



Australia



Australia does not have a nationwide connected electricity supply system. The country's size and the concentration of populations in the coastal regions have led to the development of separate systems.

Western Australia and the Northern Territories gave separate systems to supply remote areas and have no connection to the other states. The eastern states, on the other hand, have integrated into a National Electricity Market (NEM).

Competitive wholesale and retail electricity markets have been established in all eastern and southern states of Australia to form the National Electricity Market. A new competitive wholesale electricity market has been established in Western Australia. There remains an on-going program on market reforms under the guidance of the State and National government to further streamline market and regulatory arrangements. These efforts are expected to be concluded in 2009. Australia's electricity load has been growing by over 2 per cent each year

Demand

The demand for electricity over the past 20 years has grown at a rate of 2% annually and it has reached 236 TWh. In the year ended June 2006, the maximum coincident demand across the National Electricity Market was 31,705 MW.



Photo: Bloomberg

The energy demand in New South Wales is expected to grow at a rate of 2.2 percent over the next decade while peak power demand is said to increase at about 3 percent annually.

The growth in energy demand and peak power demand for Queensland is both estimated at 3 percent annually.

In South Australia demand is growing at a rate of 1.5 percent annually with peak demand growing at 2.8 percent per year.

The energy demand in Victoria is projected to grow at 2 percent annually while peak demand is at 3 percent per year. there are five distribution and supply companies, a transmission company, and seven generation companies in Victoria following its privatisation.

Tasmania is a new entrant to the NEM and a submarine transmission link to Victoria is being

PROFILE

Capital	Canberra	Installed Capacity	48,741MW
Area	7.687 million km	Population Electrified	100%
Population	21 million	Main Voltages (kV)	500, 330, 386, 132
GDP	US\$ 645.3 billion	Natural Resources	bauxite, coal, uranium, natural gas, petroleum, hydropower
Currency	Australian Dollar (AUD)		

POWER DEMAND BY SECTOR (GWh)

Sector	consumption Year ended June 2008 (Projected)	Percentage change from 2007 (Projected)
Industrial	112,660.83	1.7
Residential	64,459.44	2.3
Commercial	54,331.94	3.3
Total		2.3

Source: Australian Bureau of Agricultural and Resource Economics (ABARE)

connected. The projected growth for both peak demand and energy demand is at 1.6% annually over the next decade.

Western Australia is not part of the NEM. A part of the state is served by the South West Interconnected System (SWIS). There is also a small grid in the northwest and other smaller localized grids. Demand has been growing at the rate of 3 percent annually. In the Northern Territory, the state owned utility is the Power and Water Corporation.

Generation

According to the Australian Energy Regulator, ABARE, there are approximately 143,000 PJ of natural gas reserves (proved and probable + contingent reserves) and approximately 78 billion tonnes of economic demonstrated coal reserves in Australia.

In New South Wales power is generated by coal and hydropower. The coal-fired generation by the state-owned Macquarie Generation, Delta Electricity, and Pacific Power. Snowy Hydro, owned by a the NSW and Victoria state government and the federal government, produces the 3.6GW from hydropower. There are a number of large IPPs in Queensland despite the fact that most power generation is state-owned and controlled.

On top of the coal and gas fired plants in South Australia, there is also a number of wind

power plants. The state power sector for both South Australia and Victoria were privatised in the late 1990s. Tasmania has a two wind plants, two oil-fired plants, and a gas-fired plant. Hydro Tasmania also provides 2.6GW of generation capacity. The state-owned Western Power Corp. (WPC) owns about 3.5GW capacity with its four large plants and 20 smaller plants. These range from coal, gas, and wind-power plants. The state



Photo: Bloomberg

Installed Generating Capacity for 2007 (MW)				
Type of plant	Primary fuel type	Principal	Embedded and non-grid	Total
Hydro	-	6,735.0	337.2	7,072.2
Pump storage		740.0		740
Steam	Black coal	21,095.0	229.0	21,324
	Brown coal	7,325.0	604.2	7,929.2
	Natural gas	2,162.0	157.0	2,319
Gas turbine	Multi-fuel	880.0	204.3	1084.3
	Natural gas	2,542.3	1,465.3	4,007.6
	Oil products	614.0	82.9	696.9
Combined cycle	Multi-fuel	586.0	-	586
	Natural Gas	1,408.8	222.5	1,631.3
	Coal seam methane	625.0	32.0	657
Reciprocating engine		112.0	447.5	559.5
Fuel cell	Natural gas		0.5	0.5
Non-hydro renewable capacity	Various	87.4	1,385.7	1,473.1
TOTAL		44,912.4	5,167.9	50,080.3

As on 30 June 2006 (MW)

Transmission and distribution systems (as on 30 June 2006)

