

Greenhouse gas emissions and Australia

Introduction

Whenever we are thinking about Australia's greenhouse gas emissions it is useful to know about how they happen. As it is not easy to find reliable data on this, this technical note seeks to summarise what is known about how and why our emissions occur.

Accounting for greenhouse emissions is not easy and much of what is on the public record is from secondary sources, often quoting other secondary sources. Much of what is available from primary sources is complex and in some cases dated. These problems are compounded by the fact often it isn't clear whether emissions data refer just to carbon dioxide, CO₂, or to other greenhouse gases as well. Globally, CO₂ accounts for about 72 % of greenhouse gases expressed as CO₂ equivalents (CO₂-e); methane (CH₄) 18% and nitrous oxide and (N₂O) 9% are the other more important greenhouse gases ¹ (comparable data for Australia in 2004 were CO₂ 71.7%, CH₄ 22.2% and N₂O 4.9% ²).

1 emissions according to processes (ie how emissions were caused)

The usual manner of accounting follows the methods of the UN Framework Convention on Climate Change, which allocate domestic emissions to sources and sinks. By percentages of a total of 525.7Mt CO₂-e in 2004, domestic emissions came from ³

Crop and livestock emissions	17.1	(includes livestock, 11.7, tillage 3.2)
Stationary fuel combustion	53.0	(includes electricity generation, 36.8)
Transport fuel use	15.1	(passenger cars 8.3, half is private, other road 5.1)
Fugitive fuel emissions	5.8	(mostly from coal mines)
Industrial processes	5.8	(includes iron/steel 1.9, aluminium 0.9, cement 0.7)
Net land use change	0.0	(new vegetation roughly balances land clearing)
Waste	3.3	

The emissions from fuels (73.9 per cent of total emissions) is estimated as coming from (percentages rounded) ⁴:

Solid fuels (mainly black coal and products)	53
Liquid fuels (mainly petroleum products)	30
Gaseous fuels (mainly natural gas)	18

Solid fuels (especially brown coal and most biomass) account for higher percentages of fuel emissions than they contribute to primary energy consumption (43 per cent in 2003 ⁵) because they emit more greenhouse gases on combustion for the energy yielded than do petroleum products (32 percent of energy) or gases (20 per cent).

2 emissions according to economic sector (ie the sector in which emissions occurred)

On a different accounting, under the Kyoto Protocol, emissions are estimated according to the economic sector in which stationary energy, transport energy, industrial processes, biological processes and waste are used directly. By percentage of a total of 564.7 Mt CO₂-e in 2004 (probably fiscal year 2004-5) emissions were generated in ⁶:

Rural industries	23.8	(includes crop and animal emissions, fuels)
Mining	7.9	(fuel escapes and combustion)
Manufacturing	12.5	(industrial processes and fuel use)
Electricity, gas and water	35.9	(mostly network electricity generation)
Construction	0.3	
Wholesale and retail trade	0.1	
Accommodation, cultural and personal	2.9	
Transport and storage	6.3	(public passenger transport and freight)
Other service sectors	1.0	
Residential	9.2	(mainly private vehicular fuel and gas)

These data cover only domestic emissions (within Australia). In fiscal 2004 these contributed ‘just 1.4% of global greenhouse gas emissions’⁷. If the potential emissions from Australia’s energy exports in that year this would add a further 2.0% to our global emissions⁸.

3 Emissions according to end consumption (ie where the emissions ended up)

Ultimately, the goods and services whose production gives rise to emissions end up being consumed by households or governments in Australia or overseas. Input-output accounting seeks to allocate emissions generated during production in Australia to the sectors in which goods and services were finally consumed. The Australian Greenhouse Office has published estimates of ‘end use’ for 1999, but the most comprehensive recent estimates according to final consumption are from the Australian Bureau of Statistics for 1994-5⁹. A significant proportion of these is accounted for by emissions embodied in imports.

These estimates were detailed only for emissions caused by combustion of fuel (303.0 Mt of CO₂-e), for which proportions allocated to sectors of final consumption ‘remain fairly stable from year to year’¹⁰. If net land use change is ignored (which is reasonable in view of the great decline in these emissions over the past decade) the proportions of fuel and non-fuel emissions allocated to sectors of final consumption are likely to have been similar. In the estimates fuel emissions were allocated as follows (as percentages of emissions from fuel combustion):

induced by exports	22.9 (mainly as embodied energy)
directly by households	14.6 (includes motor vehicle use 11.8)
induced by households	41.7 (includes electricity 16.8)
directly, or induced by governments	8.5 (excludes capital expenditure)
directly, or induced by capital expenditure	12.1 (eg buildings, vehicles, equipment)

Key points

- Australia contributes towards between three and four per cent of global greenhouse gas emissions
- Over half of domestic emissions and most of the emissions from exported energy are from coal
- Domestically, the generation of electricity accounts for nearly forty per cent of emissions
- Road transport accounts for nearly a further fifteen per cent of domestic emissions
- Households contribute towards between fifty and sixty percent of domestic emissions.

Sources

¹ ‘Greenhouse gas’. At http://en.wikipedia.org/wiki/Greenhouse_gas, accessed 15/05/07.

² Australian Greenhouse Office (AGO), *National Inventory Report (revised) 2004*. Department of the Environment and Heritage, Canberra, 2006, Vol 1 p 20.

³ *op cit*, pp 20, 23 and elsewhere.

⁴ calculated (partly estimated) from data in *op cit*

⁵ Agricultural and Natural Resources (ABARE), *Impact of Oil Prices on Trade in the APEC Region*. ABARE, Canberra, 2005, p 29.

⁶ Australian Greenhouse Office, *Australia’s National Greenhouse Accounts. National Inventory by Economic Sector 2004*, AGO, Canberra, 2006, p3.

⁷ ‘Greenhouse Accounts show Australia is still on target for 108 per cent’. Media release. Australian Minister for the Environment and Heritage, Canberra, 23 May 2006; the primary source for the number is unknown but the Australian Greenhouse Office cited it in a submission to a Senate Inquiry into Australia's Response to Global Warming in 1999.

⁸ calculated using emission factors in *AGO Factors and Methods Workbook*, Department of the Environment and Heritage Canberra, 2006, applied to data from ABARE *Energy in Australia, 2006*. ABARE, Canberra 2007, p 58.

⁹ AGO, *Australia’s National Greenhouse Gas Inventory*. AGO, Canberra; Australian Bureau of Statistics (ABS), *Energy and Greenhouse Gas Emissions Accounts 1992-93 to 1997-98*. ABS (Cat 4604.0), Canberra, 2001.

¹⁰ ABS, *op cit* ‘Summary’ p5.