



**METS
IGNITED**

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METS IGNITED

**Sector Demographics
Report**

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Growth
Centres**

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Executive Summary

In 2017 AlphaBeta undertook a study for METS Ignited to better define, size and segment the Australian METS sector. The project produced a customer-focussed definition of the METS sector that was accepted by a range of stakeholders, as well as a repeatable methodology for sizing the Australian METS sector using input-output tables. The project also identified nine segments in the specialised part of the METS sector, and described the basic characteristics of each segment. This current study, METS Sector Demographics, updates key analysis from the 2017 study, and builds on and extends that work to address a range of questions about segment and firm-level characteristics.

The METS sector is a significant portion of the Australian economy, contributing an estimated \$92 billion in gross value added (GVA) in 2017/18. The sector consists of both *specialised* METS suppliers and *non-specialised* suppliers. The specialised part of the METS sector provides services such as mine construction, geological survey services, and the manufacturing of mine-specific equipment. These are goods and services that specifically support mining extraction activities. The remaining, non-specialised part of the METS sector provides other goods and services used in the mining supply chain, such as financial services, travel and accommodation, that are not specialised to mining and used also by other sectors. In 2017/18, it is estimated that the specialised METS sector contributed \$47 billion in GVA (51 percent), with the non-specialised sector contributing the remaining \$45 billion.

The METS sector has grown substantially over the last decade, more than doubling from \$44 billion GVA in 2005/06 to \$92 billion in 2017/18. Both the specialised and non-specialised sectors experienced similar growth. The sector declined from 2011/12 to 2015/16 following the peak of the investment phase of the mining boom, but has since rebounded, with two consecutive years of strong GVA growth. The METS sector is also a significant contributor to employment in Australia, with around 322,000 jobs in the *specialised* part of the sector in 2017/18. Employment peaked in 2011/12 at 455,000 then fell back to pre-boom levels in 2015/16. However, job numbers have grown strongly as the sector has rebounded. Three fundamental trends suggest a positive outlook that supports continued GVA growth and employment: a steady increase in mining production levels; mining investment stabilising at higher levels than pre-boom levels, and the prospect of increased investment in productivity through investment in technology and automation.

While the specialised sector as a whole has grown strongly, at segment level growth rates have varied significantly – the strongest growth has come from professional and technical services, ICT services and other services, followed by construction and technical equipment manufacturing. Similarly, while the specialised METS sector has seen solid employment growth, adding about 120,000 jobs since 2005/06, the picture for employment growth is more mixed at segment level. Employment growth over the long term has been strongest in other services and contract mining, followed by professional and technical services. The four largest segments of the specialised METS sector – construction, professional and technical services, contract mining, and technical equipment manufacturing – contribute 70 percent of its GVA and employment.

There are estimated to be about 90,000 businesses in the specialised METS sector. This includes businesses of all sizes, from large multinationals to small and medium sized businesses, and through to small contractors, consultants and sole traders. However, only about 7 percent (6,700) of these businesses generate revenue of \$2 million or greater and these businesses are responsible for nearly 70 percent of the total revenue of the specialised sector. Within this set of firms, there are about 1,500 businesses generating more than \$10 million revenue annually. There is a high level of revenue concentration in most segments, though there is also variation. Concentration of segment revenue and employment appears to be greatest in basic and technical equipment manufacturing, wholesale trade, and contract mining.

METS firms use a range of direct and indirect supply pathways to access their customers. The mix of these pathways varies significantly by specialised segment. Segments like contract mining, construction and wholesale trade involve predominantly direct supply, while professional and technical services has a more even mix of direct and indirect supply, and ICT services is weighted heavily to indirect supply (ICT services companies in the METS sector are not simply serving mining customers; they are serving other METS firms right across the supply chain). The manufacturing segments both have significant indirect supply components.

Australia's exports from the specialised METS sector are estimated to have been worth \$13B in 2014, having growth more than 25 percent since 2008. Australia's strength as a domestic producer across most of the major commodity groups positions our METS firms well for export. The majority of specialised METS segments are significant exporters and perform strongly in export intensity compared to peers outside the METS sector. There is no single reliable source of data on the value of exports to different resource markets, so a range of different sources were analysed. Considered in total they suggest Australia's METS exports reach a wide range of destinations, but Australia is under-penetrated in some of the world's largest mining markets including China, India and Russia

Consultations with industry experts identified several key success factors common to successful firms across different METS segments – most particularly the skill and expertise of key people, innovation and creating unique IP, being solutions-focused rather than product-focused, and finding a product that is resilient to the mining industry's cycles. In addition, small METS firms have further specific drivers of success, and face specific challenges. Responsiveness, flexibility, and adaptability to the customer is often the reason a customer will choose a small firm over a large one. A partnership with a mining company or government investment can be an important level to provide an immediate market or funding, particularly for technology-driven start ups. Some small firms have leveraged early access to export markets to grow, benefiting from providing skills into less crowded marketplaces for METS products and services. However, navigating the procurement processes of big mining companies is a key challenge for many smaller firms, as is the challenge of scalability.

Future research on the METS sector should focus on the sources of growth over the last decade, and the adoption of technology – in particular, Industry 4.0 – by METS firms. While existing work has measured the overall growth and demographics of the sector, a more detailed understanding of what types of firms have most contributed to growth could help policymakers more effectively target sector development strategies. As the sector prepares for the impact of more rapid technological disruption, it would also be helpful to understand the existing adoption of new technologies by METS firms. Both those questions could be at least partly answered through the use of the Business Longitudinal Analysis Data Environment (BLADE), maintained by the ABS, which is the richest firm-level dataset in Australia.

1 Project context and overview

2017 project: Defining the METS sector

Last year, METS Ignited undertook a project with AlphaBeta to better define, size and segment the Australian METS sector. The project built on previous work by the Minerals Council of Australia (MCA) and Austmine. It had three key objectives:

- **Develop a precise definition of the METS sector**, to guide METS Ignited's actions in supporting the sector and to give various stakeholders a common understanding of the sector with a consistent approach to its measurement and evaluation.
- **Estimate the size of the METS sector**, to be able to articulate its contribution to the broader Australian economy, and identify and understand changes over time.
- **Identify the segments of the METS sector**, in order to enable the development of more nuanced policy interventions and find areas of comparative advantage for Australia.

The 2017 project produced a customer-focussed definition of the METS sector that was accepted by a range of stakeholders, as well as a repeatable methodology for sizing the Australian METS sector using input-output tables. The project also identified nine segments in the specialised part of the METS sector, and described the basic characteristics of each segment.

Current project

The current project, METS sector demographics, updates key analysis from the 2017 study, and builds on and extends that work to address a range of questions about segment and firm-level characteristics. The key questions addressed in this report are:

- How has the performance of the METS sector changed since the previous measurement? How has GVA and employment attributable to the sector evolved?
- What is the current size and growth of GVA and employment in each of the specialised METS segments?
- What are the key demographics for the METS sector? What are the key demographics for specialised METS segments?
- What is the level of exports for the specialised METS sector? How has this changed over time? How does export intensity vary at segment level?
- What are the most important markets for Australian specialised METS exports?
- What are the key drivers of success for companies in the Australian METS sector? What are the most important factors in export success?

In developing this report we have drawn upon a range of data sources and engaged with key industry stakeholders.

The analysis in this report has drawn primarily on public statistical information, including Australian Input-Output tables; Australia's National Accounts; Firm demographic statistics; Labour market data; World Input-Output tables; and CommTrade export and import data. Most public statistical information is based on existing industry classification systems that do not include METS (eg. ANZSIC), so the use of this information for METS sector demographics does require certain assumptions.

Databases of known METS firms are an alternative source of data on METS demographics that have not previously been explored. Governments and other organisations have developed and maintained these databases over years to support industry policy activities. By aggregating these databases into a single dataset, it is possible to capture a significant population of METS firms for analysis. These databases have been collected and aggregated through the course of this project, and have been used to supplement some of the analysis for this report. Going forward though, there is the potential to use them to deepen analysis. The presence of ABNs in the dataset means that the population may also be able to be observed in other government data assets such as BLADE

In addition, AlphaBeta undertook structured discussions with expert industry participants to developed perspectives on the key success factors for companies in the Australian specialised METS sector. AlphaBeta also engaged a range of sector stakeholders including Austmine, Austrade and the Office of the Chief Economist in the Federal Department of Industry, Innovation and Science.

2 Overview of the METS sector

Unlike other, ‘traditional’ sectors of the economy, which are defined by the type of goods or services they produce, the METS sector is defined by its customer: the mining sector. The Australian METS sector thus comprises firms from a broad range of traditional sectors like construction, financial services and travel, whose businesses are linked by a common target market. The customer definition for the METS sector enables the sector to be sized and analysed using input-output tables, which are data tables that show how goods and services flow between industries in the economy.

There are several other features of firms in the Australian METS sector that are important to note:

- METS sector businesses either *directly* supply goods and services to mining companies, or *indirectly* supply to other firms further along the supply chain, that in turn supply mining companies.
- They supply both *capital* and *intermediate* goods. Capital goods are durable items that mining firms use to produce their goods and services, such as vehicles and buildings; intermediate goods and services are inputs that are used up in the mining process, including explosives, vehicle tires and spare parts, and consulting by engineers and geologists.
- Firms in the Australian METS sector supply to *local* miners, but they also *export* their goods and services both directly and indirectly to foreign mining sectors.

2.1 The size of the Australian METS sector has more than doubled since 2005/06

The METS sector is a significant portion of the Australian economy. It contributed an estimated \$92 billion in gross value added (GVA) to the economy in 2017/18.¹

The METS sector consists of both *specialised* METS suppliers and *non-specialised* suppliers. The specialised part of the METS sector provides services such as mine construction, geological survey services, and the manufacturing of mine-specific equipment. These are goods and services that specifically support mining extraction activities. The remaining, non-specialised part of the METS sector provides other goods and services used in the mining supply chain, such as financial services, travel and accommodation, that are not specialised to mining and used also by other sectors.² In 2017/18, it is estimated that the specialised METS sector contributed \$47 billion in GVA (51 percent), with the non-specialised sector contributing the remaining \$45 billion.

The METS sector has grown substantially over the last decade, more than doubling from \$44 billion GVA in 2005/06 to \$92 billion in 2017/18 (see Figure 1). Both the specialised and non-specialised sectors experienced similar growth. The sector declined from 2011/12 to 2015/16 following the peak of the investment phase of the mining boom, but has since rebounded, with two consecutive years of strong GVA growth.

¹ Gross value added (GVA) is used to measure the contribution of an individual industry to the economy. It represents the additional value that industry creates on top of the intermediate inputs that it purchases from other industries. For detailed methodology for calculating METS sector’s GVA, see Appendix A.

² Categorisation of underlying sub-industries as either specialised or non-specialised is based on previous work by Austmine and Deloitte/MCA. See Appendix B for details.

