

# THE °CLIMATE GROUP

## GREENHOUSE INDICATOR SERIES

### **AUSTRALIAN ELECTRICITY GENERATION REPORT 2008**

VICTORIA, NEW SOUTH WALES, QUEENSLAND AND SOUTH AUSTRALIA

July 2009

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# THE CLIMATE GROUP

## INTRODUCTION

This report is part of The Climate Group's Greenhouse Indicator Series. It examines electricity generation and the associated greenhouse gas emissions in Australia's four eastern states, Victoria, New South Wales, Queensland and South Australia, in 2008 and compares them with the previous year.

The Climate Group's Weekly Greenhouse Indicator tracks greenhouse gas emissions from energy on a weekly basis in Victoria, New South Wales, Queensland and South Australia.

All scheduled fossil fuel and renewable energy power stations that contribute to the National Electricity Market (NEM) are included, as well as renewable energy power stations that are registered to create Renewable Energy Certificates (RECs) or Victorian RECs (VRECs). The report does not include generation from non-scheduled power stations, renewable energy generated from small solar power systems on private homes or from power stations not registered to create RECs.

Please note that not all the power produced in each state is consumed in each state as states regularly export and import electricity via the National Electricity Market.

For more information on the report's methodology see Annex 1.

## OVERVIEW

Fossil fuel-fired power stations in Australia's four eastern states produced a total of 187.8 million tonnes of greenhouse pollution in 2008, an increase of one per cent from 2007. This produced a total of 195.2 million MWh of electricity, an increase of 0.9 per cent.

Electricity generation from renewable sources increased more sharply in 2008, up 12 per cent on the previous year. Despite stronger growth than fossil fuel production in percentage terms, the relative size of the renewable sector, less than five per cent of overall generation, means this increase had very little impact on total greenhouse gas emissions, or the overall mix of electricity generation.

Australia's eastern states relied on coal-fired power stations for the vast majority of their electricity. Coal provided 87 per cent of electricity generation in 2008, producing 95 per cent of the total greenhouse emissions from power stations. The amount of electricity generated from coal, the most carbon intensive fuel, increased by two per cent in 2008.

The amount of electricity generated from gas-fired power stations declined by eight per cent across the four states in 2008, contributing eight per cent of total electricity generation and five per cent of greenhouse gas emissions.

## **POWER STATIONS – LARGEST EMITTERS**

Loy Yang A in Victoria produced the most emissions of any power station in 2008, releasing 18.6 million tonnes of greenhouse gases during the year, almost 20 per cent more than its nearest rival, the Hazelwood power station, also in Victoria.

Of the top 10 biggest emitting power stations in absolute terms in 2008, nine are based in Victoria or New South Wales, with the Gladstone power station in Queensland taking tenth spot. The top 20 biggest emitting power stations were all coal-fired and accounted for more than 90 per cent of emissions from power generation in the four eastern states in 2008.

## **STATES**

Emissions from fossil fuel power stations grew in Victoria, New South Wales, and Queensland in 2008. South Australia saw the only fall in emissions from its electricity generation, recording a fall of six per cent.

New South Wales generated the most electricity of any state and emitted the largest amount of greenhouse gases, some 67.3 million tonnes. Victoria emitted 63.5 million tonnes of greenhouse gases but its coal-fired power stations are the most carbon intensive of any of the four eastern states due to its reliance on brown coal compared with the black coal used in the other states.

Total electricity generation in Victoria was 32 per cent more carbon intensive than New South Wales, the next most carbon intensive state. Collectively, Victoria's power stations produced 116 tonnes of greenhouse gas pollution for every 100 MWh of electricity generated. This compares with 88 tonnes in New South Wales, 80 tonnes in Queensland and 67 tonnes in South Australia.

## **RENEWABLE ENERGY**

Renewable power stations produced 9.45 million MWh of electricity in 2008, up from 8.47 million MWh in 2007.

Hydroelectricity was the largest renewable sector, accounting for more than half of emissions-free electricity. Four out of five of the highest generating renewable energy power stations in 2008 in these four states were hydroelectric. The highest generating renewable power generators were Murray Hydroelectric Station in NSW, which generated 1.48 million MWh in 2008, followed by the Tumut 3 station which generated one million MWh.

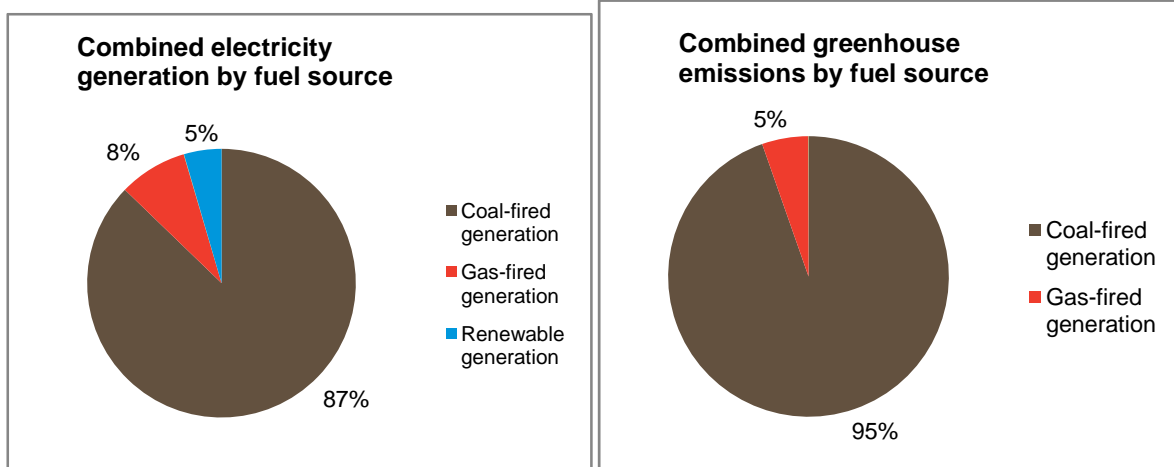
Wind was the second largest renewable energy sector with 2.32 million MWh generated in 2008. This was an increase of 58 per cent on 2007 levels – the strongest growth from any power generation sector. This was largely due to a 71 per cent increase in wind generation in South Australia where it was the largest renewable sector. 2008 saw both the Hallett and Lake Bonney Stage 2 wind farms produce their first full year of power. Wind generation was 27 per cent higher in Victoria in 2008.

