Maintaining Australia’s mining advantage

Policy paper

The Australian Council of Learned Academies
July 2014
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1 Introduction

1.1 Overview

PricewaterhouseCoopers (PwC) has been engaged by The Australian Council of Learned Academies (ACOLA) to compile a research report on Australia’s mining sector. Specifically, this report examines Australia’s comparative advantage in mining through understanding the current mining sector and its challenges, sources of comparative advantage, and credible views of possible futures and forecasts for the sector.

Requirements for the sector to maintain its comparative advantage and address the challenges are addressed and alternative strategies for Australia in the future are identified and discussed.


2 Australia’s mining sector

For the purposes of this report, mining is considered to be the action, process, or industry of extracting ores and other materials from mines. In some instances, the first stage of processing, known as primary processing, is included. Examples of primary processing include the refining and transformation of ores to basic forms such as metals.

The focus of this section is mainly on ores. However, when appropriate, the analysis also includes the broader industry such as processing, and associated industries such as services, infrastructure, and manufacturing of which support the mining industry. A brief look is also provided on the gas industry due to the abundance of gas in Australia, high levels of investment, and the growth of gas usage internationally.

The information that follows regards the size, growth and investment of the mining industry and an analysis of the current issues facing the industry. Where possible, the information that is considered in this report is from primary sources such as the Australian Bureau of Statistics and credible secondary sources such as Geoscience Australia, Marketline, Bureau of Resources and Energy Economics, IBIS World, and Business Monitor International. We note that in some cases the ‘sector’ is defined differently depending on the source.

2.1 Size and growth

The mining industry is large and critically important to the Australian economy. It is not only large in terms of ores extracted and mined, but is also part of a larger value added industry which includes processing, and associated services.

Information is available on the following sectors/industries in Australia: ore resources in the ground which are accessible for mining, actual resources mined, mining as well as metal production, the total mining industry including extraction, processing and services, minerals exported, and the gas and oil extraction industry. Table 1 attempts to summarise sector revenue and growth projections within this context.

Table 1: Australian mining sector – size and growth

<table>
<thead>
<tr>
<th>SECTOR</th>
<th>REVENUE 2013 ($b)</th>
<th>GROWTH IN REVENUE (% per annum)</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mining extraction</td>
<td>90.3²</td>
<td>4.3 From 2012 to 2017</td>
<td>Ore mined.</td>
</tr>
<tr>
<td>Mining extraction and metals production³</td>
<td>121.9⁴</td>
<td>11.0 From 2011 to 2016</td>
<td>Ore mined, and production of metals such as Aluminium, Iron, Steel.</td>
</tr>
<tr>
<td>Minerals and ore exported⁵</td>
<td>130.0</td>
<td></td>
<td>Iron ore $82.1 billion, metallurgical coal $23.7 billion, thermal coal $17.2 billion.</td>
</tr>
<tr>
<td>Oil and gas</td>
<td>56.0</td>
<td>16.0 From 2013 to 2017</td>
<td>37% on the volume of gas</td>
</tr>
</tbody>
</table>

¹ Geoscience Australia (1,2)
² 86.6 in 2012
³ Marketline (3)
⁴ 98.9 in 2011
⁵ Bureau of Resources and Energy Economics (4)

Mining policy paper:
Maintaining Australia’s mining comparative advantages
Australia’s mining sector

<table>
<thead>
<tr>
<th><strong>extracted</strong></th>
<th>2018 production (supply); 9.0 for industry sales (demand)</th>
<th>produced is exported.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mining, and oil and gas, including extraction, production, and services</strong></td>
<td>244.0</td>
<td>3.8 From 2013 to 2018</td>
</tr>
<tr>
<td><strong>Includes mining, oil and gas, iron smelting and steel manufacturing; fossil fuel electricity generation, gas supply; electricity, gas, water and waste services; wholesale trade who provide access to machinery and equipment; business services; and integrated logistics.</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The findings highlighted in Table 1 suggest that Australia’s mining industry is largely an ‘explore, extract ores, produce metals and export’ sector, but with a significant supporting service sector.

Australia also has major global companies which operate in the mining and gas sector, having five companies in the Forbes Global 2000 list, with revenue of about $82 billion per annum. These five companies are: BHP Billiton, Woodside Petroleum, Santos, Fortescue Metals, and Newcrest Mining.

**Identified and exploited mineral resources in Australia**

Economic Demonstrated Resources (EDR) are those known resources in the ground that are accessible for mining. Research suggests that as at December 2011, Australia’s EDR of a number of minerals (such as iron ore) are the world’s largest.

The minerals industry is Australia’s largest export earner with mineral exports accounting for 50% to 60% of the annual value of total exports of goods and services. Australia’s minerals industry is dominated by coal, iron ore, alumina/aluminium, copper, nickel and gold, with principal markets in China, Japan, South Korea and India. The value of the sector is expected to reach $107 billion by 2017 from $86.6 billion in 2012, growing at an annual average rate of 4.3% over this forecast period.

**Mining and metals production in Australia**

The metals and mining industry consists of: aluminium, iron and steel, precious metals and minerals, coal and base metals. Further, this includes mining (extraction from the ground) as well as production of metals such as aluminium, lead and steel. The Australian mining and metals industry in 2011 was $98.9 billion, with forecasts conducted in 2011 suggesting that it would reach $169.4 billion in 2016 (11% per annum growth) with volume only increasing by about 1% per annum over this period, from 412.2mmt to 436.5mmt. It is important to note however, that this revenue growth forecast of 11% per annum was made in 2011 when commodity prices were increasing. Consequently, one needs to take this forecast growth with caution as commodity prices have decreased since 2011 (see Table 2).
Coal is the largest segment accounting for 52.3% of the industry’s total value. Australia accounts for 5.1% of the Asia-Pacific mining and metals value with China at 72.4% (Asia-Pacific also includes Japan, South Korea, and NZ amongst others).

**Mining industry including extraction, processing and services**

The scope of the mining industry includes all operations mainly engaged in the extraction of minerals and hydrocarbons (oil and gas), exploration for minerals and hydrocarbons and the provision of a variety of services to firms engaged in these activities. Industries involved include: mining; iron smelting and steel manufacturing; fossil fuel electricity generation, gas supply; electricity, gas, water and waste services; wholesale trade who provide access to machinery and equipment; business services; and integrated logistics.

The industry is export-oriented, with exports expected to account for over 65% of revenue in 2013. This compares to 50% to 60% growth in minerals, implying a higher export performance for downstream activities. Performance depends on global trends in supply and demand for commodities. Revenue was $244.4 billion in 2013 and is expected to grow at a compound annual rate of 3.8% over the next five years.

**Gas extraction in Australia**

Australia is endowed with significant gas resources with around 3.8 trillion cubic metres of gas EDR. However, their use in Australia has historically been overshadowed by coal, especially in the power sector. Gas has grown in importance over the last decade with gas now representing the majority of new electricity generation investment. As such, gas demand growth has been faster than other fossil fuels, and gas is now 21% of Australia’s energy supply.

Australia’s total gas production in 2012/13 was estimated to be 59 billion cubic metres of which LNG exports were around 36% of Australia’s gas production. Exports of LNG have increased strongly in recent years. Indeed, over the past five years as new LNG projects have been commissioned in response to growing international demand growth of 8-10% per annum has resulted. In 2012, around 79% of Australia’s LNG exports were sold to Japan and 16% to China.

Industry performance is expected to improve dramatically over the next five years from 2013 in response to rising production (especially natural gas) and higher prices for oil and gas. Increased investment in the industry will support rising output. Industry production is forecast to expand at a compound annual rate of 16.0% over the next five years, to reach $101 billion in 2018 from $56 billion in 2013. This is due to ongoing investment in gas extraction and new sources coming on line. This increased production is due to demand for LNG increasing as an energy source internationally as a cost-effective alternative as oil reserves dwindle and become more expensive and difficult to access. Industry sales revenue is forecast to increase by 9% over 2013 on the back of increased natural gas output as major investments come on stream (for example, Chevron’s Gorgon gas project in 2015).

Australia also has a longer term opportunity to exploit shale gas as concluded in a study of the Australian Committee of Learned Academies (ACOLA). The report notes that “shale gas has the potential to be an economically very important additional energy source.”

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11 Ibis World (6)
12 Bureau of Resources and Energy Economics (8)
13 Ibid
14 IBIS World (5)
2.2 Mining investment

Mining investment in Australia from 2002 to 2012 has been high, and has been a major driver of economic growth. Mining investment was 7.7% of Australia’s Gross Domestic Product (GDP) at the end of 2012 rising from 1.5% of GDP a decade ago. \(^\text{15}\) The major reason for the investment increase was soaring demand from Asian economies, particularly that of China.

By 2013 however, mining investment peaked. The Bureau of Resources and Energy Economics believe that in late 2013, $150 billion of high value projects that were at the feasibility stage have been delayed or cancelled since April 2012. In the October 2013 listing there were 63 projects at the Committed Stage with a combined value of $240 billion, compared with 73 projects with a combined value of $268 billion six months earlier. This value is predicted to fall to $70 billion by the end of 2017. If these forecasts are correct, the peak in investment passed in October 2012, when $268.4 billion was committed to projects. \(^\text{16}\)

The view is that a mining investment decline will occur from 7.7% of GDP in 2012 to 5.5% of GDP by 2016, falling below 4% of GDP by 2023. \(^\text{17}\) In their 2013-14 Budget documents, Federal Treasury see a modest decline in mining investment in 2014-15, with sharper falls over 2015-16 and 2016-17. The reasons for a peaking and forecast decline in mining investment include: \(^\text{18}\)

- Rising costs, decreasing productivity and more regulation and taxes of which are punishing the industry
- A decline in commodity prices globally as the supply of commodities catch up to, and in some cases exceed, the demand for these commodities

This investment decline is evidenced by BHP Billiton who have announced a reduction in capital and exploration expenditure from US$21.7 billion in 2013 to US$16.2 billion in 2014 and the focus will move to generating more volume from existing equipment and the lowering of unit costs. \(^\text{19}\) Similarly, Rio Tinto’s capital expenditure has been reduced by 26% to US$12.9 billion in 2013, compared to the peak level in 2012 of US$17.6 billion. It is expected to be reduced further to around US$11 billion in 2014.

“In today’s capital-constrained environment, only the highest-returning investments will be approved. The Group analyses each investment based on net present value but also considers a number of further factors, including internal rate of return, payback period and risk profile. This suite of ranking criteria, together with the application of strategic judgment, ensures that capital is deployed to the best opportunities. Our response to this has been to focus on costs, cash flow and capital discipline. Others in the sector have embarked upon similar paths. Inefficiencies are also being exposed, and so reductions in costs and capital expenditure, productivity improvements, and project deferrals and cancellations have become a prominent part of mining industry strategy.” (Rio Tinto, Annual Report 2013)

Table 2 summarises changes in the index of base metal commodity prices over the past 20 years. The index is based on information supplied by the Reserve Bank of Australia (RBA) who use a weighted basket of currencies (US$, Euro, Yen, and UK£) established by the International Monetary Fund (IMF) to establish price (and known as ‘Special Drawing Rights’ or SDR). It is quite clear that there was a major increase in base metal prices until 2011, and a steady decline until March 2014.

\(^\text{15}\) Deloitte Access Economics (9) and RBA (10)
\(^\text{16}\) Mining Council of Australia (11) and Bureau of Resources and Energy Economics (12)
\(^\text{17}\) Deloitte Access Economics (9)
\(^\text{18}\) Mining Council of Australia (11); Deloitte Access Economics (9) and Bureau of Resources and Energy Economics (12)
\(^\text{19}\) Mining Council of Australia (13) and BHP Billiton (14)
Australia’s mining sector

Table 2: RBA index of base metal commodity prices

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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Price Index</td>
<td>55.8</td>
<td>56.0</td>
<td>75.2</td>
<td>107.9</td>
<td>123.9</td>
<td>108.1</td>
<td>100.6</td>
<td>90.2</td>
</tr>
</tbody>
</table>

Source: RBA (March 2014) Index of commodity prices

The Bureau of Resources and Energy Economics have stated that Australia is now seeing a transition from the investment phase of the resources boom to the production phase as newly developed projects commence commercial production. The projects completed in 2012 and 2013 “have added considerably to Australia’s production capacity and will support strong commodity export volumes into the future with a lasting impact on the Australian economy.”

Section 4 examines scenarios for potential future trends for mining investment in Australia.

2.3 Current issues and analysis

A number of current issues and challenges are faced by the Australian mining industry. These are shown in Appendix 1. The detailed information in Appendix 1 (with sources) can be summarised as a SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats) as shown below in Figure 1. For further elaboration (and sources) please refer to Appendix 1.