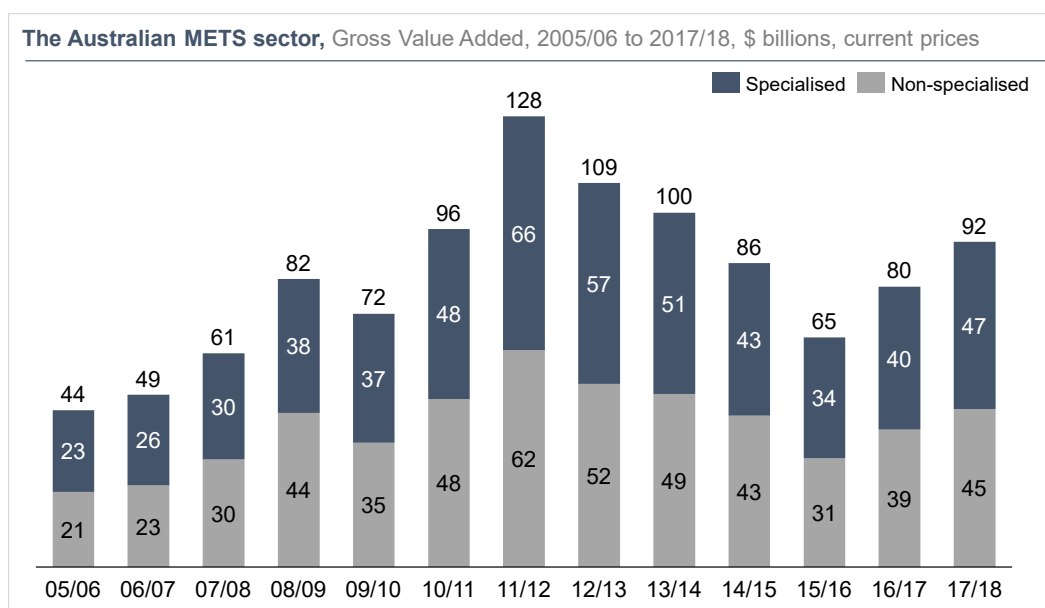


Figure 1 – The METS sector has rebounded after a decline from 2011/12 to 2015/16, with two consecutive years of GVA growth

Source: ABS, AlphaBeta analysis

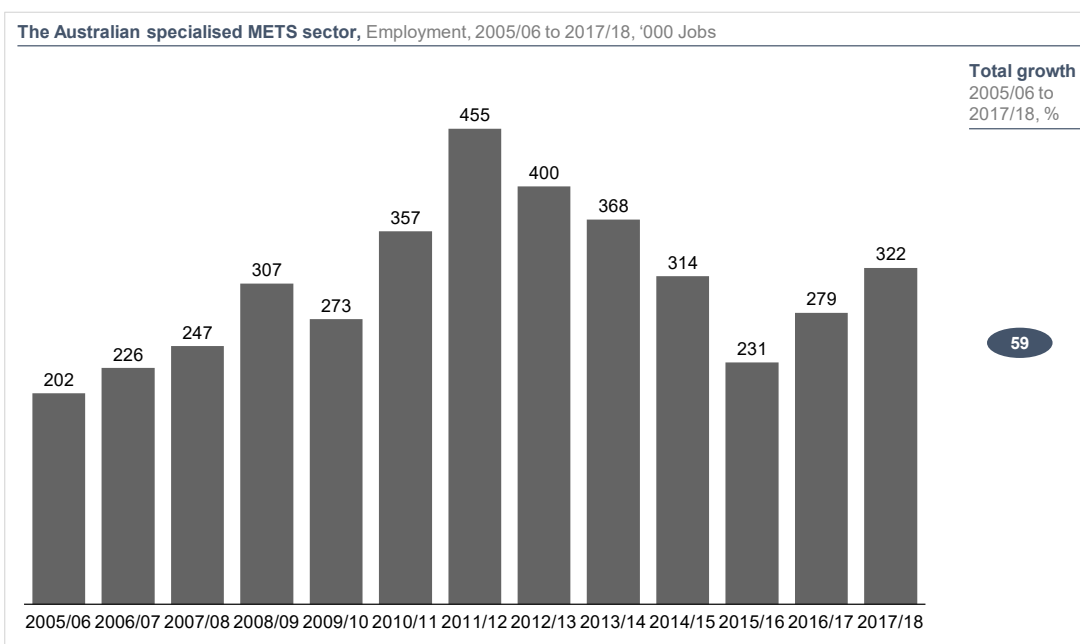
The METS sector has experienced high volatility in its GVA over the last 12 years, which is a result of the interaction of the different phases of the mining boom: the price phase (2003/4 to 2011/12), as resources prices increased in response to growing demand; followed by the investment phase (2006/07 to 2016/17) as miners invested to increase their capacity; and now the production phase (2010/11 to ongoing), with significant new production capacity coming online.³ There is reason to believe there is a positive outlook for the sector; this is discussed in Section 2.3.

2.2 Employment in the specialised METS sector has grown to around 322,000

The METS sector is also a significant contributor to employment in Australia, with around 322,000 jobs in the specialised part of sector in 2017/18. This represents just over 2.5 percent of total employment in Australia. Employment in the specialised METS sector peaked in 2011/12 at 455,000 and then fell back to pre-boom levels in 2015/16, as shown in Figure 2. Over the last two years, job numbers have grown strongly as the sector has rebounded.

Employment growth (59 percent since 2005/06) has not kept pace with growth in GVA in the specialised sector, which grew by 104 percent over the same period. This is due to increases in nominal wages and improvements in productivity.

³ See Office of Chief Economist (20XX), *Resources and Energy Quarterly*.



NOTE: Employment levels are calculated using employment-output and employment-GVA ratios estimated based on ABS data, which can be quite volatile

Figure 2 – Employment in the specialised METS sector has fluctuated considerably, but experienced strong growth overall

Source: ABS, AlphaBeta analysis

2.3 Potential outlook for the Australian METS sector is positive

While the potential future outlook for the Australian METS sector has not been a focus of this project, there is reason to believe there is a positive outlook that will support increasing GVA and employment from the sector. In particular, three fundamental trends appear to support a positive outlook for the sector:

- 1. Steady increase in mining production levels:** Production levels are forecast to the Office of the Chief Economist to increase by 7 percent between 2016/17 and 2019/20 as new capacity comes online, with modest increases in iron ore and coal and more significant increases in smaller commodities (non-ferrous metals, for example, is forecast to grow by 35 percent over the period).⁴
- 2. Mining investment stabilising at higher levels than pre-boom:** In the decade prior to the mining boom, mining investment (including oil & gas) averaged around 2 per cent of Australia's GDP, before spiking to more than 9 per cent in 2012/13. Analysis by the RBA estimates that mining investment in the post-boom era will stabilise in the range of 2-5-4 percent of GDP, due in part to the greater level of sustaining and replacement capex required to support the larger capital stock that resulted from the boom.
- 3. Prospect of increased investment in productivity through new technology:** Prior research has identified the potential for substantial productivity improvements in the resources sectors through

⁴ Office of the Chief Economist (2018), *Resources and Energy Quarterly, September 2018: forecast data*. Available at: <https://publications.industry.gov.au/publications/resourcesandenergyquarterlyseptember2018/index.html>

investment in technology and automation. This investment would increase demand in the METS sector, both directly as miners upgrade capital equipment and as a result of the increased output generated by the resources sector. However, there is greater uncertainty around this trend as it is dependent both on Australian mining firms making those investments and Australian METS firms capturing the opportunity to supply these new technologies (see 3.3 for discussion of the import penetration of foreign METS firms into Australia).

2.4 While there are around 90,000 firms in the specialised METS sector, most of the revenue is generated by around 6,700 firms,

There are about 90,000 businesses in the specialised METS sector. This includes businesses of all sizes, from large multinationals to small and medium sized businesses, and through to small contractors, consultants and sole traders. For reference, this compares to 130,000 businesses in the retail trade sector and 84,000 businesses in the manufacturing sector.

Only about 7 percent (6,700) of these businesses generate revenue of \$2 million or greater (Figure 2). These businesses are responsible for nearly 70 percent of the total revenue of the specialised METS sector. Within this set of firms, there are about 1,500 businesses generating more than \$10 million revenue annually.

A similar picture emerges for employment in the sector. Thirteen percent of businesses employ 80 percent of specialised METS sector workers, with the remaining 87 percent of businesses employing fewer than 5 employees each.

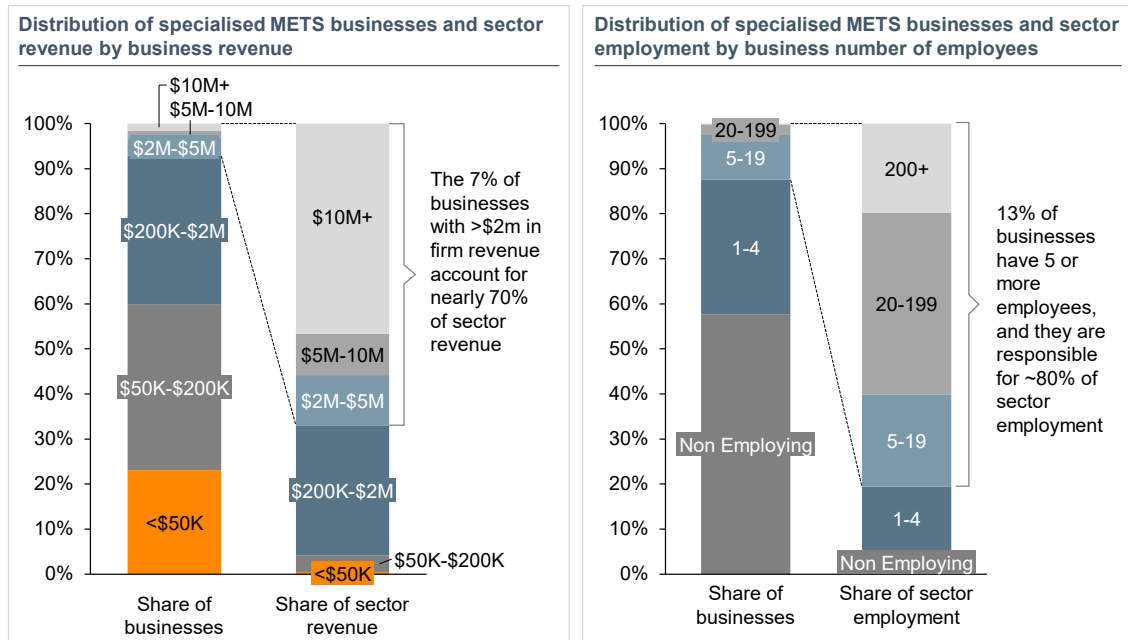


Figure 3 – Businesses with >\$2m in revenue generate nearly 70% of sector revenue; similarly, 80% of jobs in businesses with 5 or more employees

Source: ABS 8165.0; AlphaBeta analysis

3 Segments in the specialised METS sector

In its 2017 sector study, METS Ignited identified 9 segments that make up the specialised METS sector: construction; professional and technical services; technical equipment manufacturing; contract mining & exploration; transport services; wholesale trade; basic equipment manufacturing; ICT services; and other services.