Bioenergy generated 2.22 million MWh in 2008, up by 7.3 per cent on the previous year. Queensland has the largest bioenergy sector of any state, accounting for more than half of this total. It has more than 40 bioenergy stations, the biggest generator being the Pioneer Mill, which produced around 200,000 MWh in 2008.

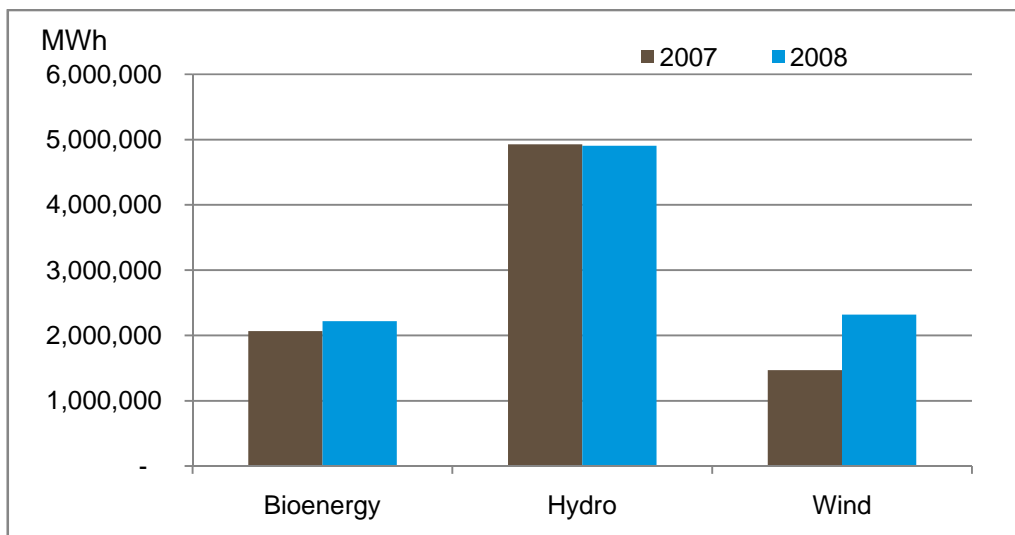
Other renewable energy, including large solar power stations, registered well under one per cent of the total renewable energy generated in 2008.

## TABLES AND GRAPHS

### ENERGY GENERATION AND EMISSIONS



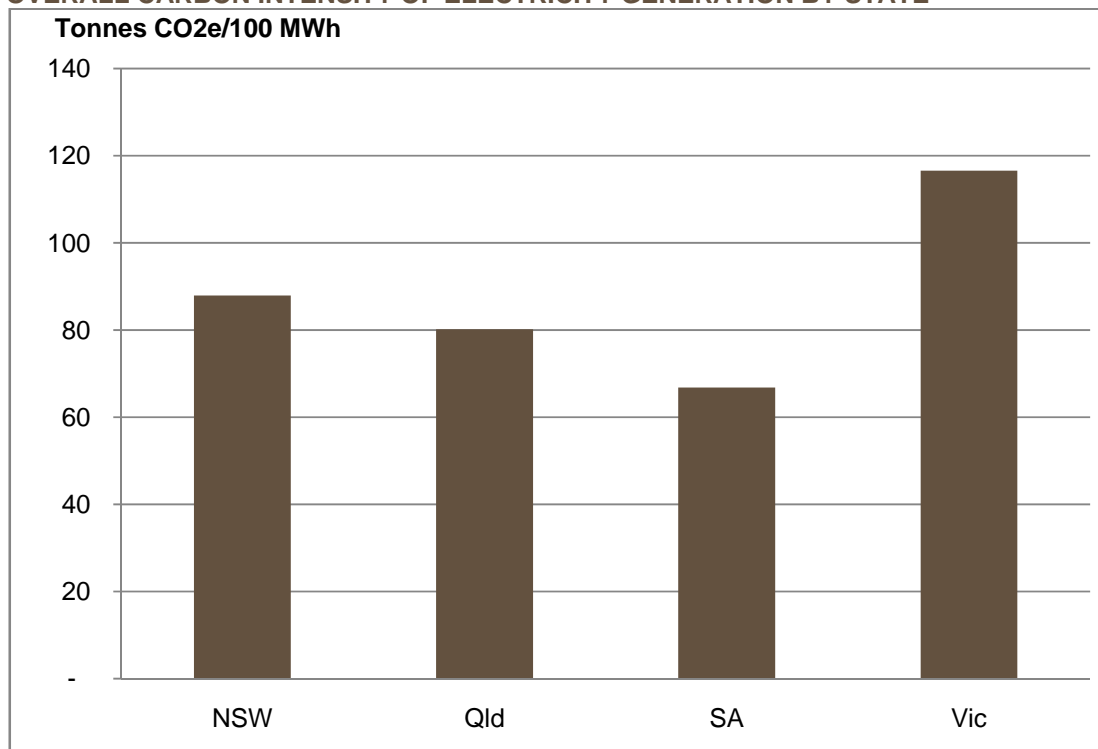
### RENEWABLE ENERGY GENERATION BY SECTOR



### EMISSIONS AND GENERATION BY SECTOR IN 2008

Sector	Emissions (million tonnes CO <sub>2</sub> e)	Generation MWh	Generation growth on 2007
Coal-fired generation	177.776	178,364,000	1.8%
Gas-fired generation	10.010	16,804,000	-7.7%
Liquid fuel-fired generation (i.e. diesel /distillate)	0.047	57,000	-28.5%
Renewable generation	0	9,446,000	11.9%

