

# minerals and energy

## major development projects – october 2006 listing

ian haine and commodity analysts, resource markets and infrastructure section

- > **Current investment intentions in the Australian mineral resources sector, as reflected in the record number and value of minerals and energy projects committed to or under construction, bode well for the sector's growth over the next few years.**
- > **In addition, the significant number of large scale projects at less advanced planning stages that are under active consideration for development is expected to provide a firm platform for future growth.**

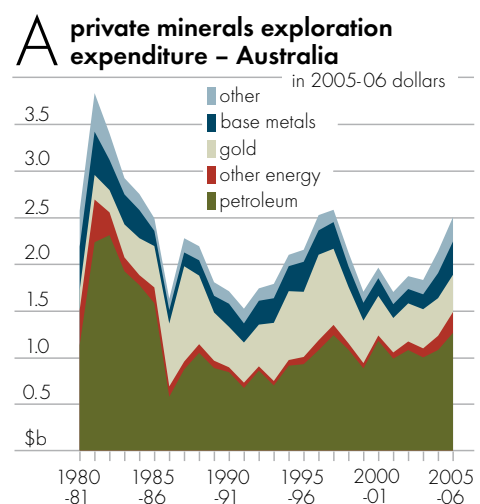
### exploration expenditure

The ability of Australia's minerals and energy sector to sustain its strong recent growth and expand its contribution to national economic performance in the medium and longer terms depends critically on the amount of investment in minerals exploration. Most of the strong growth in the minerals and energy sector of recent years, and most of the expected growth implicit in ABARE's list of planned projects, is underpinned by exploration that was undertaken over the past decade.

Australian minerals exploration expenditure, in real terms (2005-06 dollars), for the period 1980-81 to 2005-06 is shown in figure A.

Total Australian minerals exploration expenditure in 2005-06 rose by 21 per cent to \$2.5 billion. In real terms, estimated expenditure in 2005-06 was the highest since 1997-98 and around 13 per cent above average annual expenditure on minerals exploration over the past 25 years. The substantial number of minerals and energy projects in ABARE's latest projects list indicates that there will be robust growth in the mineral resources sector's productive capacity over the medium term. Continued sectoral growth over the longer term will require levels of real average annual exploration expenditure around, or higher than, that in 2005-06 in order to increase the resource base needed to underpin future development.

In 2005-06, all major commodity categories recorded increases in minerals exploration expenditure.



## development projects

Expenditure on petroleum exploration rose by 21 per cent in 2005-06, to around \$1.26 billion. Expenditure in 2005-06 was the highest since 1985-86 and was around 9 per cent higher than the annual average expenditure in real terms over the past 25 years (\$1.16 billion). The increase in petroleum exploration expenditure in 2005-06 is likely to have been encouraged by significant rises in world oil prices during the year.

However, short term oil prices are only one factor in determining exploration expenditure in any particular period. A range of other factors also have a significant bearing on exploration expenditure decisions. These include: longer term oil price trends; Australia's relative prospectivity for petroleum; the prospect for Australia's share of growing global LNG trade; the need for long term planning, particularly for relatively expensive offshore petroleum exploration; cost increases; and shortages of skilled labor and the concurrent commitment of resources (funds, equipment and labor) to other activities such as project development.

After falling in 2004-05, gold exploration expenditure increased by a modest 2 per cent in 2005-06, to \$400 million. The nominal rise in expenditure in 2005-06 is expected to have been influenced by increases in Australian dollar denominated gold prices.

### abare's list of major minerals and energy development projects

#### the full list

ABARE's listing of major minerals and energy projects expected to be developed over the medium term is compiled every six months. Information contained in the list spans the mineral resources sector and includes energy and minerals commodities projects and minerals processing projects. The information comes predominantly from publicly available sources but, in some cases, is supplemented by information direct from companies. The list is fully updated to reflect developments in the previous six months. The projects listing is released around May and November each year.

#### what's in the list

The latest projects list contains information on 268 projects, providing the following details:

- > project name
- > location
- > expected startup date
- > additional output capacity
- > proponent company or joint venture
- > capital cost of the project
- > additional employment, where available.
- > project status

With one industry exception, ABARE's listing provides details of each announced project for which total capital expenditure is expected to exceed \$40 million. The exception is the gold industry, which typically has a relatively large number of smaller projects. For gold, the expenditure threshold for inclusion in the listing is \$15 million.

In general, included projects are at relatively advanced stages of planning. That is, for new projects, stage of planning categories range from 'prefeasibility study underway' through to 'under construction'.

Projects are listed by the principal mineral commodity to be produced, under the broad headings: 'Mining projects - energy', 'Mining projects - minerals' and 'Minerals processing facilities'. The listing includes new greenfields projects as well as expansions of existing projects.

#### where to get the list

The list is available only as an electronic product.

The list can be downloaded from 'Publications' at [www.abareconomics.com](http://www.abareconomics.com)  
enquiries: [abareproducts@abare.gov.au](mailto:abareproducts@abare.gov.au) or phone +61 2 6272 2010.

Australian dollar gold prices increased by 25 per cent in 2005-06 to average \$703 an ounce. However, significant increases in exploration costs because of strong industry wide competition for resources such as labor and equipment, may have had a dampening effect on exploration expenditure. In real terms, expenditure on gold exploration in 2005-06 was a little below the average of the previous three years (\$411 million).