Figure 1: Australian mining sector SWOT analysis

- **Strengths**
  - Rich and diverse mineral endowment, including high grade deposits (e.g. iron ore)
  - Australia will remain a leading player in many mining segments
  - In recent decades, improvements in techniques allow economic extraction of deposits that were previously uneconomic
  - Ideally located in the Asia-Pacific region, and close proximity to China
  - Australian mining legislation, but perceptions of mining policy attractiveness by mining companies vary from relatively favourably in Western Australia and South Australia, and relatively unfavourably in New South Wales
  - Very favourable risk to reward ratio (best in the region)
  - Australia has global companies operating successfully in the mining industry
  - The mining industry in Australia is underpinned by world-competitive mining technology
  - The Australian mining industry invests significantly in research and development (R&D)
  - The Australian mining industry spends significantly on training their staff

- **Weaknesses**
  - Few world class discoveries of new deposits in the past two decades
  - Costs are relatively high compared to other mining economies in the region
  - A range of mineral commodities will have low or fluctuating prices in the next 5 years due to increasing competition (e.g. coal from Southern Africa), and new investments coming online
  - Mining investment has peaked and is set to decline in the next 3 years
  - Reports of negative social impacts on specific demographic sectors, localities, indigenous communities, families of fly-in fly-out mining operations, and individuals
  - The mining industry has adverse effects on the environment

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20 Bureau of Resources and Energy Economics (12)
Australia’s mining sector

Opportunities

- World economic growth and increased demand for mineral products
- New and improved technology and innovation for mining techniques and operations, with the potential to improve productivity
- Discovery of a new generation of mining deposits to extend the life of minerals
- New approaches to exploration, mining and processing with good supporting infrastructure
- Focus on improving productivity and efficiency, rationalising the supply chain, improved energy management and shared infrastructure
- Improved techniques to help manage market volatility
- New sources of funding to support investment
- Adoption to engage communities more effectively
- Improved talent strategy

Threats

- Movement of mining to other countries which offer a more attractive return on investment due to declining productivity, increasing costs (e.g. energy, labour), and reducing grades
- Mining projects may be hindered by a lack of infrastructure growth as large miners cut capital expenditure
- Potential reduced growth and reduced demand from China
- Emergence of frontier mining economies, including in Asia, with lower mining costs
- Reduced funding from traditional lenders to fuel development and growth (could particularly affect the junior miners)
- Increasing community demands and scrutiny, and the ability of mining companies to ‘win a social licence to operate’
- Talent gap and shortage of skills
3 Comparative advantages & disadvantages

This section explores the Australian mining sector’s sources of comparative advantage and considers whether Australia has the ability to mine ores and produce minerals more advantageously than other countries. This would consider aspects of lower cost, greater reliability, and lower relative risk. In addition, views are summarised on whether the comparative advantage is sustainable, and the requirements to maintain the advantage.

3.1 Current mining comparative advantage

Compared with many countries, Australia has a comparative advantage in the production of mineral commodities.\(^{21}\) This stems from a range of factors including:

- A rich and diverse mineral endowment
- High quality, regional-scale geoscience information which lowers the risks of exploration
- Advanced exploration
- Mining and processing technologies
- A skilled work force
- Generally benign physical conditions and low population density.

These factors mean that modern mining can be undertaken in line with increasing community expectations for environmental and social performance.

In recent decades, improvements in mining techniques (including large-scale mining equipment and automation) have reduced mining costs and allowed economic extraction of deposits that were previously uneconomic. New metallurgical techniques and breakthroughs (such as carbon-based leaching technologies for gold deposits) have improved the rate of recovery for certain metals and minerals or enhanced the economic viability of other deposits (such as lateritic nickel) resulting in major increases in these economic resources.

As at December 2011, Australia had the world’s largest economic resources of gold, iron ore, lead, rutile, zircon, nickel, uranium and zinc. The country also ranks among the top six worldwide for known resources of antimony, bauxite, black coal, recoverable brown coal, cobalt, copper, diamond, ilmenite, lithium, manganese ore, niobium, silver, tantalum, tungsten and vanadium. Australia is the world’s leading producer of rutile, zircon, bauxite and alumina, the second largest producer of gold, iron ore, lithium, manganese ore, lead and zinc, the third largest producer of ilmenite and uranium, and the fourth largest of silver, nickel and black coal.

Australia’s mineral resources are adequate for mining to continue as the most important export earning sector of the Australian economy for the foreseeable future. For a given resource, ratios of EDR to current mine production provide indicative estimates of the resource life. Using these ratios, we see that the EDR of most of Australia’s major commodities can sustain current rates of mine production for many decades. Commodities

\(^{21}\) Geoscience Australia (1,2)
Comparative advantages & disadvantages

with resource life duration of less than 50 years are manganese ore (about 15 years at current rates of production), diamond and gold (35 years) and zinc (45 years).

BMI\textsuperscript{22} provides an evaluation of Australia’s mining risk/reward rating compared to other countries in Asia. The rating system evaluates the relative attractiveness of countries to (primarily new) large scale investments in the industry. It does so through looking at the following:

- **Rewards**: An evaluation of the sector's size and growth potential in each state, and also broader industry/state characteristics that may inhibit its development
- **Risks**: An evaluation of industry-specific dangers and those emanating from the state's political and economic profile that calls into question the likelihood of anticipated returns being realised over the assessed time period

The outcome of this evaluation is that “Australia remains at the top of our mining risk/reward ratings in the Asia region as it has the rare combination of substantial mineral reserves, considerable growth opportunities and a positive investment climate. It is a world leader in coal, iron ore, lead, zinc and gold production, and we expect its share of global output in these metals to rise as major miners focus on the expansion of their core assets.”

In addition, the Fraser Institute conducts an annual survey on mining companies globally. The survey is an attempt to assess how mineral endowments and public policy factors such as taxation and regulatory uncertainty affect exploration investment. This global survey is deemed to be particularly relevant here as the survey gauges mining corporation’s perception of mining in different jurisdictions as opposed to explicit data monitoring techniques or evidence based government reports.

Table 3 shows how Australia ranks on the global stage regarding the Policy Perception Index (PPI) which is essentially a report card to governments on the attractiveness of their mining policies. “Policy factors examined include uncertainty concerning the administration of current regulations, environmental regulations, regulatory duplication, the legal system and taxation regime, uncertainty concerning protected areas and disputed land claims, infrastructure, socio economic and community development conditions, trade barriers, political stability, labour regulations, quality of the geological database, security, and labour and skills availability.”\textsuperscript{23}

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</tr>
</thead>
<tbody>
<tr>
<td>NSW</td>
<td>66.6</td>
<td>68.2</td>
<td>62.4</td>
<td>56.4</td>
<td>64.7</td>
<td>20</td>
<td>20</td>
<td>32</td>
<td>44</td>
<td>39</td>
</tr>
<tr>
<td>NT</td>
<td>73.0</td>
<td>62.2</td>
<td>81.5</td>
<td>68.5</td>
<td>81.8</td>
<td>14</td>
<td>27</td>
<td>11</td>
<td>22</td>
<td>13</td>
</tr>
<tr>
<td>Qld</td>
<td>62.9</td>
<td>52.8</td>
<td>65.5</td>
<td>62.8</td>
<td>74.3</td>
<td>24</td>
<td>38</td>
<td>28</td>
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<tr>
<td>SA</td>
<td>75.9</td>
<td>75.9</td>
<td>75.3</td>
<td>75.5</td>
<td>82.9</td>
<td>10</td>
<td>11</td>
<td>19</td>
<td>20</td>
<td>11</td>
</tr>
<tr>
<td>Tas</td>
<td>65.9</td>
<td>61.3</td>
<td>64.8</td>
<td>54.1</td>
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<td>23</td>
<td>28</td>
<td>30</td>
<td>49</td>
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</table>

\textsuperscript{22} Business Monitor International is a leading, independent provider of proprietary data, analysis, ratings, rankings and forecasts covering 200 countries and 24 industry sectors. The evaluation is contained within the Australia Mining Report, Quarter 3, 2013 (7).

\textsuperscript{23} The Fraser Institute (40).
Comparative advantages & disadvantages

<table>
<thead>
<tr>
<th>State</th>
<th>Score</th>
<th>Rank</th>
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</thead>
<tbody>
<tr>
<td>Vic</td>
<td>57.0</td>
<td>30</td>
</tr>
<tr>
<td>Vic</td>
<td>56.9</td>
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<td>Vic</td>
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<td>Vic</td>
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<td>Vic</td>
<td>68.8</td>
<td>33</td>
</tr>
<tr>
<td>WA</td>
<td>67.1</td>
<td>19</td>
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<td>WA</td>
<td>70.6</td>
<td>17</td>
</tr>
<tr>
<td>WA</td>
<td>81.5</td>
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<tr>
<td>WA</td>
<td>79.3</td>
<td>15</td>
</tr>
<tr>
<td>WA</td>
<td>90.3</td>
<td>6</td>
</tr>
</tbody>
</table>

Table 4 shows how Australia ranks on the global stage regarding the Best Practices Mineral Potential Index (BPMPI) which rates a region’s geological attractiveness. That is, this index ranks the jurisdictions based on which region’s geology “encourages exploration investment” or is “not a deterrent to investment”.

**Table 4: Australia’s scores in the Fraser Institute’s BPMPI**

<table>
<thead>
<tr>
<th>State</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
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<tr>
<td>NSW</td>
<td>0.62</td>
<td>0.55</td>
<td>0.55</td>
<td>0.49</td>
<td>0.62</td>
</tr>
<tr>
<td>NT</td>
<td>0.83</td>
<td>0.72</td>
<td>0.66</td>
<td>0.68</td>
<td>0.70</td>
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<tr>
<td>Qld</td>
<td>0.81</td>
<td>0.80</td>
<td>0.75</td>
<td>0.72</td>
<td>0.73</td>
</tr>
<tr>
<td>SA</td>
<td>0.80</td>
<td>0.73</td>
<td>0.79</td>
<td>0.69</td>
<td>0.68</td>
</tr>
<tr>
<td>Tas</td>
<td>0.59</td>
<td>0.66</td>
<td>0.47</td>
<td>0.46</td>
<td>0.57</td>
</tr>
<tr>
<td>Vic</td>
<td>0.51</td>
<td>0.42</td>
<td>0.37</td>
<td>0.40</td>
<td>0.53</td>
</tr>
<tr>
<td>WA</td>
<td>0.77</td>
<td>0.87</td>
<td>0.83</td>
<td>0.77</td>
<td>0.82</td>
</tr>
</tbody>
</table>

The tables highlight that regarding the PPI, South Australia and Western Australia are generally the highest performers out of the Australian jurisdictions. In particular, Western Australia ranked 6th (out of 112 jurisdictions) regarding the attractiveness of their mining policies. For the BPMPI, it is again Western Australia that leads the Australian pack coming 2nd.

Overall, studies highlight and describe the sources of Australia’s comparative advantages as:24

- World-class resources in land, minerals and energy
- Proximity to the world’s fastest growing markets in Asia
- Use of English, the world’s business language
- A temperate climate
- Well-understood tax and regulatory regimes.

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24 Deloitte (24) and The Fraser Institute (40).
3.2 Sustainability of the mining comparative advantage

For the past decade the resources boom has been driven by the combination of Australia’s comparative advantage and high growth in Asia (particularly China). A number of organisations acknowledge that mining will remain a major contributor to the Australian economy due to factors such as large economic sources of mineral resources and a growing and large market in Asia.

Research indicates that Australia will continue to win a large share of the international growth in demand for minerals due to reasons such as those outlined in Figure 2 below.

![Figure 2: Reasons for Australia’s advantages](image)

However, there are valid concerns that Australia’s advantage could erode due to a combination of factors including increasing costs and low productivity. Over recent years, the Minerals Council of Australia has warned of the structural deficits in our economy that have been masked by historically high terms of trade. “Our country’s attractiveness as a place to do business in a highly globalised industry is slipping due to a combination of rising costs, declining productivity and a deteriorating sovereign risk reputation. With commodity prices having fallen from peak levels, complacency and backsliding on economic reform pose a real threat to the minerals sector and to the wider economy.”

Further, Geoscience Australia warns that even though Australia has large economic resources of many mineral commodities, this is not a guarantee that such resources will continue to be exploited in Australia. In an increasingly globalised and competitive

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25 Deloitte (24) and
26 Minerals Council of Australia (25)
commodity market, multinational mining companies continue to search for mineral deposits that will offer attractive returns on investment.27

The factors outlined in Figure 3 have been noted as potentially inhibiting Australia’s ability to take advantage of the growth in mineral demand.

