



Australian Government  
Department of Climate Change

# AUSTRALIAN NATIONAL GREENHOUSE ACCOUNTS



## National Inventory by Economic Sector 2007



thinkchange

Published by the Department of Climate Change.

[www.climatechange.gov.au](http://www.climatechange.gov.au)

© Commonwealth of Australia 2009

ISBN: 978-1-921298-44-8

This work is copyright. Apart from any use as permitted under the Copyright Act 1968, no part may be reproduced by any process without prior written permission from the Commonwealth. Requests and inquiries concerning reproduction and rights should be addressed to the:

Commonwealth Copyright Administration  
Attorney General's Department  
Robert Garran Offices  
National Circuit  
BARTON ACT 2600

Or posted at: <http://www.ag.gov.au/cca>

The Australian National Greenhouse Accounts are available on the Internet at the following address: <http://www.climatechange.gov.au/inventory>.

Suggestions and comments would be appreciated. They should be addressed to:

The Director  
Emissions Inventory Team  
Department of Climate Change  
GPO Box 854, Canberra ACT 2601.

#### **Disclaimer**

While reasonable efforts have been made to ensure that the contents of this publication are factually correct, the Commonwealth does not accept responsibility for the accuracy or completeness of the contents, and shall not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on, the contents of this publication.

May 2009

# Table of Contents

<b>Part A – Direct Emissions (Scope 1 Emissions)</b>	<b>1</b>
Emissions at a Glance	1
Trends in Direct Emissions	1
Emissions per \$ GDP	3
Emissions Per Capita	4
State and Territory Direct Emissions by Economic Sector	4
<b>Part B – Indirect Emissions from the Generation of Purchased Electricity (Scope 2 Emissions)</b>	<b>7</b>
Trends in Indirect Greenhouse Gas Emissions from the Generation of Purchased Electricity (Scope 2 Emissions)	8
<b>PART C – Combined Direct Emissions and Indirect Emissions from the Generation of Purchased Electricity</b>	<b>11</b>
<b>Appendix 1 – Notes</b>	<b>13</b>
<b>List of Tables</b>	<b>1</b>
Table 1: Australia's Direct Greenhouse Gas Emissions by Economic Sector 2007	1
Table 2: Detailed Direct Greenhouse Gas Emissions Estimates by Economic Classification – Australia 1990, 2005 and 2007	2
Table 3: State and Territory Emissions by Economic Classification 1990	5
Table 4: State and Territory Emissions by Economic Classification 2007	6
Table 5: Australia's Indirect Greenhouse Gas Emissions from the Generation of Purchased Electricity (Scope 2 Emissions) by Economic Sector 1990, 2007	7
Table 6: Indirect Emissions from the Generation of Purchased Electricity (Scope 2 Emissions), Australia, 1990, 2006, 2007	8
Table 7: 1990 State and Territory Emissions from the Generation of Purchased Electricity (Scope 2 Emissions)	9
Table 8: 2007 State and Territory Emissions from the Generation of Purchased Electricity (Scope 2 Emissions)	10
<b>List of Figures</b>	<b>1</b>
Figure 1: Percentage Change in Direct Emissions by Economic Sectors 1990-2007	3
Figure 2: Greenhouse gas emissions per \$ of GDP 1990 to 2007	3
Figure 3: Direct State and Territory Emissions by Economic Sector, 2007	4
Figure 4: Indirect Greenhouse Gas Emissions from the Generation of Purchased Electricity Trends by Economic Sector, 1990-2007	8
Figure 5: Australia's Combined Direct and Indirect Greenhouse Gas Emissions from the Generation of Purchased Electricity (Scope 2 Emissions) by Major Economic Sector, 2007	11
Figure 6: Percentage Change in Combined Direct and Indirect Greenhouse Gas Emissions from the Generation of Purchased Electricity (Scope 2 Emissions) by Major Economic Sector, 1990-2007	12
Figure 7: Allocation of Greenhouse Gas Emissions by Source, Economic Activity and Greenhouse Gas, Australia, 2007	14



## Part A – Direct Emissions (Scope 1 Emissions)

### Emissions at a Glance

- The *National Inventory by Economic Sector* provides information on national emissions disaggregated by Australia-New Zealand Standard Industry Classifications (ANZSIC). It complements the *National Greenhouse Gas Inventory*, which provides estimates of emissions classified according to process-based emission categories (see Notes for details).
- In 2007 the major emission sources were primary industries and electricity, gas and water sectors.
- Australia's primary industries (agriculture, forestry and fishing and mining) accounted for 34.7 per cent of direct emissions and the electricity, gas and water economic sector accounted for 34.5 per cent of Australia's emissions.

**Table 1: Australia's Direct Greenhouse Gas Emissions by Economic Sector 2007<sup>(a)</sup>**

	Emissions (Mt CO <sub>2</sub> -e) <sup>(b)</sup>	Share of total emissions (%)
<b>All Sectors</b>	<b>597.2</b>	
Primary Industries	207.0	34.7
Agriculture, Forestry and Fishing	150.1	25.1
Mining	56.9	9.5
Manufacturing	71.5	12.0
Electricity, Gas and Water	205.9	34.5
Services, Construction and Transport	58.4	9.8
Residential	54.3	9.1

Notes: a) Estimated under the Kyoto Protocol reporting provisions and including emissions from article 3.3 Land Use, Land Use Change and Forestry activities. b) Carbon dioxide equivalent, CO<sub>2</sub>-e.

### Trends in Direct Emissions

- There have been significant differences in the trends experienced across various economic sectors.
- Direct emissions have increased in the mining (77.3 per cent or 24.8 Mt), electricity, gas and water (51.1 per cent or 69.7 Mt), residential (24.8 per cent or 10.8 Mt), services, construction and transport (19.3 per cent or 9.4 Mt) and manufacturing (9.9 per cent or 6.5 Mt) sectors.
- Emissions from agriculture, forestry and fishing have declined by 31.9 per cent (70.3 Mt CO<sub>2</sub>-e) since 1990. The strong decline principally reflects the impacts of declining emissions from the clearing of forest cover and increased removals by the forestry industry.