### OVERALL CARBON INTENSITY OF ELECTRICITY GENERATION BY STATE



### TOP 20 POWER STATIONS BY VOLUME OF GREENHOUSE GAS EMISSIONS IN 2008

Ranking	Power Station	State	Emissions (million tonnes CO <sub>2</sub> e)	Generation MWh	Change in generation on 2007
1	Loy Yang A Power Station	VIC	18.625	16,900,000	1.29%
2	Hazelwood Power Station	VIC	15.720	11,478,000	-3.31%
3	Bayswater	NSW	14.749	16,106,000	-1.62%
4	Yallourn W Power Station	VIC	14.622	11,328,000	11.21%
5	Eraring Power Station	NSW	14.517	15,830,000	-12.33%
6	Liddell	NSW	12.290	12,178,000	10.04%
7	Loy Yang B Power Station	VIC	10.153	8,863,000	-0.43%
8	Vales Point B Power Station	NSW	8.716	9,286,000	53.19%
9	Mt Piper Power Station	NSW	8.327	9,548,000	2.70%
10	Gladstone	QLD	7.527	8,354,000	-6.82%
11	Stanwell Power Station	QLD	7.159	8,549,000	-13.95%

12	Millmerran Power Plant	QLD	5.692	6,702,000	-4.01%
13	Tarong Power Station	QLD	5.099	6,010,000	7.38%
14	Callide C Power Station	QLD	4.904	5,685,000	-12.70%
15	Wallerawang C Power Station	NSW	4.409	4,636,000	-22.34%
16	Kogan Creek	QLD	4.322	5,171,000	148.38%
17	Callide B Power Station	QLD	4.209	4,846,000	3.69%
18	Northern Power Station	SA	3.610	4,048,000	-6.54%
19	Tarong North	QLD	2.797	3,457,000	30.32%
20	Munmorah Power Station	NSW	2.766	2,625,000	-0.15%

**\*ALL ARE COAL-FIRED**

#### TOP 10 GAS-FIRED POWER STATIONS BY EMISSIONS IN 2008

Ranking	Power Station	State	Emissions (million tonnes CO <sub>2</sub> e)	Generation MWh	Change in generation on 2007
1	Torrens Island Power Station B	SA	1.827	2,293,000	-18%
2	Pelican Point Power Station	SA	1.693	3,295,000	7%
3	Braemar	QLD	1.205	1,816,000	-6%
4	Swanbank E	QLD	0.995	2,362,000	14%
5	Newport Power Station	VIC	0.795	1,356,000	-24%
6	Osborne Power Station	SA	0.733	1,289,000	4%
7	Smithfield Energy Facility	NSW	0.551	1,009,000	-1%
8	Torrens Island Power Station A	SA	0.534	617,000	11%
9	Townsville Gas Turbine (Yabulu)	QLD	0.487	1,130,000	-23%
10	Jeeralang B Power Station	VIC	0.191	219,000	158%

**TOP 20 LARGEST RENEWABLE ENERGY POWER STATIONS BY GENERATION IN 2008**

Ranking	Power stations	Technology	State	Generation MWh	Change in generation on 2007
1	Murray 1	Hydro	NSW	1,477,000	5.5%
2	Tumut 3	Hydro	NSW	1,045,000	-12.1%
3	Tumut 1 and 2	Hydro	NSW	828,000	-2.6%
4	Kareeya	Hydro	Qld	496,000	-12.2%
5	Lake Bonney Wind Farm Stage 2	Wind	SA	373,000	368.1% (commissioned in 2007)
6	Barron Gorge	Hydro	Qld	277,000	52.3%
7	Hallett Wind Farm SA	Wind	SA	259,000	New
8	Wattle Point Wind farm	Wind	SA	248,000	-8.8%
9	Lake Bonney Wind Farm Stage 1	Wind	SA	204,000	1.9%
10	Pioneer Mill	Bioenergy	Qld	202,000	-15.4%
11	Snowtown Wind Farm - SA	Wind	SA	195,000	New
12	Cathedral Rocks Wind Farm	Wind	SA	193,000	8.4%
13	Maryvale Mill	Bioenergy	Vic	166,000	-8.0%
14	Lucas Heights I & II LFG Power Plant	Bioenergy	NSW	151,000	1.5%
15	Visy Pulp and Paper	Bioenergy	NSW	145,000	-0.7%
16	Challicum Hills Wind Farm	Wind	Vic	139,000	-8.3%
17	Canunda Wind Farm	Wind	SA	138,000	-7.8%
18	Rocky Point Sugar Mill	Bioenergy	Qld	135,000	3.1%
19	Invicta Mill	Bioenergy	Qld	133,000	-10.3%
20	West Kiewa	Hydro	Vic	116,000	-0.7%

## VICTORIA

Total greenhouse gas emissions from Victoria's power stations were 63.5 million tonnes in 2008. This was a rise of one per cent from the previous year due to an increase in coal-fired power generation and despite an increase in electricity generation from renewable sources.

Electricity generation in Victoria continues to be dominated by large-scale brown coal generators. The state produced the most carbon intensive electricity of any of the four states in 2008 with every 100 MWh of electricity producing 116 tonnes of greenhouse gas emissions. Three of the top five biggest emitting power stations in absolute terms in 2008 were located in Victoria. Loy Yang A power station tops the list, emitting more than 18.5 million tonnes, almost 20 per cent more than the second placed Victoria's Hazelwood station, which produced 15.5 million tonnes. The state is also home to seven of the top 10 most carbon-intensive power stations of any of the four states.