Overhead lines (Circuit kilometres) ¹	500kV	330kV	275kV	220kV	132kV	110kV	66kV	44kV	33kV	22kV	11kV & below	SWER ²	Low Voltage ³	Total	
New South Wales & ACT	286	5,965	0	681	9,739	48	0	8,737	0	8,024	47,566	98,727	30,066	58,286	288,167
Victoria	1,517	739	157	3,999	0	0	0	6,460	0	0	59,909	1,581	26,417	26,634	129,445
Queensland	0	691	6,669	422	7,096	1,979	0	7,476	0	6,034	13,934	50,356	61,202	31,267	187,126
South Australia	0	0	2,571	0	3,062	0	0	1,417	0	3,746	0	17,895	29,197	17,640	75,548
Western Australia	0	776	0	854	4,341	0	0	5,925	0	5,536	16,022	805	39,085	10,004	78,349
Tasmania	0	0	0	1,664	0	2,023	81	0	37	94	11,510	3,827	581	7,349	26,966
Northern Territory	0	0	0	0	340	0	0	314	0	56	2,377	595	0	1,740	5,422
Total⁴	1,803	8,191	9,397	7,420	24,598	4,050	81	25,362	37	23,460	151,316	173,767	186,580	152,930	771,043

Underground cables (Circuit kilometres) ¹	500kV	330kV	275kV	220kV	132kV	110kV	66kV	44kV	33kV	22kV	11kV & below	SWER ²	Low Voltage ³	Total	
New South Wales & ACT	0	47	0	0	616	0	0	21	0	1,065	638	12,334	0	15,047	30,567
Victoria	0	0	0	11	0	0	73	0	3,302	1,405	82	11,951	82	11,951	16,864
Queensland	0	5	0	3	92	0	9	0	932	349	4,535	10	10,276	16,211	16,211
South Australia	0	0	8	0	0	0	37	0	155	0	3,123	48	8,845	12,217	12,217
Western Australia	0	0	0	0	22	0	15	0	112	3,156	686	0	10,032	14,233	14,233
Tasmania	0	0	0	0	0	12	0	28	321	541	6	913	1,819	2,290	2,290
Northern Territory	0	0	0	0	0	0	17	0	41	561	0	1,671	0	1,671	2,290
Total⁴	0	47	13	11	641	104	0	172	0	2,290	7,807	23,365	147	59,535	94,161

Nominal MVA capacity of transformers installed	500kV	330kV	275kV	220kV	132kV	110kV	66kV	44kV	33kV	22kV	11kV & below	SWER ²	Total	
New South Wales & ACT	3,600	24,710	0	230	24,064	120	0	6,850	0	11,944	3,221	26,046	143	100,627
Victoria	8,390	2,025	0	11,732	0	0	9,270	0	13,943	4,614	424	49,796	424	49,796
Queensland	0	3,475	14,170	400	7,127	6,652	0	3,482	0	6,139	1,321	12,947	206	55,921
South Australia	0	0	6,165	0	2,516	0	1,112	0	1,112	0	6,079	220	19,444	220
Western Australia	0	4,505	0	1,028	8,138	0	1,556	0	251	4,001	1,303	337	21,119	21,119
Tasmania	0	0	0	2,670	0	3,023	70	0	36	1,743	1,124	9	8,674	9
Northern Territory	0	0	0	0	759	0	652	0	7	218	662	0	2,336	0
Total⁴	11,990	34,715	20,355	16,060	42,644	9,795	70	25,142	36	19,453	23,646	92,775	1,341	250,220

Number of transformers installed	500kV	330kV	275kV	220kV	132kV	110kV	66kV	44kV	33kV	22kV	11kV & below	SWER ²	Total	
New South Wales & ACT	9	117	0	3	430	2	0	562	0	1,681	34,626	152,739	6,421	196,592
Victoria	12	7	0	98	0	0	474	0	0	111,718	7,587	30,336	6,421	150,232
Queensland	0	4	55	7	138	113	0	327	0	1,222	12,127	60,733	15,709	110,435
South Australia	0	0	36	0	95	0	264	0	1,663	0	46,866	16,632	67,598	67,598
Western Australia	0	13	0	10	186	0	99	0	9,960	21,951	3,004	31,864	31,864	67,109
Tasmania	0	0	0	16	0	88	3	0	6	5	18,900	7,976	454	28,448
Northern Territory	0	0	0	0	15	0	38	0	17	1,510	1,969	0	3,569	0
Total⁴	21	141	91	134	866	203	3	1,764	6	14,600	201,634	300,894	106,416	625,873

Source: esa

Notes

1. Circuit kilometres are the length of an overhead or underground feeder comprising a group of one or more conductors which form one electrical circuit.
2. SWER = Single wire earth return. Figures quoted include all voltages.
3. Low voltage = 640 volts and below.
4. Total includes revised figures from Electricity Gas Australia 2006 on the basis of new information.

Renewable Sources (GWh)	
Fuel type	Installed capacity (MW)
Hydro	7,072.2
Bagasse	376.3
Biomass	46.5
Black liquor	76.5
Landfill gas	133.1
Sewage gas	19.1
Solar	3.5
Wave	0.5
Wind	817.6
Total	8,545.2

has substantial resources and a small demand. The WPC is restricted to adding only 'renewable' added capacity. The state has many IPPs that cater to local demand.

The Power and Water Corp. in the Northern Territory is responsible for power generation in the state.

Environment

The States and the National government have developed the National Framework for Energy Efficiency and are pursuing its implementation. In addition, the State of Victoria is proposing a regulatory scheme – the Victorian Energy Efficiency Target – which requires electricity retailers to assist consumers to reduce demand.

The Federal and State governments have a wide range of greenhouse gas abatement programs including mandatory renewable energy targets, generator efficiency standards, solar feed-in tariffs, solar PV subsidies, low emission technology demonstration funds and renewable energy development initiatives.