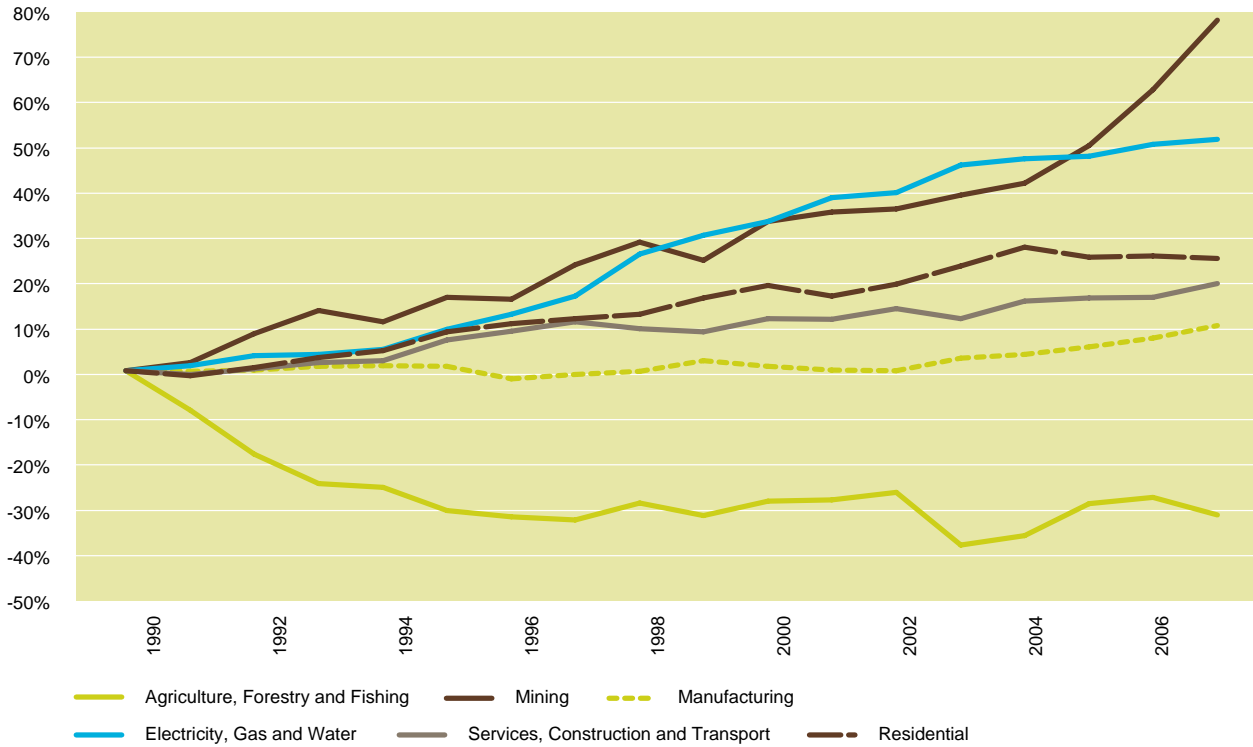
**Table 2: Detailed Direct Greenhouse Gas Emissions Estimates by Economic Classification – Australia 1990, 2005 and 2007 <sup>(a)</sup>**

ANZSIC code	Industry Classification	Emissions (Mt CO <sub>2</sub> -e)			Change in emissions (%)	
		1990	2006	2007	2006 to 2007	1990 to 2007
Div A	Agriculture, forestry and fishing	220.4	158.6	150.1	-5.3	-31.9
Div B	Mining	32.1	52.0	56.9	9.4	77.3
11	Coal Mining	17.1	27.6	30.5	10.6	78.2
12	Oil and Gas Extraction	12.5	15.9	17.2	8.2	37.6
13-15	Mining Non-energy	2.5	8.5	9.2	7.9	273.8
Div C	Manufacturing	65.1	69.8	71.5	2.5	9.9
21	Food, beverages, tobacco	4.4	4.5	4.6	1.6	4.5
22	Textile, clothing, footwear and leather	0.5	0.5	0.5	0.0	-6.2
23-4	Wood, paper and printing	1.7	2.5	2.5	-0.2	48.1
25	Petroleum, coal and chemical	15.7	19.2	19.4	1.3	24.0
26	Non-metallic mineral products	9.6	10.9	11.7	6.9	21.3
27	Metal products	32.7	31.8	32.4	2.1	-0.9
28	Machinery and equipment	0.5	0.4	0.5	6.2	-3.6
29	Other manufacturing	0.0	0.0	0.0	0.0	0.2
Div D	Electricity, gas and water	136.3	204.4	205.9	0.8	51.1
Div E-H, J-Q	Commercial services and construction	21.8	18.6	19.2	3.0	-11.9
Div I	Transport and storage	27.2	38.3	39.2	2.5	44.2
	Residential	43.5	54.5	54.3	-0.4	24.8
	Residential (non transport)	7.8	9.7	10.0	3.6	28.3
	Residential (transport)	35.7	44.9	44.3	-1.3	24.1

Source: Australian Greenhouse Emissions Information System: [www.climatechange.gov.au/inventory](http://www.climatechange.gov.au/inventory).

Note: a) These estimates are reported on a Kyoto Protocol reporting basis and include emissions from article 3.3 LULUCF activities.

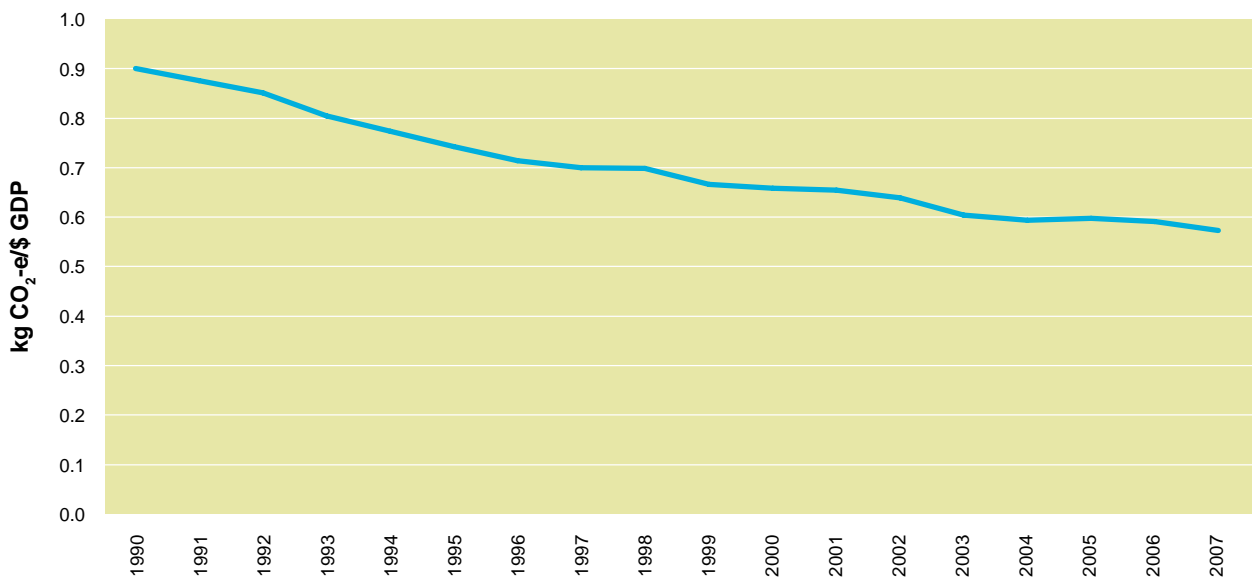
**Figure 1: Percentage Change in Direct Emissions by Economic Sectors 1990-2007**



