Minerals and energy

Major development projects - April 2008 listing

Kate Penney, Alan Copeland and commodity analysts,
resources and energy branch

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- *In 2007-08, exploration expenditure in Australia's minerals and energy sector is estimated to be at a record $6.1 billion or two and a half times above the average annual expenditure on mineral exploration over the past 25 years.*
- *In the six months to April 2008, 22 major minerals and energy projects, with a total capital expenditure of $11.3 billion, were completed. A further 97 projects are at an advanced stage with projected capital expenditure of $70.5 billion.*

Exploration expenditure

Investment in mineral exploration will affect the ability of Australia's minerals and energy sector to sustain its recent strong growth and expand its contribution to national economic performance over the medium and longer term. Expenditure on mineral exploration represents an investment in knowledge about the size, location and quality of mineral deposits.

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 factors influence the decision to invest in mineral exploration, some of these are common to investment decisions across the economy, while others are more specific to the minerals sector. These factors include prevailing and expected mineral prices; existing mining and processing technologies; input costs more generally; and land access and government policies.

Australian mineral exploration expenditure in real terms (2007-08 dollars) for the period 1980-81 to 2007-08 is shown in figure a. The 2007-08 data are estimates based on actual data from the Australian Bureau of Statistics

(ABS) for July–December 2007, combined with data from the ABS survey of expected expenditure for January–June 2008.

Mineral exploration expenditure in Australia is estimated to total $6.1 billion in 2007-08, a 50 per cent increase on 2006-07 expenditure. In real terms, mineral exploration expenditure in 2007-08 is the highest on record and two and a half times above the average annual expenditure on mineral exploration over the past 25 years.

The dramatic increase in exploration expenditure is a response to higher world prices for most mineral and energy commodities as supply struggles to keep pace with growth in demand. It also reflects the trend toward developing projects with higher production capacities, which generally require larger resource delineation programs.

In recent years, expenditure on brownfield exploration, that is exploration around existing or known deposits, has accounted for an increasing proportion of total exploration expenditure. This is partly explained by companies reassessing reserves at current and depleted deposits which are more economic to extract at higher world prices. Further, mining in brownfield locations is attractive for companies because mineral extraction can start sooner and generally requires lower capital expenditure than that of greenfield projects because of existing infrastructure.

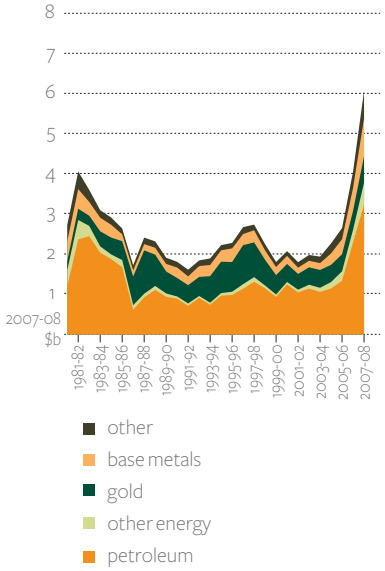
In 2007-08, exploration expenditure on all major mineral and energy commodities is expected to increase. Petroleum exploration expenditure is estimated to rise by 41 per cent in 2007-08 to around $3.2 billion. Expenditure on petroleum exploration (in 2007-08 dollars) is estimated to be the highest on record, encouraged by high global oil prices.

Exploration expenditure on iron ore is estimated to increase by 76 per cent to $503 million in 2007-08 and has accounted for an increasing proportion of total mineral exploration expenditure over the past seven years. High contract prices and the prospect of continued strong demand in China over the medium term are the principal drivers behind this significant increase in expenditure.

Gold exploration expenditure in 2007-08 is estimated to increase by 40 per cent to around $660 million, the highest on record since 1997-98. The increased expenditure reflects the higher Australian dollar denominated gold prices forecast to average A$932 an ounce in 2007-08, an increase of 14 per cent from 2006-07.

In 2007-08, exploration expenditure on base metals, including copper, silver, lead, zinc, nickel and cobalt, is estimated to rise by 66 per cent to around $945 million. Expenditure on exploration for all base metals is esti-

a Australian private minerals exploration expenditure



Long lead times for key items of equipment encourage early expenditure commitments

Together with the rest of the world, Australia's mineral resources sector is facing difficulties in securing inputs such as grinding mills, draglines and locomotives. This reflects the recent acceleration in global exploration and development in order to meet growing global demand for mineral and energy commodities, particularly in China.

As such, the lead times for key items of equipment have increased considerably over the past few years. For example, according to Rio Tinto, lead times for obtaining large haul trucks and tyres have increased from around three months to around two years.

In response to the long lead times for obtaining key items of equipment, a number of companies are announcing pre-approval funding (prior to the final investment decision) to allow for procuring certain items of equipment in time for the expected project start up.

