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Australian Coal Industry Competitiveness Assessment

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AUSTRALIAN COAL INDUSTRY COMPETITIVENESS ASSESSMENT

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ABSTRACT: National Energy Resources Australia (NERA), in association with Accenture, have completed the Australian Coal Industry Competitiveness Assessment (ICA), including an Industry Competitiveness Framework (ICF) and Industry Competitiveness Score (ICS). The score provides NERA with a data-driven analysis of how to effectively allocate and direct their resources to deliver maximum industry impact. It also delivers a baseline against which the industry can measure its performance in future releases. This report outlines the methodology utilised and the results and insights gained from the ICS.

The ICS provides a comprehensive, data-driven assessment of the Australian coal industry from a global viewpoint. The results identify numerous areas for more rigorous study and suggest a number of innovative and collaborative improvements that, if implemented, will have a significant impact on overall industry competitiveness. NERA has a role in helping to increase engagement across the industry on a national level to ultimately deliver greater value for the nation. In future years, the ICS will provide a solid baseline against which the industry can measure improvement.

INTRODUCTION

From the baseline results, Australia's black coal industry has an overall competitiveness score of 5.8 out of 10, placing the nation 3rd on the leader board of global peers, marginally above the world average of 5.4, and lagging behind the world best, China, at 6.5. Modelling and analysis finds that improvements across several priority areas have the ability to improve the country's competitiveness score by 18 per cent, and increase the value added to the Australian economy by A$4.5b.

Australia performs poorly across the exploration and development and extraction and production phases of the value chain, resulting in a mediocre standing for the country amongst the peer group. With the world undergoing an energy generation transition, moving away from fossil fuels to cleaner energy sources, the competition between energy sources is set to increase. Success for the Australian coal industry lies in performing consistently well across all eight pillars of competitiveness and, ensuring the energy generation and steel making demands of the developing world are met with Australia's high-quality coal.

To achieve improvements in Australia's overall industry competitiveness, this report has identified five priority areas where changes in the short term have the ability to affect the country's performance:

- **Supply chain:** Supporting the industry by setting up regional supply hubs, and coordinating key activities across the industry to increase standardisation and utilisation rates.
- **Research and innovation:** Resolving the gap between research and commercialisation, and investing in the "connected mine", with the goal of increasing overall productivity and lowering costs.
- **Workforce:** Upskilling the workforce to be competent in the "new" way of working, and investing in local capability for the closure and rehabilitation phase to maximise potential value and increase workforce ability.
- **Regulatory reform:** Shifting the interaction between government bodies and industry to a partnership-based model, establishing clear requirements and regulations, and developing greater transparency on the tax and royalty system, to reduce red tape costs and increase cross-stakeholder collaboration.

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- **Social License:** Building a consistent message for the Australian public, with a focus on growing mining and energy literacy, and articulating the important role Australia's coal industry plays in the global energy transition; and also, focusing on rehabilitation of heritage sites.

AUSTRALIA AND THE GLOBAL COAL MARKET

Given the export nature of Australia's coal industry, the global coal market has a significant influence on the country's competitive position. As of 2015, Australia had a 36 per cent share of the world's coal exports (26 per cent thermal and 63 per cent metallurgical). Figure 1 provides a view of the supply and demand structure of the global coal market. Asia fuels the majority of global demand and even though they are major producers, both east and west Asia are significant importers of coal. Australia's large potential production volume, high quality, reserves, reliability of supply and unique location creates a structural advantage compared to other major exporting nations.

Australia is well positioned geographically to meet the significant Asian coal demand

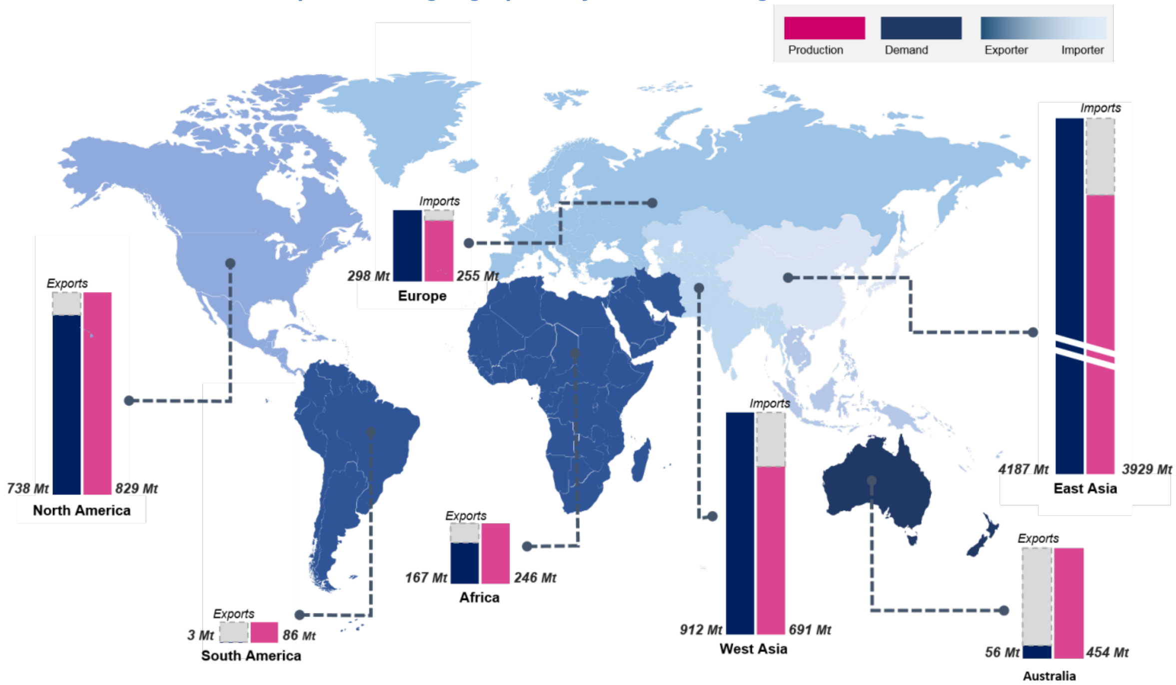


Figure 1: Global Black Coal Market

Source: Wood Mackenzie Ltd. Coal Supply Service Q4, 2015, IEA 2015, Accenture Research 2016

Figure ***2*** breaks down Australia's black coal industry across the four producing states, clearly illustrating strengths and weaknesses of the local industry. Coal production in Australia is concentrated within Queensland (QLD) and New South Wales (NSW), with over 97 per cent of the country's black coal production occurring in the two states (Wood Mackenzie, 2015). The significant brown coal production and reserves concentrated in Victoria is not covered in this study. The tight clusters of mining operations create a critical mass of infrastructure and suppliers that is vital for a cost competitive exporting industry.