Base metals exploration expenditure rose by 37 per cent to \$357 million in 2005-06. This increase is mainly attributable to strong rises in expenditure on copper and silver-lead-zinc exploration, reflecting recent substantial rises in global prices for these commodities. For example, average world prices for copper increased by over 60 per cent in 2005-06 while zinc prices rose by more than 80 per cent over the same period. In real terms, exploration expenditure on base metals in 2005-06 was 43 per cent higher than the 25 year average (\$249 million) and was the highest since 1981-82.

Apart from the main exploration sectors referred to above, three other commodities – iron ore, coal and uranium – had significant expenditure increases in 2005-06. Spending on iron ore exploration rose by 17 per cent in 2005-06 to around \$161 million (after more than doubling in 2004-05), reflecting a positive outlook for Chinese demand for this commodity. Exploration expenditure on coal increased by 31 per cent to around \$166 million in 2005-06, reflecting high global demand and recent strong price increases, particularly for coking coal. Uranium exploration expenditure more than doubled in 2005-06 (to \$56 million). This reflects increased global interest in nuclear power as an alternative to fossil fuels as well as actual and expected substantial increases in world uranium prices.

### factors influencing exploration decisions

In general, decisions to invest in mineral exploration depend on the probability of discovering an economic mineral deposit or extending the resource base of a known deposit. A range of economic and policy factors will also influence companies' expectations of the likely return on investing in exploration. Such factors include: expectations and risks relating to mineral prospectivity; prevailing and expected mineral prices; existing mining and processing technologies; input costs more generally; land access; and government policies.

Over the medium term, exploration expenditure is expected to be influenced by a different set of factors in each of the main exploration sectors.

In the petroleum sector, Australia's prospectivity for crude oil, together with the long term outlook for global oil prices, will be key factors in determining future levels of exploration activity and expenditure, along with higher input costs. With world oil prices forecast to remain relatively high in the short term, further increases in exploration expenditure are likely.

Movements in the Australian dollar price of gold will be a key factor influencing gold exploration expenditure. However, expected future costs of exploration and development will also play an important role in determining future expenditure. Rises in the costs of labor, fuel and other inputs (such as steel) have increased development costs and may continue to be a negative influence on gold exploration expenditure over the medium term.

In the base metals sector, the price outlook will clearly be important, as demonstrated by the rise in copper and silver-lead-zinc exploration expenditure. Other important factors are expected to be: future Chinese demand for base metals; assessments of the development potential of several known (but as yet undeveloped) base metal deposits in Australia; higher costs; and Australia's relative attractiveness for exploration.

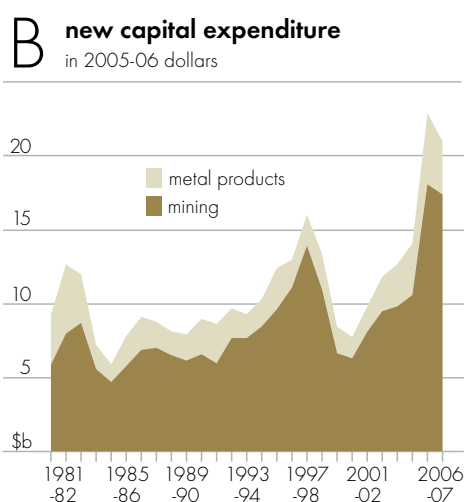
## development projects

### capital expenditure

Data from the ABS survey of new capital expenditure in the mining and metal products industries give an indication, in aggregate terms, of the pace and scale of development in the minerals and energy sector, both historically and in the short term (figure B).

ABS Survey data show that new capital expenditure in the mining industry was \$18.1 billion in 2005-06, 76 per cent higher than in 2004-05. In real terms (2005-06 dollars), new capital expenditure in 2005-06 was the highest on record and was more than double the average annual expenditure for the past 25 years (\$8.3 billion).

However, there are indications that capital expenditure on mining may ease slightly in 2006-07. Based on industry intentions canvassed in the September quarter 2006, ABS data indicate that capital expenditure on mining in 2006-07 may be just under \$18 billion. If realised, this would represent a decline of 1 per cent from the record 2005-06 expenditure. The expected continued high level of capital expenditure in the mining industry in 2006-07 is consistent with the development trends shown in the full list of major mineral and energy projects (see figure H).



Capital expenditure in the metals products sector, which includes the minerals processing activities covered in ABARE's projects list, was \$4.8 billion in 2005-06, 42 per cent above expenditure in 2004-05. Paralleling the result in mining, real expenditure in the metal products sector in 2005-06 is the highest on record and more than double the 25 year annual average of \$2.38 billion (in 2005-06 dollars). However, surveyed industry intentions suggest that metal products expenditure could fall by around 23 per cent in 2006-07 to about \$3.7 billion, reflecting the imminent completion of some projects. Nevertheless, at that level, real metal products sector expenditure in 2006-07 would be the third highest on record.

In 2006-07, if the expenditure intentions for both the mining and metal products sectors are realised, total capital expenditure in the mineral resources sector could fall, by around 8 per cent, in real terms.

Over the medium term, there is evidence to suggest that there is potential for continued high levels of resource sector capital investment. There are a significant number of advanced projects in ABARE's projects list (particularly a number of high capital cost petroleum and iron ore developments). There also exists a number of large scale, but less advanced projects, that may be developed in a longer timeframe.