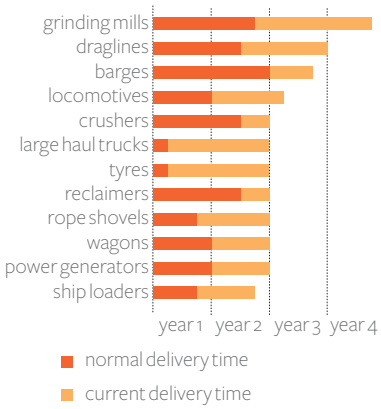
For example, Woodside announced pre-approval funding of $1.4 billion for its Pluto LNG project in Western Australia in December 2006 to allow for long lead time items and site preparation. The project was subject to a final investment approval decision in mid-2007.

Similarly, BHP Billiton announced approval for US$1 billion (A$1.3 billion) of capital expenditure to support infrastructure development at its Rapid Growth Project 5 in Western Australia in February 2008. This funding will be used to commence duplicating the railway track between the Yandi mine and Port Hedland, and allows procuring items earlier which have long lead times, such as locomotives.

On a smaller scale, in March 2008, Iluka Resources announced funding of up to $8 million to procure certain long lead capital equipment integral to developing its Jacinth Ambrosia mineral sands project in the Eucla Basin of South Australia.

With a large number of minerals and energy projects currently committed or under development over the next few years, decisions to pre-approve funding for equipment with long lead times will increase the probability projects will commence operations at their targeted startup dates.

Delivery times for key items of equipment (Rio Tinto)



mated to increase, particularly for nickel and copper, reflecting continued high global prices. In real terms, exploration expenditure on base metals in 2007-08 is expected to be more than three times the 25 year average.

Uranium exploration expenditure is estimated to more than double in 2007-08 to around $285 million. This reflects relatively high uranium prices and an increased interest in uranium for use in nuclear power globally.

Over the medium term, exploration expenditure is expected to be influenced by a common set of factors in each of the main exploration sectors. These include the outlook for prices over the medium to longer term, prospectivity, expected future costs of exploration and development — including costs of labour, fuel and other inputs — and Australia's relative attractiveness for mineral exploration and extraction.

Capital expenditure

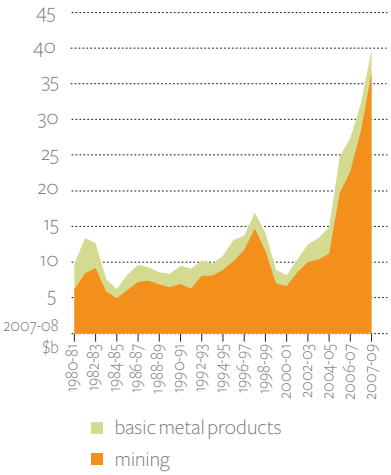
New capital expenditure in the mining and metal products industries provides an indication, in aggregate terms, of the pace and scale of development in the Australian minerals and energy sector (figure b).

Based on ABS survey data, new capital expenditure in the mining industry is estimated to be $32.3 billion in 2007-08, 25 per cent higher than in 2006-07. In real terms (2007-08 dollars), new capital expenditure in 2007-08 was the highest on record and more than two and a half times the average annual expenditure over the past 25 years ($12.7 billion).

There are indications capital expenditure in the mining sector may increase further in 2008-09. Based on industry intentions canvassed in the December quarter 2007, ABS data indicate capital expenditure on mining in 2008-09 may be around $36.5 billion (2007-08 dollars). If this expenditure is realised, this would represent a 29 per cent increase on 2007-08 expenditure. The scale of this expenditure and its order of increase are consistent with development trends shown in the full list of major mineral and energy projects.

However, capital expenditure in the metals products sector, which includes mineral processing activities covered in ABARE's projects list, is estimated to be $3.8 billion in 2007-08, approximately 19 per cent lower (in real terms) than in 2006-07. Surveyed industry intentions indicate metal products expenditure could fall by a further 15 per cent in 2008-09 to $3.3 billion (2007-08 dollars). This reflects the completion, or expected completion, of a number of large scale projects. However, this is likely to be partially offset by the commitment of new projects including the Yarwun alumina refinery, the two upgrades at the Boyne Island smelter (both in Queensland) and the recently approved Worsley alumina refinery expansion in Western Australia.

b New capital expenditure



ABARE's list of major minerals and energy development projects

The full list

ABARE's list of major minerals and energy projects which are 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 mineral commodities projects and mineral 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 341 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 list 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 list is $15 million.

In general, included projects are at relatively advanced stages of planning. That is, for new projects the 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 mineral processing facilities. The list includes new greenfields projects as well as expansions of existing projects.

Where to get the list

The list is only available as an electronic product.

The list can be downloaded from www.abare.gov.au

enquiries: abareproducts@abare.gov.au

or phone +61 2 6272 2010.

