



Australian Government
Bureau of Resources
and Energy Economics

Resources and Energy Major Projects

April 2014



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Foreword

The Resources and Energy Major Projects is a biannual snapshot of the stock of investment in Australia's resources and energy sectors. In the April 2014 report we are seeing a continuation of the trend we have observed over the past two years – a moderation in resources and energy sector investment from its peak post-GFC levels.

Australia has seen an unparalleled ramp up of investment in resources and energy over the past five years. The combined value of projects under construction has increased ten-fold in the past decade and the annual capital expenditure of the mining sector has grown from 20 per cent of Australia's total private sector capital expenditure to 60 per cent in that time. While the surge in investment value has been driven by large, high value projects the full investment story is not complete without recognising the large number of small to medium size investments that also occurred.

While the investment cycle has peaked, Australia is now moving into a period of significant increases in the production of resources and energy commodities. Many of the projects entering the production phase will have a long operation lives, supporting exports over an extended period. In the past year alone there have been large production capacity increases of 215 million tonnes for iron ore, 43 million tonnes for coal and over 1100 petajoules for gas.

It is clear the commodity price cycle is in a downturn. This is not unexpected given the scale of the global commodity supply response. Future investment prospects are driven by commodity prices but also by factors such as exchange rates, urbanisation in Asia and rising incomes.

There are still good prospects for exports based on the long term trajectory of economic growth through Asia. However, the investment cycle is likely to show further weakness in the short term. Australia still has a strong resources base with many promising high quality deposits and remains well placed to meet the continuing demand for resources and energy commodities in emerging economies.



Wayne Calder
Deputy Executive Director
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Executive summary

This edition of the Resources and Energy Major Projects report provides an update on project developments over the period November 2013 to April 2014 (inclusive). Australia has seen an unparalleled ramp up of investment in resources and energy over the past five years. The value of projects under construction increased ten-fold in the past decade and the annual capital expenditure of the mining sector has grown from 20 per cent to nearly 60 per cent of Australia's total private sector capital expenditure in that time.

The value of committed resources and energy projects has now decreased from its peak of \$268 billion in April 2013 to \$229 billion at the end of April 2014. In the past six months, eight resources and energy projects were approved to start construction with a combined value of \$12.8 billion. However, this was insufficient to offset the 21 projects worth \$25.6 billion that were completed in the same period.

World demand for raw materials and energy remains strong and for most commodities is still growing. However, the global rush to capitalise on China's booming appetite for commodities has now resulted in too much supply hitting the markets and has pushed commodity prices down. Current market conditions are not supportive of progressing new projects and this has been observed in delays to a number of projects in the investment pipeline. The number of projects at the Publicly Announced Stage is 14 lower at the end of April 2014 than it was at the end of October 2013 and the number of Feasibility Stage projects is down 18 in the same period. Exploration expenditure on minerals deposits was also down substantially in 2013 and at \$2.5 billion was 31 per cent lower than 2012.

The quarterly and annual reports of many mining, petroleum and exploration companies indicates there is an increased focus on delivering cost reductions in core activities and planned projects. The short term outlook for resources and energy investment therefore remains subdued despite recent government initiatives to streamline the project approvals process and award major project facilitation status.

The peak of the investment boom has now passed but opportunities for further investment still remain. The realisation of these opportunities will be driven by the commodity price cycle, Australian project developer's ability to regain their cost competitiveness and business conditions both in Australia and around the world.

Background to the Resources and Energy Major Projects Report

The Resources and Energy Major Projects is a biannual report released by the Bureau of Resources and Energy Economics (BREE) that provides a review of the mining, infrastructure and processing facilities projects that increase, extend or improve the output of mineral and energy commodities in Australia. This edition of the report is an update on project developments over the six months from November 2013 to April 2014 (inclusive). Its purpose is to measure the value of the current and potential investment in the mining and energy sectors and provide an analysis of the key trends and issues underpinning the level of investment. The value of this 'stock' of investment is an important economic indicator for Australia. The annual capital expenditure that flows from it has been a major source of economic activity over the past five years and it informs expectations of resources and energy commodity output growth.

BREE gathers information on major projects from a number of sources including company websites, ASX quarterly activity reports and media releases, and in some cases, from direct contact with company representatives. Although there is substantial investment by mining and energy companies in replenishing equipment, plant and other property, the focus of this report is on 'major' investments that are greater than \$50 million. Smaller scale operations that cost less than \$50 million are also an important contributor to the sector and the broader Australian economy; however gathering data on such projects is challenging as many are undertaken by private companies with fewer obligations to report progress and they often have shorter development cycles.

Proponents of resources and energy projects often use different planning processes and assessment methods to support a Final Investment Decision (FID). Thus, there is no standard project development model with clearly defined stages and terminology that can be applied to every resources and energy project. To broadly represent the general lifecycle of a project BREE use a four-stage model of the investment pipeline to measure the potential investment in Australia's resources and energy sectors. To be included on the major projects list that accompanies this report, there must be evidence of project activities that support the project progressing to an FID within the next five years.

The four stages in BREE's investment pipeline model are:

- **Publicly Announced Stage.** Projects at this stage are either at a very early stage of planning (i.e. undertaking their first pre-feasibility study), have paused in progressing their feasibility studies or have an unclear development path. As a result, not all projects will progress from the Publicly Announced Stage to become operational facilities. To include a project on the major projects list at this stage, preliminary information on project schedule, planned output or cost must be publicly available.

- **The Feasibility Stage.** This stage of the project development cycle is where the initial feasibility study for a project has been completed and the results support further development. This stage is characterised by further studies being undertaken to finalise project scope, complete engineering designs, assess environmental impacts and develop commercial plans. Projects at the Feasibility Stage are less uncertain than those at the Publicly Announced Stage, but are still not guaranteed to progress further as evaluations of commercial prospects have not yet been finalised and all regulatory approvals are yet to be received.
- **Committed Stage.** Projects at this stage of the development cycle have completed all commercial, engineering and environmental studies, received all required regulatory approvals and finalised the financing for the project. Such projects are considered to have received a positive Final Investment Decision from the owner, or owners, and are either under construction or preparing to commence construction. Typically, projects at the Committed Stage have cost estimates, schedules and mine output that are well defined and often publicly released. Nevertheless, plans are subject to change due to schedule delays, scope changes and cost overruns even after construction has commenced.
- **Completed Stage.** The period of time that a project undertakes commissioning or ramps up to full production varies; however, BREE first classifies a project as being at the Completed Stage when they have substantially finished their construction and commissioning activities to the point where initial commercial level production has commenced. Projects remain at the Completed Stage for a period of up to three years after construction so as to provide an ongoing record of the investment pipeline.

