

STATISTICS DIGEST

2015–16



WESTERN AUSTRALIAN
MINERAL AND PETROLEUM



Government of Western Australia
Department of Mines and Petroleum

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Government of **Western Australia**
Department of **Mines and Petroleum**

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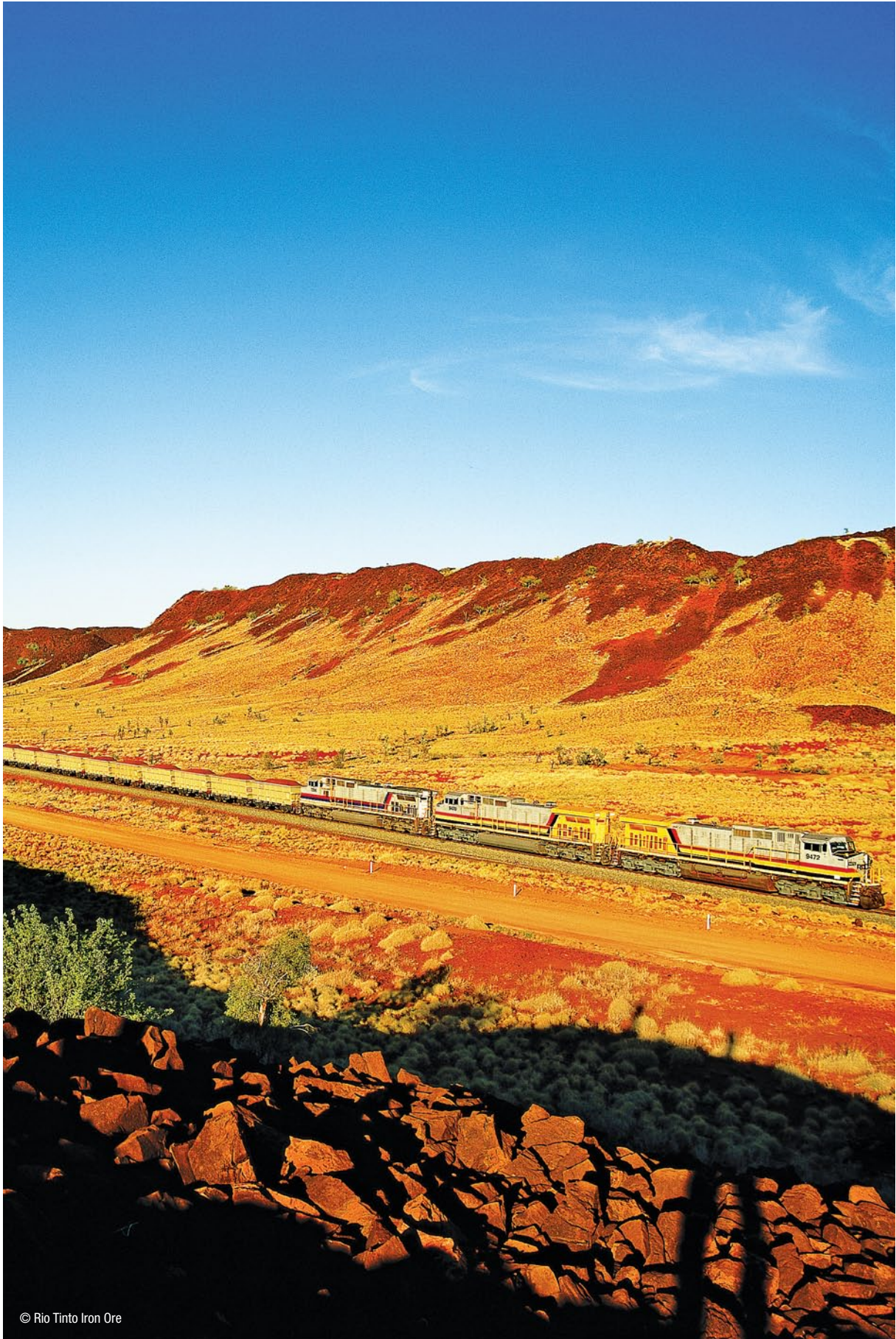
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Western Australia, more than any other Australian state, has seen fortunes rise and fall on the back of the mineral and petroleum industry. The strength of the industry was most noticeable through 2010 to 2013 when the demand for major commodities, such as iron ore, expanded significantly in response to unprecedented Chinese demand.

Growth of key global markets has since slowed, reducing the demand for raw materials in parallel with a rise in political and economic uncertainty.

Western Australian producers have felt the effects these challenges have placed on global commodity markets. The State's mineral and petroleum industry has continued to focus on building resilience into operations. This has been evident in the number of project and expansion delays announced, as well as the significant cost-cutting undertaken to improve the efficiency of operations.

Despite the broader downturn in commodity prices, the prospects for the Western Australian mineral and petroleum industry remains positive.

In December 2015, Hancock Prospecting's Roy Hill project achieved its first ore shipment. In March 2016, the US\$54 billion Chevron-operated Gorgon project made its first LNG shipment. Gorgon is the largest single resources project in Australian history and one of the largest natural gas projects in the world. These projects will drive economic benefits for Western Australians well into the future.

Western Australia's gold sector has remained strong, leading the way in exploration and growth. This can be largely attributed to the commodity's monetary and metal value in times of economic uncertainty.

The mineral and petroleum industry has also begun a renewed focus on innovation, as companies look to technological solutions to reduce costs and maintain the safety of operations. The use of driverless trucks, hosting of "hackathons" to foster open-source collaboration and remote-controlled devices for inspection activities are examples of innovation in practice.



The *Fraser Institute's Annual Survey of Mining Companies: 2015*, released this year, ranked Western Australia as the top jurisdiction in the world for investment, based on the Investment Attractiveness Index. The State moved up from fourth in the previous survey.

As always, a publication such as this requires input from a range of organisations. I would like to thank the Department of Industry Innovation and Science, the Australian Bureau of Statistics and the Western Australian Department of Treasury for their contributions.

Tim Griffin
A/Director General
Department of Mines and Petroleum

It was another challenging year for commodity markets. Globally, surplus stock, combined with weaker demand for raw materials, generally kept prices on a downward trend.