### recently commissioned projects

In the six months ended October 2006, 24 major minerals and energy projects with a combined capital expenditure of \$5.8 billion were completed. These completed projects will add to the sector's production and export capacity for a range of commodities, including coal, petroleum, diamonds, gold, iron ore, nickel, aluminium, ammonia and crude iron and steel. Summary details of these projects are shown in table 1. While the

## development projects

project completion rate in the six months to the end of October 2006 was lower than the record established in the previous six month period (27 projects with a total capital cost of \$8.9 billion), it was still relatively high (table 2; figure C). The average value of projects completed in the six month period to October 2006 (\$243 million) was about the same in nominal terms as the average value in the past eight years (\$244 million).

Looking ahead, ABARE's project list indicates that the rate of project completions could remain high in the short term, with over 60 advanced projects scheduled for completion in the fourteen months to the end of 2007. However, strong industry wide competition for skilled labor, and equipment, may mean that the announced scheduled completion dates for some of these projects are not met and actual completion does not occur until after 2007.

### major mineral resource developments – projects completed, May to October 2006

commodity	project	location	company	capital expenditure \$m
<b>mining – energy projects</b>				
black coal	Austar underground	NSW	Yanzhou	250
	Sandgate Rail Grade Separation	NSW	Aust Rail Track Corp	80
	Ulan longwall expansion	NSW	Xstrata/Mitsubishi	140
	Wambo opencut expansion	NSW	Peabody	61
	BMA coal expansion (stage 2)	Qld	BMA	236
	Carborough Downs & Broadlea Nth	Qld	AMCI Australia	136
	German Creek coal projects	Qld	Anglo Coal Australia	66
	Grasstree	Qld	Anglo Coal Australia	275
	Hail Creek expansion	Qld	Rio Tinto/Nippon Steel/ Marubeni/Sumisho	300
	Millennium opencut	Qld	Peabody	161
Millennium CHPP and rail project	Qld	Red Mountain JV	115	
petroleum	BassGas (gas/LPG/condensate)	Tas	Origin/AWE/CalEnergy/ Wandoo	750
	Enfield oil project	WA	Woodside/Mitsui	1 480
<b>mining – minerals projects</b>				
diamonds	Ellendale expansion (pipe 4)	WA	Kimberley Diamond Company	48
gold	Bendigo	Vic	Bendigo Mining	127
	Coyote	WA	Tanami Gold	15
iron ore	Jack Hills project (stage 1)	WA	Murchison Metals	41
	Rail duplication project	WA	Rio Tinto	268
	WA Rapid Growth Project 2	WA	BHP Billiton	770
nickel	Black Swan Disseminated 2 project	WA	LionOre	69
	Maggie Hays upgrade	WA	LionOre	91
<b>minerals processing projects</b>				
aluminium	Kurri Kurri Surf project (stage 2)	NSW	Hydro Aluminium	50
ammonia	Ammonium nitrate plant	Qld	Orica	195
crude iron & steel	Port Kembla hot strip mill	NSW	Bluescope Steel	100
<b>total capital expenditure</b>				<b>5 824</b>

## development projects

### energy projects

Of the major projects completed in the six months ended October 2006, by far the largest in terms of capital cost was the \$1.48 billion Enfield oilfield development completed midyear. This offshore development, owned by Woodside Energy and Mitsui and operated by Woodside, is located 50 kilometres north of Exmouth in Western Australia and

will produce 100 000 barrels a day of crude oil at full capacity. One other petroleum project – the \$750 million BassGas gas/LPG/condensate project located in Bass Strait – was completed in the six months to October. This project, originally scheduled for completion in 2005, is expected to produce 23 petajoules of natural gas a year, 70 000 tonnes of LPG a year and 2800 barrels of condensate a day from the Yolla gasfield.

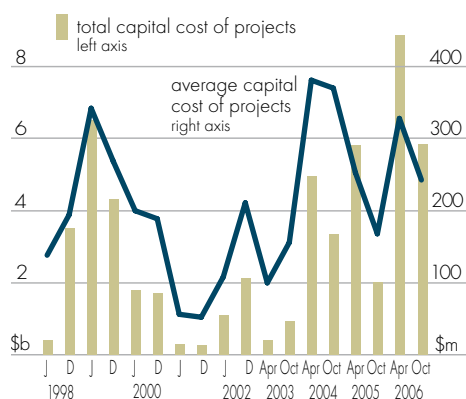
Eleven coal projects – four in New South Wales and seven in Queensland – were completed in the six months to October 2006. The largest of the New South Wales projects, in terms of capital cost, was Yanzhou's \$250 million redevelopment of the Austar underground mine near Cessnock. This mine, formerly known as the Southland mine, was damaged by fire in 2003. The redeveloped Austar mine will produce around 3 million tonnes a year of coking coal. Two of the other New South Wales completions – the \$140 million Ulan longwall and the \$61 million Wambo opencut – are expansions of existing operations. The additional annual output capacity at the Ulan mine will be 3.5 million tonnes of thermal coal while at Wambo it will be 1.5 million tonnes of thermal and coking coal. The Sandgate Rail Grade Separation coal infrastructure project, located between Newcastle and Maitland, was recently completed at a capital cost of \$80 million. As a result, local rail carrying capacity is expected to increase from 106 million tonnes a year to 165 million tonnes.

