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Resource Economics – Bureau of Rural Sciences

Minerals and energy
Major development projects – October 2010 listing

Michael Lampard, Alan Copeland and commodity analysts

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Australian Bureau of Agricultural and Resource Economics – Bureau of Rural Sciences
Postal address GPO Box 1563 Canberra ACT 2601 Australia
Switchboard +61 2 6272 2010
Facsimile +61 2 6272 2001
Email info@abare-brs.gov.au
Web abare-brs.gov.au

ABARE–BRS project 43136

On 1 July 2010, the Australian Bureau of Agricultural and Resource Economics (ABARE) and the Bureau of Rural Sciences (BRS) merged to form ABARE–BRS.

Minerals and energy major development projects – October 2010 listing

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Key points

- At the end of October 2010, there were 72 projects at an advanced stage of development, with a record capital expenditure of $132.9 billion. This represents a 21 per cent increase from April 2010. The record value of advanced minerals and energy projects reflects, in part, the decision to proceed with the development of BG Group's Queensland Curtis Island LNG facility and Rio Tinto's commitment to expand its iron ore export capacity by 60 million tonnes over the next three years.
- In 2009–10, exploration expenditure in Australia's minerals and energy sector was $5.7 billion, a decrease of 5 per cent on expenditure in 2008–09. Nevertheless, investment in mineral exploration remained strong, with Australia recording its third highest mineral exploration expenditure in 2009–10.
- New capital expenditure in the mining industry was $34.8 billion in 2009–10, 8 per cent lower than in 2008–09. Based on industry intentions from the June quarter 2010, Australian Bureau of Statistics (ABS) survey data indicate capital expenditure in the mining sector in 2010–11 may be around $54.8 billion.
- In the six months to October 2010, 25 projects with a combined capital cost of $8.2 billion were completed in Australia. In addition, 72 projects with a combined capital cost of $132.9 billion are currently either committed or under construction.

Exploration expenditure

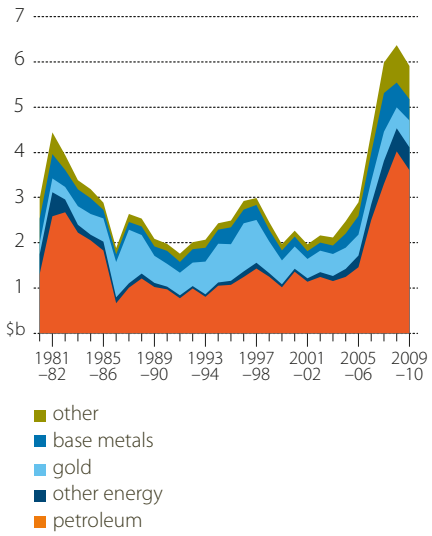
The amount of investment in mineral exploration affects critically the ability of Australia's minerals and energy sector to sustain its recent strong growth and expand its contribution to national economic growth over the medium to long term. Mineral exploration represents an investment in knowledge about the potential size, location and quality of mineral deposits.

In general, decisions to invest in mineral exploration depend on the probability of discovering an economic mineral deposit or extending the resource base of a known deposit. However, a range of factors affect the decision to invest in mineral exploration. Some of these are common to investment decision across the economy, while others are specific to the minerals sector. These factors include: current and expected future prices; mining and processing technologies; input costs; access to land; and government policies. Government policies are also important in deciding whether to undertake exploration expenditure as they determine the overall legal, social and environmental foundations that affect the security and economics of an investment.

Brownfield exploration expenditure—exploration around existing or known deposits—has accounted for around 60 per cent of total mineral exploration expenditure over the past eight years. Two factors have contributed to this trend. First, higher world prices have encouraged companies to reassess reserves previously considered uneconomic. Second, brownfield mining is attractive for companies because infrastructure often already exists, which means extraction can start sooner and capital costs are lower.

The share of petroleum exploration expenditure undertaken on production leases (20 per cent of total petroleum exploration expenditure) has been comparatively lower than the proportion of exploration expenditure spent on brownfield mineral deposits in recent years. This reflects in part the amount of exploration associated with feasibility studies on greenfield petroleum projects.

a Australian private minerals exploration expenditure
2010–11 dollars



In 2009–10, mineral exploration expenditure in Australia was $5.7 billion, a decrease of 5 per cent on expenditure in 2008–09. In real terms, exploration expenditure in 2009–10 was the third highest on record and nearly double the average exploration expenditure of the past 30 years. Expenditure on mineral exploration in Australia since 1980–81 (in real terms) is provided in figure a.

Despite recording strong overall investment in exploration expenditure in 2009–10, total exploration expenditure declined for the first time since 2003–04. Lower exploration expenditure reflects, in part, the delaying or slowing of some exploration activity in response to lower commodity prices and cost saving measures which persisted throughout 2009. Although there is always a degree of uncertainty surrounding the outlook for commodity prices, exploration expenditure is likely to remain high. This reflects expectations of a positive outlook for commodity prices over the medium term.

In 2009–10, exploration expenditure on energy minerals declined, as lower expenditure on petroleum and uranium more than offset increased expenditure on coal. Petroleum exploration expenditure declined by around 8 per cent to $3.5 billion in 2009–10, although it was still the second highest recorded in Australia's petroleum industry. Exploration expenditure for coal increased by 8 per cent to around $321 million in response to expectations of increasing world coal demand over the medium to longer term. Spending on uranium exploration decreased by 9 per cent in 2009–10, as sharp declines in uranium spot prices in recent years have resulted in some exploration activity being postponed.

With the notable exceptions of copper and gold, exploration expenditure for all other major mineral commodities declined in 2009–10. Expenditure on gold exploration increased by 31 per cent to around $575 million in 2009–10, as higher Australian denominated gold prices encouraged exploration.

In 2009–10, exploration expenditure on base metals declined by 12 per cent to around $457.2 million, as lower expenditure on silver, lead, zinc and nickel more than offset an increase in copper exploration expenditure. Lower expenditure on base metal exploration is partly attributable to a continuation of cost saving measures, which have affected some small exploration companies, and uncertainty surrounding future commodity price movements.