**Figure 3: potential inhibitors to Australia**

- **Growing costs**: The cost of mining in Australia has been escalating due to a range of factors of which include: the scarcity of skilled labour, the high Australian dollar, the cost of inputs such as machinery and wages, and more regulations and taxes.
- **Taxes and red and green tape**: Australia has been making the regulatory environment more complex and onerous, including the introduction of new mining taxes and the raising of existing ones.
- **Lack of new infrastructure**: Australia will need more mining-related infrastructure to prevent future bottlenecks.
- **Falling productivity**: Australia’s mining productivity has declined over the past decade at a time when other nations have improved theirs.
- **Questions about coal**: The world is worried, not merely about greenhouse gas emissions, but also about air quality. This means that coal—although it will remain an anchor asset of Australia’s mining sector—is unlikely to drive as much growth in coming years.

### 3.3 Benefits of mining comparative advantage to other sectors

There are a number of sectors that benefit directly from the Australian mining sector and its comparative advantage. These include infrastructure, business services and manufacturing. It has been estimated that 18% of Australia’s gross value add is contributed by the resources economy.28 For example, for each dollar of resource exports in 2011/12:

- Resource extraction (mining, processing, and refining) contributed $0.70 to value addition
- Business services contributed $0.13 to value addition
- Manufacturing and transport and construction each contributed $0.02 to $0.04 to value addition
- Other industries contributed $0.07 to value addition.

The RBA analysis concludes that there are ‘non-trivial’ spillover effects resulting from demand for Australia’s natural resources to domestic industries outside of the mining sector.

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27 Geoscience Australia (2)
28 RBA (27)
For example, about 10% of Australia’s total employment is engaged in servicing demand for resource extraction and investment. An example of where mining has had a positive effect is manufacturing. This is indicated by the two following examples:

1. Companies manufacturing construction, earthmoving and mining machinery along with specialised parts for such equipment had $4.9 billion revenue ($1.7 billion exports) of which mining accounted for half of the revenue in 2013.\(^{29}\)

2. The mining technology services industry is an example of Australian manufacturing leveraging Australia’s mining and minerals industry, research strengths and global supply chain markets on multinational corporations. In 2009, the industry generated $27.5 billion revenue and employed 83,000 people.\(^{30}\)

An example of an Australian company that has become a leading global player through advanced manufacturing is Orica who prides itself on being “An Australian Company with a global footprint.” Orica has a workforce of over 14,500 with operations in more than 50 countries and customers in more than 100. The company’s major market sector is mining services, and the largest geographical segment is in Australia with 33% of the total revenue, and 60% of total earnings in the Asia Pacific region. The “strategic positioning within the mining sector allows it to maintain stability through continued global uncertainty”. Orica is the largest provider of explosives and blasting systems to the mining and infrastructure markets (28% market share globally for commercial explosives), is the global leader in the provision of ground support and tunnelling, and a leading supplier of sodium cyanide to the gold industry. Their vision is to provide ‘clever resourceful solutions’ through ground breaking technology, and a significant R&D focus. This had led to an increased contribution from mining services across its explosives market.\(^{31}\)

However, the net spillover effect is not always positive as the case of the Australian tourism industry during the mining boom demonstrates. Modelling by Tourism Research Australia (2013) has demonstrated that the mining boom has benefited some sectors of the tourism industry, whilst others have suffered. “The net economic effect on Australian tourism would be seen to be negative”. The impacts to the tourism industry are as follows:\(^{32}\)

- Positive impacts: increased aggregate domestic demand for leisure travel; increased demand for business travel; rapid expansion of fly-in-fly-out and drive-in-drive-out commuting workers with increases in accommodation and aviation services

- Negative impacts: high Australian dollar decreased international leisure tourism and increased travel overseas; leisure travel is being crowded out or priced out in mining regions and some capital cities; commuting miners have less time and spend less than leisure tourists on tourism activities.

### 3.4 Requirements to maintain the comparative advantage over the medium term

There have been very few world-class mineral discoveries in Australia in the past two decades. Further, the inventory of minerals has been sustained largely through delineation of additional resources in known mineral fields. Sustaining the strength of the minerals sector is dependent on:

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\(^{29}\) IBIS World (28)
\(^{30}\) Department of Industry (29)
\(^{31}\) Orica (30)
\(^{32}\) Tourism Research Australia (31)
Comparative advantages & disadvantages

- Discovering a new generation of large low-cost mineral deposits to sustain the resource base; and/or,

- Increasing mine production to maintain world market share for major mineral commodities.

"Australia's continuing position as a premier mineral producer is dependent on continuing investment in exploration to locate high quality resources and/or upgrading known deposits to make them competitive on the world market, as well as investment in beneficiation processes to improve metallurgical recoveries."

In a study commissioned by the Minerals Council of Australia with Port Jackson Partners, policy solutions were developed which have the potential to have a positive impact on Australia's competitiveness as a supplier of mineral resources. This report recommends a series of initiatives:

The need for change in the minerals sector must be recognised

- Shift the national dialogue on mining towards the opportunity and benefits at risk in order to strengthen the appetite for reform. At present, the national dialogue on the mining industry focuses primarily on how to distribute the earnings of the minerals sector, not on actions needed to ensure those benefits continue.

- Match competitor countries in acknowledging a home-grown competitiveness problem. Examples include: Canada has announced plans for a ‘one project, one review’ approvals process; Chile is driving innovation in state-of-the-art mining techniques; Brazil has announced plans to modernise its regulatory framework to encourage investment.

Address the cost pressures on current operations and projects

- Mobilise all available skilled labour including importing critical skills, to stop labour cost super-inflation. A large and persistent shortage of skilled labour has resulted in rapid growth in minerals sector wage costs. Construction wages, for example, grew at 9% per annum between 2001 and 2011. Policy settings must ensure every step is taken to attract suitably skilled labour into minerals employment with skilled immigration in particular being a necessary element.

- Ensure unfettered access to globally competitive suppliers. To remain competitive, Australian projects must have access to the most competitive supplies of inputs, including fuel, materials, equipment and consumables.

- Increase national savings to ease exchange rate pressures.

Set about regaining world leading competitiveness through a new program of long-term structural reform

- Grow ample skills by building university capacity and lifting technical training.

- Maximise innovation dividends to enable productivity gains.

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33 Geoscience Australia (2)
34 Minerals Council of Australia (25)
Comparative advantages & disadvantages

- Reorient the workplace relations framework towards ‘win-win’ deals that reward more output with more pay.

- Align owner and user interests to optimise infrastructure investment and operation.

- Reforms are needed in the area of multi-user infrastructure chains to maximise throughput, particularly as existing infrastructure comes under pressure from increased volumes.

- Reform approvals processes to reduce delays and lower costs. Clear and predictable rules and timeframes for approvals are essential.

- Lock in stable and internationally competitive tax and royalty arrangements. The Resource Super Profits Tax debate damaged Australia’s reputation on tax. To restore investor confidence to previous levels, governments in Australia should commit to stable and competitive tax and royalty regimes.

Mining companies have already started adapting to these changing circumstances. For example, BHP Billiton indicates in a talk on “Building on Australia’s comparative advantage” that the commodities that would feed future China growth would require Australia’s resources industry to continue to improve its competitiveness. It is critical that industry and policy makers work together to capitalise on these opportunities. For BHP Billiton, this meant reducing operating costs and driving productivity improvements which delivered a US$2.7 billion reduction in controllable cash costs in 2013. BHP highlighted that government also has a role in securing future investment –particularly in taxation and industrial relations policy and addressing duplication between state and federal regulatory obligations.
4 Looking to the future

This section examines credible scenarios for the international and Australian mining sector; namely it looks at the possible future of the Australian mining sector in an international context. It must be emphasised that scenarios are stories about the future. “Good scenarios are plausible, challenging and rigorously constructed to address the most crucial questions that decision makers need to face. They represent stories about the future context that are relevant, plausible, challenging and divergent. One cannot expect any given scenario to come true as it stands.” Scenarios are presented here to assist in the development of strategic policy options.

As emphasised in the report prepared for The Australian Committee of Learned Academies (ACOLA) by the Centre for Australian Foresight “when dealing with the future, there are no right or wrong answers, just assessments of plausibility and relevance for particular contexts, which are in turn influenced by individual perspectives and beliefs about the future. As stories about possible futures, scenarios are not predictions of one future that urge us to ‘bet the farm’ on a single locked in strategic or optimal choice. Instead they implore us to take the opposite approach – to find strategies that are robust, that stand us in good stead regardless of how the future finally comes to be. Scenarios represent a range of potential outcomes for an organisation, from which consideration of strategy today can be informed.”

4.1 International mining scenarios

Global Mining & Metals Scenarios to 2030 were developed through the World Economic Forum in 2009. This was a year long process which brought together over 200 stakeholders from the private sector, government, academia and international and non-governmental organisations in numerous discussions and face-to-face and virtual workshops. Numerous representatives from the Australian and associated sectors participated in this forum.

The participants agreed on the central question: “How will the environment for the global mining and metals sector look in 2030?” The scenarios developed were Green Trade Alliance, Rebased Globalism, and Resource Security. Details of these three different scenarios are shown in Table 5.

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35 World Economic Forum (33)
### Table 5: World Economic Forum international mining scenarios to 2030

<table>
<thead>
<tr>
<th>Scenario 1: Green Trade Alliance (GTA)</th>
<th>Geo-economic landscape</th>
<th>Geopolitical landscape</th>
<th>Economic outlook</th>
<th>Environmental outlook</th>
</tr>
</thead>
<tbody>
<tr>
<td>World divided economically by whether or not they belong to the GTA (formed to promote environmental sustainability without compromising competitiveness).</td>
<td>Environmental standards are used as the basis for protectionist measures by GTA countries.</td>
<td>Tense relations between GTA and non-GTA countries. Emerging of the Sustainable Trade Organisation to facilitate and enforcing GTA trade agreements.</td>
<td>Global GDP averages 2% annually. GTA have a metric which incorporates environmental, sustainability and social indicators. Investment capital comes with green ties or no ties.</td>
<td>GTA countries: radical environmental policies; changing consumer behaviours; cradle-to-cradle stewardship. Non-GTA countries: action motivated to overcome impediments to economic growth rather than environment concerns.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scenario 2: Rebased Globalism</th>
<th>Geo-economic landscape</th>
<th>Geopolitical landscape</th>
<th>Economic outlook</th>
<th>Environmental outlook</th>
</tr>
</thead>
<tbody>
<tr>
<td>World is committed to realising the benefits of global interconnection but has become complex and multipolar. Power comes from control of resources as well as possession of capital.</td>
<td>Economic power held by markets with strong demand and countries with strategically important resources. Cross-border flows open &amp; free market principles favour privatisation and financial liberalisation. Some capture social value though in-country manufacturing.</td>
<td>Multipolar world with broad commitment to reap benefits of globalisation and interconnectedness. Agreements reached bilaterally or among smaller groups. Proliferation of local regulations which are strongly enforced.</td>
<td>Global GDP growth averages 4% annually. High levels of investment capital available but strict condition related to social development. Demand and prices for commodities are high. Most large companies in the industry are from emerging countries.</td>
<td>Local laws protect local environments, but no significant progress to a widely adopted CO2 reduction agreement. Growing acceptance that too late to prevent climate change and efforts need to be on adaptation.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scenario 3: Resource Security</th>
<th>Geo-economic landscape</th>
<th>Geopolitical landscape</th>
<th>Economic outlook</th>
<th>Environmental outlook</th>
</tr>
</thead>
</table>
4.2 **Australian scenarios**

Participants from the Australian mining and associated sectors participated in, and utilised, a number of important inputs during 2010 and 2011 to develop ‘Vision 2040: Mining, minerals and innovation – A vision for Australia’s mineral future’. This report aims to provide direction for a national strategy that transforms existing assumptions about how Australia can contribute to local and global development. The consultation process for this vision aimed to answer the following questions:

- What should Australians be doing with our mineral endowment in the next 30 years to underpin long-term national benefit?
- What strategies can deliver on a vision of a minerals industry embedded within a sustainable Australian community in a range of future scenarios?
- What technologies and innovations should be given priority for research and development?

### 4.2.1 Summary of key themes

The following are the key themes that arose from the Vision 2040 document.

