

Minerals and energy

Major development projects

Ian Haine and commodity analysts, Industries Branch



Recent indications of a turnaround in petroleum exploration expenditure (up 48 per cent to \$1.1 billion in 2000-02) and a modest increase in capital expenditure, coupled with a recent increase in the number of projects committed or under construction, are positive developments for the future pace of growth of Australia's minerals and energy sector.



In addition, the existence of several as yet uncommitted but potentially large scale projects requiring substantial investment and undergoing serious study provide a further basis for optimism about the sector's expansion in the longer term.

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 December 2000 issue of *Australian Commodities*.

In general (with one industry exception), the table provides details of announced projects for which total capital expenditure is expected to exceed \$40 million (in 2000-01 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.

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'. Also, with the focus being on projects planned to commence production over the next few years, projects at the more advanced stages of planning — those identified as 'committed' or 'under construction' — are grouped together and listed first within each principal commodity segment.

Project: 1493 Contact: Peter Berry +61 2 6272 2120

These projects appear in the lighter shaded areas of the table.

Projects that are at less advanced planning stages (for example, those at the 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 mineral exploration expenditure, in real terms (2000-01 dollars), for the period 1980-81 to 2000-01 is shown in figure A. The 2000-01 data are estimates based on actual data from the Australian Bureau of Statistics for July–December 2000, combined with data from the ABS survey of expected expenditure for January–June 2001.

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

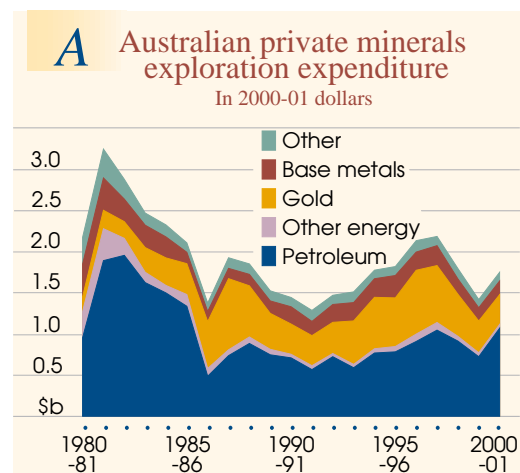
23 per cent in real terms to \$1.75 billion. This substantial rise followed two years of sharp declines, with expenditure in 1999-2000 reaching its lowest level since 1991-92.

The sharp turnaround in total mineral exploration expenditure in 2000-01 was entirely the result of a 48 per cent rise in petroleum expenditure, as expenditure on nonenergy exploration fell marginally. Within the nonenergy minerals sector, the negative trend was also focused on a single industry, gold. Exploration expenditure fell by an estimated 6 per cent for gold, while for base metals and other minerals it rose, by 3 per cent and 6 per cent respectively.

Petroleum exploration expenditure in 2000-01 was \$1070 million, almost 90 per cent of which related to offshore exploration. Total petroleum exploration expenditure in 2000-01 was the highest in real terms since the period from the early to mid 1980s, a period in which petroleum prices were relatively high. The increased expenditure in 2000-01 is also considered to at least partly reflect the incentive provided by sustained high oil prices over the past two years and the effects on price expectations of increased OPEC production discipline.

However, infrastructure requirements for offshore exploration generally require costly, long term planning, so some of the exploration activity undertaken in 2000-01 is likely to have also reflected decisions taken some time earlier when prices were relatively low.

The Australian Bureau of Statistics survey of expected expenditure indicates that almost 60 per cent of total petroleum



expenditure for the 2000-01 year is likely to have been spent in the period January–June 2001. This provides some indication that petroleum exploration expenditure may continue at recent levels, in the near term, especially if oil price expectations continue to provide sufficient incentive.

The fall in gold exploration expenditure in 2000-01 followed falls in each of the three previous years. In real terms, expenditure on gold exploration has declined by 53 per cent since its peak in 1996-97 and, at around \$362 million in 2000-01, is at its lowest level since 1992-93. 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. Recent quarterly data indicate a flattening in exploration spending during 2000-01. 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 modest rise in base metals exploration expenditure in 2000-01 mainly reflected an upturn in spending on nickel exploration; expenditure on copper and zinc–lead–silver remained about the same as in 1999-2000. The increase in nickel exploration expenditure may have primarily reflected increased activity aimed at proving up and extending known resources as part of feasibility or development studies for a number of nickel projects. Copper and zinc–lead companies, in particular, appear to have remained focused on reducing overall costs and expenditure (including exploration expenditure) in order to improve financial performance in expectation of a continuation of declining real prices over the longer term. An associated factor is likely to have been a desire on the part of many Australian producing companies to take steps to increase shareholder returns, particularly following the recent period when a substantial portion of company profits was directed to major capital developments and during a period in which most companies are potentially vulnerable to takeovers.