Across all four states, mining and preparation costs are well above the world average (Wood Mackenzie, 2015). This contributes to the poor performance in the Extraction and Production phase of the value chain. Fortunately, QLD and NSW have high quality product and sizeable reserves. This combination positions the country as a key supplier of world coal, now and in the future.

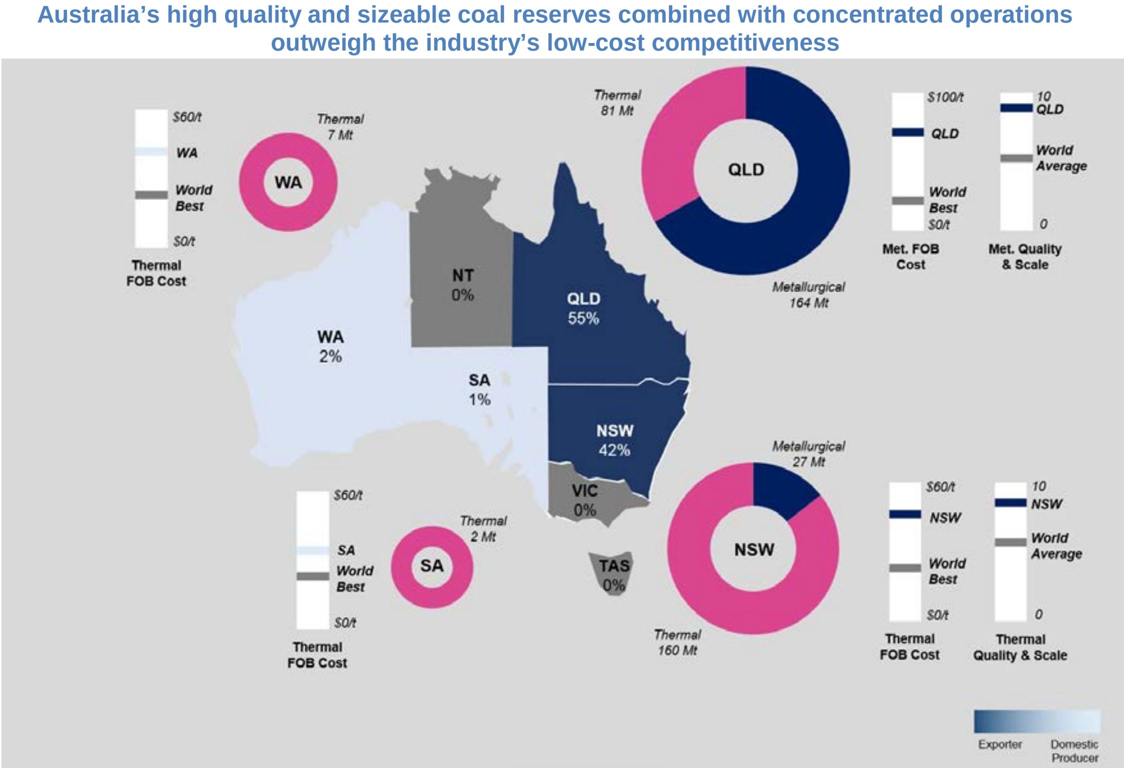


Figure 2: Australian black coal market

Source: Wood Mackenzie Ltd. Coal Supply Service Q4, 2015, IEA 2015, Accenture Research 2016

The global coal industry produces two key products, thermal and metallurgical coal. While similar, they have fundamentally different applications, affecting market dynamics. Thermal coal is used to produce energy, while metallurgical coal is a key input into the production of steel.

The world is undergoing an energy generation transition, moving away from fossil fuels to more environmentally sustainable sources of energy. World energy consumption share of coal is projected to decline by 3.5 per cent over the next 15 years; however, total coal consumption is still expected to grow by 419 Mtoe during this same period. This is illustrated in Figure 3.

Due to rising populations and economic growth, demand for coal fired power is expected to grow in developing nations; India, in particular, will see electricity requirements double by 2040 (IEA, 2015).

With aggressive environmental targets, it is expected that future demand will shift to high-efficiency, low-emissions coal-fired power, requiring high quality inputs. Against these conflicting trends, thermal coal is forecast to grow 8.5 per cent by 2030 (EIA, 2015). While still positive, this growth is significantly lower than the last 15 years as shown in Figure 4.

Coal may decrease in overall energy consumption share, but total consumption is set to increase

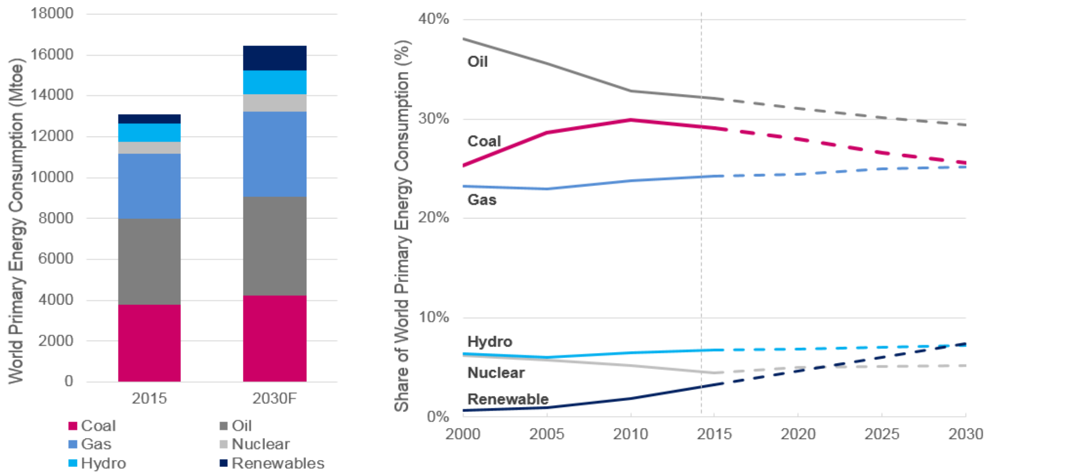


Figure 3: Share of world primary energy consumption 2000-2030

Source: BP Statistical Review of World Energy 2016

The demand for Thermal Coal is still expected to grow, but at a much slower rate over the next 15 years

