

Minerals and energy

Major development projects

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Despite the poor short term outlook for global growth and minerals and energy commodity prices, there are current indications of upturns in both mineral exploration and capital expenditure, with positive implications for the future pace of growth of Australia's minerals and energy sector.

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In addition, the recent commitment to several medium and large scale projects, together with the existence of several other large, but as yet uncommitted, projects undergoing serious study, are further positive developments for sector growth in the medium to longer term.

List of projects

The table at the end of this article is a listing of the larger Australian mining, minerals processing and minerals infrastructure projects that are planned to be developed over the medium term. The table updates information published in the June 2001 issue of *Australian Commodities*.

With one industry exception, the table provides details of announced projects for which total capital expenditure is expected to exceed \$40 million (in 2001-02 dollars). 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 table is \$15 million.

Project stage

In general, projects identified are at relatively advanced stages of planning. That is, for new projects, stage of planning categories range from 'feasibility study underway' through to 'under construction', ignoring a range of 'possible' projects at earlier stages of consideration. However, in a few cases where it is considered informative to demonstrate a more complete picture of the range of development proposals for certain commodities at this time, some significant projects at earlier planning stages (for example 'prefeasibility study underway') have been included.

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'. Also, with the focus being on projects planned to commence

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production over the next few years, projects at the more advanced stages of planning — that is, those identified as ‘committed’ or ‘under construction’ — are grouped together and listed first within each principal commodity segment. These projects appear in the lighter shaded areas of the table.

Projects that are at less advanced planning stages (for example, those at feasibility study stage) follow within each commodity segment and appear in the darker shaded areas. Where available, details of employment expected to be generated at the ‘construction’ and ‘operational’ phases of new or expanded projects have been included in the table.

The table includes new greenfields projects as well as expansions of existing projects. For both, expected additional annual production capacity has been identified, as well as total expected capital expenditure — including the costs of construction, plant and equipment — in current dollars as reported by the company.

The sum of identified increases in annual production capacity should not be interpreted as the expected net additions to Australian minerals production capacity. Some projects will not proceed as planned. Also, as always, there will be closures of some existing mines or processing facilities over the next five years, as they reach the end of their economic lives.

Exploration expenditure

It is important to recognise that 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 levels 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 this list of planned projects, is underpinned by minerals exploration expenditure in the past decade.

The trend in Australian minerals exploration expenditure, in real terms (2001-02 dollars), for the period 1980-81 to 2000-01 is shown in figure A.

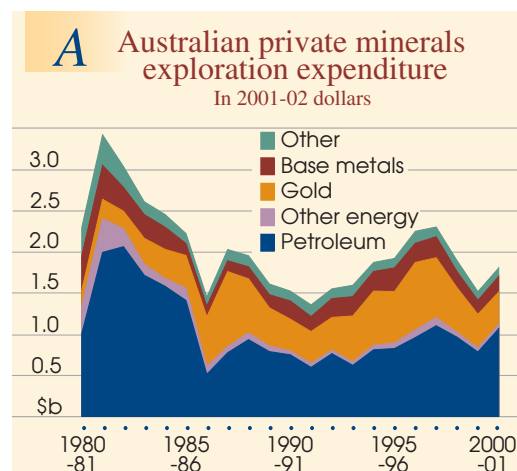
In 2000-01, total Australian minerals exploration expenditure rose strongly: by 26

per cent to \$1.77 billion. This substantial rise followed two years of sharp declines, with expenditure in 1999-2000 reaching its lowest level since 1991-92.

The sharp turnaround in total minerals exploration expenditure in 2000-01 was predominantly driven by a 44 per cent rise in petroleum expenditure, as expenditure on nonenergy exploration increased by only 6.7 per cent. Within the nonenergy minerals sector, expenditure on base metals rose by 12 per cent while expenditure on gold and other minerals both rose by less than 3 per cent.

Petroleum exploration expenditure in 2000-01 was \$1044 million, over 80 per cent of which related to offshore exploration. Total petroleum exploration expenditure in 2000-01 was the highest in real terms (apart from 1997-98) since the early to mid-1980s, a period in which petroleum prices were relatively high. Similarly, the increased expenditure in 2000-01 is considered to at least partly reflect the incentive provided by sustained high oil prices in the two years to June 2001.

The small rise in gold exploration expenditure in 2000-01 followed falls in each of the three previous years. In real terms, expenditure on gold has declined by 52 per cent since its peak in 1996-97 and, at around \$394 million in 2000-01, is at its lowest level since 1991-92. For much of the 1990s, gold dominated nonenergy exploration expenditure and in 2000-01 gold still accounted for almost 60 per cent of the total. However, relatively low prices and a subdued price



outlook, resource access problems, reduced access to investment funds, an increased focus on resource acquisition, and the attractions of exploration in some overseas locations, continue to be dampening influences on gold exploration in Australia.

The rise in base metals exploration expenditure in 2000-01 mainly reflected a 46 per cent increase in spending on zinc-lead-silver exploration; expenditure on copper rose by 15 per cent but nickel exploration expenditure remained about the same as in 1999-2000.

Data from the Australian Bureau of Statistics' recent survey of expected minerals exploration expenditure in the period July-December 2001 indicated that expenditure for both minerals and petroleum exploration was likely to increase significantly. For petroleum, the survey indicated that expenditure in the six months July-December 2001 was expected to be 35 per cent greater than that in July-December 2000. On the same basis, expenditure on other commodities was expected to be up 21 per cent.

While this is encouraging, these survey results should be interpreted with caution. The ABS survey was conducted prior to the events of 11 September and is therefore likely to reflect exploration expenditure intentions based on views of prices and general global economic conditions somewhat different from those faced soon after the terrorist attacks. For example, world oil prices fell sharply in the wake of the attacks and fell even further in the period to early December 2001. In addition, the outlook for oil and metal prices and global economic growth in 2002 is significantly weaker than expected prior to 11 September 2001.

To the extent that factors such as these influence short term decisions on exploration expenditure, then realised expenditure for July-December 2001 is likely to be lower than the survey indicated.