In 2000-01, total nonenergy mineral exploration expenditure was \$634 million, marginally less than in 1999-2000. However, 2000-01 expenditure was 44 per cent below its peak in 1996-97 and at its lowest since 1985-86. While nonenergy exploration expenditure may be leveling out (based on estimated 2000-01 data), there is evidence to suggest that it is considered unlikely that there will be a significant upturn in expenditure in the short term. This is because both gold and base metals (which together comprise over four-fifths of total nonenergy minerals exploration expenditure) are expected to continue to be subject, in the short term, to the range of market and other factors that contributed to the recent downturn in expenditure.

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 sustainability of 'high' 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 regarding 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/outsourcing of exploration capacities (not only in Australia but also globally), and issues affecting Australia's relative attractiveness for exploration. The backlog of applications to explore or mine brought about by delays in native title negotiations is of particular concern.

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.

Based on ABS survey data, new capital expenditure in the mining industry is estimated to have been around \$5.5 billion in

2000-01, 4 per cent higher than in 1999-2000 (figure B). This apparent increase follows sharp falls in expenditure in each of the two previous years. In 1999-2000, capital expenditure on mining was less than half the record level in 1997-98 (\$11.77 billion, in real 2000-01 dollars), 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 indications that capital expenditure on mining may rise significantly next year. Based on industry intentions canvassed in the March quarter 2001, ABS data indicate that capital expenditure on mining in 2001-02 may be around \$6.8 billion (in 2000-01 dollar terms) — about 24 per cent up on estimated 2000-01 expenditure.

Capital expenditure in the metal products sector, which includes the minerals processing activities covered in this projects list, is estimated to be \$1.2 billion in 2000-01 — around 20 per cent, in real terms, below 1999-2000 expenditure and the lowest, in real terms, since 1993-94. Expenditure in 1999-2000 was itself 25 per cent below the previous year when several processing facilities were brought into production.

However, surveyed industry intentions provide an initial indication of a possible significant 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 min-

eral resource sector could rise by around 20 per cent in 2001-02.

Looking beyond the short term, there is some evidence of 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 recently 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.

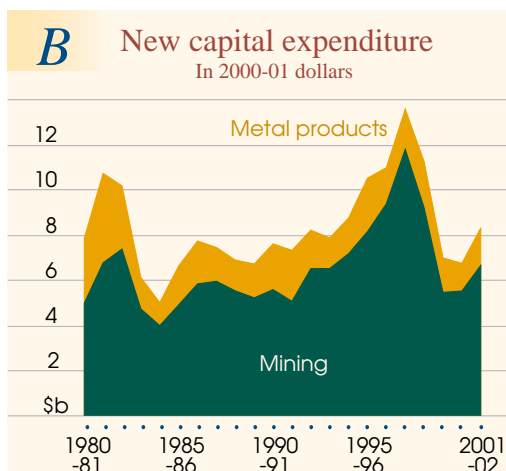
Recently commissioned projects

In the six months ended June 2001, only five major minerals and energy projects were completed. This rate of project completions was about half that of the previous six month period (July–December 2000) when there were nine projects completed.

In addition to this significant decline in the rate of completions, the average value of completed projects also fell sharply. The estimated total capital cost of the five projects commissioned in the six months ended June 2001 was \$282 million, compared with a total capital cost of \$1.8 billion for the nine projects completed in the period to December 2000 — a decline in average project value of over 70 per cent.

The trend toward lower project completions (and lower average investment) has been evident since the end of 1999. In that year, a record 35 projects, valued at almost \$11 billion, were commissioned. In 2000, eighteen projects, valued at around \$3.6 billion, were completed. However, it should be borne in mind that the two year period 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.

Looking ahead over the short term, current information indicates that eight projects are expected to be completed in the next six months (July–December 2001). However, at



this stage, there are only around eight projects scheduled for completion in the whole of 2002. While some scheduled for completion in 2001 may slip into 2002, decision making and investment lead times mean it is unlikely that this relatively modest development outcome in the sector can be avoided.

Among the major projects completed in the six months period ended June 2001, the largest in terms of capital cost was Woodside's \$110 million Legendre oil and condensate field, 100 kilometres north of Dampier in the Carnarvon Basin off Western Australia. When full production capacity is achieved, output of up to 40 000 barrels a day will come from two fields, Legendre North and Legendre South. The Legendre fields are expected to have a productive life of three and a half years.

After delays caused by cyclone damage to infrastructure in 1999, the \$80 million Onslow solar salt project, near Onslow in Western Australia, was recently brought into production. Output is expected to be 2.5 million tonnes of solar salt a year, predominantly for export. Murray Basin Titanium's \$28 million Wemen mineral sands project, near Robinvale in Victoria, was commissioned earlier this year. Although small, this development is significant because it is the first of several mineral sands prospects in the Murray Basin that may be developed. Wemen's annual output is expected to be 32 000 tonnes of rutile, 10 000 tonnes of zircon and 27 000 tonnes of ilmenite.