Earlier stages of developing mining and energy projects, such as identifying deposits and exploration activities, are not included in the model. While these activities remain important, it is beyond the scope of this report to assess exploration activities on a project by project basis. Instead, a summary and analysis of aggregate exploration expenditure is provided.

Exploration

Overview

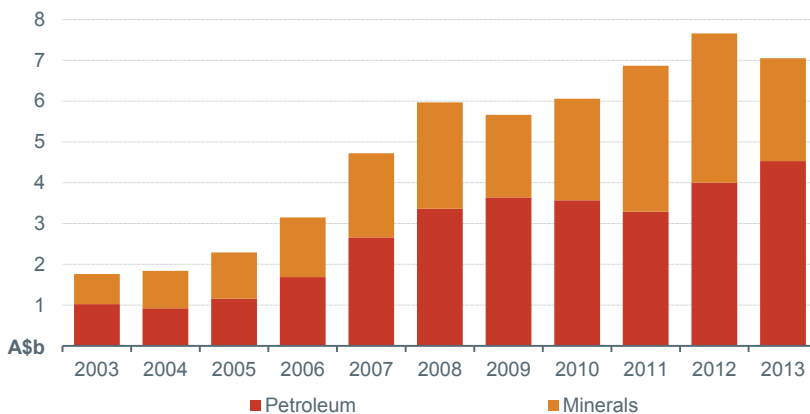
Exploration is an important precursor to the development of projects in the mining investment pipeline. It is an investment in knowledge about the location of deposits and the quantity of resources available to potentially support future development. Thus, exploration activity is a useful indicator of possible future mining activity. Before making the decision to undertake exploration activities, resources and energy companies consider a number of factors to ensure the benefits of exploration activities exceed the costs. These include prevailing and expected commodity prices; regulatory environments; geological prospects and fiscal arrangements.

Commodity market and general economic conditions have not supported exploration activity as they did during the height of the mining boom. Lower commodity prices have pushed many established companies to curtail exploration activities to save costs while the quarterly activity reports of aspiring producers indicate they are having more difficulty arranging finance for exploration programs.

Exploration expenditure

In 2013 total exploration expenditure, including both minerals and petroleum exploration, declined 8 per cent, relative to 2012, to \$7.1 billion (see Figure 1). Higher expenditure on petroleum exploration was more than offset by a substantial decline in minerals exploration expenditure.

Figure 1: Australian exploration expenditure 2003 to 2013



Source: ABS

Australia’s minerals exploration expenditure continued its 18-month downwards trend and decreased further during the December quarter 2013. Expenditure on minerals exploration was \$547 million in the December quarter, a decrease of 14 per cent from the previous quarter and 34 per cent year-on-year. Quarterly minerals exploration expenditure has now declined nearly 50 per cent since it peaked at \$1.1 billion in June 2012. For 2013 as a whole minerals exploration expenditure totalled \$2.5 billion, 31 per cent lower than 2012.

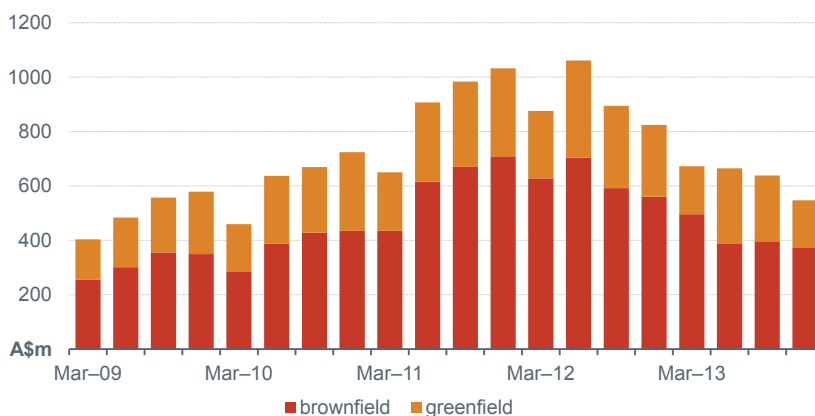
In the December quarter 2013, petroleum exploration expenditure decreased 1 per cent from the September quarter to \$1.10 billion. Year-on-year, petroleum exploration expenditure decreased 21 per cent. For the full year 2013 petroleum exploration expenditure totalled \$4.5 billion, an increase of 13 per cent from 2012. Increases in both onshore and offshore exploration expenditure contributed to this total.

Western Australia remained the leading state for exploration activity in 2013 and accounted for 64 per cent, or \$4.5 billion, of total exploration expenditure (including both minerals and petroleum). Like most states, exploration expenditure in Western Australia declined and was down 7 per cent in 2013. Queensland had the second largest exploration expenditure in 2013 with \$1.2 billion (or 17 per cent of total expenditure).

Greenfield and brownfield minerals exploration

Greenfield sites are locations that are not currently mined and where exploration activities for new potential mineral deposits are undertaken. Brownfield sites already have operating mines in the vicinity and exploration in these areas seeks to identify additional resources. Greenfield exploration is riskier than brownfield exploration because there is greater uncertainty that activity will result in the discovery of a profitable deposit. Greenfield exploration is important for maintaining resource development to supply growing world consumption of resources.

Figure 2: Exploration expenditure on greenfield and brownfield sites

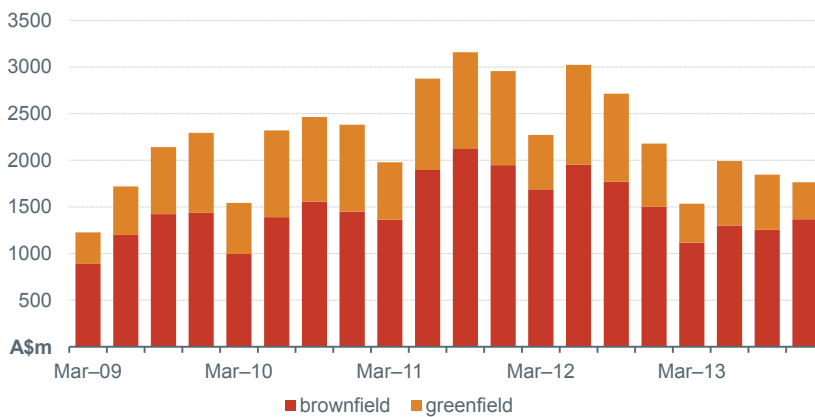


Source: ABS

In the December quarter 2013 both Australia’s greenfield and brownfield exploration expenditure decreased (see Figure 2). Expenditure on greenfield mineral exploration decreased 28 per cent, relative to the previous quarter, to \$175 million. Brownfield minerals exploration decreased 6 per cent to \$372 million in the same period. For the full year 2013, greenfield exploration expenditure decreased 26 per cent, relative to 2012, to \$869 million and brownfield exploration expenditure decreased 33 per cent to \$1.7 billion.