<table>
<thead>
<tr>
<th>Building long term benefit for Australia</th>
<th>Looking ahead to get ahead</th>
<th>Brand Australia: responsible minerals</th>
<th>A National Mining Strategy to 2040</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Problem:</strong> Economic, social and environmental impacts are affecting the productivity of mining in Australia, and future benefits.</td>
<td><strong>Problem:</strong> Declining mineral deposits are creating greater impacts during operations and upon closure.</td>
<td><strong>Problem:</strong> Social licence to operate is extending to sustainable and ethical supply chains for consumer products and infrastructure.</td>
<td><strong>Problem:</strong> Limited information and coordination reduces strategic competitiveness and opportunities for innovation.</td>
</tr>
<tr>
<td><strong>Solutions:</strong> Sovereign wealth fund to support diversification, infrastructure and innovation.</td>
<td><strong>Solutions:</strong> Embedding best practice mine closure &amp; post-mining transition in planning and operations as well as exporting this knowledge globally.</td>
<td><strong>Solutions:</strong> Developing and applying accredited standards for mining operations; Link mining to clean energy.</td>
<td><strong>Solutions:</strong> Measuring and managing above and below-ground stocks to guide technology and policy development.</td>
</tr>
</tbody>
</table>

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36 The inputs included (among others) the ‘Mining and metals scenarios to 2030’, World Economic Forum (January 2009), as well as exploring Australian implications of megatrends under these scenarios in Melbourne in September 2010. (35)
Global demand for Australian minerals and metals continues to rise, making a comprehensive assessment of the industry’s current and future role in the Australian economy an important goal. As a mineral dependent economy, Australia faces challenges from declines in key minerals, and must also find ways of adapting to carbon constraints and a new tax structure.

### 4.2.2 National Strategy

In this vision, Australia develops a national strategy for the development of its mineral resources that will guide future development and ensure long-term benefit to the national community. The development of a national minerals strategy is an opportunity to integrate mining sustainability into economic planning. The report notes that such a strategy should include policy measures and programs that:

- Improve the coordination of mineral development across states and territories through an organisation, similar to The National Water Commission, which would drive progress in sustainable management of Australia’s mineral resources
- Identify challenges, such as declining productivity and high currency values, and develop innovative responses
- Improve knowledge of Australia’s mineral resources including much stronger reporting requirements for exploration undertaken by private companies
- Improve social and environmental outcomes by encouraging all mining and mineral processors operating in Australia to report under the Global Reporting Initiative
- Improve capacity for innovation through collaborations amongst universities, mineral producers and other researchers
- Facilitate the commercialisation of technologies that make a ‘step change’ in the environmental and social performance of mining and mineral production
- Monitor and evaluate key social, environmental and economic indicators for mining and mineral production
- Implement sustainability reporting on the Australian economy as a whole, to ensure that improvements by the mineral industry can be monitored and compared with other sectors

### 4.3 Investment and growth scenarios for Australia to 2017/18

This section is aimed at providing views on possible scenarios for mining investment until 2017, based on trends since 2005. As previously indicated, Australia has experienced an investment boom in mining between 2002 and 2012, which was a major contributor to growth. However, the peak appears to have passed and the consensus view is that mining investment will decline in absolute terms until at least 2017. Uncertainty exists however, on the extent of this decline.

“The forecasts for the Australian economy continue to embody a gradual shift in growth from mining investment towards exports, non-mining business investment and household spending. While there are signs that this rebalancing is beginning, there remains considerable uncertainty about how it will proceed. In particular, there remains a large degree of uncertainty surrounding the exact profile for mining investment”.

Multifactor productivity grew strongly in Australia until 2004/05, but has since declined on average at 0.7% per annum. Prior to the resources boom, productivity delivered half of Australia’s income growth. Since 2005, 90% of growth is from favourable terms of trade. There has also been an investment boom in mines, processing plants, pipelines and ports until 2012 caused by Asia’s rapid growth and need for raw materials.

Because of Australia’s low productivity and dependence on raw material exports (including commodity prices, and high growth in China), and an expected decline in mining investment, a number of scenarios were developed for 2017 by McKinsey as shown in Figure 4.

**Figure 4: Scenarios for 2017**

These scenarios project major differences in growth in income from ‘best’ to ‘worst’ case with income growth to 2017 varying between $35 billion and $250 billion (Table 4). The ‘best case’ scenario is when productivity returns to pre-2005 growth, the current favourable terms of trade continue (especially continuing increases in resource prices), and all advanced projects plus 75% of less advanced projects come on stream. The ‘worst case’ scenario is where terms of trade tend to the long term average (decline from the present), 67% of advanced projects come to fruition, and there is no improvement in productivity.

**Table 6: Projected outcomes in 2017 to each scenario**

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Terms of Trade</th>
<th>Projects Completed</th>
<th>Productivity</th>
<th>GDI Growth 2011 - 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>% CHANGE PER ANNUM</td>
<td>GROWTH $ billion</td>
</tr>
<tr>
<td><strong>Paradise</strong></td>
<td>Current maintained</td>
<td>All advanced and most less advanced occur</td>
<td>Gets better and returns to trend pre-2005</td>
<td>3.7</td>
</tr>
<tr>
<td><strong>Lucky escape</strong></td>
<td>Current maintained</td>
<td>All advanced and most less advanced occur</td>
<td>Stays low at 2006 to 2011 levels</td>
<td>2.9</td>
</tr>
</tbody>
</table>

37 McKinsey (36)
Suggestions to move to ‘best case’ scenarios, requires consideration of the following:

**Resource sectors:**
- Major projects are prone to overruns and inefficiencies and thus there are opportunities to boost performance by up to 30%
- Government has a role by ensuring environmental approvals, infrastructure development and industrial relations deliver the right balance between development and other social goods. Further, regulators should provide increasing clarity, certainty, and speed to companies while fulfilling their mandates

**Resource rider sectors:**
- Improved efficiency, especially in transport
- Transport and professional services have experienced declines in productivity
- Finding ways to make infrastructure development most cost-efficient and adopting a more integrated cross-sector approach that can reduce the need for expensive new infrastructure will be crucial

**Manufacturing:**
- Build the foundation for long term competitiveness, such as a more supportive ecosystem for innovative manufacturing

In terms of infrastructure, there are opportunities for government to play a supporting role to lifting mining production, including via railways, port projects and electricity. Infrastructure investment is expected to average 4.3% of GDP over the next ten years from 2013. Over that time, this would amount to a cumulative total of $767 billion of infrastructure investment in Australia, although a major part of this will not be directly related to mining.

However, for a number of these projects to get the go ahead a supportive macroeconomic environment will be required, and support from government in terms of planning, regulation and financing mechanisms. Infrastructure investment thus has the potential to help fill the gap left by declining mining investment (and make good use of some of the skilled workers who will be leaving mining projects).38

### 4.4 Trends analysis

In addition to the SWOT analysis conducted earlier, the detailed information in Appendix 1 can be summarised as a PESTLE (Political, Economic, Social, Technical, Legal and Environmental) analysis for the short to medium term time horizon (next 3 to 5 years) for the Australian mining sector. This is shown in Table 5.

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38 Deloitte Access Economics (9)
Table 7: Australian mining sector PESTLE analysis (short to medium term)

**Political/legal**

- Australia has a very favourable Risk/Reward Rating.
- Australia’s mining legislation is the best in the world according to Business Monitor International. However, the Fraser Institute ‘Policy Perception Index’ indicates that mining managers and executives assess the attractiveness of mining policies differently in each Australian State from relatively favourably in Western Australia and South Australia, to relatively unfavourably in New South Wales.

**Economic**

- A rich and diverse mineral endowment means Australia will remain a leading supplier of minerals.
- Increased demand for mineral products worldwide, particularly in China. However, this is dependent on high levels of economic growth in China.
- Increasingly, multinational mining companies will continue to search globally for mineral deposits that will offer attractive returns on investment. This will adversely affect mining investment in Australia.
- There have been very few world-class discoveries of mineral deposits in Australia in the past two decades, and with increasing production, resources to production ratios of many minerals are decreasing.
- Costs are increasing, commodity prices are moderating, and productivity is a concern.
- Mining investment has peaked and is expected to decline in the next few years commencing 2012.

**Social**

- Local communities are becoming more sophisticated in their negotiations with mining companies.
- Despite project halts and a slower pace of development, the mining industry’s talent shortage persists.
- Social impacts of mining include: shortages in affordable housing, increased local costs of living, psychological impacts on mine workers (particularly fly-in, fly-out workers), skills shortages in trades, pressure on local community services, and localised inequality and disadvantage between mining and non-mining communities.

**Technical (innovation)**

- Improvements in mining techniques have reduced mining costs and allowed economic extraction of deposits that were previously uneconomic.
- The mining industry in Australia is underpinned by world-competitive mining technology.
- The Australian mining industry invests significantly in research and development (R&D).

**Environment**

- Environmental impacts of mining are associated with increased mine waste, increased potential for pollution, increased mine size, as well as increasing water and energy consumption.
- Biggest impacts are likely to stem from greenhouse and air pollution concerns in Australia’s export markets as well as domestically. This will affect coal negatively and gas positively.
- Within the minerals industry, much of the focus on improving sustainability performance revolves around selecting and improving technology to reduce impact.
In addition, Table 6 indicates the long term (ie over the next 20 years) trends and/or drivers which are expected to shape the industry both internationally and within Australia. The information in this Table is from the scenario work done via the WEF and the associated Australian process.\textsuperscript{39}

### Table 8: International and Australian mining sector trends and driving forces (long term)

<table>
<thead>
<tr>
<th>International Driving Forces</th>
<th>Australia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Political</strong></td>
<td></td>
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<tr>
<td>Geopolitical instability</td>
<td></td>
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<tr>
<td>Level of state intervention in business</td>
<td></td>
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<tr>
<td>Degree of trade liberalisation</td>
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<tr>
<td>Resource nationalism</td>
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<tr>
<td>Resource management</td>
<td></td>
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<tr>
<td>Protectionism</td>
<td></td>
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<tr>
<td>Energy security policy</td>
<td></td>
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<tr>
<td>Corruption</td>
<td></td>
</tr>
<tr>
<td>Global governance, quality of public governance</td>
<td></td>
</tr>
<tr>
<td>Geopolitical power shifts</td>
<td></td>
</tr>
<tr>
<td><strong>Economic</strong></td>
<td>Maturing demand: Australian minerals production is projected to rise based on demand from countries including China and India continuing to follow growth trends. However, per capita steel consumption in China is now maturing to steadier levels, similar to those in developed economies like the USA.</td>
</tr>
<tr>
<td>Global economic growth, emerging middle classes</td>
<td></td>
</tr>
<tr>
<td>Developmental state of economies</td>
<td></td>
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<tr>
<td>Access to capital</td>
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<tr>
<td>Financial openness</td>
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<tr>
<td>Global wealth distribution</td>
<td></td>
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<tr>
<td>Fiscal policy</td>
<td></td>
</tr>
<tr>
<td>Form of capitalism</td>
<td></td>
</tr>
</tbody>
</table>

\textsuperscript{39} Geoforum (19) for Australian drivers and World Economic Forum (33) for the international driving forces
Looking to the future

### Social
- Corporate Social Responsibility (CSR) expectations
- Income inequality
- Population growth
- Consumer behaviour
- Indigenous expectations
- Skills gap
- Health and safety expectations

#### Planning for transitions:
Similarly, increasing emphasis on ‘Fly-In-Fly-Out’ (FIFO) and ‘Drive-In-Drive-Out’ (DIDO) operations has reduced the benefits to local communities during operations, and failed to address collapses in economic development post-closure. In 2040 Australia must lead the way in transition planning for communities. (It must be noted however that FIFO and DIDO has increased labour supply and reduced the investment in stranded personal and social assets as mine closure occurs).

#### Indigenous leadership:
It is expected that by 2040, indigenous Australians will have increased their levels of economic and political power with respect to mining and mineral production.

#### Social Licence to Operate:
Local social and environmental impacts are already a problem for securing and maintaining social licence. As expectations for ‘ethical’ products rise, manufacturers are looking much further up the supply chain, to ensure that all raw materials included in their products comply.

### Technical innovation
- Automation of operations
- Substitutions for minerals
- Energy innovation
- Resource scarcity
- Low carbon technologies
- New use for minerals

#### New approaches for new needs:
Rates of discovery for new, accessible, high grade ores are declining. Consequently, research for new discoveries, technologies and approaches are needed to continue Australia’s position as a global commodity supplier and to develop innovation beyond mining. International joint ventures and strategic collaborations between mining and other industry, universities, and government are required to create long-term prosperity for Australia.

#### Making our own luck:
Australia must commit to increased innovative thinking and collaborative action to build long-term value not only from resources but also from resourcefulness.