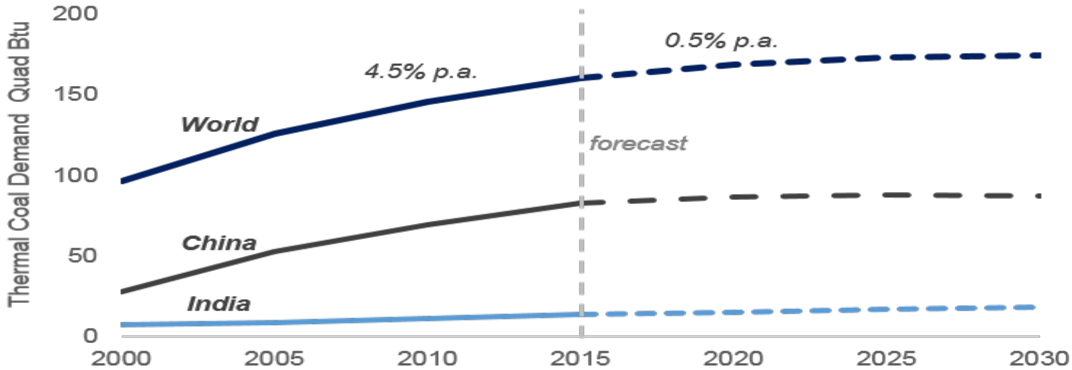


Figure 4: Global thermal coal demand 2000-2030

Source: EIA International Energy Outlook 2016

Over the last three decades, China has experienced an unprecedented level of urbanisation. The resulting economic growth has seen global steel production grow by 75 per cent (5.5 per cent p.a.) over the last 15 years alone (WorldSteel, 2010, 2014). This was the key contributor to the enormous growth in Australia's coal industry over the same period.

As China's economy matures, growth has begun to slow, resulting in the softer steel demand shown in Figure 5. However, due to economic growth throughout the rest of Asia, metallurgical coal will still be in demand. The IEA and the World Steel Association expect steel production to continue growing at 2 per cent p.a. until 2030, which is slower than the previous 15 years (IEA, 2015; Aurizon, 2015). India is set to be the largest source of this growth, however the country has very few high quality metallurgical coal reserves (Aurizon, 2015), so any major increase in demand will have to be met through imports, placing Australia, and Queensland in particular, in a favourable position. Figure 6 shows the industry competitiveness results and insights.

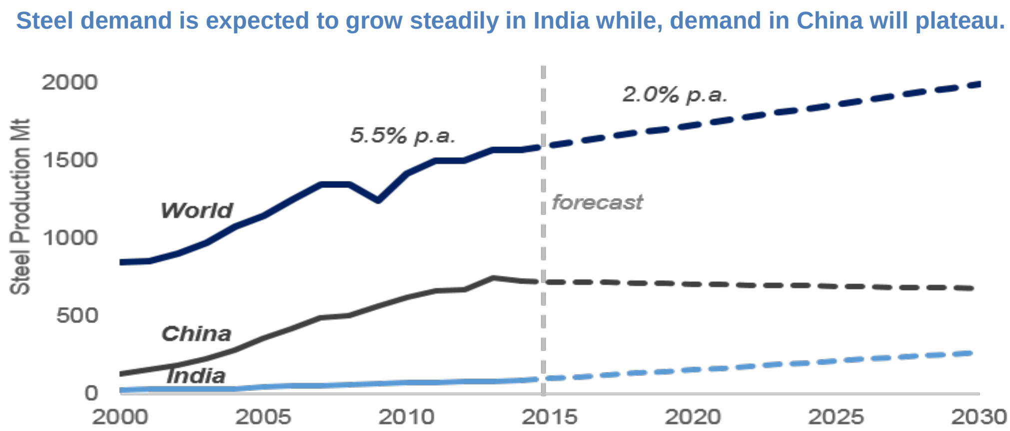
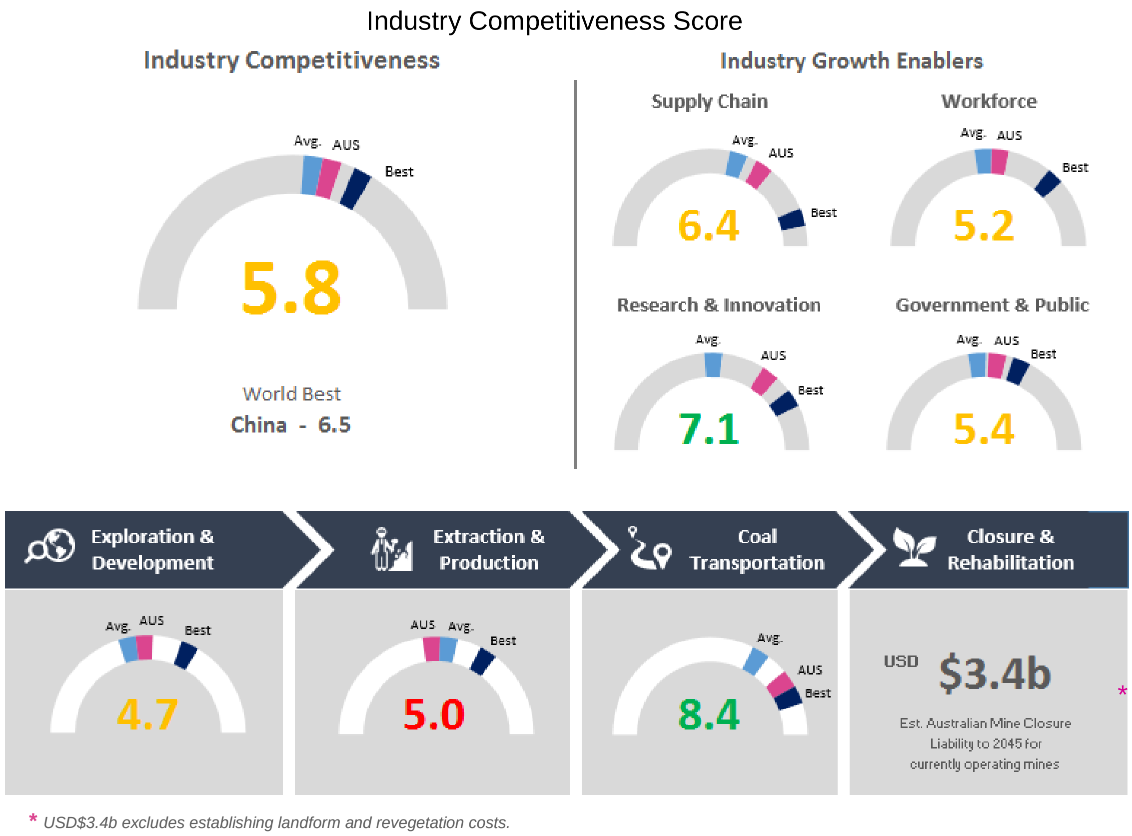