Five of the seven Queensland coal projects completed are new mines and two are expansions. Among the new mines brought into production, Anglo Coal Australia's \$275 million Grasree mine is the largest in terms of capital cost. The mine is north east of Emerald and will produce around 5 million tonnes a year of hard coking coal. The other new mines completed are: AMCI Australia's \$136 million Carborough Downs and Broadlea North operations (capacity of 5 million tonnes a year of coking and PCI coal); Anglo Coal Australia's \$66 million German Creek coal projects (1 million tonnes coking coal); Peabody's \$161 million Millennium opencut (1.5 million tonnes coking coal); and the Red Mountain Joint

## 2 completed projects – January 1998 to October 2006

	number of projects no.	total capital cost of projects \$m	average capital cost of projects \$m
<b>six months ended</b>			
June 1998	3	415	138
December 1998	18	3 500	194
June 1999	19	6 500	342
December 1999	16	4 300	269
June 2000	9	1 800	200
December 2000	9	1 700	189
June 2001	5	282	56
December 2001	5	262	52
June 2002	10	1 082	108
December 2002	10	2 110	211
<b>four months ended</b>			
April 2003	4	400	100
<b>six months ended</b>			
October 2003	6	937	156
April 2004	13	4 956	381
October 2004	9	3 328	370
April 2005	23	5 812	253
October 2005	12	2 012	168
April 2006	27	8 854	328
October 2006	24	5 824	243
<b>total</b>	<b>222</b>	<b>54 074</b>	<b>244</b>

## C completed projects



Venture's \$115 million Millennium coal preparation, handling and rail project (throughput capacity of 6 million tonnes a year). The two coal expansion projects completed are Rio Tinto's \$300 million Hail Creek mine and BHP Billiton Mitsubishi Alliance's \$236 million BMA coal expansion project (stage 2). Together these two expansions will add around 4.5 million tonnes a year of coking coal output capacity.

### metal mining projects

On the metal mining front, the largest development commissioned in the six months to October 2006 was BHP Billiton's Iron Ore Rapid Growth Project 2. This project, completed at a capital cost of US\$575 million (A\$770 million), involved the development of Orebody 18, near BHP Billiton's other operations in the Pilbara. As well as expanding mine output capacity by 8 million tonnes a year, the Rapid Growth Project 2 development provides extra port and rail capacity. Also in iron ore, Rio Tinto commissioned its Rail Duplication (Tunkawanna to Rosella Siding) infrastructure project at a capital cost of \$268 million and Murchison Metals completed stage 1 of its new, \$41 million, Jack Hills mine in the Mid West region of Western Australia. The initial capacity of the Jack Hills mine will be around 1.2-1.5 million tonnes a year.

For gold, two projects were brought into production in the six months to October 2006. The largest of these was Bendigo Mining's Bendigo mine in Victoria, completed at a capital cost of \$127 million. The mine is expected to produce around 120 000 ounces of gold a year at full capacity. The other gold project completed was Tanami Gold's \$15 million Coyote mine in the Kimberley region of Western Australia.

Two nickel mine expansions in Western Australia – the \$69 million Black Swan Disseminated 2 project and the \$91 million Maggie Hays Upgrade project – were completed in the six months to October 2006. Both operations are owned by LionOre. The Black Swan expansion is expected to add 6000 tonnes a year of nickel output capacity while the Maggie Hays upgrade is expected to add 4000 tonnes a year.

In Queensland, Orica commissioned its \$195 million ammonium nitrate plant expansion at Yarwun. Additional production capacity is 300 000 tonnes a year with most of the output expected to be used in mining operations. In Western Australia, the Kimberley Diamond company completed its Ellendale (pipe 4) expansion at a capital cost of \$48 million. The mine's output capacity is expected to be increased by 580 000 carats a year.

### minerals processing projects

In the minerals processing sector, two projects, both in New South Wales, were completed in the half year to October 2006. At Port Kembla, Bluescope Steel completed a \$100 million expansion of its hot strip mill. Additional output is expected to be 400 000 tonnes of steel a year. At the Kurri Kurri aluminium smelter near Newcastle, Hydro Aluminium commissioned stage 2 of its Surf project at a capital cost of \$50 million. The Surf project involved efficiency improvements that are expected to lift output capacity by 8000 tonnes of aluminium a year.

Having come on stream, the above projects no longer appear in ABARE's project list.

### advanced projects

At the end of October 2006, there were 94 projects at advanced stages of development included in ABARE's projects list – that is, projects that are either committed or under construction. This is a record and four more than the number of advanced projects (90) included in the April 2006 list. Given that 24 projects were completed in the six months to

## development projects

October (and therefore no longer appear in ABARE's list), the increase in the number of advanced projects in the October 2006 list indicates that around 28 projects were either newly committed, or entered the list at an advanced stage, in that six month period.

The announced capital expenditure of the 94 advanced projects at the end of October 2006 sums to \$34.9 billion (table 3).

However, it should be noted that even projects which have reached the committed stage may be deferred, modified or even canceled if economic or competitive circumstances change sufficiently. This is particularly relevant in the current period of rapid project development in which the mineral resources sector is experiencing significant difficulties in securing sufficient inputs including materials, equipment, skilled labor and professionals. In this environment, where demand from developers is rising faster than supply, the impact on project development is being manifested in delays to scheduled completion dates for projects and in increases in project capital costs.

Nevertheless, current investment intentions in the Australian mineral resources sector, as reflected in the record number and value of minerals and energy projects committed to or under construction, bode well for the sector's growth over the next few years.