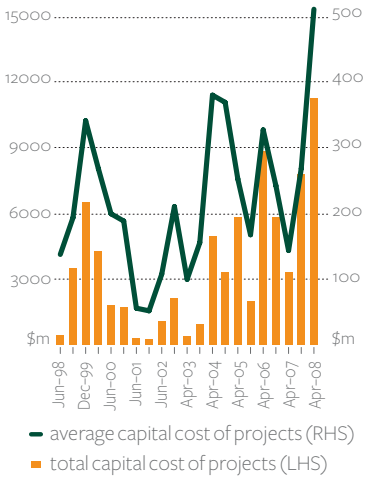
Recently commissioned projects

In the six months ended April 2008, 22 major minerals and energy projects, with a record total capital expenditure of $11.3 billion, were completed. The completion of these projects is expected to result in increased production and export capacity for a range of commodities including coal, petroleum, iron ore, gold, mineral sands and nickel. A summary of these projects is provided in table 1.

While the total number of projects completed in the six months ended April 2008 is seven less than that for the six months ended October 2007 (table 2, figure c), the total capital expenditure was significantly higher than for the six months ended October 2007 and April 2007, respectively. The average value of projects completed in the six month period to April 2008 was $512 million, around twice the historical average over the past nine years of around $255 million (in 2007-08 dollars).

Looking ahead, ABARE's project list indicates the rate of project completion is likely to accelerate in the short term, with 38 advanced projects scheduled for completion before the end of 2008. However, there is a possibility some of these projects will not meet announced scheduled completion dates or forecast budgets which reflects strong industry wide competition for skilled labour and equipment.

C Completed projects, June 1998 to April 2008



Energy projects

In the six months ended April 2008, 12 energy projects (including infrastructure) were completed with a capital expenditure of $5 billion. Of these, 10 projects were coal mines and export infrastructure projects. The largest coal mining project was the $1.1 billion Dawson project, located south-west of Gladstone, Queensland. The project, which has a capacity of 5.7 million tonnes of coking and thermal coal, is a joint venture between Anglo Coal Australia and Mitsui. Also completed were the Glendell, New South Wales (4 million tonnes) and Sonoma, Queensland (2 million tonnes) projects.

In the six months to April 2008, five coal infrastructure projects were completed. The most notable of these, in terms of capital expenditure, are the expansion of the RG Tanna coal terminal at the port of Gladstone, Queensland (capitial expenditure of $800 million), which will increase capacity by 28 million tonnes, and Phase 1 of the 7X expansion at Dalrymple Bay Coal Terminal ($530 million), which will increase capacity by 8 million tonnes. In addition, three rail projects were completed at a total cost of $192 million.

Off the west coast of Australia, BHP Billiton's Stybarrow oil project (capacity of 80 000 barrels a day) was completed two months ahead of

schedule at a cost of $874 million. DBP's Dampier–Bunbury gas pipeline Stage 5A expansion, also in Western Australia, was completed at a cost of $660 million. The pipeline is capable of transporting an additional 100 terajoules of natural gas a day.

1 Major mineral resource developments - projects completed, October 2007 to April 2008

commodity	project	location	company	capital expenditure $m
Mining - energy projects				
Black coal	Glendell opencut	NSW	Xstrata	
	Mount Owen (washplant upgrade to wash Glendell coal)	NSW	Xstrata	290
	Blackwater coal handling and processing facility	Qld	BHP Billiton Mitsubishi Alliance (BMA)	320
	Dawson project	Qld	Anglo Coal Australia/Mitsui	1 120
	Sonoma coal project	Qld	Qcoal	200
	Blackwater to Burngrove duplication (rail)	Qld	Queensland Rail	43
	Callemondah to RG Tanna 3rd spur	Qld	Queensland Rail	40
	Dalrymple Bay Coal terminal 3rd Rail Loop	Qld	Queensland Rail	109
	Dalrymple Bay Coal terminal 7X expansion project Phase 1	Qld	Babcock and Brown Infrastructure	530
	RG Tanna Coal terminal expansion	Qld	Central Queensland Ports Authority	800
Petroleum	Stybarrow oil field	WA	BHP Billiton/ Woodside Energy	874
	Dampier–Bunbury gas pipeline (DBNGP) expansion (Stage 5A)	WA	DBP	660
Mineral mining projects				
Gold	Perseverance (Coolgardie gold project)	WA	Focus Resources/Committee Bay Resources	2.8
Iron ore	Hope Downs Stage 1	WA	Hancock Prospecting/ Rio Tinto	1 130
	Western Australian Iron Ore Rapid Growth project 3 (RGP3)	WA	BHP Billiton	1 730
Mineral sands	Mindarie Zircon project	SA	Australian Zircon	74
	Gwindinup	WA	BeMax Resources	17
Nickel	Carnilya Hill	WA	Mincor/ View Resources	28
	Cosmos project (includes Prospero and Tapinos deposits)	WA	Jubilee Mines	
	Flying Fox (T1 deposit) (part of Forrestania project)	WA	Western Areas	165
	Ravensthorpe	WA	BHP Billiton	2 400
Mineral processing projects				
Nickel	Yabulu extension project	Qld	BHP Billiton (QNI)	731

