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## minerals and energy

### major development projects – october 2007 listing

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- » ***In 2006-07, exploration in Australia's minerals and energy sector was around \$4 billion, the highest level in real terms (2006-07) since 1981-82 and 73 per cent higher than the average over the past 25 years.***
- » ***In the six months to October, a record 29 projects were completed, with a total capital expenditure of \$7.8 billion. A further 91 projects are at an advanced stage with projected capital expenditure of \$57.9 billion.***

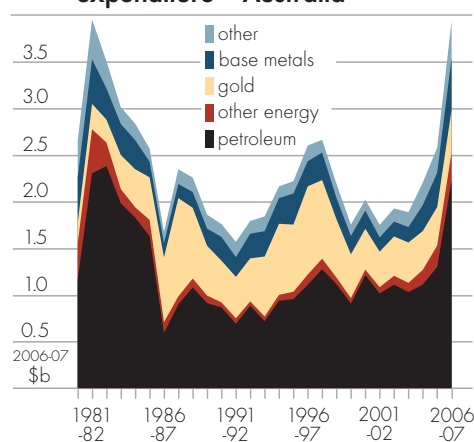
### exploration expenditure

Exploration is an investment in knowledge about the location, size and quality of petroleum and mineral deposits. The ability of Australia's minerals and energy sector to sustain its recent strong growth and expand its contribution to national economic performance in the medium and longer term depends on the amount of investment in minerals exploration.

In general, decisions to invest in minerals 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: prevailing and expected mineral prices; existing mining and processing technologies; input costs more generally; land access; and government policies.

In 2006-07, minerals exploration expenditure in Australia totalled \$3.9 billion, an increase of 53 per cent on 2005-06 exploration expenditure. In real terms (2006-07 dollars), exploration expenditure in 2006-07 was the highest on record and around 73 per cent higher than the average annual expenditure on exploration over the past 25 years. The recent increase in exploration expenditure is a response to higher world prices for most mineral and energy commodities. It also reflects the trend toward developing projects with higher production capacities, which generally require larger resource delineation programs. While exploration expenditure has increased recently, it cannot be determined from the Australian Bureau of Statistics

fig A private minerals exploration expenditure – Australia



## development projects

data what proportion of the increased expenditure is related to increased exploration activity and what proportion is attributable to higher costs of inputs, such as labour and equipment.

Over the past two years, expenditure on brownfield exploration – that is, exploration around existing or known deposits – has made up an increased proportion of total exploration expenditure. This can be partly explained by mining companies reassessing reserves at current and depleted mining areas with the view to extracting additional reserves that are now considered to be economic as commodity prices are currently high. Further, mining at or near existing deposits is attractive for companies because projects can be started sooner and generally require lower capital expenditure because there is already existing infrastructure in place.

In 2006-07, exploration expenditure increased across all major commodities. Petroleum exploration expenditure was \$2.23 billion, an increase of 71 per cent from 2005-06. Expenditure on petroleum exploration in 2006-07 was the highest in real terms since 1982-83 and 87 per cent higher than the annual average over the past 25 years. Increased petroleum exploration expenditure has been encouraged by historically high global oil prices. With world oil prices forecast to remain relatively high in the short term, exploration expenditure can be expected to remain high.

Iron ore exploration expenditure in 2006-07 is estimated to have almost doubled to \$320 million. Successive annual contract price rises and the prospect of continued strong Chinese demand for iron ore over the medium term are important drivers behind the significant increase in expenditure.

In 2006-07 gold exploration expenditure totalled \$456 million, an increase of 11 per cent. The increase in gold exploration activity has been driven largely by the increase in Australian dollar gold prices, which in 2006-07 averaged around \$800 an ounce, an increase of 15 per cent from 2005-06.

Exploration expenditure on base metals (including copper, lead, nickel and zinc) was \$555 million in 2006-07, an increase of 51 per cent from 2005-06. This overall increase was underpinned by strong rises in expenditure on exploration for copper, nickel and silver-lead-zinc, in line with substantial increases in global prices for these commodities. For example, in 2006-07, copper prices increased by more than 40 per cent compared with 2005-06, while nickel prices rose by more than 145 per cent over the same period. In real terms, exploration expenditure on base metals in 2006-07 was more than double the 25 year average of \$255 million (in 2006-07 dollars) and the highest on record.

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

In the petroleum sector, short to medium term oil prices are an important factor in encouraging increased exploration expenditure. However, there are other factors that are likely to have a significant bearing on decisions on exploration expenditure. These include: longer term oil price trends; Australia's relative prospectivity for petroleum; the prospects for Australia's share of growing global LNG trade; the need for long term planning, particularly for relatively expensive offshore petroleum exploration; cost increases; shortages of skilled labour; and the concurrent commitment of resources (funds, equipment and labour) to other activities, such as project development.

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. Rising costs of labour, fuel and other inputs (such as steel) have increased development costs and could have a negative influence on gold exploration expenditure over the medium term.

Equally, in the base metals sector, in addition to the price outlook, other important factors include 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.