### Environment
- Climate change policy
- Water availability
- Effects of climate change/environmental degradation
- Price of CO₂, price of water
- Global adaptation of environmental standards
- Ecosystem evaluation, biodiversity evaluation

#### Challenges for energy and water:
Energy consumption for mining in Australia has increased by a factor of 10 over the last decade. In the future, Australia’s competitiveness will depend on being able to access even more energy with dramatically reduced carbon dioxide emissions. Recent floods and droughts have also demonstrated that managing water is becoming a high priority for both mining operations and surrounding communities.

#### Excellence in remediation:
With over 30,000 legacy sites in need of remediation, the minerals industry in Australia must be at the forefront of best practice in mine closure and remediation. This will ensure that mining and mineral production is a ‘welcome guest’ rather than a ‘bad tenant’ in communities.
5 Key findings

This section outlines the key findings from the above analysis of the current state and potential future of the Australian mining sector.

5.1.1 The Australian mining sector is large relative to the size of the Australian economy

The mining industry is not only large in terms of ores extracted and mined, but is also part of a larger value added industry which includes processing, and associated services. However, the sector is still largely ‘extract and export’ focused. Table 1 indicates the following mining sector size in 2013:

- Mining (ore) extraction: $90.3 billion
- Metals produced: $31.6 billion
- Mining/metals exported: $130.0 billion
- Oil and gas extracted: $56.0 billion
- Services to the mining and oil and gas industry: $66.1 billion

5.1.2 The Australian mining sector currently has a comparative advantage

Advantages include:

- Australia holds some of the world’s biggest and highest-quality mineral deposits
- Proximity to the world’s fastest growing markets in Asia
- Australia has substantial assets for producing and exporting minerals
- Australia’s miners are highly skilled, compared to many of those working elsewhere across the world
- Australia is a global leader in next-generation production techniques

5.1.3 The Australian mining sector faces short to medium term challenges which need to be addressed

The industry focus on the short to medium term remains ‘extract and export’ orientated and requires a longer term view and cooperative national leadership as recommended in the Australia 2040 scenarios. Many organisations have identified the challenges and responses that the mining sector faces in the short to medium term. It is interesting that the RBA takes a more conservative view of the industry’s prospects than industry.
Key findings

Challenges that have been identified include:

- **Growing costs**
  - The cost of mining in Australia has been escalating due to a range of factors such as the scarcity of skilled labour, the cost of inputs such as machinery and wages, and more regulations and taxes

- **Falling productivity**
  - Australia’s mining productivity has declined over the past decade at 0.7% per annum

- **Declining commodity prices as supply catches up with demand**

- **Decreasing investment**
  - Investment has been a major contributor to Australia’s GDP, but has peaked in 2012 and is forecast to decline over the next 5 years from 7.7% of GDP in 2012 to potentially 5.5% in 2016

In order to regain world leading competitiveness, Australia needs to focus on issues as shown in Figure 5.

**Figure 5: Focus areas**

Skills development | Innovation to enable productivity gains | Optimisation of infrastructure investment and operation

- Reforms in the area of multi-user infrastructure chains to maximise throughput, particularly as existing infrastructure comes under pressure from increased volumes
- Cost reduction, including processes to reduce delays and lower costs

Mining companies have already started adapting to these changing circumstances by reducing capital investment and focusing on reducing operating costs and driving productivity improvements. It is possible that Australia’s declining productivity may be reversed by this strategy as Australia moves from the ‘investment’ to the ‘production’ phase.

A mine’s productivity will generally decline after higher grade ores are mined, and mining then requires longer haul roads, mining faces become more remote underground, stripping ratios may increase etc. Technology development is required to mechanise, increase the capacity of equipment and to embrace new types of operation. Mining companies are investigating and implementing innovations to secure low-cost productivity gains, such as those delivered by Rio Tinto’s Mine of the Future program.

Due to productivity declines and increasing labour costs (among others), Australia is in danger of increasing the capital cost of building plants in Australia versus competing low cost countries such as in Africa. Even though many competing regions have higher risk than Australia, investing in these regions will become more attractive to international investors.
It is important to emphasise that not all types of mining have the same issues. For example, underground and surface mining face different challenges. As an illustration, Australia requires the development of new methodologies and techniques for accessing minerals at greater depth than previously where new deposits are likely to be found. Existing technologies at these depths are likely to be stretched and will be very expensive and ineffective. More powerful remote sensing technologies need to be developed. As indicated by a report of the Australian Academy of Science: “Australia’s resources industry is based on large, high-quality deposits discovered in the late 19th Century and the 20th Century – an exploration endeavour that was supported by high-quality pre-competitive research that mapped the surface of Australia. While demand for Australian minerals remains strong, it is of serious concern that discovery of new deposits has not kept pace with depletion, despite ongoing competitive exploration efforts. The decline in exploration success is in large part due to the difficulty in exploring what lies beneath the regions of highly weathered rock (known as regolith) and sedimentary basins that cover approximately 80% of Australia. There is no reason to believe the resource potential of this 80% which lies under cover would be less than the exposed 20% that has provided so much wealth.”

Australia needs to invest in more R&D, which includes (among others): social science research such as the sociology of mining towns and indigenous relations; environmental challenges; improvement in productivity, and new methodologies and techniques for exploration.

5.1.4 The Australian mining sector has major spillover effects to other sectors of the Australian economy

There are major spillover effects resulting from demand for Australia’s minerals. For example, about 10% of Australia’s total employment is engaged in servicing demand for resource extraction and investment. An example of where mining has had a positive effect is manufacturing such as in advanced manufacturing of which includes manufacturing explosives and mining machinery.

5.1.5 There are a number of possible long term futures for the Australian mining sector

Australia faces a number of alternative scenarios for mining. These include a slow decline of the mining industry, the creation of a growing and sustainable mining industry, growing a value-added downstream sector, and refocusing effort to new growth areas. Of course, more than one of these alternatives is possible such as a sustainable mining industry with growing value addition in related sectors. These alternatives are summarised below.

Slow decline of the mining industry

This alternative assumes that Australia does not address the weaknesses or threats as articulated in the SWOT analysis (Figure 1) or address the challenges such as growing costs, taxes and red and green tape, lack of new infrastructure, and falling productivity.

In particular, a ‘worst case’ scenario is when the following issues are not addressed:

- Moving of mining to other countries which offer a more attractive return on investment due to declining productivity, increasing costs (e.g. energy, labour), and reducing grades

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*Australian Academy of Science (49)*
Key findings

- Mining projects may be hindered by a lack of infrastructure growth as large miners cut capital expenditure
- Potential reduced growth and reduced demand from China
- Emergence of frontier mining economies, including in Asia with lower mining costs
- Reduced funding from traditional lenders to fuel development and growth (this could particularly affect the junior minors)
- Increasing community demands and scrutiny, and the ability of mining companies to ‘win a social licence to operate’
- Talent gap and shortage of skills
- Taxes and red and green tape, including the introduction of new mining taxes

Create a sustainable mining industry

The challenges and threats identified above need to be addressed in both the short/medium and long term in order for the sector to maintain its comparative advantage. For the long term, the development of a national minerals strategy is an opportunity to integrate mining sustainability into economic planning. Such a strategy should include policy measures and programs that:

- Improve the coordination of mineral development across states and territories
- Identify challenges, such as declining productivity, and develop innovative responses
- Improve knowledge of Australia’s mineral resources
- Improve social and environmental outcomes
- Improve capacity for innovation
- Facilitate the commercialisation of technologies that make a ‘step change’
- Monitor and evaluate key social, environmental and economic indicators
- Implement sustainability reporting

This response requires industry and government to work together in a coordinated and sophisticated way, with effective engagement with the community

Grow downstream and associated sectors

As indicated in the report, there are a number of sectors that benefit directly from the Australian mining sector and its comparative advantage. These include infrastructure, business services and manufacturing, with a number of companies having grown to become leading international players.

Australia has an excellent track record in planning, design, development and servicing of mining software and equipment, scientific analysis, exploration assessment technology, mineral processing technology, environmental services, and health and safety services and
These strengths provide major opportunities for the Australian manufacturing, consulting and services industry both in Australia and internationally.

It is worth reflecting on the experience of the Canadian mining sector which has adopted this strategy. The Canadian Chamber of Commerce examined the mining resource sector where Canada has succeeded in establishing itself as a world-leading niche player. Canada is a major mining country and a top ten producer of 17 key metals and minerals. The extraction and processing of these materials is an important part of Canada’s industrial sector and an essential source of GDP, jobs and government revenues.

“Typically, countries are thought to gain a competitive advantage from a resource endowment by moving up the value chain, in other words, by processing raw materials into manufactured goods. However, Canada has leveraged its metal and mineral endowment not just by extracting and processing raw materials, but also by creating and marketing the knowledge of how to effectively and responsibly develop these resources.”

The Canadian mining industry includes not only the core activities of exploration, mine development and operation, mineral processing and site remediation, but also the vast array of suppliers, service providers and professionals that help support miners and prospectors both in Canada and abroad. Canada believes that it is “the clear global leader in mining finance, exploration and a global top-five producer of 11 minerals and metals, including potash, uranium, diamonds, aluminium and nickel. Canada is also a strong competitor in mining technologies, and houses the second largest mining supply sector globally. These are all fields that provide productive spillovers into other sectors of the Canadian economy and can help sustain Canada’s competitive advantage. It is one of the few sectors in which we have the expertise, capital and capacity to be world leaders.”

In this report, fifteen leaders in the Canadian mining, financial, and professional services sectors discussed some of the factors that have helped establish Canada as a global leader in mining. Though initially rooted in the good fortune of their mineral reserves, Canada’s global success in mining can be attributed more recently to the emergence of smart policies and innovative private institutions that are tailored to the unique attributes of the mining industry. However, there is a view that action in five distinct areas is needed to ensure that Canada maintains this advantage:

- **Maintaining Canada’s pool of uniquely skilled people**: While Canada’s competitive strength in mining is founded in its unique pool of qualified people, demographics and the larger skills crisis have transformed what was an advantage into the sector’s key challenge.

- **Staying ahead of the pack on world-leading practices in finance and taxation**

- **Setting up the infrastructure and international agreements today to ensure a competitive mining sector tomorrow**: The mining cluster in general depends on physical infrastructure, like roads and power plants, as well as intangible infrastructure, like geosciences, to ensure access to resources at competitive costs.

- **Becoming the world leader in the development of new mining technology and best practices**: Canada’s history of innovation in the mining sector has been a great competitive advantage. In the face of growing competition from low-cost suppliers, deposits that are harder to find and extract and increased expectations on environmental performance, Canada cannot afford to be lower than number one when it comes to mining innovation.

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41 Australian Government (16)
42 The Canadian Chamber of Commerce (37)
Key findings

- **Social licence and an efficient and predictable regulatory environment as emerging areas of competitive advantage for Canadian mining:** Ensuring community buy-in for mining projects around the world has emerged as a critical factor in the success of the industry. There is increasing pressure for governments to regulate firm activity that occurs outside of their borders.

**Focus on alternative sectors to replace the dominance of mining**

Research has identified the ‘next wave’ growth areas for Australia after analysing international growth trends and identifying Australia’s comparative advantage. The common factor among the ‘new wave’ sectors is the growth in Asia. Those sectors with high international growth where Australia has a strong comparative advantage are shown in Figure 6.

**Figure 6: Sectors with expected high international growth**

- **Gas**
  - Countries will seek to improve air quality and reduce greenhouse emissions
- **Agribusiness**
  - People will seek to buy Australia’s fresh produce
- **International education**
  - Students seek to study in an English-speaking country
- **Tourism**
  - People seek space, nature, holidays, and luxury experiences
- **Wealth management**
  - Organisations and individuals seek to tap into Australia’s expertise

Research conducted suggests that “exceptional growth in these sectors could add about $250 billion to the economy between 2013 and 2033.”

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43 Deloitte (24)
44 Ibid
6 Policy Solutions

Growth in minerals export volumes continues to support the economy. This demonstrates that the gains from the ‘mining boom’ are large and enduring. However, whilst Australia is naturally well endowed regarding our known available resources, we are losing a portion of our competitive advantage due to challenges surrounding the mining pipeline, rising costs and difficult market conditions.

Australia’s capacity to draw into the country the next wave of mining investment, maintain its advantages in the mining sector, and to secure future export revenues depends critically on regaining national competitiveness via improved policy settings. While there is no automatic policy lever or mechanism that can be pulled by government to improve competitiveness or its advantages, there are tangible policy steps that can and should be taken to shift burdens and improve conditions for our mining related businesses. “The urgency with which policy makers tackle the nation’s structural competitiveness problem will determine Australia’s capacity to secure maximum returns from future minerals resource development.”