Figure 5: Global steel production 2000-2030

Source: IEA 2015, World Steel Association

INDUSTRY COMPETITIVENESS RESULTS AND INSIGHTS



Source: Accenture Research 2016, Wood Mackenzie Ltd. Coal Supply Service Q4, 2015

Figure 6: Industrial competitiveness dashboard

From the analysis completed, Australia has an Industry Competitiveness Score (ICS) of 5.8 out of 10, behind the world best, China, while marginally exceeding the world average of 5.4. The country performs strongly in the coal transportation phase of the value chain, with a score of 8.4, and also performs better than the world average in three of the four Industry growth enablers. However, weak results in both the exploration and development and the extraction and production phases ultimately undermine the country's overall competitiveness.

China comes out on top of the ICS due to having one of the lowest costs across the value chain. China is the largest consumer and producer of coal in the world. The country performs the best in the exploration and development and coal transportation phases, and ranks third in the extraction and production phase**.**

Table 1 presents the ICS leader board, where Australia ranks as the world's third most competitive coal producing nation. While the country ranks only slightly above average, the spread of scores across the peer group is low.

Table 1: Industrial competitiveness leaderboard

Country	Competitiveness Rank
China	1
South Africa	2
Australia	3
United States	4
Russia	5
Indonesia	6
Colombia	7
Canada	8
Vietnam	9
Mozambique	10

Inspection of the results suggest this is because no country performs consistently well across all eight pillars of competitiveness. For example, Canada, ranked 8th, scores very highly in the industry growth enabler pillars (i.e. supply chain, research and innovation, workforce, and government and public involvement), however, it is among the worst performers in the extraction and production and coal transportation pillars.
These results suggest all 10 countries within the peer group have significant room for improvement and that, with industry commitment and policy support, Australia has the opportunity to significantly increase its competitiveness standing.

EXPLORATION AND DEVELOPMENT

Australia performs poorly in the exploration and development phase of the industry value chain with a score of 4.7, only slightly above the world average of 4.5, and trailing behind the world's best, China, with a score of 6.3.

Exploration spending has fallen significantly since its peak in 2011 (SNL, 2016; ABS, 2016); the decrease is in line with exploration spending across the world, which is down 72 per cent over the same period (SNL, 2016). Subdued coal prices and a slower demand growth are clear contributors to this fall in spending (Index Mundi, 2016). Figure 7 shows the strong correlation between exploration spending and the price of thermal coal over the last seven years, both in Australia and across the world. This trend is unlikely to reverse in the short term given the uncertainty surrounding coal prices.

For Australia's coal exploration sector to flourish when coal prices rebound, it is essential to create an environment where regulation and costs promote, rather than hinder, an active exploration sector. According to the 2015 Fraser Institute Survey of Mining Companies, 55 per cent of respondents in Queensland and New South Wales reported that regulation uncertainty had a negative impact on the states' investment attractiveness, versus only 13 per cent in Western Australia (Fraser Institute, 2016). The industry must look to other geographies and industries that are promoting exploration more effectively.

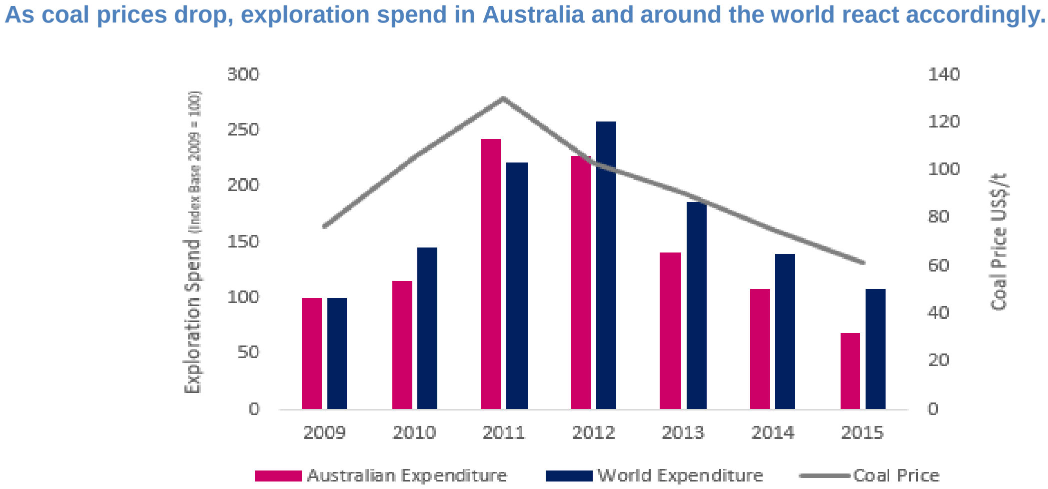


Figure 7: Exploration spending and Australian coal price (Source: ABS 2016, SNL 2016)

Australia must make progress in creating an attractive exploration environment for new and existing firms. If the country cannot develop and operate projects competitively, the ability to find new reserves is inconsequential.

Over the last decade, coal prices were pushed well above their long-term average, fuelled primarily by demand from Asia. In spite of Australia's uncompetitive development capability and poor regulatory environment, there was significant expansionary capital expenditure which saw coal production grow by 124 Mt (Wood Mackenzie, 2015). However, as prices have weakened in the past 3 years, the industry's expansionary capital expenditure has followed (Wood Mackenzie, 2015; Index Mundi, 2016). Figure 8 shows the downward trend in Australia's CAPEX to production ratio over this period.