### capital expenditure

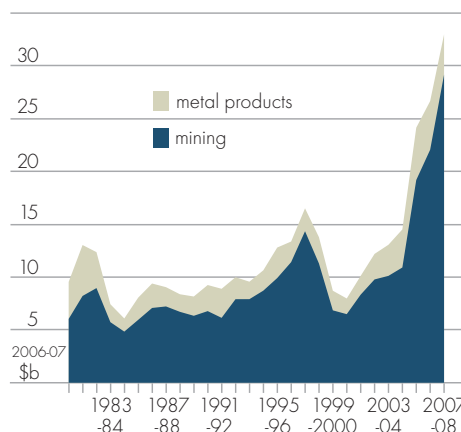
Data from the ABS survey of new capital expenditure in the mining and metal products industries give an indication, in aggregate terms, of the pace and scale of development in the minerals and energy sector, both historically and in the short term (figure B).

ABS survey data show that new capital expenditure in the mining industry was \$22.1 billion in 2006-07, 15 per cent higher than in 2005-06. In real terms (2006-07 dollars), new capital expenditure in 2006-07 was more than double the average annual expenditure over the past 25 years (\$9.2 billion).

In addition, there are indications that capital expenditure in the mining sector may continue to increase rapidly in 2007-08. Based on industry intentions canvassed in the September quarter 2007, ABS data indicate that capital expenditure on mining in 2007-08 may be around \$30 billion. If this capital expenditure in 2007-08 is realised, this would represent an increase of 32 per cent from the record expenditure in 2006-07. The expected continued high level of capital expenditure in the mining industry in the near future is consistent with the development trends shown in the full list of major mineral and energy projects.

Capital expenditure in the metal products sector, which includes the minerals processing activities covered in ABARE's projects list, was \$4.6 billion in 2006-07, approximately 7 per cent below expenditure in 2005-06. Despite the moderate fall in nominal terms, real expenditure in the sector in 2006-07 was still at historically high levels and almost double the 25 year annual average of \$2.4 billion (in 2006-07 dollars). However, surveyed industry intentions suggest that metal products expenditure could fall in 2007-08 to about \$3.8 billion, reflecting the imminent completion of some large projects. Nonetheless, the fall will be partially offset by the commitment of new projects such as the Yarwun Alumina refinery.

fig B new capital expenditure



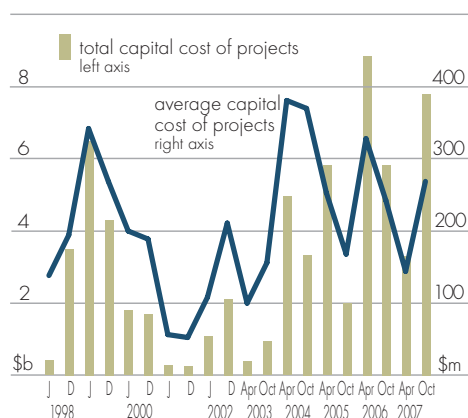
### recently commissioned projects

In the six months to the end of October 2007, a record 29 major minerals and energy projects, with a total capital expenditure of \$7.8 billion, were completed. The completion of these projects is expected to result in increased production and export capacity in a range of commodities, including coal, gas, alumina, base metals, gold, iron ore and mineral sands. A summary of these projects is provided in table 1.

The total number of projects completed in the six months ended October 2007 is six more than in the six months ended April 2007 and two higher than the previous record number (27) completed in the six months to April 2006 (table 2). However, total capital

## development projects

fig C completed projects



expenditure was significantly higher than in the six month periods ended April 2007 and October 2006. The average value of projects completed in the six months ended October 2007 was \$269 million, an increase from the historical nominal average over the past nine years of around \$240 million (figure C).

Looking ahead, ABARE's project list indicates that the rate of project completion is likely to accelerate in the short term, with more than fifty advanced projects scheduled for completion before the end of 2008. However, there is the possibility that some of these projects will not meet announced scheduled completion dates or forecast budgets, reflecting strong industrywide competition for skilled labour and equipment.

### 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 mining 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 list is released around May and November each year.

#### what's in the list

The latest projects list contains information on 305 projects, providing the following details:

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

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: 'Energy mining projects', 'Minerals mining projects' and 'Minerals processing projects'. The listing includes new greenfields projects as well as expansions of existing projects.

#### where to get the list

The list is available from ABARE's website [abareconomics.com](http://abareconomics.com) under 'latest releases' enquiries: [abareproducts@abare.gov.au](mailto:abareproducts@abare.gov.au) or phone +61 2 6272 2010.