The attractiveness of Australia as an investment destination depends on the expected profitability of mining projects. This can be complicated to assess due to the inherent uncertainties and the long time horizon over which mining projects run. The key factors that will affect the calculation and thus the decision to invest in Australia are:

- the expected revenue that will be generated
- the availability, quantity and quality of the underlying commodity
- the expected cost of the required major construction
- the expected ongoing cost of operating the mine, and
- the expected costs of exiting the mining operation; in particular remediation costs and other issues/costs that may be associated with environmental approvals.

In considering the information contained within this report, the following sections identify three areas where Government could tangibly support the mining industry. These policy areas impact upon stages of the “project life cycle”. Namely, the policies have been grouped according to which stage of the mining industry they impact upon. The policy areas put forward include:

1. The pipeline
   a. Policies concerning the start of the project life cycle
2. The inputs
   a. Policies regarding the actual cost of mining in Australia such as labour, technology and cost of inputs
3. The value-add
   a. Policies concerning later stages of mining as well as those that regard the efficiency and effectiveness of mining operations

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45 Minerals Council of Australia (41)
Largely, many of the policy ideas/changes put forward in this paper are either regarding the removal of a government intervention (ie government failure) or suggested to address an existing or arising market failure. For example, the use of rent taxes over income taxes, the minimisation of duplicative and costly regulations, and the minimisation of trade barriers for goods and labour address current government failures. Alternatively, maintaining research bodies and addressing the lack of supply or investment in quality infrastructure addresses issues of market failure. For example, government has justification to intervene or assist the industry where: the lack of supply is due to problems of ‘free riders’, or if economies of scale are present and results in the investment being too significant for one private participant.

The following policies have been suggested within the context of a broader government reform setting. Namely, there are reviews currently occurring within the areas of: tax, federation and competition policy. The ideas and policy suggestions that follow are not inconsistent with these reviews. Practically, the ideas could be taken up through these reviews. Potential policy ideas are now discussed in turn.

6.1 The pipeline

Policies regarded in this section are largely concerning the exploration stages of the project pipeline. There are numerous papers and releases of late which have highlighted the fall in exploration in greenfields areas. The Australia's Identified Mineral Resources (AIMR) 2012 indicates that there have been very few world class discoveries of minerals in Australia in the past 20 years whereby most of the current mineral production has been sourced from deposits discovered over 20 years ago. This reduction in exploration is a major concern for Australia’s mining future.

To address this issue, there are largely three areas in which Government can assist and support the industry to make undertaking exploration activity more favourable.

6.1.1 Funding geoscience Australia and state equivalent bodies

Geoscience Australia and the equivalent state bodies are world regarded as a competitive advantage of Australia given their activities of providing pre-competitive geoscience information and data to industry. The strategic Review of Geoscience Australia recognised the value of pre-competitive geoscience stating that it grows prospectivity, uncovers opportunities, and reduces risk and cost.46

Australia’s geoscience bodies provide a relatively genuine “public good” service through conducting research and then providing pre-competitive geoscience information to the government and industry to support, and facilitate, energy and mineral exploration (both onshore and offshore). The pre-competitive geoscience information is generally non-rivalrous in that the use of the information by one industry participant does not reduce the availability or use of it by another. Under current policy, the information is also non-excludable in that particular industry participants cannot be effectively excluded from use of the information as government chooses not to ‘cost’ users out of accessing the information.

46 Exploration Investment and Geoscience working group of the Standing Council on Energy and Resources (44)
In the current economic climate, there is a push for government to reduce expenditure and cut funding to programs where appropriate. The reduction or cessation of funding for Geoscience Australia and/or the equivalent state bodies would be short sighted of government and impinge upon the mining industry and the level of exploration activity. Rather, governments continuing commitment to pre-competitive geoscience programs and geological surveys is an effective way for Australia to indicate to global mining explorers and/or operators that it is “open for exploration business”

**Policy advice - Maintain funding to Geoscience Australia and other relevant state based geoscience bodies to ensure they continue providing the valued pre-competitive information to aid in exploration and maintain this world regarded advantage.**

### 6.1.2 Regulation regime governing exploration licences

Whilst Australia is generally known for a stable regulation regime, the depth and breadth of regulations on the mining industry has continued to grow. The growth in both red and green tape regulations are adding to mining business costs and extending project time frames for the industry. In particular, recent papers have identified the following:

1. Industry confidence in Australia’s regulatory framework has declined in the face of a steady stream of knee-jerk regulatory changes, usually characterised by poor regulatory process. (Minerals Council of Australia, February 2014)

2. Poor regulatory practices, such as duplicated assessment processes and a lack of clear guidance on the criteria being used to assess exploration projects, have caused a dramatic increase in the length of time it takes to approve exploration and that delays pose an unnecessary and costly impediment to exploration. (Productivity Commission, March 2014)

3. The mining tax remains a drag on confidence, while red tape and excessive regulation remain concerns [within Australian jurisdictions] (Fraser Institute, March 2014)

Often, the approval process for exploration and mining titles involves numerous bodies with papers suggesting there is a lack of co-ordination between bodies and lack of cohesion across state borders. This leads to an increase in time required to successfully navigate through the approvals system and also increases the probability for delays due to agency backlog and a multitude of different forms and actions required for each body. For example, in NSW (a jurisdiction considered to have one of the more complicated approval systems in Australia) navigating the system and gaining an exploration licence may involve Planning, Division of Resource and Energy, Office of Water, Office of Environment and Heritage, the Environment Protection Authority, the Ministry of Health and local authorities.

Consequently, it is imperative (particularly within the current context of the Commonwealth Government’s red tape reduction regime) that regulation falling within the mining industry should aim to meet policy objectives at minimal cost or burden to industry. Of particular importance are the regulations, policy frameworks, and processes governing the move from the exploration stage to production such as exploration, land use and environmental approval processes.

A similar strategy as to the ‘one project, one review’ approvals process employed by the Canadian Government would prove beneficial. Namely, a ‘one-stop-shop’ has the potential to provide significant benefits to not only industry through making the environmental approvals process more streamlined, easier to navigate and less time consuming, but also would drive efficiency in the government bodies concerned without compromising high environmental standards. As noted by the Minerals Council of Australia, a streamlined
process would mean that Commonwealth resources can be better directed to strategic matters, including as a “standard setter” for state and territory processes under bilateral agreements.

Further, within the environmental approvals space, there are two distinct processes: the assessment process and the approval process. There has been some progress regarding the delegation of the assessment process from Commonwealth to State agencies. However, there has been less activity regarding the full delegation of the approval process. That is, whilst States may now have the power to conduct the assessment phase, the Commonwealth still by and large holds the authority regarding the approval process and final say. To avoid delays, inconsistencies and duplication, the allocation of the approval process should be delegated to one layer of government to the greatest extent possible.

**Policy advice –** Commonwealth, State and Territory Governments should collaborate and seek to continue to undertake red and green tape reduction strategies. Particularly, differing jurisdictional approvals processes should be examined to ensure there are no duplications and that the process is commensurate with the risk and significance of the impacts of exploration.

**Policy advice –** reform the approvals process regarding the movement from exploration through to production stages to streamline processes and reduce the burden on industry through consideration of a program similar to Canada’s one-stop-shop. This should also involve ensuring stronger and simpler coordination, transparency and accountability of exploration licence approval processes.

**Policy advice –** the approval process should be assigned to one layer of government.

### 6.1.3 Awarding of an exploration licence

The current structure of the mining landscape means that each jurisdiction largely has its own chosen process for assessing an exploration application and thus (potentially) granting an exploration licence. States can largely either award an exploration licence through two processes: cash bidding or work program bidding. Cash bidding is essentially the largest bidder wins the licence (ie whoever is willing to ‘pay’ the most). Conversely, work program bidding involves committing to objectives and actions rather than funds and thus the ‘winner’ or licence holder, will have obligations under the lease arrangement to conduct certain activities. The allocation of the licence is awarded to the applicant who proposes the greatest level of work to explore the area.47

There are existing – or already awarded - licences which could be considered to be ‘dormant’ or inactive in that a licence holder has the right to explore a certain piece of land but is choosing not to. Thus there is potentially a viable mining opportunity but no exploration or production activity is occurring. This action effectively acts as a barrier to greenfields investment and the adequacy of Australia’s mineral supply thus also negatively impacting upon Australia’s competitiveness. The reason why this occurs is that there is no real imperative for the licence holder to do otherwise – especially if they have been awarded the licence through a work program bidding process as minimal funds would have been outlaid. There is no reason to start exploration activities as there is no real need to recoup cash and

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47 Department of Resources, Energy and Tourism (48)
Policy Solutions

no pressing objectives that have to be hit to meet government obligations that cannot be done in the future.

To avoid this activity, or reduce the likelihood of exploration organisations choosing to ‘sit’ on the licence, government should consider the option of increasing the level of obligations on the licence holder the longer the licence is considered inactive. Alternatively, a greater use of the cash bidding process could be considered. Through undertaking either of these actions, government is effectively increasing the cost of holding an exploration licence but remaining inactive on the land it covers.

To ascertain the impact of increasing the utilisation of the cash bidding process and the implications of use of either process, a benchmarking exercise would prove valuable and should be conducted. This would seek to evaluate both the cash bidding and work program bidding processes and identify best practice from across the States and Commonwealth and their processes for awarding exploration licences.

Policy advice – to avoid ‘squatting’ or dormant licences (and thus barriers to increasing the pipeline and growth in greenfields investments) give greater consideration to increasing obligations on the licencee the longer the licence is held or use of the cash bidding process. This would add a time or cost to the holder to simply holding the licence.

Policy advice – review and ensure that the licence release processes (or the assessments of exploration applications) are effective and appropriate. Namely, identify through a fit for purpose benchmarking exercise whether and/or when processes of either cash or work program bidding is appropriate.

6.1.4 Exploration tax treatment

The tax treatment of exploration expenditure is currently undergoing a process of change for two reasons. Firstly, the ATO is in a process of reviewing the definition of exploration expenditure for tax purposes and the manner in which mining and exploration companies have been treating expenditure of that nature. Secondly, in the 2013-14 Budget there was an announced measure to “target the deduction for exploration to genuine exploration activity.” Namely, the Government announced that it would better target the immediate deduction for the cost of assets first used for exploration by excluding mining rights and information. Rather than being immediately deductible, expenditure on mining rights and information will be depreciated over the shorter of either 15 years or their effective lives. These changes, and importantly the definition arrived at by the ATO, could result in unsettled investor sentiment should the definition remain unclear and there remain any uncertainty.

Policy advice – ensure the changes to the tax treatment of exploration expenditure is clear and ensure that the new definition/treatment does not deter or impede exploration activity.

6.2 The inputs

Currently, there is a global perception that Australia is a high cost jurisdiction to undertake a mining operation with the mining industry facing increasing input costs in recent years. When compared with its competitors, this is one of Australia’s core comparative disadvantages. This paper identifies four areas in which government could aid in improving how Australia is globally perceived in relation to the attractiveness of its inputs to mining operations.
6.2.1 Cost structures

There is no denying that the costs faced by mining organisations operating within Australia have increased in recent years. This, however, could be due to the recent boom in investment mining of which has driven up demand – and hence prices – of inputs. This could mean that rather than facing this increased price level indefinitely (i.e., a long-run supply curve), prices may in fact decrease if demand for inputs falls following the slowdown in some areas of mining investment (i.e., a short-run supply curve). The implications of this are now discussed in the following sections.

Evidence of cost structures

There is no significant body of research or clear evidence that examines the underlying cost structures of the mining industry and its core drivers. That is, there is a dearth of current, robust and accurate information, research and evidence of which to judge the cost implications of operating in Australia.

As such, the government, as well as the industry more broadly, needs a better understanding of the cost structures faced by mining organisations here in Australia as compared to core competitor jurisdictions. To aid in Australia’s global standing, there needs to be more transparency surrounding – and demonstration of – where the costs are, whether they are short or long run in nature, and what the implication of these factors mean.

This research could be undertaken by a body like the Bureau of Resources and Energy Economics (BREE) to provide this genuine piece of public good research. If Australia were able to prove or provide more information as to why its costs structures are high (comparatively speaking) this would not only prove to aid in our ability of mitigating this comparative weakness, but would also provide an evidence base as to how to improve the costs faced by industry and where efficiencies may lie.

Cabotage, monopoly and cost rigidity

The ability for prices to move and be reflective of supply and demand forces is particularly relevant should the industry be facing higher input costs due to a short-run supply curve. The ability for prices to adjust, however, is dependent on the market being flexible with no factors or rigidities in place effectively ‘locking in’ the currently high prices.