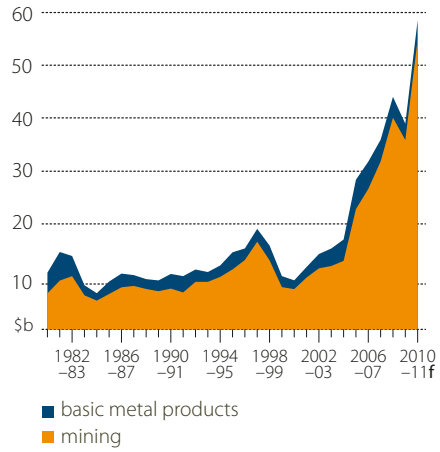
Iron ore exploration expenditure declined by around 11 per cent to $524 million in 2009–10. This follows a 31 per cent increase in exploration expenditure in 2008–09.

Over the medium term, a set of common factors is expected to influence exploration expenditure in each sector of Australia's minerals and energy industry. These include prospectivity, the outlook for prices over the medium to longer term, expected future costs of exploration and development (including costs of labour, fuel, drilling rigs and other inputs) and Australia's relative attractiveness for mineral exploration and extraction.

Capital expenditure

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

b New capital expenditure
2010–11 dollars



Capital expenditure in mining refers to spending on equipment, plant and assets directly related to mining or concentrating of ores or other raw materials. Expenditure on basic metals products refers to spending on equipment, plant and assets for basic processing of mine output. As Australia has a comparative advantage in mining, relative to basic metal processing, a larger proportion of capital expenditure is directed to mining rather than basic metal processing.

Based on ABS data, new capital expenditure in the mining industry was $34.8 billion in 2009–10, 8 per cent lower than in 2008–09. The fall in capital expenditure reflects some projects being suspended or delayed following commodity price falls in late 2008 and early 2009. In real terms (2010–11 dollars), new capital expenditure in 2009–10 was the second highest on record and was 2.7 times the average annual expenditure of the past 30 years ($13 billion).

There are indications that capital expenditure in the mining sector may increase in 2010–11. Based on industry intentions surveyed in the June quarter 2010, ABS data indicate capital expenditure in the mining sector in 2010–11 is estimated to be around $54.8 billion. If this expenditure is realised, it would represent a 58 per cent increase on 2009–10 expenditure. The scale and pace of expenditure estimated by the ABS is consistent with recent trends shown in ABARE–BRS's full list of major mineral and energy projects.

Capital expenditure in the metal products sector, which includes mineral processing activities covered in ABARE–BRS's projects list, was $3 billion in 2009–10, approximately 20 per cent lower

than in 2008–09. Lower capital expenditure most likely reflects the slowing of construction at two major upgrades at the Boyne Island smelter and the completion of the Kwinana titanium oxide pigment plant. Surveyed industry intentions indicate metal products expenditure could increase by 22 per cent to $3.7 billion in 2010–11.

ABARE–BRS's list of major minerals and energy development projects

The full list

ABARE–BRS's list of major minerals and energy projects expected to be developed over the medium term is compiled every six months. Information contained in the list spans the mineral resources sector and includes energy and minerals commodities projects and mineral processing projects.

The information comes predominantly from publicly available sources but, in some cases, is supplemented by information direct from companies. The list is fully updated to reflect developments in the previous six months. The projects list is released around May and November each year.

What's in the list?

The latest projects list contains information on 376 projects, providing the following details:

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

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

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

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

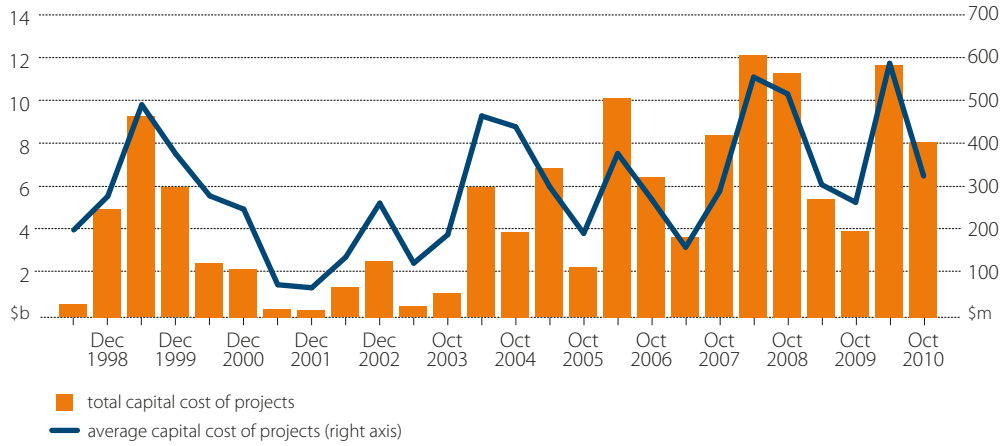
Where to get the list

The list is available only as an electronic product and can be downloaded from www.abare-brs.gov.au or obtained by phoning +61 2 6272 2010.

Recently completed projects

In the six months ended October 2010, 25 major minerals and energy projects, with a combined capital cost of $8.2 billion, were completed (table 1). Of the 25 projects completed, five were energy projects, 10 were mineral mining projects, nine were infrastructure projects and one was a mineral processing project. While the number of projects completed was the highest since the six months ending October 2007 (table 2), the total capital cost of completed projects was lower than the previous listing and slightly below the average (in 2010–11 dollars) for the previous eight years (figure c).

C Completed projects, June 1998 to October 2010, total and average capital costs
2010–11 dollars



Energy projects

In the six months ended October 2010, five energy projects were completed at a capital cost of $2.5 billion. Of these five projects, four were coal projects and one was a coal seam gas project.

The largest energy project completed in the six months to October 2010 was Rio Tinto's Clermont open cut thermal coal project. The mine, which will ultimately replace Rio Tinto's existing Blair Athol mine, has an annual capacity of 12.2 million tonnes and cost US$1.3 billion to construct. Other coal projects completed include Xstrata's Blakefield South thermal coal mine, Whitehaven Coal's Narrabri coal project, both in New South Wales, and Syntech Resources' Cameby Downs thermal coal mine in Queensland. Blakefield South cost US$330 million to develop and will replace the existing Beltana coal mine. Narrabri coal project has a capacity of 1.5 million tonnes and cost $227 million to complete. Cameby Downs cost $250 million to construct and has added 1.4 million tonnes to Queensland's coal capacity. The only other non-infrastructure energy project completed in the six months to October 2010 was APLNG's (Origin Energy and ConocoPhillips joint venture) Talinga Stage Two project. The facility will supply around 33 petajoules of gas a year to the domestic market and cost $260 million to develop.