## 1 major mineral resource developments – projects completed, April to October 2007

commodity/project	location	company	capital expenditure \$m
<b>energy mining projects</b>			
<b>black coal</b>			
North Wambo longwall	NSW	Peabody	101
Abbot Point Coal Terminal X21 expansion	Qld	Ports Corporation of Queensland	116
Bluff to Blackwater Duplication (rail)	Qld	Queensland Rail	58.5
Hay Point Coal Terminal (phase 2)	Qld	BHP Billiton Mitsubishi Alliance (BMA)	70
<b>coal seam methane</b>			
Argyle	Qld	Queensland Gas Company	100
Spring Gully (phase IV)	Qld	Origin Energy	114
Tipton West	Qld	Arrow Energy/ Beach Petroleum/ Australian Pipeline Trust	119
<b>petroleum</b>			
Otway Gas	Vic	Woodside Energy/Origin/ Benaris/ CalEnergy	1 100
Puffin North East oil field	NT	AED Oil	150
West Kimberley Power Project	WA	Energy Developments Limited	320
<b>minerals mining projects</b>			
<b>copper</b>			
Lady Annie	Qld	CopperCo	86
Leichhardt (stages 1&2)	Qld	Matrix Metals	15
<b>gold</b>			
Bronzewing redevelopment	WA	View Resources	30
Mount Wright (feed for Ravenswood operations)	Qld	Resolute Mining	25
Wallaby underground extension	WA	Barrick Gold	35
Sunrise Dam underground development	WA	AngloGold Ashanti	109
<b>iron ore</b>			
Dampier port expansion (phase B)	WA	Rio Tinto	956
Hammersley Iron Yandicoogina mine expansion	WA	Rio Tinto	631
Koolan Island	WA	Mt Gibson Iron	147
Project Magnet	SA	OneSteel	395
<b>lead-zinc-silver</b>			
Flinders zinc	SA	Perilya	35
Jaguar base metals	WA	Jabiru Metals	69
Potosi (stage 1)	NSW	Perilya	18
<b>mineral sands</b>			
Goondicum	Qld	Monto Minerals	73
Waroona	WA	Iluka Resources	39
<b>other commodities</b>			
Ellendale (pipe 9 stages 1&2) (diamonds)	WA	Kimberley Diamond Company	26
<b>minerals processing projects</b>			
<b>alumina</b>			
Alcan refinery expansion	NT	Alcan	2 700
<b>copper</b>			
Townsville refinery expansion and upgrade	Qld	Xstrata	7
<b>crude iron and steel</b>			
Coating plant	NSW	Bluescope Steel	150

## development projects

### completed energy projects

In the six months ended October 2007, ten energy projects (including infrastructure) were completed, with a capital expenditure of \$2.2 billion. The largest of these was the \$1.1 billion Otway project, located 70 kilometres off the coast of western Victoria. The project, which has a production capacity of 60 petajoules of gas as well as condensate and liquid petroleum gas, is operated by Woodside and owned with joint venture partners Origin Energy, Benaris International and CalEnergy.

Off the northern coast of Australia, 700 kilometres west of Darwin, AED Oil's Puffin North East project (capacity of 30 000 barrels a day) was completed at a capital cost of \$150 million. Oil production, storage and offloading facilities will be located on a vessel, which will be moored over the oil field.

The largest onshore energy project completed during the six months to October 2007 was Energy Development's West Kimberly Power project, which had a capital cost of \$320 million. The project encompasses annual production of 73 000 tonnes of liquefied natural gas, which will be delivered by trucks to small remote gas fired power stations located in north western Western Australia.

In Queensland, six energy projects were completed – three coal and three coal seam methane projects. All of the completed coal projects were infrastructure related, including two port and one rail upgrade. The 4 million tonne annual capacity increase at the Hay Point coal terminal was completed at a cost of around \$70 million, while at Abbot Point, a 6 million tonne upgrade was completed at a cost of \$116 million. Further expansion work at Abbot Point coal terminal is undergoing feasibility studies.

Three coal seam methane projects were completed; Queensland Gas Company's Argyle project, Origin Energy's Spring Gully Phase IV and Arrow Energy's Tipton West project. The three projects will have a total production capacity of around 33 petajoules a year, equivalent to around 40 per cent of Queensland's gas consumption.

## 2 completed projects, June 1998 to October 2007

	projects no.	capital cost of projects	
		total \$m	average \$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
April 2007	23	3 314	144
October 2007	29	7 795	269
<b>total</b>	<b>274</b>	<b>65 183</b>	<b>238</b>

### completed minerals mining projects

In the six months ended October 2007, sixteen minerals mining projects were completed at a capital cost of \$2.7 billion. Four iron ore projects accounted for around 80 per cent of this capital expenditure. The largest two projects were completed by Rio Tinto – the \$956 million phase B expansion at the Dampier port and the \$631 million expansion at the Hammersley Iron Yandicoogina mine in the Pilbara region of Western Australia. The expansion of the port at Dampier will allow for increased annual throughput of 16 million tonnes, while there will be a 24 million tonne increase in annual capacity at the Yandicoogina mine. OneSteel completed its \$395 million Project Magnet, which will produce 3 million tonnes of hematite ore and 0.22 million tonnes of pellets. The fourth iron ore project completed was Mount Gibson Iron's Koolan Island project located

in northern Western Australia. The project, which has a capital cost of \$147 million and an annual capacity of 4 million tonnes, is expected to reach full production toward the end of 2008.

