

Australian energy production, consumption and trade, 1973-74 to 2005-06

- » *In contained energy terms, Australia's energy production declined by 3 per cent in 2005-06 to 16 500 petajoules, owing to a drop in production of uranium oxide and crude oil.*
- » *Coal continues to be Australia's major energy export, totalling 6580 petajoules (230 million tonnes) and accounting for half of total exports in 2005-06. Uranium oxide exports, at 4820 petajoules, contributed a further 37 per cent to energy exports in 2005-06.*
- » *Australia's energy consumption rose by an estimated 2.2 per cent in 2005-06, to 5640 petajoules.*
- » *Total renewable energy maintained its share of the fuel mix despite the declining availability of biomass and hydroelectricity.*

production and trade

Australia's total energy production is estimated to have declined by 3 per cent in 2005-06. In total contained energy terms, Australia's production of energy commodities in 2005-06 is estimated to have been around 16 500 petajoules (table 1, figure A and see 'methodology and coverage').

Australian energy statistics – historical series

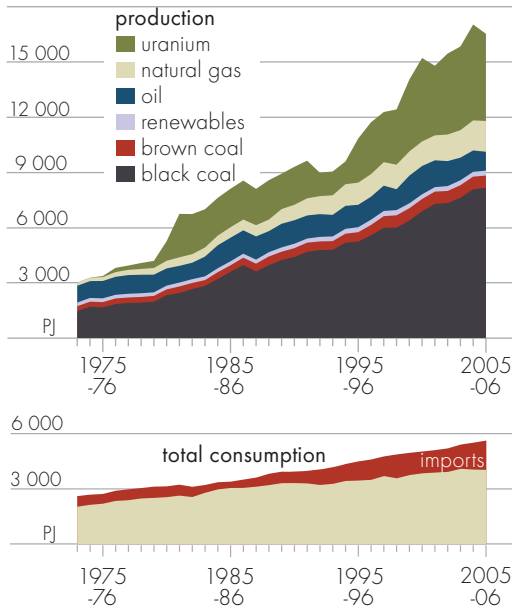
A comprehensive set of Excel tables on energy production, consumption and trade, by state, industry or fuel, is available on ABARE's website.

See table 4 on page 7 for the complete list.

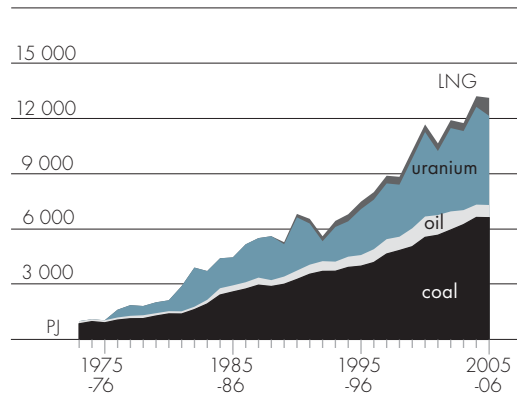
1 Australian energy production

	1973-74	1980-81	1990-91	2002-03	2003-04	2004-05	2005-06
	PJ	PJ	PJ	PJ	PJ	PJ	PJ
black coal	1 464	2 325	4 396	7 331	7 615	8 074	8 194
brown coal	263	312	484	654	684	657	697
crude oil and condensate	858	854	1 182	1 233	1 099	1 039	900
naturally occurring LPG	54	79	94	123	123	123	125
natural gas	172	416	840	1 444	1 490	1 627	1 672
uranium		1 066	2 063	4 399	4 544	5 235	4 666
renewables	198	207	239	267	268	272	270
total	3 009	5 259	9 298	15 451	15 823	17 027	16 524

A Australian energy production and consumption



B Australian energy exports



Australia is a significant net exporter of energy, consuming only a third of the energy it produces (figures A, B). Coal is Australia's major energy export. Australia's exports of black coal in 2005-06 are estimated to have remained steady at around 230 million tonnes (6580 petajoules). These exports accounted for nearly 40 per cent of Australia's total energy production in 2005-06. Exports of uranium declined by around 9 per cent in 2005-06, to 4820 petajoules but still represented 37 per cent of Australia's total energy exports in energy equivalent terms (figure B).