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

In the petroleum sector, the level of oil prices over the medium term will be a key factor in determining future levels of exploration activity and expenditure. For gold,

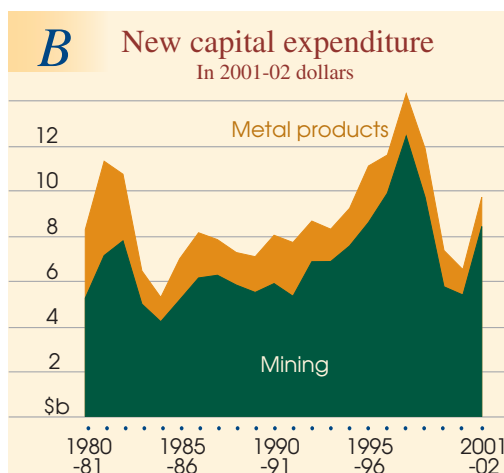
factors such as continued uncertainty about sales by central banks and the associated subdued outlook for gold prices will be important.

In the base metals sector, the price outlook will clearly be important, as will a range of other factors including the apparent trend toward company rationalisation/out-sourcing of exploration capacities (not only in Australia but also globally), the perceived need on the part of many Australian producing companies to take steps to increase shareholder returns (particularly during a period in which companies are potentially vulnerable to takeovers) at the expense of exploration expenditure, and Australia's relative attractiveness for exploration.

Capital expenditure

Data from the ABS surveys 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 going forward in the short term.

ABS survey data show that new capital expenditure in the mining industry was \$5.2 billion in 2000-01, marginally less than in 1999-2000. In real (2001-02 dollar) terms new capital expenditure was the lowest since 1991-92 (figure B). This outcome follows sharp falls in expenditure in each of the two previous years. In 2000-01, capital expenditure on mining was less than half the record in 1997-98 (\$12.4 billion, in real terms), and



among the lowest in the past twenty years. (It should be noted, though, that the three years up to and including 1997-98 was an unusually intensive period of development).

However, there are strong indications that capital expenditure on mining may rise significantly next year. Based on industry intentions canvassed in the December quarter 2001, ABS data indicate that capital expenditure on mining in 2001-02 may be around \$8.4 billion — about 60 per cent up on estimated 2000-01 expenditure. It should be noted that the survey was conducted after the September terrorist attacks in the United States, with the implication that the subsequent weaker world economic and price outlook has been factored into expenditure expectations.

Capital expenditure in the metal products sector, which includes the minerals processing activities covered in this projects list, was \$1.1 billion in 2000-01, 26 per cent below 1999-2000 expenditure and the lowest, in real terms, since 1984-85. However, surveyed industry intentions provide an initial indication of a possible 18 per cent increase in metal products expenditure in 2001-02.

If the expenditure intentions for both the mining and metal products sectors are realised, total capital expenditure in the mineral resources sector could rise by 50 per cent in 2001-02.

Looking beyond the short term, there is some evidence to suggest that there is potential for further recovery in resource sector capital investment. This assessment is based on the observation that the number of advanced projects listed in the following table has increased and that there now exists a number of high quality and large scale, but less advanced, projects that may be developed in a longer timeframe.

Recently commissioned projects

In the six months ending December 2001, only five major minerals and energy projects were completed. This low rate of project completions is the same as that of the previous six month period (January–June 2001). The estimated total capital cost of the five projects commissioned in the six months to December 2001 was \$262 million, similar to

that of the projects commissioned in the six months to June (\$282 million).

These figures represent a significant decline in both rate of project completions and in average project value compared with the previous two years. In 2000, eighteen projects, valued at around \$3.6 billion, were completed and in 1999 a record 35 projects, valued at almost \$11 billion, were commissioned. However, it should be borne in mind that the two years to the end of 1999 was an extraordinarily intensive period of minerals and energy sector development in Australia. Given the shock of the Asian economic downturn in 1998, limitations on companies' capacity to raise finance and to service debt beyond certain levels, and the finite number of projects available for development, it is perhaps not surprising that project completions in the sector have declined.

Among the major projects completed in the six months to December 2001, the largest in terms of capital cost was Nardell Coal's new Nardell underground coal mine in the Hunter Valley. The mine was developed at a capital cost of \$150 million and is expected to produce between 2.75 and 3 million tonnes a year of semisoft coking and thermal coal for export.

Two new gold mines — Cobar Central opencut (Peak Gold Mines) in New South Wales and the Lewis mine (Gympie Gold) in Queensland — were brought into production in the six months to December 2001. Each was developed at a capital cost of \$35 million. The Lewis mine, together with an existing operation (El Dorado), reestablishes Gympie as an important goldfield. The Lewis mine is expected to produce around 65 000 ounces of gold a year at full production.

LionOre's new Emily Ann nickel sulphide mine commenced production in November. It is located in the Lake Johnson area of Western Australia and is one of the few greenfields nickel deposits to come on stream in recent years. The mine, developed at a capital cost of \$42 million, is expected to reach full annual output capacity of 6700 tonnes of nickel in concentrate in the first quarter of 2002.

(Having come on stream, the above projects no longer appear in the list of planned projects).

Minerals and energy projects

Advanced projects

In the table of planned minerals and energy projects that follows, 33 projects at advanced stages of development — that is, projects that are either committed or under construction — are listed.

Of the current list of advanced projects, seventeen are scheduled to be completed in 2002, while sixteen have announced completion dates beyond 2002. (However, some projects scheduled to be completed in 2002 may slip into the following year).

If the seventeen projects earmarked for completion in 2002 are brought into production as planned, it would represent a significant turnaround both in numbers (only ten projects were completed in 2001) and in the average capital cost of completed projects — an estimated \$186 million in 2002, compared with an average of just \$54 million in 2001.

Importantly, the number of advanced projects now scheduled to be completed within the next five years (33) compares reasonably favorably with numbers in this category recorded in earlier periods. This may reflect an increasingly positive outlook for some commodity markets over the next five years and beyond.

The 33 advanced projects in this list indicate continued expansion across most of the minerals and energy industry spectrum. However, in terms of capital expenditure,

there is a heavy weighting toward petroleum and coal projects. The announced capital expenditure of these 33 advanced projects sums to \$14.3 billion. Around 80 per cent of this amount relates to mining and petroleum developments as there are only three mineral processing projects, valued at around \$2.9 billion, that have reached an advanced stage.