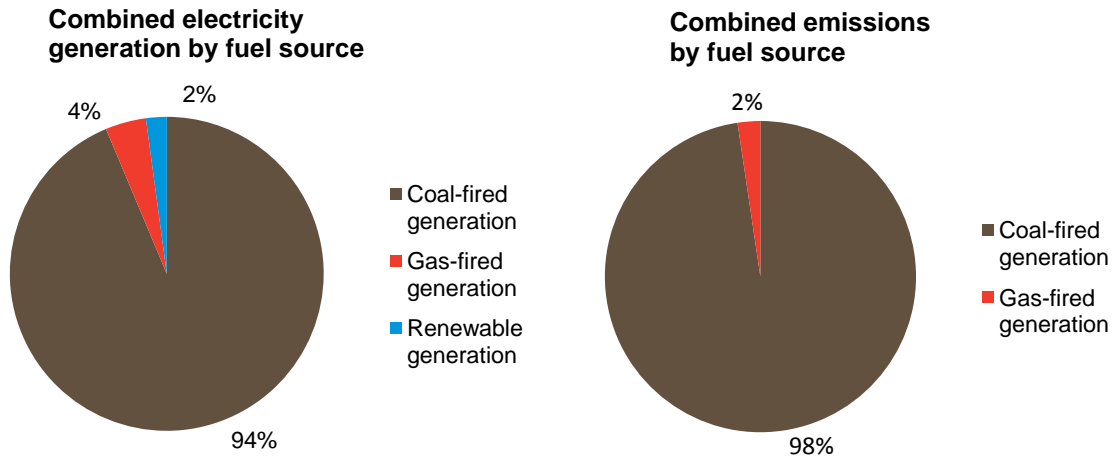
Coal accounted for 97.6 per cent of emissions and 94 per cent of the electricity generated in Victoria. Emissions from coal rose by 2 per cent or 1.2 million tonnes in 2008 on the previous year. Gas accounted for the remaining 2.4 per cent of emissions in 2008 and 4.2 per cent of the electricity generated. Thirty five per cent less electricity was produced by Victoria's gas-fired power stations in 2008 due to less power being generated from all three of Victoria's largest gas-fired power stations: Valley Power, Laverton and Newport.

The amount of electricity generated from renewable sources in Victoria rose by 14 per cent in 2008. Renewable sources accounted for just over two per cent of Victoria's electricity generation in 2008, the lowest proportion of any of Australia's four eastern states. This represented 14 per cent of the total renewable energy generated in the four states.

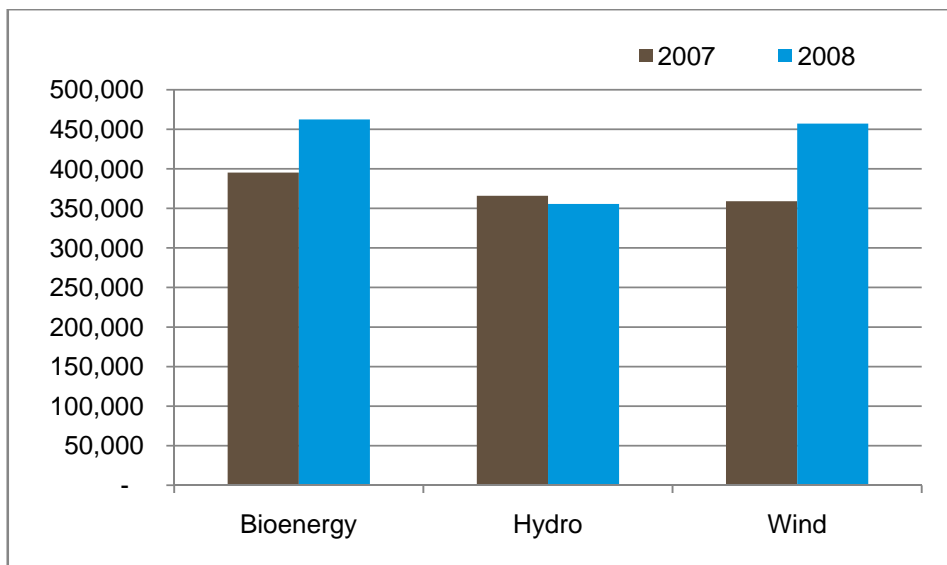
Bioenergy was the largest source of renewable energy in the state, generating just over 460,000 MWh in 2008. This was just over 36 per cent of all renewable energy generated in Victoria. The state's largest renewable generator, Maryvale Mill, produced around 165,000 MWh in 2008. Wind energy accounted for just under 36 per cent of the state's renewable energy with hydroelectricity at 28 per cent. Wind energy grew by 27 per cent in 2008, with bioenergy up by 17 per cent. Hydro produced less electricity in 2008 than 2007.

## VICTORIA: TABLES AND GRAPHS

### 2008 POWER GENERATION AND EMISSIONS IN VICTORIA



### VICTORIA'S RENEWABLE GENERATION 2008



### VICTORIA'S EMISSIONS AND GENERATION 2008

Sector	Emissions (million tonnes CO <sub>2</sub> e)	Generation MWh	Generation Growth on 2007
Coal-fired generation	61.999	51,031,000	2.0%
Gas-fired generation	1.494	2,283,000	-34.9%
Renewable generation	0	1,275,000	13.8%

### TOP 5 POWER STATIONS IN VICTORIA BY EMISSIONS IN 2008

Ranking	Power Station	Emissions (million tonnes CO <sub>2</sub> e)	Generation MWh	Generation growth on 2007
1	Loy Yang A Power Station	18.625	16,900,000	1.3%
2	Hazelwood Power Station	15.720	11,478,000	-3.3%
3	Yallourn W Power Station	14.622	11,327,000	11.2%
4	Loy Yang B Power Station	10.153	8,863,000	-0.4%
5	Morwell (Energy Brix)	1.487	1,178,000	5.5%

### TOP GAS POWER STATIONS BY EMISSIONS IN VICTORIA IN 2008

Ranking	Power Station	Emissions (million tonnes CO <sub>2</sub> e)	Generation MWh	Generation growth on 2007
1	Newport Power Station	0.795	1,356,000	-23.8%
2	Jeeralang B Power Station	0.191	219,000	158.5%
3	Bairnsdale Power Station	0.131	223,000	-40.0%

### TOP 5 RENEWABLE STATIONS BY GENERATION IN VICTORIA IN 2008

Ranking	Power stations	Technology	Generation (MWh)	Generation growth on 2007
1	Maryvale Mill	Bioenergy	166,000	-8.0%
2	Challicum Hills Wind Farm	Wind	139,000	-8.3%
3	West Kiewa	Hydro	116,000	-0.7%
4	Cape Bridgewater	Wind	102,000	N/A
5	Yambuk Wind Farm	Wind	86,000	-4.7%

## NEW SOUTH WALES

Total greenhouse gas emissions from New South Wales' power stations were 67.3 million tonnes in 2008, the largest total of any Australian state. This represented a rise of one per cent on the previous year and was due to a one per cent increase in electricity generation from coal and a rise of 11 per cent in gas-fired generation.