1 Major mineral resource developments - projects completed, May 2010 to October 2010

commodity	project	location	company	capital expenditure $m
Mining - energy projects				
Black coal	Blakefield South	NSW	Xstrata/Nippon Steel	US$330m
Black coal	Cameby Downs	Qld	Syntech Resources	$250m
Black coal	Clermont open cut	Qld	Rio Tinto	US$1.3b
Black coal	Narrabri coal project	NSW	Whitehaven	$227
Coal seam gas	Talinga Stage 2	Qld	APLNG (Origin/Energy ConocoPhillips)	$260m
Mining - mineral projects				
Copper	Northparkes (E48 development)	NSW	Rio Tinto	US$160m
Gold	Randalls (phase 1)	WA	Integra Mining	$64m
Gold	Duketon Gold Project	WA	Regis Resources	$73m
Gold	Edna May	WA	Catalpa Resources	$92m
Gold	Super Pit	WA	Newmont/Barrick Gold	na
Iron ore	Hamersley Iron Brockman 4 project (Phase A)	WA	Rio Tinto	US$1.5b
Iron ore	Cairn Hill iron ore copper gold project	SA	IMX Resources	$15m
Mineral sands	Eucla Basin (Jacinth and Ambrosia deposits)	SA	Iluka Resources	$390m
Other commodities	Mt Cattlin	WA	Galaxy Resources	$79m
Other commodities	Nicholas Downs	WA	Hancock Prospecting/Mineral Resources	na
Infrastructure projects				
Black coal	Kooragang Island Coal Terminal expansion (project 3Exp)	NSW	Port Waratah Coal Services	$458m
Black coal	NCIG export terminal (Newcastle Coal Infrastructure Group)	NSW	NCIG	US$1.1b
Black coal	Minimbah Bank Third Rail Line (stage 1)	NSW	Australian Rail and Track Corporation	$134m
Black coal	Brisbane coal terminal expansion	Qld	Queensland Bulk Handling	$10m
Black coal	Coppabella to Ingsdon rail duplication	Qld	Queensland Rail	$80m
Petroleum – gas pipeline	Dampier–Bunbury gas pipeline expansion (Stage 5B)	WA	DBP	$700m
Petroleum – gas pipeline	Eastern Gas Pipeline	NSW	Jemena	$41m
Petroleum – gas pipeline	Queensland Gas Pipeline	Qld	Jemena	$112m
Iron ore	Utah Point Berth Project	WA	Port Hedland Port Authority	$225m
Mineral processing projects				
Titanium minerals	Kwinana TiO_2 pigment plant (stage 1)	WA	Tiwest JV	$120m

2 Completed projects, October 2003 to October 2010

2010–11 dollars

	number of projects	total capital cost of projects	average capital cost of projects ($million)
Six months ending			
October-03	6	1 145	191
April-04	13	6 056	466
October-04	9	3 970	441
April-05	23	6 932	301
October-05	12	2 325	194
April-06	27	10 233	379
October-06	24	6 541	273
April-07	23	3 722	162
October-07	29	8 466	292
April-08	22	12 234	556
October-08	22	11 380	517
April-09	18	5 525	307
October-09	15	3 993	266
April-10	20	11 765	588
October-10	25	8 175	327
Total	288	102 462	356

Mineral projects

In the six months to October 2010, 10 mineral mining projects were completed at a capital cost of $2.5 billion. The largest, in terms of capital expenditure, was Rio Tinto's Hamersley Iron Brockman 4 project in Western Australia. Completed at a capital cost of US$1.5 billion, the expansion has added 22 million tonnes of capacity to Rio Tinto's Pilbara operations.

Other projects completed in Western Australia in the six months to October 2010 include four gold projects, a manganese project and a lithium project. The largest of the gold projects, in terms of capital expenditure, is Catalpa Resources' $92 million redevelopment of the Edna May gold mine, which will increase production by 100 000 ounces a year. Other gold projects completed include Integra Mining's $64 million Randalls gold mine, Newmont's expansion to the Super Pit, and Regis Resources' $73 million Duketon Gold Project. The joint venture Nicholas Downs manganese project between Hancock Prospecting and Mineral Resources was also completed in the past six months, and will produce around 720 000 tonnes a year at full capacity.

In South Australia, two mineral mining projects were completed in the six months to October 2010. These are Iluka Resources' Eucla Basin mineral sands operation and IMX Resources' Cairn Hill iron ore copper gold project. Eucla Basin was completed at a capital cost of $390 million and has an annual production capacity of 490 000 tonnes of mineral sand concentrates. Cairn Hill cost $15 million to complete and has an annual capacity of 1.7 million tonnes of iron concentrates.

In New South Wales, the only mineral mining project completed in the six months to October 2010 was Rio Tinto's Northparkes copper mine expansion. The expansion project cost US$160 million to complete and has been underway since early 2007. Development of Northparkes slowed during 2009 in response to lower demand as a result of the global financial crisis.

Infrastructure projects

In the six months to October 2010, there were nine mineral and energy infrastructure projects completed, at a combined cost of $3 billion. These comprised five coal projects, three gas pipelines and an iron ore infrastructure project.

The largest energy infrastructure project completed, in terms of capital expenditure, was Newcastle Coal Infrastructure Group's (NCIG) 30 million tonne coal export terminal. Once fully operational, the US$1.1 billion private user facility will significantly increase the export capacity of the Hunter Valley coal chain. An expansion to increase the capacity of the NCIG terminal to 53 million tonnes a year is already under construction and is expected to be completed in 2013. Also at the Port of Newcastle, Port Waratah Coal Services' 3Exp project was also completed in the past six months. The 3Exp expansion has increased the annual capacity of the Kooragang Island Coal Terminal by 11 million tonnes and cost $458 million to complete.

To support these significant increases to port capacity, ongoing expansions to rail infrastructure continues throughout the Hunter Valley. In the past six months, the Minimbah Bank Third Rail Line was completed at a capital cost of $134 million. In Queensland, two coal infrastructure projects were also completed—the Brisbane coal terminal expansion and the Coppabella to Ingsdon rail duplication.