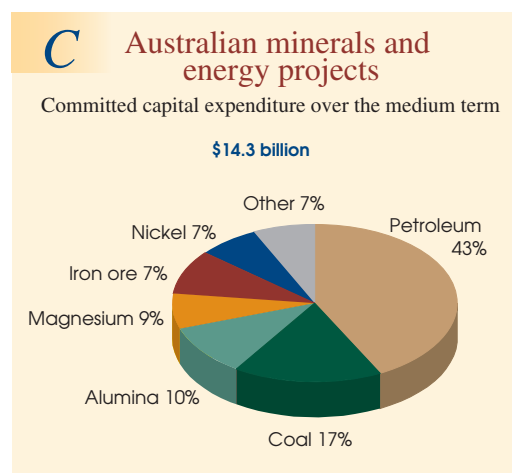
Figure C provides the breakdown of proposed capital expenditure on advanced projects, by major commodity grouping, while figure D shows their location.

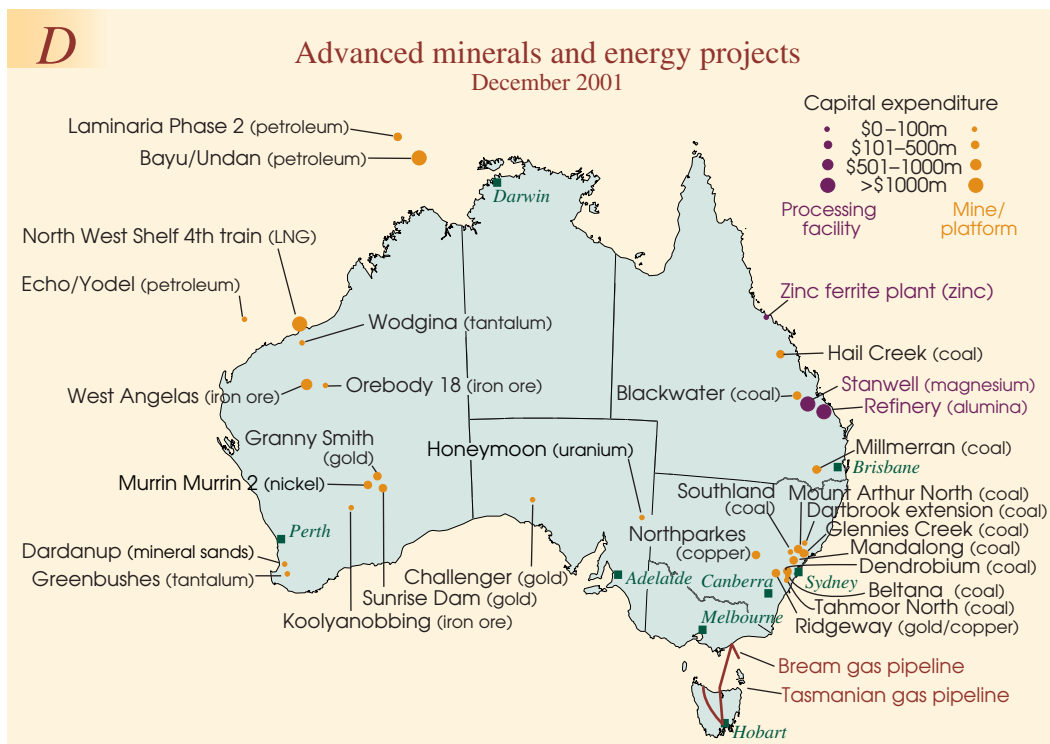
It should be borne in mind that even projects that have reached the committed stage may be deferred, modified or even cancelled if economic or competitive circumstances change sufficiently.

Of the seventeen major projects scheduled to be commissioned in 2002, a few stand out in terms of capital cost, scale of development and potential contribution to national mineral output.

The largest of these in capital cost is Robe River's new, \$880 million, West Angelas iron ore mine in the Pilbara, expected to be commissioned in the second half of 2002. The development of the West Angelas mine is expected to include upgrades to the existing port and port handling facilities at Cape Lambert. The initial annual output from West Angelas will be 7 million tonnes of Marra Mamba ore but the mine may eventually produce 20 million tonnes a year.

Three petroleum projects are expected to be completed in 2002 and all are scheduled to be in operation around mid-year. Duke Energy's \$440 million, 753 kilometre, Tasmanian Gas Pipeline, from Longford in Victoria across Bass Strait to Hobart and Port Latta, will bring natural gas to Tasmania for the first time. The capacity of the pipeline will be 40 petajoules a year. Woodside Energy is the operator of the other two petroleum projects due for completion in mid-2002. One of these is the \$205 million Echo-Yodel gas and condensate field on the North West Shelf which is expected to produce 37 million barrels of condensate and 11.3 billion cubic metres of natural gas over a four to five year period. The other is the Laminaria phase 2 development that is expected to contribute an additional 65 000 barrels of oil a day (50 per cent of current





capacity) from the existing Laminaria/Corallina operation.

Development activity in the coal mining industry is increasing, with six projects scheduled for completion in 2002. Collectively, the capital expenditure for these coal developments is around \$770 million and their combined additional coal output is expected to be around 25 million tonnes a year at full capacity. Four of these projects are in New South Wales and include Shell's Dartbrook extension, Namoi Hunter's Glennies Creek longwall and Powercoal's new Mandalong mine, all in the Hunter Valley. Enx's new Beltana longwall mine near Wollongong is the largest of the coal mine developments and is expected to have a production capacity of 6 million tonnes a year. Of the two Queensland projects, BHP Billiton's Blackwater mine expansion, near Emerald, is expected to be in operation early in 2002. Normandy Mining's new Millmerran opencut mine is located in the Darling Downs region.

The four gold mine developments scheduled to be completed in 2002 are expected to add almost 1 million ounces (30 tonnes)

to Australia's annual gold output capacity. Expansions to Placer Dome's Granny Smith mine and AngloGold's Sunrise Dam Megapit, both in Western Australia, are expected to contribute 700 000 ounces of this increase. The combined capital cost of these two developments is \$360 million. Newcrest's new Ridgeway mine, near Orange in New South Wales, is being built at a capital cost of \$376 million and is expected to produce around 240 000 ounces of gold a year, as well as 24 000 tonnes of copper in concentrate. South Australia's first stand-alone gold mine — Dominion Mining's new Challenger mine, near Tarcoola — is expected to begin production in the second half of the year. Challenger's annual output capacity will be 50 000 ounces of gold.