The other projects completed in the six months ended June 2001 were: Equigold's Mount Rawdon gold mine in Queensland, with annual production expected to be 80 000 ounces of gold and 200 000 ounces of silver, developed at a capital cost of \$34 million; and the \$30 million Beverly in situ uranium leaching operation in the north of South Australia.

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



Minerals and energy projects

Advanced projects

The table of planned minerals and energy projects that follows lists 28 projects at advanced stages of development — that is, projects that are either committed or under construction.

Of the current list of advanced projects, eight are scheduled to be completed in the six months ending December 2001, with twenty having announced completion dates beyond 2001. (However, some projects scheduled to be completed in 2001 may slip into the following year.)

In the past six months, the number of advanced projects expected to be completed after 2001 has increased from fifteen (in December 2000) to twenty (in June 2001). Importantly, the number of advanced projects now scheduled to be completed within the next five years compares reasonably favorably with numbers in this category recorded in earlier periods. The recent increase may merely reflect several companies committing to projects at around the same time. On the other hand, reflecting a longer term industry perspective on investment decision making, the increase may reflect an increasingly positive outlook for some commodity markets over the next five years and beyond.

There appears to be increased confidence in the outlook for the Australian energy export sector. The 28 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 28 advanced projects sums to \$9.9 billion. Virtually all of this amount relates to mining and petroleum developments as there are only two mineral processing projects, valued at around \$50 million, that have reached an advanced stage.

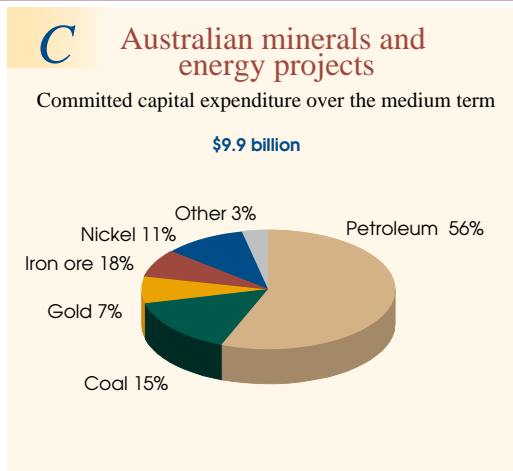
However, it should be borne in mind that even projects that have reached the committed stage may be deferred, modified or even cancelled if economic or competitive circumstances change sufficiently.

Other factors also have the potential to significantly affect the progression of advanced projects toward development. One such factor is the current issue of the ownership of Timor Sea petroleum resources that could ultimately modify or limit current development plans for several projects. These include the currently committed Bayu Undan project located in the Timor Gap Zone of Cooperation. The ownership issue has emerged following efforts by the East Timor Interim National Council to negotiate a new international boundary between East Timor and Australia.

A breakdown of proposed capital expenditure on advanced projects, by major commodity grouping, is given in figure C, while their location is shown in the map below.

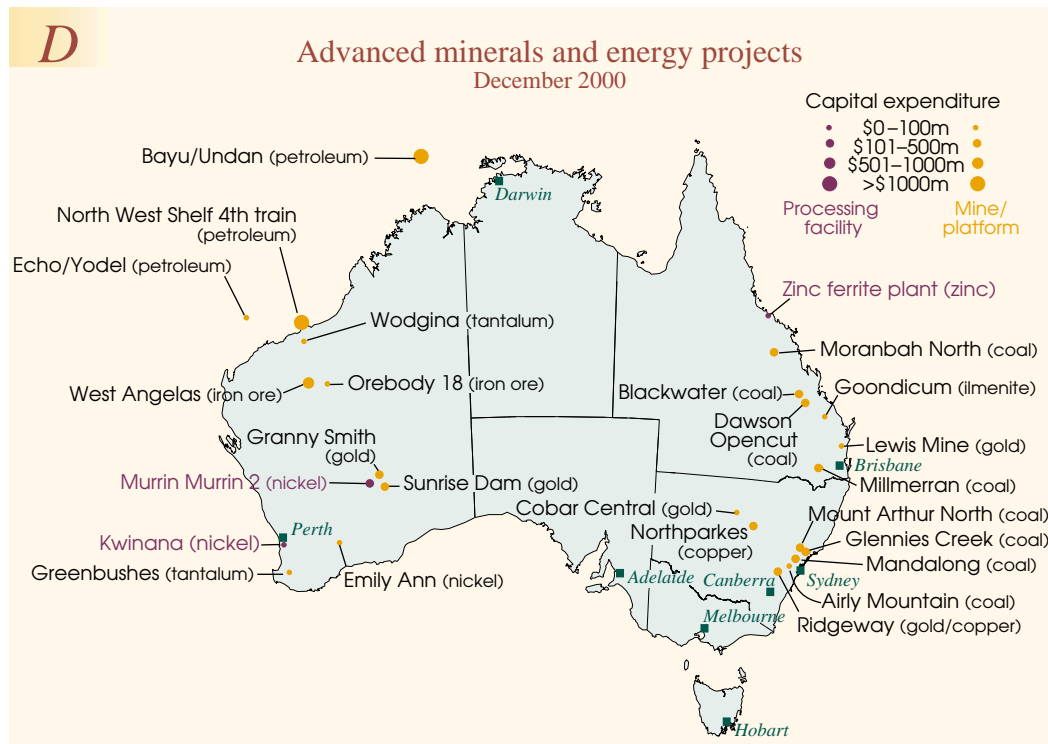
Of the eight projects scheduled to be commissioned by the end of 2001, three are coal mine developments. Collectively, the capital expenditure for these coal developments is around \$550 million, or over 80 per cent of the total capital cost (\$662 million) of all eight projects expected to be completed in the remainder of this year.

