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energy update 2006

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Australian energy consumption and production, 1974-75 to 2004-05

- *In contained energy terms, Australia's energy production rose by an estimated 7.5 per cent in 2004-05, to 17 028 petajoules.*
- *Coal continues to dominate energy export trade, with exports of coal rising by 6 per cent to reach 6595 petajoules (231 million tonnes) in 2004-05.*
- *Australia's energy consumption rose by an estimated 1.9 per cent in 2004-05, to 5525 petajoules.*

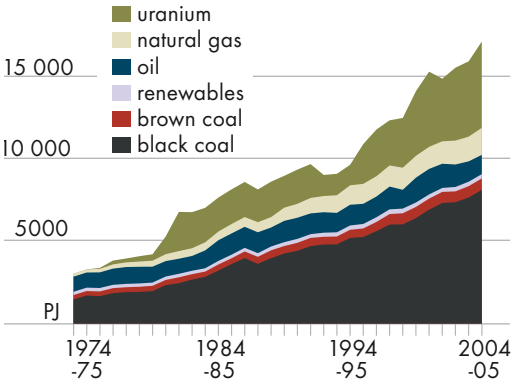
production and trade

In 2004-05 the rate of increase in total energy production far exceeded the rate of increase in energy consumption. Australia's total energy production is estimated to have increased by 7.5 per cent in 2004-05. In energy terms, production of natural gas and uranium increased by 10 per cent and 15 per cent respectively, while production of coal, which accounts for around half of production in contained energy terms, increased by 6 per cent. These increases more than offset a 6 per cent estimated decline in crude oil and condensate production (table 1, figure A. and see the 'methodology' section later). In total the energy equivalent of Australia's production of energy commodities in 2004-05 is estimated to have been 17 026 petajoules. In contained energy terms, Australia consumes less than a third of the energy it produces.

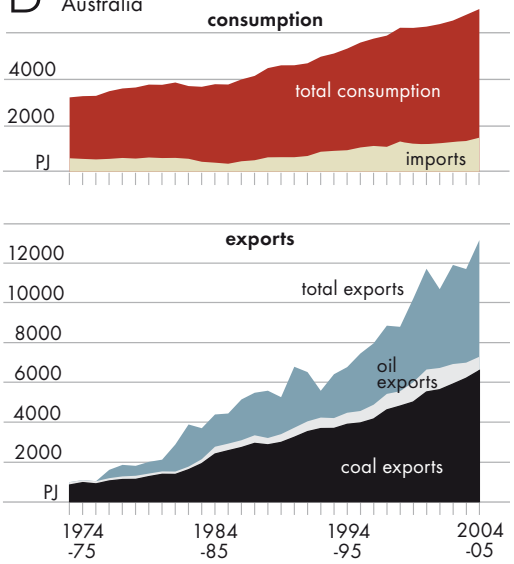
1 energy production – Australia

	1973-74	1980-81	1990-91	2002-03	2003-04	2004-05
	PJ	PJ	PJ	PJ	PJ	PJ
Black coal	1 464	2 325	4 396	7 504	7 615	8 074
Brown coal	263	312	484	687	684	691
Crude oil and condensate	858	854	1 182	1 233	1 099	1 039
Naturally occurring LPG	54	79	94	123	123	123
Natural gas	172	416	840	1 373	1 492	1 634
Uranium	0.0	1 066	2 063	4 399	4 544	5 207
Renewables	198	207	239	274	267	258
Total	3 009	5 259	9 298	15 593	15 924	17 026

A energy production, by fuel
Australia



B energy consumption and exports
Australia

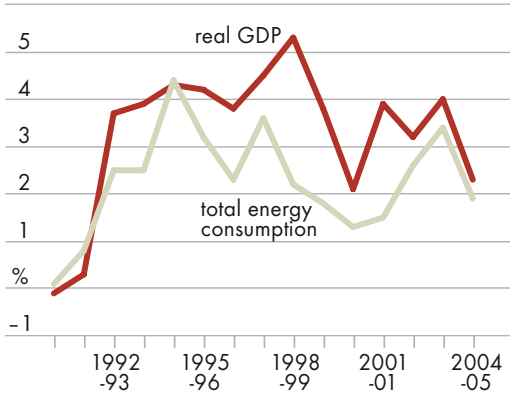


This makes Australia a significant energy net exporter. Trade in energy commodities is dominated by coal. In contained energy terms, Australia's exports of black coal in 2004-05 are estimated to have risen by 6 per cent to 6595 petajoules (231 million tonnes), from 6208 petajoules (218 million tonnes) in 2003-04. These exports accounted for nearly 40 per cent of Australia's total energy production in 2004-05. Exports of uranium rose by an estimated 24 per cent in 2004-05, to 5287 petajoules, and represented 31 per cent of Australia's total energy production (figure B).