Australia's gold production capacity will increase with the completion of four gold projects; the Bronzewing redevelopment, the Wallaby underground extension, the Sunrise Dam underground development and Mount Wright. The largest of these projects in terms of production capacity is Barrick Gold's Wallaby underground extension (\$35 million in capital expenditure), which has a production capacity of 120 000 ounces a year. The redevelopment of the Bronzewing mine (\$30 million), undertaken by View Resources, is targeting production of 50 000–70 000 ounces a year. Resolute Mining has commenced production from the Mount Wright project (\$25 million), which will supply feed to the nearby Ravenswood processing facilities. The production target is 650 000 ounces over an eight year period.

Australia's base metal production capacity has increased with the completion of five projects, the largest of which in terms of capital expenditure are CopperCo's Lady Annie and Jabiru Metals' Jaguar project. Lady Annie (capital expenditure \$86 million) in north western Queensland has an annual production capacity of 25 000 tonnes of copper cathode. The Jaguar project (\$69 million), 250 kilometres north of Kalgoorlie, has an anticipated annual output of 33 600 tonnes of zinc, 9600 tonnes of lead and 900 000 ounces of silver. In terms of capital expenditure, three smaller base metals projects recently commenced production. These are Perilya's \$35 million Flinders zinc project (annual production capacity of 57 000 tonnes of zinc oxide ore), Perilya's \$18 million stage 1 of the Potosi project (38 000 tonnes of zinc, 21 000 of lead and 19 000 tonnes of silver) and Matrix Metals \$15 million stage 1 and 2 of the Leichhardt project (10 000 tonnes of copper cathode).

In the six months ended October 2007, two mineral sands projects were completed – Monto Minerals \$73 million Goondicum project and Iluka Resources \$39 million Waroona project. In Western Australia, the Kimberley Diamond Company completed the \$26 million expansion of its Ellendale operations.

### completed mineral processing projects

In September 2007, Alcan's upgrade of its alumina refinery at Gove was completed after a three and a half year construction period. The announced capital cost of the project was US\$2.3 billion (A\$2.7 billion), which in terms of capital expenditure makes it Australia's largest single stage metal mining/processing project. The refinery upgrade will increase annual production capacity by 1.8 million tonnes to 3.8 million tonnes and reduce operating costs by around US\$30 a tonne (A\$25 a tonne). Bluescope Steel completed its \$150 million steel coating plant, which has an annual capacity of 120 000 tonnes.

### advanced projects

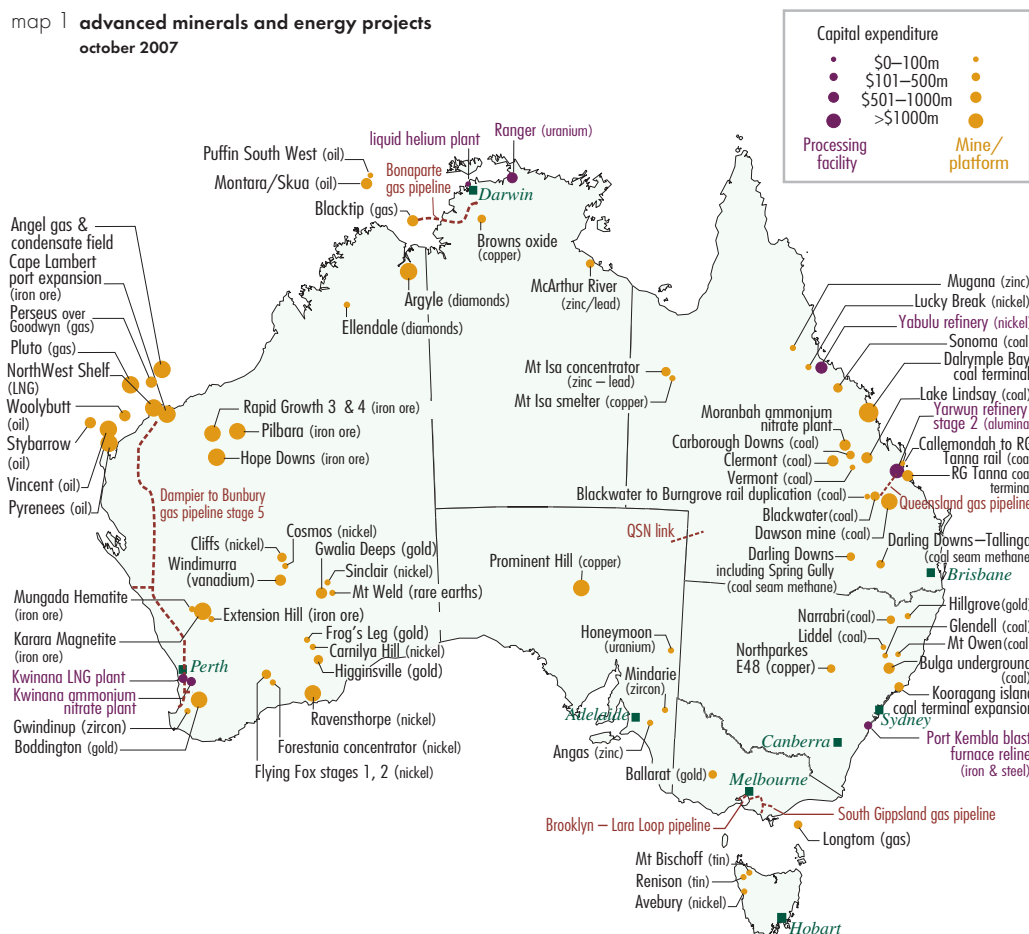
At the end of October 2007, there were 91 projects at advanced stages of development included in ABARE's project list (table 3) – these projects are either committed or under construction. This is one more than the number of advanced projects in the April 2007 list. The number of advanced projects in the October 2007 list includes nine that are either newly committed or entered the list at an advanced stage during the previous six months. The total capital expenditure of the 91 advanced projects at the end of October 2007 is \$57.9 billion, an increase of 33 per cent from April 2007 and 66 per cent year on year.