Two of the coal developments are in Queensland. Anglo Coal Australia's new



Dawson opencut mine, south west of Rockhampton, is expected to produce 3 million tonnes of coal a year when fully operational. The final capital cost of this mine will be around \$300 million. BHP's \$130 million expansion of its Blackwater mine, south of Emerald, is due for commissioning late in 2001. This expansion will raise production capacity by 5.5 million tonnes a year.

In New South Wales, Powercoal's new Mandalong coal mine, south west of New-



castle, is expected to commence production around midyear. Annual output is expected to be 3 million tonnes, for an estimated capital cost of \$130 million.

Two new gold mines, each with a capital cost of \$35 million, are among the operations scheduled for commissioning before the end of the year. Gympie Gold's Lewis mine at Gympie in Queensland is due for completion around midyear and will have an annual production capacity of 65 000 ounces. Peak Gold Mines' Cobar Central project, expected to be completed around the third quarter of this year, will access a new underground resource beneath historic gold workings near Cobar in central western New South Wales.

Other projects nearing completion are: Lion Ore's new \$42 million Emily Ann nickel mine; Alcoa's efficiency improvements at the Pinjarra alumina refinery, expected to increase output by around 165 000 tonnes a year; and WMC's incremental expansion (6000 tonnes a year) at its Kwinana nickel refinery. All of these developments are in Western Australia.

Of the committed projects expected to be completed beyond 2001, four in particular are notable because of the significant scale of investment and production involved. These are Phillips Petroleum's \$2.7 billion proposal to develop the Bayu/Undan LPG and condensate field in the Timor Gap Zone of Cooperation; Woodside Energy's \$2.4 billion North West Shelf project extension; Anaconda's \$1 billion expansion of its Murrin Murrin nickel operation (Murrin Murrin 2) near Leonora in Western Australia; and Robe River's proposed \$700 million West Angelas iron ore mine in the Pilbara.

Woodside's North West Shelf extension has only recently been committed. It involves the construction of a fourth LNG train, with a capacity of 4.2 million tonnes a year — the largest LNG train to be built anywhere in the world — and development of a second subsea trunkline to carry gas to the onshore processing facilities on the Burrup Peninsula. The intended expansion is based on expected growth in Asian energy markets. First LNG production is scheduled for 2004.

The proposed development of the West Angelas mine may include upgrades to the existing port and port handling facilities at Cape Lambert. West Angelas is expected to commence in 2002 and to eventually produce 20 million tonnes of Marra Mamba ore a year.

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 completion 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. They are also susceptible to the emergence of policy or political influences such as the current issue of the ownership of Timor Sea petroleum resources. In addition, securing finance for project development — even for high quality projects that 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 about 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 22 significant projects at less advanced planning stages that are new to the list. Total potential capital expenditure of these project additions is around \$12.4 billion.

Four of the projects new to the list are proposed new petroleum developments, all based in or near Darwin and all based on Timor Sea gas. In scale and significance, these are among the more important additions to the list, with a combined potential capital expenditure of \$7.5 billion. These are Woodside's \$2.5 billion Sunrise Gas project in the Timor Sea; Phillips' \$2.5 billion LNG plant in Darwin; Methanex's \$1.5 billion syngas and methanol plant, also in Darwin; and Epic Energy's \$1 billion Darwin to Moomba gas pipeline. However, there is currently significant uncertainty, over and above normal market considerations, about the future development of these projects. The timing and nature of the resolution of this issue will be critical to decisions on when, or if, these projects are developed.

If it proceeds, Methanex's methanol plant may take gas from both Phillips' committed Bayu Undan development and from Woodside's proposed Sunrise gas operation.

Three of the other project additions involve a potentially significant amount of investment in the aluminium/alumina industry. The most notable of these is Aldoga Aluminium's proposal for a new greenfields smelter near Gladstone in Queensland. The estimated capital cost of the proposed smelter is \$3 billion and it would have an expected output of 500 000 tonnes of metal a year, if it proceeds.

The owners of the Kurri Kurri aluminium smelter, near Cessnock in the Hunter Valley

(VAW) in New South Wales, are considering constructing a fourth potline that could add 100 000 tonnes to its current capacity of 150 000 tonnes a year.

