

Mining Brief – International Supply Chain Benchmarking Sectoral Assessment

Report for the Department of Infrastructure, Transport, Regional Development and Communications

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Executive Summary

Total freight value* c.\$165b	Jobs in Aus c.250k	Key issues <ol style="list-style-type: none"> 1. Rail access disputes 2. Difficulties getting funding for some mining projects and relevant supply chain infrastructure 											
Total transported volume* c.1,075Mt	Import volumes* c.400Kt Export volumes* c.1.2Bt												
Supply chain cost* c.5-15% of total commodity value of total freight value	Key iron ore and coal exporters (2019) Millions of tonnes <table border="1"> <caption>Key iron ore and coal exporters (2019)</caption> <thead> <tr> <th>Country</th> <th>Iron Ore (Millions of tonnes)</th> <th>Coal (Millions of tonnes)</th> </tr> </thead> <tbody> <tr> <td>Australia</td> <td>~800</td> <td>~400</td> </tr> <tr> <td>Brazil</td> <td>~500</td> <td>~400</td> </tr> <tr> <td>Indonesia</td> <td>~400</td> <td>~400</td> </tr> </tbody> </table>		Country	Iron Ore (Millions of tonnes)	Coal (Millions of tonnes)	Australia	~800	~400	Brazil	~500	~400	Indonesia	~400
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* Volume and value include iron ore, coal and minerals (copper, zinc, lead, nickel)

The Mining Supply Chain and Logistics Dashboard currently has coverage of iron ore and coal, as well as range of other metals and minerals such as copper, zinc, lead and nickel. Iron ore and coal make up the bulk of the freight task. The mining sector makes up c.10% of Australia's GDP.ⁱ Mining makes up more than half of Australia's total exports and directly employs c.250,000 people.

Iron ore and coal networks are industry operated. As such, industry is best placed to benchmark and drive improvements in their own supply chains.

Australia is a world leader in mining and while considerable investment into Australia's mining supply chains has occurred, there may be further opportunities to improve aspects of supply chain efficiency, particularly outside of iron ore and coal. The mining industry is expected to continue to receive scrutiny for its environmental impact, as has been the case with coal. Therefore, further benchmarking should consider both performance metrics alongside environmental considerations. This effort should continue to identify ways for Australian mining to limit its environmental impact, while remaining efficient and globally competitive.

Mining Supply Chains in Australia

Australia's main coal mining regions are in Queensland and New South Wales. Australia has the fourth largest coal reserves in the world, with c.100 years of production for black coal, and 400 years for brown coal.ⁱⁱ Most of Australian coal is exported to developed and developing economies, supplying c.54% of world trade in metallurgical coal and c.24% of thermal coal. Australia's coal is seen as a particularly high-quality product globally, as it is high-energy, low ash and produces less emissions per unit burned.

Australia has the world's largest estimated reserves of iron ore, with 52 billion tonnes available (30% of the world's total estimated reserves) and is seen as a high-quality producer globally. While iron ore can be found throughout Australia, 90% of iron ore deposits occur in Western Australia. In 2017, Australia shipped c.828Mt of iron ore.ⁱⁱⁱ

Australia is viewed as one of the most efficient and resilient commodity producers worldwide. While most issues are resolved by the private parties operating the infrastructure, the industry faces the following broad issues:

- Mining relies on rail infrastructure, which has historically been subject to cumbersome access regimes that are difficult for newcomers, often leading to disputes over applications for access from existing owners and leaving them either unable to operate, or forced to use inefficient alternatives while disputes are resolved.^{iv}
- As many mining supply chains are industry operated, funding is a key issue. Supply chains for some resources (e.g. coal) may lack investment in the future due to investor pressure (likely due to environmental concerns).

International Supply Chain Comparison

	Australia	Russia	China	Brazil	Indonesia	USA	India
Coal produced (Mt) (2019)	c.507	c.440	c.3,846	c.8	c.610	c.639	c.728
Share of coal exported	76% c.389Mt	47% c.205Mt	0.2% c.7Mt	25% c.2Mt	77% c.472Mt	15% c.94Mt	0.1% c.1Mt
Modal split estimate for coal (road vs rail)	Mainly rail	Mainly rail	10% road / 60% rail (Water 30%)	Not available	Road, rail and waterways	Mainly rail, followed by waterways	c.65% rail

Australia's strong economy, proximity to Asia (which is a high energy consumer) and endowment of natural resources make it a strong player in the global coal supply chain. Asia fuels the majority of global demand for coal and contains a number of major producers (such as China, Indonesia and Vietnam).