Of the advanced projects expected to be completed beyond 2002, two of the recently committed major development proposals are particularly noteworthy. These are Comalco's \$1.5 billion alumina refinery project and Australian Magnesium Corporation's \$1.3 billion Stanwell magnesium proposal, both in central Queensland. Both are notable for several reasons, including:

the significant scale of investment and production involved; both are the first large scale mineral processing projects committed for some time; and each has been subjected to extensive feasibility study (and considerable uncertainty) over several years before commitment.

In addition, the proposed AMC magnesium plant is likely to be the pioneer magnesium metal operation in Australia (several others are currently under serious consideration) and will use production technology developed and tested in Australia. Annual output from the Stanwell plant will be 97 000 tonnes of magnesium metal, a commodity for which world demand is expected to increase substantially in the medium to longer term.

The Comalco alumina refinery is expected to produce 1.4 million tonnes of alumina a year from 2005.

Commitment to both the alumina refinery and the magnesium plant boosts the potential market for natural gas in Queensland and may have an influence on considerations with respect to the proposed PNG to Queensland gas pipeline development.

Less advanced projects

It is not intended that the project information in this article provide a basis for estimating total planned capital expenditure, particularly for the following projects at the less advanced planning stages (those not listed as committed or under construction). Apart from the fact that capital expenditure details are not available for some of these projects, the principal reason for caution is that there remains significant uncertainty about whether such projects will actually proceed over the medium term.

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 com-

pletion of a feasibility study. Some of these projects cannot proceed for some years and may confront changed 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 would have a high probability of success — can present problems, particularly in periods when there is perceived to be excess global supply and/or an uncertain demand outlook.

However, despite the uncertainty that attaches to projects at these earlier stages of consideration, they provide a useful indication of the nature and extent of the platform for future development of the minerals and energy sector.

There are nine significant projects at less advanced planning stages that are new to the list. Total potential capital expenditure of these project additions is around \$5.8 billion. The largest of the projects new to the list is a \$2.04 billion gas to liquid fuels plant, primarily to produce environmentally clean diesel fuel from natural gas, proposed by the Sasol Chevron Global Joint Venture. Possible locations for the plant are the north west of Western Australia or the Northern Territory. It should be noted that this is one of several chemical and petrochemical projects, based on Australia's gas resources on the North West Shelf and the Timor Sea, proposed for the region.

Other large projects include a possible \$1.2 billion expansion of Alcan's Gove alumina refinery in the Northern Territory and a \$1 billion expansion of Comalco's Boyne Island aluminium smelter at Gladstone in Queensland. The Gove alumina project aims to produce an additional 1.2 million tonnes of alumina a year and is currently at feasibility study stage. The Boyne Island smelter proposal is undergoing prefeasibility studies.

Mining projects – energy ^a

Project	Company ^b	Location	Status ^c	Expected startup	New capacity ^d	Capital expend. ^e	Employment ^f
Black coal							
<i>New South Wales mines</i>							
Beltana longwall	Enex	near Wollongong	New project, under construction	2002	6 Mt	na	na
Dartbrook extension	Shell	10 km NW of Muswellbrook	Expansion, under construction	2002	4 Mt	\$57m	30 O
Dendrobium underground	BHP Billiton	Kemira Valley, W of Wollongong	New project, under construction	2002-03 longwall by 2005	5 Mt	US\$126m (A\$242m)	170 O
Glennies Creek longwall	Namoi Hunter (Tomen Corporation)	12 km NW of Singleton	Expansion, under construction	2002	3 Mt by 2005	\$200m	140 O
Mandalong	Powercoal (Pacific Power)	35 km SW of Newcastle	New project, under construction	2002	3–4 Mt	\$120m	200 O
Mount Arthur North	Coal Operations Australia	5 km SW of Muswellbrook	New project, committed	2002-03	6.3 Mt by 2003 14.5 Mt by 2006	US\$411m (A\$790m)	500 C 300 O
Southland colliery	Thiess	Hunter Valley	Restructure of mining operations, committed	2003	2 Mt	\$150m	na
Tahmoor north underground longwall	Austral Coal	near Wollongong	Expansion, under construction	2004	1.6 Mt	\$100m	210 C
Airly Mountain underground	Centennial Coal	42 km NW of Lithgow	New project, feasibility study underway	na	0.75–1.0 Mt	na	80–100 O 60 C
Glendell opencut	Liddell (Enex)	17 km NW of Singleton	New project, feasibility study underway	2003	3 Mt	\$100m	85 O
Carrington open pit extension (to Hunter Valley No 1)	Coal and Allied (Rio Tinto)	25 km NW of Singleton	Expansion, development consent granted	2002	3.75 Mt	\$100m	235 C 145 O
Maules Creek opencut	Coal and Allied (Rio Tinto)	20 km NE of Boggabri	New project, mining lease granted. On hold over medium term	na	6.5 Mt	\$450m	300 O
Mt Pleasant opencut	Coal and Allied (Rio Tinto)	5 km W of Muswellbrook	New project, mining lease granted	2003-04	10.5 Mt	\$310m	250 C 330 O