Three gas pipelines were completed in the six months to October 2010. These were Jemena's Eastern Gas Pipeline and Queensland Gas Pipeline expansions and DBP's Stage 5B expansion to the Dampier–Bunbury gas pipeline (DBNGP). The largest of these projects, the DBNGP expansion project, has increased the capacity of the existing pipeline by 40 petajoules a year at a cost of $700 million. Jemena's Eastern Gas Pipeline will transport gas from Longford in Victoria to Wollongong in New South Wales. The pipeline has an annual capacity of 20 petajoules and cost $41 million to construct. Jemena's Queensland Gas Pipeline was completed at a cost of $112 million and has a capacity of 25 petajoules a year. It will transport gas over 550 kilometres from Wallumbilla to Gladstone.

In Western Australia, the Port Hedland Port Authority completed their $225 million Utah Point Berth Project. With a total capacity of 18 million tonnes, this multi-use export terminal has significantly increased the export capacity available to smaller iron ore producers.

Mineral processing projects

The only mineral processing project completed in the six months to October 2010 was Tiwest's Kwinana TiO_2 pigment plant. The pigment plant located in Kwinana, Western Australia, cost $120 million to complete and, once fully operational, will have a capacity of 40 000 tonnes a year.

Advanced projects

At the end of October 2010, there were 72 projects at an advanced stage of development on ABARE–BRS's project list (table 3). Projects in this category are either 'committed' or 'under construction'. Of the 72 projects, 21 are either newly committed or entered the list at an advanced stage during the previous six months.

The total capital expenditure of the 72 advanced projects at the end of October 2010 is a record $132.9 billion, an increase of 21 per cent from April 2010. The significant increase primarily reflects BG Group's final investment decision to proceed with the Queensland Curtis LNG project, which has a capital expenditure of $US15 billion. The value of advanced projects also includes the approved early works expenditure of $3 billion on two projects that occurred before a final investment decision was made. The early works allowed for procurement of equipment with long lead times and for initial project work. At October 2010, the value of committed capital expenditure in the mineral and energy sector was equivalent to nearly 12 per cent of Australia's gross domestic product.

3 Committed projects, October 2010

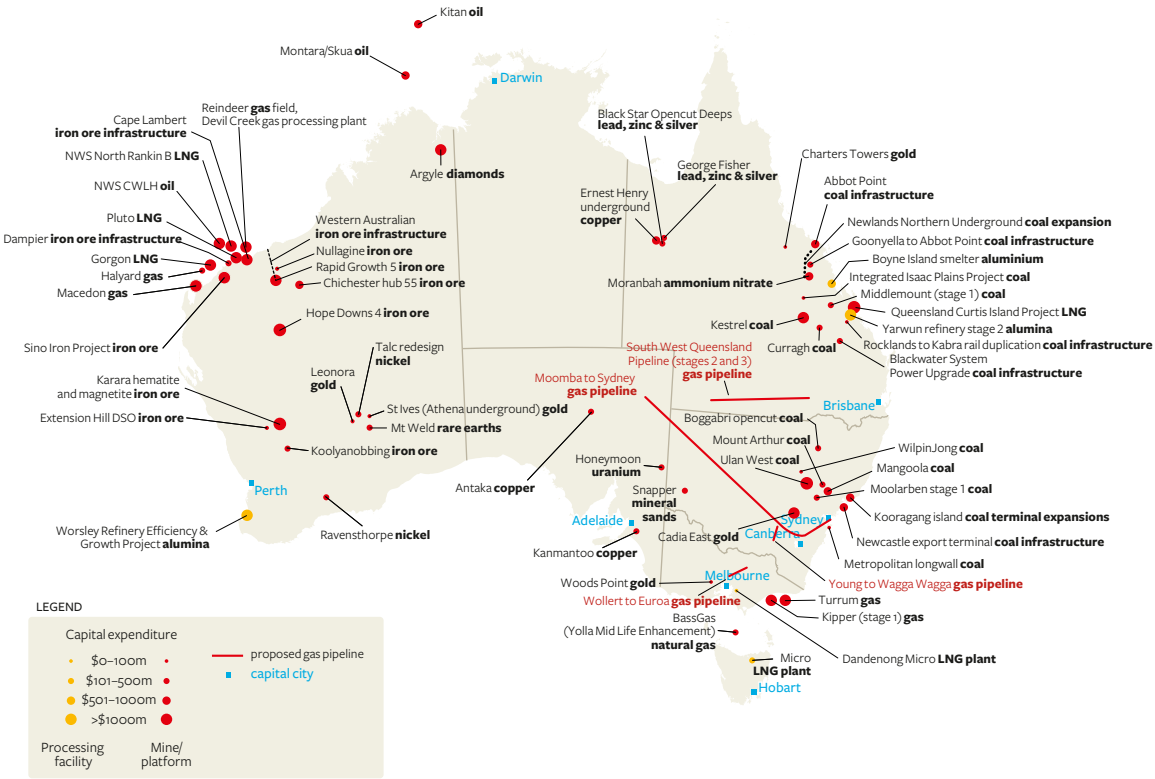
	energy projects		minerals projects		infrastructure projects		minerals and energy processing		total	
	no.	cost $m	no.	cost $m	no.	cost $m	no.	cost $m	no.	cost $m
New South Wales	7	3 194	2	2 050	4	1 715	0	0	13	6 959
Victoria	2	2 611	1	44	1	45	1	65	5	2 765
Queensland	6	19 711	5	1 990	6	3 343	3	2 797	20	27 841
Western Australia	7	65 447	15	19 237	4	5 922	1	2 444	27	93 050
South Australia	1	138	2	242	0	0	0	0	3	380
Tasmania	1	345	0	0	0	0	1	150	2	495
Northern Territory	2	1 444	0	0	0	0	0	0	2	1 444
Australia	26	92 890	25	23 563	15	11 025	6	5 456	72	132 934

Energy projects

As at October 2010, energy project developments accounted for 26 of the 72 advanced projects on ABARE–BRS's list and around 70 per cent (or $92.9 billion) of committed capital expenditure. Capital expenditure on advanced energy projects increased by 16 per cent in the six months to October 2010, largely reflecting the Queensland Curtis Island LNG project being added to the advanced list. Petroleum projects now account for around 94 per cent ($87.3 billion) of the total estimated capital cost of all advanced energy projects.