### Emissions per \$ GDP

The greenhouse gas emissions intensity of the Australian economy, expressed as emissions per dollar of GDP, has declined over the period 1990 to 2007 by 36.4% from 0.90 to 0.57 kg CO<sub>2</sub>-e<sup>1</sup>. The falling trend in emissions per unit of GDP reflects specific emissions management actions across sectors; the large decline in land use change emissions over the period; and structural changes in the economy with stronger growth in the services sector than in the more energy intensive manufacturing sector.

**Figure 2: Greenhouse gas emissions per \$ of GDP 1990 to 2007**



<sup>1</sup> 2006–07 Australian dollars

## Emissions Per Capita

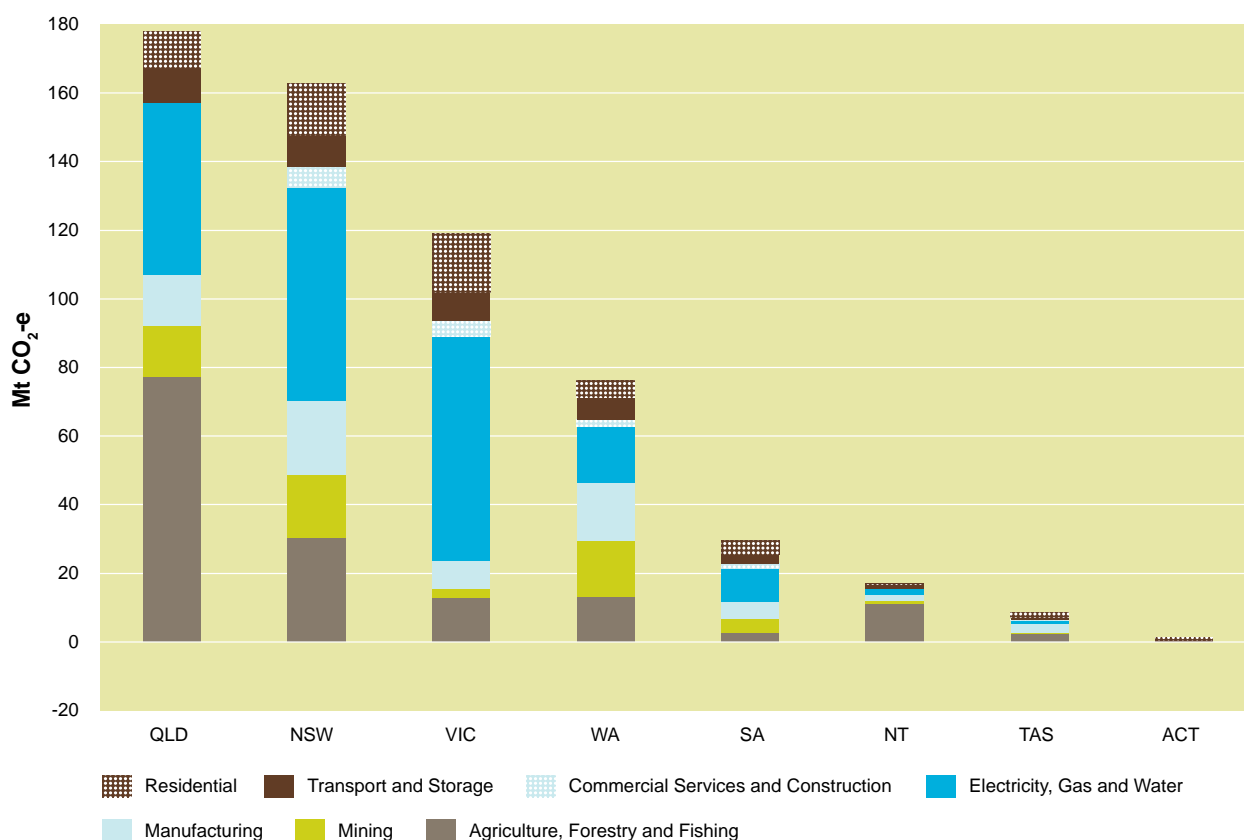
Australia has reduced its emissions per capita over the period 1990 to 2007 by 11.2% from 32.3 to 28.6 tonnes CO<sub>2</sub>-e. The magnitude of Australia's per capita emission level reflects a number of factors in particular the dominance of the use of coal as a fuel in electricity generation – although natural gas has taken an increasing share in recent years; the historical presence of net emissions from the land use, land use change and forestry sector – which is unusual for a developed country; and the impact of international trade patterns, which result in the production in Australia of many goods with high associated emission levels – that is, resource and agricultural products that are destined for export and consumption in other countries.

## State and Territory Direct Emissions by Economic Sector

The profile of emissions by economic sector in each state and territory reflect the diverse circumstances of individual states. For example, in 2007:

- the largest quantity of net emissions from the agriculture, forestry and fishing sector was attributed to Queensland (77.3 Mt CO<sub>2</sub>-e, see table 4).
- the largest quantity of direct emissions from the electricity, gas and water sector was attributed to Victoria (65.2 Mt CO<sub>2</sub>-e, see table 4).
- the largest quantity of direct emissions from the manufacturing sector was attributed to New South Wales (21.6 Mt CO<sub>2</sub>-e, see table 4).