Metres drilled in exploration at brownfield sites increased 9.1 per cent in the December quarter to total 1.4 million metres but was lower than the same period a year earlier (1.5 million metres). Drilling at greenfield sites continued to decline at the end of 2013, down 33.2 per cent on the September quarter to 0.4 million metres in December 2013.

Figure 3: Exploration—metres drilled



Source: ABS

Table 1: Cost per metre drilled, 2003–04 to 2012–13 (in 2013–14 dollars)

	2003 –04	2004 –05	2005 –06	2006 –07	2007 –08	2008 –09	2009 –10	2010 –11	2011 –12	2012 –13
Greenfield site	145	178	207	217	288	333	295	309	336	365
Brownfield site	199	191	220	244	276	289	277	313	352	350

Source: ABS.

Projects at the Publicly Announced Stage

Overview

Projects at the Publicly Announced Stage are usually very early in their development and are typically undergoing an initial feasibility study to assess the commercial aspects of developing an identified resource. Projects that have stalled in progressing towards an FID and are investigating alternative development options are also classified as Publicly Announced to reflect their longer planning times.

As they are still in early planning stages, projects at the Publicly Announced Stage may not have finalised engineering designs or construction costs. To reflect this uncertainty project costs are quoted as a cost band in the major projects list when they have not been announced by the project proponent. In most cases this is based upon an estimate developed by BREE using industry averages for similar construction activities. The cost bands used by BREE in this report for Publicly Announced projects are:

- \$0 – \$249m
- \$250m – \$499m
- \$500m – \$999m
- \$1 000m – \$1 499m
- \$1 500m – \$2 499m
- \$2 500m – \$4 999m
- \$5 000m+

Summary of projects at the Publicly Announced Stage

As at the end of April 2014, BREE has identified 78 projects at the Publicly Announced Stage with a combined value of between \$96 billion and \$122 billion. This is 14 fewer than reported in October 2013 with a corresponding decrease in value of between \$13 billion and \$29 billion. This decrease was the result of 21 projects being removed from the major projects list after extended periods of inactivity or announcements that they were on hold. Three new projects were added to the list, while two projects advanced further up the investment pipeline and six projects were pushed back from the Feasibility Stage to reflect delays in their progress.

Table 2: Publicly Announced Stage project summary

	Number of projects	Indicative cost range \$m
Aluminium, Bauxite, Alumina	2	0 - 500
Coal	13	14 958 - 16 708
Copper	5	6 873 - 7 873
Gold	8	990 - 1740
Infrastructure	12	20 650 - 25 900
Iron ore	13	19 589 - 29 839
Lead, Zinc, Silver	0	0 - 0
LNG, Gas, Oil	8	28 500 - 30 500
Nickel	3	1 500 - 3 000
Other commodities	9	1 626 - 2 876
Uranium	5	1 750 - 3 500
Total	78	96 436 - 12 2436

The decline in iron ore prices since late 2013 appears to have stalled the progress of several iron ore projects at the Publicly Announced Stage. While iron ore projects are, along with coal, the highest in number at the Publicly Announced Stage with 13 projects, this has decreased by six since October 2013. These 13 iron ore projects have a combined value of between \$19.6 billion and \$29.8 billion. Five iron ore projects have been removed from the major projects list and two projects (Iron Ore Holdings' Iron Valley and Buckland projects) have progressed from the Publicly Announced Stage. Partially offsetting this was the addition of Red Hill Iron's Pannawonica Iron Ore Project to the major projects list. The net result of these movements and the changes in costs of remaining projects is that the value of iron ore projects at the Publicly Announced Stage has decreased by between \$16.2 billion and \$25.9 billion. Around \$6 billion of this decrease in value is attributable to the separation of the port and rail elements of Aquila and AMCI's West Pilbara project which is now classified as a separate infrastructure project.

There are 13 coal projects at the Publicly Announced Stage with a combined value of between \$14.9 billion and \$16.7 billion. This has decreased by six projects since October 2013 with the value declining by between \$1.9 billion and \$2.9 billion. Six coal projects were removed from the major projects list, one project progressed to the Feasibility Stage (Cuesta Coal's Moorlands project) and BHP Billiton's Caroonna project was added to the list.

LNG, gas and oil projects have the highest combined value of projects at the Publicly Announced Stage with between \$28.5 billion and \$30.5 billion. This has increased by around \$4 billion as a result of the Arrow LNG project being moved back from the Feasibility Stage and the addition of Woodside's Persephone gas field project which, together, more than offset the value of three projects that have been removed from the major projects list. Woodside's Browse LNG project is one of the largest projects that remains on the major projects list. While project plans are still being finalised the lodged EIS indicates Woodside are currently planning to develop three floating LNG vessels as part of the project.

Lower metals prices have slowed the development of most early planning stage metals projects in Australia with company activity reports indicating most are now targeting capital cost reductions to make their projects more commercially viable. No metals projects progressed from the Publicly Announced Stage in the past six months, and all changes in the number and value of metals projects reflects either projects being removed from the major projects list, revisions to project costs or projects being delayed.

At the end of April there were eight gold projects with a combined value of between \$990 million and \$1.7 billion being developed. This was one project less than reported in October, which given the sustained decrease in gold prices over the past 12 months is a positive result.

There were 10 metals projects, including copper, nickel, zinc, lead and aluminium-related projects, at the Publicly Announced Stage at the end of April 2014. This is four less than reported in October 2013 as the removal of five projects from the major projects list was offset by one project being pushed back to the Publicly Announced Stage. Together, these metals projects are valued at over \$11.4 billion. The main contributors to this value are copper projects such as BHP Billiton's Olympic Dam expansion and Oz Minerals' Carrapateena projects.

Projects at the Feasibility Stage

Overview

Projects that have progressed to the Feasibility Stage have undertaken initial project definition studies and commenced more detailed planning such as Front-End Engineering Design studies, Bankable Feasible Studies and environmental surveys in support of finalising an Environmental Impact Statement. While there is an opportunity to progress projects at the Feasibility Stage to the Committed Stage, this is not guaranteed to occur. Projects at the Feasibility Stage have not been committed to and are only potential investments that may occur under the appropriate conditions. Therefore, the total value of projects at the Feasibility Stage cannot be directly compared to the value of the projects at the Committed Stage to forecast the future of capital investment in Australia's resources and energy sectors.