The largest petroleum project, by capital expenditure, is the Gorgon LNG project which is a joint venture between Chevron, Shell and ExxonMobil, as well as three Japanese customers that hold minor equity stakes. The 15 million tonne LNG development received a final investment decision in 2009 and is scheduled for completion by 2015. With an estimated capital

1 Advanced minerals and energy projects
October 2010



expenditure of $43 billion, it is the largest resources project to be undertaken in Australia. Other significant LNG projects on the list include QGC's Queensland Curtis LNG project and Woodside's Pluto LNG project. QGC approved the development of its Queensland Curtis Island LNG facility in October 2010. Once completed in 2014, the facility will have an annual capacity of 8.5 million tonnes of LNG and will be the first facility in the world to use coal seam gas as a feedstock in the production of LNG. Woodside's Pluto two train LNG facility will have an annual capacity of 4.3 million tonnes and has an announced capital cost of $12.1 billion. This project is scheduled to produce its first LNG in 2011.

Ten other petroleum developments account for a further $14.7 billion in capital expenditure. In September 2010, BHP Billiton and Apache Energy approved the US$1.5 billion Macedon project. Macedon will supply around 75 petajoules of gas a year to the Western Australian domestic gas market from 2013. The North West Shelf Joint Venture is also undertaking the US$5.1 billion North Rankin B project in Western Australia, which is due for completion in 2013. Other significant petroleum projects include the US$1.3 billion Turrum natural gas and condensate field in Bass Strait, which is due for completion in 2011, and the US$1.1 billion Kipper gas and condensate field off the coast of eastern Victoria, also scheduled for completion in 2011.

Coal mine projects account for 6 per cent ($5.4 billion) of the estimated $92.9 billion capital cost of all advanced energy projects. The largest coal mine development is Xstrata's US$1.1 billion Ulan West expansion in New South Wales. Due for completion in 2014, the expansion will produce around 6.7 million tonnes of thermal coal a year for export markets. Other significant projects include Rio Tinto's US$991 million Kestrel expansion near Emerald in Queensland. Once operational, the expansion will increase annual production capacity of coking coal by 1.7 million tonnes.

In New South Wales, Xstrata Coal's US$888 million Mangoola (Anvill Hill) open cut mine development near Muswellbrook is expected to have a capacity of 8 million tonnes of thermal coal when completed in 2011. Another large coal mine under construction in New South Wales is Stage 1 of the Moolarben project. The $405 million project will enable 8 million tonnes of production from an open cut mine (late 2010) and 4 million tonnes of production from an underground mine (2012).

Apart from those already listed, eight other advanced coal mine developments in Queensland and New South Wales are expected to raise coal production capacity by 19 million tonnes a year over the next three to four years. The combined capital cost of these projects is $1.4 billion.

Mineral projects

At the end of October 2010, there were 25 advanced mineral mining projects collectively valued at around $23.6 billion. Sixty per cent of these projects are located in Western Australia and comprise 82 per cent ($19.2 billion) of the estimated total capital expenditure. Eight mineral mining projects, including iron ore (5), gold (1), diamonds (1) and ammonium nitrate (1), account for 89 per cent ($20.9 billion) of the total estimated capital cost of advanced mineral mining projects.

In the six months to October 2010, eight mineral mining projects were added to the advanced project list, with a combined capital value of $2.8 billion. The largest of these projects is Rio Tinto's US$1.6 billion Hope Downs 4 project. Once completed in 2013, this project will have an annual production capacity of 15 million tonnes. Also added to the advanced list in the six months to October 2010 were two copper and gold projects, a nickel project and a lead–zinc–silver project.

Major iron ore projects on the advanced list include: BHP Billiton's US$5.7 billion Western Australian Iron Ore Rapid Growth Project 5 (annual production capacity of 45 million tonnes) and CITIC Pacific Mining's US$5.2 billion Sino Iron project in Cape Preston, Western Australia, which will have an annual production capacity of 28 million tonnes of iron ore pellets and concentrates. Gindalbie Metals' Karara magnetite project is scheduled for completion in 2011. This project, along with the recently committed Karara hematite project, will have a total combined capacity of 10 million tonnes and a total project cost of around $2 billion. Fortescue Metals Group's Chichester Hub 55 project in Western Australia is expected to produce 20 million tonnes of iron ore a year from 2011, with the project costing around $630 million.

The largest advanced gold project is Newcrest's newly committed $1.9 billion Cadia East underground expansion near Orange in New South Wales. The expansion is scheduled for completion in 2013 and is expected to increase total gold production at Cadia Valley to between around 700 000 and 800 000 ounces a year. Four other gold projects are at an advanced stage of development, including two that have been moved to the advanced list in the past six months. The largest gold projects include: Citigold's 280 000 ounce Charters Towers mine in Queensland; Gold Fields' 85 000 to 95 000 ounce St Ives (Athena underground) expansion near Laverton in Western Australia; St Barbara's 55 000 to 60 000 ounce Leonora expansion in Western Australia; and Morning Star Gold's 25 000 ounce Woods Point redevelopment in Victoria.

There are currently seven base metal operations at an advanced stage of development in Australia. Collectively, these six projects have a combined committed capital expenditure of $1.5 billion or around 6 per cent of the committed capital expenditure of mineral mining projects. The largest of these projects is Xstrata's recently approved US$542 million Ernest Henry underground mine expansion. The project is scheduled to be completed in 2013 and will increase the capacity of the operation by 50 000 tonnes of copper a year. Other significant projects include Xstrata's George Fisher lead–zinc mine expansion in Queensland, First Quantum's redevelopment of the Ravensthorpe nickel operation in Western Australia and BHP Billiton's Talc Redesign Project in Western Australia.

Other significant projects currently under construction include Rio Tinto's Argyle underground development (diamonds) and Incitec Pivot's Moranbah ammonium nitrate project. Rio Tinto's Argyle underground development has a capital expenditure of US$1.5 billion and, once completed, will enable mining at Australia's largest diamond mine to continue. In Queensland, Incitec Pivot's Moranbah ammonium nitrate project is scheduled for completion in 2012. The project is expected to have a capital cost of $935 million and to produce around 330 000 tonnes of ammonium nitrate a year.

Infrastructure projects

At the end of October 2010, there were 15 infrastructure projects at an advanced stage of development, with a combined capital cost of $11 billion. Infrastructure projects include iron ore and coal port and rail projects and gas pipelines. Of the 15 advanced infrastructure projects, seven are coal-related, four will support iron ore exports and four are gas pipelines.