**Figure 3: Direct State and Territory Emissions by Economic Sector, 2007**



**Table 3: State and Territory Emissions by Economic Classification 1990<sup>(a) (b) (c)</sup>**

ANZSIC code	Industry Classification	NSW <sup>(d)</sup>	VIC	QLD	WA
		Mt CO <sub>2</sub> -e	Mt CO <sub>2</sub> -e	Mt CO <sub>2</sub> -e	Mt CO <sub>2</sub> -e
<b>Total Net Emissions</b>		<b>160.7</b>	<b>105.8</b>	<b>166.7</b>	<b>57.6</b>
Div A	Agriculture, forestry and fishing	47.7	19.1	110.9	23.3
Div B	Mining	13.5	3.8	4.1	4.7
Div C	Manufacturing	24.1	10.9	11.9	9.4
Div D	Electricity gas and water	47.1	46.3	23.3	10.9
Div E-H, J-Q	Commercial services and construction	8.1	5.0	4.1	1.9
Div I	Transport and storage	7.9	6.4	5.5	3.4
	Residential	12.3	14.3	7.0	4.0

ANZSIC code	Industry Classification	SA	TAS	NT	ACT (partial inventory) <sup>(d)</sup>
		Mt CO <sub>2</sub> -e	Mt CO <sub>2</sub> -e	Mt CO <sub>2</sub> -e	Mt CO <sub>2</sub> -e
<b>Total Net Emissions</b>		<b>32.4</b>	<b>11.2</b>	<b>10.5</b>	<b>1.1</b>
Div A	Agriculture, forestry and fishing	7.2	5.7	6.7	0.0
Div B	Mining	4.8	0.2	0.5	0.0
Div C	Manufacturing	5.6	2.4	1.2	0.0
Div D	Electricity gas and water	7.1	0.6	0.9	0.0
Div E-H, J-Q	Commercial services and construction	1.4	0.4	0.2	0.2
Div I	Transport and storage	2.5	0.6	0.7	0.2
	Residential	3.7	1.2	0.3	0.6

Source: Australian Greenhouse Emissions Information System: [www.climatechange.gov.au/inventory](http://www.climatechange.gov.au/inventory).

Notes: a) These State and Territory estimates are reported on a Kyoto Protocol reporting basis and include emissions from article 3.3 LULUCF activities.

b) The difference between the national and the sum of the state and territory emissions reflects the inclusion of military transport and external territories in the national inventory and a small balancing item.

c) Uncertainty estimates at a sectoral level are reported in the national inventory. While no quantitative estimates have been produced, the Department of Climate Change assesses that the uncertainties for emission estimates for the inventory, particularly the smaller states and territories, will be somewhat higher than for the national inventory.

d) The NSW inventory includes ACT emissions from the stationary energy sector.

**Table 4: State and Territory Emissions by Economic Classification 2007** <sup>(a) (b) (c)</sup>

ANZSIC code	Industry Classification	NSW <sup>(d)</sup>	VIC	QLD	WA
		Mt CO <sub>2</sub> -e	Mt CO <sub>2</sub> -e	Mt CO <sub>2</sub> -e	Mt CO <sub>2</sub> -e
	<b>Total Net Emissions</b>	<b>162.7</b>	<b>119.2</b>	<b>181.6</b>	<b>76.3</b>
Div A	Agriculture, forestry and fishing	30.5	13.0	77.3	13.2
Div B	Mining	18.2	2.4	15.0	16.1
Div C	Manufacturing	21.6	8.4	14.7	17.3
Div D	Electricity, gas and water	62.3	65.2	50.3	16.1
Div E-H, J-Q	Commercial services and construction	5.8	4.4	3.8	2.2
Div I	Transport and storage	9.3	8.4	10.3	6.3
	Residential	15.1	17.3	10.3	5.2

ANZSIC code	Industry Classification	SA	TAS	NT	ACT (partial inventory) <sup>(d)</sup>
		Mt CO <sub>2</sub> -e	Mt CO <sub>2</sub> -e	Mt CO <sub>2</sub> -e	Mt CO <sub>2</sub> -e
	<b>Total Net Emissions</b>	<b>29.5</b>	<b>8.5</b>	<b>17.2</b>	<b>1.1</b>
Div A	Agriculture, forestry and Fishing	2.7	2.4	11.2	-0.1
Div B	Mining	4.0	0.2	0.9	0.0
Div C	Manufacturing	5.0	2.7	1.9	0.0
Div D	Electricity, gas and water	9.9	0.7	1.4	0.0
Div E-H, J-Q	Commercial services and construction	1.2	0.4	0.2	0.1
Div I	Transport and storage	2.8	0.8	1.2	0.2
	Residential	4.0	1.3	0.4	0.8

Source: Australian Greenhouse Emissions Information System: [www.climatechange.gov.au/inventory](http://www.climatechange.gov.au/inventory).

Notes: a) These State and Territory estimates are reported on a Kyoto Protocol reporting basis and include emissions from article 3.3 LULUCF activities.

b) The difference between the national and the sum of the state and territory emissions reflects the inclusion of military transport and external territories in the national inventory and a small balancing item.

c) Uncertainty estimates at a sectoral level are reported in the national inventory. While no quantitative estimates have been produced, the Department of Climate Change assesses that the uncertainties for emission estimates for the inventory, particularly the smaller states and territories, will be somewhat higher than for the national inventory.

d) The NSW inventory includes ACT emissions from the stationary energy sector.

## Part B – Indirect Emissions from the Generation of Purchased Electricity (Scope 2 Emissions)

- Emissions from the generation of electricity may be allocated to electricity consumers according to the share of electricity consumption of each economic sector. These estimates are known as “indirect” emissions from the generation of purchased electricity, or scope 2 emissions, and are defined in the World Resources Institute and World Business Council for Sustainable Development (WRI-WBCSD), *The Greenhouse Gas Protocol: A corporate accounting and reporting standard (Revised edition), 2004 (WRI/WBCSD 2004<sup>2</sup>)*.
- Indirect emissions estimate the impact of emissions generated offsite (in this case in the electricity industry) as a result of economic activity in particular other sectors and reflects the interdependence of economic sectors across the Australian economy.

**Table 5: Australia’s Indirect Greenhouse Gas Emissions from the Generation of Purchased Electricity (Scope 2 Emissions) by Economic Sector 1990, 2007<sup>(a) (b) (c) (d)</sup>**

Industry Classification	Emissions (Mt CO <sub>2</sub> -e)		Change in emissions (%)
	1990	2007	1990 - 2007
<b>All Electricity Generation</b>	<b>129.5</b>	<b>199.5</b>	<b>54.1</b>
Primary Industries	9.2	14.1	52.9
Agriculture, Forestry and Fishing	1.6	1.5	-5.1
Mining	7.7	12.6	64.7
Manufacturing	42.2	61.5	45.7
Services, Construction and Transport	24.6	40.1	63.2
Residential	33.8	51.3	51.7

Notes: a) Estimated under the Kyoto Protocol reporting provisions.

b) Scope 2 emissions are account for greenhouse gas emissions from the generation of purchased electricity. Purchased electricity is defined as electricity that is purchased or otherwise brought into the organisational boundary of the entity (WRI/WBCSD 2004).

c) Emissions from electricity generation consumed within the electricity, gas and water sector includes own use of electricity by generators and is not necessarily purchased electricity. As these emissions do not necessarily meet the definition outlined at (c) they have been omitted from the table above. Electricity generation emissions attributed to the electricity, gas and water sector were 19.6 Mt CO<sub>2</sub>-e in 1990 and 32.5 Mt CO<sub>2</sub>-e in 2007.