The 94 advanced projects as at October 2006 indicate continued expansion across most of the minerals and energy industry spectrum.

### advanced energy projects

Energy developments account for 46 of the 94 advanced projects (49 per cent) and around 47 per cent (or \$16.5 billion) of the estimated capital cost of \$34.9 billion for all of the advanced projects (table 3).

Six large petroleum developments – four of them Woodside operated – together with two natural gas pipeline projects, account for just over half of the total value of energy projects. The largest of these projects is the \$2.4 billion North West Shelf Extension Project in Western Australia, which involves the construction of a fifth LNG processing train with gross annual capacity of 4.2 million tonnes of LNG. The fifth train is currently under construction and is expected to be completed toward the end of 2008. Two new offshore oilfield developments in the Carnarvon Basin in Western Australia – Vincent (\$1 billion) and Stybarrow (\$803 million) – are expected to add around 180 000 barrels a day of crude oil production capacity. Vincent (Woodside operated) and Stybarrow (BHP Billiton operated) are expected to begin production in 2008. The other three petroleum projects are the \$1.6 billion Angel gas and condensate field in the Carnarvon Basin, scheduled for completion in 2008; the \$1.1 billion Otway gas project in offshore Victoria, expected

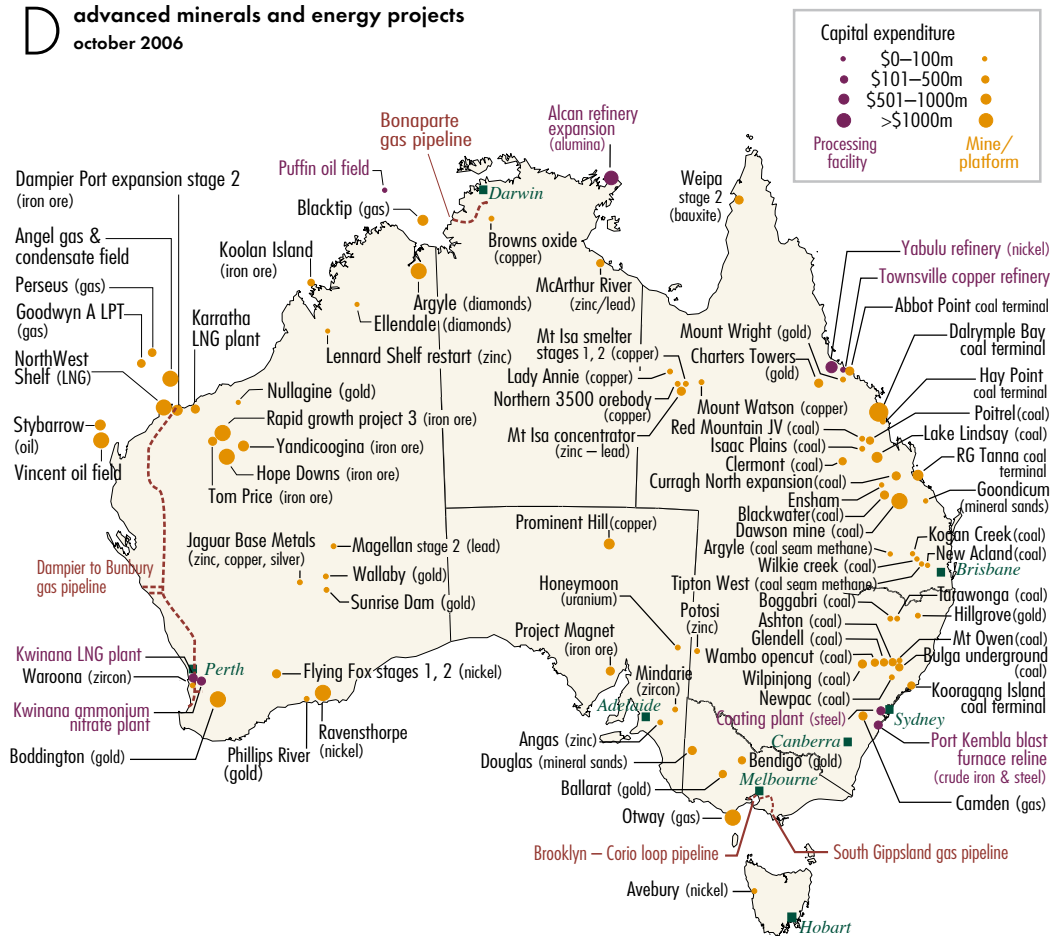
### 3 advanced projects, october 2006 – number and estimated capital cost, by state

	energy projects		mining projects		minerals processing		total	
	no.	\$m	no.	\$m	no.	\$m	no.	\$m
New South Wales	11	1 415	2	48	2	460	15	1 923
Victoria	3	1 212	3	652	0	0	6	1 864
Queensland	18	5 661	9	729	3	689	30	7 079
Western Australia	11	7 929	21	11 783	0	0	32	19 712
South Australia	1	56	4	1 254	0	0	5	1 310
Tasmania	0	0	1	77	0	0	1	77
Northern Territory	2	201	2	195	1	2 500	5	2 896
Australia	46	16 474	42	14 738	6	3 649	94	34 861

to be completed early in 2007; and the \$620 million offshore Blacktip gasfield project in the Bonaparte Basin south west of Darwin scheduled for completion in 2009. The two advanced gas pipeline projects are separate stages of the Dampier–Bunbury pipeline expansion. Stage 4 (capital cost of \$433 million) is expected to be completed early in 2007, while stage 5A (\$700 million) is expected to be commissioned in 2008. Each stage is expected to add 100 terajoules a day of carrying capacity.