A 1 million tonnes a year expansion of the QAL alumina refinery at Gladstone is currently undergoing a feasibility study. If it proceeds, its capacity would increase to 4.6 million tonnes a year by around 2005, making it the largest alumina refinery in the world.

Three of the other project additions of significance are located in Western Australia's Pilbara region. They are: BHP/POSCO's proposed \$300 million development of 'C' iron ore deposit (within BHP's larger Mining Area C prospect); Straits Resources' proposal to develop its Nifty sulphide copper deposit, at an estimated capital cost of \$250–300 million; and Newcrest's possible \$250 million expansion of its Telfer gold mine.

Although they remain uncommitted, two magnesium metal projects — AMC's \$1.1 billion Magmetal project in Queensland, and Pima Mining's \$750 million SAMAG project in South Australia — are nearing the stage when decisions to proceed to development (or otherwise) may soon be made. If either proceeds, it would represent an important first step to Australia becoming a significant producer of magnesium metal, a commodity for which demand is expected to increase substantially in the medium to longer term.

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>							
Airly Mountain underground	Centennial Coal	30 km NW of Lithgow	New project, under construction	2002	0.75–1.0 Mt	\$40m	80–100 O 60 C
Glennies Creek longwall	Namoi Hunter (Tomen Corporation)	12 km NW of Singleton	Expansion, under construction	na	3 Mt	\$200m	140 O
Mandalong	Powercoal (Pacific Power)	35 km SW of Newcastle	New project, under construction	mid 2001	3 Mt	\$120m	nil O
Mount Arthur North	Coal Operations Australia (Ingwe coal)	5 km SW of Muswellbrook	New project, committed	2002-03	6 Mt by 2003	\$500m	500 C 300 O
Dartbrook extension	Shell	70 km N of Singleton	New project, feasibility study completed	2003	3.2 Mt	\$120m	nil
Dendrobium underground	BHP	Kemira Valley, W of Wollongong	New project, feasibility study underway	2002-03	3.5–4.5 Mt	\$140m	na
Glendell opencut	Liddell (Glencore)	17 km NW of Singleton	New project, under review	next 5 years	2.7 Mt	\$25m	85 O
Howick opencut	Coal and Allied (Rio Tinto)	25 km NW of Singleton	Expansion, under review	2002	3.75 Mt	\$100m	30 O
Maules Creek opencut	Coal and Allied (Rio Tinto)	20 km NE of Boggabri	New project, mining lease granted. Undergoing assessment	na	5.5 Mt	\$450m	300 O
Mt Pleasant opencut	Coal and Allied (Rio Tinto)	6 km NW of Muswellbrook	New project, mining lease granted	2003-04	7 Mt	\$310m	250 C 330 O
Nardell underground	Nardell Coal	20 km NW of Singleton	Proposed new project	2002	2.75–3.0 Mt	\$150m	156 O
Southland colliery	Thiess	Hunter Valley	New project, development approval granted	2004	2 Mt	\$100m	na
<i>Queensland mines</i>							
Blackwater	BHP	80 km S of Emerald	Expansion, committed	late 2001	5.5 Mt	\$130m	nil
Dawson opencut	Anglo Coal Australia	160 km SW of Rockhampton	New project, under construction	2001	3 Mt	\$300m	200 O
Millmerran opencut	Normandy Mining	5 km S of Millmerran	New project, committed	na	3 Mt	\$200m	100–120 O

MINERALS AND ENERGY PROJECTS

Project	Company b	Location	Status c	Expected startup	New capacity d	Capital expend. e	Employment f
Moranbah North longwall	Anglo Coal Australia	150 km SW of Mackay	Expansion, committed	2003	3 Mt	na	na
Acland opencut	New Hope Coal Australia	15 km N of Oakey	New project, seeking development approval	2002	2 Mt	na	300 C 120 O
Clermont opencut	Clermont Coal Mines (Mitsubishi)	11 km N of Clermont	New project, feasibility study completed	2005	10 Mt	\$400m	na
Goonyella longwall	Central Queensland Coal Assoc.	30 km N of Moranbah	New project, feasibility study completed	2002	Up to 5.5 Mt	\$150m	110–125 O
Hail Creek opencut	Hail Creek JV (Rio Tinto)	100 km SW of Mackay	New project, feasibility study completed	na	2.2 Mt initially, rising to 5.5 Mt	\$400m	na
Meandu opencut (Kunioon)	Pacific Coal (Rio Tinto)	15 km W of Nanango	Expansion, feasibility study underway	2002	2.0–2.4 Mt	na	na
Peak Downs opencut expansion	Central Queensland Coal Assoc.	35 km S of Moranbah	Expansion, under review	2002	3 Mt	\$280m	nil
Togarah North longwall	Glencore	45 km SW of Blackwater	New project, feasibility study completed, on hold	na	5.5 Mt	\$350m	200 O
Wandoan opencut	MIM	60 km N of Miles	New project, on hold	na	3 Mt	\$800m	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							
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
Bell Bay gas pipeline	Duke Energy	Longford, Vic to Bell Bay, Tas	New project, committed	mid-2002	40 PJ pa	\$380m	na
Echo/Yodel gas and condensate fields	Woodside Energy	120 km NW of Dampier, WA	New project, under construction	2002	25 kbd	\$24m	na