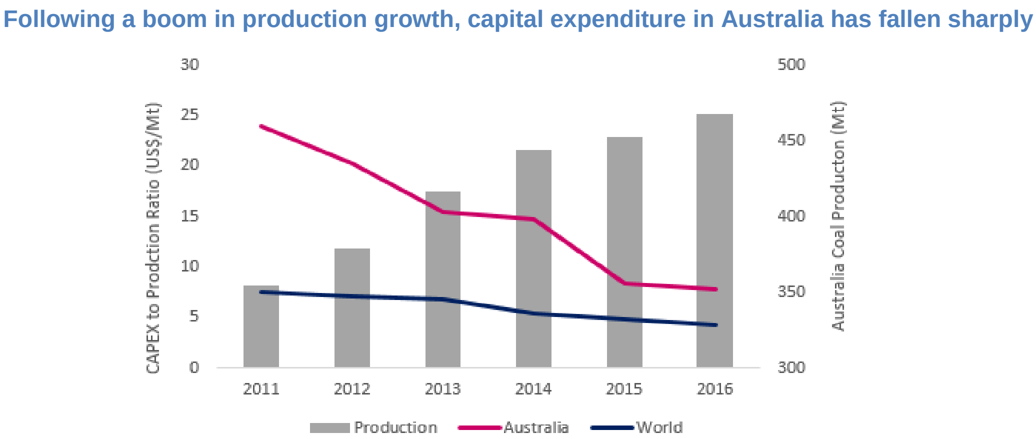


Figure 8: CAPEX to production ratio (Source: Wood Mackenzie Ltd. Q4 2015)

Development is a key weakness for the Australian coal industry. Capital costs for projects built over the last 5 years averaged US$7.2/t, the highest in the world, and almost 50 per cent above average (Wood Mackenzie, 2015; Accenture). While excessive demand during the boom saw significant cost inflation and project delays, this does not fully explain Australia's poor performance; instead, structural factors; such as the high cost of labour, are a major cause of this weakness. In the past two years, construction and labour costs have been falling; however, they are still among the highest in the world, and further labour cost reductions are unlikely to provide the step change in costs required. The country's current poor development capability is a severe barrier to investment. If the industry is to approve major new projects, investment must be made into new and innovate ways to compete.

The combination of a complex regulatory environment (State and Federal Government) and low social licence to operate creates an unfavourable environment for Australian coal companies to venture into new coal projects. A recent study by the World Bank found 50 per cent of respondents believe the coal industry does not benefit their local communities and, 65 per cent believe it is having a negative impact on the local environment. The lack of a clear social licence for the coal industry is a significant impediment to new operations. To improve social licence, the industry should start by building a clear and consistent message targeted to the Australian public, increasing energy literacy and articulating the need for high quality coal in the global energy transition.

Due to Australia's poor development capability, based on current projections, only four new mines have a high probability of opening in the next decade (Wood Mackenzie, 2015). If additional greenfield projects are to become operational, the country must find ways to reduce upfront capital costs to be more in-line with the rest of the world, and work to improve its current social licence position.

EXTRACTION AND PRODUCTION

Australia performs poorly overall in the extraction and production phase of the industry value chain with a score of 5.0, below the world average of 5.3, and trailing behind the world's best, Russia, with a score of 6.7.

Regardless of mine type (surface or underground) or coal product (metallurgical or thermal), Australia performs below average in both mining and coal preparation in the extraction and production phase. Australia's average mining and coal preparation costs are US$37.50/t and US$6.00/t respectively. This is substantially higher than the peer group average of US$29.60/t and US$3.10/t respectively, indicating there is significant room for improvement[1].

Over the last few years, foreign exchange factors have played a significant part in pushing down operating costs for developing nations. For example, in Russia, the devaluation of the Rouble has reduced operating costs significantly, making their industry more competitive.

While Australia's costs are significantly higher, 75.3 per cent of coalmines were able to generate positive margins in 2015. This view on overall margin is illustrated in Figure 9. Metallurgical coalmines perform better and have a higher share of mines with positive margins compared to thermal coalmines (87.6 per cent compared to 65.9 per cent respectively) (Wood Mackenzie, 2015; Accenture).

Although this paints a positive picture of Australia's coal industry, many mines are operating close to the breakeven point. Given the volatile nature of coal prices, the profitability of Australia's coal industry can move quickly. Scenario modelling suggests that, based on 2015 costs, a fall in the price of coal of only 15 per cent would see 49 per cent of mines operating with negative margins. On the other hand, should prices rise 15 per cent, based on 2015 costs, only 15 per cent of Australian mines would be operating on negative margins.

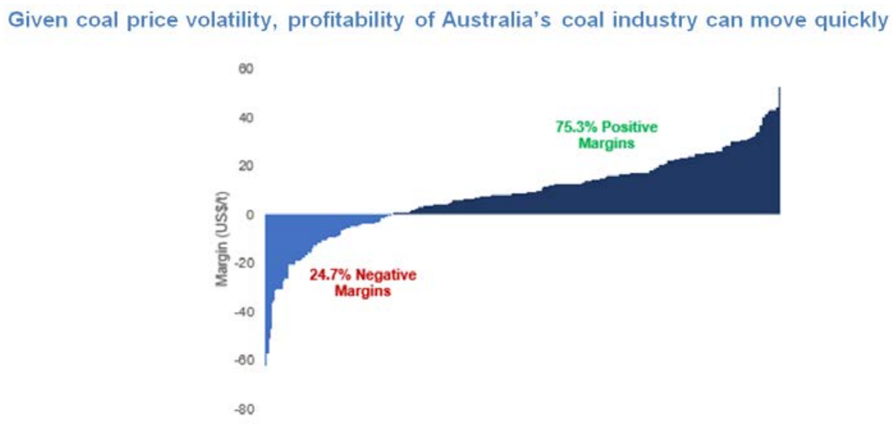


Figure 9: Variations in Australian coal mines profitability margins

Cost cutting initiatives, since prices began to fall, have kept Australia's coal mines competitive up until this point. However, progress is beginning to slow, particularly as automatic cost stabilisers such as the falling Australian dollar have taken effect, and quick savings such as workforce reductions have already been implemented. Now the industry is faced with the much tougher task of tackling the structural factors contributing to Australia's poor cost competitiveness. If not addressed as a priority, high-cost and low-margin mines in Australia will be forced to close prematurely.