development projects

### 3 number and estimated capital cost of advanced projects, by state - October 2007

	energy mining		minerals mining		minerals processing		total	
	no.	\$m	no.	\$m	no.	\$m	no.	\$m
New South Wales	6	1 036	3	793	2	464	11	2 293
Victoria	3	315	1	120	0	0	4	435
Queensland	17	6 831	4	740	3	2 931	24	10 502
Western Australia	12	22 478	24	19 530	1	30	37	42 038
South Australia	1	50	3	1 224	0	0	4	1 274
Tasmania	0	0	2	102	0	0	2	102
Northern Territory	5	930	4	328	0	0	9	1 258
Australia	44	31 640	41	22 837	6	3 425	91	57 902

map 1 advanced minerals and energy projects  
october 2007



However, even projects that have reached the committed stage may be deferred, modified or even cancelled if economic or competitive circumstances change significantly. 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 and skilled and professional labour. The impact of this capacity constrained environment is being manifested in delays to scheduled completion dates for projects and in increases in project capital costs.

In line with previous ABARE project listings, current investment intentions in the Australian minerals sector, as reflected in the large number and record value of minerals and energy projects committed to, or under construction, indicate strong growth in the sector over the next few years. The 91 advanced projects as at October 2007 indicate continued expansion across most of the minerals and energy commodities.

### advanced energy mining projects

As at October 2007, energy developments accounted for 44 of the 91 advanced projects and around 55 per cent (or \$31.6 billion) of committed capital expenditure. Estimated capital expenditure on energy projects has doubled since April 2007, largely reflecting Woodside's construction approval for the Pluto LNG project and the BHP Billiton–Apache Energy Pyrenees oil project. Approval of these two projects has added more than \$14 billion to the value of committed energy projects.

In July, Woodside formally approved the Pluto LNG project, which has an announced capital cost of \$12 billion. In terms of capital expenditure, this is the largest current commitment to a single project in Australia's mining and energy industry. The project will have an annual production capacity of 4.2 million tonnes of LNG and is scheduled for completion in late 2010. The gas has been purchased under long term supply contracts by Tokyo Gas and Kansai Electric. Also in July, BHP Billiton (operator) and Apache Corporation approved the development of the Pyrenees oil field, which is located offshore, 50 kilometres north of Exmouth in Western Australia. The project will have an annual production capacity of 96 000 barrels a day when completed in the first quarter of 2010.

Six large petroleum developments – four of them operated by Woodside – account for a further \$7.4 billion or around 23 per cent of the total value of energy projects and are all located off Western Australia. The largest of these projects is the \$2.6 billion North West Shelf Extension Project, 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 \$800 million Perseus-over-Goodwyn project, aimed at enabling full utilisation of the existing Goodwyn gas platform; and the \$620 million offshore Blacktip gas field project in the Bonaparte Basin south west of Darwin, scheduled for completion in 2009. Almost all of these large advanced petroleum projects are scheduled to be completed by the end of 2008.

In August, Nexus Energy gave final approval to the Longtom project, which allows for the annual extraction of 25 petajoules of gas from Bass Strait off the coast of Victoria. Gas

## development projects

from the \$195 million project will be purchased by Santos for processing at the Patricia Baleen gas plant in Victoria.

As at the end of October 2007, there were seven natural gas pipelines at an advanced stage, including the recently approved Dampier-Bunbury stage 5A(2) pipeline and the QSN link. In terms of capital expenditure, Dampier-Bunbury stage 5A is the largest, with a value of \$660 million. Completion of this project will add around 36.5 petajoules a year to pipeline capacity. Capacity of the Dampier-Bunbury pipeline will increase further when the \$245 million stage 5A(2) is completed, adding an additional 14.6 petajoules. In Queensland, Epic Energy has committed to constructing the 180 kilometre QSN link, which will connect the existing south western Queensland gas network to the Moomba gas hub in northern South Australia. When the \$140 million pipeline is complete, gas will be able to be piped from Queensland into the southern and eastern gas markets.