At the end of October 2010, there were four coal terminal expansions and three rail expansions either committed or under construction. In terms of capital expenditure, the largest coal port project is the second stage of the NCIG export terminal at the Port of Newcastle. When the $900 million expansion is completed in 2013, the facility will have a coal loading capacity of 53 million tonnes. Further upgrades to the terminal could increase annual coal handling capacity to 66 million tonnes a year. Also at the Port of Newcastle, Port Waratah Coal Services recently approved an expansion to increase the capacity of Kooragang Island Coal Terminal by 20 million tonnes to 133 million tonnes. The project, which is expected to be completed in 2012, has a capital expenditure of $670 million. In Queensland, the Abbot Point Coal Terminal X50 expansion at Bowen is due for completion in 2011. At a cost of $818 million, the expansion will increase annual coal loading capacity from 25 million tonnes to 50 million tonnes a year.

Major rail infrastructure projects include the Goonyella to Abbot Point Expansion Project and the Blackwater system power upgrade. At $1.1 billion, the Goonyella to Abbot Point Expansion is the largest committed rail project. Expected to be completed in 2012, the project will link the Goonyella rail system to the Newlands rail system as well as upgrade the existing Newlands system, adding 50 million tonnes to the capacity of the Queensland rail network. It will also enable a significant quantity of coal to be railed from the Bowen Basin to Abbot Point for export. In total, coal infrastructure projects have an estimated capital cost of $4.1 billion or 37 per cent of total committed capital expenditure in the coal industry.

At the end of October 2010, there were four natural gas pipelines at an advanced stage of development. Epic Energy is undertaking an $858 million, 77 petajoule a year expansion of its South West Queensland Pipeline. Australian Pipeline Group is expanding the Moomba to Sydney pipeline at a cost of $100 million, with a scheduled completion date of 2012. Australian Pipeline Group is also expanding the capacity of the Wollert to Euroa (Victoria) and Young–Wagga Wagga (New South Wales) pipelines.

There are four iron ore infrastructure projects under construction, all located in Western Australia. These include BHP Billiton's Western Australian Iron Ore Infrastructure Project and three Rio Tinto infrastructure projects. As part of its Rapid Growth 5 project, BHP Billiton is expanding its rail and port handling capacity to 300 million tonnes a year. The capital expenditure is included in the total Rapid Growth 5 project cost of US$5.7 billion and will be completed in 2011. Rio Tinto's three infrastructure projects collectively have a capital expenditure of US$3.4 billion and will increase Rio Tinto's port capacity to 283 million tonnes by 2013. The largest of these projects is the Cape Lambert port expansion, which has a capital expenditure of US$3.1 billon and will add 50 million tonnes a year of export capacity to Rio Tinto's Pilbara operations.

The value of advanced infrastructure projects includes around $2.4 billion committed to early works programs by BHP Billiton for expanding its iron ore infrastructure in Western Australia (Rapid Growth 6 project) and the Hay Point Coal Terminal in Queensland. While both projects are yet to receive a final investment decision for full project capital expenditure, BHP Billiton has committed to partial project expenditure to allow for the procurement of equipment with long lead times and for early project construction.

Mineral and energy processing projects

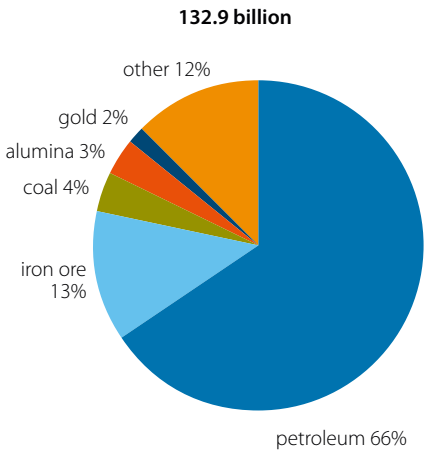
At the end of October 2010, there were six mineral and energy processing projects at an advanced stage of development, with a combined capital expenditure of $5.5 billion. Two alumina projects account for 84 per cent ($4.5 billion) of the total expected capital cost of advanced mineral processing projects. The Worsley Efficiency and Growth Project near Bunbury, Western Australia, is a joint venture between BHP Billiton, Japan Alumina and Sojitz Alumina. The expansion project is due for completion in 2011, has an expected capital cost of US$2.2 billion and is expected to increase alumina production capacity by 1.1 million tonnes a year. Rio Tinto's Yarwun alumina refinery expansion, near Gladstone in Queensland, is scheduled to be completed in late 2012 at a capital cost of $US1.9 billion and is expected to increase capacity by 2 million tonnes a year.

Other mineral processing projects at an advanced stage include Rio Tinto's upgrade at the Boyne Island aluminium smelter in Queensland and two micro LNG processing facility in

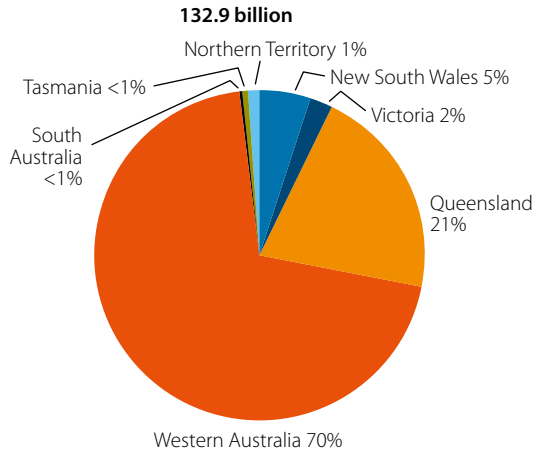
Victoria and Tasmania. At the Boyne Island aluminium smelter, Rio Tinto plans to replace cranes on runway lines 1 and 2 and carbon bake furnace lines 1 and 2. This is expected to be completed progressively over 2011 and 2012 at a combined capital cost of $US617 million. BOC is currently developing micro LNG projects in Victoria and Tasmania. The two projects will supply the transport sector with LNG and have a combined capital cost of $215 million. The Victoria plant has an expected annual capacity of 25 000 tonnes of LNG and is scheduled to be completed in 2012. The Tasmanian plant has a capacity 20 000 tonnes of LNG a year and is expected to be completed in 2011.

A breakdown of proposed capital expenditure on advanced projects, by major commodity grouping, is provided at figure d. Figure e shows the estimated capital expenditure on a state basis.