2 Completed projects, June 1998 to April 2008

	number of projects	total capital cost of projects	average capital cost of projects ($m)
Six months ending			
June-98	3	415	138
December-98	18	3 500	194
June-99	19	6 500	342
December-99	16	4 300	269
June-00	9	1 800	200
December-00	9	1 700	189
June-01	5	282	56
December-01	5	262	52
June-02	10	1 082	108
December-02	10	2 110	211
Four months ending			
April-03	4	400	100
Six months ending			
October-03	6	937	156
April-04	13	4 956	381
October-04	9	3 328	370
April-05	23	5 812	253
October-05	12	2 012	168
April-06	27	8 854	328
October-06	24	5 824	243
April-07	23	3 314	144
October-07	29	7 795	269
April-08	22	11 263	512
Total	296	76447	258

Metal mining projects

In the six months to April 2008, nine metal mining projects were completed at a capital cost of $5.5 billion. Three projects accounted for 95 per cent of this capital expenditure. The largest project was BHP Billiton's $2.4 billion Ravensthorpe project in Western Australia. The project will produce 50 000 tonnes of nickel and 1400 tonnes of cobalt a year, which will be transported to the Yabulu nickel refinery, north of Townsville, for refining.

In the Pilbara region of Western Australia, two iron ore projects were completed during the six months to April 2008. BHP Billiton's Rapid Growth Project 3 project was completed at a cost of $1.7 billion and will increase capacity at the mine by 20 million tonnes a year. In addition, Hope Downs Stage 1, a joint venture between Hancock Prospecting and Rio Tinto, was completed with a capital cost of $1.1 billion and will be capable of producing up to 22 million tonnes of iron ore annually.

Western Australian projects Mincor and View Resources' Carnilya Hill and Western Areas' Flying Fox (T1 deposit) were completed for a combined cost of $193 million. These projects are anticipated to have an average output of 5000 tonnes and 8000–10 000 tonnes of nickel, respectively. In addition in South Australia, Australian Zircon's Mindarie zircon project (capital expenditure of $74 million) will have an annual production of 6000–12 000 tonnes of rutile, 31 000–50 000 tonnes of zircon, 60 000–110 000 tonnes of ilmenite and 4000–9000 tonnes of leucoxene.

Mineral processing projects

BHP Billiton's Yabulu extension project in Townsville was completed during the first quarter of 2008 at a capital cost of $731 million. The refinery extension will process ore from the Ravensthorpe mine, increasing its annual capacity by 45 000 tonnes of nickel and 1400 tonnes of cobalt.

Advanced projects

At the end of April 2008, there were 97 projects at advanced stages of development included in ABARE's project list (table 3). These projects are either committed or under construction. This is broadly similar to the number of advanced projects in the October 2007 list. The number of advanced projects in the April 2008 list includes 14 projects that are either newly committed or entered the list at an advanced stage during the past six months. Total capital expenditure of the 97 advanced projects at the end of April 2008 comes to $70.5 billion, an increase of 21 per cent from October 2007 and 62 per cent year on year.

However, it should be noted projects which have reached the committed stage may be deferred, modified or even cancelled if economic or competi-

3 Advanced projects, April 2008 – number and estimated capital cost by state

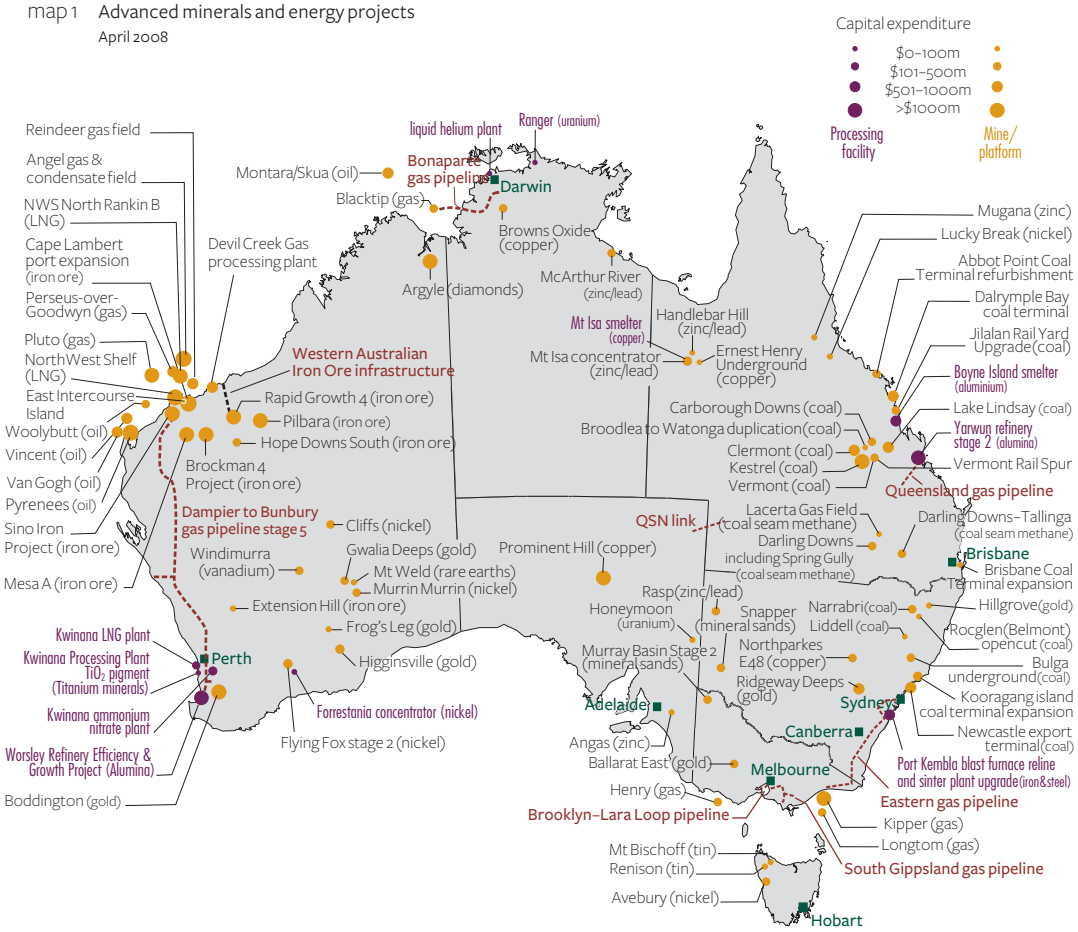
	energy projects		mining projects		minerals processing		total	
	no.	cost ($m)	no.	cost ($m)	no.	cost ($m)	no.	cost ($m)
New South Wales	7	2 123	5	1 046	2	504	14	3 673
Victoria	5	1 850	2	329	0	0	7	2 179
Queensland	17	5 790	5	365	4	2 840	25	8 935
Western Australia	12	27 893	21	22 286	3	2 670	36	52 849
South Australia	1	87	2	1 150	0	0	3	1 237
Tasmania	0	0	2	155	0	0	2	155
Northern Territory	5	1 040	4	340	0	0	9	1 380
Australia	47	38 783	41	25 671	9	6 014	97	70 486