A key structural factor contributing to the country's high mining and coal preparation costs is the workforce. Education and training levels scored very highly in Australia compared to the peer group, which contributes to the country having the highest salaries in the world (approximately 30 per cent higher than the US) (Hays, 2016). While salaries have peaked and Australia has seen a marked decrease, this is in line with the rest of the world, and as such has not improved the country's competitive position.

Although salaries are high in Australia, labour productivity, measured as marketable (product) tonnes per employee, is also high, ranking second overall as shown in Figure 10 (Wood Mackenzie, 2015). Australia scores highly due to the nation having more established and advanced operating environments compared to other countries in the peer group. Australia can further invest in increasing its current use of technology and automation in mining operations, for example, by learning from and considering remote operations and driverless trucks used in the metals mining sector. This will drive further productivity gains, offsetting the uncompetitive labour cost to improve overall competitiveness.

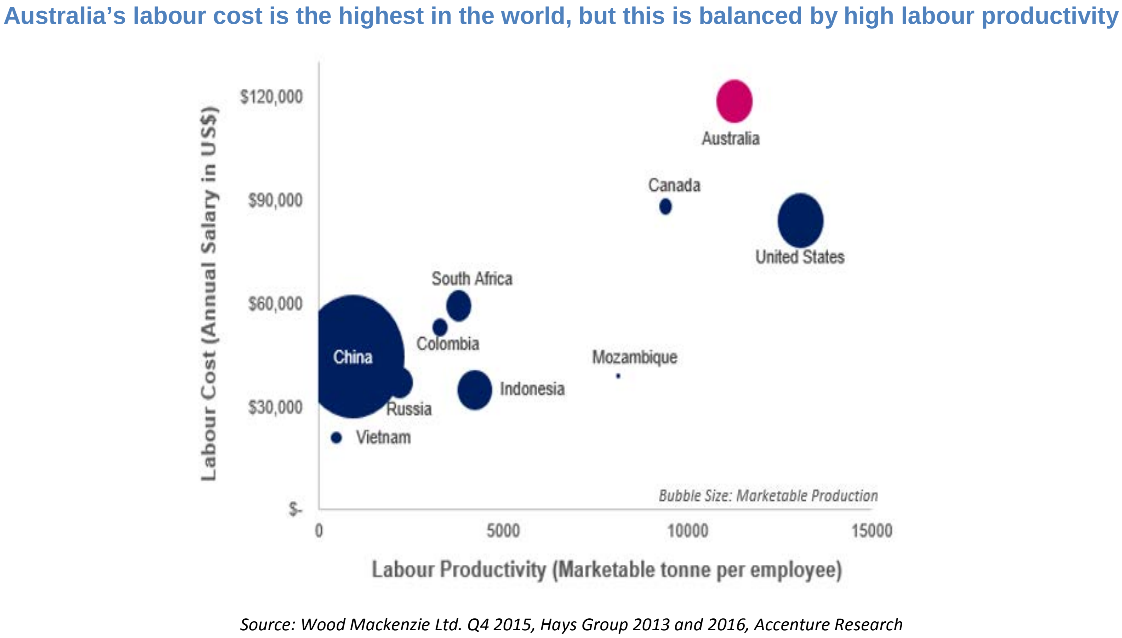


Figure 10: Labour performance comparison

The ability to produce high quality coal at scale is key to the competitiveness of Australia's export based coal industry. Metallurgical and thermal reserves in Queensland and New South Wales are among the largest and highest quality in the world. The ability to export this coal at scale sets Australia apart from many of its competitors. For example, Mozambique exports high quality coal, however the total production of the country is only one per cent of Australia's output (Wood Mackenzie, 2015).

Extraction and production is the weakest phase in the value chain for Australia's coal industry. While the country has significant high quality metallurgical and thermal coal operations, it cannot currently mine and process this coal competitively. By tackling structural disadvantages, the industry has the opportunity to make a substantial impact on overall competitiveness.

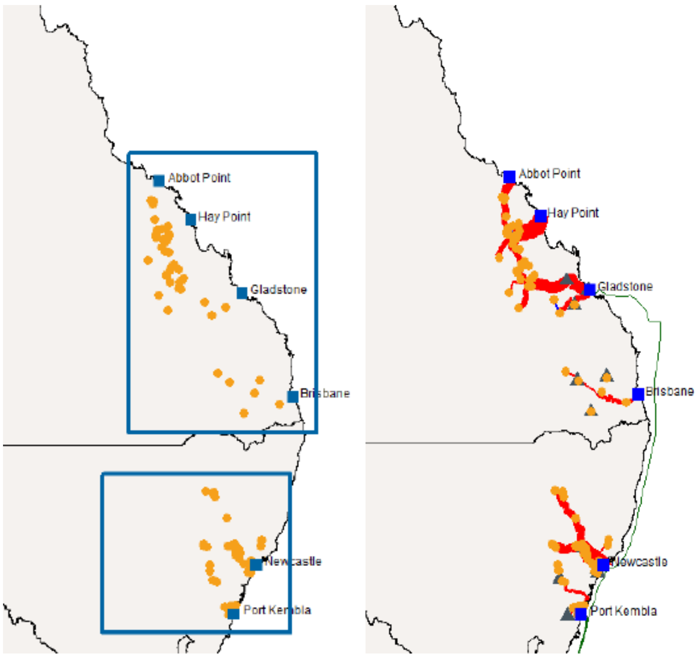
COAL TRANSPORT

Australia performs well in the coal transport phase of the industry value chain with a score of 8.4, well above the world average of 6.7, and only just behind the world's best, China, with a score of 8.6.

The transport of coal is a significant cost factor for industry operators, representing 25 per cent – 40 per cent of the cost for seaborne coal (Woods Mackenzie, 2015; Metalytics, 2015). Given Australia exports 88 per cent of its coal production, strong performance here is crucial in the overall competitiveness of the sector. Fortunately for the country, geography plays a major role in determining a coal producer's transportation competitiveness. Shorter distances to ports, and to final markets, significantly reduce the infrastructure required and the total cost of transportation.