MINERALS AND ENERGY PROJECTS

Project	Company b	Location	Status c	Expected startup	New capacity d	Capital expend. e	Employment f
Queensland mines							
Blackwater	BHP Billiton	80 km S of Emerald	Expansion, under construction	2001-02	5.5 Mt	\$130m	nil
Hail Creek opencut	Hail Creek JV (Rio Tinto)	85 km W of Mackay	New project, committed	2003	2.2 Mt initially, rising to 5.5 Mt by 2005	\$425m	na
Millmerran opencut	Normandy Mining	5 km S of Millmerran	New project, under construction	2002	3 Mt	\$200m	100–120 O
Acland opencut	New Hope Coal Australia	15 km N of Oakey	New project, on hold	na	2 Mt	na	300 C 120 O
Clermont opencut	Clermont Coal Mines (Mitsubishi)	11 km N of Clermont	New project, feasibility study completed	2006	10 Mt	\$400m	na
Dawson opencut	Anglo Coal Australia	160 km SW of Rockhampton	New project, mining lease granted. On hold over medium term	na	3 Mt	\$300m	200 O
Goonyella longwall	Central Queensland Coal Assoc.	30 km N of Moranbah	New project, feasibility study underway	2003	Up to 5.5 Mt	\$150m	110–125 O
Grasstree longwall	Anglo Coal Australia	German Creek area	New project, feasibility study underway	2005	4 Mt	na	na
Meandu opencut (Kunioon)	Pacific Coal (Rio Tinto)	15 km W of Nanango	Expansion, feasibility study underway	2003	2.0–2.4 Mt	na	na
Peak Downs opencut expansion	Central Queensland Coal Assoc.	35 km S of Moranbah	Expansion, under review	na	3 Mt	\$280m	nil
Togarah North longwall	Enex	45 km SW of Blackwater	New project, feasibility study underway	na	4.0–5.0 Mt	\$300m	200 O
Wandoan opencut	MIM	60 km N of Miles	New project, on hold	2004	3 Mt	na	na
For further information contact: Robert Curtotti + 61 2 6272 2014							
Brown coal							
Victoria							
Maryvale opencut	Yallourn Energy	Latrobe Valley	New project, feasibility study underway	2004	18 Mt	\$200m	150 C
For further information contact: Robert Curtotti + 61 2 6272 2014							

MINERALS AND ENERGY PROJECTS

Project	Company b	Location	Status c	Expected startup	New capacity d	Capital expend. e	Employment f
Petroleum							
Bayu/Undan LPG/condensate field	Phillips Petroleum	Timor Gap Zone of Cooperation	New project, committed	early 2004	116 kbd condensate and LPG	\$2.7b	1380 C 90 O
Bream gas pipeline	Esso/BHP Billiton	Bream platform to Longford, Vic	New project, committed	mid-2003	na	\$200m	na
Echo/Yodel gas and condensate fields	Woodside Energy	120 km NW of Dampier, WA	New project, under construction	mid-2002	25 kbd	\$205m	na
Laminaria oilfield phase 2	Woodside Energy	Timor Sea	Expansion, under construction	mid-2002	65 kbd	\$130m	na
North West Shelf project extension (fourth train)	Woodside Energy	North West Shelf, WA	Expansion, under construction	LNG by 2004	4.2 Mt LNG	\$2.4b	2000 C 70 O
Tasmanian Gas Pipeline	Duke Energy	Longford, Vic to Tasmania	New project, under construction	mid-2002	40 PJ pa	\$440m	800 C 30 O
Darwin – Moomba gas pipeline	Epic Energy	Darwin, NT to Moomba, SA	New project, under review	2004	na	>\$1b	1400 C
Gas to liquid fuels plant	SASOL/Chevron JV	Burrup Peninsula, WA	New project, feasibility study underway	na	22.7 kbd diesel 7.3 kbd naphtha and LPG	\$2.04b	na
Gorgon LNG (staged development, 2 trains ultimately)	Chevron	Carnarvon Basin, WA	New project, feasibility study underway	na	8.6 Mt LNG ultimately	\$8b	4000 (peak) C 300 O
LNG plant	Phillips	Darwin	New project, under review	na	4.8 Mt LNG	\$2.5b	na
Minerva offshore gas production facility	BHP Petroleum	Otway Basin, Vic	New project, on hold	na	16 PJ pa	\$160m	220 C 20 O
Patricia/Baleen gas field	OMV Australia	Bass Strait, Vic	New project, feasibility study underway	late 2002	11 PJ pa	\$120m	350 C
Pilbara petro-chemical project	Dow	Near Dampier, WA	New project, stage 1 feasibility study completed	na	1 Mt EDC 550 kt MEG 825 kt caustic soda 750 kt chlorine	\$3b	2000 C 500 O
PNG–Qld gas pipeline	Exxon/Mobil	PNG to Qld	New project, feasibility study underway	2006	300 PJ pa	around \$2b (first stage)	1800 C 60 O

MINERALS AND ENERGY PROJECTS

Project	Company b	Location	Status c	Expected startup	New capacity d	Capital expend. e	Employment f
Stuart oil shale plant (stage 2)	Stuart Energy JV	Gladstone, Qld	New project, under review	na	14.8 kbd	\$450m	na
Sunrise Gas Project (incl Sunrise and Troubador gas fields)	Woodside Energy	500 km NW of Darwin, NT	New project, feasibility stage	2006	(260 billion cubic metres reserves)	\$2.5b	na
Sweetwater gas to liquids plant	Syntroleum Corporation	Burrup Peninsula, WA	New project, feasibility study underway	2002-03	580 ML per year synthetic hydrocarbons	\$1b	1000 C 80 O
Syngas and methanol plant	Methanex	Darwin	New project, under review	na	110 PJ pa	\$1.5b	1000 C 150 O
Victoria – SA gas pipeline	Duke Energy/ GPU GasNet	Vic to SA	New project, feasibility study underway	2003	45 PJ pa	\$250m	na
Victoria – SA gas pipeline	Origin Energy/ ANP	Vic to SA	New project, feasibility study underway	2003	na	\$230m	na
Vincent/ Enfield oil project	Woodside Energy	50 km N of Exmouth, WA	New project, feasibility study underway	2005	na (probable reserve 125 million bbl)	na	na
Yolla LPG/ condensate field	Australia Worldwide Exploration	Bass Strait	New project, feasibility study underway	2003	40 ktpa LPG 22 kbd condensate	\$400m	na
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Uranium							
Honeymoon	Southern Cross Resources	420 km NE of Adelaide, SA	New project, committed	2002-03	0.5–1.0 kt U3O8	\$20m	na C 40 O
Jabiluka	ERA (Rio Tinto)	230 km E of Darwin, NT	New project, on hold	na	1 kt U3O8	\$70m	110 O
For further information contact: Ian Haine + 61 2 6272 2031							
Mining projects – minerals a							
Cobalt							
Browns polymetallic project	Compass Resources/ Guardian Resources	Near Batchelor, NT	New project, feasibility study underway	2004	3.4 kt Co cathode 71 kt Pb bullion 12.5 kt Cu cathode 1.95 kt Ni hydroxide	\$300m	450 C 200 O
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MINERALS AND ENERGY PROJECTS