Summary of projects at the Feasibility Stage

One of the strongest indicators of the slowdown in resources and energy investment is the status of projects at the Feasibility Stage. Australia is currently observing a slowdown and pausing of activity on projects at the Feasibility Stage. Not only are projects not progressing to the Committed Stage they are also being delayed, paused or in some cases cancelled. At the end of April 2014 there were 146 projects at the Feasibility Stage that had a combined value of \$169 billion (see Table 3). The number of projects has decreased by 16 since October 2013 and the value is \$39 billion lower (see Figure 4). Fourteen projects previously listed at the Feasibility Stage have been removed from the major projects list in response to announcements that the project would not continue to be developed or a period of 12 months or more of insufficient activity indicated the project was unlikely to progress further.

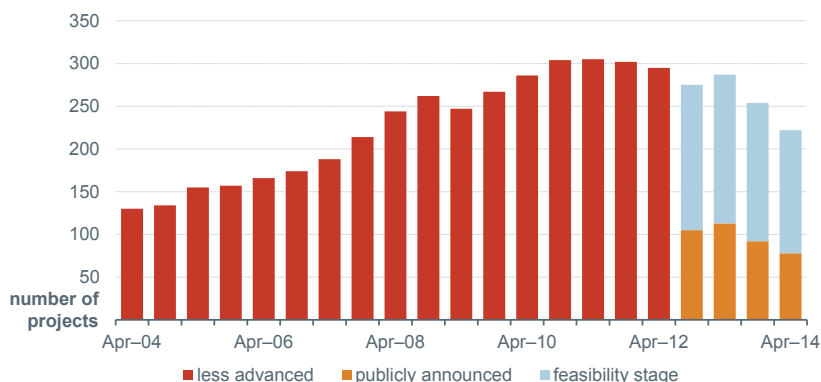
The status of several projects that remain on the list remains uncertain and future announcements on capital investment programs and changes in corporate strategy are expected to result in additional projects being removed from the list in the short term. However, in the past six months there has been a surge in the number of projects that have secured Government (both state and federal) environmental approvals and if market conditions improve the owners of these projects are now better positioned to make a positive Final Investment Decision.

Projects to develop, expand or extend coal mines account for both the highest number and highest value of projects at the Feasibility Stage. There are 47 coal projects with a combined value of \$51 billion at the Feasibility Stage. Since October 2013, five coal projects have been removed from the major projects list, one project progressed from the Publicly Announced Stages and one project was moved to the Committed Stage. In total, there are now three fewer coal projects at the Feasibility Stage than reported in October 2013.

Table 3: Summary of projects at the Feasibility Stage

	NSW		Qld		WA		NT		SA		Vic		Tas		Other		Total	
	No.	Value \$m	No.	Value \$m	No.	Value \$m	No.	Value \$m	No.	Value \$m	No.	Value \$m	No.	Value \$m	No.	Value \$m	No.	Value \$m
Aluminium, Bauxite, Alumina	2	1 650															2	1 650
Coal	10	3 712	34	46 990	1	200					2	227					47	51 130
Copper	1	420	3	867	1	279			2	1 297	1	291					8	3 154
Gold	2	138	1	123	9	1 144	1	1 046									13	2 451
Infrastructure	3	1 094	8	19 920	1	3 100			2	663							14	24 777
Iron ore	1	2 900			16	20 601	1	267	2	4 980							20	28 748
Lead, Zinc, Silver	2	417			1	70											3	487
LNG, Gas, Oil	2	1 500	2	2 000	2	26 000					1	200			1	13 000	8	42 700
Nickel			1	15	6	5 228											7	5 243
Other commodities	3	1 334	6	2 570	5	782	1	563	1	49	4	1 117	1	180	1	1 408	22	8 003
Uranium					2	575											2	575
Total	24	11 515	57	74 135	44	57 979	3	1 876	7	6 989	8	1 835	1	180	2	14 408	146	168 918

Figure 4: Number of uncommitted projects



Queensland remains the main location for planned coal projects, accounting for 34 of the 45 coal projects at the Feasibility Stage. By value, Queensland accounts for around 93 per cent of planned coal investment at the Feasibility Stage which is attributable to large coal projects located in the greenfield Galilee Basin. These projects include Adani’s Carmichael coal project (\$7.1 billion), GVK-Hancock’s Alpha and Kevin’s Corner coal mines (\$8.2 billion and \$4.2 billion, respectively), Waratah Coal’s China First coal project (\$8.8 billion) and Bandanna Energy’s South Galilee coal project (\$4.2 billion). New South Wales has 10 coal projects at the Feasibility Stage; however, as these are mainly expansions to existing mines they are generally lower in cost than the greenfield developments in Queensland. While current market conditions are not supportive of these projects being approved, it should be noted that most of them have very long operating lives and decisions to commence will be based more on long term assessments of market conditions rather than today’s prevailing market prices.

There are eight LNG, gas and oil projects at the Feasibility Stage with a combined value of \$43 billion. This value has decreased since October 2013 due to the Arrow LNG project being moved back to the Publicly Announced Stage. The development plans for this project are now being reconsidered and company announcements indicate that different options with lower capital requirements are now being considered.

Floating LNG (FLNG) projects are the main driver of project value for LNG, oil and gas projects at the Feasibility Stage, with the Scarborough and Bonaparte FLNG projects accounting for around 60 per cent of the value of projects at this stage. Although they are high value projects, as noted at the recent inquiry conducted by the Economics and Industry Standing Committee of the parliament of Western Australia, these projects have a much lower proportion of local content in their project scope as the FLNG vessels are likely to be built overseas. Therefore these projects contribute less to the Australian economy during their construction phase but still provide the ongoing benefit of royalties during their operating phase.

There were 20 iron ore projects with a combined value of \$29 billion at the Feasibility Stage at the end of April 2014. The number of projects and their combined value have decreased by two and \$10.9 billion, respectively, since October 2013. One project was removed from the major projects list following a period of inactivity, Iron Ore Holdings' Buckland project progressed from the Publicly Announced Stage and Hancock Prospecting's \$10.7 billion Roy Hill project has been moved to the Committed Stage after finalising all funding for the project after an extended period of pre-site works. Several high value iron ore projects remain on the major projects list at the Feasibility Stage and most of these are greenfield magnetite developments.

The number of gold projects at the Feasibility Stage has increased by three in the past six months and at the end of April 2014 there were 13 gold projects with a combined value of \$2.5 billion. This increase is due to two new projects being identified and added to the major projects list (Gascoyne Resources' Glenburgh and Excelsior Gold's Kalgoorlie North projects which are both in Western Australia) and one project being moved back to the Feasibility Stage after previous announcements that it would be developed. There are also a number of gold projects that are below the \$50 million threshold that are not considered for inclusion on the major projects list still being developed in Australia.