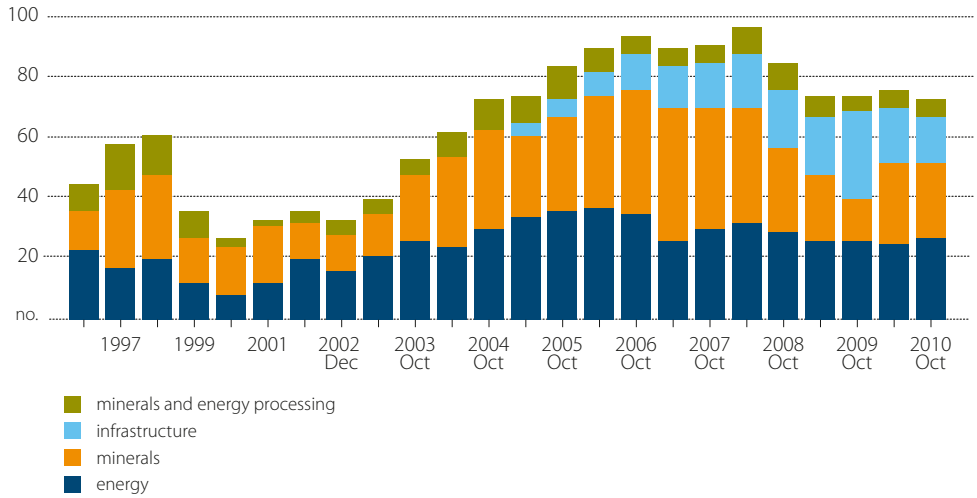
d Value of advanced projects
by commodity, October 2010



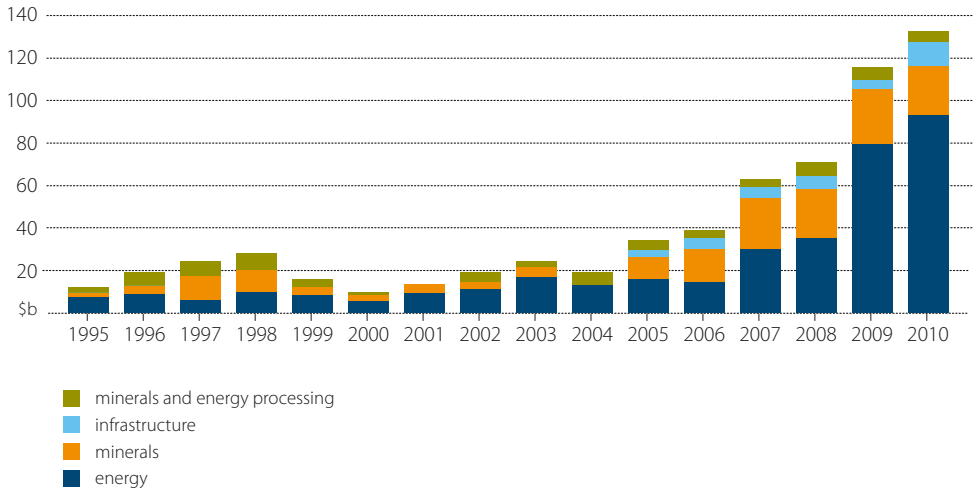
e Value of advanced projects
by state and territory, October 2010



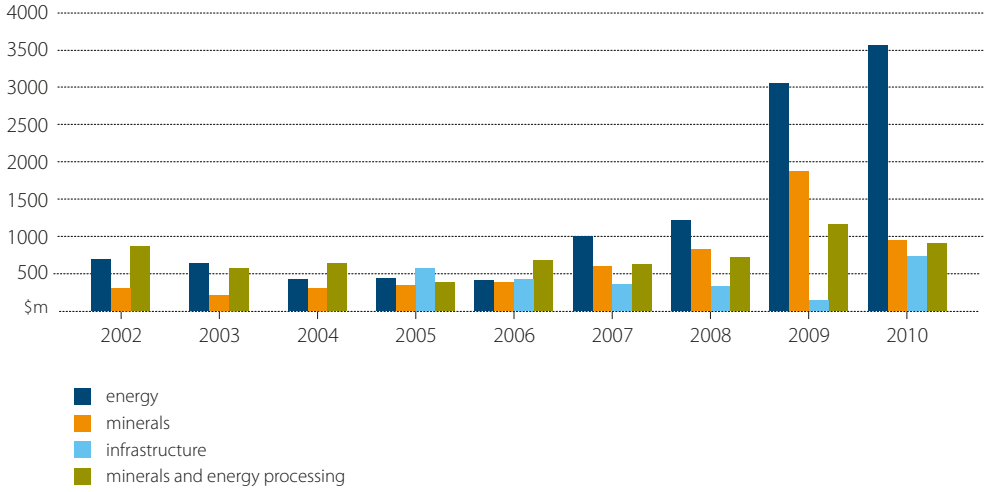
f Number of committed projects



g Value of advanced projects
2010–11 dollars



h Average value of advanced projects
2010–11 dollars



Less advanced projects

Projects considered to be less advanced are either undergoing feasibility (in some cases, pre-feasibility) study, or have not yet been subject to a final investment decision since the completion of a feasibility study. Some projects may face changes in economic or regulatory conditions, or may be targeting the same emerging market opportunities, necessitating

rescheduling. In addition, securing finance for project development, even for high-quality projects with a high probability of success, is not guaranteed.