Australia is a net importer of liquid hydrocarbons (including crude oil, LPG and other refined and semirefined petroleum products). In 2004-05, Australia exported around 778 petajoules of liquid fuels (excluding LNG but including international bunkers) and imported around 1451 petajoules. Exports of liquid fuels fell in 2004-05, while imports rose. The increase in net imports corresponded with a decrease in domestic oil production, which offset a moderate increase in domestic refinery output.

Australian electricity production is estimated to have risen by around 8.5 per cent between 2000-01 and 2004-05. However, production of hydroelectricity fell by around 6 per cent in this period as the water flow available to hydro power generators, particularly in New South Wales, Victoria and Tasmania, was severely affected by continued dry conditions.

C annual growth in energy consumption and real GDP
Australia



consumption

Over the past thirty years, energy consumption in Australia has more than doubled from around 2700 petajoules to more than 5500 petajoules a year. The average annual rate of growth in consumption has fallen from a peak of 5.8 per cent in 1988-89 to 1.9 per cent in 2004-05.

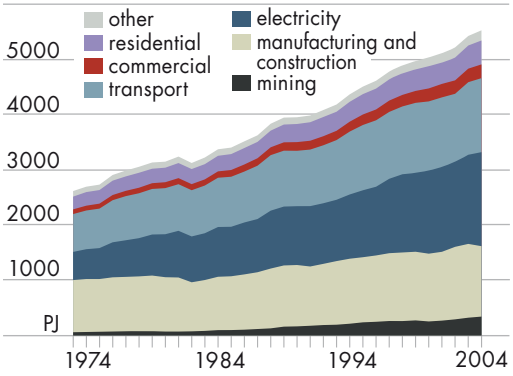
Until the early 1990s total energy consumption tended to grow at a rate that closely matched the rate of growth in gross domestic product. Since then, energy consumption has tended to grow more slowly than gross domestic product (figure C). This decline in the 'energy intensity' of the Australian economy can be attributed to two main factors – greater energy efficiency through technological improvements and fuel switching, and the rapid growth of less energy intensive sectors, such as services, relative to the more moderate growth of more energy intensive sectors such as manufacturing and mining.

Australia's primary energy consumption (total domestic availability) is estimated to have risen by 1.9 per cent to 5525 petajoules in 2004-05, from 5422 petajoules in 2003-04. However, there are large differences in the rates of growth in energy consumption among the major energy using sectors of electricity generation, transport and manufacturing. These three sectors account for around three quarters of Australia's energy consumption, while the residential, commercial and mining 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 fell in both 2001-02 and 2002-03, before rising slightly in 2003-04 and more strongly in 2004-05. Total energy consumption in the manufacturing sector rose by 1.6 per cent in 2004-05.

There are also large differences in the rates of growth in energy consumption among the states and territories. Over the past fifteen years, energy consumption in both Queensland and Western Australia has risen by an average rate of around 4 per cent a year. This increase has been driven by state population and economic growth, and the expansion of energy intensive industries in those states. The boom in the mining sector in recent years has also resulted in increased energy demand in northern Australia, where mining and minerals processing contribute significantly to economic output. In the Northern Territory, recent strong

D energy consumption, by industry
Australia



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 used to produce the energy products consumed in other sectors does not count toward the estimate of total energy consumed in the sector where the products are produced. 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 both account for 24 per cent. However, 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.

growth in energy consumption is expected to continue, with the startup of LNG and other natural gas liquids processing facilities.

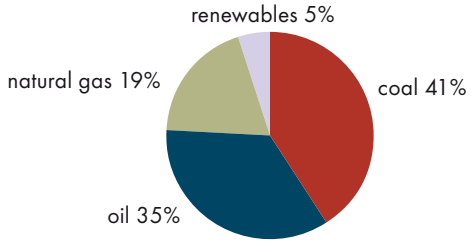
The economies of Victoria and New South Wales are less energy intensive than those of Queensland and Western Australia. Despite considerable growth in the New South Wales and Victorian state economies over the past fifteen years, the rate of growth in energy consumption in both these states has been relatively subdued. In South Australia and Tasmania, low population and economic growth and a decline in activity in the energy intensive industries in these states have resulted in lower rates of energy consumption growth than in New South Wales and Victoria (table 2).

Changes in the mix of fuels consumed in Australia are also of interest (figure E). Australia's energy consumption is dominated by coal, petroleum and natural gas. Black and brown coal – used mainly to generate electricity – accounted for around 41 per cent of primary energy consumption in 2004-05, while crude oil accounted for 35 per cent and natural gas for 19 per cent. Renewable energy sources, such as wind, hydroelectricity and solar energy represented 4.7 per cent of primary energy consumption and contributed 5 per cent of the energy used in electricity generation. Biomass and hydroelectricity accounted for around 94 per cent of the renewable energy used to generate electricity in Australia in 2004-05 (figure F).