The number of metals projects, including aluminium, copper, lead, zinc, silver and nickel projects, at the Feasibility Stage decreased by two in the six months to April 2014. The Pisolite Hills bauxite project was removed from the list following environmental decisions to ban mining in the area and the Thaduna-Green Dragon copper project was moved back to the Publicly Announced Stage following announcements to engage a new partner in the project. In total, there were 20 metals projects at the Feasibility Stage worth \$10.5 billion at the end of April 2014. Notably, no metals projects have progressed to the Committed Stage in over 12 months. While demand for most metals is still growing, the abundance of supply that has entered the market in the past 12 to 24 months has subdued most prices and reduced the incentive for new projects. Australian project developers now seem more focused on reducing the capital and operating costs for their projects to make them more competitive but this is resulting in longer project approval times.

There are 22 projects at the Feasibility Stage that relate to other commodities such as rare earth elements, mineral sands and metallic minerals that Australia produces in smaller quantities. These 22 projects have a combined value of \$8 billion. By comparison, there were 30 projects worth \$9.6 billion at the end of April 2013.

Projects at the Committed Stage

Overview

Projects at the Committed Stage have completed their planning activities, received all necessary Government regulatory approvals and finalised the financing of the project to allow construction. In most cases, projects at this stage of development have already started construction as there are typically pre-works undertaken as part of exploration and design activities. Most projects that progress to the Committed Stage will eventually commence production. Post-FID, there are still schedule, technical and financial risks that, if realised, can affect the commercial viability of a project and possibly lead to its cancellation.

Projects progressing to the Committed Stage

In the six month period from November 2013 to April 2014 (inclusive), eight projects worth a combined \$12.8 billion were identified as receiving a positive Final Investment Decision and were progressed to the Committed Stage on the major projects list (see Table 4). By comparison, in the previous six month period five projects worth \$1.7 billion were added to the Committed Stage. The rebound in new committed project value is dominated by the approval of Hancock Prospecting's Roy Hill iron ore project which is valued at around \$10.7 billion. Despite the downturn in iron ore prices, five of the eight new project commitments relate to iron ore.

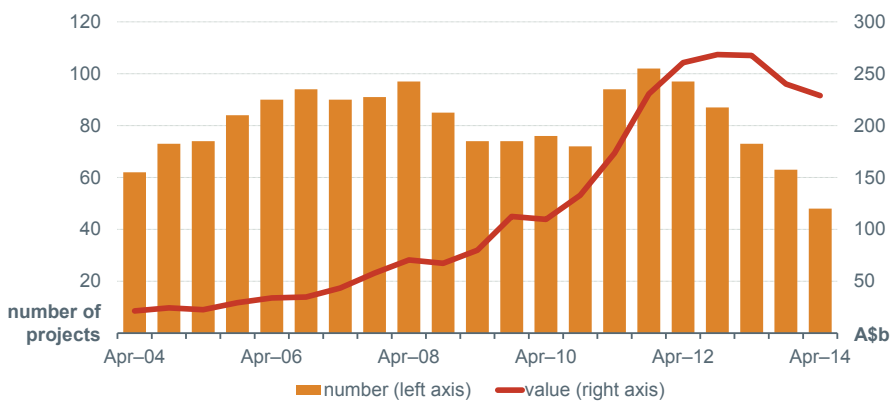
Table 4: Projects that progressed to the Committed Stage

Project	Company	State	Value (\$m)
Baralaba expansion	Cockatoo Coal	QLD	311
Iron Valley Project	Iron Ore Holdings / Mineral Resources	WA	200
Keysbrook	MZI Resources	WA	70
Mine of the Future Program	Rio Tinto	WA	599
Mt Webber (stage 2)	Atlas Iron, Altura Mining	WA	73
Port Pirie	Nyrstar	SA	514
Roy Hill	Hancock Prospecting	WA	10 700
WAIO - Nelson Point (ship loader replacement)	BHP Billiton	WA	325
Total			12 792

Analysis of committed investment

The number of projects at the Committed Stage continued to decrease in the latest six month period. At the end of October 2013 there were 63 projects worth \$240 billion, these have now decreased to 48 projects worth \$229 billion at the end of April 2014. Although the value of new committed projects increased in the recent six month period, this was insufficient to offset the large wave of projects that have moved from their construction phase to their production phase. The peak of the investment boom has now passed but opportunities for further investment still remain. The realisation of these opportunities will be driven by the commodity price cycle, Australian project developer's ability to regain their cost competitiveness and business conditions both in Australia and around the world.

Figure 5: Number and nominal value of projects at the Committed Stage



The 'mega projects' valued at more than \$5 billion continue to represent the highest proportion of investment in Australia (see Figure 6). At the end of April 2014 there were eight mega projects at the Committed Stage which accounted for 88 per cent of the value of all committed projects, up from 82 per cent in October 2013. Hancock Prospecting's Roy Hill is the only non-LNG 'mega project' at the Committed Stage.

Figure 6: Share of committed investment – April 2008 vs April 2014

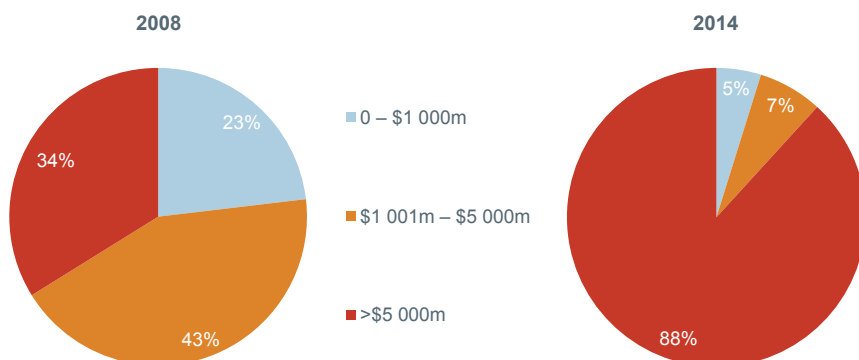


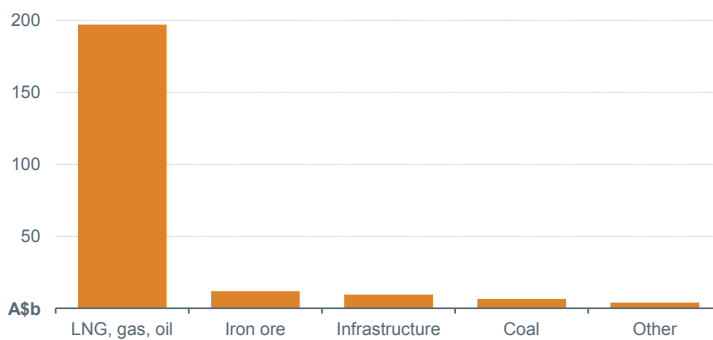
Table 5: Summary of projects at the Committed Stage