A specialised METS firm may operate in one or more of these segments. Each of the segments is composed of various sub-industries (from the ANZSIC taxonomy of Australian industries) and can be further divided into sub-segments:

Table 1 – Segments

SEGMENTS	DESCRIPTION	EXAMPLE SUB-INDUSTRIES AND SUB-SEGMENTS
Construction	Constructing mine sites and associated infrastructure	<ul style="list-style-type: none"> • Heavy and civil engineering • Site preparation services • EPCM, project and contract management
Contract mining and exploration	Undertaking outsourced mining or exploration activities	<ul style="list-style-type: none"> • Mineral exploration • Mining support services
Basic equipment manufacturing	Making basic products to be used in mining	<ul style="list-style-type: none"> • Metal coating and finishing • Iron and steel casting • Metal fabrication
Technical equipment manufacturing	Making technical or complex products to be used in mining	<ul style="list-style-type: none"> • Professional and scientific equip. • Mining machinery • Mineral handling equipment • Drilling and blasting equipment • Specialised vehicles
Professional and technical services	Assisting miners to plan projects, assess sites, conduct research and implement technology	<ul style="list-style-type: none"> • Engineering design • Surveying and mapping • Geotechnical services • Maintenance services • Asset management
Transport services	Managing storage, transportation and logistics	<ul style="list-style-type: none"> • Rail freight transport • Pipeline transport • Logistics services
Wholesale trade	Selling and distributing mining equipment	<ul style="list-style-type: none"> • Professional and scientific goods • Specialised industrial machinery
ICT services	Applying information, communication and technology services in mining	<ul style="list-style-type: none"> • Data processing and web hosting • Computer system design

SEGMENTS	DESCRIPTION	EXAMPLE SUB-INDUSTRIES AND SUB-SEGMENTS
		<ul style="list-style-type: none"> Resources software Operations management software
Other services	Utility, waste management and repair services	<ul style="list-style-type: none"> Precision equip. repair Water drainage services

3.1 Growth in the specialised METS sector has varied significantly at segment level

The four largest segments of the specialised METS sector contribute 70 percent of its GVA. These are construction (\$11 billion), professional and technical services (\$9 billion), contract mining (\$6 billion), and technical equipment manufacturing (\$6 billion). These segments also account for 70 percent of jobs in the specialised METS sector. The largest employer is the professional and technical services segment (73,000 jobs), followed by construction (58,000), technical equipment manufacturing (45,000), and contract mining and exploration (44,000).

Overall, the specialised METS sector has grown strongly, with an increase in GVA of 105 percent since 2005/06. However, at segment level four distinct groups have grown at different rates over the long term:

- Very high growth: professional and technical services, ICT services and other services, have grown most strongly since 2005/06 (total growth over that period ranging from 154-199 percent for these segments).
- High growth: construction (114 percent growth) and technical equipment manufacturing (112 percent) have seen lower but nonetheless very robust growth.
- Solid growth: contract mining (83 percent growth), wholesale trade (79 percent) and transport services (70 percent) have grown more slowly, but still seen solid growth over this period.
- Low growth: basic equipment manufacturing, has been the lowest growth segment, growing 30 percent since 2005/06, at a compound annual growth rate of c. 2.25 percent.

Figure 4 below shows the growth of each specialised METS sector segment since 2005/06.

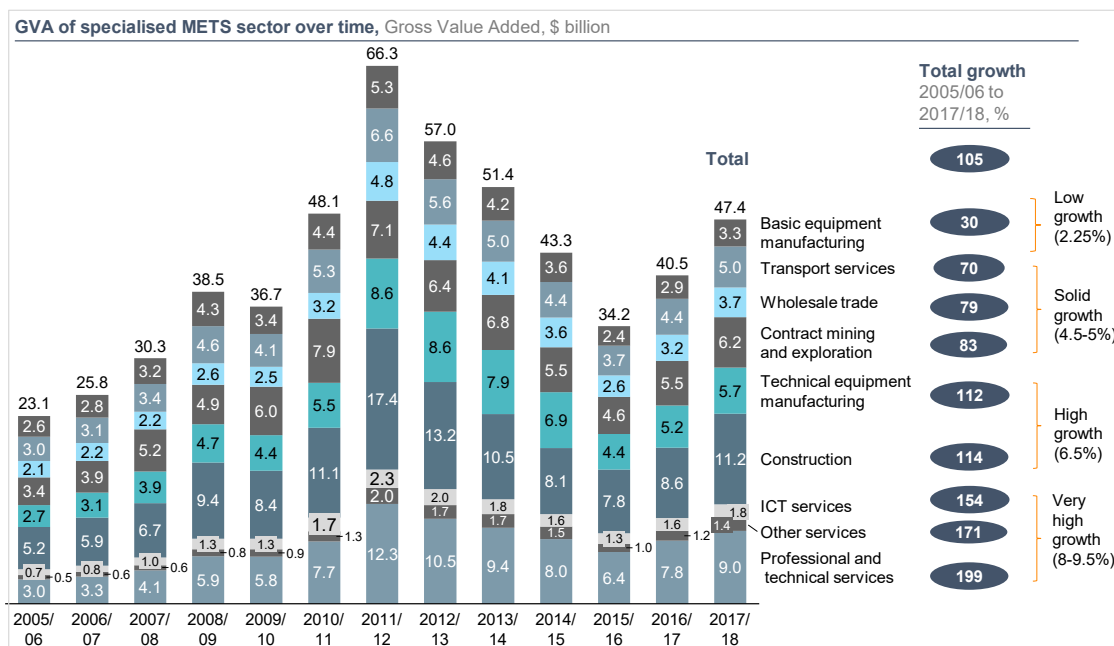


Figure 4 – While the sector has grown overall, at segment level 4 distinct groups have grown at different rates over the long term

Source: ABS, AlphaBeta analysis

As discussed in Section 2.2, the specialised METS sector has seen solid employment growth, adding about 120,000 jobs since 2005/06. However, the picture for employment growth is more mixed at segment level (Figure 5).

Employment growth over the long term has been strongest in other services and contract mining, followed by professional and technical services. Contract mining has seen employment growth significantly higher than its GVA growth. It is likely that these changes reflect a shift in the nature of activity occurring in this segment over time, from exploration focussed activity to more labour-intensive production-related contract mining activity. Professional and technical services has seen solid growth in employment (though it hasn't kept pace with GVA growth), and this segment continues to be the largest employer.

ICT services and technical equipment manufacturing have seen solid growth in employment – 77 percent and 78 percent respectively since 2005/06. Wholesale trade and transport services have both seen more modest employment growth over the period.

Employment in the construction segment in 2017/18 is estimated to be only 10 percent higher in 2017/18 than in 2005/06, despite a significant increase in GVA from the segment.

Finally, basic equipment manufacturing, the segment with the lowest growth in GVA, has delivered very limited employment growth over the period.

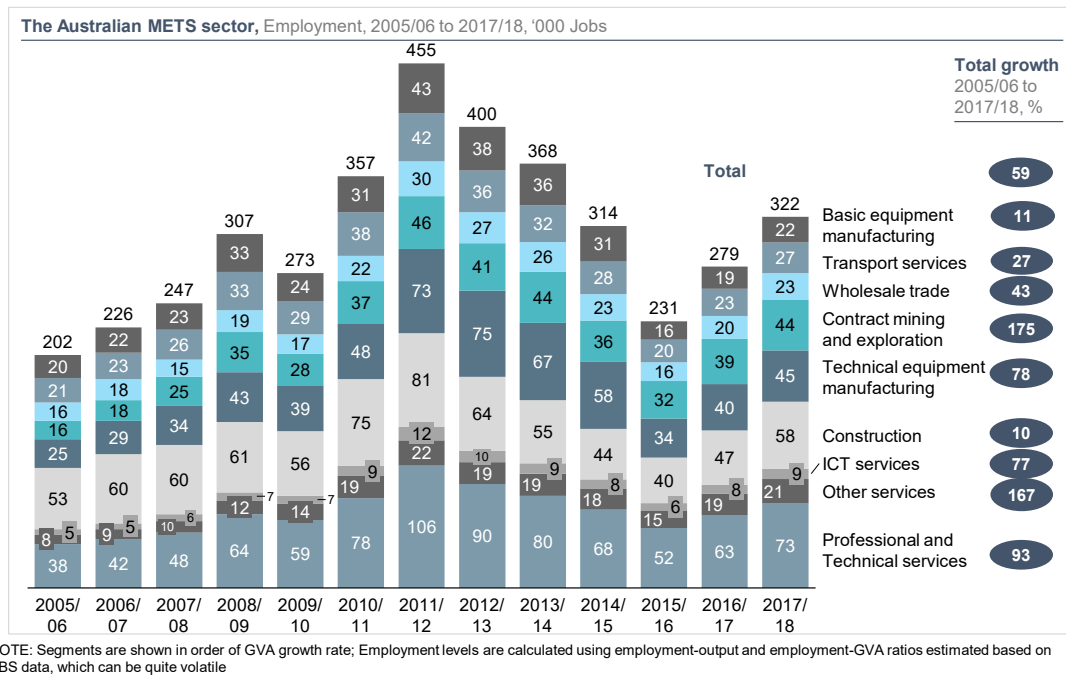


Figure 5 – The picture is more mixed for employment growth at segment level. Contract mining has outperformed relative to its GVA growth

Source: ABS, AlphaBeta analysis

3.2 METS firms use a range of direct and indirect supply chain pathways to access their customers

Products and services from the nine specialised METS segments reach miners via a mix of supply chain paths, as shown in Figure 6 below.

The contract mining segment, almost by definition, directly supplies all its services to mining customers.

The construction segment also predominantly supplies direct to mining customers. However, there is a small portion of the segment that is involved in indirect supply. Wholesale trade has a similar mix of direct and indirect supply to construction. The predominant customer for firms in the wholesale trade sector is typically a mining company. Transport services is also weighted towards direct supply.

Professional and technical services is even balanced between the direct and indirect supply components. ICT services is heavily weighted to indirect supply – ICT services companies in the METS sector are not simply serving mining customers; they are serving other METS firms right across the supply chain.

The manufacturing segments both have significant indirect supply components. For both segments, indirect supply generates more than 50 percent of the segment GVA. This is to be expected given that supply chains for manufactured goods generally tend to be longer than for services.

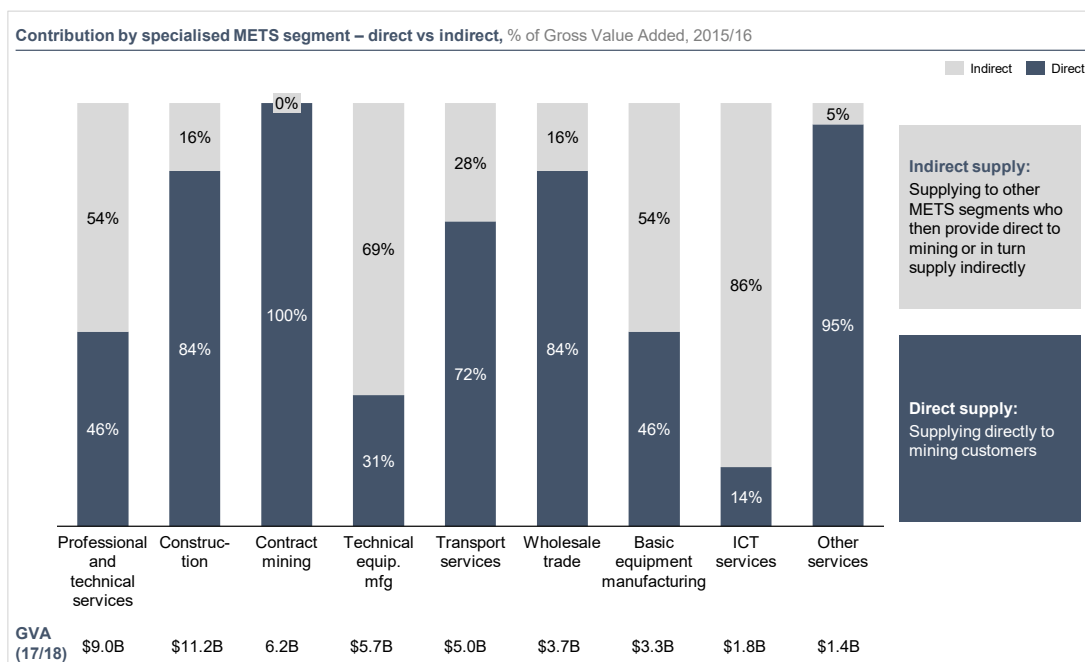


Figure 6 – Specialised METS segments differ in their mix of direct and indirect supply

Source: ABS, AlphaBeta analysis

Beyond the overall proportion of supply that is direct versus indirect, it is important to consider the different supply chain pathways operating within the specialised METS sector.