Coal mine, and coal infrastructure, projects account for a further 20 per cent (or \$6.8 billion) of the estimated capital cost of \$34.9 billion for all advanced projects. The largest coal mine development, in terms of capital cost, is the \$1.1 billion Dawson Project (Anglo Coal Australia/Mitsui), south west of Gladstone. This is an expansion project that is expected to add around 5.7 million tonnes of coking and thermal coal capacity, commencing in 2007. Anglo Coal/Mitsui is also developing the large new Lake Lindsay opencut mine (capital cost \$690 million) near German Creek in central Queensland. The mine is expected to commence production in 2008, with output subsequently building up to full capacity of around 4 million tonnes a year, mainly of hard coking and PCI coals. Rio Tinto is committed to developing its \$440 million Clermont opencut mine by 2008 as a replacement for the existing Blair Athol mine. Output is expected to be around 12 million tonnes a year of thermal coal. Apart from those listed above, seventeen other advanced

**D** advanced minerals and energy projects  
 october 2006



## development projects

coal mine developments in Queensland and New South Wales are expected to raise coal production capacity by around 35 million tonnes a year in the next two or three years. The combined capital cost of these seventeen projects is \$2.4 billion.

The large number of coal projects recently commissioned and scheduled for completion in the short to medium term has provided the impetus for expanded coal terminal capacity. At the end of October 2006, there were six terminal expansions, five in Queensland and one in New South Wales, either committed or under construction. These expansions have an estimated capital cost of \$2.2 billion and will increase total port or terminal capacity by an estimated 79 million tonnes a year. Two of the largest projects are Babcock and Brown Infrastructures' phased expansions of the Dalrymple Bay coal terminal near Mackay. Together these will increase annual port capacity from 60 million tonnes to 85 million tonnes. Phase 1 is expected to increase capacity by 8 million tonnes a year by late 2007 at a capital cost of \$530 million; Phase 2 (\$640 million) will raise capacity by a further 17 million tonnes by the end of 2008. At Gladstone, the Central Queensland Ports Authority's \$698 million expansion of the RG Tanna coal terminal is under construction. Terminal capacity is expected to be raised progressively during 2007 from 40 million tonnes a year to 68 million tonnes.

### advanced metal mining projects

At the end of October 2006, there were 42 advanced minerals mining projects collectively valued at around \$14.7 billion. Half of these projects are located in Western Australia, with the 21 Western Australian projects comprising 80 per cent (\$11.8 billion) of the estimated total capital cost of \$14.7 billion. In addition, a relatively small number of large projects in iron ore (six), nickel (one), gold (one) and diamonds (one) make up the bulk of the \$11.8 billion estimated capital cost of all advanced Western Australian projects.

In iron ore, the largest advanced project is BHP Billiton's Rapid Growth Project 3, currently under construction in the Pilbara, with an estimated capital cost of just over \$2 billion. This project involves an expansion of the Area C mine that will provide extra output capacity of 20 million tonnes a year, as well as additional port and rail capacity, by the end of 2007. Rio Tinto and Hancock Prospecting's new \$1.3 billion Hope Downs iron ore mine in the Pilbara region is expected to commence production early in 2008, with stage one capacity expected to be 22 million tonnes a year, building to 30 million tonnes in stage 2.

Three other Rio Tinto expansion projects in the Pilbara – Dampier Port (capital cost \$924 million), Hamersley Iron Yandicoogina mines (\$710 million) and Tom Price/Marandoo/Nammuldi mine (\$388 million) – are scheduled to be completed by the end of 2007. The Dampier Port expansion will lift port capacity by 24 million tonnes a year, while the two mine expansions will together add over 30 million tonnes a year of iron ore output capacity. One iron ore project in South Australia – OneSteel's Project Magnet near Whyalla – is under construction and scheduled for completion in 2007. The announced capital cost of this project is \$355 million with annual output expected to be 3 million tonnes of hematite lump ore and 220 000 tonnes of iron ore pellets.

The most notable advanced gold project is Newmont and AngloGold's \$2 billion redevelopment of the Boddington gold mine near Pinjarra in Western Australia. Boddington's redevelopment is expected to be completed in 2008, with annual output at full capacity expected to be 900 000 ounces of gold and 30 000 tonnes of copper. Ten other gold projects located in New South Wales, Victoria, Queensland and Western Australia are either committed or under construction; they have a combined capital cost of \$826 million.

In copper, Oxiana plans to bring its new greenfields Prominent Hill copper-gold mine, located south east of Coober Pedy, into production late in 2008. Annual output is expected to be 104 000 tonnes of copper in concentrates, 115 000 ounces of gold and 420 000 ounces of silver. The announced capital cost of this development is \$775 million.

The largest advanced nickel mining project is BHP Billiton's Ravensthorpe development near Esperance in Western Australia. Since ABARE's April 2006 listing was published the announced capital cost has increased to \$2.25 billion (previously \$1.8 billion) and the commissioning date put back to 2008 (previously mid-2007).

In diamonds, Rio Tinto's new Argyle underground development is under construction. The development is expected to be completed in 2009 at a capital cost of \$1.24 billion.