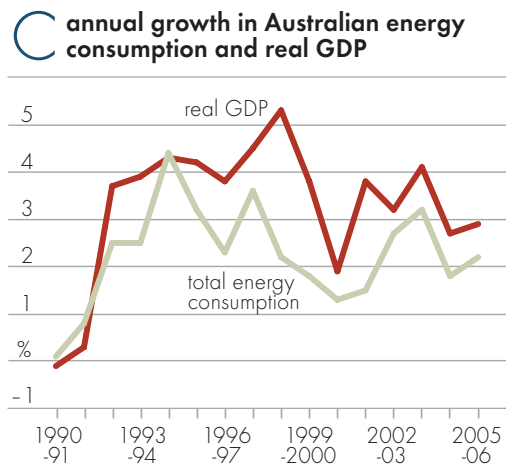
Australia is a net importer of liquid hydrocarbons, which include crude oil, LPG and petroleum products. In 2005-06, Australia exported around 689 petajoules of liquid fuels (excluding LNG but including international bunkers) and imported around 1550 petajoules. Exports of liquid fuels continued to fall in 2005-06, while imports rose. This increase in net imports corresponded with a decrease in domestic crude oil and condensate production.

Australian electricity production is estimated to have risen by around 14 per cent between 2000-01 and 2005-06, including a 1.2 per cent increase in 2005-06. Production of hydroelectricity rose by 2.7 per cent in 2005-06, with downstream demand for water coinciding with strong demand for peak electricity. However, over the nine years to 2005-06, hydroelectricity output has fallen almost 7 per cent, with the water flow available to hydro power generators restricted by continued dry conditions, particularly in New South Wales, Victoria and Tasmania.

consumption

The average annual rate of growth in energy consumption in Australia peaked in 1988-89 at 5.8 per cent. Since then it has grown generally by 2-4 per cent a year (figure C). In 2005-06, energy consumption grew by 2.2 per cent, up from 1.8 per cent in 2004-05. Total energy consumption over the period 1989-90 to 2005-06 rose by nearly 50 per cent.

Since the early 1990s, growth in energy consumption has remained below the rate of growth in gross domestic product (GDP - figure C). This indicates a long term decline in the 'energy intensity' of the Australian economy, which can be attributed to two main factors – first, greater efficiency achieved through technological improvements and fuel switching and, second, rapid growth in the less energy intensive sectors such as 'commercial and services' relative to the more moderate growth of energy intensive sectors such as manufacturing and mining.



Australia's primary energy consumption (total domestic availability) is estimated to have risen to 5640 petajoules in 2005-06, from 5520 petajoules in 2004-05. However, there are large differences in the rates of growth in energy consumption among the major energy consuming sectors – electricity generation, transport and manufacturing. These three sectors account for around three-quarters of Australia's energy consumption, while the mining, residential and commercial and services sectors account for a large proportion of the remainder (figure D, box 1).

Energy demand in the transport sector has been more volatile than usual in the past few years, mainly as a result of high oil prices and changes in international tourism. Energy consumption in the aviation transport industry continued to increase significantly in 2005-06, rising by 13 per cent following an 11 per cent rise in 2004-05. For the second year in succession, road transport fuel use remained reasonably constant and residential energy use rose only marginally. Total energy consumption in the manufacturing sector increased by 2 per cent in 2005-06, while the mining sector's energy consumption increased by almost 15 per cent. Energy consumption in agriculture, fisheries and forestry fell by 6 per cent.

Over the period 1989-90 to 2005-06, energy consumption growth was the strongest in Queensland, the Northern Territory and Western Australia, where consumption rose on average by over 3 per cent a year. This increase was driven by state population and economic growth, and by the expansion of energy intensive industries in those states. The mining sector averaged 9 per cent growth in

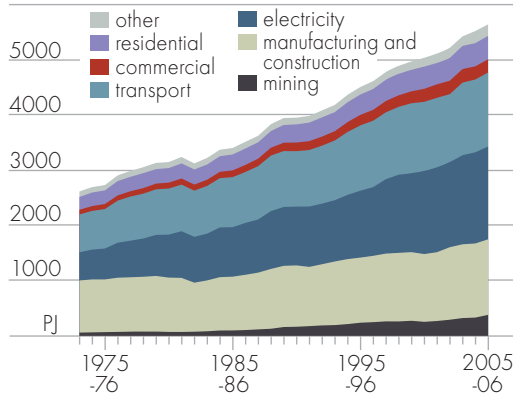
box 1 total energy consumption

Total energy consumption, as depicted in figure D, is a net concept. In order to avoid double counting, the energy consumed in producing energy products for consumption in other sectors does not count toward the total energy consumption of the producing sector. For example, in the electricity generation sector, total energy consumption comprises fuel inputs of all types less the amount of electricity produced; where one petajoule (PJ) of energy approximates to 278 gigawatt hours (GWh).