Coal production in Australia is concentrated within Queensland and New South Wales, with over 97 per cent of the country's black coal production occurring in those two states (Woods Mackenzie, 2015). The large clusters of mining operations and maturity of infrastructure mean that most mines operate within proximity to world-class port and rail infrastructure, as shown in Figure 11. As a result, Australia's average distance from mine to port of 206 km is among the lowest in the world (Metalytics, 2015).

Australia's transport infrastructure is clustered around the coal operations in Queensland and New South Wales



Source: BITRE, 2006

Figure 11: Australian coal mines and transport Infrastructure

The total inland coal transport task in Australia is estimated at 88.9 billion tonne kilometers, of which rail accounts for 95.9 per cent (BITRE, 2006). Over 4 years from 2008 to 2012, fuelled by export demand from Asian markets, Australia invested heavily in rail infrastructure, boosting capacity by 120 Mt (35 per cent) (Woods Mackenzie, 2015).

During the industry's rush to add capacity, transportation costs soared. A concerted effort has since been made to reduce costs, in particular, a significant focus has been placed on improving productivity and utilisation of these assets through regulated collaboration and coordination. Across the country, utilisation rates have reached 75 per cent, and costs have fallen by 38 per cent as seen in Figure 12 (Woods Mackenzie, 2015).

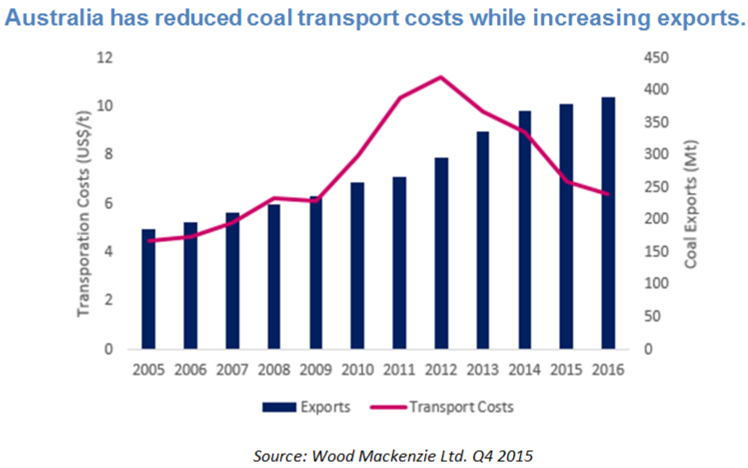


Figure 12: Australian coal exports and transport costs

While the location of Australia's current coal operations is favourable to land based transport costs, this may change. The next major untapped reserves of coal are in the Galilee and Surat basins, located over 500km inland, with no significant rail infrastructure. Adani estimates it would cost A$2.2bn to build the significant rail infrastructure needed to export from the Galilee basin (Qld Department of State Development, 2016). This has been a major impediment to any development within the region.

Successful transportation capability, for an exporting nation, requires quality port infrastructure. Exports from Australia's seven largest ports have grown an average of 5.6 per cent p.a. over the last decade (Woods Mackenzie, 2015). To support this growth, the industry has added an additional 246 Mtpa of world class export handling capacity since 2006 (Woods Mackenzie, 2015). Newcastle port is now the largest coal export terminal in the world, exporting 158.1 Mt of coal in 2014-15 (BITRE, 2006). As a result of high quality infrastructure and having the world's leading port utilisation rate of 75 per cent, Australia's port costs are among the lowest in the world, adding on average, only US$3.6 per tonne shipped (Woods Mackenzie, 2015; Metalytics, 2015).

Shipping is a major cost to the seaborne coal market; however, distance is the major driver of costs, providing little opportunity for the industry to improve competitiveness. Fortunately for Australia, the world's four largest coal importers; China, Japan, India and Korea, are all within close proximity, leading to lower shipping costs, as illustrated in Figure 13.

The combination of quality port and rail infrastructure, along with short distances mean Australia's cost per tonne for land based transportation of US$7.1/t is the third lowest among the peer group (Woods Mackenzie, 2015; Metalytics, 2015). The industry must continue to work collaboratively across shared transportation infrastructure, both rail and ports, if it is to remain competitive.

CLOSURE AND REHABILITATION

Closure and rehabilitation is a crucial phase of the industry value chain, as it leaves a significant legacy, affecting local communities and the environment. Due to the complex and different nature of the physical environment, political landscapes, and social culture across the peer group, an overall score was not developed. Instead, this study exclusively examines Australia's mine closure costs and social and community engagement indexes.
As of 2015, there were 95 coalmines operating across Australia (Woods Mackenzie, 2015). Figure 14 shows the forecast drop in coal production should no new mines be opened. This clearly indicates the enormous closure and rehabilitation activity that is coming. Mine closure and rehabilitation is both complex and expensive. Rehabilitation covers a range of activities including establishing final land form position, revegetation and ongoing environmental

monitoring. As a result, rehabilitation is significantly more expensive and requires a longer duration to complete compared to mine closure activities. The estimated liability for mine closure activities such as decommissioning based on currently operating mines within Australia, over the next 30 years stands at US$3.4 Billion (Woods Mackenzie, 2015). This indicates the substantial overall cost to the coal industry for both closure and rehabilitation.