Factors which may in fact hinder the ability of prices to fall include:

1. Existing cabotage arrangements and monopoly markets – the existence of these factors most likely results in the increase of price above what may be considered the ‘market equilibrium rate’ in any economic climate. However, the increase is exacerbated in times of high prices as there are greater rents to share.

2. Price rigidities – this includes government imposed asymmetries such as price floors or ceilings set within the climate of higher prices of mining products. It also includes the unfavourable behaviour of monopoly suppliers who may seek to maintain high rents even with falling prices of commodities; that is, they choose to fix their prices.

Government should consider these factors to ensure that any government interventions regarding the price of inputs or outputs are flexible enough to adjust should the industry be facing a short-run supply curve.

Government restrictions

Lastly, if protectionist sentiments were to arise moving forward, or trade barriers and/or restrictions were to increase, input costs would continue to escalate further damaging Australia’s international competitiveness. To mitigate or reduce the impact of this, government can ensure Australia remains open to global markets with minimal trade barriers and undue regulation. This would ensure mining organisations operating within...
Australia can continue to rely on access to competitively priced imports and be certain no unnecessary domestic regulatory impediments will be put in place.

Also falling into this area (and as briefly mentioned in the previous section) is the act of government enforcing domestic reservation requirements or price controls, as well as government mandated local input requirements. Any action that could be considered to fall under the banner of one of these types of ‘restrictions’ on business would impinge upon Australia’s ability to compete globally and maintain an advantage compared to its competitors. Any restrictions placed on business (for example local preference requirements) need to be based on sound evidence and provide benefit to the economy greater than the cost to the mining operator.

Policy advice – consider undertaking a review of the Australian mining industry’s cost structure to address the global perception that Australia is comparatively higher cost to operate within.

Policy advice – ensure no rigidities in place that lock in the current high cost structures and ensure flexibility in the market in the face of lower commodity prices.

Policy advice - continue to seek reductions in trade barriers and maintain an approach to reduce unnecessary domestic regulatory impediments to cross border business activity.

6.2.2 Technology

A core driver to the efficiency of many industries is the technology available, its development and its associated costs and cost savings. Numerous mining organisations are continuously searching for new approaches to their operations to reduce overheads and increase efficiency in their supply chain. In principle, government should allow proponents to use the most cost effective technology available (subject to other policy goals). An example of this is floating versus onshore processing infrastructure for LNG operations. Whilst the government may prefer one approach over another, the mining organisation should have the capacity to determine which approach is most effective and efficient.

The introduction of barriers for use of certain technologies would result in the reduction of how a jurisdiction is seen globally – the higher the restrictions placed on operation approaches the lower the desirability of that jurisdiction.

Policy advice – ensure a technology neutral environment whereby mining organisations/the private sector are enabled to determine the most appropriate business model for technology and/or efficiency improvements. Ensure no distortions are present through the existence of restrictions on operating techniques/approaches.

6.2.3 Labour supply

Labour flexibility and migration

The increasing costs faced by mining companies are linked to the increasing costs of labour and the relative inflexible nature of the Australian labour force as compared to other jurisdictions. Utilising and drawing upon skilled labour migration – or labour mobility - can be a mechanism drawn upon by mining corporations to reduce costs and access the right people at the right time.
Government should seek to enable or facilitate labour mobility, both domestically and internationally. Amendments to programs such as the 457 visas are a good example of how government can reduce the barriers that were in place to ensure organisations can access the labour it needs. Similar type reviews should be undertaken to ensure organisations also have access to appropriate skilled labour.

**Education**

As discussed within the body of this report, the mining industry continues to face skills shortages of which are linked to wider productivity and cost competitiveness challenges within the industry. These shortages lie predominantly in the areas of experienced professionals (including engineers, geoscientists and project managers) as well as experienced tradespeople and operators.

Consequently, availability of higher education programs in these areas is critical for providing the needed skilled labour within the industry. However, the programs often needed for these mining skill sets are often high cost. Accordingly, if a university is constrained by government set fee structures, the resulting effect is to reduce the number of high cost courses. That is, the university is constrained in what it can offer, producing a bottle neck of skilled labour in the fields of high cost educational programs. In sum, government mandated fees (or ‘fee ceilings’) can inadvertently restrict the number of places available in higher education institutions in the fields required of mining organisations.

To address this, industry, through the MCA, provides funds to higher education institutions to fund critical programs in the areas of Earth Science, Mining Engineering and Metallurgy. This program has led to increased enrolments in these areas with many graduates joining the minerals industry post completion of their studies.  

**Industrial Relations**

Further compounding the labour issue is the regulation governing workplace relations whereby recent changes have meant that the power of trade unions and tribunals has increased at the perceived expense of employers and employees. Namely, the changes to the Fair Work Act are seen to “compromise direct relationships, choice and flexibility in workplace arrangements and created a more adversarial bargaining system.”

If Australia is to be competitive moving forward, labour market conditions that are conducive to contract negotiations are required to ensure that the employment conditions being governed by any contract suit the conditions and environment of which they are operating within.

**Policy advice – facilitate the movement and flexibility of labour**

- **Policy advice - partner with industry to deliver a sustainable education and training path to increase mining workforce participation, diversity and skills which meet the expected future demands of the Australian mining industry**

- **Policy advice - ensure government set fees for higher education programs are not inadvertently restricting the number of skilled labour force participants**

- **Policy advice – ensure flexible labour arrangements are in play**

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48 Minerals Tertiary Education Council (47)

49 Minerals Council of Australia (43)
6.2.4 The tax system

Government clearly has a role to play regarding any tax policies (or general economic settings) that impact upon how our mining industry is perceived both internally and externally for fostering mining investment and production. The current system has some attractive tax elements such as accelerated depreciation allowances and the dividend imputation regime. However, when it comes to tax, the corporate tax rate dominates perceptions with the corporate tax rate being relatively high compared to global standards. Whilst for domestic shareholders dividend imputation aids in the reduction of the effective tax rate, the relatively high head line corporate rate makes it hard for Australia to communicate to investors how it rates on a global scale. Indeed, based on policies regarding company tax and royalties, coal and iron ore were already among the highest taxed industries in Australia even prior to the instigation of the MRRT. As such, Australia remains a relatively high tax jurisdiction globally for both commodities. The high taxes, and the addition of taxes in recent times, impacts mining corporations investment decision and makes Australian based projects less appealing relative to some of Australia’s competitor’s potential mining projects.

Further opportunities of tax policy adjustments to enhance the sectors comparative advantage includes the replacement of royalties with intelligently structured and negotiated resource rent taxes. This type of tax regime is less damaging to economic growth and profitability (as compared to other taxes such as the corporate tax regime) over much of the mining business cycle.

In recent years Australia’s business tax regime has been characterised by uncertainty and instability which undermines confidence in Australia as a stable and attractive minerals investment destination. Whilst it is easy to note this disturbance through the imposition of regimes such as the MRRT, instability has also been caused by factors such as:

- the abolition of the R&D Tax Incentive for large companies
- proposals to increase tax burdens on explorers
- changes to the transfer pricing and general anti-avoidance provisions.

What further dilutes Australia’s comparative advantage (the ‘ease of doing business’ in this regard) is that these tax policy changes are often perceived to be implemented with “lack of consultation, shifting policy rationales, and short-term revenue considerations, with little regard for evidence or sound taxation principles and practice.” These perceived hasty tax adjustments damages mining investment prospects as it undermines investor confidence in Australia’s system.

Given today’s globalised world, the flow of capital over jurisdictional borders is relatively free flowing meaning capital is extremely mobile and sensitive to changes in investment factors such as tax rates and policies. Consequently, a tax regime that is attractive to mobile capital (for example mining organisation’s capital expenditure and foreign direct investment) is important to ensure that Australia captures organisation’s investment over and above its mining competitors. In this way, policy changes should look at making our tax regime favourable from a global perspective with minimal ad hoc adjustments.

Policy advice - Ensure tax policy surrounding the mining industry is stable.

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50 Ibid
6.3 The value-add

This paper recognises that to assist the industry in maintaining its comparative mining advantage, government should also focus attention on policies relating to the mining services and advanced manufacturing segments of the mining supply chain. These are core segments of the supply chain in which there is the potential for significant value-add but instead, these are areas within Australia’s mining industry in which there are often barriers and high costs. These barriers and high costs associated with these stages of the supply chain thus subtract from the potential value add of these points in the supply process and the overall profitability and thus desirability of mining in Australia as compared to other regions in the world.

6.3.1 Evaluation of the supply chain

Whilst the previous section notes the significant regulatory burden imposed upon industry through red and green tape in the exploratory and initial investment stages of the supply chain, the industry as a whole faces a substantial level of regulation across the entire supply chain. Consequently, this paper finds that there is value to be gained in undertaking an evaluation and analysis of the entire mining supply chain and associated industries within Australia to determine at which points along the process that industry faces the biggest regulation impost. It is these areas that government should then focus on initially to reduce red tape and thus costs of mining companies doing business in Australia. This reduction will improve Australia’s standing (and thus comparative advantage) as a jurisdiction in which it is ‘easy to do business’.

Figure 7 below illustrates what the evaluation may set out to achieve. That is, through completing individual assessments a monetary figure is assigned to each piece of regulation that interacts with or impacts the mining supply chain broken down by stage of the mining supply. In this way, three critical pieces of information could be determined:

1. The stage which incurs the greatest regulatory burden (sum of regulation cost below the cost neutral line verse sum of regulation cost above the cost neutral line)
2. The stage/s which would benefit from red tape reduction (ie where there is duplication present)
3. The stage/s which would benefit from regulation aggregation (ie where there are multiple pieces of regulation within minimal impact)

Note: the individual rectangles represent individual pieces of regulation. The width is equivalent to the breadth of activities touched by the regulation and the length represents the value (monetary impact).

It should be noted that undertaking or investing in a value adding activity is not inherently good and an efficient use of that resource. There still remains the need to appropriately evaluate the activity to determine whether the activity is profitable and a net benefit to Australia as compared to other areas where that resource could be deployed.
Once this has been completed, it would then be possible to determine an indicative net present value (NPV) of Australia’s competitive advantage in mining along different points in the supply chain. This could be achieved by obtaining the value of mining to Australia at each stage along the supply chain (i.e., the natural or gross value or advantage to Australia) and subtracting the net cost of regulation.

This concept or activity is depicted in Figure 8 below. The ‘up’ arrows depict Australia’s gross or natural advantage whilst the ‘down’ arrows depict the net cost of regulation. The blocks thus represent the net indicative value of mining to Australia as activity is moved down the supply chain.
Figure 8: Visual representation of net present value of Australia’s competitive advantage in mining

Policy advice - conduct an evaluation of the breadth and depth of regulations across the entire mining supply chain.

6.3.2 Export of mining services

As noted within the body of this report, Australia holds a relative advantage in relation to our export of mining services and skilled labour force. In assisting skills development and ensuring appropriate and sustainable educational and training programs are put in place to provide the sector with the skilled workforce it needs (discussed above), Australia will also be building its comparative advantage in relation to the export of mining services. By continuing to increase Australia’s human capital in relation to skilled labour through mining related development platforms, Australia will only continue to grow its advantage in this niche market thus also increasing its visibility and presence in the global mining market.

Policy advice - ensure the export of mining services faces minimal barriers and government restrictions.
6.3.3 Infrastructure access and collaboration

**Infrastructure investment**

Efficient and timely infrastructure development is critical to ensuring further productivity growth in the sector; especially as Australia moves from a construction to production phase. Specifically, road, rail, and port infrastructure is vital to ensuring Australia’s mining industry can compete effectively in international markets. However, inadequate infrastructure surrounding core mining regions is impeding Australia’s ability to fully draw upon resource development opportunities. Limited infrastructure creates bottlenecks and places delays on the supply chain thus causing issues further downstream. As noted in the Vision 2020 Project, “infrastructure capacity constraints were a key factor explaining Australia’s loss of market share in key commodities despite some increases in export volumes.”

Whilst private investment should continue to be the main method of funding commercial infrastructure, government should consider its role in supporting the mining industry in this area. Whilst the Australian Government has “laid out a number of infrastructure priorities and processes, including directing the Productivity Commission to examine major infrastructure projects and to consider, among other things, the funding and financing of these projects,” it is important to note that previously, much investment in infrastructure has occurred around urban centres. Thus there still remains much need for infrastructure in the regional and remote mining regions. This would have the flow on advantage of providing social and economic benefit to lower socio-economic regions through the funnelling of investment and job creation into some rural areas.