tive circumstances change significantly. This is particularly relevant in the current period of rapid project development in which the global mineral resources sector is experiencing significant difficulties in securing sufficient inputs including materials, equipment and skilled labour. In this capacity constrained environment, the effect on project development is manifested in delays to scheduled completion dates for projects and increases in project capital costs.

For example, Dyno Nobel's Moranbah ammonium nitrate plant in the Bowen Basin in north Queensland was removed from the April 2008 advanced projects list. Dyno Nobel cited substantial delays and difficulty in reliably forecasting project costs as the main reasons for suspending the development indefinitely.

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, continue to bode well for the sector's growth over the next few years.

map 1 Advanced minerals and energy projects
April 2008



The 97 advanced projects as at April 2008 indicate continued expansion across most of mineral and energy commodities and will support increased Australian production over the medium term.

Energy projects

As at April 2008, energy project developments accounted for 47 of the 97 advanced projects on ABARE's list and around 55 per cent (or $38.8 billion) of committed capital expenditure. Estimated capital expenditure on energy projects has increased by 23 per cent since October 2007, reflecting the addition of 15 projects, worth a combined $10 billion, to the advanced list.

In terms of capital expenditure, Woodside's Pluto LNG project, which has an announced capital cost of $12 billion, is the largest commitment to a single project in Australia's mining and energy industry.

This project will have an annual production capacity of 4.3 million tonnes of LNG and is scheduled for completion in late 2010. The gas has been purchased under long term contracts with Tokyo Gas and Kansai Electric in Japan.

Six large petroleum developments, four operated by Woodside, account for a further $14 billion or around 36 per cent of the total value of advanced energy projects. The largest of these projects is the $5.9 billion North West Shelf North Rankin B project in Western Australia. A fifth train is being built at the North West Shelf project in Western Australia. It will have a gross annual capacity of 4.4 million tonnes of LNG and will increase the project's total annual production to 16.3 million tonnes. The project is expected to be completed toward the end of 2008 at a capital cost of $2.6 billion.

The other four petroleum projects are the $1.9 billion Pyrenees oil field, located 50 kilometres north of Exmouth in Western Australia, scheduled for completion in 2010; the $1.4 billion Angel gas and condensate field in the Carnarvon Basin, scheduled for completion in 2008; the $1.3 billion Kipper gas and condensate field off the coast of Gippsland, scheduled for completion in 2011; and the $1 billion Vincent oil field in the Carnarvon Basin, scheduled for completion in late 2008.

As at the end of April 2008, there were six natural gas pipelines at an advanced stage. Epic Energy has committed to constructing the 180km QSN Link which will connect the existing south-western Queensland network to the Moomba gas hub in northern South Australia. When the $140 million pipeline is completed, gas will be able to be piped from Queensland into the southern and eastern Australia gas markets.

Coal mine and coal infrastructure projects account for 18 per cent (or $6.8 billion) of the estimated capital cost of $38.8 billion for all advanced projects.

