were 23.3% higher than in 1990. Fuel efficiency of LCVs was fairly constant during the period and so was the average load carried, but the emissions per tonne-km for LCVs increased between 1991 and 1995. This is consistent with an increase in distance travelled for lightly-loaded trips such as couriers and home deliveries.

Emissions from buses remained low and fairly constant during the period. Natural gas is increasing in use as bus fuel. In 1990, most buses used automotive diesel oil and none used natural gas; but in 1998, 7.5% of the fuel used was natural gas. Greenhouse gas emissions per unit of energy used have decreased accordingly.

* Rigid trucks have a gross vehicle mass (GVM) greater than 3.5 tonnes. Articulated trucks consist of a prime mover with a turntable device which can be linked to a trailer. LCVs are constructed primarily for the carriage of goods and have a GVM of 3.5 tonnes or less. Vehicle fuel efficiencies are measured in terms of emissions per kilometre.

Greenhouse

Air transport

Air transport emissions in 1998 totalled 4.4 Mt, which is 71.5% higher than the 1990 level. Though 1990 was something of a low point in air travel in Australia, due to an extended strike by pilots, both passenger and freight use of air transport has increased significantly ever since. The average rate of increase in domestic air transport emissions over the period 1990 to 1998 was 7% per year. There are indications of some levelling of growth in this subsector in the latter part of the 1990s.

Improved operating procedures, higher passenger load factors and the introduction of larger, more modern aircraft contributed to a 23% reduction in greenhouse gas emissions per tonne-kilometre carried between 1991 and 1995. The number of passengers carried increased by 51.3% between 1991 and 1998, and passenger-kilometres by 77.6%.

Coastal shipping

Emissions from domestic shipping in 1998 were 1.8 Mt, nearly 22.6% lower than in 1990. The average rate of decline in domestic shipping emissions was 3.2% per year over the period 1990 to 1998. Some of the decline is due to the partial replacement of coal in the domestic shipping fleet by fuel oil that produced lower emissions per unit of energy.

Rail transport

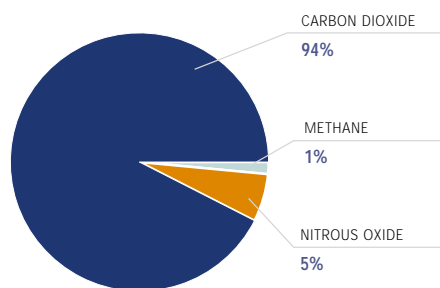
Emissions from rail fuel declined steadily throughout the period, totalling 1.6 Mt in 1998, which is 9.2% lower than the 1990 level. It should be noted, however, that this total does not include emissions associated with production of electricity for use in rail transport as these emissions are included elsewhere in the energy sector.

Composition of emissions by gas

Transport emissions are mostly carbon dioxide (CO₂), with small amounts of nitrous oxide (N₂O) and methane (CH₄). The proportion of nitrous oxide in transport emissions nearly doubled from 2.6% in 1990 to 5.1% in 1998, due mainly to the increasing proportion of passenger vehicles equipped with catalytic converters.

Catalytic converters, an air pollution control tool, became mandatory in 1987. While three-way converters reduce air pollution more effectively than two-way converters, they do produce more nitrous oxide per unit of fuel use. Passenger cars with three-way converters emit 12% more methane and 154% more nitrous oxide per kilometre than cars with two-way converters or those without any pollution controls at all.

1998 transport emissions by gas



Reliability of emissions estimates

The amount of fuel consumed and the characteristics of that fuel influence the estimates of carbon dioxide emissions from combustion. As these primary data are known reasonably accurately, the uncertainty associated with carbon dioxide emissions from transport is understood to be less than 5%. For estimates of methane and nitrous oxide emissions, emission factors associated with the type of equipment or process that uses the fuel, and the proportions of these in use are also required. While the amount of fuel is relatively well known, the mix of technology in use is less well known and can change with time. Information on emissions under various operating conditions is also limited. Estimates of emissions of non-CO₂ gases in the transport sector have an associated uncertainty of greater than 20%.



Household Gas Inventory

Change in emissions relative to economic growth

While gross domestic product (GDP) and total emissions both increased, total emissions per dollar of GDP declined by 8.2% between 1990 and 1998 and energy emissions per dollar GDP by 4.9%. GDP increased at an average rate of 3.1% while emissions increased at an average rate of 2.0% during this period.

Indicators for transport include:

- total emissions per passenger-km travelled were 1.7% lower in 1995 than in 1990
- emissions per tonne of freight-km were 2.7% lower in 1995 than in 1990.

The reduction is related to more efficient use of the transport infrastructure as a whole, a gradual shift towards the use of fuel with lower emission factors, such as natural gas, and improvement in on-road fuel efficiency of passenger vehicles.

Reducing greenhouse gas emissions in the transport sector

Australia is undertaking a range of activities that will reduce emissions from the transport sector.

The Prime Minister's 1997 \$180 million greenhouse package contains a range of measures to reduce greenhouse gases from transport. The Australian Greenhouse Office is delivering the following initiatives:

- Compressed Natural Gas Infrastructure Program which provides funding for the establishment of publicly accessible refuelling facilities
- Environmental Strategy for the Motor Vehicle Industry including
 - the *Fuel Consumption Guide*
 - mandatory fuel consumption labels on cars showing fuel consumption in Litres/100km
 - a national average fuel consumption target for new vehicles
 - fuel consumption targets for the Commonwealth government vehicle fleet.

A number of additional new initiatives are being supported under the Commonwealth Government's 1999 *Measures for a Better Environment* package. These are targeted at encouraging greater use of alternative fuels with lower greenhouse gas emissions per unit of energy produced. These include:

- the Alternative Fuel Conversion Program, which provides grants for purchasing or converting buses and other commercial vehicles over 3.5 tonnes GMV to use compressed natural gas (CNG) and liquefied petroleum gas (LPG) fuels
- Diesel and Alternative Fuel Grant Scheme, which maintains the current price relativities between diesel and a range of alternative and renewable transport fuels.

A number of States and Territories are also implementing measures to reduce greenhouse gas emissions from passenger and freight transport. These include:

- Integrating land use and transport planning
- Travel demand and traffic management (eg park and ride programs)
- Encouraging greater use of public transport, walking and cycling.

All governments are committed to improving the efficiency of public transport. Actions such as improvements and upgrades to rail and road-based public transport services, the creation of high-occupancy vehicle lanes on roadways, and market reforms will increase the efficiency and competitiveness of public transport.

Commonwealth, State and Territory Governments are undertaking a reform program to rejuvenate rail services, increase private sector involvement in this area and increase rail's share of the freight market. This is expected to reduce the average greenhouse gas emission per unit of freight carried.



Greenhouse

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

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

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 Transport (Mobile Sources), Workbook 3.1 reprinted with supplements 1998.

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

Fuel Consumption Guide.



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