Locally, Australian producers were insulated marginally by the difference in value between the US and Australian dollars. The Australian dollar averaged 72.8 cents in 2015–16, down from 83.6 cents in 2014–15. This was the lowest annual average exchange rate since 2003–04. However, given the scale of global commodity price falls, this was insufficient to protect Australian producers from decreased prices.

Consequently, the value of Western Australia's mineral and petroleum industry in 2015–16 was \$87.9 billion, down 12 per cent from 2014–15. Compared with the value of the industry in 2005–06 at \$43 billion, the industry's current value remains more than twice what it was 10 years ago.

As of September 2016, Western Australia had an estimated \$97 billion worth of resource projects under construction or in the committed stage of development. A further \$46 billion was identified as planned or possible projects.

Mineral sector highlights

The mineral sector accounted for almost 80 per cent, or \$69.5 billion, of Western Australia's resources industry value in 2015–16, up from 76 per cent in 2014–15.

Iron ore was the State's highest value commodity, accounting for more than \$48 billion (71 per cent) of total mineral sales. Sales volumes increased 5 per cent during the financial year, assisted by production starting at the Roy Hill project. Western Australia cemented its position as the world's largest exporter of iron ore, with sales volumes reaching 756 million tonnes, up from 719 million tonnes in 2014–15.

The gold sector defied trends and increased in value for the second consecutive year. The value of the sector rose more than 10 per cent in 2015–16 to reach a record \$10 billion. This was largely attributable to the Australian dollar price of gold continuing to rise from an average of \$1479 per ounce in 2014–15 to an average of \$1613 in 2015–16. Sales volumes rose marginally during the period from 6.2 million ounces to 6.3 million ounces.

Alumina was Western Australia's third most valuable mineral sector at \$4.9 billion (down by 1.6 per cent from \$5 billion in 2014–15). There was a small increase in alumina sold, from 13.7 million tonnes in 2014–15 to

13.9 million tonnes in 2015–16. However, this was not enough to offset the fall in the alumina price, which finished the financial year at \$346 per tonne, down 5.5 per cent on the previous year.

Rounding out Western Australia's top four most valuable minerals was the nickel sector, which was valued at \$2.2 billion. Globally, the nickel market has been in over supply for several years and this continued to place downward pressure on nickel prices. In 2015–16, the price fell 30 per cent from an average of \$18,388 per tonne to an average of \$12,800 per tonne. Some local supply has dropped out of the market, with Western Australian production decreasing more than 4 per cent for the year, from 183,000 tonnes to 176,000 tonnes.

The overall value of base metals (copper, lead and zinc) decreased by close to 16 per cent to just below \$1.4 billion in 2015–16. Copper dominated this group with sales of \$1.2 billion, down 9 per cent on the previous financial year. The sales value of lead also decreased, from \$137 million to \$14.6 million following the closure of the LeadFX-owned Paroo Station lead mine in 2015, while the value of zinc sales was down 3.8 per cent from last year despite a 3 per cent increase in production.

The remaining mineral sales values comprised:

- mineral sands – \$539 million (up 10 per cent)
- salt – \$336 million (down 10 per cent)
- diamonds – \$354 million (up 3 per cent)
- coal – \$336 million (up 10 per cent)
- cobalt, as a by-product of nickel mining – \$174 million (down 17 per cent).

Petroleum sector highlights

The value of Western Australia's petroleum sector, comprising crude oil, condensate, LNG, natural gas and LPG (butane and propane), was again affected by declining crude oil prices, which averaged US\$45.05 per barrel, down from US\$76.70 in 2014–15. As a result, the value of the petroleum sector decreased almost 24 per cent to \$18.4 billion in 2015–16.

LNG remained the State's most valuable petroleum product with output increasing marginally to a record 20.9 million tonnes. The low price affected the overall sales value of LNG, which decreased 22 per cent from the previous financial year to \$10.8 billion.

Production of crude oil, the second most valuable petroleum product in 2015–16, fell 3 per cent to 48 million barrels, but sales value tumbled 33 per cent to \$3 billion.

Similarly, the sales value for condensate decreased 32 per cent to \$2.4 billion, despite output of more than 42 million barrels for the financial year.

In 2015–16, domestic natural gas was the only petroleum sector to experience a rise in sales value. Production increased marginally, by 3.5 per cent to 10.2 billion cubic metres, and the value of sales rose almost 5 per cent to \$1.9 billion.

Output of LPG (butane and propane) decreased 4 per cent, with the sales value also decreasing to \$249 million, down 39 per cent on the previous financial year.

Western Australia's mineral and petroleum resources in order of value for 2015–16 were:

Commodity	A Billion
Iron Ore	48.4
LNG	10.8
Gold	10.0
Crude Oil and Condensate	5.4
Alumina	4.9
Nickel	2.2
Others	6.2
Total	87.9

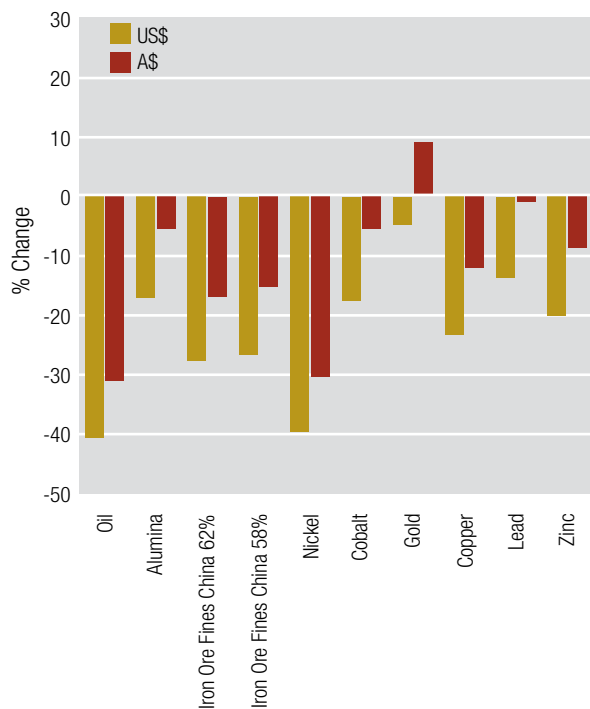


Figure 2 | **Percentage price change between 2014–15 and 2015–16**
Source: LME, Kitco, Metal Prices, WATC and DMP