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Copper							
Northparkes expansion (lift 2)	Rio Tinto	Near Parkes, NSW	Expansion, under construction	2003	no increase – replacement for lift 1	\$139m	na
Ridgeway	Newcrest	Near Orange, NSW	New project, under construction	2002	24 kt Cu 240 000 oz Au	\$376m	450 C 200 O
Maroochy-dore	Straits Resources/ Murchison	Pilbara region, WA	New project, pre-feasibility study underway	na	30 kt Cu cathode	na	na
Nifty sulphide resource	Straits	Pilbara region, WA	New project, feasibility study underway	2003	50–70 kt Cu in concentrates or SX/EW Cu cathode	na	160 C 90 O
Olympic Dam expansion	WMC	Roxby Downs, SA	Expansion, feasibility study underway	2003	35 kt Cu	\$83m	na
Tritton (Bonnie Dundee)	Nord Resources	22 km SW of Girilambone, NSW	New project, feasibility study completed. On hold	na	18 kt Cu	\$45m	na C 120 O
Selwyn mine expansion	Selwyn Mines	160 km SE of Mt Isa	Expansion, feasibility study underway	2002	22 kt Cu 55 000 oz Au	\$13m	na
For further information contact: Peter Berry + 61 2 6272 2120							
Gold							
Challenger mine	Dominion Mining	Near Tarcoola, SA	New project, under construction	late 2002	50 000 oz	\$17m	70 O
Granny Smith Wallaby ext.	Placer Dome/	Delta WA	Expansion, under construction	2002	400 000 oz	\$150m	300 C 300 O
Ridgeway	Newcrest	Near Orange, NSW	New project, under construction	2002	240 000 oz Au 24 kt Cu	\$376m	450 C 200 O
Sunrise Dam MegaPit expansion	AngloGold	WA	Expansion, under construction	early 2002	300 000 oz	US\$58m (A\$110m)	100 C 280 O
Ballarat	Ballarat Goldfields	Vic	New project, prefeasibility study completed. On hold	na	100 000 oz	\$65m	180 O

MINERALS AND ENERGY PROJECTS

Project	Company b	Location	Status c	Expected startup	New capacity d	Capital expend. e	Employment f
Cowal	Homestake Resources	NSW	New project, feasibility study completed. On hold	na	200 000 - 250 000 oz	\$220m	300 C 200 O
Gwalia Deeps	Sons of Gwalia	WA	Expansion underground, feasibility study underway	2005-06	150 000 – 200 000 oz	\$100m	na
New Bendigo	Bendigo Mining	Vic	New project, feasibility study underway	2003	90 000 – 100 000 oz	\$40–50m	70 C 200 O
Paulsen's	Taipan	WA	New project, feasibility study completed. On hold	2002	100 000 oz	\$35m	na
Peak Hill sulphide project	Alkane	Peak Hill, NSW	Expansion, feasibility study underway	2003-04	30 000 oz	\$10–20m	na
Telfer expansion	Newcrest	Pilbara region, WA	Expansion, feasibility study underway	na	na	\$250m	na
White Foil	Cogema SA/ Goldfields Ltd	WA	New project, feasibility study underway	2002	100 000 oz	na	na
For further information contact: Anthony Simms + 61 2 6272 2403							
Iron ore							
Koolya-nobbing	Portman	Koolya-nobbing WA	Expansion, under construction	2004	5.5 Mt (rolling expansion)	\$100m	120 C 35 O
Orebody 18	BHP	Pilbara, WA	New project, further construction deferred	na	5 Mt initially, 10 Mt eventually	\$50m (initial capacity only)	200 C 100 O
West Angelas	Robe River (Rio Tinto)	Pilbara, WA	New project, under construction	2nd half 2002	7 Mt initially, 20 Mt eventually	\$880m	1200 C 330 O
Fortescue	Austeel	Fortescue 80 km SW of Karratha, WA	New project, prefeasibility underway	2005	20 Mt iron ore 6 Mt pellets 4.6 Mt DRI	\$3b	na C 600 O
Hope Downs	Hancock Prospecting/ Iscor	Pilbara, WA	New project, feasibility study underway	na	15–25 Mt	\$0.4–1.6b	500 C 200 O
Mining Area C	BHP/ POSCO (Pohang Iron and Steel)	Pilbara, WA	New project, feasibility study underway	2003-04	5–10 Mt initially, up to 15 Mt eventually	\$350m	500 C 200 O

MINERALS AND ENERGY PROJECTS

Project	Company b	Location	Status c	Expected startup	New capacity d	Capital expend. e	Employment f
Nammuldi	Hamersley Iron (Rio Tinto)	Pilbara, WA	New project, feasibility study underway	na	2–3 Mt initially, up to 20 Mt eventually	\$300m	400 C 150 O
For further information contact: Andrew Maurer + 61 2 6272 2134							
Lead–zinc–silver							
Bowden's silver project	Silver Standard Australia	25 km ESE of Mudgee, NSW	New project, on hold	na	124 t Ag in concentrate	\$75m	200 C 60–80 O
Dugald River	Pasminco	85 km NE of Mount Isa, Qld	New project, on hold	after 2003	na	\$250m	na
Hellyer metals project	Western Metals	90 km S of Burnie, Tas	New project, on hold	na	24 kt Zn 93 t Ag 100 000 oz Au	\$90m	na
Mount Garnet (incorporating Surveyor 1)	Kagara Zinc	105 km SW of Cairns, Qld	New project, feasibility study completed	2002	35 kt Zn in concentrates	\$43m	na
Lady Loretta	Lady Loretta JV (Noranda Pacific/Buka Minerals)	140 km NW of Mt Isa, Qld	New project, feasibility study underway	na	125 kt Zn 50 kt Pb 850 000 oz Ag	\$200m	na
Magellan lead project	Magellan Metals (Ivernia West)	Near Wiluna, WA	New project, feasibility study completed	2002	55 kt Pb metal	\$26m	na
For further information contact: Peter Berry + 61 2 6272 2120							
Mineral sands							
Dardanup	Doral Mineral Industries	Dardanup, WA	New project, under construction	2002	100–115 kt ilmenite and leucoxene; 8–10 kt zircon	\$40m	60 C 60 O
Douglas	Basin Minerals	40 km SW of Horsham, Vic	New project, final feasibility study nearing completion	2003	180 kt ilmenite 75 kt zircon 30 kt rutile 15 kt leucoxene	\$90m	180 C 180 O
Gingko	BIP Joint Venture (BeMax/Probo)	NSW (120 km N of Mildura)	New project, EIS and feasibility study underway	2003	55 kt rutile 40 kt zircon 165 kt ilmenite 100 kt altered ilmenite	\$167m	na
Goondicum	Monto Minerals	Burnett River, Qld	New project, feasibility study underway	2002	275 kt ilmenite	\$40m	60 O