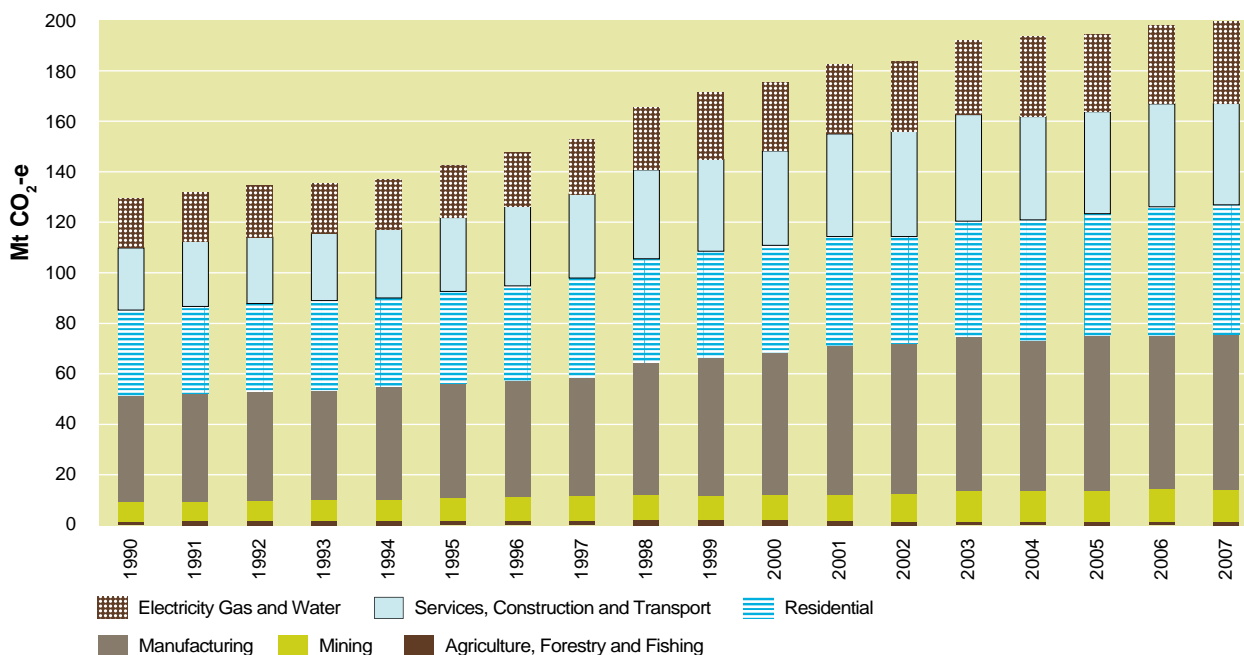
d) Sectoral emission totals do not sum to all electricity generation emissions as the electricity, gas and water sector is not included in the above table as outlined at (c).

<sup>2</sup> WRI/WBCSD (2004) *The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard*, World Business Council for Sustainable Development and World Resources Institute (Revised edition), 2004.

## Trends in Indirect Greenhouse Gas Emissions from the Generation of Purchased Electricity (Scope 2 Emissions)

Emissions from electricity generation across all sectors have increased by 54.1 per cent since 1990 (see table 5). The largest drivers of increased indirect emissions from the generation of purchased electricity are the manufacturing, residential and the services, construction and transport sectors which have recorded increases of 19.3 Mt CO<sub>2</sub>-e, 17.5 Mt CO<sub>2</sub>-e and 15.5 Mt CO<sub>2</sub>-e respectively.

**Figure 4: Indirect Greenhouse Gas Emissions from the Generation of Purchased Electricity Trends by Economic Sector, 1990-2007**



Note: Scope 2 emissions account for greenhouse gas emissions from the generation of purchased electricity. Purchased electricity is defined as electricity that is purchased or otherwise brought into the organisational boundary of the entity (WRI/WBCSD 2004). Emissions from electricity generation consumed within the electricity, gas and water sector are included in the above graph for completeness although this electricity use includes own use of generators and does not necessarily meet the WRI-WBCSD definition of scope 2 emissions.

**Table 6: Indirect Emissions from the Generation of Purchased Electricity (Scope 2 Emissions), Australia, 1990, 2006, 2007<sup>(a) (b) (c)</sup>**

ANZSIC code	Industry Classification	Emissions (Mt CO <sub>2</sub> -e)		
		1990	2006	2007
Div A	Agriculture, forestry and fishing	1.6	1.5	1.5
Div B	Mining	7.7	12.9	12.6
Div C	Manufacturing	42.2	60.8	61.5
Div E-H, J-Q	Commercial services and construction	23.0	38.5	37.9
Div I	Transport and storage	1.6	2.2	2.2
	Residential	33.8	50.9	51.3

Source: Australian Greenhouse Emissions Information System: [www.climatechange.gov.au/inventory](http://www.climatechange.gov.au/inventory).

Notes: a) These estimates are reported on a Kyoto Protocol reporting basis.

b) Scope 2 emissions are account for greenhouse gas emissions from the generation of purchased electricity. Purchased electricity is defined as electricity that is purchased or otherwise brought into the organisational boundary of the entity (WRI/WBCSD 2004).

c) Emissions from electricity generation consumed within the electricity, gas and water sector includes own use of electricity by generators and is not necessarily purchased electricity. As these emissions do not necessarily meet the definition outlined at (b) they have been omitted from the table above. Electricity generation emissions attributed to the electricity, gas and water sector were approximately equal to 19.6 Mt CO<sub>2</sub>-e in 1990, 31.1 Mt CO<sub>2</sub>-e in 2006 and 32.5 Mt CO<sub>2</sub>-e in 2007.

**Table 7: 1990 State and Territory Emissions from the Generation of Purchased Electricity  
(Scope 2 Emissions) <sup>(a) (b) (c) (d)</sup>**

ANZSIC code	Industry Classification	NSW	VIC	QLD	WA
		Mt CO <sub>2</sub> -e	Mt CO <sub>2</sub> -e	Mt CO <sub>2</sub> -e	Mt CO <sub>2</sub> -e
Div A	Agriculture, forestry and fishing	0.5	0.5	0.3	0.2
Div B	Mining	1.6	0.9	2.1	2.6
Div C	Manufacturing	14.4	17.8	6.4	1.5
Div E-H, J-Q	Commercial services and construction	7.0	7.4	4.1	2.5
Div I	Transport and storage	0.7	0.4	0.6	0.0
	Residential	13.3	10.2	5.5	2.3

ANZSIC code	Industry Classification	SA	TAS	NT
		Mt CO <sub>2</sub> -e	Mt CO <sub>2</sub> -e	Mt CO <sub>2</sub> -e
Div A	Agriculture, forestry and fishing	0.1	0.0	0.0
Div B	Mining	0.2	0.0	0.2
Div C	Manufacturing	1.8	0.3	0.0
Div E-H, J-Q	Commercial services and construction	1.5	0.1	0.4
Div I	Transport and storage	0.0	0.0	
	Residential	2.3	0.1	0.2

Source: Australian Greenhouse Emissions Information System: [www.climatechange.gov.au/inventory](http://www.climatechange.gov.au/inventory).