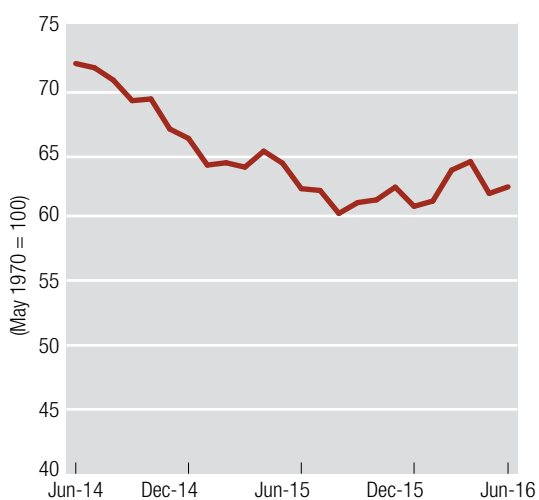


Figure 1 | **Exchange rate trade-weighted index (May 1970 = 100) (units of foreign currency per A\$)**
Source: Reserve Bank of Australia
Definition: "Trade-weighted index" is the average value of A\$ in relation to the currencies of Australia's major trading partners.

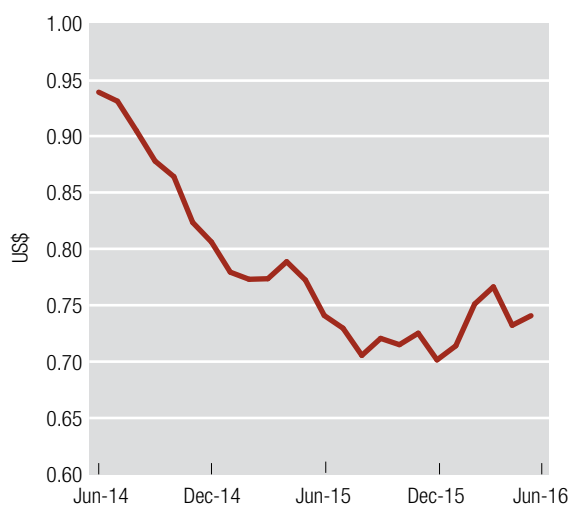


Figure 3 | **Exchange rate US\$/A\$**
Source: Reserve Bank of Australia

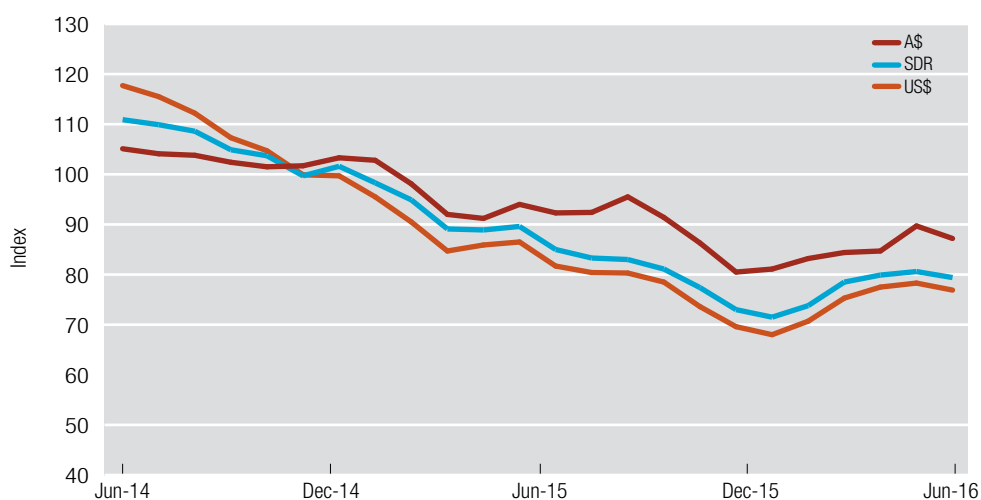


Figure 4 | **Non-rural commodity price index (2014-15 = 100)** Source: Reserve Bank of Australia

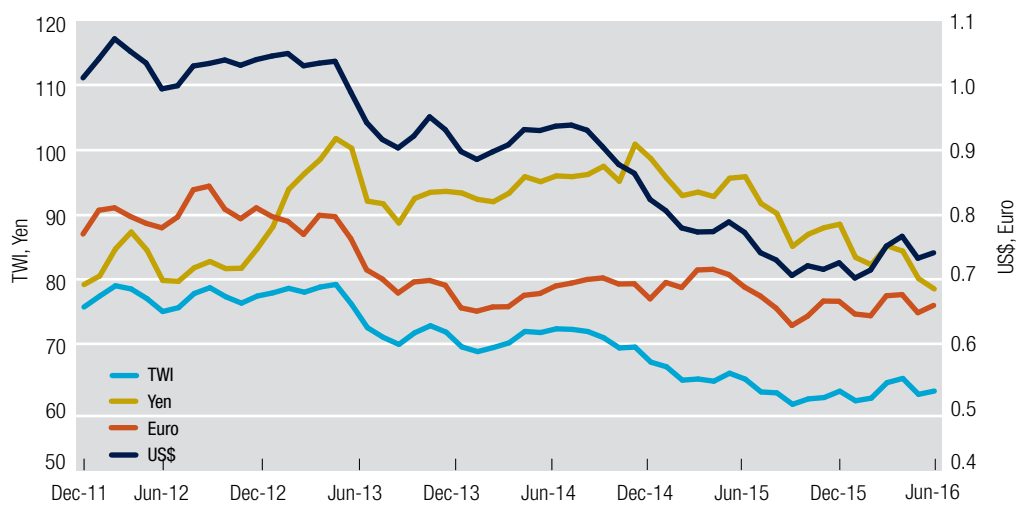


Figure 5 | **Australian dollar exchange rate against major currencies**
Source: Reserve Bank of Australia