The largest coal mine development in terms of capital cost is the Rio Tinto $1.1 billion Kestrel project, north east of Emerald. This will add around 1.7 million tonnes of coking coal capacity from 2012. Rio Tinto is also developing the Clermont opencut mine (capital cost $860 million) in Queensland. The mine will produce 12.2 million tonnes of thermal coal a year from 2010 and is expected to replace capacity from the existing Blair Athol mine. Anglo Coal and Mitsui's Lake Lindsay opencut mine (capital cost $690 million), near German Creek in central Queensland, is expected to commence production in 2008. Output will subsequently build up to a full capacity of around 4 million tonnes a year, mainly of hard coking and PCI coals.

Apart from those listed above, six other advanced coal mine developments in Queensland and New South Wales are expected to raise coal production capacity by around 12.4 million tonnes a year in the next two to three years. The combined capital cost of these six projects is $1.2 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 infrastructure (rail and port) capacity. At the end of April 2008, there were four coal terminal expansions and three rail expansions either committed or under construction. The largest of these projects, in terms of capital expenditure, is the first stage of the Newcastle Coal Infrastructure Group export terminal at the port of Newcastle.

When completed in early 2010, this $1 billion terminal will have a coal loading capacity of 30 million tonnes a year. Further upgrades to the terminal could increase annual coal handling capacity to 66 million tonnes a year. Also at the Port of Newcastle, Port Waratah Coal services is expanding and refurbishing the Kooragang Island Coal Terminal. The $456 million project will result in an increased coal loading capacity of 11 million tonnes.

In total, coal infrastructure projects have an estimated capital cost of $2.6 billion or around 40 per cent of total committed capital expenditure in the coal industry.

Metal mining projects

At the end of April 2008, there were 41 advanced metals mining projects collectively valued at around $25.7 billion. Around half of these projects are located in Western Australia and comprise almost 90 per cent ($22.3 billion) of the estimated total capital expenditure. Nine metal mining projects, including iron ore (7), gold (1) and copper (1) account for almost 85 per cent ($19.5 billion) of committed metal mining capital expenditure in Australia.

In the six months to April 2008, 10 projects with a combined expenditure of $10.1 billion were added to the advanced project list, of which five were iron ore projects. The largest of these is CITIC Pacific Mining's Sino Iron project

in Cape Preston, Western Australia ($5.2 billion), which will have a production capacity of 27 million tonnes of iron ore pellets and concentrates. This project is expected to be completed in 2009.

Rio Tinto has approved the Hammersley Iron Brockman 4 project in Western Australia ($1.7 billion), which is scheduled for completion in 2010. Initial production capacity will be 22 million tonnes a year, with the potential to build up to 36 million tonnes a year. Rio Tinto has also approved the Mesa A project ($1 billion), which is expected to build up to an expected capacity of 25 million tonnes a year from 2010.

BHP Billiton and Rio Tinto are progressing three iron ore infrastructure projects, with a collective capital expenditure of $1.3 billion. BHP Billiton's Western Australian Iron Ore infrastructure project is expected to cost $1.3 billion and increase rail capacity to 300 million tonnes a year from 2011. Rio Tinto's East Intercourse Island project, also in Western Australia, is under construction. The wharf upgrade and ship loader replacement are expected to be completed in 2009 and cost $75 million. In addition, Rio Tinto and Robe River have committed to a 25 million tonne expansion of their Cape Lambert port facilities ($1.1 billion). The expansion is expected to be completed in late 2008.

The significant growth in planned capital expenditure on iron ore projects reflects significant increases in iron ore prices during the past five years and the prospect of continued strong demand growth. Much of the projected growth in demand for Australian iron ore exports is expected to emanate from China as increases in its domestic production fail to keep pace with the increased demand associated with higher steel output.

The largest advanced gold project is Newmont and AngloGold Ashanti's $2.6 billion redevelopment of the Boddington gold mine near Pinjarra in Western Australia. The redevelopment of Boddington is scheduled to be completed in early 2009, with an annual capacity of 850 000 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 with a combined capital cost of $1.1 billion.

There are four copper projects currently under construction with a combined capital expenditure of $1.5 billion. The largest of these are 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 south east of Coober Pedy and is due for completion in late 2008. The $1.1 billion 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 under-

taking 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.

In relation to diamonds, Rio Tinto's Argyle underground development in Western Australia is under construction. The development is expected to be completed in 2009 at a capital cost of $1.7 billion.

Mineral processing projects

At the end of April 2008, there were nine advanced mineral processing projects, compared with six projects listed in October 2007. The combined capital expenditure on these projects is $6 billion, a 67 per cent increase from the figure quoted in the October 2007 list. The increase in capital expenditure largely reflects the recent approval of the Worsley Refinery Efficiency and Growth project in Western Australia. The project is a joint venture between BHP Billiton (operator), Japan Alumina and Sojitz Alumina and has an announced capital cost of $2.5 billion. The project is expected to increase annual production capacity by 1.1 million tonnes and is due for completion in 2011.

In terms of capital expenditure, the other large mineral processing project is Rio Tinto's Yarwun alumina refinery expansion in Gladstone, Queensland. The project is expected to have a capital cost of $2.1 billion and add 2.2 million tonnes a year to its capacity from 2011.