Note: a) These estimates are reported on a Kyoto Protocol reporting basis.

b) Scope 2 emissions are account for greenhouse gas emissions from the generation of purchased electricity. Purchased electricity is defined as electricity that is purchased or otherwise brought into the organisational boundary of the entity (WRI/WBCSD 2004).

c) Emissions from electricity generation consumed within the electricity, gas and water sector includes own use of electricity by generators and is not necessarily purchased electricity. As these emissions do not necessarily meet the definition outlined at (c) they have been omitted from the table above. Electricity generation emissions attributed to the electricity, gas and water sector were approximately equal to 6.3 Mt CO<sub>2</sub>-e in NSW, 6.7 Mt CO<sub>2</sub>-e in VIC, 3.9 Mt CO<sub>2</sub>-e in QLD, 1.4 Mt CO<sub>2</sub>-e in WA, 1.1 Mt CO<sub>2</sub>-e in SA, 0.0 Mt CO<sub>2</sub>-e in TAS and 0.1 Mt CO<sub>2</sub>-e in NT.

d) The NSW inventory includes ACT emissions from the Stationary Energy sector.

**Table 8: 2007 State and Territory Emissions from the Generation of Purchased Electricity (Scope 2 Emissions)** <sup>(a) (b) (c) (d)</sup>

ANZSIC code	Industry Classification	NSW	VIC	QLD	WA
		Mt CO <sub>2</sub> -e	Mt CO <sub>2</sub> -e	Mt CO <sub>2</sub> -e	Mt CO <sub>2</sub> -e
Div A	Agriculture, forestry and fishing	0.4	0.4	0.3	0.1
Div B	Mining	3.4	1.2	4.5	2.4
Div C	Manufacturing	21.6	22.1	11.2	2.7
Div E-H, J-Q	Commercial services and construction	12.1	11.5	8.0	3.2
Div I	Transport and storage	0.9	0.5	0.6	0.1
	Residential	20.0	12.9	10.0	3.7

ANZSIC code	Industry Classification	SA	TAS	NT
		Mt CO <sub>2</sub> -e	Mt CO <sub>2</sub> -e	Mt CO <sub>2</sub> -e
Div A	Agriculture, forestry and fishing	0.2	0.0	
Div B	Mining	0.4	0.2	0.5
Div C	Manufacturing	2.3	1.6	0.0
Div E-H, J-Q	Commercial services and construction	2.2	0.4	0.5
Div I	Transport and storage	0.1		
	Residential	3.7	0.6	0.3

Source: Australian Greenhouse Emissions Information System: [www.climatechange.gov.au/inventory](http://www.climatechange.gov.au/inventory).

Note: a) These estimates are reported on a Kyoto Protocol reporting basis.

b) Scope 2 emissions are account for greenhouse gas emissions from the generation of purchased electricity. Purchased electricity is defined as electricity that is purchased or otherwise brought into the organisational boundary of the entity (WRI/WBCSD 2004).

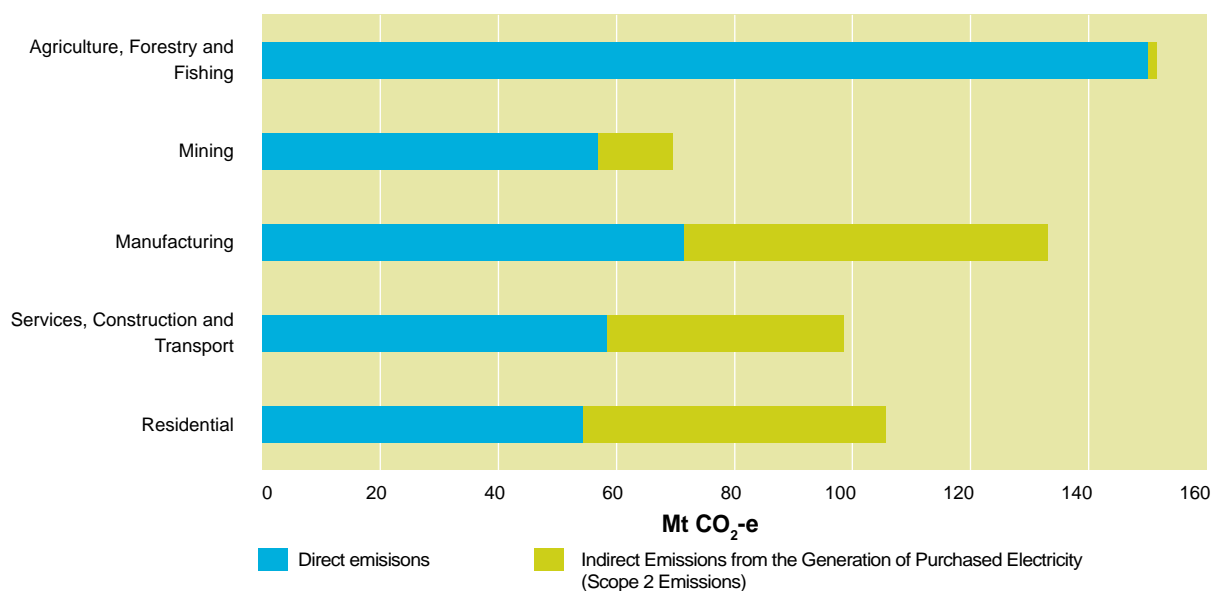
c) Emissions from electricity generation consumed within the electricity, gas and water sector includes own use of electricity by generators and is not necessarily purchased electricity. As these emissions do not necessarily meet the definition outlined at (c) they have been omitted from the table above. Electricity generation emissions attributed to the electricity, gas and water sector were approximately equal to 9.4 Mt CO<sub>2</sub>-e in NSW, 9.4 Mt CO<sub>2</sub>-e in VIC, 8.9 Mt CO<sub>2</sub>-e in QLD, 3.0 Mt CO<sub>2</sub>-e in WA, 1.6 Mt CO<sub>2</sub>-e in SA, 0.2 Mt CO<sub>2</sub>-e in TAS and 0.1 Mt CO<sub>2</sub>-e in NT.

d) The NSW inventory includes ACT emissions from the Stationary Energy sector.