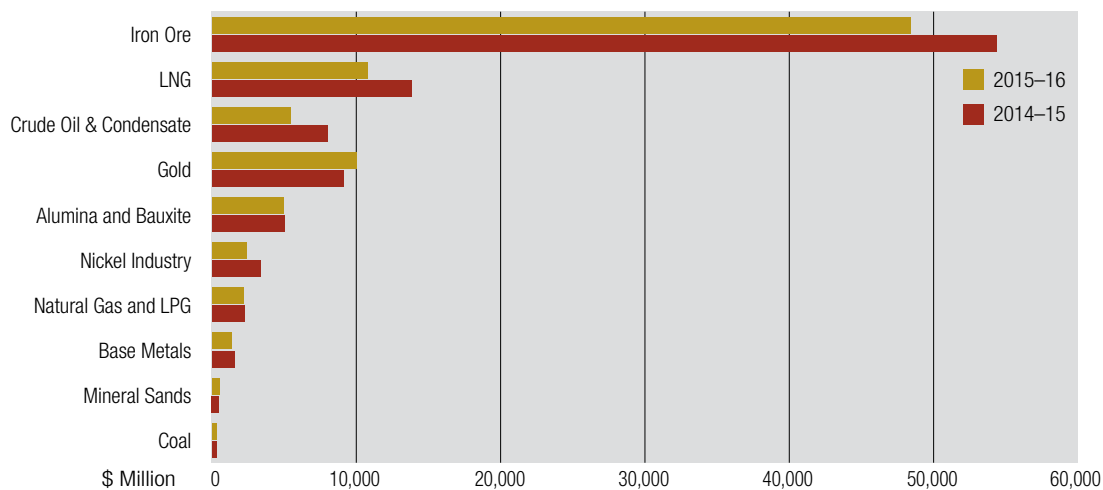


Figure 6 | **Major commodities by value** Source: DMP

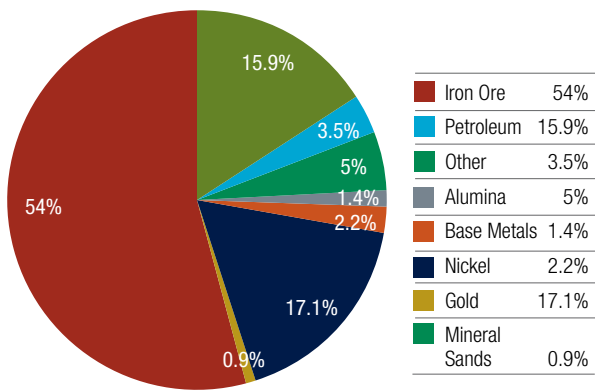


Figure 7 | **Western Australian mineral and petroleum exports 2015–16**
\$91.62 Billion Source: DMP and ABS

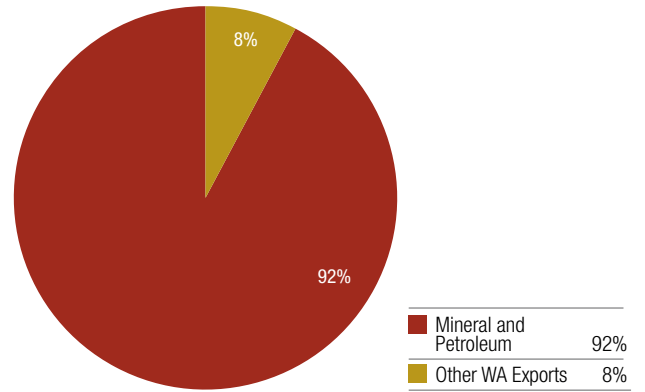


Figure 8 | **Western Australian merchandise exports 2015–16**
\$99.67 Billion Source: DMP and ABS

Note: Mineral and Petroleum includes \$5.53 billion worth of gold and \$332.1 million worth of Mineral Sands refined or processed in WA but produced in other States/Territories/overseas.

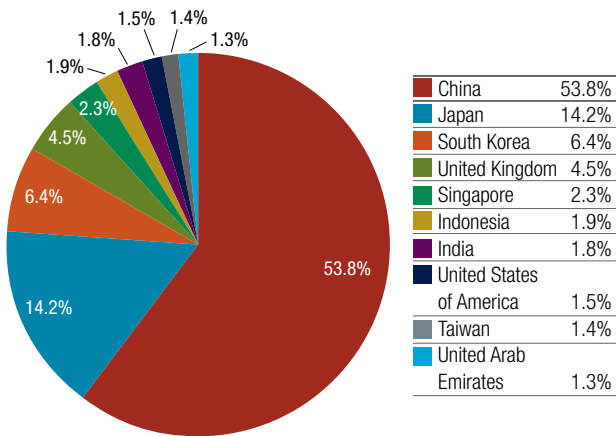


Figure 9 | **Western Australian merchandise exports by country 2015–16**
\$99.67 Billion Source: ABS

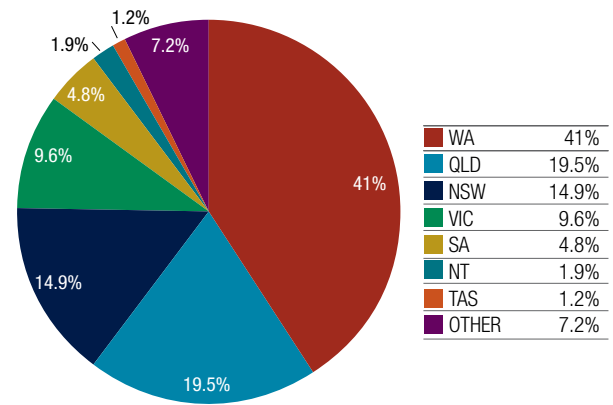


Figure 10 | **Australian merchandise exports 2015–16 by state/territory**
\$243.3 Billion Source: ABS

Note: "Other" refers to exports where state of origin is not released by ABS or where merchandise is re-exported.