	NSW		Qld		WA		NT		SA		Vic		Tas		Other		Total		
	No.	Value \$m	No.	Value \$m	No.	Value \$m	No.	Value \$m	No.	Value \$m	No.	Value \$m	No.	Value \$m	No.	Value \$m	No.	Value \$m	
Aluminium,																			
Bauxite, Alumina																			
Coal	6	2 406	4	4 118													10	6 524	
Copper	1	93	1	250													2	343	
Gold	1	74	1	246													2	320	
Infrastructure	2	453	5	6 683	2	2 375											9	9 511	
Iron ore					5	11 928											5	11 928	
Lead, Zinc, Silver			2	1 515			1	360	1	514							4	2 389	
LNG, Gas, Oil			3	62 500	9	100 542	1	33 000			1	1 000					14	197 042	
Nickel																			
Other commodities					2	845											2	845	
Uranium																			
Total	10	3 026	16	75 312	18	115 690	2	33 360	1	514	1	1 000					48	228 902	

Summary of projects at the Committed Stage

Investment in LNG, gas and oil projects continues to be the main driver of resources and energy investment in Australia (see Figure 7). The 14 LNG, gas and oil projects at the Committed Stage have a combined value of \$197 billion and account for 86 per cent of committed investment. No new LNG, gas and oil projects were approved or completed in the six months to April 2014 but a \$2 billion cost increase was announced for the Gorgon LNG project. Four of the six onshore LNG projects at the Committed Stage are scheduled to enter production within the next two years and will underpin a substantial decline in the value of Committed Projects.

Figure 7: Value of projects at the Committed Stage by commodity



Although iron ore prices have declined from the high levels seen in 2013, four iron ore projects progressed to the Committed Stage in the past six months. Although these five projects have a combined value of \$11.6 billion, this was still not enough to offset the value of iron ore projects that were assessed as completed. The surge in completed projects in the past six months has been most noticeable in iron ore with several high value projects finished, and in some cases ahead of schedule. Only one of the iron ore projects at the Committed Stage in April 2014 was also at the Committed Stage in October 2013. Furthermore, about 90 per cent of the value of committed iron ore projects is attributable to the recently approved Roy Hill project.

There are 10 coal projects with a combined value of \$6.5 billion at the Committed Stage; this is five projects and \$4.9 billion less than reported in October 2013. Six coal projects were completed in the period and moved to the Completed Stage and one project, Cockatoo Coal's Baralaba expansion, progressed from the Feasibility Stage. Of the 10 committed coal projects, six are located in New South Wales and four in Queensland. Anglo American's Grosvenor underground project is the highest value coal project under construction following the completion of BHP Billiton's Caval Ridge project.

The number of infrastructure projects at the Committed Stage at the end of April decreased by two from October 2013. Three projects were completed and one new project was approved (BHP Billiton's Nelson Point ship loader replacement). Subsequently the value of infrastructure projects at the Committed Stage decreased by \$2.5 billion to total \$9.5 billion at the end of April 2014. Most of these committed infrastructure projects are also scheduled to be completed within the next 18 months.

Progress on metals and other minerals projects has been slowing significantly over the past 12 months. However, MZI Resources Keysbrook mineral sands project and Nyrstar's Port Pirie smelter extension have bucked the trend and progressed to the Committed Stage in the past six months. Subsequently there are now four lead, zinc and silver projects at the Committed Stage worth \$2.2 billion and two other commodity projects worth \$845 million. The number of copper projects at the Committed Stage remains unchanged at two projects with a combined value of \$343 million while the number of gold projects has decreased by two following the completion of the Tomingley project and one project being moved back to the Feasibility Stage to be re-evaluated. There are no aluminium-related, nickel or uranium projects at the Committed Stage following the completion of the Four Mile uranium project.

Projects at the Completed Stage

Overview

The Completed Stage includes projects that have completed the majority of their full project scope as well as commissioning activities and can begin commercial scale production. As many projects include multiple stages and scope elements that can be independent of each other, the timing of when a project reaches the Completed Stage is difficult to assess. In the major projects list provided with this report, projects that have progressed to the Completed Stage in the past six months are recorded in the commodity table of the major project list and all projects completed within the past three years shown in a separate table.

Summary of projects at the Completed Stage

The surge in resources and energy investment that commenced in 2009 is now resulting in a wave of high value projects being completed and entering the production phase of their project life-cycle. In the six month period from November 2013 to April 2014 (inclusive), 21 resources and energy projects were completed that together were valued at \$25.6 billion (see Table 5). While this is three more projects completed than the previous period, the combined value is \$4.7 billion lower as more high value projects were completed in the six months to October 2013. The April 2014 period was also the second highest on record for completed project value (see Figure 9).