Other major mineral processing projects include Rio Tinto's upgrade at the Boyne Island aluminium smelter in Queensland and the reline at Bluescope's Port Kembla blast furnace in New South Wales.

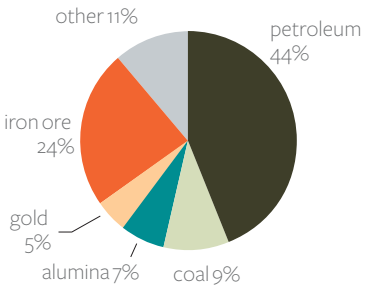
At the Boyne Island aluminium smelter, Rio Tinto plans to replace cranes and runway lines one and two; and replace carbon bake furnace lines one and two. These projects are expected to be completed progressively over 2010 and 2011 at a combined capital cost of $710 million. The reline at the Port Kembla blast furnace is expected to cost $370 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 April 2008, both the number of advanced projects (figure f) and the total value of advanced projects (figure g) were at historically high levels, (in 2008 dollars). On average, the value of advanced projects, in real terms, at the end of April 2008 ($726 million) was well above the average for all years since 1995 ($439 million) as shown in figure h. This reflects a combination of higher input costs and the types and scale of projects being developed.

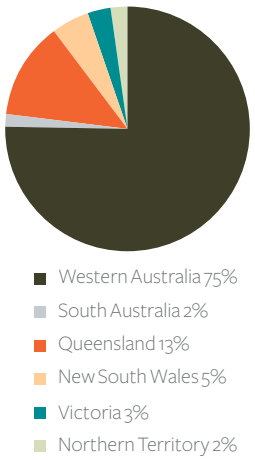
d Value of advanced projects by commodity, April 2008

$70.5 billion



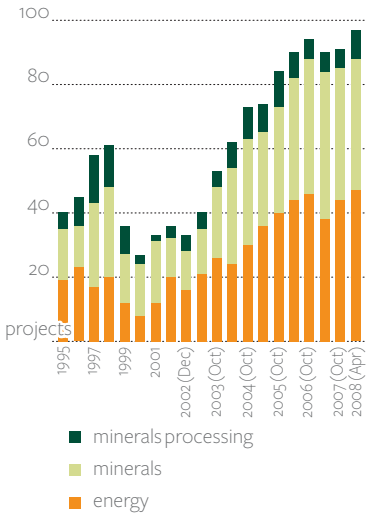
e Value of advanced projects April 2008, by state and territory

$70.5 billion



Less advanced projects

f Number of advanced projects



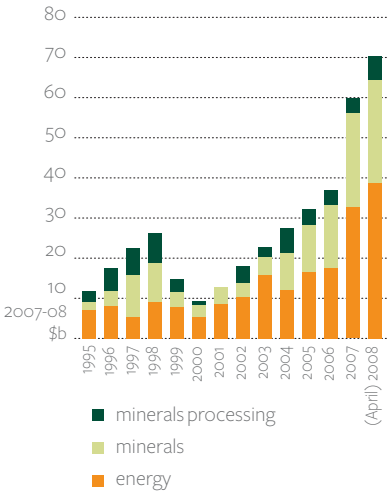
Projects in the less advanced category are either still undergoing a feasibility study (in some cases, prefeasibility study), or not subject to a definite decision on development following the completion of a feasibility study. Some of these projects may not proceed for several years. Some may confront 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 with 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 labour and materials and the associated cost pressures are unlikely to be relieved in the short to medium term. This makes it likely the feasibility of many less advanced projects will need to be re-examined. This may also imply, from a commercial perspective, some project developments may be deferred beyond their scheduled startup dates.

Despite the uncertainty inherent to projects at these earlier stages of consideration, the significant number of large scale projects at less advanced planning stages under active consideration for development is expected to provide a firm platform for future growth in Australian mineral and energy production in the medium term and beyond.

Of the 341 projects in ABARE's April 2008 projects list (which is a record), 72 per cent (244 projects) remain uncommitted. Table 4 contains a summary of the numbers and commodity distribution of the 244 uncommitted 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.

g Value of advanced projects



However, most of the projects that will ultimately proceed to development in the medium term are included in ABARE's current list of 244 less advanced projects.

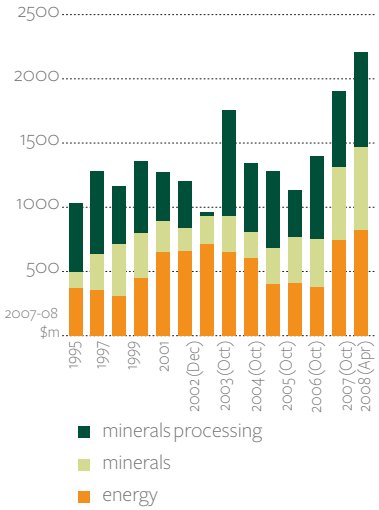
Among the more notable large scale projects in ABARE's April 2008 list still undergoing feasibility studies are eight proposed LNG developments that, collectively, could add around 58 million tonnes of annual LNG production capacity in the medium to longer term (compared with the 15.2 million tonnes in 2006-07).