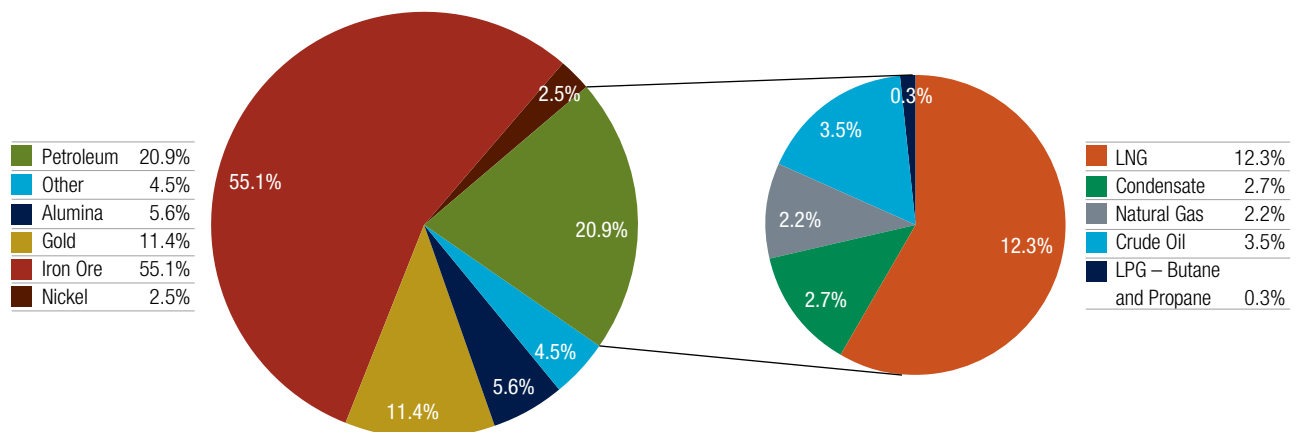


Figure 11 | **Value by commodity 2015–16**
\$87.9 Billion Source: DMP

AVAILABILITY OF DETAILED RESOURCE DATA

The Department of Mines and Petroleum (DMP) has recently completed a project to increase the overall efficiency, reliability and ease of use of the resources data it collects. This has led to some changes in the way the data is presented and published on our website. It has also allowed us to present more detailed information, for example, monthly employment data and commodity-specific exploration data.

Three separate Excel files are available:

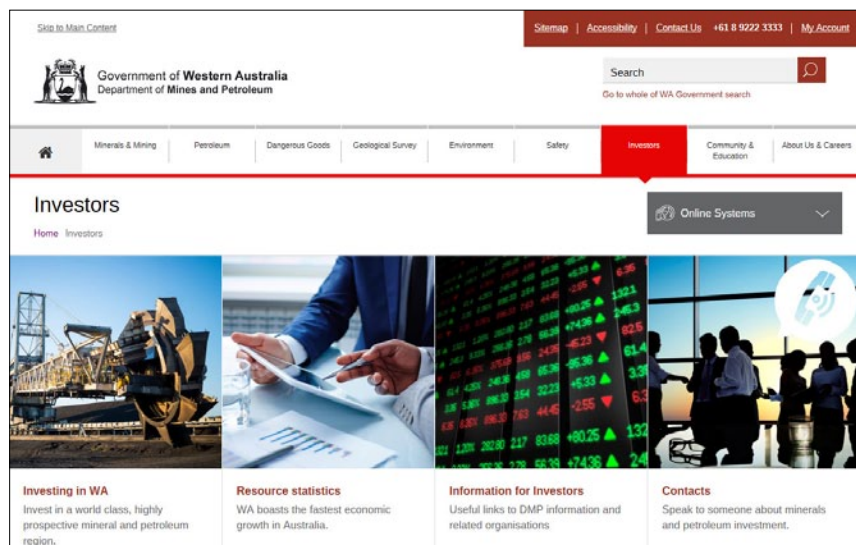
1. major commodities – this file contains information about the scale and scope of Western Australia’s mineral and petroleum industry, as well as detailed information about the State’s major commodities, such as export value and sales value in comparison to other jurisdictions
2. economic indicators – this file contains information about how the State’s mineral and petroleum industry contributes to the economy, including through exploration and investment, royalty receipts and employment

3. spatial and regional – this file contains information about mineral and petroleum tenements and how the value of mineral and petroleum sales is distributed across the State.

Our resource data files may be accessed on the DMP website at www.dmp.wa.gov.au/Investors.

Throughout this digest you will find references indicating where in the resource data files to find more detailed information about the topics discussed here.

These hints are identified by this symbol:



1.1 MINERAL TITLES

In 2015–16, the area of Western Australian land covered by mining tenements fell 19 per cent to 37.6 million hectares. This equates to slightly less than 15 per cent of Western Australia's total land area.

The largest decrease occurred with exploration licences which comprise most of the mining tenements (83 per cent). The number of exploration licences fell 10 per cent to 4529, while the area covered by them reduced 16 per cent from 37 to 31 million hectares.

The number of mining leases increased 14 and the ground covered by them increased 17,000 hectares. Mining leases accounted for just 6 per cent (2.4 million hectares) of the total area of mining tenements.



Historic information about the number and type of mineral titles in force is available in the spatial and regional data file.

MINERAL TITLES ONLINE

DMP is committed to providing digital services enabling all transactions to be online. The initiative is designed to provide users with the flexibility of transacting at their convenience.

DMP has made 36 *Mining Act 1978* (Mining Act) forms available online. This initiative has reduced processing times and improved ease of business by replacing the physical lodgement of Mining Act-related forms, and supporting documents, through Mining Registrar offices.

The initiative is consistent with the State Government's 'Digital WA Strategy', which aims to create cost-effective and efficient online systems to access government services and transactions.

About 75 per cent of applications are now lodged using Mineral Titles Online.

DMP encourages its customers to use online services as this increases accessibility and encourages streamlined processing of applications and determinations.

1.2 PETROLEUM TITLES

State petroleum titles are administered under three Acts:

1. The *Petroleum (Submerged Lands) Act 1982*, which generally applies to the State's territorial sea to the three nautical mile mark, including the territorial sea around State islands.
2. The *Petroleum and Geothermal Energy Resources Act 1967*, which generally covers all onshore areas of the State, including its islands. Most areas under petroleum titles are covered under this Act.
3. The *Petroleum Pipelines Act 1969*, which applies to petroleum pipelines on land within the State.

As at 3 August 2016, the total area covered by petroleum titles regulated under Western Australian legislation was 189,507 square kilometres. This is about 7.5 per cent of Western Australia's land area. The area covered by petroleum titles was lower compared with 2014–15 (240,418 square kilometres).

1.3 EXPLORATION

Continued investment in exploration has underpinned most of the strong growth in the minerals and petroleum industry and wider economy in recent years.



The economic indicators resources data file contains detailed ABS exploration expenditure data including:

- historic and current expenditure on mineral exploration in Western Australia and the rest of Australia
- a breakdown of the State's exploration spend by commodity versus the rest of Australia
- historic and current exploration drilling and expenditure on new and existing mineral deposits
- historic and current expenditure on petroleum exploration in Western Australia compared with the rest of Australia.