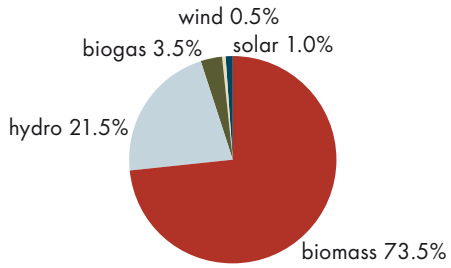
2 energy consumption , by state

	consumption		shares		annual growth	
	1989-90	2004-05	1989-90	2003-04	1989-90 to 2003-04	2003-04 to 2004-05
	PJ	PJ	%	%	%	%
New South Wales	1230	1532	31.2	27.7	1.5	1.2
Victoria	1100	1407	27.9	25.5	1.7	-3.2
Queensland	692	1251	17.5	22.6	4.0	8.5
South Australia	302	340	7.7	6.2	0.8	1.6
Western Australia	428	785	10.8	14.2	4.1	0.1
Tasmania	96	114	2.4	2.1	1.2	3.8
Northern Territory	52	83	1.3	1.5	3.2	5.8
Australia	3946	5525	100.0	100.0	2.3	1.8

E primary energy consumption, by fuel, 2004-05 Australia



F renewable energy consumption, by fuel, 2004-05 Australia



Overall, the fuel mix in Australia's domestic energy use has changed little in the past five years. The share of consumption represented by natural gas and renewable energy continues to rise. Contrary to what might have been expected, the higher petrol prices in 2003-04 and 2004-05 do not appear to have led to an increase in LPG use in the transport sector in 2004-05, possibly because there were also increases in the price of LPG over the same period (from around 35 cents per litre in mid-2003 to around 45 cents per litre in mid-2005). An estimated 25 million litres of fuel ethanol was sold in 2004-05.

methodology

The general methodology used in ABARE's *Australian Energy Statistics* balances consumption with production, where much of the production data are sourced independently. This check for internal consistency has been an important component of the fuel and electricity survey and ensures that ABARE's estimates of energy consumption at an aggregate level are as accurate as possible.

This year's energy update adds the year 2004-05 to the historical energy statistics, many of which extend back to the early 1970s. Some changes to the historical series occurred two years ago when ABARE's fuel and electricity survey was benchmarked to a one-off statistical collection 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.

For the first time in this update, from 2000-01, estimates of unreported oil production have been included directly in the figures for domestic production. Previously the unreported production entered the energy balance indirectly as a residual discrepancy in the balance between production, exports, imports and refinery usage of crude oil and other feedstocks. ABARE enquiries suggest that this statistical discrepancy, which has been as large as 10 per cent of production in recent years, is too large to have resulted merely from any small discrepancies in export, import and refinery data. Therefore some of the energy production previously included in the statistical discrepancy has been moved to oil production.

industry coverage

ABARE's energy database provides detailed energy consumption and production statistics at an industry specific level. The greatest coverage of industries is provided in the energy intensive manufacturing sectors and for Australian totals. In some cases, particularly at the state level, specific industry detail is not able to be provided for reasons of confidentiality. The overview tables also include less industry specific detail. The coverage of industries provided in Abare's energy database are included in the following table.

energy statistics – Australia

information available online www.abareconomics.com

number	title	range
Table A	Australian energy supply and disposal – energy units	2003-04 to 2004-05
Table B*	Australian energy consumption, by industry – energy units	1973-74 to 2004-05
Table C*	Australian energy consumption, by fuel – energy units	1960-61 to 2004-05
Table D*	Australian consumption of coal, by state – kilotonnes	1960-61 to 2004-05
Table E*	Australian consumption of natural gas, by state – gigalitres	1960-61 to 2004-05
Table F*	Australian energy consumption, by industry and fuel type – energy units	1973-74 to 2004-05
Table G*	Australian energy consumption, by fuel – physical units	1960-61 to 2004-05
Table H*	Australian production of primary fuels – physical units	1960-61 to 2004-05
Table I*	Australian consumption of electricity, by state – gigawatts	1960-61 to 2004-05
Table J	Australian energy supply and trade, by fuel – energy units	1973-74 to 2004-05
Table K*	Australian consumption of petroleum products – megalitres	1960-61 to 2004-05
Table L	Australian petroleum supply and disposal – energy units	1973-74 to 2004-05
Table M	Australian energy imports, by fuel – physical units	1960-61 to 2004-05
Table N	Australian energy exports, by fuel – physical units	1960-61 to 2004-05

* Includes state level data.

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).