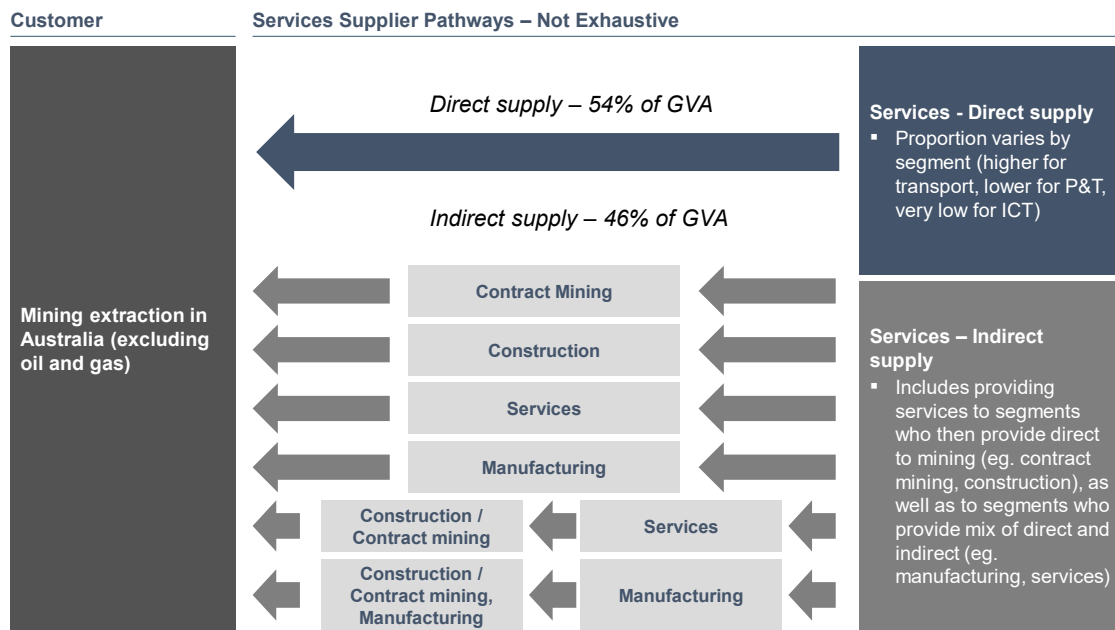
Figure 7 below outlines the most likely pathways for a collection of services segments (Professional and technical, transport, ICT, and other). As noted above, the mix of direct and indirect supply varies between these different segments, but considering them in total, direct supply to mining generates 54 percent of their GVA and indirect supply accounts for 46 percent of GVA.

There are a number of likely indirect supply chain pathways for these segments. One path is providing services to contract miners or construction services providers (who in turn supply miners). This is likely to be the most common indirect pathway for transport services firms, as well as a common pathway for professional and technical services providers.

Services providers may also supply to the technical or basic equipment manufacturing segments, or to other service segments, that in turn supply directly or indirectly themselves. These would be common indirect pathways for firms in professional and technical Services.

ICT services is likely to operate significantly through all these indirect pathways, reflecting the fact it supplies the whole spectrum of METS companies as well as mining customers, and the GVA generated by the sector is weighted heavily to indirect supply.

Australian specialised METS sector – Indicative supply pathways



NOTE: *Services includes Professional and Technical Services, Transport Services, ICT Services and Other Services

Figure 7 – Services segments use a range of different pathways to supply to the mining sector

Source: ABS, AlphaBeta analysis

3.3 The only significant METS imports to Australia are capital goods, such as specialised vehicles and equipment

Australian METS firms are not the only suppliers to the Australian mining sector; imported METS goods and services are also purchased directly by mining firms. Australian METS firms may also source goods and services from overseas that they need to produce finished goods and services, for example fasteners used in the production of technical equipment.

The contribution of imports to the supply of intermediate goods and services to Australian mining is low. It is estimated that these imports were worth around \$4.5 billion in 2015/16, the latest year for which data is available. Given total estimated revenue from intermediate goods in the specialised METS sector in 2015/16 was \$50B, this implies an import penetration ratio of around 9 percent. As shown in Figure 8, most of these imports are concentrated in the two equipment manufacturing segments, technical (\$3.1 billion) and basic (\$0.8 billion). The most significant source countries for imports by far are China and the USA, with smaller shares for Germany, Italy, UK, Japan and South Korea. This mix of countries is to be expected given the dominance of manufactured goods.

The Australian mining sector also imports capital goods and services, such as specialised vehicles and equipment for mine site processing. While there is less data available on capital imports, the import penetration ratio for capital is likely to be much higher than intermediate because none of the major global original equipment manufacturers (OEM) that dominate the supply of capital equipment are based in Australia. Analysis of a sample of relevant goods in the limited available import data shows an import

penetration ratio of around 35 percent, but the overall ratio is probably above 50 percent once other goods used for mining but not visible in the data are included.⁵

While some of these imports are directly competing for customers with goods and services produced by the Australian METS sector, some are complementary because Australian firms may not be producing, or be able to produce, comparable goods or services.

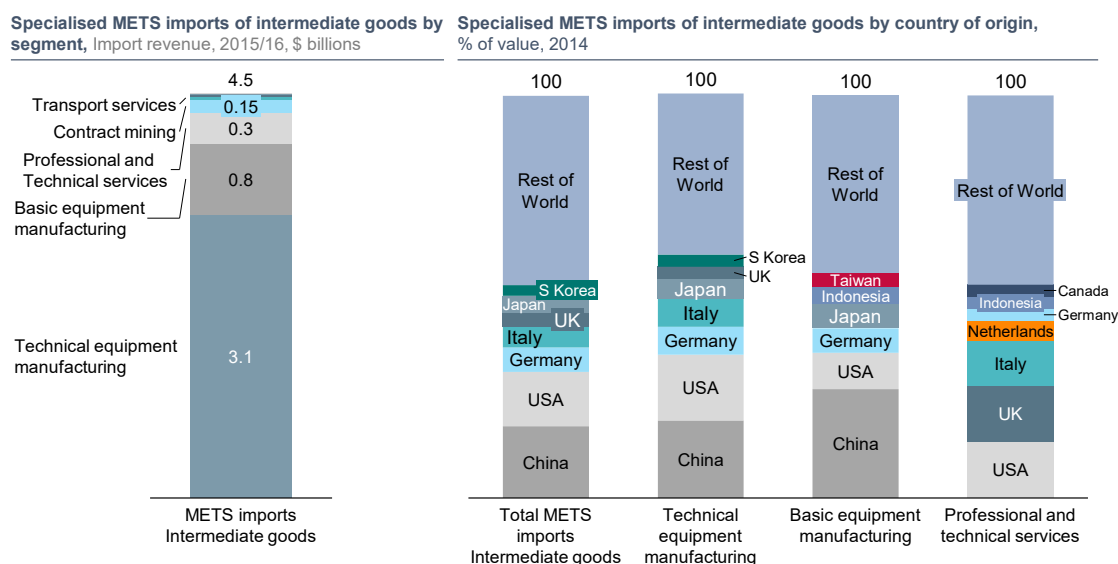


Figure 8 – Import penetration in specialised intermediate goods is low and concentrated in manufactured goods; China and US are the largest source countries

Source: ABS, Australian IO tables, World IO table

3.4 Mix of firm size and revenue concentration varies, with manufacturing and wholesale trade the most concentrated segments

As outlined earlier, it is estimated that only about 7 percent (6,700) of the businesses in the specialised METS sector generate revenue of \$2 million or greater. However, these businesses are responsible for nearly 70 percent of the total revenue of the specialised METS sector. Further, there is estimated to be a subset of approximately 1,550 firms generating more than \$10 million revenue annually.

Using ABS data to estimate the distribution of firms for each specialised METS segment suggests that there is a high level of revenue concentration in most segments, though there is also variation. Concentration of segment revenue appears to be greatest in basic and technical equipment manufacturing, wholesale trade, and contract mining. The distribution of firms and revenue concentration for each segment is shown in Figure 9 below.

A similar picture emerges for the estimated employment distribution within the different specialised METS segments. Again, concentration of segment employment appears highest for basic and technical equipment manufacturing, wholesale trade, and contract mining.

⁵ United Nations (2016), *Comtrade Database*. Available at: <https://comtrade.un.org/>