Electricity generation in New South Wales continues to be heavily dominated by black-coal generators. Five of the top 10 biggest emitting power stations across all four states in 2008 were located in NSW. Bayswater power station was the third most polluting power station across all four states, emitting 14.7 million tonnes in 2008, closely followed by Eraring and Liddell stations, which produced 14.5 and 12.3 million tonnes of greenhouse gas respectively in 2008.

Coal accounted for 99 per cent of emissions from electricity generation in New South Wales and 93 per cent of the electricity generated. Emissions from coal rose by 0.5 million tonnes in 2008. Despite an increase of just over 11 per cent in 2008, gas produced 1.5 per cent of total electricity for the state, and one per cent of emissions.

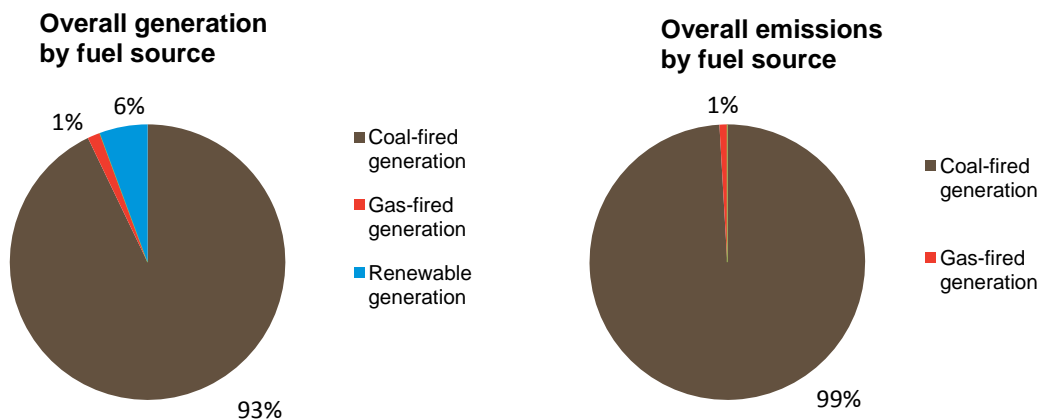
Electricity in New South Wales was the second most carbon intensive of the four states, behind Victoria. On average, every 100 MWh of electricity generated in 2008 produced 88 tonnes of greenhouse gases.

The amount of electricity generated from renewable sources in New South Wales was 4.35 million MWh, a rise of 2.1 percent on the previous year. Despite producing 4 per cent of total renewable energy generated across all four states and the most renewable energy of any single state, renewable sources only accounted for six per cent of NSW's electricity generation in 2008.

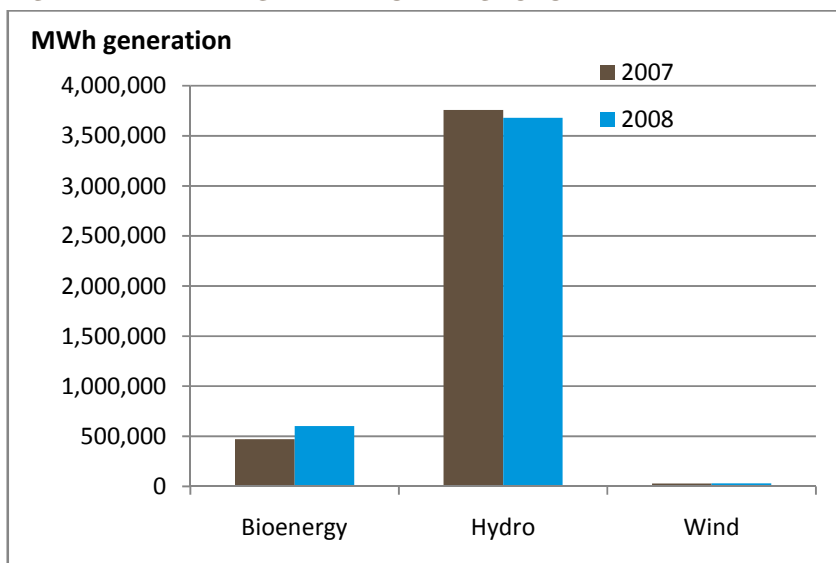
Hydroelectricity was the by far the largest category of renewable energy in New South Wales, producing 85 per cent of the state's renewable output. Bio-energy grew by almost 30 per cent in 2008 due to a number of new power stations and power station upgrades being completed during the year. It made up around 14 of the remaining 15 per cent of renewable energy generation for the state. Wind accounted for less than one per cent (despite an increase in output of almost 10 per cent in 2008).

### NEW SOUTH WALES: TABLES AND GRAPHS

#### POWER GENERATION AND EMISSIONS IN NEW SOUTH WALES



## NSW RENEWABLE GENERATION BY SECTOR



## NSW EMISSIONS AND GENERATION IN 2008

Sector	Emissions (million tonnes CO <sub>2</sub> e)	Generation MWh	Generation growth on 2007
Coal-fired generation	66698	71,053,000	0.7%
Gas-fired generation	0.619	1,140,000	11.3%
Liquid fuel-fired generation (i.e. Diesel/ distillate)	380	437	136.9%
Renewable generation	0	4,354,000	2.1%

## TOP 5 POWER STATIONS IN NEW SOUTH WALES BY EMISSIONS IN 2008

Ranking	Power Station (all coal)	Emissions (million tonnes)	Generation (MWh)	Generation growth on 2007
1	Bayswater	14.749	16,106,000	-2%
2	Eraring Power Station	14.517	15,831,000	-12%
3	Liddell	12.291	12,178,000	10%
4	Vales Point B Power Station	8.716	9,286,000	53%
5	Mt Piper Power Station	8.327	9,548,000	3%