1.3.1 Minerals

Global economic conditions, particularly ongoing lower commodity prices, have led to mineral exploration programs being scaled back or delayed, resulting in reduced exploration expenditure at a national and state level. Australia attracted \$1.4 billion in mineral exploration activity in 2015–16. Western Australia accounted for almost 61 per cent of this expenditure, with \$871 million.

The gold and iron ore sectors accounted for almost 76 per cent of Western Australia's exploration spend.

Exploration drilling data is provided by the ABS on a national basis, therefore no specific data is available for Western Australia. However, given that Western Australia accounted for more than 60 per cent of exploration expenditure in 2015–16, the trends identified in national data can be assumed to broadly reflect Western Australia's situation.

In 2015–16, the number of metres drilled within existing deposits in Australia increased 6.5 per cent. This was the first increase reported since 2011–12. Drilling at new deposits continued to decline, down 4 per cent from 2014–15.

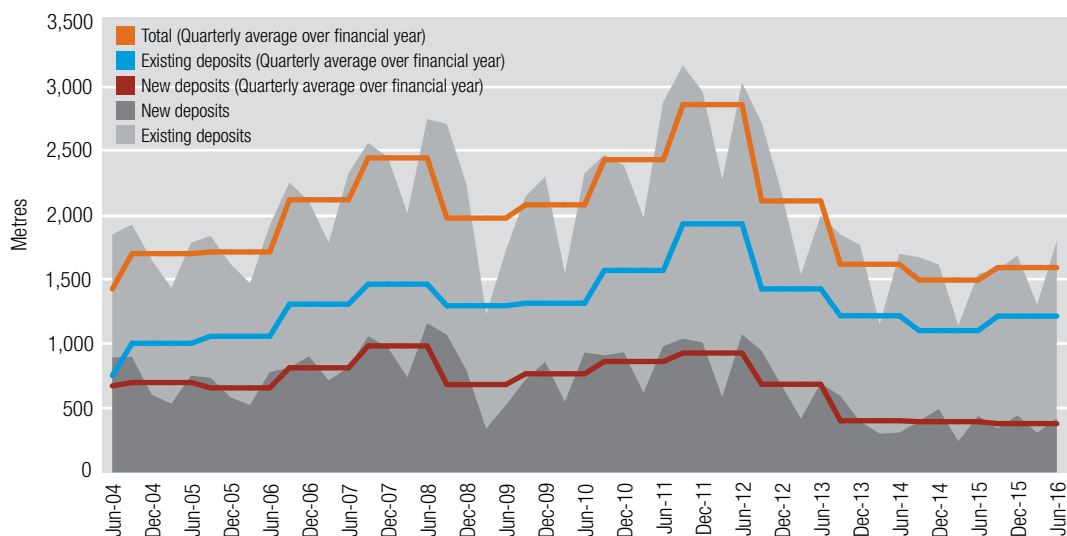


Figure 12 | **Australia-wide drill metres – new and existing deposits**
Source: ABS