	Australia	Russia	China	Brazil	Indonesia	USA	India
Iron ore produced (Mt), 2019	c.930	c.99	c.350	c.480	c.4	c.48	c.230
Share of iron ore exported	87% c.806Mt	22% c.22Mt	5% c.16Mt	71% c.340Mt	0% by 2022	27% c.11Mt	13% c.31Mt
Modal split estimate for iron ore (road vs rail)	Mainly rail	Not available	Not available	Mainly rail	N/A	Mainly rail	c.65% rail

Other countries with substantial iron ore reserves include Russia (c.13%), Brazil (c.12%) and China (c.11%).^v Australia's iron ore has a high-quality reputation, compared to that produced in China which is considered substantially lower grade.

Benchmarking considerations

Intl benchmarking considerations	Importance	Mining supply chain						
Size and growth	●	The mining supply chain employs c.250k Australians, and moves over 1.3 billion tonnes per year						
Freight importance	●	Freight is a significant cost to mining (c.5-15% of commodity cost). Improving freight performance will have a sizable impact						
Export importance	●	Most iron ore and coal volumes are exported. While Australia is competitive on some dynamics, there is expected to be some room for improvement						
Geographic scope	●	Geographically, key mining states are QLD, NSW and WA due to their rich natural deposits						
Issues		<table border="1"> <thead> <tr> <th>Coal</th> <th>Iron ore / other</th> </tr> </thead> <tbody> <tr> <td>Coal has faced increasing uncertainty in value with a changing global environmental and energy outlook.</td> <td>Australia's supply chain is known as a global leader for efficiency.</td> </tr> <tr> <td>●</td> <td>●</td> </tr> </tbody> </table>	Coal	Iron ore / other	Coal has faced increasing uncertainty in value with a changing global environmental and energy outlook.	Australia's supply chain is known as a global leader for efficiency.	●	●
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Mining supply chains are vital to the Australian economy, due to mining's significant contribution to GDP and overall employment. However, Australia's iron ore and coal supply chains are considered efficient by global standards. Furthermore, iron ore and coal networks are industry operated. As such, industry is best placed to benchmark and drive improvements in their own supply chains.

Given the scale of Australia's iron ore operations relative to the rest of the world, there are few appropriate comparative countries. Brazil offers the most viable benchmark, due to its scale of operations and similar reliance on the rail network. Like Australia, most of Brazil's iron ore is exported, rather than used domestically. For coal exports, the U.S. offers a good benchmark, producing similar volumes of coal to Australia with reasonable data availability. Coal is moved predominantly by rail, making comparison more equal. Indonesia or India could also be a potential comparator for coal, based on scale. However, data and experts are likely to be less accessible than the U.S. In addition, India's coal exports are limited, though like Australia it has a strong rail focus.

Though not shown in the CSIRO modelling, supply chains of significant resources such as bauxite, alumina or high-growth resources such as spodumene may be of significant interest:

- Australia produced 102Mt of Bauxite in 2020, with 37Mt exported (the remainder producing c.21Mt of alumina, with c.18Mt exported), making it the largest exporter of alumina in the world.^{vi}
- Spodumene, a source of Lithium, is a potential growth supply chain. Australia produced c.233k tonnes of spodumene in FY2020, with production expected to rise to double by FY2026.^{vii} Given the high potential growth in spodumene, this could present a good opportunity to determine whether the supply chain is in a strong position to manage this volume.

Australia also has the largest demonstrated resources of nickel, zinc and lead, and is in the top six worldwide for demonstrated copper resources. Such metals are high value though represent a small fraction of Australian mining volumes (c.6Mt), suggesting less significant value in benchmarking supply chain costs than high volume, high freight cost resources like coal and bauxite/alumina.

References

- ⁱ Australian Bureau of Statistics, Resources and Energy Quarterly, March 2021
- ⁱⁱ Australian Trade and Investment Commission: Australian Capability Across the Coal Supply Chain, June 2018
- ⁱⁱⁱ Minerals Council of Australia (webpage), Iron Ore: supplying high-grade product to the world
- ^{iv} For example: ABC News (article), FMG ordered to open up Pilbara rail access for Brockman Mining, March 1, 2016
- ^v Government of Western Australia (webpage), Department of Mines, Industry Regulation and Safety
- ^{vi} Australian Aluminium Council LTD (webpage), Australian Industry
- ^{vii} Australian Bureau of Statistics, Resources and Energy Quarterly, March 2021