**TOP GREENHOUSE GAS EMITTING GAS-FIRED STATIONS IN 2008 BY VOLUME**

Ranking	Power Station	Emissions (million tonnes CO2e)	Generation (MWh)	2007/08 Generation growth
1	Smithfield Energy Facility	0.551	1,009,000	-1.5%
2	Tallawarra	0.045	99,000	N/A
3	Uranquinty	0.023	32,000	N/A

**TOP 5 RENEWABLE STATIONS IN 2008 BY GENERATION**

Ranking	Power stations	Technology	2008 Generation MWh	2008/07 Generation Growth
1	Murray 1	Hydro	1,477,000	5.5%
2	Tumut 3	Hydro	1,045,000	-12.1%
3	Tumut 1 and 2	Hydro	828,000	-2.6%
4	Lucas Heights I & II LFG Power Plant	Bioenergy	151,000	1.5%
5	Visy Pulp and Paper	Bioenergy	145,000	-0.7%

## QUEENSLAND

Total greenhouse gas emissions from Queensland's power stations were 47.3 million tonnes in 2008, an increase of more than three per cent on the previous year. This was due to a four per cent increase in coal-fired power generation spread across a number of its coal stations and despite a decrease in gas-fired generation.

Coal accounted for 94 per cent of emissions and 87 per cent of the electricity generated in Queensland. Emissions from coal rose by 4 per cent or 1.5 million tonnes in 2008. Gas accounted for six per cent of emissions from electricity generation in 2008, and 10 per cent of the total electricity generated.

Queensland's electricity was the third most carbon intensive of the four states with every 100 MWh generated producing an average of 80 tonnes of greenhouse gases.

Nine of the 10 biggest generators of electricity in Queensland were coal-fired. Gladstone power station produced the most greenhouse gases in the state in 2008 with 7.5 million tonnes. This was followed closely by Stanwell, Millmerran and Tarong and Callide C Power Stations. The combined output of these five power stations was more than 30 million tonnes, or around 65 percent of the emissions from all of Queensland's electricity generation. Collinsville Power station was the most emissions intensive power station.

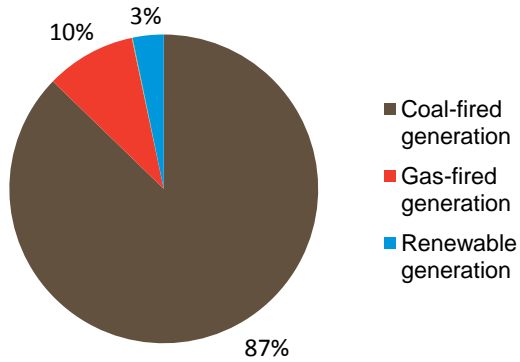
Renewable sources only account for just over three per cent of Queensland's electricity generation in 2008, producing 1.93 million MWh of electricity. Queensland's renewable power stations are mostly powered by bioenergy (sugar cane waste). When combined, these produced more than a million MWh in 2008. The next largest source of renewable energy was hydroelectricity, which generated 830,000 MWh in 2008. Combined, these two sources made up 99 per cent of renewable energy generation in Queensland.

Queensland was the only one of the four states to see a decrease in generation from renewables in 2008, with a fall of just less than one per cent. This decrease was largely because of a 12 per cent decrease in generation from Kareeya hydroelectric station, and reductions of 15 and 10 per cent at Pioneer and Invicta Mill bioenergy stations.

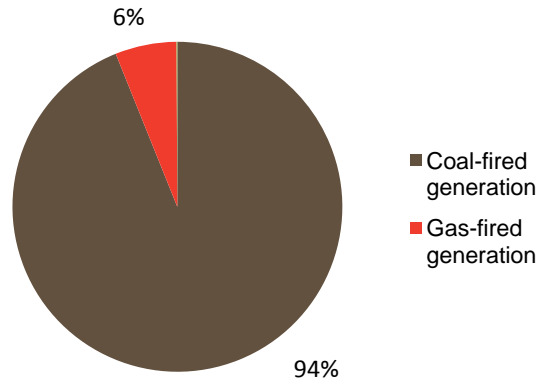
**QUEENSLAND: TABLES AND GRAPHS**

**ENERGY GENERATION AND EMISSIONS IN 2008**

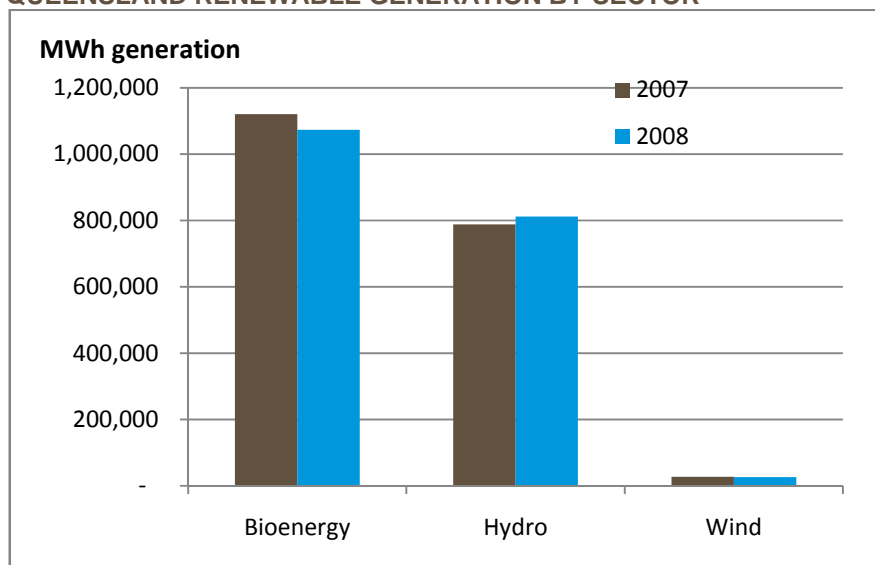
**Overall electricity generation by fuel source**