MINERALS AND ENERGY PROJECTS

Project	Company b	Location	Status c	Expected startup	New capacity d	Capital expend. e	Employment f
North West Shelf project extension (fourth train)	Woodside Energy	North West Shelf, WA	Expansion, committed	LNG by 2004	4.2 Mt LNG	\$2.4b	2000 C 600 O
Darwin – Moomba gas pipeline	Epic Energy	Darwin, NT to Moomba, SA	New project, pre-development phase	2004	na	>\$1b	1400 C
Gorgon LNG (staged development, 2 trains ultimately)	Chevron	Carnarvon Basin, WA	New project, feasibility study underway	LNG exports by 2004	8.6 Mt LNG ultimately	\$8b	4000 (peak) C 300 O
LNG plant	Phillips	Darwin	New project, advanced feasibility stage	2004-05	4.8 Mt	\$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
Pilbara petro-chemical project	Dow /Shell	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
Stuart oil shale plant (stage 2)	Stuart Energy JV	Gladstone, Qld	New project, under review	2002	14.8 kbd	\$370m	na
Sunrise Gas Project (incl Sunrise and Troubador gas fields)	Woodside Energy	500 km NW of Darwin, NT	New project, advanced 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	\$600m	1000 C 80 O
Syngas and methanol plant	Methanex	Darwin	New project, advanced feasibility stage	na	110 PJ pa	\$1.5b	1000 C 150 O
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
For further information contact: Kim Donaldson + 61 2 6272 2169							

MINERALS AND ENERGY PROJECTS

Project	Company b	Location	Status c	Expected startup	New capacity d	Capital expend. e	Employment f
Uranium							
Honeymoon	Southern Cross Resources	420 km NE of Adelaide, SA	New project, feasibility study completed; seeking development approvals	2002-03	0.5–1.0 kt U ₃ O ₈	\$20m	na C 40 O
Jabiluka	ERA (Rio Tinto)	230 km E of Darwin, NT	New project, on hold	na	1 kt U ₃ O ₈	\$70m	110 O

For further information contact: Kim Donaldson + 61 2 6272 2169

Mining projects – minerals a

Cobalt							
Browns polymetallic project	Compass Resources/Guardian Resources	Near Batchelor, NT	New project, feasibility study underway	2002	3.4 kt Co cathode 71 kt Pb bullion 12.5 kt Cu cathode 1.95 kt Ni hydroxide	\$300m	450 C 200 O

For further information contact: John Hogan + 61 2 6272 2056

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	na	\$200m	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	\$250–300m	na
Olympic Dam expansion	WMC	Roxby Downs, SA	Expansion, feasibility study underway	2003	45 kt Cu	less than \$100m	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	na	\$42m	na

For further information contact: Peter Berry + 61 2 6272 2120

Project	Company b	Location	Status c	Expected startup	New capacity d	Capital expend. e	Employment f
Gold							
Cobar Central project	Peak Gold Mines	Cobar, NSW	New project, under construction	late 2001	na	\$35m	na
Granny Smith Wallaby ext.	Placer Dome/	WA	Expansion, under construction	2002	400 000 oz	\$150m	300 C 300 O
Lewis mine	Gympie Gold	Gympie, Qld	New project, under construction	mid 2001	65 000 oz	\$35m	20 C 40-50 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
Cowal	Rio Tinto	NSW	New project, feasibility study completed. On hold	na	250 000 oz	\$220m	300 C 200 O
Gwalia Deeps	Sons of Gwalia	WA	Expansion underground, feasibility study underway	2003-04	150 000 – 200 000 oz	\$70m	na
New Bendigo	Bendigo Mining	Vic	New project, feasibility study underway	2002	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	30 000 oz	\$10–20m	na
Telfer expansion	Newcrest	Pilbara region, WA	Expansion, feasibility study underway	na	na	\$250m	na
Wandoo	Worsley JV	WA	Expansion, feasibility study completed	2003	up to 600 000 oz	\$500m	300 C 150 O
White Foil	Cogema SA/ Goldfields Ltd	WA	New project, feasibility study underway	2001-02	100 000 oz	na	na
For further information contact: Peter Berry + 61 2 6272 2120							