## PART C – Combined Direct Emissions and Indirect Emissions from the Generation of Purchased Electricity

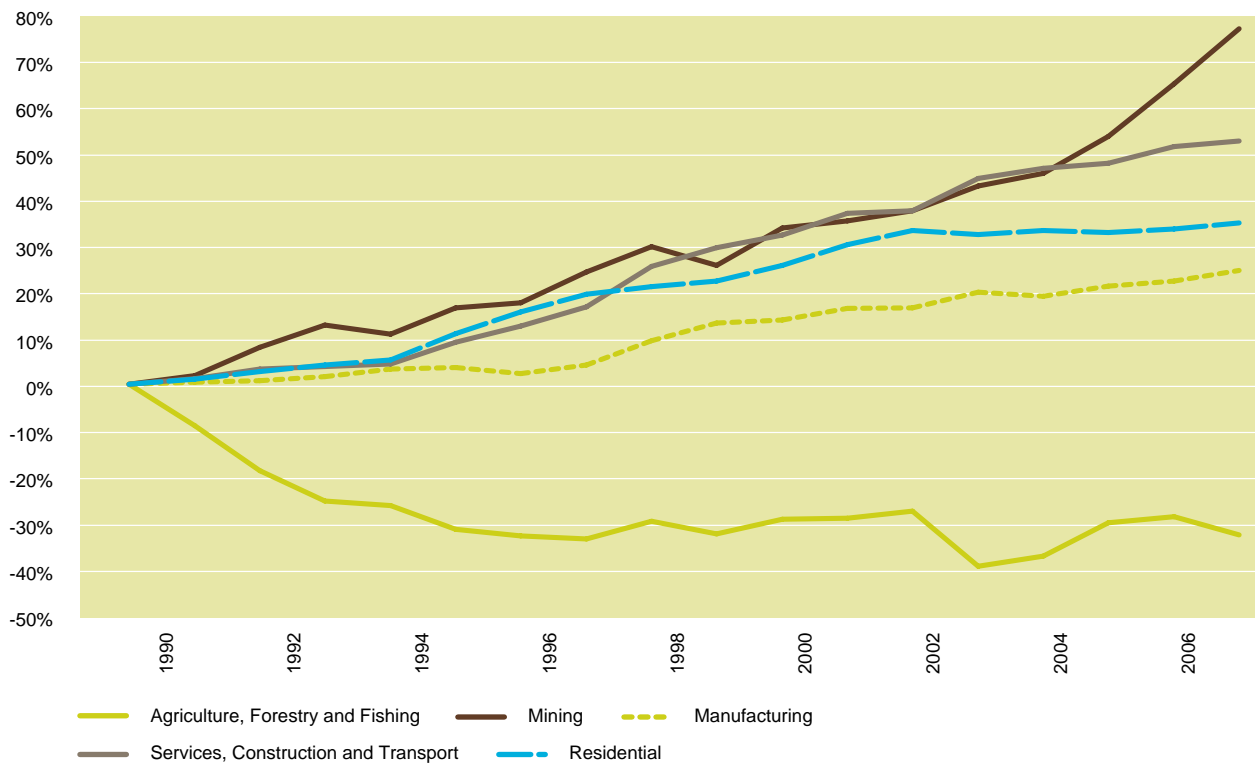
In this view of emissions allocation, the direct and scope 2 emissions have been combined to provide a broader understanding of the emissions resulting across the economy from activity within each economic sector. The direct emissions associated with electricity generation have been removed to avoid double counting as they are already embodied within the indirect scope 2 emissions from purchased electricity. Caution should be taken when analysing combined emissions due to the different conceptual bases of the emission estimate components. Direct emissions are allocated to individual sectors at the point of emissions while indirect emissions from the generation of purchased electricity (scope 2 emissions) are not produced within the bounds of the industry to which they are attributed.

**Figure 5: Australia’s Combined Direct and Indirect Greenhouse Gas Emissions from the Generation of Purchased Electricity (Scope 2 Emissions) by Major Economic Sector, 2007**



Note: Scope 2 emissions account for greenhouse gas emissions from the generation of purchased electricity. Purchased electricity is defined as electricity that is purchased or otherwise brought into the organisational boundary of the entity (WRI/WBCSD 2004). Emissions from electricity generation consumed within the electricity, gas and water sector are not included in the figure above as this electricity use includes own use of generators and does not necessarily meet the WRI-WBCSD definition of scope 2 emissions.

**Figure 6: Percentage Change in Combined Direct and Indirect Greenhouse Gas Emissions from the Generation of Purchased Electricity (Scope 2 Emissions) by Major Economic Sector, 1990-2007**



Note: Direct emissions and indirect greenhouse gas emissions from the generation of purchased electricity (Scope 2 Emissions) have been combined in the figure above to provide a broader understanding of the emissions resulting across the economy from activity within each economic sector. Caution should be taken when analysing combined emissions due to the different conceptual bases of the emission estimates.

# Appendix 1 – Notes

## Australian National Greenhouse Accounts

The Australian National Greenhouse Accounts comprise the:

- *National Greenhouse Gas Inventory*;
- *National Inventory by Economic Sector*;
- *State and Territory Greenhouse Gas Inventories*; and
- *National Inventory Report*.

Detailed emission estimates for each of these accounts are available online on the Australian Greenhouse Emissions Information System (AGEIS).

The emission estimates for these inventories are prepared in accordance with international guidelines and are subject to annual review by international experts. The methodologies for the estimation of emissions are documented and available online at [www.climatechange.gov.au/inventory](http://www.climatechange.gov.au/inventory).

The *National Inventory by Economic Sector* provides information on emissions disaggregated by Australia-New Zealand Standard Industry Classifications (ANZSIC - details available from the Australian Bureau of Statistics). It complements the *National Greenhouse Gas Inventory*, based on Intergovernmental Panel on Climate Change (IPCC) classifications, which provide estimates of emissions classified according to process-based emission categories.

Emissions estimates presented in this document have been mapped from the *National Greenhouse Gas Inventory* using the Australian Greenhouse Emissions Information System (AGEIS). Emissions for any particular ANZSIC classification will include estimates from all relevant IPCC sectors. For example, the Division A Agriculture, Forestry and Fishing sector includes emissions from the IPCC Energy sector (fuel combustion from Division A industries); the IPCC Agriculture sector (processes such as enteric fermentation); and the Land use, Land use Change and Forestry activities (deforestation, afforestation and reforestation).