Figure 9: Value of completed projects

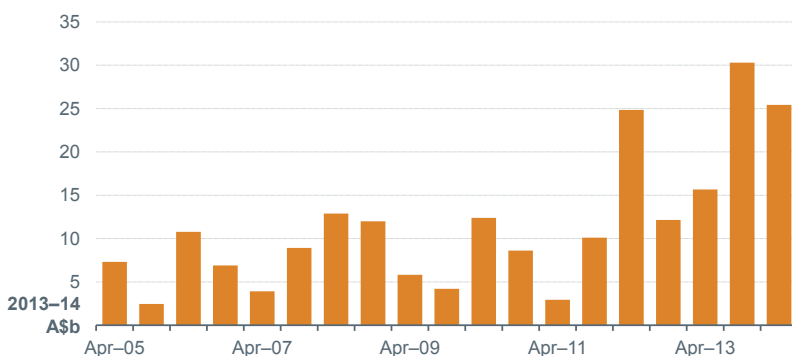


Table 6: Projects at the Completed Stage

Project	Company	State	New Capacity	Capacity Unit	Resource	Cost \$m
Caval Ridge	BHP Billiton Mitsubishi Alliance (BMA)	QLD	5.5	Mt	coking coal	1 968
CSBP expansion	Wesfarmers	WA	260	kt	Ammonium nitrate	550
Four Mile	Quasar Resources / Alliance Resources	SA	2300	t	U3O8	98
Goldfields pipeline expansion	APA Group	WA	16	PJ pa	Gas	150
Lake Vermont	Jellinbah, Marubeni, Sojitz, AMCI	QLD	4	Mt	PCI and coking coal	200
Marandoo	Rio Tinto	WA	n/a		Hematite	1 070
Mt Webber (stage 1)	Atlas Iron, Altura Mining	WA	3000	kt	Hematite	141
Mt Weld (phase 2)	Lynas Corp	WA	11	kt	Rare earths	170
Nammuldi expansion	Rio Tinto	WA	26000	kt	Hematite	2 140
North Goonyella	Peabody Energy	Qld	5	Mt	coking coal	150
Potosi (Stage 2 and 3)	Perilya	NSW	45	kt	Zinc, Lead	58
Rail (55 - 155 Mtpa)	Fortescue Metals Group	WA	100000	ktpa	Iron Ore	2 300
Ravensworth North (Stage 1)	Glencore Xstrata, Itochu	NSW	8	Mt	thermal and semi-soft coal	1 400
Rolleston (phase 1)	Glencore Xstrata, Sumisho, IRCA	QLD	3	Mt	thermal coal	391
Roper Bar	Western Desert Resources	NT	3000	kt	Hematite	180
Sino Iron Project	CITIC Pacific Mining	WA	24000	kt	Magnetite	8 400
Solomon Hub (stage I)	Fortescue Metals Group	WA	60000	kt	Hematite	3 100
Tomingley (Wyoming) gold project	Alkane Resources	NSW	50000	oz	Gold	116
Ulan West	Glencore Xstrata, Mitsubishi	NSW	6.7	Mt	thermal coal	1 300
Utah Point Expansion	Atlas Iron	WA	2000	ktpa	Iron Ore	60
Yandicoogina	Rio Tinto	WA	4000	kt	Hematite	1 700
Total						25 642

The completion of several high value iron ore projects is the main factor driving the completed projects story. In total, seven iron ore projects with a combined value of \$16.7 billion were completed in the six months to April 2014. The largest of these was Citic Pacific's \$8.4 billion Sino Iron project in Western Australia, and another four projects with a value of over \$1 billion were also completed. Together, these seven iron ore projects will increase Australia's iron ore production capacity by around 120 million tonnes when they ramp up to full capacity. Also supporting these new mines are two completed iron ore-related infrastructure projects including Fortescue Metals Group's rail expansion. These completed infrastructure projects are valued at around \$2.4 billion.

There were six coal projects with a combined value of \$5.4 billion that progressed to the Completed Stage in the period. These included BHP Billiton's Caval Ridge as well as Glencore Xstrata's Ravensworth North and Ulan West projects that are each valued at over \$1 billion. Together these projects have a production capacity of around 32 million tonnes of coal (both thermal and metallurgical).

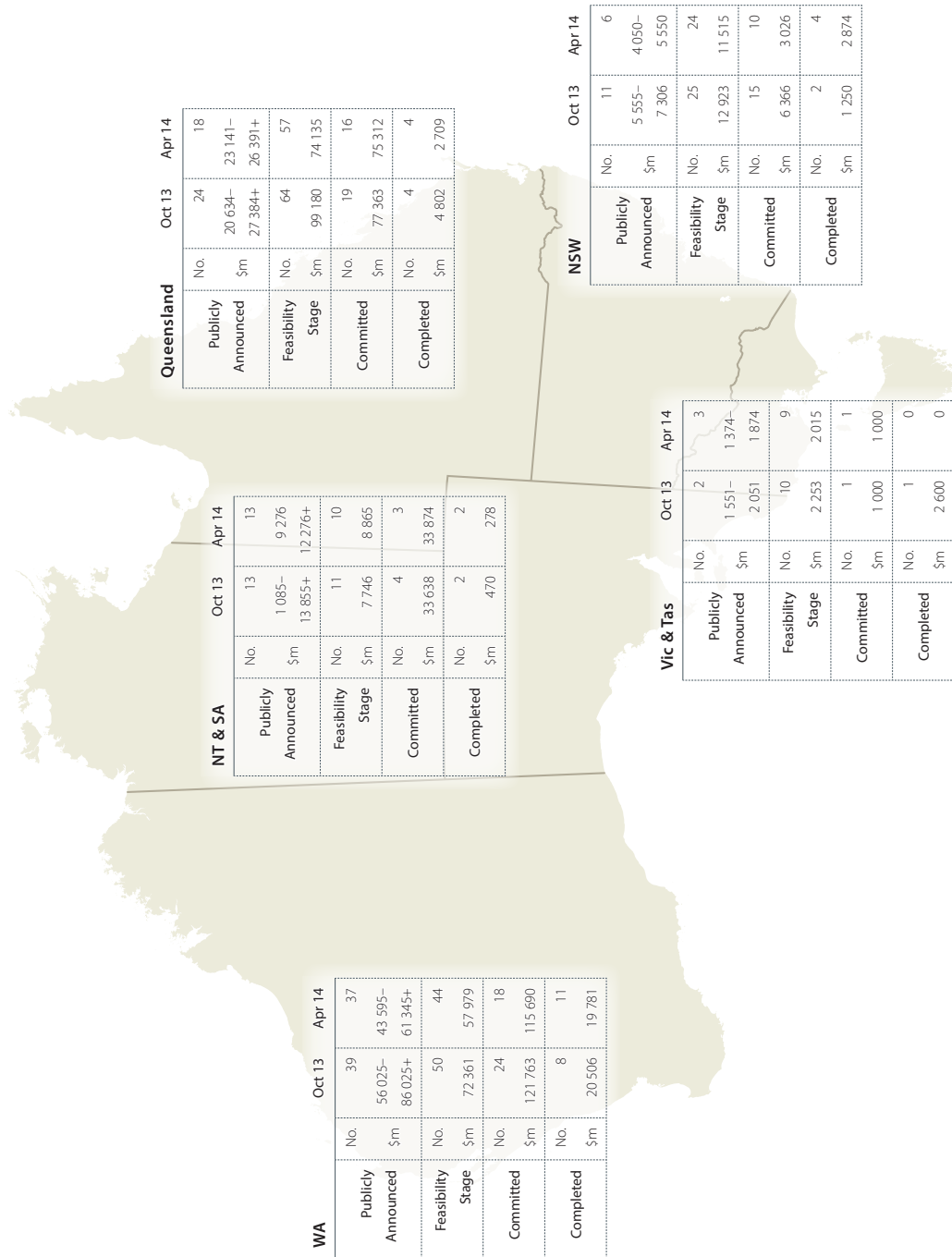
Four non-ferrous minerals projects were completed in the period. This included one gold project, one zinc project, one rare earths project and one uranium project. In addition, Wesfarmers' CSBP expansion (ammonium nitrate) and APA Group's Goldfields pipeline expansion were identified as being completed. These six projects had a combined value of around \$1.1 billion.