Estimated distribution of specialised METS firms by revenue by segment

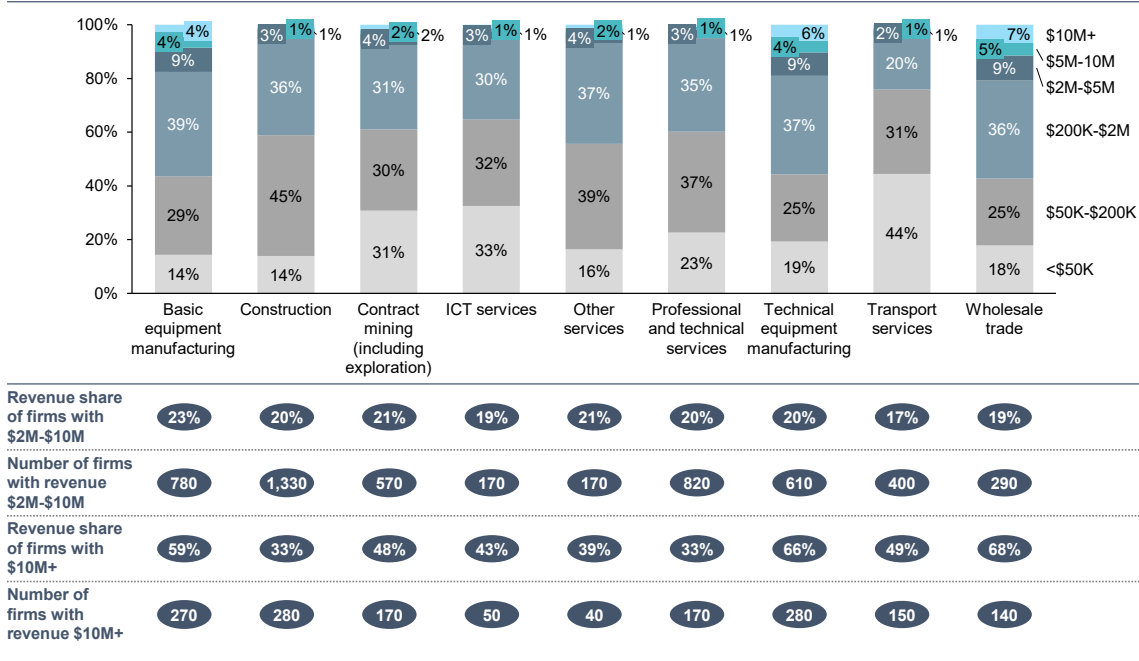


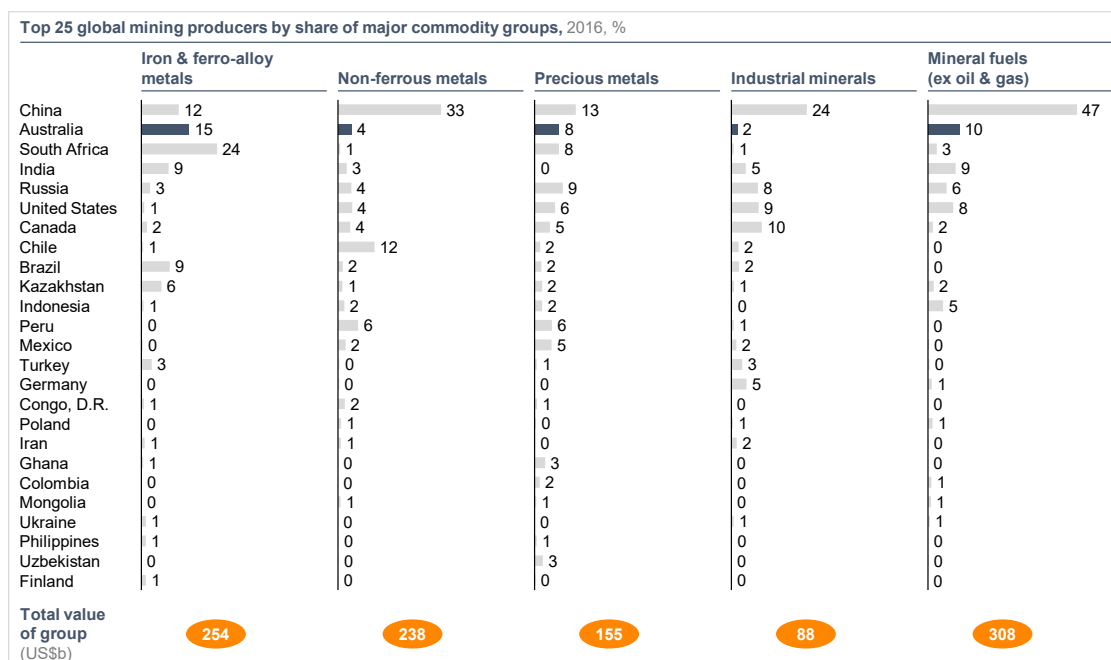
Figure 9 – Concentration varies by segment – basic and technical equipment manufacturing, wholesale trade are more weighted to large firms

Source: ABS 8165.0; AlphaBeta analysis.

Using the combined METS firm database, it is possible to map a large set of firms to specialised METS segments based on their capabilities and offerings. This shows that a significant portion of firms appear to play in multiple specialised segments. These firms may have a dominant or principal segment, but nonetheless play in multiple segments. This phenomenon appears to be related to the size of the METS firm. Typically, smaller METS firms were more weighted to participation in a single segment than the average firm (and it is reasonable to conclude this would hold for the large number of small firms not identified in the database). Larger firms had a greater weighting to participation in multiple segments.

4 METS sector exports

Australia’s strength as a major global mining producer in most of the major commodity groups positions our METS sector well for participation in global export markets. After China, Australia is the world’s second largest resources producer, with particularly strong positions in mineral fuels (excluding Oil and Gas), iron and ferro-alloy metals, and precious metals. Figure 10 below shows the key global producers by major commodity group.



NOTE: Excludes diamonds

Figure 10 – Australia’s strength as a mining producer in most of the major commodity groups positions our METS sector well for export

Source: World Mining Congresses & BM NT Austria; AlphaBeta analysis.

4.1 Australia’s exports from the specialised METS sector were worth \$13 billion in 2014

As with the domestic market, the export market for Australian METS segments is composed of both direct supply to foreign mining companies, and indirect supply to other foreign firms that then supply mining.

The export revenue from direct exports has been estimated based on the World Input-Output (IO) Table, which measures the value of direct exports from Australian companies of intermediate goods to the mining sectors of global export markets. The World IO Table is the only export data source that specifically categorises export sales by both the producing and purchasing sectors.

Indirect exports are not identifiable in the World IO Table data, so these were estimated by assuming the same ratio of direct versus indirect supply as exists in the Australian METS sector. The level of capital

exports was estimated by assuming the same ratio of capital to intermediate goods supply as evidenced in the Australian METS sector.

Based on this approach, the value of specialised METS exports is estimated to be \$13 billion in 2014 – consisting of \$4.3 billion in direct exports (comprising both intermediate and capital goods and services) and \$8.7 billion in indirect exports.⁶

This estimate is slightly above the estimate for export revenue in AlphaBeta’s 2017 work for METS Ignited, and slightly below the \$15 billion estimate developed by Austmine based on survey research in 2013. The 2017 estimate was developed based on the assumption that export intensity for METS sectors was in line with that of the sectors from which its firms are drawn.

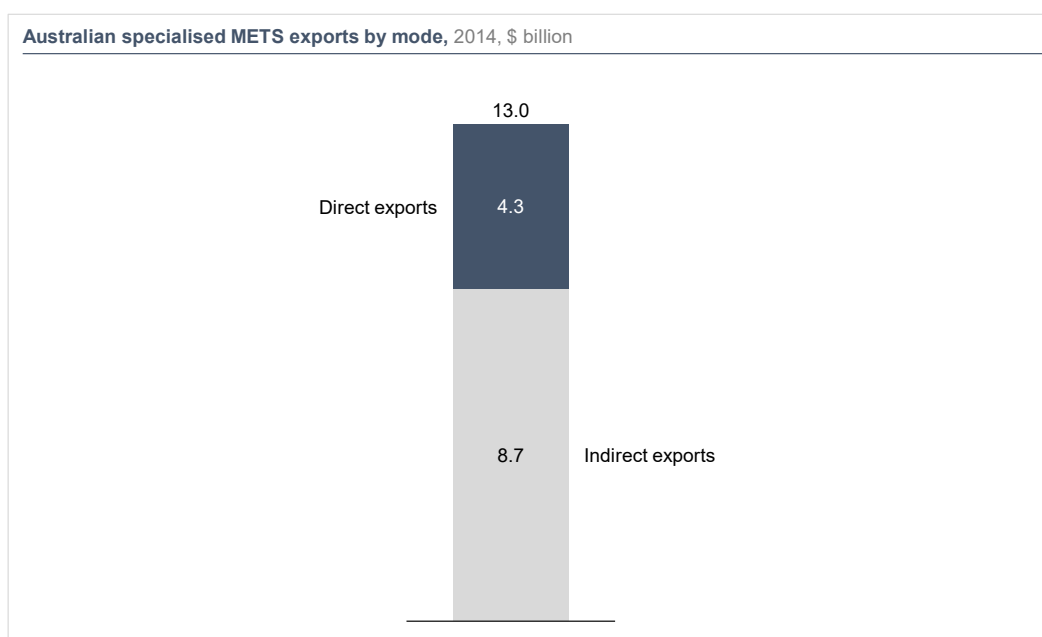


Figure 11 – Australia’s total specialised METS exports were estimated to be worth \$13b in 2014, with 67% being indirect exports

Source: World Input-Output tables; ABS 5209, Australian Input-Output tables; AlphaBeta analysis.

4.2 Two thirds of specialised METS segments are significant exporters and perform strongly in export intensity when compared their broader sectors

All but three METS segments achieve significant export revenues, reflecting Australia’s overall strength in the market. The largest of these is basic equipment manufacturing, with about \$5.8 billion in export revenues, of which more than two thirds (\$4 billion) is estimated to be from indirect supply.

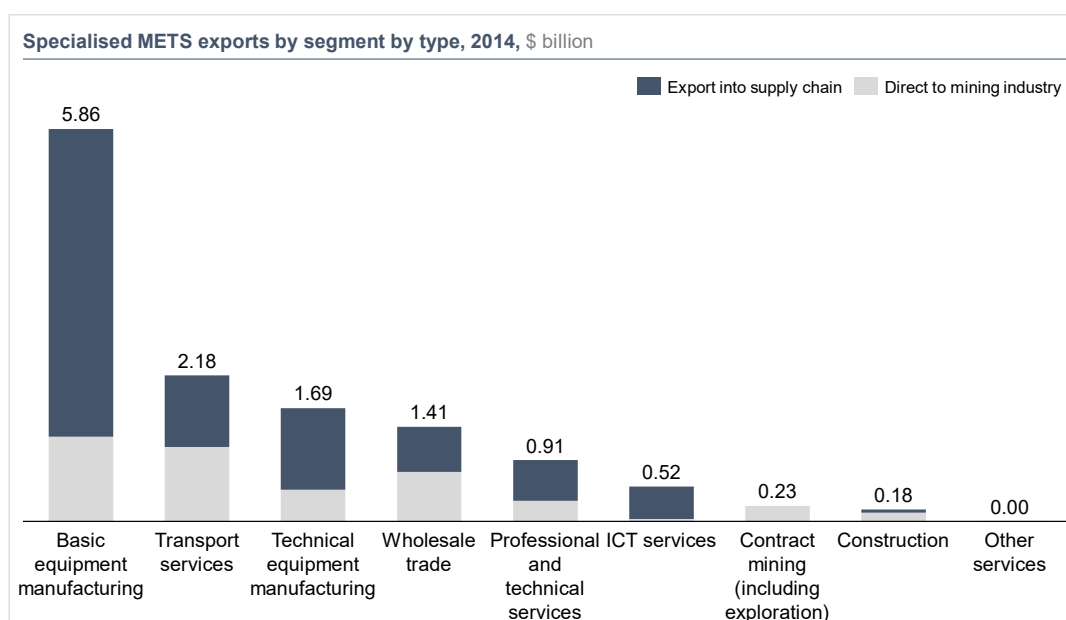
⁶ 2014 is the last published World IO table, and it is unclear whether further tables will be published. Available at: <http://www.wiod.org/home>

Transport services (\$2 billion), technical equipment manufacturing (\$1.7 billion), wholesale trade (\$1.4 billion), and professional and technical services (\$0.9 billion) are all estimated to have significant export revenue.

The ICT services segment is estimated to have export revenue of \$0.5 billion. While this is smaller than some other key segments, this is due to the overall size of the segment. ICT services actually has relatively high export intensity versus other segments.

Construction and contract mining have very low levels of exports, which is unsurprising given the difficulty of exporting these types of services. Australian construction and contracting mining firms may be undertaking work outside Australia through local subsidiaries, but this is not classified as exports.

The estimated value of exports by specialised METS segment, split between direct and indirect exports, is shown in Figure 12 below.



¹ Australian exports data was used to estimate data missing from World IO tables, including the value of contract mining exports and exports of capital goods. Share of indirect METS exports are currently estimated based on comparable Australian supply chains.

Figure 12 – The largest segments in export contribution were manufacturing, transport services and wholesale trade

Source: World Input-Output tables; ABS 5209, Australian Input-Output tables; AlphaBeta analysis.

It is also important to consider the export intensity of the different specialised METS segments. Export intensity is defined as the proportion of total segment revenue that comes from exports.