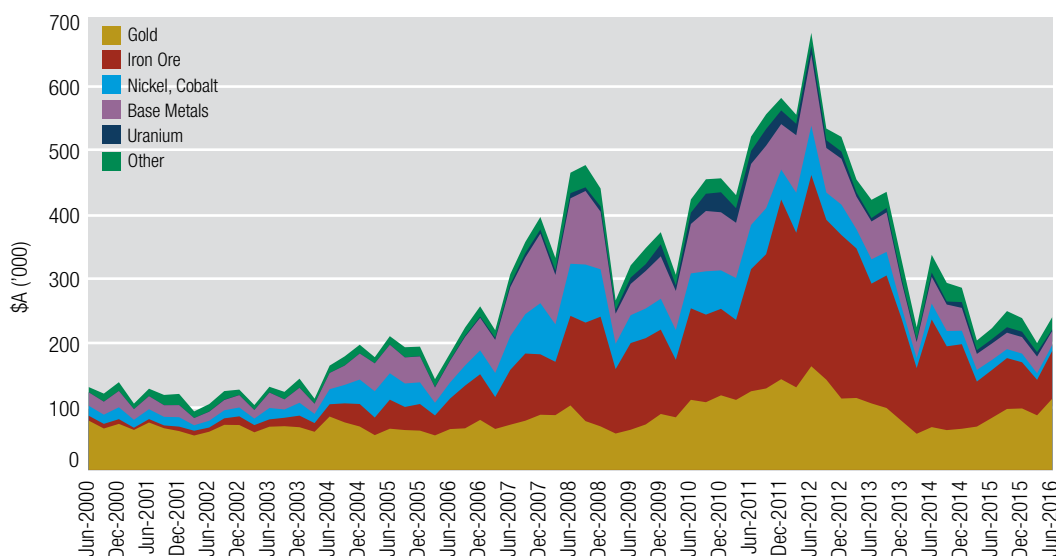


Figure 13 | **WA mineral exploration spend by commodity**
Source: ABS and DMP

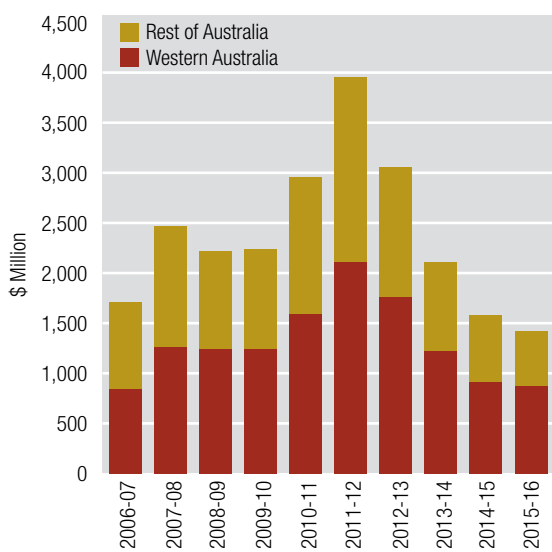


Figure 14 | **Mineral exploration expenditure**
Source: ABS

Notable events

- Sandfire Resources issued a maiden resource estimate for its Monty deposit of 99,000 tonnes of copper and 55,000 ounces of gold.
- Saracen Minerals announced that drilling at its Karari deposit at Carosue Dam had increased the resource and reserves 38 per cent and 117 per cent respectively.
- Silver Lake Resources announced a high-grade gold find from a \$1.4 million drilling program that may sustain an underground operation at its Maxwells mine.
- Blackham Resources discovered two new lodes at its Matilda prospect, boosting reserves to 6.3 million tonnes at 2.5 grams per tonne for 517,000 ounces of gold.
- Metalicity completed a mineral resource estimate at its Admiral Bay zinc project that confirmed it as Australia's largest undeveloped zinc deposit.
- Northern Star Resources boosted its total gold reserves 33 per cent to two million ounces of gold.
- The indicated and inferred resource within the Mount Marion lithium project increased to 60.5 million tonnes at 1.36 per cent lithium and 1.09 per cent iron.
- Sheffield Resources doubled the measured resource at the Thunderbird mineral sands project to more than 220 million tonnes, placing it in the top tier of mineral sands deposits globally.

- Blackham Resources added another 43,000 ounces of gold to reserves of 560,000 ounces at Matilda.
- Dacian Gold boosted its Mount Morgans project resources to 2.2 million ounces.
- Regis Resources increased resources and reserves around its Duketon operations 6 per cent to 2.13 million ounces at 1.09 grams per tonne.

EXPLORATION INCENTIVE SCHEME

The State Government's Exploration Incentive Scheme (EIS) aims to encourage exploration and promote opportunities for mineral and petroleum investment in Western Australia. The State Government has committed to fund the scheme to June 2017, by which time total expenditure will have reached \$130.27 million since its inception in 2009. Budget forward estimates show that funding will continue to June 2020.

The EIS has funded significant projects, including more than 4.2 million line-kilometres of airborne geophysics at 400 metre spacing or better, more than 4200 kilometres of seismic, 137,000 ground gravity stations and 30,100 kilometres of airborne electro-magnetic surveys. More than 30 publications have been released comprising collaborative research projects with the CSIRO, the University of Western Australia, Curtin University and the WA:ERA. All data is available online at no charge.

To date, the flagship Co-funded Drilling Program, one of five programs in the EIS, has refunded more than \$23 million to more than 320 completed projects. This has resulted in more than 470,000 metres of drilling across the State and, directly or indirectly, contributed to at least 20 discoveries. These include Mount Fisher East (nickel), Yeneena (copper), Emily Ann (nickel), Dusk til Dawn (gold) and the Nova Bollinger (nickel) discovery, which will produce its first concentrate in December 2016.

The Co-funded Drilling Program also helped identify the potential of Gold Road Resources' Gruyere project in the Eastern Goldfields.

1.3.2 Petroleum exploration

National petroleum exploration expenditure was down significantly in 2015–16, falling from \$3.8 billion in 2014–15 to \$1.8 billion, with Western Australia’s share of expenditure declining from \$2.1 billion in 2014–15 to \$1.3 billion in 2015–16.

In contrast, Western Australia’s share of national petroleum expenditure increased from 55 per cent to 73 per cent.

Notable events

- Transerv Energy announced its independent contingent resources in the Warro tight gas field had doubled.
- Buru Energy achieved a significant oil find north of Ungani.
- BHP Billiton announced accelerated exploration in the Beagle Sub-basin of the northern reaches of the Carnarvon Basin, as part of a \$600 million global exploration spend.
- Woodside advised that two exploration wells in the Beagle Sub-basin were unsuccessful.
- Carnarvon Petroleum announced plans to drill a Roc-2 appraisal well to confirm recoverable resource estimates from the Roc-1 well (13MMbbl and 270Bcf).
- Buru Energy advised that further testing at Ungani Far West-1 was encouraging, while an independent assessment of the gas and liquids resources of its Valhalla North 1 program supported the view that it contains a nationally significant wet gas accumulation.
- AWE announced a 93 per cent increase in gas reserves for the Waitsia gas field.

Further information on petroleum exploration activity in Western Australia can be found in the publication ‘Petroleum in Western Australia’, produced by DMP. This publication contains a comprehensive overview of petroleum exploration activities in this State and details

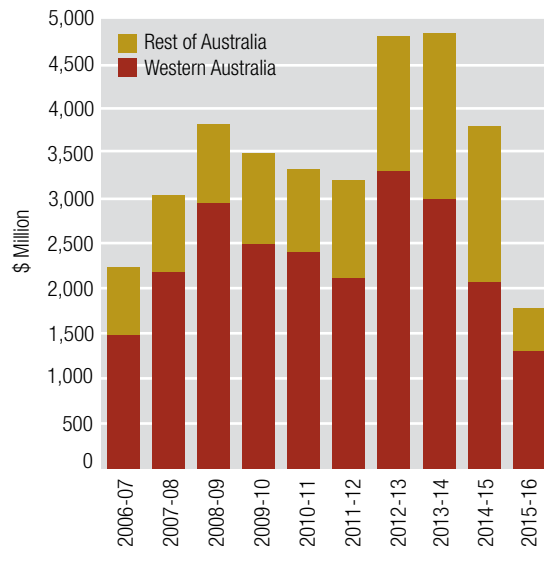


Figure 15 | **Petroleum exploration expenditure**
Source: ABS

about the award of petroleum exploration permits. It is available at www.dmp.wa.gov.au.

1.4 INVESTMENT ACTIVITY

During the commodities super cycle that began in the early 2000s, Western Australia benefitted from increased exploration, investment and production across a range of commodities. Now that these patterns have reversed, the project development trend is to suspend or delay as proponents wait for more favourable market conditions.



The economic indicators resources data file contains historic and current ABS investment data released in catalogue 5625.0 – *Private New Capital Expenditure and Expected Expenditure*.

This data includes:

- mining investment within Australia, including Western Australia
- new capital investment for mining within Australia, including Western Australia.

1.4.1 Mining investment and new capital expenditure

According to the ABS, \$35 billion was invested in Western Australia’s mining industry in 2015–16. Western Australia increased its share of national expenditure from 60 per cent in 2014–15 to 66 per cent in 2015–16. During the reporting period, national investment fell 29 per cent, compared to a 23 per cent decline in Western Australian investment.