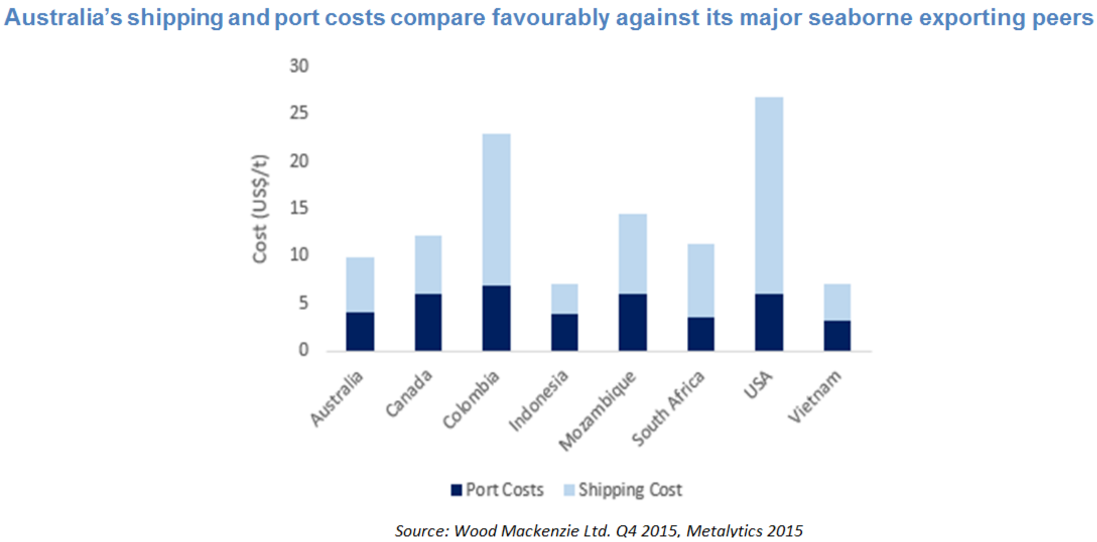


Figure 13: Port and shipping costs

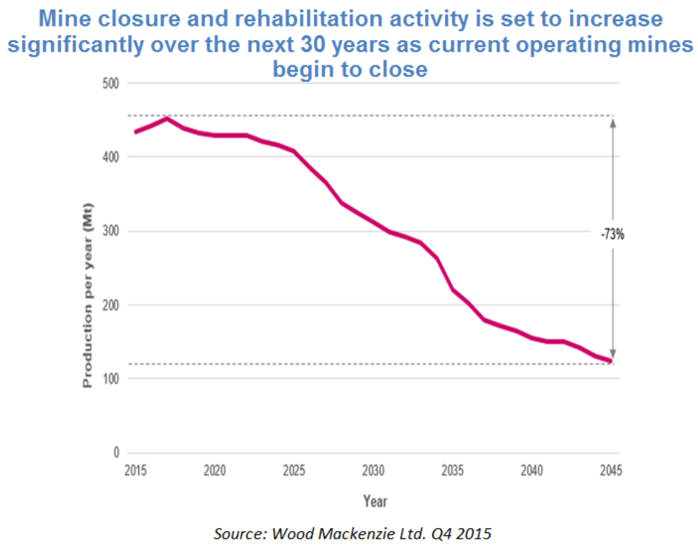
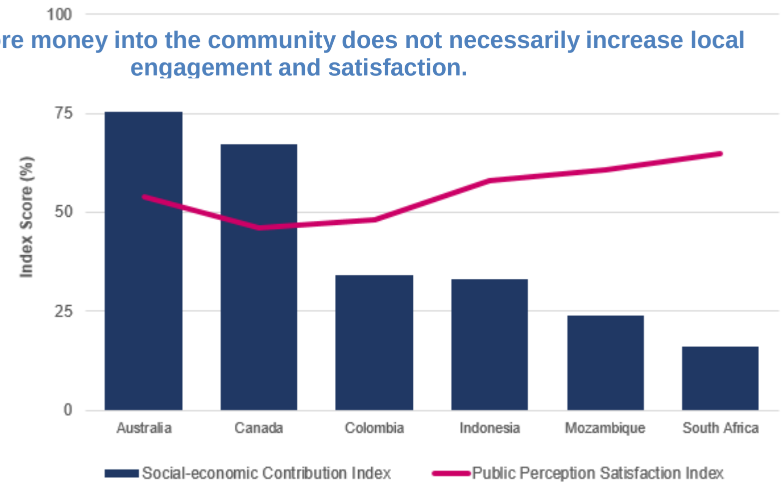


Figure 14: Production outlook from operating mines in Australia

Issues in the sector arise when sufficient funds have not been allocated to adequately complete mine closure. While many companies plan for the rehabilitation, it is vital that sufficient funds are set aside well in advance of the cost. Where necessary, the government must step in to ensure state money is not ultimately required. In tandem, the industry must find ways to reduce this future liability. One way to reduce this liability is for operators to progressively rehabilitate mining areas which are no longer used for mining purposes. Australia should collaborate with other countries to train *its workforce to be able to operate competently during mine closure and ongoing monitoring,* as well as leverage the opportunity to learn lessons and gain insights from countries that have experience in this phase of the value chain (e.g. UK).

It is crucial that eventual mine closure and rehabilitation is carried out successfully as the impact to the regions and communities will be lasting and significant. Failure to perform these activities properly on just one coalmine could trigger significant backlash from the community, and affect the overall credibility and social licence to operate for the entire coal industry.

The amount of socio-economic contribution and involvement by the coal industry in Australia ranks as the highest amongst the peer group. Figure 15 shows that Australia's contribution is more than double that of countries such as Colombia, Indonesia, Mozambique and South Africa (Fraser Institute, 2016).



Source: Fraser Institute Survey of Mining Companies 2015, World Bank Extractive Industries Perception Survey

Figure 15: Coal industry contribution to community against public perception and support

However, even with the highest investment into local content development, the general public perception toward the coal industry in Australia is very poor, with 46 per cent of the public surveyed having a negative view (World Bank, 2014). Figure 16 shows that investing more does not directly translate to having a greater share of buy-in from the public. In Australia's case, it shows that investments made have not been effective and there is a potential disconnect between what the coal industry has been doing to engage and address the concerns of the public.

The industry must listen to the public and look to address concerns with projects that generate tangible benefits to the community and the environment. One practical example is by revisiting heritage mines and ensuring they are properly rehabilitated, and fit for use by future generations. An undertaking like this, which would require significant collaboration from the industry and its partners, would start to rebuild the industry's social license. A focus on building stronger collaboration with government bodies, and changing the current engagement model from being an 'enforcer of rules and regulations' to being a part of the process would also lead to overall benefit to the industry and Australian community.

There is time for the coal industry in Australia to prepare and position itself to effectively manage the closure and rehabilitation phase of the industry value chain. *By increasing collaboration with various stakeholder bodies, positioning and skilling workforce accordingly, and learning lessons from other countries, Australia has the opportunity to increase its competitiveness and maximise value for the industry and country in this phase of the value chain.*

ACKNOWLEDGMENTS

The results and findings from this report are based on research conducted over the course of ten weeks from October to December 2016. The objective was to create an industry relevant measure of the coal industry competitiveness that was robust and repeatable, allowing improvements to be tracked over future releases. The assistance of Accenture in undertaking this work with NERA is acknowledged.

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