In net energy terms the electricity generation sector accounts for approximately 31 per cent of total energy consumption. The transport and manufacturing sectors account for 24 per cent each.

In terms of primary energy consumption, the electricity generation sector accounts for around 30 per cent of total energy consumed, while electricity represents 21 per cent of final energy consumed.

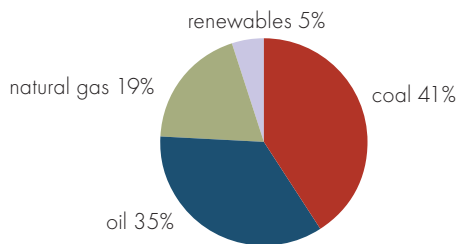
D energy consumption in Australia, by industry



energy consumption over the past three years, with Queensland, Western Australia and the Northern Territory contributing significantly, along with coal mining in New South Wales. Strong growth in minerals processing added to energy consumption in the mining sector in 2005-06, with the startup of LNG processing near Darwin in 2006 a major contributor.

Energy consumption in New South Wales and South Australia declined in 2005-06 with these two states continuing to move toward a greater dominance of low energy intensive industries. In Victoria, energy consumption rose after declining in the previous year, to average 2.3 per cent over the past three years. The most obvious change in 2005-06 was the 11 per cent rise in energy consumption in the Northern Territory, where LNG production commenced (table 2).

E primary energy consumption in Australia, by fuel, 2005-06



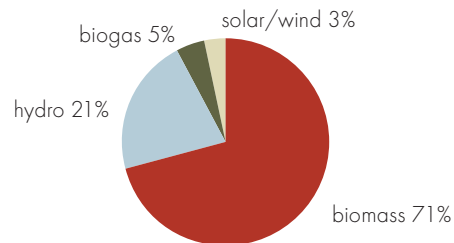
Overall, the fuel mix in Australia's domestic energy use has changed little in the past five years. Black and brown coal, used mainly to generate electricity, account for the largest share at 41 per cent of primary energy consumption in 2005-06. Despite the rapid increase in the use of coal seam methane, total natural gas use remained at 19 per cent. Petroleum products' share remained at 35 per cent (figure E).

2 Australian energy consumption, by state

	consumption		shares		annual growth	
	1989-90	2005-06	1989-90	2005-06	1989-90	2004-05
	PJ	PJ	%	%	to 2005-06	to 2005-06
New South Wales	1 230	1 504	31.2	26.7	1.3	-1.9
Victoria	1 100	1 483	27.9	26.3	1.9	5.4
Queensland	692	1 306	17.5	23.2	4.0	4.5
South Australia	302	328	7.7	5.8	0.5	-3.5
Western Australia	473	808	12.0	14.3	3.4	2.9
Tasmania	96	121	2.4	2.1	1.5	5.3
Northern Territory	53	91	1.3	1.6	3.4	10.8
Australia	3 946	5 641	100.0	100.0	2.3	2.2

Despite declining availability of plantation biomass and hydroelectricity, renewable energy maintained its share of the fuel mix owing to a rise in biogas/liquids and wind energy. Renewable energy sources in Australia accounted for 5 per cent of primary energy consumption in 2005-06. Biogas, solar and wind energy are estimated to have contributed just less than 1 per cent of total electricity generated in 2005-06 (figure F).

F renewable energy consumption in Australia, by fuel, 2005-06



methodology and coverage

The general methodology used by ABARE in calculating Australia's energy statistics balances consumption with production and trade, with much of the production and trade data sourced independently. This check for internal consistency is an important component of ABARE's annual fuel and electricity survey and ensures that ABARE's estimates of energy consumption at an aggregate level are as accurate as possible.