**Overall greenhouse emissions by fuel source**



**QUEENSLAND RENEWABLE GENERATION BY SECTOR**



### QLD EMISSIONS AND GENERATION BY SECTOR IN 2008

Sector	Emissions (million tonnes CO2e)	Generation (MWh)	2007/08 Generation Growth
Coal-fired generation	44.448	51,490,000	3.9%
Gas-fired generation	2.844	5,562,000	-1.4%
Liquid fuel-fired generation	0.042	52,000	-29.2%
Renewable generation	0	1,930,000	-0.7%

### TOP 5 EMITTING STATIONS BY VOLUME IN 2008

Ranking	Power Station	Emissions (million tonnes CO2e)	Generation (MWh)	2007/08 Generation growth
1	Gladstone	7.527	8,354,000	-7%
2	Stanwell Power Station	7.159	8,549,000	-14%
3	Millmerran Power Plant	5.692	6,702,000	4%
4	Tarong Power Station	5.099	6,010,000	7%
5	Callide C Power Station	4.904	5,685,000	-13%

### TOP 3 GAS-FIRED POWER STATIONS IN QLD BY EMISSIONS IN 2008

Ranking	Power Station	Emissions (million tonnes CO2e)	2008 Generation MWh	Generation growth
1	Braemar	1,205	1,816,000	-6.2%
2	Swanbank E	0.995	2,362,000	14.5%
3	Townsville Gas Turbine (Yabulu)	486,664	1,131,000	-22.5%

### TOP 5 RENEWABLE STATIONS BY GENERATION IN 2008

Ranking	Power stations	Tech	Generation MWh	Generation growth
1	Kareeya	Hydro	496,000	-12.2%
2	Barron Gorge	Hydro	277,000	52.3%
3	Pioneer Mill	Bioenergy	202,000	-15.4%
4	Rocky Point Sugar Mill	Bioenergy	135,000	3.1%
5	Invicta Mill	Bioenergy	133,000	-10.3%

## SOUTH AUSTRALIA

South Australia's fossil fuel power stations produced 9.69 million tonnes of greenhouse pollution in 2008. This was a decrease of six per cent from the previous year. South Australia was the only state to see a decline in emissions from its electricity generation. This figure included a fall in emissions from coal-fired stations, gas-fired generation and diesel/distillate generation of seven per cent, five per cent and 26 per cent respectively. Fossil fuels accounted for 87 per cent of electricity generation in the state.

Electricity produced in South Australia was the least carbon intensive of any of the four states, with each 100 MWh of electricity producing 67 tonnes of greenhouse gases. This was due to substantial increases in renewable energy production in the state and a decline in generation from fossil fuels.

Northern Power Station, one of two coal-fired power stations in South Australia, produced the single largest volume of greenhouse gas emissions in 2008 in South Australia. Producing 3.6 million tonnes of greenhouse gases in 2008, it was the only power station in the top 20 emitters across all four states. Playford B Power Station, South Australia's other coal-fired station produced the most greenhouse gas for each unit of electricity of any of the four major states making it the most emissions intensive power station. This is due to a combination of the carbon rich coal that fuels the station, and the poor thermal efficiency of it.

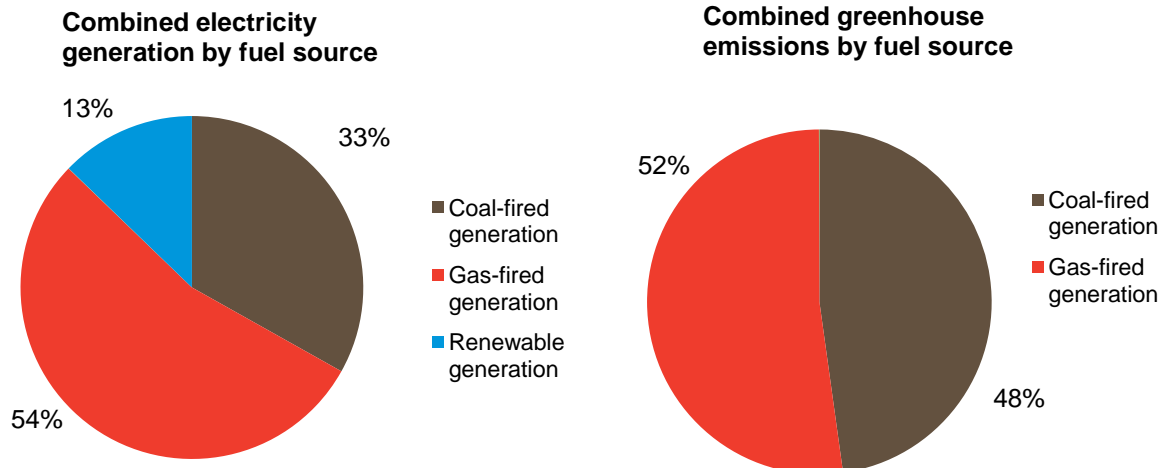
These two coal-fired power stations accounted for 48 per cent of South Australia's emissions with the state's nine gas-fired generators making up the other 52 per cent. Liquid fuel such as diesel took up a tiny fraction of all power station emissions. South Australia's Torrens Island B station produced the largest volume of greenhouse gases in 2008 of any gas-fired power station across all four states, despite producing almost 30 per cent less electricity than the state's less carbon intensive Pelican Point gas-fired power station.

Renewable sources in South Australia produced 1.9 MWh in 2008. This accounted for 13 per cent of total electricity generation in South Australia, the largest proportion of renewable generation of any of the four states.