MINERALS AND ENERGY PROJECTS

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Jangardup South	Cable Sands	Jangardup South, WA	New project, EIS and feasibility study underway	2003	250 kt mineral sands concentrates	\$40m	100 C 50 O
Mindarie	Southern Titanium	Near Loxton, SA	New project, final feasibility study completed	2002	17.5 kt rutile 43.7 kt zircon 76.6 kt ilmenite 14.8 kt leucoxene	\$65m	na
For further information contact: John Hogan + 61 2 6272 2056							
Nickel							
Murrin Murrin 2	Anaconda Nickel	45 km E of Leonora, WA	Rolling expansion, under construction	2003	55 kt Ni 4.5 kt Co	\$1b	2529 C 479 O
Cosmos Deeps	Jubilee Mines	50 km N of Leinster, WA	New project, committed	2003	10 kt Ni	\$33m	na
Cawse 2	Centaur/ Anaconda Nickel	50 km NW of Kalgoorlie, WA	Expansion, on hold	2003	40 kt Ni 1 kt Co	na	na
Marlborough	Preston Resources	70 km NW of Rockhampton, Qld	New project, feasibility study completed. On hold	na	25 kt Ni 2 kt Co	\$688m	1000 C 300 O
Mt Keith	WMC	S of Wiluna, WA	Expansion, feasibility study underway	na	22 kt Ni	\$300m	na
Mt Margaret	Anaconda Nickel	100 km NW of Murrin Murrin, WA	New project, feasibility study underway	2003	64 kt Ni 3.6 kt Co	\$2.0b	2529 C na O
Ravens-thorpe	QNI/BHP Billiton	35 km E of Ravens-thorpe, WA	New project, feasibility study underway	2003	35 kt Ni 1.3 kt Co (in concentrates – feed for Yabulu refinery)	\$720m	1100 C 380 O
Syerston	Black Range Minerals	80 km NW of Parkes, NSW	New project, feasibility study completed	2003	42 kt mixed nickel/cobalt sulphide; and platinum conc	\$493m	1000 C 280 O
For further information contact: Andrew Maurer + 61 2 6272 2134							
Rare earths							
Mt Weld	Lynas Corp/ Anaconda Industries	Meenaar and Mt Weld, WA	New project, feasibility study nearing completion	late 2002	5–7.5 kt rare earth oxides	\$80m	150 C 105 O

MINERALS AND ENERGY PROJECTS

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Pinjarra rare earth plant	Rhodia Pinjarra	Pinjarra, WA	New project, on hold	na	15 kt rare earth nitrates 23 kt tricalcium phosphate	\$60m	150 C 50 O
For further information contact: John Hogan + 61 2 6272 2056							
Tantalum							
Greenbushes underground mine and plant upgrade	Sons of Gwalia	Greenbushes, WA	New project, under construction	2002	600 000 lbs tantalum	\$65m	na
Wodgina mine expansion	Sons of Gwalia	100 km S of Port Hedland, WA	Expansion, under construction	2002	500 000 lbs tantalum	\$35m	na
Dalgaranga project	Tantalum Australia JV (AGM/Kemet)	Dalgaranga, WA	New project, prefeasibility study underway	na	na	\$40m	na
For further information contact: Ian Haine + 61 2 6272 2031							
Vanadium							
Balla Balla	Renewable Energy Corporation	100 km SW of Port Hedland, WA	New project, feasibility study underway	na	6 kt vanadium pentoxide	\$100m	400 C 90 O
For further information contact: Ian Haine + 61 2 6272 2031							
Other commodities							
Ammonia	Burrup Fertilisers	Burrup Peninsula, WA	New project, feasibility study completed	na	720 kt ammonia	\$600m	500 C 60 O
Ammonia/urea plant	Plenty River Corporation	Burrup Peninsula, WA	New project, feasibility study underway	2002	760 kt urea 190 kt ammonia	\$800m	1000 C 120 C
Ant Hill manganese project	HiTec Energy	Port Hedland, WA	New project, feasibility study completed	2002	40 kt electrolytic Mn dioxide 15 kt Mn sulphate	\$209m	na C 75 O
Dubbo zirconia project	Alkane Exploration	Toongi, 20 km S of Dubbo, NSW	New project, feasibility study nearing completion	2003	3.5 kt zirconia 1.5 kt rare earths 0.9 kt Nb/Ta	\$50-70m	300 C 60 O
Exmouth (limestone/quicklime)	Exmouth Limestone	Cape Range, near Exmouth, WA	New project, on hold	na	1 Mt limestone 200 kt quicklime	\$45m	150 C 40 O

Project	Company b	Location	Status c	Expected startup	New capacity d	Capital expend. e	Employment f
Munni Munni PGM project	Helix Resources/ Lonmin	WA	New project, feasibility study underway	na	100 000 oz PGM's and gold 5 kt Cu and Ni	\$71m	na
Wickepin (kaolin)	WA Kaolin	Near Wickepin, WA	New project, feasibility study completed	na	250 kt kaolin	na	na
For further information contact: Ian Haine + 61 2 6272 2031							
Minerals processing facilities							
Alumina							
Comalco alumina refinery project	Comalco	Gladstone, Qld	New project, committed	2005	1400 kt alumina	\$1.5b	1500 C 400 O
Nabalco refinery expansion	Alcan	Gove, NT	Expansion and plant optimisation, feasibility study underway	2006	1200 kt	\$1.2b	1000 C 100 O
QAL refinery expansion	Queensland Alumina	Gladstone, Qld	Expansion, feasibility study underway	2004	1200 kt alumina	na	na
Wagerup refinery expansion – unit 3	Alcoa of Australia	Darling Ranges, WA	Expansion, feasibility study completed	na	1100 kt alumina	\$1b	1500 C 250 O
For further information contact: Michael Peel + 61 2 6272 2073							
Aluminium							
Aldoga smelter	Aldoga Aluminium	Aldoga, near Gladstone, Qld	New project, feasibility study underway	2005	500 kt	\$3b	3500 C 900 O
Boyne Island smelter expansion	Comalco	Gladstone, Qld	Expansion, prefeasibility study underway	na	170 kt	\$1b	na
Kurri Kurri aluminium smelter	VAW	Kurri Kurri, NSW	Efficiency improvements, feasibility study underway	2005	20 kt	\$250m	na