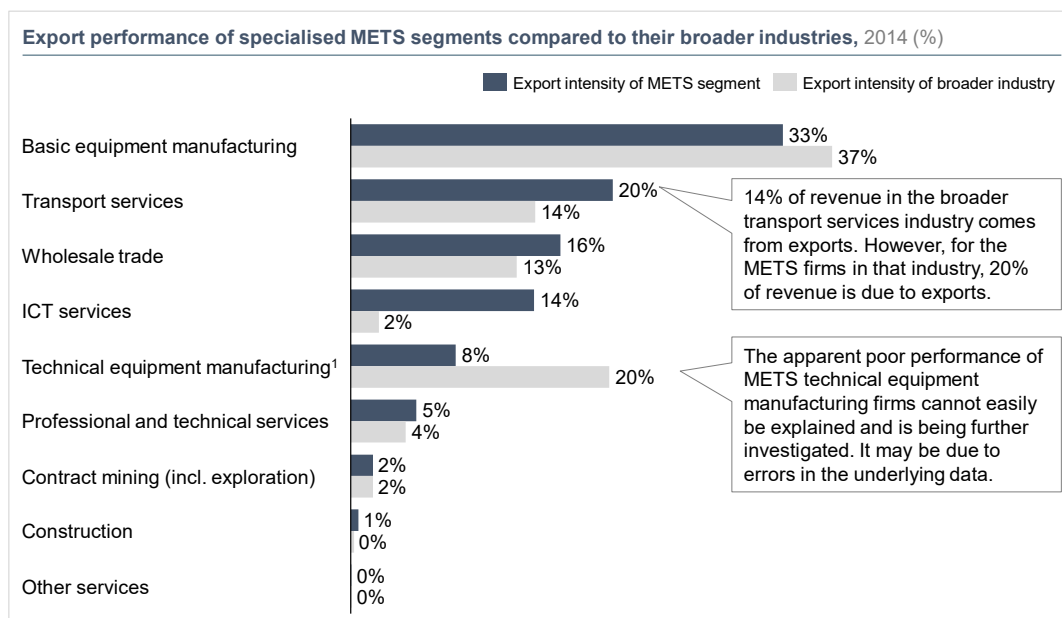
There are significant differences at segment level. Interestingly though, these largely mirror differences in export intensity apparent in the broader sectors from which these specialised METS segments are drawn. The export intensity for each segment and its sector are shown in Figure 13 below.

A number of segments appear to have an export intensity broadly in line with the firms in their broader sector – basic equipment manufacturing, wholesale trade, and professional and technical services.

Several METS segments appear to ‘over-perform’ in terms of relative export intensity compared to their broader sectors, namely transport services and most particularly ICT services.

The technical equipment manufacturing METS segment appears to have a lower export intensity than its broader sector peers. This is perhaps a surprising result, but may be due to the fact that domestic demand for METS manufactured goods is so much higher than for non-METS manufactured goods.

The construction segment has a very low export intensity, consistent with the broader construction sector.



NOTE: Export intensity is defined as export share of total revenue. Contract mining and exploration has been excluded because it does not sit within a broader industry, as that activity takes place only in the METS sector.

Figure 13 – METS firms in transport and ICT services overperform their industry segments, whilst technical equipment manufacturing underperforms

Source: World Input-Output tables; ABS 5209, Australian Input-Output tables; AlphaBeta analysis.

4.3 Australia’s specialised METS exports increased steadily between 2009 and 2014

The analysis of export performance also examined exports over time, using the World IO Table data and estimating exports using the approach described earlier in this section.

Exports are estimated to have grown from \$10B in 2008 to \$13B in 2014, total growth over that period of 26 percent. Exports fell in 2009 as the post GFC environment saw a significant contraction in global trade, but then rose strongly over the next 5 years to 2014.

The World Input Output Table dataset ends at 2014, and CommTrade and ABS data do not provide sufficient visibility to make robust estimates for the period post 2014. However, an estimate of the trend in Australian specialised METS exports post 2014 can be developed by using BLADE with the combined database of METS companies developed as part of this project.

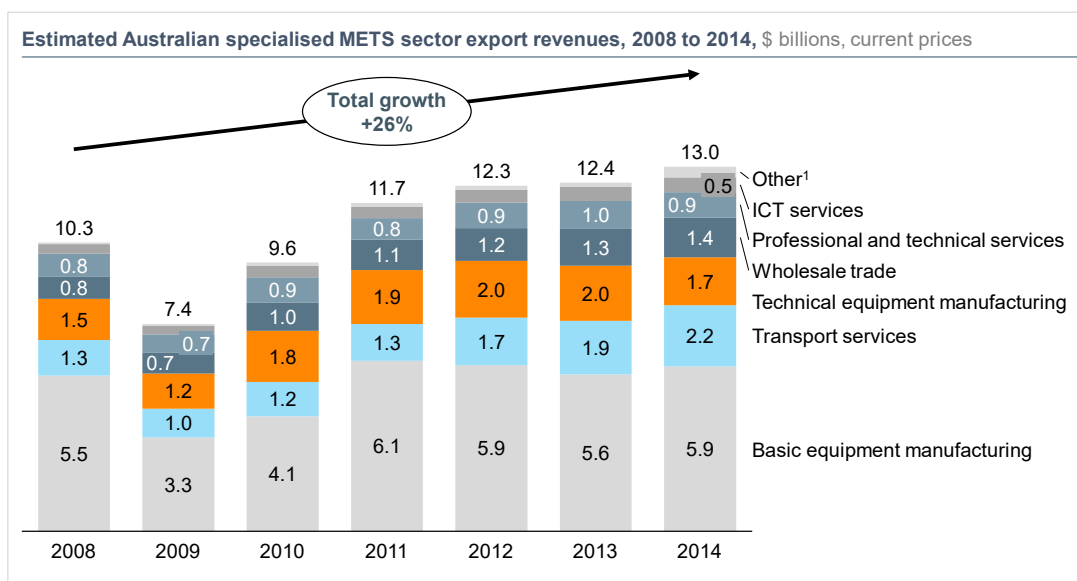


Figure 14 – Exports from the specialised METS sector grew significantly in the first half of the decade, after a contraction following the GFC

Source: World Input-Output tables; ABS 5209, Australian Input-Output tables; AlphaBeta analysis.

4.4 Australia’s METS exports reach a wide range of destinations, but are under-penetrated in some of the largest markets

There are a variety of data sources that can be considered in developing an assessment of the relative importance of different markets as destinations for specialised METS exports. There is no one definitive source, and all of the key sources have various limitations. Accordingly, the appropriate approach is to bring to bear multiple data sources in developing perspectives. The key data sources considered for this project include ABS trade data, Comtrade data on Australia’s exports, the World Input-Output Tables, and the Bremer database developed for the Department of Industry, Innovation and Science.⁷

ABS trade data covers both goods and services exports, and provides the value of exports by destination country. However, the data is aggregated to total exports by country, so product/service detail is not visible.

Comtrade data provides exports by export country, and by product category. However, Comtrade data only provides detail for goods not services, and the categorisation of goods does not readily align with METS categories.

The World Input-Output Tables (World IO) dataset provides visibility of exports to the mining sector for 42 individual countries plus ‘Rest of World’. The 42 countries are 28 EU countries plus 14 large economies. This set of countries visible in the World IO represent 70 percent of global mining output (excluding Australian output), with ‘Rest of World’ representing 30 percent. The key gaps in terms of representation in the set of visible countries are Africa, parts of South America, and parts of Central Asia and South East Asia.

⁷ Comtrade is the United Nation’s International Trade Statistics Database. Available here: <https://comtrade.un.org/>

However, in terms of the world’s largest mining producers, the gaps are more limited. Of the top 10 countries by mining output globally, the only countries not visible in the World IO data are South Africa and Kazakhstan. While the countries visible in World IO represent 70 percent of global production, the data suggests they only represent 33 percent of Australia’s METS exports. However, given industry perspectives on Australia’s under-penetration in some key markets (China, India, Russia) and success in markets not visible in the data (Africa, South East Asia and parts of South America) this distribution seems plausible.

The Bremer database contains more than 400 firms identified as exporters. For the majority of these the database also has information about the export markets in which the firm participates. However, the database only identifies export market participation, not the value of exports to each market.

Figure 15, below, outlines the top 10 global mining producers (excluding Australia), the available export data metrics from the sources considered, and a summary perspective of Australia’s performance in that market based on all the available data. The colour coding indicates the degree of consensus amongst the various sources.

Assessment of Australian METS exports to major global mining producers

Country	Global Mining Output Rank	% of Global Mining Output (ex Australia)	Measures of relative size for Australian METS exports			Summary perspective
			World IO Share of METS exports (%) ¹	Bremer % Exporters Serving the Market (Rank & %) ²	Comtrade Share of relevant exports (Rank & %) ³	
China	#1	31%	18%	6 th (18%)	5 th (5%)	Data sources suggest China is significantly under-penetrated vs. its output position (consistent with industry perspectives), yet still a sizeable export market. However, there is difference over its actual size / rank in Australia's exports – World IO suggests #1
South Africa	#3	8.8%	n/a	4 th (24%)	5 th (3.5%)	Not visible in World IO, but Bremer suggests it is a significant METS market, similar to its global production rank. CommTrade appears to support this. ABS trade data suggests sizeable total exports (\$1.2B) similar to Canada (\$1.6B). Given the importance of mining to SA economy this is consistent with significant mining exports
India	#4	6.3%	0.5%	11 th (12%)	13 th (1.8%)	Data sources suggest India is under-penetrated. This is consistent with industry (eg. Austmine, METS Ignited) views that India has been a more difficult market
Russia	#5	6.0%	0.3%	19 th (7%)	29 th (0.7%)	Datasets suggest Russia is under-penetrated vs. output share, and more so than India
USA	#6	5.8%	4.4%	1 st (33%)	1 st (13%)	Datasets suggest USA is well penetrated vs. output share and is one of Australia's largest METS export markets
Canada	#7	3.7%	1.5%	5 th (21%)	9 th (2.5%)	Reasonable variation across datasets - World IO suggests Canada is under-penetrated, Bremer ranking is in line with its global output, CommTrade data supports a middle position. Overall though, Canada appears a key market, consistent with industry views
Chile	#8	3.5%	n/a (data issues)	6 th (18%)	25 th (1%)	No common conclusion from the data. World IO suggests Chile is under-penetrated, Bremer suggests ranking in line with its global output, CommTrade data suggests Chile is under-penetrated. However, ABS trade data suggests the possibility of significant METS exports, though likely less than for Canada or South Africa
Brazil	#9	3.4%	0.6%	13 th (10%)	30 th (0.7%)	Data sources suggest Brazil is under-penetrated vs. its output share. This is also consistent with industry (eg. Austmine, METS Ignited) perspectives that Brazil has been a more difficult market
Kazakhstan	#10	3.1%	n/a	c. 30 th (3%)	59 th (0.1%)	Data suggests very low METS exports to Kazakhstan. Kazakhstan is not visible in World IO, but Bremer suggests it is under-penetrated relative to its global output, CommTrade and ABS trade data suggests very little total exports from Australian
Indonesia	#11	2.7%	1.3%	2 nd (33%)	4 th (7%)	No common conclusion - World IO suggests Indonesia is under-penetrated, Bremer ranking is much higher than Indonesia's share of output – suggesting Indonesia is one of Australia's biggest markets. CommTrade also supports this latter position

Note: ¹World IO Table allows estimation of the share of METS exports for 42 countries; ²Bremer database enables estimation of the relative prevalence of markets as export destinations - specifically, the percent of identified exporters who export to a market; ³Share of exports estimated from CommTrade focuses on a selection of goods codes that most directly align to METS

Figure 15 – Available data sources provide a consistent picture for around half of the major METS markets

Source: World Mining Congresses & BM NT Austria, Bremer, World IO Table, Comtrade, ABS, AlphaBeta analysis

A clear theme that emerges from the picture in Figure 15 is that Australia’s specialised METS sector exports are underweight to a number of the largest global resources producers, and conversely are well penetrated into the large set of smaller resource markets countries outside the top 10 producers.