### advanced minerals processing projects

At the end of October 2006, there were six advanced minerals processing projects – two fewer than at the end of April 2006. The combined capital expenditure of the six projects is \$3.6 billion. By far the largest, in terms of capital cost, is Alcan's \$2.5 billion alumina refinery expansion at Gove in the Northern Territory. The expansion is expected to add 1.8 million tonnes a year to Australia's alumina capacity following its scheduled commissioning early in 2007. In Townsville, BHP Billiton's \$616 million expansion of its Yabulu nickel refinery – the Yabulu Extension Project, a development linked to the company's Ravensthorpe nickel mine development in Western Australia – is currently under construction and is expected to be completed in mid-2007.

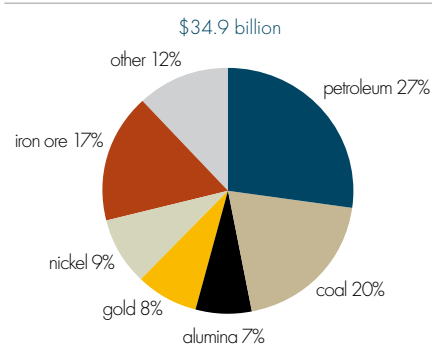
### capital value of all projects

Figure E provides a breakdown of proposed capital expenditure on advanced projects, by major commodity grouping. Figure F shows the estimated capital cost on a state basis.

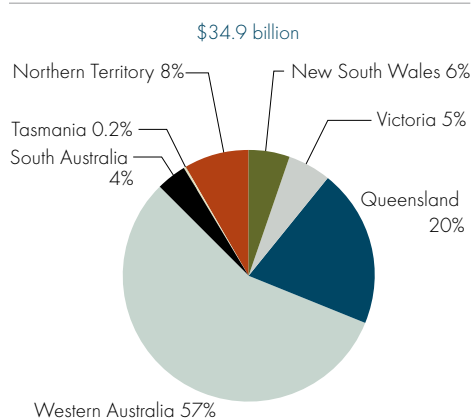
At the end of October 2006, the number of advanced projects was a new record (figure G), as is the total value of advanced projects (in 2006 dollars) – figure H.

The real average value of advanced projects at the end of October 2006 (\$371 million) is just a little below the average for all years since 1995 (\$375 million) – figure I.

**E value of advanced projects**  
by commodity, october 2006

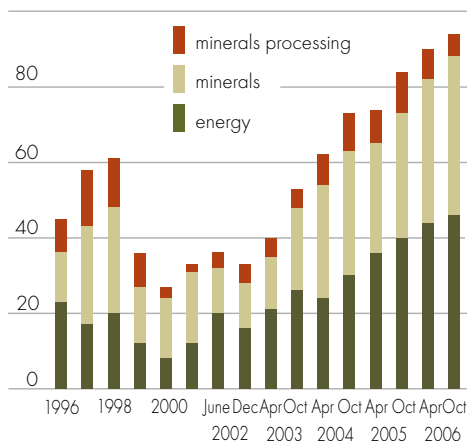


**F value of advanced projects**  
by state, october 2006



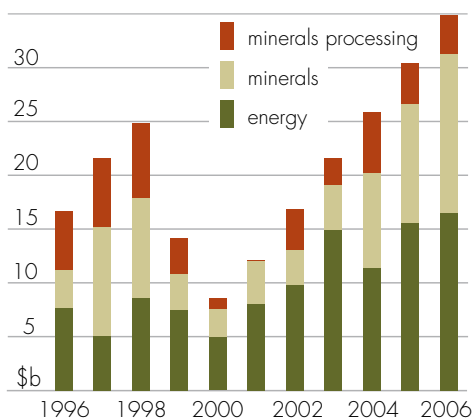
## development projects

### G number of advanced projects



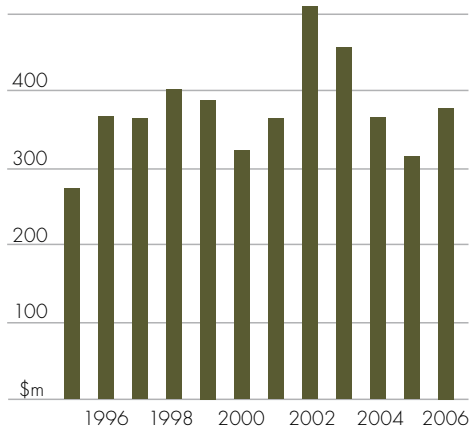
### H value of advanced projects

in 2005-06 dollars



### I average value of advanced projects

in 2005-06 dollars



### less advanced projects

Projects in the less advanced planning category are either still undergoing feasibility study (in some selected cases, prefeasibility study), or no definite decision has been taken on development following the completion of a feasibility study. Some of these projects cannot proceed for several years and may confront changes in economic or competitive conditions, or may be targeting the same emerging market opportunity, necessitating rescheduling. In addition, securing finance for project development – even for high quality projects that have a high probability of success – can present problems, particularly when there is perceived to be excess global supply and/or an uncertain demand outlook.

Also, with an exceptionally large number of minerals and energy projects currently committed or under development in the next few years, competition for skilled labor and materials and the attendant cost pressures are unlikely to ease in the short to medium term. This makes it likely that the feasibility of many less advanced projects will need to be re-examined. It may also mean that, from a market perspective, some project developments may be deferred beyond their optimal startup dates.