Coal mine and coal infrastructure projects account for a further 12 per cent (or \$7.0 billion) of the estimated capital cost 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 project is expected to add around 5.7 million tonnes of coking and thermal coal capacity, commencing toward the end of 2007. Much of the construction associated with the Dawson project has been completed and commissioning activities were taking place at the end of October. 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 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 \$900 million Clermont opencut mine as a replacement for the existing Blair Athol mine. The Clermont mine is scheduled to be commissioned in 2010, with output expected to be around 12 million tonnes a year of thermal coal.

In the six months ended October, four coal mine projects were added to the list of advanced projects. Two of these are in New South Wales, Xstrata's upgrade of the Liddel washplant (capital expenditure \$91 million) and stage 1 of Whitehaven's Narrabri Coal project (\$140 million). A further two projects are in Queensland, Bowen Basin Coal's Vermont mine (\$176 million) and CVRD's longwall at Carborough Downs (\$360 million). Annual production from Narrabri and Liddel will increase by 2.5 million tonnes and 1.4 million tonnes of thermal coal respectively, while the Vermont mine and Carborough Downs longwall will have production capacities of 3 and 4 million tonnes a year respectively.

Apart from those listed above, five other advanced coal mine developments in Queensland and New South Wales are expected to raise coal production capacity by around 7 million tonnes a year in the next two to three years. The combined capital cost of these five projects is \$880 million.

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 infrastructure (rail and coal terminal) capacity. At the end of October 2007, there were four coal terminal expansions and three rail expansions either committed or under construction. These include the recently approved upgrade to the Kooragang Island coal terminal at the port of Newcastle. The \$331 million project will add 11 million tonnes of throughput when completed in 2009. These expansions have a total estimated capital cost of \$2.6 billion or around 36 per cent of total committed capital expenditure in the coal industry.

### advanced minerals mining projects

At the end of October 2007, there were 41 advanced minerals mining projects, collectively valued at around \$22.8 billion. Two-thirds of these projects are located in Western Australia and comprise more than 85 per cent (\$19.5 billion) of the estimated total capital expenditure. Nine minerals mining projects – six iron ore, one gold, one nickel and one diamonds – account for almost 90 per cent (\$17.5 billion) of committed capital expenditure to metal mining in Western Australia.

In the six months ended October 2007, four iron ore projects, with an estimated total capital expenditure of \$2.2 billion, were added to the advanced project list. The largest of these was Gindalbie Metals Karara magnetite project (\$1.6 billion), which will have a production capacity of 8 million tonnes of iron ore concentrates. Gindalbie Metals also approved the construction of the Manguda hematite project (\$94 million), which is scheduled for completion in 2009 and will have an annual production capacity of 3 million tonnes. Rio Tinto committed to an 8 million tonne expansion of its Hope Downs project (Hope Downs South), which is scheduled for completion in early 2009 at a capital cost of \$417 million. Finally, Mount Gibson Iron has decided to proceed with its \$84 million Extension Hill direct shipment ore project, which is scheduled for completion in 2009. At full capacity, Mount Gibson Iron will produce around 3 million tonnes of hematite to be exported for processing. In terms of capital expenditure, the largest iron ore project under construction is Fortescue Metals Group Pilbara project, which will cost around \$2.9 billion. The project will have a production capacity of around 45 million tonnes and also include dedicated port and rail facilities.

BHP Billiton and Rio Tinto are progressing another four iron ore projects, with a collective capital expenditure of \$6.6 billion. BHP Billiton's Rapid Growth 3 and 4 projects are under construction at a total capital cost of \$4.4 billion. The projects will increase iron ore production capacity by 46 million tonnes a year and also includes upgrading associated rail and port infrastructure at Port Hedland. Rapid Growth 3 is due to be completed at the end of 2007, while Rapid Growth 4 is scheduled for completion in 2010. Rio Tinto is constructing the \$1.2 billion first stage of the Hope Downs project, which will add 22 million tonnes of production and export capacity, and the \$1.0 billion 25 million tonne expansion of its Cape Lambert port facilities.

The significant growth in planned capital expenditure on iron ore projects reflects significant increases in iron ore prices over the past five years and the prospect of continued strong demand growth. Much of the projected growth in traded iron ore is expected to come from China as increases in its domestic production fail to keep pace with increased demand associated with higher steel output. In addition, the healthy outlook for iron ore is encouraging new participants to the industry, such as Fortescue Metals Group and Gindalbie Metals.

The most notable advanced gold project is Newmont and AngloGold Ashanti's \$2 billion redevelopment of the Boddington gold mine near Pinjarra in Western Australia. The redevelopment of Boddington is scheduled to be completed in 2008, with an annual capacity of 900 000 ounces of gold and 30 000 tonnes of copper. Six other gold projects located in New South Wales, Victoria and Western Australia are either committed or under construction, at a combined capital cost of \$976 million.

There are three copper projects currently under construction, the largest of which is Oxiana's Prominent Hill project in South Australia and Rio Tinto's expansion of its Northparkes mine in central New South Wales. Prominent Hill is a Greenfield project located

## development projects

south east of Coober Pedy and is due for completion in late 2008. The \$1080 million project will produce 90 000 tonnes of copper in concentrates, 115 000 ounces of gold and 420 000 ounces of silver. In central New South Wales, Rio Tinto is undertaking a \$211 million upgrade of its Northparkes mine, which is due to be completed in 2009. The upgrade to Northparkes will not result in an increase in capacity, but will allow for production at the mine to continue until 2016.