The construction of ABARE's historical series of energy statistics is based primarily on the voluntary fuel and electricity survey conducted in the second half of each year. The survey can be described more accurately as a partial census.

In energy terms, the survey provides consumption and derived production statistics for just over half the national total. A further 25 per cent comes from state and federal agencies and industry associations. The remainder is estimated using the energy balance process, based on the assumption that statistics for energy production and trade are reliable.

This year's *Energy Update* adds the year 2005-06 to the historical energy statistics that extend back to the early 1970s for many elements of the series. Some changes to the historical series occurred when ABARE's fuel and electricity survey was benchmarked to a one-off statistical collection for 2001-02 by the Australian Bureau of Statistics (ABS). The results of this ABS benchmarking study are located at www.abs.gov.au/ausstats/ (ABS cat. no. 4649.0.55.001). Breaks in some series occurred as a result.

ABARE's energy database provides detailed energy consumption and production statistics, by state and fuel, at an industry specific level. The most detailed coverage of industries is provided in the energy intensive manufacturing sectors and in the Australian totals. In some cases, particularly at the state level, specific industry detail is not able to be released for reasons of confidentiality. The overview tables (provided on ABARE's website) also include less industry specific detail. The coverage of industries in ABARE's Australian energy statistics database is included in table 3. Table 4 provides a list of tables, presenting various aspects of Australian energy statistics, that are available on ABARE's website.

3 industries covered in ABARE's energy database

division	subdivision	title
A		Agriculture, forestry and fishing
B		Mining
C		Manufacturing
	21	Food, beverages and tobacco
	22	Textile, clothing, footwear and leather
	23-24	Wood, paper and printing
	25	Petroleum, coal, chemical and associated products
		251 Petroleum refining
		252 Petroleum and coal products nec
		253 Basic chemical products
		254-256 Other chemical, rubber and plastic products
	26	Nonmetallic mineral products
		261 Glass and glass products
		262 Ceramic products
		263 Cement, lime, plaster and concrete products
		264 Nonmetallic mineral products
	27	Metal products
		271 Iron and steel
		272-273 Basic nonferrous metal products
		274-276 Other metal products
	28	Machinery and equipment
	29	Other manufacturing
D		Electricity, gas and water
	36	Electricity and gas
		361 Total electricity generation
		362 Gas production and distribution
	37	Water, sewerage and drainage
E		Construction
F-G		Wholesale and retail trade
I		Transport and storage
	61	Road transport
	62	Railway transport
	63	Water transport
		6301 International bunkers
		6302 Coastal bunkers
	64	Air transport
		Domestic air transport
		International air transport
	65-67	Other transport, services and storage
H, J-Q		Commercial and services
		Residential
		Solvents, lubricants, grease and bitumen

Source: Modified from Australian Bureau of Statistics and New Zealand Department of Statistics, *Australian and New Zealand Standard Industrial Classification* (1993 edition).

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Australian energy statisticsinformation available online www.abareconomics.com

number	title	range
table A	Australian energy supply and disposal – energy units	2003-04 to 2005-06
table B*	Australian energy consumption, by industry – energy units	1973-74 to 2005-06
table C*	Australian energy consumption, by fuel – energy units	1960-61 to 2005-06
table D*	Australian consumption of coal, by state – kilotonnes	1960-61 to 2005-06
table E*	Australian consumption of natural gas, by state – gigalitres	1960-61 to 2005-06
table F*	Australian energy consumption, by industry and fuel type – energy units	1973-74 to 2005-06
table G*	Australian energy consumption, by fuel – physical units	1960-61 to 2005-06
table H*	Australian production of primary fuels – physical units	1960-61 to 2005-06
table I*	Australian consumption of electricity, by state – gigawatts	1960-61 to 2005-06
table J	Australian energy supply and trade, by fuel – energy units	1973-74 to 2005-06
table K*	Australian consumption of petroleum products – megalitres	1960-61 to 2005-06
table L	Australian petroleum supply and disposal – energy units	1973-74 to 2005-06
table M	Australian energy imports, by fuel – physical units	1960-61 to 2005-06
table N	Australian energy exports, by fuel – physical units	1960-61 to 2005-06

* Includes state level data.