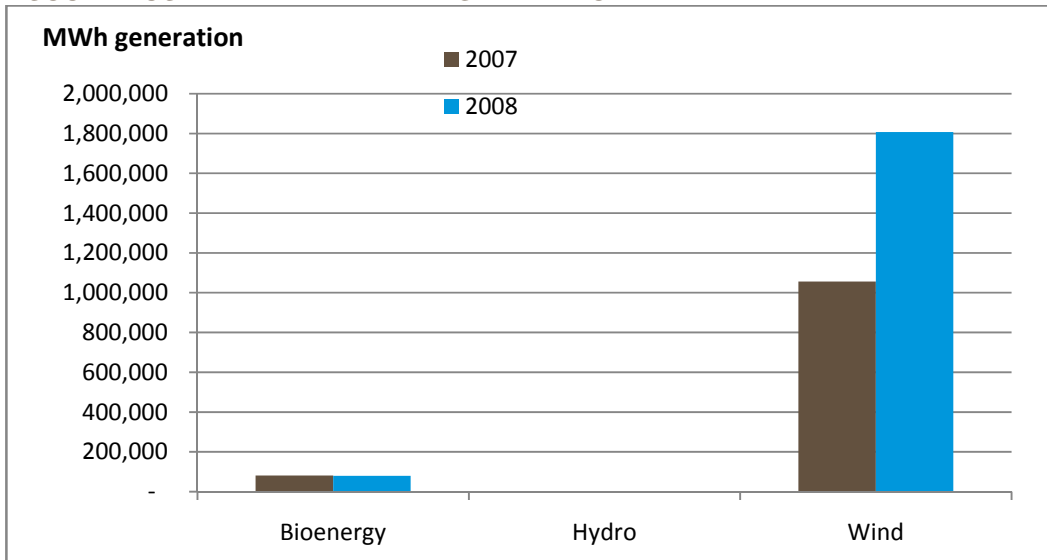
The amount of electricity generated from renewable sources in South Australia rose by 66 per cent in 2008. This was entirely due a rise of 71 per cent in electricity produced from wind power, which generated 1.81 million MWh in 2008. Wind energy accounted for 96 per cent of the state's total renewable energy, and 78 per cent of all wind energy generated across all four states. All other forms of renewable energy in South Australia declined in 2008.

## SOUTH AUSTRALIA: TABLES AND GRAPHS

### ENERGY GENERATION AND EMISSIONS IN 2008



### SOUTH AUSTRALIA RENEWABLE GENERATION



### SOUTH AUSTRALIA EMISSIONS AND GENERATION BY SECTOR IN 2008

Sector	Emissions (million tonnes)	Generation (MWh)	Generation growth
Coal-fired generation	4.631	4,790,000	-7.0%
Gas-fired generation	5.053	7,820,000	-2.6%
Liquid fuel-fired generation	4,025	4,492	-24.5%
Renewable generation	0	1,887,000	65.9%

### TOP 5 POWER STATIONS BY EMISSIONS IN 2008

Ranking	Power Station	Fuel	Emissions (million tonnes CO <sub>2</sub> e)	2008 Generation	2007/08 Generation growth
1	Northern Power Station	Coal	3.611	4,048,000	-6.5%
2	Torrens Island Power Station B	Gas	1.827	2,293,000	-18.1%
3	Pelican Point Power Station	Gas	1.693	3,295,000	7.2%
4	Playford B Power Station	Coal	1.020	742,000	-9.4%
5	Osborne Power Station	Gas	0.733	1,289,000	4.1%

### TOP 5 RENEWABLE STATIONS BY GENERATION IN 2008

Ranking	Power stations	Technology	2008 Generation	2008/07 Generation Growth
1	Lake Bonney Wind Farm Stage 2	Wind	373,000	368%
2	Hallett Wind Farm SA	Wind	259,000	New
3	Wattle Point Wind farm	Wind	248,000	-9%
4	Lake Bonney Wind Farm Stage 1	Wind	204,000	2%
5	Snowtown Wind Farm - SA	Wind	195,000	New

## **ANNEX 1 METHODOLOGY**

As with the Weekly Greenhouse Indicator, this report uses actual data to determine the most accurate figure possible for electricity generation and the greenhouse gas emissions produced from all the power stations included.

The methodology for calculating weekly emissions from these fuels in Victoria, New South Wales, Queensland and South Australia is detailed below.

### **COAL**

Emissions are calculated from the electricity generated by each coal-fired power station in the state using detailed market data from the National Electricity Market Management Company (NEMMCO). Emissions factors are based on the ACIL Tasman Report on NEM Generator Costs, prepared for Inter Regional Planning Committee (IRPC) and NEMMCO, 2009. Emissions data includes fugitive methane emissions released in the mining process.

### **NATURAL GAS**

Emissions from electricity generation are calculated from the electricity generated by gas-fired power stations in the state using detailed market data from the National Electricity Market Management Company (NEMMCO). Emissions factors are based on the ACIL Tasman Report on NEM generator costs, prepared for Inter Regional Planning Committee (IRPC) and NEMMCO, 2009. Emissions data includes all indirect emissions associated with the gas consumption.

### **LIQUID FUEL**

Emissions from electricity generation are calculated from the electricity generated from liquid fuel (i.e. diesel/distillate) power stations using detailed market data from the National Electricity Market Management Company (NEMMCO). Emissions factors are based on the ACIL Tasman, Report on NEM generator costs, prepared for Inter Regional Planning Committee (IRPC) and NEMMCO, 2009. Emissions only include direct emissions associated with the combustion of the fuel.

### **RENEWABLES**

Generation from renewable energy is based on actual generation figures where available – i.e. for scheduled generators on the NEM. Generation from other power stations is estimated using data on Renewable Energy Certificate (REC) creation, 'baselines' for generators existing prior to the MRET scheme and marginal loss factors.

### **NOTES ON RENEWABLE CALCULATIONS:**

- These calculations do not include auxiliary generation.
- For smaller renewable energy stations outlined in this report (i.e. those without scheduled generation), there may be an error margin of around five per cent due to transmission loss factors and other variables.
- For stations in which RECs have been used as part of the calculation, REC's created as of July 2009 have been used in these calculations.
- For renewable energy projects with no REC creation but with MRET baselines, electricity has been estimated at 50 per cent of their baseline generation (roughly 15 per cent of the renewable stations included).
- Renewable projects that are neither scheduled in the market, nor registered to create renewable energy certificates, are not included in these calculations. This accounts for a small number of stations with extremely low levels of generation.

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For more information visit [www.theclimategroup.org/indicator](http://www.theclimategroup.org/indicator)

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