**Collaboration**

One outcome of a competitive operating environment is the reduced incentive for mining organisations to work together regarding common use infrastructure such as rail and ports. Should organisations be able to work cooperatively and share the cost and use of critically needed infrastructure, they would be able to take advantage of factors such as economies of scale without the need for government intervention or investment. However, in most situations this appears to not be the case.

Generally, mining organisations will build their own connecting infrastructure to maximise their own production and efficiency of their supply chain with little thought as to how mining organisations in the region could collaborate to maximise the value (or net benefit) of the infrastructure itself. That is, whilst contributing to a shared piece of infrastructure may mean some fall in efficiency for the mining organisation, the total level of benefit the infrastructure is creating in total is greater (ie now only the cost of one rail track as opposed to four or five). Further, the cost incurred by each organisation would also likely fall due to the assumed cost sharing arrangement.

This paper notes however, that reasons or situations do exist where collaboration may not work and should not be implemented. These include situations where an organisation needs direct control over the infrastructure to align with supply chain and demand needs (vertical scale ownership).

Collaboration could also extend to sharing of core equipment with non-utilised pieces of equipment from one company being ‘loaned’ to another whom may be experiencing a shortage. This would stand to increase the use of idle equipment and thus productivity of the sector as a whole.

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52 Deloitte (34)
53 Minerals Council of Australia (41).
Policy Solutions

Policy advice - assist in the creation of effective and efficient markets governing the supporting infrastructure to the mining industry with the objective of ensuring investment in critically needed infrastructure in regional and rural areas.

Policy advice – review infrastructure access regime and facilitate collaboration amongst mining organisations
## 6.4 Policy Summary

Overall, the research contained within this report suggests three areas where government can influence Australia’s comparative advantage in the mining sector through amended, new or removal of policy. The policies, and which advantage they maintain and strengthen, or disadvantage they mitigate or reduce, is shown in the below matrix.

**Figure 9: Policy summary**

<table>
<thead>
<tr>
<th>Policy</th>
<th>Naturally endowed with large quantities of high quality resource deposits</th>
<th>Close proximity to Asia</th>
<th>Advanced technology &amp; highly skilled workforce</th>
<th>High quality assets</th>
<th>Growing construction costs but declining commodity prices</th>
<th>High tax rates and regulatory burden</th>
<th>Decreasing investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funding geoscience bodies</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regulation governing exploration licences (red and green tape reduction)</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Awarding of exploration licence through best practice</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exploration tax treatment</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technology neutral environment</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost structure review</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduce cost rigidities/ensure price flexibility</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimise government restrictions</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facilitate flexibility of labour</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sustainable education pathways</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ensure conducive industrial relations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stable tax system</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>

This report can be found at www.acola.org.au © Australian Council of Learned Academies
<table>
<thead>
<tr>
<th>Policy</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mining regulation evaluation</td>
<td>Naturally endowed with large quantities of high quality resource deposits</td>
<td><strong>✓</strong></td>
</tr>
<tr>
<td></td>
<td>Close proximity to Asia</td>
<td><strong>✓</strong></td>
</tr>
<tr>
<td></td>
<td>Advanced technology &amp; highly skilled workforce</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High quality assets</td>
<td></td>
</tr>
<tr>
<td>Facilitate export of mining services</td>
<td>Growing construction costs but declining commodity prices</td>
<td><strong>✓</strong></td>
</tr>
<tr>
<td>Support infrastructure investment</td>
<td>High tax rates and regulatory burden</td>
<td></td>
</tr>
<tr>
<td>Review access regime and facilitate collaboration</td>
<td>Decreasing investment</td>
<td><strong>✓</strong></td>
</tr>
</tbody>
</table>
**Appendix A  Current issues for Australian mining**

The following table outlines the core issues facing particular sections of Australia’s mining environment with corresponding commentary on the issue sourced from a multitude of sources.

**Table 9: Issues faced by Australia’s mining sector and supporting commentary**

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>ISSUES</th>
<th>COMMENTS</th>
</tr>
</thead>
</table>
| Australia’s mineral endowment              | Compared to many countries, Australia has a comparative advantage in the production of mineral commodities. There have been very few world-class discoveries in Australia in the past two decades and the inventory has been sustained largely through delineation of additional resources in known mineral fields. | This stems from a rich and diverse mineral endowment, high quality regional-scale geoscience information which lowers the risks of exploration, advanced exploration, mining and processing technologies, a skilled work force, generally benign physical conditions and low population density. These factors mean that modern mining can be undertaken in line with increasing community expectations for environmental and social performance. (2) Most of Australia’s current mineral production and exports are sourced from deposits discovered during exploration more than two decades ago. (2) Sustaining the strength of the minerals sector is dependent on:  
  - Discovering a new generation of large low-cost mineral deposits to sustain the resource base  
  - Increasing mine production to maintain world market share for major mineral commodities All this will require new approaches to exploration, mining and processing, together with good supporting infrastructure and access to land and finance (2) |
| Demand and prices for Australia’s minerals  | World economic growth in recent years, particularly in China and India, has increased demand for mineral products worldwide. Even though Australia has shown large growth in mining and will remain a leading player in many segments, there is no guarantee that high growth may continue. For example, other countries are increasing their minerals | In an increasingly globalised and competitive commodity market, multinational mining companies continue to search for mineral deposits that will offer attractive returns on investment. Such returns are influenced by the quality of the resources (grade, tonnage, metallurgical properties) as well as environmental, social and political factors, land access and the location and scale of competing projects. Increasingly, minerals projects are being ranked by multinational companies against investment returns from other projects worldwide, particularly during periods of global financial stress. (2) |
The proximity of Australia to China will continue to power growth in the mining sector. However, this is dependent on continued growth in the Chinese economy.

Market imbalances affect commodity prices. A range of mineral commodities is expected to limit growth in prices in the next five years as supply grows to meet demand.

It is expected that Australia will retain its dominance in the global mining sector, as investors remain attracted to the rare combination of a very positive business environment and substantial mineral reserves. The Asia Pacific region is where major metals consumers are located. This proximity to China substantially reduces the transportation costs compared to its peers in other regions.

Power growth in China could significantly crimp demand for commodities and affect Australia’s mining industry.

Countries such as Vietnam, the Philippines and Indonesia may threaten Australia’s dominance in the mining industry.

The legacy of unconstrained project development threatens to push certain commodities, such as iron ore, thermal coal and aluminium, into oversupply. As China ramps up domestic production, international producers face stiffer competition.

More significantly, higher domestic production of commodities such as gold and coal could ultimately enable China to reduce its out-sized reliance on global imports, at least until such time as the country internalises the costs of environmental damage caused by its mining activities. This is particularly the case as China transitions away from the investment driven growth that fuelled demand for the commodities used in construction and power generation (e.g., iron ore, coal, natural gas and copper).

While mining companies cannot hope to predict commodity demand or price movements consistently, they need to implement strategies they can use to manage market volatility.

Moderating prices have already cut into growth in the past two years. In 2013-14, the industry is expected to expand by 6.4%. This follows on from a contraction in 2012-13 resulting from lower prices for major products, despite growing production.

Technology, innovation

The Australian mining industry invests significantly in research and development. The mining industry in Australia is underpinned by world-competitive mining technology.

The Australian mining industry invests (2011/12) $4.1 billion in R&D which has increased at 15% per annum from 2005/6 and constitutes 22.4% of business R&D (up from 17.3% in 2005/6).

Australia has an excellent track record in planning, design, development and servicing of mining software and equipment, scientific analysis, exploration...
## Appendix A

<table>
<thead>
<tr>
<th>Productivity, costs</th>
<th>Costs in the Australian mining industry are increasing. Costs are high relative to other mining economies in the region. Mining productivity reaches new lows.</th>
</tr>
</thead>
</table>
|                     | The industry is struggling to compete at the lowest possible cost. Mining companies are shifting focus towards operating efficiently instead of expanding capacity. Effective tax rate for mining players has become higher with the imposition of the super profits tax on coal and iron ore miners. The Australian mining industry faces mounting costs of doing business. Despite commodity price weakness, input and production costs (everything from labour and energy to equipment and supplies) remain stubbornly high.

- Strategies to consider include: pursue operational excellence; improve efficiencies through technology; rationalise the supply chain; go modular; right-size capital projects; use analytics to uncover true cost drivers. |

<table>
<thead>
<tr>
<th>Infrastructure, investment</th>
<th>Mining investment has peaked and is set to decline.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mining investment has peaked (late 2012) at about 8% of GDP and could decline to 5% of GDP by 2016. Traditional lenders are pulling back from the mining sector. While bank financing is still available, falling market capitalisations prevent companies from qualifying for the amount of funds they need to fuel growth.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Risk, reward</th>
<th>Australia has a very favourable Risk/Reward Rating.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BMI benchmarking indicates that Australia has an overall score of 67.8 (out of a possible 100); the regional average is 51.3.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mining legislation</th>
<th>Australia’s mining legislation is the best in the world.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>This is the view of BMI who assess and report on mining industry trends internationally.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Attractiveness</th>
<th>The attractiveness of mining</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The Fraser Institute ‘Policy Perception’</td>
</tr>
</tbody>
</table>

---

49 Mining policy paper: Maintaining Australia’s mining comparative advantages
### Mining of mining policies

<table>
<thead>
<tr>
<th>Policies in different Australian States in Australia is perceived differently by mining executives.</th>
<th>Index’ (out of 112 jurisdictions internationally) as perceived by mining company managers and executives is: Western Australia 6th, South Australia 11th, Northern Territory 13th, Queensland 24th, Tasmania 27th, Victoria 33rd, and New South Wales 39th. (40)</th>
</tr>
</thead>
</table>

### Environment

<table>
<thead>
<tr>
<th>The mining industry has impacted on the environment.</th>
<th>Environmental impacts: associated with increased mine waste, increased potential for pollution, increased mine size, as well as increasing water and energy consumption. (19) Within the minerals industry, much of the focus on improving sustainability performance revolves around selecting and improving technology to reduce impact; opportunities include rehabilitation of mined land and remediation of acid mine drainage, to cleaner production, decision support for sustainability, indicators of minerals sustainability and sustainable design of mineral processing operations. Mine site rehabilitation, including addressing tailings and drainage issues, has become a progressively more important component of mining operations and mine feasibility planning. However, adequate rehabilitation is often limited by the technology available at the time of the mine’s development, and the ability to implement new technologies at closure. (20, 21)</th>
</tr>
</thead>
</table>

### Social

| The Australian mining industry spends significantly on training their staff. The talent gap widens into executive suites. Local community demands intensify. The mining industry has impacted on social issues. | The total mining spend in the Australian mining industry is 5% of total payroll ($11.1 billion in 2012). There is unfortunately no industry benchmark available. (18) Despite project halts and a slower pace of development, the mining industry’s talent shortage persists. Accordingly, miners must continue to refine their talent attraction and retention strategies, especially as many senior workers reach retirement age. In today’s tumultuous economic environment, mining companies are walking a fine line between reducing labour costs and retaining critical talent. Talent strategies to consider include: developing a board-focused talent strategy; standardising systems; embracing new training environments. (22) Owing to their potential for both outsized economic contributions and significant local environmental effects, mining companies are in the spotlight – as cast not only by international media but also by a growing number of monitoring and standard setting bodies. Social media has elevated these activities to new levels, |
enabling the instantaneous and global dissemination of negative press in real time. As a result, corporate reputations, access rights to new discoveries and market valuations are all at risk like never before. In response to this wider visibility, many mining companies are raising the bar on what it means to be model corporate citizens. Winning a social licence to operate now means more than simply following national and industry regulations; in many emerging markets, local community engagement has come to the fore as one of the most pressing issues facing operators, with particular emphasis on water and land access rights, environmental protection, local economic development and jobs. (22)

Social impacts include: shortages in affordable housing, increased local costs of living, psychological impacts on mine workers (particularly fly-in, fly-out workers), skills shortages in trades, pressure on local community services, and localised inequality and disadvantage between mining and non-mining communities. (19)

Research, review, and analysis of social-economic issues in the mining industry by CSIRO finds:

- no evidence of systematic negative associations between quality of life and the gross value of minerals productions for the 71 local government areas containing mining activities across Australia.
- no evidence of a resource curse, at the local government level, in Australia’s mining regions.
- Nevertheless, there are observations by many other researchers of negative social impacts on specific demographic sectors, localities, families of fly-in fly-out mining operations, and individuals.
- Indigenous communities residing in mining regions are often excluded from the socio-economic benefits of adjacent mining operations.
- The adoption of fly-in–fly-out (FIFO) has been criticised for causing social problems for mining employees and their families. (23)
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