However, despite the uncertainty that attaches to projects at these earlier stages of consideration, the significant number of large scale projects at less advanced planning stages that are under active consideration for development is expected to provide a firm platform for future growth in the medium term and beyond.

Of the 268 projects in total (a record) in ABARE's October 2006 projects list, 65 per cent (174 projects) remain uncommitted. Table 4 contains a summary of the numbers and commodity distribution of the 174 uncommitted projects together with their potential capital expenditure. The potential capital expenditure data should be used as a rough guide only. Capital expenditure data for many early stage projects are either not available or, if available, will change significantly if they do proceed to development. In addition, changes in market conditions can often lead to significant variations in capital expenditure estimates.

## development projects

However, most of the projects that will ultimately proceed to development in the medium term are included in ABARE's current list of 174 less advanced projects.

Among the more notable large scale projects in ABARE's October 2006 list that are still undergoing feasibility studies are seven proposed LNG developments that, collectively, could add around 50 million tonnes of annual LNG production capacity in the medium to long term. The largest of these LNG projects is Chevron Texaco's proposed \$15 billion, 10 million tonnes a year, Gorgon development on Barrow Island that is currently at the front end engineering and design stage.

The largest less advanced metal mining project is BHP Billiton's proposed \$5 billion Olympic Dam expansion, currently undergoing prefeasibility studies. This project aims to more than double the mine's current output of copper, uranium, gold and silver. Among the less advanced iron ore projects, six have an estimated capital expenditure of \$1 billion or more. These are: Mineralogy's Cape Preston mine and pellet plant (estimated capital cost of \$2 billion); Murchison Metals' Jack Hills stage 2 mine (\$1.8 billion); Geraldton Iron Ore Alliance's Oakajee Port and Rail Project (\$1.5 billion); Atlas Iron's Pardoo magnetite project (\$1 billion); Fortescue Metals' Pilbara iron ore and infrastructure projects (\$1.9 billion); and BHP Billiton's Rapid Growth Project 4 (\$2.2 billion).

### 4 number of less advanced projects – october 2006

	NSW	Vic	Qld	WA	SA	Tas	NT	Aust	potential capital expend.
	no.	no.	no.	no.	no.	no.	no.	no.	\$m
<b>mining – energy projects</b>									
black coal	14	0	21	0	0	0	0	35	9 547
petroleum	1	3	6	7	0	0	7	24	65 843
uranium	0	0	1	1	2	0	1	5	705
subtotal	15	3	28	8	2	0	8	64	76 095
<b>mining – minerals projects</b>									
bauxite	0	0	2	0	0	0	0	2	700
copper	2	0	4	1	3	0	0	10	6181
gold	5	0	1	10	2	0	0	18	335
iron ore	0	0	0	16	0	0	0	16	13 812
lead-zinc-silver	3	0	3	1	1	1	1	10	1 985
mineral sands	3	3	0	5	1	0	0	12	601
nickel	0	0	2	9	0	0	0	11	6 456
rare earths	0	0	0	1	0	0	1	2	175
tin	0	0	0	0	0	2	0	2	53
vanadium	0	0	0	3	0	0	0	3	431
other commodities	1	0	1	5	0	1	1	9	2 015
subtotal	14	3	13	51	7	4	3	95	32 744
<b>minerals processing</b>									
alumina	0	0	3	2	0	0	0	5	8 900
aluminium	1	1	1	0	0	0	0	3	2 600
crude iron and steel	0	0	1	0	0	0	0	1	602
magnesium	0	1	0	0	0	0	0	1	1 000
nickel	0	0	0	2	0	0	0	2	341
titanium minerals	1	0	0	1	0	0	0	2	277
zinc	0	0	1	0	0	0	0	1	na
subtotal	2	2	6	5	0	0	0	15	13 720
<b>total</b>	<b>31</b>	<b>8</b>	<b>47</b>	<b>64</b>	<b>9</b>	<b>4</b>	<b>11</b>	<b>174</b>	<b>122 559</b>

## development projects

### projects new to abare's list

There are 50 projects (both advanced and less advanced) that are new to ABARE's list since April 2006. In the two year period from the end of October 2004 to the end of October 2006, over 150 projects have been added to ABARE's project list. The number of newly listed projects in this timespan is unprecedented and is another indication of the current high level of investment interest in the mineral resources sector. Figure J provides a summary of the 50 newly listed projects in the six months ended October 2006 by commodity category. Of the 50 projects added to the list, twelve are either committed or already under construction.

Among the more notable less advanced projects new to the list are two large infrastructure proposals – the \$1 billion Southern Missing Link rail project (coal) in southern Queensland and the \$1.5 billion Oakajee Port and Rail project (iron ore) near Geraldton in Western Australia. These two proposed developments are scheduled to come on line in

the years 2010-11. The Oakajee project is aimed at providing port capacity for several emerging iron ore producers in the Mid West region of Western Australia. The Southern Missing Link rail project is one of seven coal infrastructure projects in both Queensland and New South Wales that are new to the list. Gas pipeline proposals also feature prominently in the list of newcomers, with eight projects – three advanced and five less advanced – new to the list. The largest of these is the proposed \$800 million stage 5B and 5C Dampier-Bunbury pipeline expansion, still undergoing feasibility studies. Potentially, this proposal is the third leg of the current expansion program for that pipeline – earlier stages are the \$433 million stage 4 expansion (under construction) and the \$700 million stage 5A expansion (committed) mentioned above in 'advanced projects'.