MINERALS AND ENERGY PROJECTS

Project	Company b	Location	Status c	Expected startup	New capacity d	Capital expend. e	Employment f
Iron ore							
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	mid-2002	7 Mt initially, 20 Mt eventually	\$700m	1200 C 330 O
Hope Downs	Hancock Prospecting/ Iscor	Pilbara, WA	New project, feasibility study underway	na	15–25 Mt	\$0.4–1.6b	300 C 150 O
Koolya-nobbing	Portman	Koolya-nobbing WA	Expansion, feasibility study underway	2004	5.5 Mt	\$100m	120 C 35 O
Mining Area C– ‘C Deposit’	BHP/ POSCO (Pohang Iron and Steel)	Pilbara, WA	New project, feasibility study underway	2003-04	5–10 Mt initially, up to 15 Mt eventually	\$300m	na
Nammuldi	Hamersley Iron (Rio Tinto)	Pilbara, WA	New project, feasibility study underway	na	na	\$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, feasibility study underway	na	124 t Ag in concentrate	\$75m	200 C 60–80 O
Dugald River	Pasminco	85 km NE of Mount Isa, Qld	New project, feasibility study ongoing	after 2003	na	\$250m	na
Hellyer metals project	Western Metals	90 km S of Burnie, Tas	New project, feasibility study underway	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	early 2002	35 kt Zn in concentrates	\$40m	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							

Project	Company b	Location	Status c	Expected startup	New capacity d	Capital expend. e	Employment f
Mineral sands							
Goondicum	Monto Minerals	Burnett River, Qld	New project, committed, development studies ongoing	stage 1: 2001 stage 2: 2003	stage 1: 275 kt ilmenite stage 2: 410 kt ilmenite	\$40m (stage 1) \$120–150m (stage 2)	stage 1 60 O stage 2 100–150 O
Dardanup	ISK	Dardanup, WA	New project, feasibility study underway	na	100 kt heavy mineral sands	\$40m	80 C 40 O
Douglas	Basin Minerals	40 km SW of Horsham, Vic	New project, prefeasibility study completed	2003-04	500 kt mineral sands product	\$100–140m	180 C 180 O
Gingko	BIP Joint Venture (BeMax/Probo)	NSW (120 km N of Mildura)	New project, feasibility study underway	2003	55 kt rutile 40 kt zircon 165 kt ilmenite 100 kt altered ilmenite	\$167m	na
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/Mercunda	Murray Basin Minerals	Near Loxton, SA	New project, feasibility study completed	2002	10 kt rutile 35 kt zircon 75 kt ilmenite	\$42m	na
For further information contact: John Hogan + 61 2 6272 2056							
Nickel							
Emily Ann	Lion Ore	450 km E of Perth	New project, under construction	late 2001	6.7 kt Ni in concentrate	\$42m	na
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
Cawse 2	Centaur/Anaconda	50 km NW of Kalgoorlie, WA	Expansion, on hold	2003	40 kt Ni 1 kt Co	na	na
Cosmos Deeps	Jubilee Mines	50 km N of Leinster, WA	New project study completed	2003	na	\$33m	na
Marlborough	Preston Resources	70 km NW of Rockhampton, Qld	New project, feasibility study completed	na	25 kt Ni 2 kt Co	\$739m	1000 C 300 O
Mt Keith	WMC	S of Wiluna, WA	Expansion, feasibility study about to commence	na	22 kt Ni	\$300m	na

MINERALS AND ENERGY PROJECTS

Project	Company b	Location	Status c	Expected startup	New capacity d	Capital expend. e	Employment f
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/ 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	\$80–90m	150 C 105 O
Pinjarra rare earth plant	Rhodia Pinjarra	Pinjarra, WA	New project, feasibility study underway	na	15 kt rare earth nitrates	\$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, committed	2003	600 000 lbs tantalum	\$65m	na
Wodgina mine expansion	Sons of Gwalia	100 km S of Port Hedland, WA	Expansion, committed	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: John Hogan + 61 2 6272 2056

Vanadium

Balla Balla	Renewable Energy Corporation	100 km SW of Port Hedland, WA	New project, feasibility study underway	late 2001	6 kt vanadium pentoxide	\$100m	400 C 90 O
-------------	------------------------------	-------------------------------	---	-----------	-------------------------	--------	---------------

For further information contact: John Hogan + 61 2 6272 2056

Project	Company b	Location	Status c	Expected startup	New capacity d	Capital expend. e	Employment f
Other commodities							
Burrup Peninsula 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
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
EMD and manganese sulfate plant	HiTec Energy	Port Hedland, WA	New project, feasibility study completed	2002	40 kt electrolytic Mn dioxide 15 kt Mn sulphate	\$140m	na C 75 O
Munni Munni PGM project	Helix Resources	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 underway	na	250 kt kaolin	na	na
For further information contact: John Hogan + 61 2 6272 2056							

Minerals processing facilities

Alumina							
Comalco alumina refinery project	Comalco	Gladstone, Qld	New project, final feasibility study underway	2004	1400 kt alumina	\$1.4b	700 C 450 O
QAL refinery expansion	Queensland Alumina	Gladstone, Qld	Expansion, feasibility study underway	2005	1000 kt	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							