The largest advanced nickel project is BHP Billiton's Ravensthorpe development near Esperance in Western Australia. The project has an estimated capital cost of \$2.6 billion, and a productive capacity of 50 000 tonnes of nickel and 1400 tonnes of cobalt when completed in early 2008.

### advanced minerals processing projects

At the end of October 2007, there were six advanced minerals processing projects, the same number listed in April 2007. However, combined capital expenditure of these

fig D value of advanced projects, by commodity  
october 2007

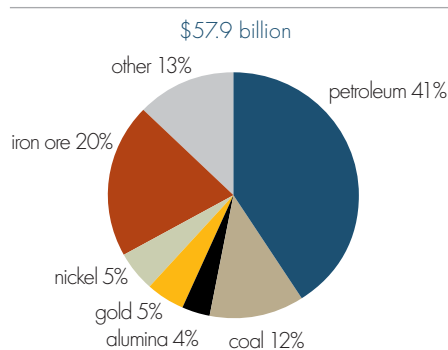
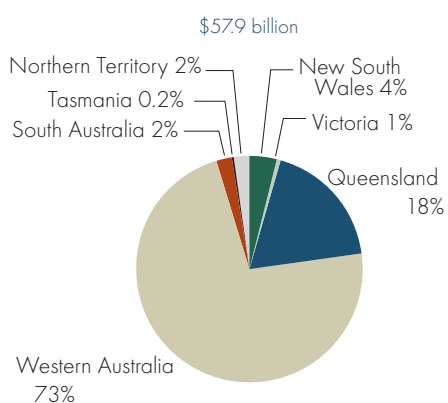


fig E value of advanced projects, by state  
october 2007



projects is \$3.4 billion, a decrease of \$0.9 billion from the figure quoted in the April 2007 listing. The lower capital expenditure reflects the completion of the \$2.7 billion Alcan Refinery Expansion. However, partially offsetting the reduced capital expenditure associated with the completion of the Gove Refinery was Rio Tinto's approval of the Yarwun alumina refinery expansion in Gladstone, at a capital expenditure of \$2.1 billion. The refinery is scheduled to be completed in 2011. In terms of capital expenditure, two other large minerals processing projects under construction are the Yabulu Extension Project and the reline of the Port Kembla blast furnace no. 5. In Townsville, BHP Billiton's \$731 million expansion of its Yabulu nickel refinery is scheduled for completion in early 2008 and will refine nickel produced at the Ravensthorpe nickel mine development in Western Australia. The reline at Bluescope's Port Kembla blast furnace in New South Wales will cost \$330 million and be completed in 2009.

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

At the end of October 2007, both the number of advanced projects (figure F) and the total value of advanced projects (figure G) were at a historically high level (in 2007 dollars).

On average the real value of advanced projects at the end of October 2007 (\$611 million) was well above the average for all years since 1995 (\$400 million) – figure H.

### less advanced projects

Projects in the less advanced planning category are either still undergoing feasibility study (in some selected cases, prefeasibility study) or not subject to a definite decision 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 opportunities, necessitating rescheduling. In addition, securing finance for project development – even for high quality projects that have a high probability of success – is not guaranteed.

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 associated 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. This may also imply that, from a commercial perspective, some project developments may be deferred beyond their scheduled startup dates.

However, despite the uncertainty inherent in 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 305 projects (a record) in ABARE's October 2007 projects list, 70 per cent (214 projects) remain uncommitted. Table 4 contains a summary of the numbers and commodity distribution of the 214 less advanced projects, together with their potential capital expenditure. The potential capital expenditure data should be used as an approximate guide only. Capital expenditure data for many early stage projects are either not available or, if available, likely to change significantly if these do proceed to development. In addition, changes in market conditions can often lead to significant variations in capital expenditure estimates.

However, most of the projects that will ultimately proceed to development in the medium term are included in ABARE's current list of 214 less advanced projects.

Among the more notable large scale projects in ABARE's October 2007 list that are still undergoing