Table 7: Summary of projects in the investment pipeline, April 2014

	Publicly Announced		Feasibility Stage		Committed		Completed	
	No.	Range* \$m	No.	Value \$m	No.	Value \$m	No.	Value \$m
Aluminium, Bauxite, Alumina	2	0 - 500	2	1 650				
Coal	13	14 958 - 16 708+	47	51 130	10	6 524	6	5 409
Copper	5	6 873 - 7 873+	8	3 154	2	343		
Gold	8	990 - 1 740+	13	2 451	2	320	1	116
Infrastructure	12	20 650 - 25 900+	14	24 777	9	9 511	3	2 510
Iron ore	13	19 589 - 29 839+	20	28 748	5	11 928	7	16 731
Lead, Zinc, Silver			3	487	4	2 389	1	58
LNG, Gas, Oil	8	28 500 - 30 500+	8	42 700	14	197 042		
Nickel	3	1 500 - 3 000	7	5 243				
Uranium	5	1 626 - 2 876	2	575			1	98
Other commodities	9	1 750 - 3 500	22	8 003	2	845	2	720
Total	78	96 436 - 122 436+	146	168 918	48	228 902	21	25 642

* Value of Publicly Announced projects given in cost range with projects over \$5 billion having no upper bound.

Figure 10: Resources and energy projects by stage and region



Outlook for resources and energy investment

Overview

BREE's version of the investment pipeline is a generic model and in practice resources and energy projects go through complex and tailored development processes that suit their proprietor's planning requirements. The BREE pipeline model is useful for assessing trends in resources and energy sector investment such as the rate at which projects are progressing or if bottlenecks are emerging at any particular point. Despite the strength of the resources boom over the past decade, it has been clear that not every resources and energy project is developed. As such, the projects still in the Publicly Announced and Feasibility Stages can only be viewed as potential investment and additional analysis is required to produce an outlook for future investment in the resources and energy sectors.

BREE's outlook for resources and energy project investment provides aggregate estimates of investment in two scenarios, a 'likely' and a 'possible' scenario. The two scenarios model the rate at which projects currently at the Committed Stage are expected to move to the Completed Stage and are subsequently removed from the list, as well as the timing of projects assessed as possible or likely to progress to the Committed Stage. BREE does not attempt to model the timing of projects and forecasts are therefore based on the current project plans. The schedules of planned projects, including both the timing of a FID and start of production, are uncertain and subject to variation (as are BREE's investment forecasts). It should also be noted that the concept of investment being modelled is the total value of projects that are under construction each year, and not the expenditure of each project in that year.

The 'likely' scenario is based on the existing projects at the Committed Stage and adds projects that BREE assesses as having a higher probability of proceeding based on analysis of a range of internal and external factors that historically helped determine a project's success in being sanctioned. Where data is available, analysis of the proposed project's position on the relevant commodity cost curve and an assessment of the internal rate of return are undertaken. As the assessments are probability-based there still remains a degree of uncertainty over projects assessed as likely and their progression to the Committed Stage is far from guaranteed.

The 'possible' scenario includes projects already at the Committed Stage, projects assessed as likely to proceed and projects assessed as 'possible'. A possible rating is given to a project that has some positive internal and market factors that suggest it may advance to the Committed Stage, but it also faces greater challenges than a 'likely' project that may limit its commercial viability.

Projects assessed as unlikely to proceed are not included in the forward projection of the value of committed investment. Although assessments are made at the project level, as some of the information provided to support the assessment is treated as commercial in confidence, individual project assessments are not provided with the Resources and Energy Major Projects report.

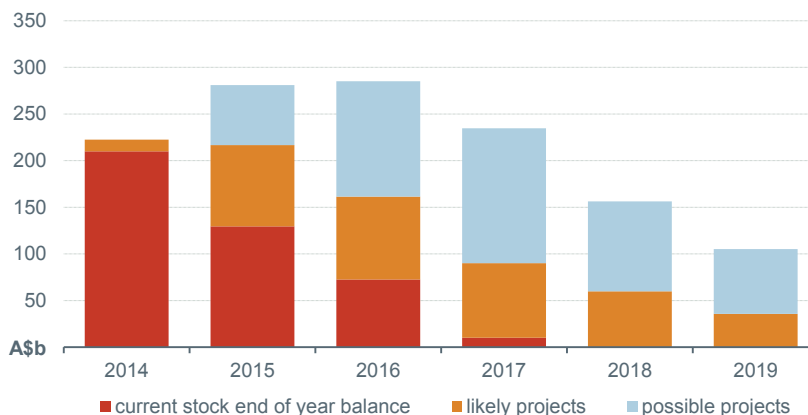
Outlook for resources and energy investment

In the past six months government initiatives to streamline the approvals process and award major project facilitation status have been implemented. Nevertheless, the current state of commodity markets is not supportive of further investment in resources and energy projects. World demand for raw materials and energy remains strong and for most commodities is still growing. However, the global rush to capitalise on China's booming appetite for commodities has now resulted in too much supply entering markets. The quarterly activities reports of many Australian miners and aspiring mine developers show a slowing in activity to progress projects to the Committed Stage. Although Bankable/Definitive Feasibility Studies have been completed that indicate favourable project economics, investor appetite for risk amid a period of declining commodity prices appears limited.

The outlook for resources and energy investment therefore remains subdued in the near term with the investment cycle having peaked. The value of committed resources and energy projects has now decreased from its peak of \$268 billion in April 2013 to \$229 billion at the end of April 2014. However, it is important to remember that coinciding with the decline in investment are substantial increases in annual production capacity including 215 million tonnes of iron ore, 43 million tonnes of coal and over 1100 petajoules of gas. The investment phase of the mining boom is winding down but the shift to the output phase is now in full swing. Furthermore, while the investment phase lasted for around five years the output phase will last for decades and deliver an ongoing stream of economic benefits such as employment, royalties and ongoing operating expenditure in Australia.

BREE's outlook for investment therefore remains broadly unchanged and it is projected that there will be a substantial drawdown in the stock of committed projects as high value LNG projects are completed (see Figure 11). While efforts are being made to expedite projects through government approval processes, a reversal of the trend for schedule delays seems unlikely and further delays to project approvals are expected. As BREE's likely and possible scenarios are based on the current announced schedules for projects, further shifts in the forecast investment profile are also likely in the future.

Figure 11: Outlook for committed project investment.



Source: BREE

In the current economic climate, it is worth noting that like most economic variables, business investment is cyclical. The current downturn in Australia’s resources and energy sectors has come from a very high point and while investment decisions have been delayed, the prospect of future investment is far from terminal. The cost pressures that were associated with the surge in investment to build new projects in Australia are showing signs of abating now that construction activity has peaked. A number of the companies that have delayed decisions on project investments have also reported that they are re-evaluating their project plans to develop less capital intensive solutions and identify ways to reduce operating costs through more efficient designs. Cost structures, just like commodity prices, change over time.

Australia still has many high quality mineral and petroleum deposits that can be developed when the economic cycle rebounds. Yet, future investment is far from certain and Australia is facing growing competition from aspiring market entrants for investment dollars. The resources and energy sectors will need to continue the recent efficiency and cost saving drives along all stages of the supply chain to remain a world leading destination for attracting capital.