MINERALS AND ENERGY PROJECTS

Project	Company b	Location	Status c	Expected startup	New capacity d	Capital expend. e	Employment f
Aluminium							
Aldoga smelter	Aldoga Aluminium Smelter Pty Ltd	Aldoga, near Gladstone, Qld	New project, feasibility study underway	2004	500 kt	\$3b	3500 C 900 O
Kurri Kurri aluminium smelter	VAW	Kurri Kurri, NSW	Efficiency improvements, feasibility study underway	2004	na	\$100m	na
Kurri Kurri aluminium smelter (fourth potline)	VAW	Kurri Kurri, NSW	Expansion, prefeasibility study underway	na	100 kt	na	na
For further information contact: Michael Peel + 61 2 6272 2073							
Copper							
QSmelt copper smelter	Queensland Minex (Mineral Commodities)	Phosphate Hill, Qld	New project, feasibility study underway	na	105 kt Cu matte 175 kt sulfuric acid	\$120m	200 C 90 O
For further information contact: Peter Berry + 61 2 6272 2120							
Crude iron and steel							
Fortescue	Austeel	Fortescue 80 km SW of Karratha, WA	New project, prefeasibility study underway	2005	20 Mt iron ore 6 Mt pellets 4.6 Mt DRI	\$2.2b	5000 C (peak) 600 O
Hismelt plant	Hismelt (Rio Tinto)	WA or overseas	New project, feasibility study underway	2003	800 kt Hismelt product (low impurity iron units)	\$300m	na
Hunter specialty steel mini mill	Boulder Group, Australian Overseas Resources, Danieli	Newcastle, NSW	New project, feasibility study underway	na	260 kt steel	US\$425m (A\$815m)	na
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
Mt Gibson Iron pellet plant	Mt Gibson Iron	Geraldton, WA	New project, feasibility study completed	na	4Mt DRI	\$700m	1100 C 360 O
Newcastle integrated steel plant	Austeel	Newcastle, NSW	New project, prefeasibility study underway	na	3.85 Mt steel	\$2.8b	na
Oakajee Mid West iron and steel project	Kingstream Steel	Oakajee, WA	New project, feasibility study completed	na	2.6 Mt steel	\$1.7b	2000 C 822 O

Project	Company b	Location	Status c	Expected startup	New capacity d	Capital expend. e	Employment f
Pig iron plant	Australian Bulk Minerals	Port Latta, Tas	New project, feasibility study completed	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

Anaconda magnesium project	Anaconda	Near Murrin Murrin, 45 km E of Leonora, WA	New project, prefeasibility study underway	na	100 kt magnesium metal	\$1b	na
Arthur/Lyons River magnesium metal project	Crest Magnesium	Bell Bay, Tas	New project, feasibility study underway	2003	95 kt magnesium metal/alloy	\$950m	1000 C 440 O
Batchelor magnesium project	Mount Grace Resources/MINTEX/Anglo American	85 km S of Darwin, NT	New project, feasibility study underway	na	50 kt magnesium metal	\$250m	100 O
Hazelwood magnesium project	Hazelwood Power	150 km E of Melbourne, Vic	New project, prefeasibility study underway	na	34 kt magnesium metal	\$270m	na
Magmetal project	Australian Magnesium Corporation	Stanwell, near Rockhampton, Qld	New project, feasibility study completed	2004	96 kt magnesium metal	\$1.13b	1000 C 300 O
PMMA project	Pilbara Magnesium Metal Associates	Pilbara, WA	New project, prefeasibility study underway	2002	50 kt magnesium metal	\$700m	na
South Australia magnesium project	SAMAG (Pima Mining/RFC)	Port Pirie, SA	New project, feasibility study nearing completion	2003	52.5 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	Golden Triangle Resources	Woodsreef, NSW	New project, feasibility study underway	na	80 kt magnesium metal/alloy	\$700m	na

For further information contact: Michael Peel + 61 2 6272 2073

MINERALS AND ENERGY PROJECTS

Project	Company b	Location	Status c	Expected startup	New capacity d	Capital expend. e	Employment f
Nickel							
Kwinana refinery expansion	WMC	Kwinana, WA	Expansion, under construction	mid 2001	6 kt Ni	na	na
Yabulu refinery expansion	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							
Lithgow silicon project	Portman Mining	Lithgow, NSW	New project, feasibility study completed. On hold pending sale	na	30 kt silicon metal 10 kt silica fume	\$140m	300 C 140 O
For further information contact: John Hogan + 61 2 6272 2056							

Titanium minerals							
Kemerton TiO ₂ pigment plant	Millennium Inorganic Chemicals	Kemerton, WA	Expansion, on hold	na	110 kt TiO ₂ pigment	\$470m	500 C 200 O
Kwinana TiO ₂ pigment plant	Tiwest JV	Kwinana, WA	Three stage expansion, on hold	na	100 kt TiO ₂ pigment	\$200m	200 C 65 O
For further information contact: John Hogan + 61 2 6272 2056							

Zinc							
Zinc ferrite reprocessing plant	Sun Metals	Townsville, Qld	New project, committed	2002	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.