fig F number of advanced projects

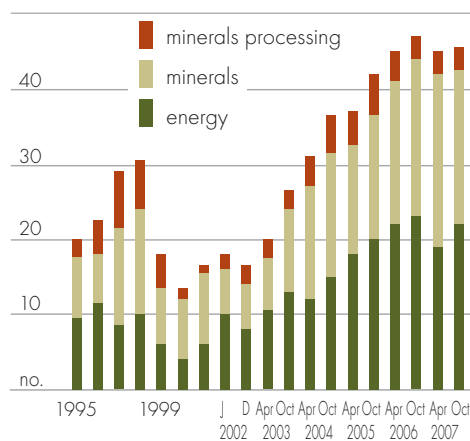


fig G total value of advanced projects

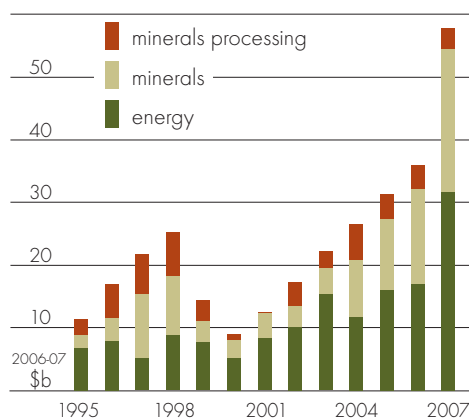
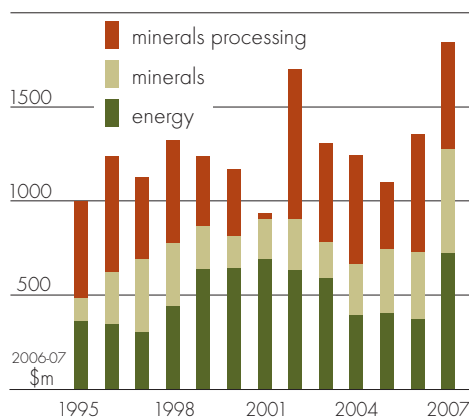


fig H average value of advanced projects



## development projects

feasibility studies are seven proposed LNG developments that, collectively, could add around 50 million tonnes of annual LNG production capacity in the medium to longer term. These projects include the Browse, Gorgon, Ichthys and Scarborough projects off the coast of Western Australia and two coal seam methane based LNG projects in Queensland being proposed by Santos and LNG Ltd.

The largest less advanced metal mining project is BHP Billiton's proposed \$6 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: Australasian Resources Balmoral South magnetite project (\$2.5 billion); CITIC Pacific's Sino Iron project (\$4.0 billion) Murchison Metals' Jack Hills stage 2 mine (\$3 billion); Yilgarn's Oakajee port and rail project (\$2 billion); Atlas Iron's Pardoo magnetite project (\$1 billion); and Gindalbie Karara magnetite mine (\$1 billion).

### 4 number of less advanced projects, October 2007

	NSW	Vic	Qld	WA	SA	Tas	NT	Aust	potential capital expenditure \$m
<b>energy mining projects</b>									
black coal	16	0	34	0	0	0	0	50	14 523
coal seam methane	3	0	0	0	0	0	0	3	275
petroleum	0	6	7	10	0	0	6	29	84 320
uranium	0	0	3	1	4	0	2	10	1 030
sub-total	19	6	44	11	4	0	8	92	100 148
<b>minerals mining projects</b>									
bauxite	0	0	1	0	0	0	0	1	700
copper	1	0	4	1	4	0	0	10	7 224
gold	4	1	4	12	2	0	2	25	2 173
iron ore	0	0	0	20	2	0	0	22	21 174
lead-zinc-silver	5	0	3	1	0	0	1	10	1 302
mineral sands	3	4	0	4	1	0	0	12	1 103
nickel	0	0	3	12	0	0	0	15	8 397
rare earths	0	0	0	0	0	0	1	1	750
tin	0	0	0	0	0	1	0	1	53
vanadium	0	0	0	1	0	0	0	1	256
other commodities	2	0	1	5	0	1	1	10	2 600
subtotal	15	5	16	56	9	2	5	108	45 732
<b>minerals processing projects</b>									
alumina	0	0	2	2	0	0	0	4	5 600
aluminium	1	1	0	0	0	0	0	2	2 250
crude iron and steel	0	0	1	0	0	0	0	1	536
magnesium	0	1	0	0	0	0	0	1	1 000
nickel	0	0	0	2	0	0	0	2	na
titanium minerals	1	0	0	2	0	0	0	3	602
zinc	0	0	1	0	0	0	0	1	na
subtotal	2	2	4	6	0	0	0	14	9 988
<b>total</b>	<b>36</b>	<b>13</b>	<b>64</b>	<b>73</b>	<b>13</b>	<b>2</b>	<b>13</b>	<b>214</b>	<b>155 868</b>

na Not available.

projects new to abare's list

There are 51 projects (both advanced and less advanced) that are new to ABARE's list since April 2007. Since the end of October 2006, 94 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 1 provides a summary of the 51 newly listed projects in the six months ended October 2007 by commodity category. Of the 51 projects added to the list, 9 are either committed or already under construction.

Among the more notable less advanced projects new to the list are two LNG projects in Queensland. Santos and LNG Ltd are proposing to each build an LNG plant based in Gladstone, Queensland. Santos is proposing a 3-4 million tonne, \$5-7 billion LNG project, while LNG Ltd is proposing a 1 million tonne, \$400 million project. These projects are significant because they will both use coal seam methane as the gas feedstock.

Also new to the list are seven oil and gas developments that will add to Australia's future production capacity. These include the Pyrenees oil field development, which is under construction and the Van Gogh, Puffin South West and Talbot oil fields that are at a less advanced stage. New gas fields to the list include the Julimar and Reindeer fields located off the coast of northern Western Australia and the Turrum gas field, which is in Bass Strait, off the coast of Victoria.