Direct emissions are allocated to individual sectors at the point of emissions. For example, direct emissions from the combustion of fuel for electricity generation are accounted for at the power station where the electricity is produced.

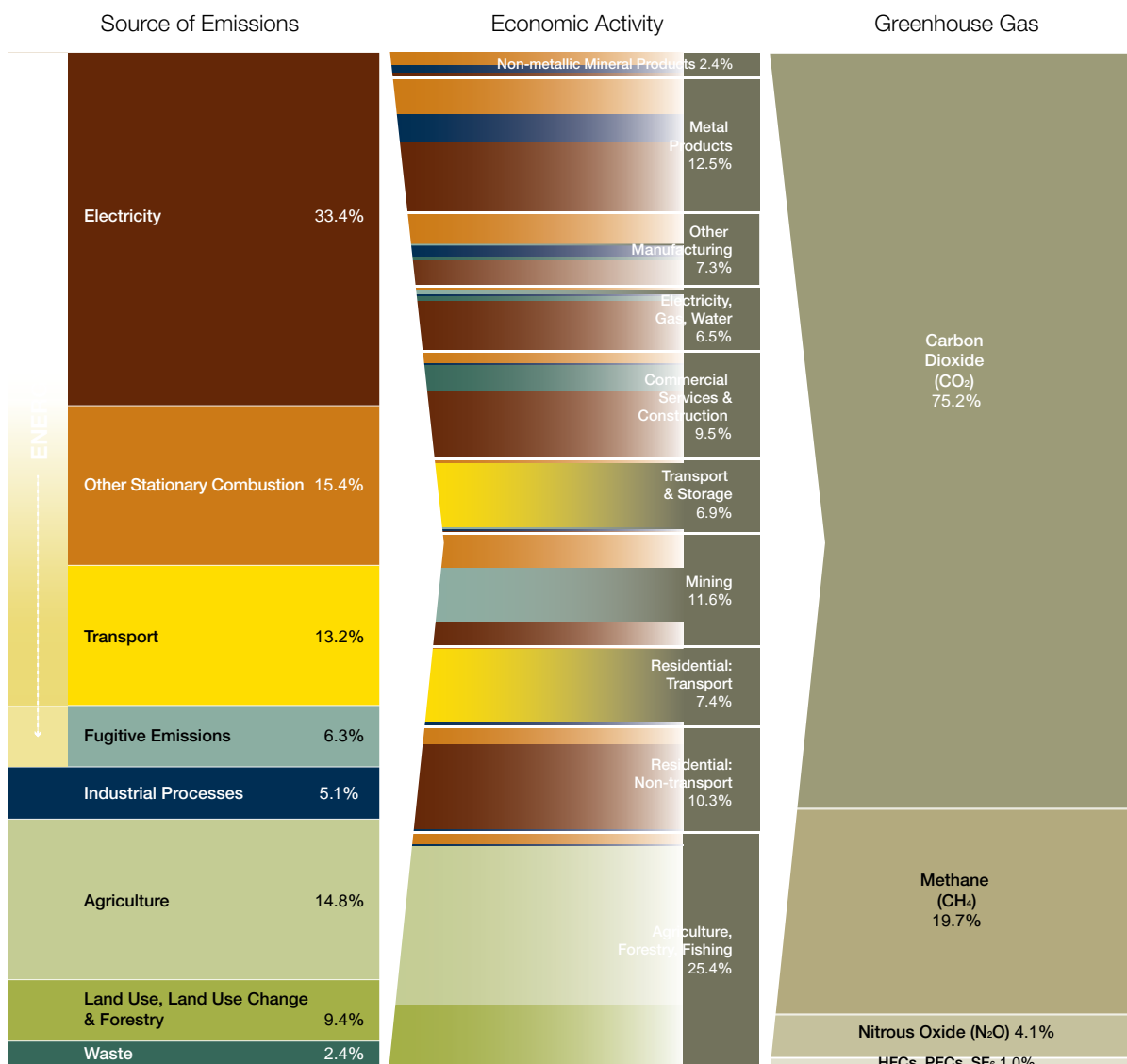
Scope 2 emissions are indirect greenhouse gas emissions produced offsite in the generation of electricity, subsequently purchased and consumed within a sector and attributed to the electricity consuming sector.

The allocation of greenhouse gas emissions by source, economic activity and greenhouse gas is displayed at figure 7.

- Column A lists the sources of direct emissions by IPCC sector as reported in the *National Greenhouse Gas Inventory 2007*.
- Column B lists the direct emissions and indirect greenhouse gas emissions from the generation of purchased electricity (scope 2 emissions) attributable to the activity of each economic sector.
- Column C lists the contribution of greenhouse gases to Australia's total net CO<sub>2</sub>-e emissions.

Emissions from the processes listed in column A are distributed to the economic sectors listed in column B based on the activity of each sector. The source of combined direct and indirect (scope 2) emissions is represented by the colour and the magnitude of emissions by the width of the lines within column B. For example, the mining sector comprises of emissions from three sources (other stationary combustion (orange), fugitive emissions (grey), and electricity production (maroon)).

**Figure 7: Allocation of Greenhouse Gas Emissions by Source, Economic Activity and Greenhouse Gas, Australia, 2007**



Source: Department of Climate Change

Note: Direct emissions and indirect greenhouse gas emissions from the generation of purchased electricity (Scope 2 Emissions) have been combined in the figure above to provide a broader understanding of the emissions resulting across the economy from activity within each economic sector. Caution should be taken when analysing combined emissions due to the different conceptual bases of the emission estimates.

### Major greenhouse gases covered by the Inventory:

The greenhouse gases covered by this inventory include: carbon dioxide (CO<sub>2</sub>); methane (CH<sub>4</sub>); nitrous oxide (N<sub>2</sub>O); perfluorocarbons (PFC); hydrofluorocarbons (HFC); and sulphur hexafluoride (SF<sub>6</sub>). The global warming potential is an index for each greenhouse gas which is used to convert emissions to carbon dioxide equivalents (CO<sub>2</sub>-e). This allows the atmospheric warming effect of the different greenhouse gases to be compared.

Copies of the other *Australian National Greenhouse Accounts* documents

*National Greenhouse Gas Inventory 2007*

*State and Territory Greenhouse Gas Inventories 2007*

*National Inventory Report 2007*

can be obtained from the Department of Climate Change website

**[www.climatechange.gov.au/inventory](http://www.climatechange.gov.au/inventory)**

On-line access to emissions results — Australian Greenhouse Emissions Information System (AGEIS) – also available at **[www.climatechange.gov.au/inventory](http://www.climatechange.gov.au/inventory)**