MINERALS AND ENERGY PROJECTS

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Kurri Kurri aluminium smelter (fourth potline)	VAW	Kurri Kurri, NSW	Expansion, feasibility study underway	2008	140 kt	\$850m	na
For further information contact: Michael Peel + 61 2 6272 2073							
Crude iron and steel							
Cold rolling mill	Protech	Newcastle, NSW	New project, feasibility study underway	na	500 kt sheet steel	\$520m	700 C 365 O
HiSmelt plant	Rio Tinto	Kwinana, WA	New project, feasibility study underway	2003	500 kt iron	\$300m	na
Hunter specialty steel mini mill	Boulder Group, Australian Overseas Resources	Newcastle, NSW	New project, feasibility study underway	na	260 kt specialty steel	US\$425m (A\$815m)	340 O
Maitland Steel slab and HBI plant	Australian United Steel Industries	Pilbara, WA	New project, feasibility study completed	na	3.6 Mt DRI	\$1.9b	2000 C 300 O
Newcastle integrated steel plant (linked to Fortescue iron ore project)	Austeel	Newcastle, NSW	New project, prefeasibility study underway	na	3.85 Mt steel	\$2.5b	900 O
Oakajee Mid West iron and steel project	Kingstream Steel	Oakajee, WA	New project, feasibility study completed	na	2.6 Mt steel	\$2.7b	2000 C 775 O
Pig iron plant	Australian Bulk Minerals	Port Latta, Tas	New project, feasibility study completed. On hold	na	0.5–1 Mt pig iron	\$120m	na
South Australian Steel and Energy pig iron project	Auiron	Cooper Pedy or Whyalla, SA	New project, feasibility study underway	2003	2.5 Mt pig iron	\$1b	2000 C 500 O
For further information contact: Andrew Maurer + 61 2 6272 2134							
Magnesium							
Stanwell magnesium project	Australian Magnesium Corporation	Stanwell, near Rockhampton, Qld	New project, committed	2004	97 kt magnesium metal	\$1.3b	1350 C 350 O
Anaconda magnesium project	Anaconda	Near Murrin, 45 km E of Leonora, WA	New project, prefeasibility study underway	na	100 kt magnesium metal	\$1b	na

MINERALS AND ENERGY PROJECTS

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Batchelor magnesium project	Mount Grace Resources/ MINTEX/ Anglo American	85 km S of Darwin, NT	New project, feasibility study underway	na	12.5 kt magnesium metal (stage 1)	\$127m	150 O 66 C
Hazelwood magnesium project	Hazelwood Power	150 km E of Melbourne, Vic	New project, prefeasibility study underway	na	34 kt magnesium metal	\$270m	na
PMMA project	Pilbara Magnesium Metal Associates	Pilbara, WA	New project, prefeasibility study underway	na	50 kt magnesium metal	\$700m	na
South Australia magnesium project	Samag (Pima Mining/RFC)	Port Pirie, SA or New Zealand	New project, feasibility study nearing completion	2004	65 kt magnesium metal/alloy	\$750m (US\$375m)	700 C 280 O
Tasmanian magnesium project	Bass Resources	Bell Bay, Tas	New project, prefeasibility study underway	na	80 kt magnesium metal	\$800m	na
Woodsreef magnesium project	Pacific Magnesium Corporation	Woodsreef, NSW	New project, feasibility study underway	na	80 kt magnesium metal/alloy	\$681m	na
For further information contact: Ian Haine + 61 2 6272 2031							
Nickel							
Yabulu refinery expansion	BHP Billiton	Townsville, Qld	New project feasibility study underway	2003	35 kt Ni 1.3 kt Co (linked to Ravensthorpe mining project)	\$300m	na
For further information contact: Andrew Maurer + 61 2 6272 2134							
Silicon							
Australian silicon project	Quaestus	Lithgow, NSW	New project, feasibility study completed	na	31.5 kt silicon metal 10 kt silica fume	\$165m	300 C 140 O
For further information contact: Ian Haine + 61 2 6272 2031							
Titanium minerals							
Kemerton TiO ₂ pigment plant	Millennium Inorganic Chemicals	Kemerton, WA	Expansion, on hold	na	95 kt TiO ₂ pigment	\$470m	500 C 200 O
Kwinana TiO ₂ pigment plant	Tiwest JV	Kwinana, WA	Three stage expansion, on hold	na	85 kt TiO ₂ pigment	\$200m	200 C 65 O
For further information contact: John Hogan + 61 2 6272 2056							

MINERALS AND ENERGY PROJECTS

Project	Company b	Location	Status c	Expected startup	New capacity d	Capital expend. e	Employment f
Zinc							
Zinc ferrite reprocessing plant	Sun Metals	Townsville, Qld	New project, committed	by 2006	na	\$50m	na
For further information contact: Peter Berry + 61 2 6272 2120							

a Includes projects expected to commence production over the medium term and for which capital expenditure is expected to exceed \$40 million (except for gold projects, for which the expenditure threshold is \$15 million). b Principal operating companies. c Type of project and stage of development — categories of the former include: 'new project' and 'expansion'; categories of the latter include: 'feasibility study underway', 'feasibility study completed', 'committed' and 'under construction'. d Annual incremental capacity expected in terms of contained mineral or product; for example, zinc content in zinc concentrate production or salable coal in coal produced. For oil and condensate kbd ('000 barrels a day) and gas TJ (terajoules a day) and liquid petroleum gas LPG (Mt). e Total capital expenditure as reported by the company in current dollars. Includes cost of development, plant and equipment. f Reported employment. Where possible, project employment has been shown at both the construction phase (shown as 'C' against the employment numbers below) and in the operational phase (shown as 'O'). na Not available.