In terms of specific export markets, the strength of the conclusions that can be drawn varies.

The Australian specialised METS sectors does appear to be under-penetrated in export performance in three of the world’s largest mining producers – namely China, India and Russia. However, the World IO

dataset does suggest that China – which represents 31 percent of global mining output excluding Australia – is still the biggest market for Australian METS exports. This conclusion is not supported by other data sources. In addition, Brazil and Kazakhstan also appear under-penetrated relative to their share of global mining output.

Australian METS companies appear to have developed a strong position exporting to the US, with solid penetration compared to the US's share of global mining output. The US emerges as one of the Australian METS sector's largest exports markets.

South Africa is not visible in the World IO data, but other data sources suggest it is well penetrated by and a key market for Australian METS firms.

Canada also appears to be an important market for Australian METS exports, consistent with industry views, though data on its relative prominence and level of penetration is mixed.

Australia's METS sector appears to have developed a solid export position in our region. As Figure 15 suggests, Australia is well penetrated in Indonesia. In addition, data from the Bremer database suggests that the sector has also developed significant positions in Papua New Guinea and second tier South East Asian mining markets including the Philippines and Vietnam.

The picture of export performance is perhaps least clear for Chile. Industry perspectives are that Chile is an important market for Australia's METS sector, and the Bremer database supports this view. However, Comtrade data suggest a much lower level of exports to Chile and World IO data appears to be unreliable.

Overall, a majority of Australia's specialised METS exports appear to be to destination markets outside the top 10 global mining producers. Indeed, there is a long tail of destination markets for Australia's METS exports. World IO analysis identifies more than 30 countries with more than \$1m in exports, and that dataset excludes Africa, large parts of South America, and parts of Central and South East Asia. Analysis of the Bremer database suggests exports to more than 85 countries. Notably this includes more than 15 countries in Africa, not visible in the World IO data.

5 Key success factors for METS firms

Understanding and sharing information on what has driven the success of successful Australian METS firms can both help other firms develop their strategies, and aid policy makers to design more successful interventions to support sector development.

AlphaBeta undertook a series of structured discussions with expert industry participants to develop perspectives on the key success factors and drivers of success for companies in the Australian specialised METS sector. In total AlphaBeta conducted 15 interviews, with a mix of participants across miners, METS businesses, and research institutions.

The discussions provided perspectives across all specialised METS segments, though coverage was most comprehensive for the Technical Equipment Manufacturing and Professional and Technical Services segments. These discussions addressed a range of topics including the key success factors for the METS sector and different METS segments, specific challenges facing small businesses, and enablers of export success.

5.1 There is a high degree of commonality in the factors driving success across the different METS segments, with skill and expertise of key people most critical

Several key success factors emerged from expert consultations as common to successful firms across different METS segments. Specifically:

- **Skill and expertise of key people** was the most commonly cited driver of success
- **Innovation** and creating **unique IP** are central to success in most METS segments
- Successful METS firms are **solutions-focused** rather than product-focused firms, aligning products and services with customers' actual problems
- To navigate the mining industry's cycles, successful METS firms either create a **highly specialised product** which will always be in demand, or **serve customers beyond the mining industry**, to ensure resilience in downturns

In addition to these overall themes, discussions highlighted specific factors that are important to success for large firms and small METS firms respectively.

Large firms draw success from **leveraging their scale**, including their size, reputation, and participation in multiple sectors and geographies. They can deliver the largest projects, support customers globally, and are perceived as offering **stability and security**.

Small METS firms have specific drivers of success, and also face specific challenges. Key themes surfaced included:

- **Responsiveness, flexibility, and adaptability to the customer** is a key advantage and driver of success for small METS firms, often the reason a customer will choose a small firm over a large one

While a clear set of drivers emerge as keys to success across most segments, the relative importance of these drivers to individual firms' success varies. Discussions with industry experts identified a range of different pathways to success in the METS sector, illustrated by a number of successful Australian METS firms. A selection of successful firms, illustrating different pathways to success, are outlined in Appendix C.

5.2 Navigating procurement processes is a major barrier to success, especially for smaller METS firms

Figure 16 also highlights that a firm's ability to navigate complex procurement processes is an important factor in success. Industry experts noted that one of the key challenges facing METS firms as they seek to expand, and a key factor in their success, is the ability of those firms to navigate the complex procurement processes that operate in the sector, particularly for the larger, global miners. Smaller, newer firms face a range of challenges throughout the end-to-end procurement process, from awareness and access to procurement processes, through difficulties in the qualification and application stage, and challenges in the decision-making process. The key issues facing smaller firms at each stage of the procurement process are outlined in Figure 17, below.

Navigating the procurement processes of big mining companies is a significant challenge for many smaller Australian METS firms

Challenges experienced by smaller METS firms in mining procurement processes			
Awareness and Access	Qualification	Application	Decision
<p>Awareness: Smaller firms are often not 'on the radar' for large miners. In addition, smaller, newer firms lack the connections to be aware of key procurement opportunities in a timely fashion</p>	<p>Many hurdles to jump: Smaller suppliers face a number of hurdles, such as being an approved vendor, being accredited, having adequate insurance. It is often easier for small firms to sell their product to a larger company who ticks all the boxes to sell for them, or to partner with a large 'pre-qualified' player</p>	<p>Lack of scale: Large, global miners want fewer, larger suppliers/contracts, and suppliers who can meet global needs</p>	
	<p>Size forces subcontracting: Small firms often lack the scale to qualify for direct supply. For example, construction firms may need to subcontract into larger 'turnkey' players. However, this model can be a perpetuating constraint, especially as these larger firms often treat everything as their IP</p>		<p>Perceived risk: A small or new supplier may be perceived as risky – if a miner adjusts their processes to include a new product and then the firm fails, the miner incurs wasted effort and costly remediation</p>
<p>Limited opportunities to enter: Due to mining cycles and investment patterns, there are only three key opportunities for miners to invest in new technology: when developing a new plant, maintenance, and rebuilding. This heightens the criticality of awareness for small companies and limits opportunities for new companies to 'break out'</p>	<p>Restricted to small part of the project: Mid-size firms supplying directly to miners are often restricted to tendering for small 'commodity' pieces of a project, with no opportunity to bid for larger, more sophisticated project pieces. Firms voice frustration that they could think of better approaches, but can't raise these through the procurement process as they risk being a non-compliant bid</p>	<p>Sharing IP: Working with smaller innovators, large mining companies often want to license the resulting product and use it widely. Firms that are too protective of IP may not succeed.</p>	
	<p>Expensive to navigate: Large mining companies often require suppliers to have substantial insurance and legal support, incur other significant costs, have long decision-making processes, and long payment terms</p>		
<p>Confusing decision-making process: Lines of communication and decision-making within large mining companies can be complicated – there is often a distinction between sites, regional office, head office etc. Smaller firms can have difficulty accessing the right level of decision maker, and lack the resources to navigate a complex process effectively</p>			

Figure 17 – Navigating the procurement processes of big mining companies is a significant challenge for many smaller Australian METS firms

Source: Expert interviews; AlphaBeta analysis

6 Areas for further research

This project has also highlighted several areas where further investigation could provide valuable insight to inform decisions for policy makers in the sector.

Sources of growth: Further investigation of the sources of growth within the sector and within segments. There is potential to use BLADE to identify the proportion of growth coming from different sizes of firms, in order to identify which types of firms are the growth engines for the sector and tailor policies and interventions in response.

Supply chain pathways: Refinement of the understanding of supply chain paths for firms in different METS segments, focusing on quantifying the most important major indirect pathways in each case (direct vs. total indirect is already estimated as part of this report). An understanding of these indirect pathways would assist policy makers in designing programs that support firms to access supply chains.

Adoption of technology: Investigation of the adoption of new technologies by METS firms and segments, in particular Industry 4.0. Data in BLADE from the ABS's Business Use of IT survey could improve understanding in this area, and support the development of policies to stimulate innovation in the sector.

Export performance / commodity capability: Further refine understanding of export intensity and key destinations by METS segment, and build on perspectives on export market performance by developing a view of Australia's METS sector's export performance and key markets by commodity group. BLADE could be used to refine estimates of the export intensity of different METS segments. Given the limitations of public data sources on export destinations, the most appropriate tool is likely to be a detailed survey across a broad range of METS segment participants. To develop additional insight beyond that from prior survey work, it would be imperative to ensure appropriate coverage across all specialised METS segments. Questions should not only focus on the level of exports and key markets for different participants, but also address the mix of channels / customers for participants (eg. direct to mining companies, selling to contract miners or construction companies supplying to miners, or selling to OEMs in the case of an equipment manufacturer).

Appendix A – Methodology for measuring sector and segment performance

1. Estimating the Gross Value Added (GVA) of METS sector

To compute the GVA of the METS sector we consider three contributing components: GVA generated through the sale of intermediate goods, through the supply of capital goods to the mining sector, and through exports of goods for use in overseas mining activities. Note that mining here includes extraction of metals and minerals but excludes oil & gas extraction. In condensed form:

$$GVA_{METS} = GVA_{Intermediate} + GVA_{Capital} + GVA_{Exports}$$

We consider activity along the entirety of the supply chain, not just the final supplier that sells the goods directly to the mining sector. That is, to create a unit of mining output requires a certain level of inputs from a range of other sectors, which in turn require a certain level of inputs from other sectors to generate, and so forth.

These relationships between industries in the economy can be quantified using the ABS's Input-Output tables (tables 5 and 8 of 5209.0.55.001 – Australian National Accounts: Input-Output Tables). In the Input-Output tables, the Australian economy is partitioned into 114 industries, with a matrix showing the value of intermediate goods sold from each industry to each other industry. For each industry, the Input-Output tables also include the output of final goods, the output of exports and the total value added. For a full treatment of how the Input-Output tables can be used to quantify relationships between industries in this way, see Raynor and Bishop.⁸

The total METS GVA in a given year is the sum of the three components described above for each of the 114 industries in the Input-Output tables.

Intermediate Goods

The Input-Output tables contain the direct sale of intermediate goods to the mining industry from other industries. Performing the full supply chain analysis described above we determine where the GVA *due to the sale of intermediate goods to mining* is generated in the Australian economy, and the amount generated per unit of mining output. This table is referred to as a value-added total requirements matrix, which is then applied to the level of mining output in a given year.

For years without a published Input-Output table we use the ratios from the most recent year for which an Input-Output table has been published (assuming the overall structure of the economy is the relatively unchanged). We also need to estimate the output of the mining sector in these years. To do this we assume the relationship between output and GVA in mining (obtainable from the most recent Input-Output release) is consistent, and use either 8415.0 – Mining Operations or Table 45 of 5206.0 – Australian National Accounts to obtain the GVA. Historically there are differences between the GVA reported in these sources and the GVA reported in the Input-Output tables. . To account for these differences in our new estimates

⁸ Rayner, Vanessa. & Bishop, James. & Reserve Bank of Australia, issuing body. (2013). *Industry dimensions of the resource boom: an input-output analysis*. Sydney: Economic Research Department, Reserve Bank of Australia, <http://www.rba.gov.au/publications/rdp/2013/pdf/rdp2013-02.pdf>

we look at the historic ratios between these sources and the Input-Output numbers, compute the average and adjust our estimates for the additional years accordingly. Further, table 45 has a single value for mineral mining and oil & gas combined. We therefore also remove the historic proportion of all mining that is oil & gas.