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

4 Number of less advanced projects, October 2010

commodity	NSW	Vic	Qld	WA	SA	Tas	NT	Aust	potential capital expenditure
	no.	no.	no.	no.	no.	no.	no.	no.	$m
Mining - energy projects									
Black coal	23	0	44	1	0	0	0	68	34 439
Coal Seam Methane	4	0	1	0	0	0	0	5	335
Petroleum	1	5	5	8	0	0	8	27	112 826
Uranium	0	0	2	5	4	0	2	13	1 715
Sub-total	28	5	52	14	4	0	10	113	149 315
Mining - minerals projects									
Bauxite	0	0	3	2	0	0	0	5	2 361
Copper	1	0	5	2	5	0	1	14	1 596
Gold	5	0	4	14	0	0	4	27	2 950
Iron ore	0	0	0	29	4	0	1	34	30 569
Lead-zinc-silver	7	0	2	5	1	0	1	16	3 513
Mineral sands	2	2	0	3	0	0	0	7	621
Nickel	0	0	6	12	0	1	0	19	13 503
Rare earths	0	0	0	0	0	0	1	1	na
Tin	0	0	1	0	0	2	0	3	454
Vanadium	0	0	0	2	0	0	0	2	880
Other commodities	4	0	5	7	0	1	2	19	4 742
Sub-total	19	2	26	76	10	4	10	147	61 189
Infrastructure									
Coal	5	10	0	0	0	0	0	15	11 304
Petroleum pipelines	4	0	3	2	0	0	0	9	3 560
Iron ore	0	0	0	4	2	0	1	7	12 950
Sub-total	9	10	3	6	2	0	1	31	27 814
Minerals and energy processing									
Alumina	0	0	2	2	0	0	0	4	6 367
Copper	0	0	0	0	1	0	0	1	na
Crude iron and steel	0	0	2	0	0	0	0	2	2 000
Magnesium	0	1	0	0	0	0	0	1	20
Titanium minerals	1	0	0	0	0	0	0	1	120
Petroleum	0	0	1	0	2	0	0	3	160
Rare earths	0	0	0	0	1	0	0	1	1 000
Sub-total	1	1	5	2	4	0	0	13	9 667
Total	57	18	86	98	20	4	21	304	247 985

Of the 376 projects on ABARE–BRS's October 2010 list, 81 per cent (304 projects) remain uncommitted. Table 4 contains a summary of the numbers and commodity distribution of the 304 uncommitted projects, together with their potential capital expenditure. The potential capital expenditure data should be used as an approximate guide only. Capital expenditure data for many early stage projects are either not available or, if available, are likely to change significantly if these projects proceed to development. In addition, changes in market conditions can often lead to significant variations in capital expenditure estimates. However, most of the projects which will ultimately proceed to development in the medium term are included in ABARE–BRS's current list of 304 less advanced projects.

Among the capital intensive projects in ABARE–BRS's October 2010 list still undergoing feasibility studies are 15 proposed LNG developments, which collectively could add nearly 95 million tonnes to Australia's annual LNG production capacity in the longer term. These projects include the Browse, Ichthys, Sunrise and Wheatstone projects off the coast of Western Australia and four coal seam gas based LNG projects in Queensland and one in New South Wales.

Among the less advanced iron ore projects, 11 have an estimated capital expenditure of $1 billion or more. These include: Aquila Resources' West Pilbara mine ($5.8 billion); Atlas Iron's Ridley Magnetite Project ($3 billion); Australasian Resources' Balmoral South magnetite project ($2.7 billion); Fortescue Metals Group's Chichester Hub 95 ($2.5 billion), Solomon Hub Stage 1 ($2.4 billion) and Solomon Hub Stage 2 ($2.1 billion); Asia Iron Holdings' Extension Hill Magnetite Project ($2 billion); and Crosslands Resources' Jack Hills Stage 2 mine ($1.5 billion).

Projects new to the list

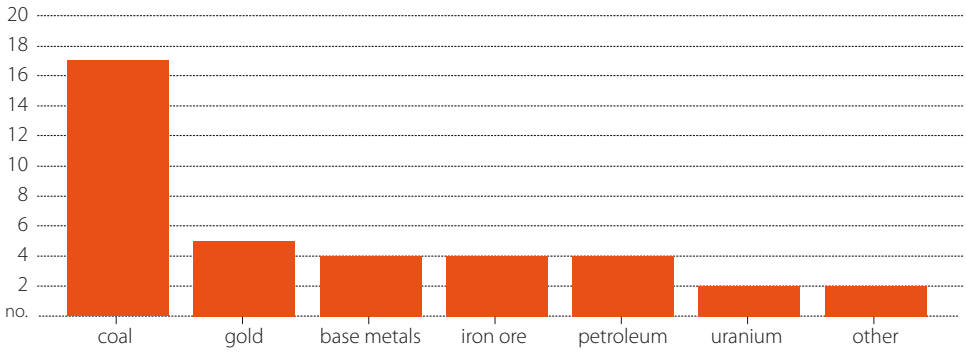
There are 38 projects (both advanced and less advanced) that are new to ABARE–BRS's list since April 2010. The relatively high number of new projects reflects an increase in prices over the past 18 months, with an improved outlook for minerals, and increased investment in exploration expenditure in recent years. Figure i provides a summary of the 38 newly listed projects in the six months ended October 2010, by commodity category. Of these 38 projects, 12 are either committed or currently under construction.

The more notable less advanced projects new to ABARE–BRS's list include: Cameco's Kintyre and Energy and Minerals Australia's Mulga Rock uranium projects in Western Australia; Flinders Mines Pilbara Iron Ore Project; Sherwin Iron's Roper River Iron Ore Project; Orica's Kooragang Island ammonium plant; Regis Resources' Duketon gold mine; and Sandfire Resources' DeGrussa copper mine.

Also new to the list are 17 coal projects, which could add up to 50 million tonnes a year to Australia's future production capacity. Among those with the most significant capacity are the Collinsville and Denham coking coal mines in Queensland and the Bulga and Wambo expansions in New South Wales. Also new to the list is the second stage of the NCIG coal export facility at the Port of Newcastle, which is now under construction.

Projects added to list

six months to October 2010 (total number: 38)



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AusAID

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Australian Fisheries Management Authority

Australian Government Department of Innovation, Industry, Science and Research

Australian Government Department of Climate Change and Energy Efficiency

Australian Government Department of Resources, Energy and Tourism

Australian Government Department of Sustainability, Environment, Water, Population and Communities

Australian Government Department of the Treasury

Australian National University

Cooperative Research Centre for National Plant Biosecurity

CSIRO

Dairy Australia

Ensis (joint venture between the CSIRO (Aust) and Scion (NZ))

Fisheries Research and Development Corporation

Forest & Wood Products Australia

Goulburn-Murray Water

Grains Research and Development Corporation

Grape and Wine Research and Development Corporation

Horticulture Australia Limited

Industry & Investment NSW

Meat & Livestock Australia

Murray–Darling Basin Authority

New Zealand Institute of Veterinary, Animal and Biomedical Sciences

Plant Health Australia

Queensland Competition Authority

Queensland Department of Employment, Economic Development and Innovation

Rural Industries Research and Development Corporation

Sinclair Knight Mertz

Southern Cross University

University of Melbourne