These projects include the Browse, Gorgon, Icthys and Sunrise projects off the coast of Western Australia and two coal seam methane based LNG

projects in Queensland being proposed by Santos, Queensland Gas and BG Group.

The largest less advanced metal mining project is BHP Billiton's proposed Olympic Dam expansion in South Australia, 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: Gindalbie Metals' Karara Magnetitie project ($1.6 billion); Australasian Resources Balmoral South magnetite project ($2.5 billion); Murchison Metals' Jack Hills Stage 2 mine ($1.5 billion); Fortescue Metals' Pilbara Iron Ore Stage 2 project ($3.9 billion); Aquila Resources' West Pilbara mine ($4.5 billion) and Atlas Iron's Ridley magnetite project ($1.6 billion)

h Average value of advanced projects



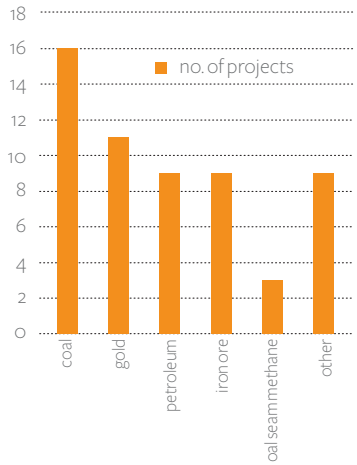
Projects new to ABARE's list

There are 58 projects (both advanced and less advanced) new to ABARE's list relative to October 2007. Since the end of April 2007, 109 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 i provides a summary of the 58 newly listed projects in the six months ended April 2008 by commodity category. Of these 14 are either committed or already under construction.

Among the more notable less advanced projects new to the list are two LNG projects to be based in Gladstone, Queensland. Queensland Gas Company and BG Group are proposing to build a 3-4 million tonne LNG plant and 380km pipeline to coal seam methane fields at a cost of $8 billion. Sojitz and Sunshine Gas are proposing to build a 0.5 million tonne LNG plant in Gladstone at a cost of $500 million which will also be based on coal seam methane. In the past 12 months a total of four coal seam methane based LNG projects have been added to ABARE's list that could have an annual capacity of 10 million tonnes.

Also new to the list are nine iron ore production and infrastructure projects. The most notable of these, in terms of capital expenditure, is Aquila Resources' proposed US$3.9 billion (A$4.5 billion) West Pilbara project in Western Australia. The project includes mine and processing facilities with the capacity to produce 25 million tones of hematite ore; associated rail, rolling stock and port infrastructure; and allowances for engineering, procurement and construction management and contingencies. The project, for which a prefeasibility study has just been completed, is scheduled to commence operation in 2012.

i Projects added to list six months to April 2008



4 Number of less advanced projects, April 2008

Commodity	NSW	Vic	Qld	WA	SA	Tas	NT	Aust	potential capital expenditure $m
Mining - energy projects									
Black coal	18	0	38	0	0	0	0	56	23 416
Coal Seam Methane	2	0	2	0	0	0	0	4	555
Petroleum	1	5	10	12	0	0	7	35	93 648
Uranium	0	0	3	1	4	0	2	10	1 030
Sub-total	21	5	53	13	4	0	9	105	118 649
Mining - minerals projects									
Bauxite	0	0	1	0	0	0	0	1	700
Copper	1	0	4	1	4	0	0	10	7213
Gold	5	3	5	16	3	0	3	35	3 040
Iron ore	0	0	0	25	3	0	0	28	28 581
Lead-zinc-silver	4	0	2	1	1	0	1	9	1 413
Mineral sands	2	3	0	3	1	0	0	9	825
Nickel	0	0	3	16	0	0	0	19	11 634
Rare earths	0	0	0	0	0	0	1	1	750
Tin	0	0	0	0	0	1	0	1	55
Vanadium	0	0	0	1	0	0	0	1	256
Other commodities	2	0	3	6	0	1	1	13	3 208
Sub-total	14	6	18	69	12	2	6	127	57 675
Minerals processing									
Alumina	0	0	2	1	0	0	0	3	4 700
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	25
Nickel	0	0	0	2	0	0	0	2	na
Titanium minerals	1	0	0	1	0	0	0	2	555
Zinc	0	0	1	0	0	0	0	1	na
Sub-total	2	2	4	4	0	0	0	12	8 066
Total	37	13	75	86	16	2	15	244	184 390

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02.08

Asia Pacific Economic Cooperation Secretariat

Association of Southeast Asian Nations – secretariat

AusAid

Australian Centre for Excellence in Risk Analysis

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Australian Fisheries Management Authority

Department of Climate Change

Australian Government Department of the Environment, Water , Heritage and the Arts

Australian Government Department of Resources, Energy and Tourism

Australian Government Department of Prime Minister and Cabinet

Australian Government Department of Infrastructure, Transport, Regional Development and Local Government

CRC Plant Biosecurity

CSIRO (Commonwealth Scientific and Industrial Research Organisation)

Dairy Australia

Department of Business, Economic and Regional Development, Northern Territory

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