Capital goods

Determining the GVA due to supplying mining with capital goods is a two-step process. The first step is to determine the value of capital goods that each industry sells to mining. The second is to use the value-added total requirements matrix to determine the GVA associated with the intermediate goods required to construct that capital good.

Our primary source for mining’s expenditure on capital investment is 8415.0 – Mining Operations, which splits the capital expenditure of the mining sector into five categories: Construction, PME (Plant, Machinery and Equipment), R&D (Research and Development), Mineral and petroleum exploration and Computer Software. It also splits out the oil & gas sector from the rest of mining.

In years without a Mining Operations release we use a multistep process to develop the relevant estimates. First, we use Table 64 of 5204.0 – Australian System of National Accounts to get the gross capital formation for the whole mining and oil & gas sector combined, split into Construction, PME, R&D, Exploration, Computer software (but without oil & gas split out separately).

Second, we use Table 2A of 5625.0 - Private New Capital Expenditure and Expected Expenditure to remove the component of capital investment attributable to the oil & gas sector. This table only accounts for a subset of the gross capital formation but provides the best proxy for the oil & gas share of investment. This dataset does not split into the four categories of Table 64, so we apply the share uniformly.

The most recent release of Table 64 of 5204.0 is for 2016/17, so for 2017/18 we use Table 2A of 5625.0 to proxy the change in capital formation from 2016/17 to 2017/18 and apply this growth to the 2016/17 number in Table 64, maintaining the same relative shares of Construction, PME, R&D and Computer software as 2016/17.

We then assume that a fixed percentage of each investment category is imported (20% for Construction/Exploration and 50% for PME/R&D/Computer Software), and then the domestic supply is allocated to supplying industries as follows:

Investment Category	Construction	Plant, Machinery & Equipment	R&D	Mineral & petroleum exploration`	Computer Software
Assumed Supplying Industry	Heavy Civil Engineering Construction	76% Specialised and Other Machinery 8% Retail Trade 8% Wholesale Trade 8% Transportation	Within Mining	Exploration and Mining Support Services	Within Mining

The value added total requirements matrix is then applied to these industries to estimate the GVA associated with the supply of intermediate goods to produce the capital goods that are sold to mining.

Exports

While the Australian Input-Output tables show the value of each industry's total exports, they do not show the destination country or industry for those exports. To estimate METS exports, we therefore assume that the METS share of a given industry's total exports is the same as the METS share of that industry's total output. In years without a published IO table we assume the export intensity is the same as the most recent year with a table.

2. Estimating the GVA of specialised METS segments

To estimate the GVA of the specialised part of the METS sector and its segments, each of the 114 industries represented in the Input-Output tables is categorised as either specialised or non-specialised. The basis of this allocation is described in Appendix B. For the specialised part of the METS sector, we also identified nine distinct segments based on product or service type. These segments are each composed of one or more of the 114 industries in the Input-Output Tables, which enables us to estimate GVA at the segment level.

3. Estimating employment of METS sector and segments

Releases of the Input-Output tables prior to 2014/15 contain employment numbers for each industry. In this case we assume that the Employment/GVA ratio for the METS part of the industry is consistent with the broader industry and thus allocate the same proportion of the total employment from each industry to METS and the relevant specialised METS segment as the proportion of its GVA. For the years without employment numbers up until 2014/15, we assume that the Employment/GVA ratio for each industry was the same as calculated from the most recent Input-Output table with employment data. To get the updated estimates of employment we multiply by the updated GVA of each industry.

For the following years, we use table 6 of the 2015/16 release of 6291.0.55.001 - Labour Force to obtain employment by ANZSIC industry sub-division (attributing part time employees as 0.5 of an employee), which is then mapped to the specialised METS industries in the Input-Output tables. This enables us to update the Employment/GVA ratio and the new ratio is then applied to the GVA for years starting from 2015/16.

Appendix B – Classification of METS sub-industries

Classification of METS sub-industries as specialised

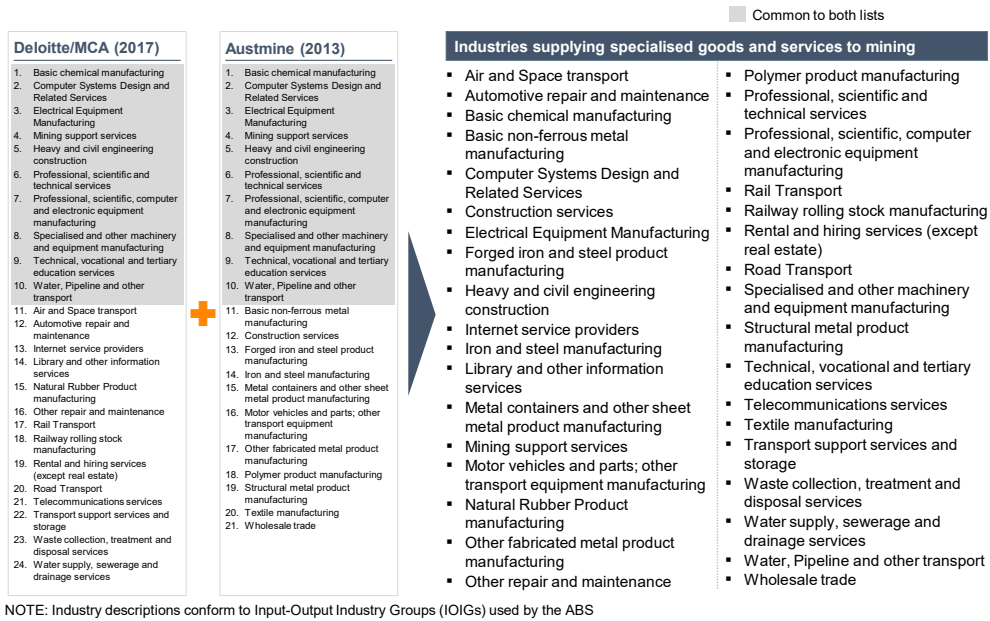


Figure 18 – Classification of METS sub-industries as specialised

Source: Austmine; Deloitte; MCA

Appendix C – Example success stories

1. Nivek Industries



Segment: Technical equipment manufacturing

Pathways to success: Unique IP and innovation; Highly specialised product

Nivek Industries is a NSW manufacturing and fabrication company that created the Tracked Elevating Device (TED), a remote-controlled belly plate jack (a field maintenance tool) that has improved safety and reduced physical stress for maintenance staff in mining and earthmoving. TED was developed by Kevin Cant after his own experience of narrowly escaping serious injury. TED is now exported to international markets including the USA and Canada.

2. Elphinstone



Segment: Technical equipment manufacturing

Pathways to success: Unique IP and innovation; People: skills and expertise; Responsiveness / agility

Elphinstone was identified by multiple experts as a highly successful Australian METS firm that creates robust and innovative products. Elphinstone designs, manufactures and supplies heavy equipment to mining, including underground dump and ejector trucks, and is a Caterpillar (CAT) Original Equipment Manufacturer, now owned by CAT. Based in Tasmania, Elphinstone was particularly cited for its ability to provide support to sites far from capital cities, which is especially important in mining.

3. Austin Engineering



Segment: Technical equipment manufacturing; Professional and technical services

Pathways to success: People: skills and expertise; Responsiveness / agility

Austin Engineering is a medium/large Perth-based METS firm that designs and manufactures customised dump truck bodies, buckets and ancillary products used by the mining industry, and provides on and off-site maintenance. Experts note that the firm has an excellent understanding of the mining business and strong relationships with mining companies, and operations all over the world.

4. Daracon Group



Segment: Construction

Pathways to success: Responsiveness / agility

Daracon is a NSW-based METS firm that specialises in civil construction, including mining infrastructure, site remediation, and earthmoving equipment hire. Experts attributed its success to being highly responsive to the customer, giving Daracon an edge over larger firms that may be slower to act on requests from customers.

5. Polymathian



Segment: Professional and technical services

Pathways to success: People: skills and expertise; Solutions not products; Connect with customer workforce

Brisbane-based firm that applies advanced mathematics to industry, including designing, building and supporting bespoke mathematical optimisation tools for the mining industry. Industry experts cited their high quality product, strong understanding of mining and ability to work and communicate effectively with operations staff within the mining sector.

6. Manta controls



Segment: ICT services; Professional and technical services

Pathways to success: Collaborate effectively with customer; Highly specialised product; Solutions not products

Works in advanced process control, automation and plant optimisation for the mining industry. Manta Controls is based in South Australia but operates across Australia and in Canada and Africa. Experts attribute its success to effective collaboration with mining customers and other METS firms. For example, Manta Controls provides solutions to Rockwell Automation, linking sensors to Rockwell's existing operating system.

7. GlassTerra



Segment: ICT services

Pathways to success: Unique IP and innovation; Collaborate effectively with customer

Provides digital terrain modelling software and data storage services. The platform is built specifically for the mining sector and is customised to relevant data sources, users, and data formats. Glass Terra was identified by experts as a leader in collaboration and combining with other products – it has created an open source product that sits on top of General Electric’s platform.

8. Russell Mineral Equipment



Segment: Technical equipment manufacturing

Pathways to success: Solutions not product; People: skills and expertise; Unique IP and innovation; Collaborate effectively with customer

Russell Mineral Equipment designs, manufactures and supplies mineral grinding machines and associated technology. Based in Toowoomba, the firm has grown rapidly over the last 30 years and now exports to over 56 countries. Experts attribute its success to a founder with a strong understanding of the challenges of the mining industry, who created solutions to improve safety and speed, as well as a focus on innovation, rather than an overly protective approach to IP.

9. Lewis Australia



Segment: Professional and technical services

Pathways to success: People: skills and expertise; Connect with customer workforce; Highly specialised product

Victorian engineering services firm specialising in automation solutions, providing engineering design, feasibility studies, manufacturing and tailored commissioning to the mining industry. Industry experts attribute Lewis Australia’s success to highly skilled people, a specialised offering, and an ability to connect well with operations teams in the mining sector.

10. Maptek



Segment: Professional and technical services; ICT services

Pathways to success: Solutions not products; Collaborate effectively with customer; Unique IP and innovation; Responsiveness / agility

Maptek provides innovative software, hardware and services to the mining industry, exports widely, and was mentioned by multiple industry experts as an impressive firm. Maptek was cited as a skilled collaborator, highly responsive and able to align their products to the customer's needs. Experts also name Maptek as a leader in innovation, collaborating with mining companies in the product development and testing phase to create a fast innovation cycle where both parties benefit.

11. Vix Resources



Segment: ICT services

Pathways to success: Unique IP and innovation; Collaborate effectively with customer; Responsiveness/agility; Highly specialised product

Systems integrator specialising in FIFO logistics, offering progressive software and technologies that assist mining companies with large workforces to access data and find opportunities to increase efficiencies and reduce costs. Experts identify Vix as an innovative niche player and a skilled collaborator, working closely with customers to produce products specialised for the customer with a quick turnaround.

12. Gekko



Segment: Technical equipment manufacturing; Professional and technical services

Pathways to success: Unique IP and innovation; Collaborate effectively with customer; Responsiveness/agility; Highly specialised product

Named as a successful firm by several experts, Gekko started out producing inline pressure jigs for the gold mining industry but now specialises in low-energy mining solutions as a result of growing demand for energy-efficient products. Experts note that Gekko built success through exports, targeting emerging, less saturated international markets to build their business. Experts also cite Gekko as a highly innovative firm with skilled staff that has built a strong brand around their values and community involvement.

An AlphaBeta report commissioned by and prepared for METS Ignited Growth Centre

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