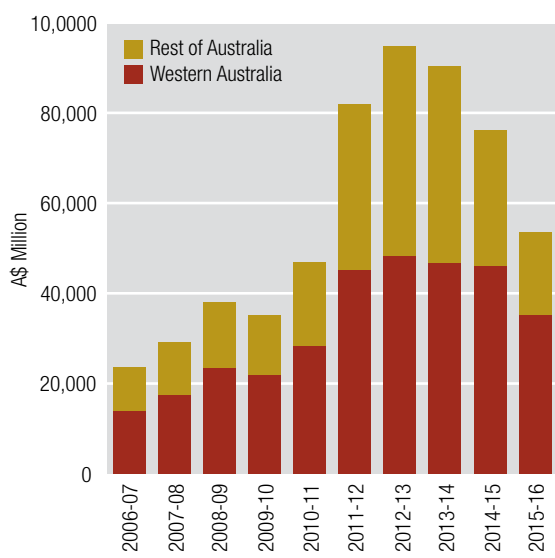


Figure 16 | **Mining investment**
Source: ABS

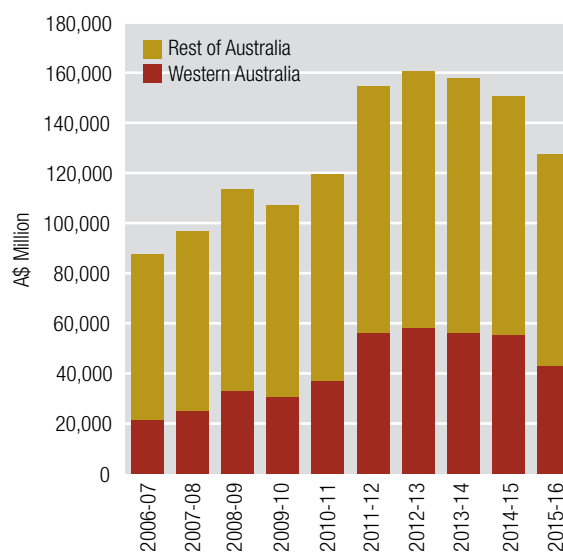


Figure 17 | **New capital investment**
Source: ABS

New capital expenditure in Western Australia by mining, manufacturing and other selected industries decreased 22 per cent in 2015–16 to a little more than \$43 billion. The State accounted for 34 per cent of Australia’s \$1.27 billion total.

The ABS uses classifications specified in the 2006 edition of the Australian and New Zealand Standard Industrial Classification (ANZSIC).

Under this standard, mining is broadly defined as the extraction of minerals occurring naturally as solids, such as coal and ores, and liquids such as crude petroleum and natural gas. Downstream mining activities, such as smelting of minerals or ores (other than preliminary smelting of gold) or refining, are classified as manufacturing activities under the ANZSIC. Products such as coke and alumina are also included in the ANZSIC manufacturing category.

Therefore, the ABS figures do not capture all mining investment.

1.4.2 Major projects

DMP collects information on mineral and petroleum projects to estimate actual and possible investment in Western Australia’s resources industry. Where possible, information is collated relating to expected capital expenditure, project timing and employment during the construction and operation phases.

Mineral and petroleum projects are categorised as follows.

- Projects under construction – those actually under construction at the time of updating the estimates of total capital expenditure.
- Committed projects – have company commitment including a final investment decision (FID) but are waiting for approvals to proceed with construction.
- Planned projects – those undergoing advanced feasibility studies including definitive and bankable feasibility studies. For oil and gas projects, the planning phase typically involves detailed engineering design which is also referred to as Front End Engineering and Design (FEED).
- Possible projects – those raising capital and not yet as advanced as those projects conducting definitive and bankable feasibility studies.

Information is obtained from various sources including the Office of the Chief Economist’s list of major mineral and energy projects, EnergyQuest, REPS’ Major WA Projects Listing, online company research consultancy systems, media announcements and company websites.

As of September 2016, Western Australia had an estimated \$97 billion worth of resource projects under construction or in the committed stage of development. This was up on March 2016 figures following:

- approval to develop Rio Tinto's Oxbow iron ore deposit (\$247 million)
- the announcement of the \$120 million Robe River joint venture iron ore project
- Rio Tinto's \$338 million Silvergrass project moving from the planned to the committed stage
- approval to develop Woodside's \$1.9 billion Greater Enfield project.

A total of \$46 billion has been identified as planned or possible projects in the coming years.

The value of investment in major projects is expected to reduce in 2017 as projects under construction are completed. This includes the expected completion of Inpex's Ichthys and Chevron's Wheatstone projects, which have a combined value of around US\$63 billion.

A summary of total capital expenditure by commodity is provided in the table below. It should be noted that investment in several projects is publicly reported in US dollars and the data may therefore vary over time in line with movements in the US\$/A\$ exchange rate.

1.5 PRINCIPAL MINING PROJECTS

In 2015–16, Western Australia produced more than 50 minerals from 111 principal mining projects and hundreds of smaller quarries and mines. The principal projects produced more than 99 per cent of the industry's total sales value.

The State's principal mining projects are those that produce commodities valued at more than \$5 million per annum or, in the case of gold producers, more than 2500 ounces of gold.

Projects on private land, for which production values are not required to be reported, are also classified as principal projects where employee numbers are greater than 50.

A list of the principal mining projects and key basic raw minerals producers is available on DMP's website at www.dmp.wa.gov.au/investors.

Sector	Commodity	CAPEX (A\$ million)	
		Committed/ under construction	Planned/ possible
Minerals	Gold	0	1,177
	Iron ore	2,260	10,907
	Nickel, copper and zinc	443	3,664
	Other minerals and infrastructure	0	9,618
	Sub-total Minerals	2,703	25,366
Petroleum	Crude oil and condensate	2,608	0
	Gas	2,745	1,200
	LNG	88,862	19,500
	Pipelines and infrastructure	0	0
	Sub-total Petroleum	94,215	20,700
Total forecast investment		96,918	46,066

Source: DMP

1.6 EMPLOYMENT



Detailed employment data is available in the economic indicators resources data file, including:

- current and previous period employment data in the mineral industry
- current and previous period employment data in the petroleum industry
- a breakdown of employment by commodity for the mineral industry
- calendar year employment by commodity data for the mineral industry since 2001

- financial year employment by commodity data for the mineral industry since 2001–02
- employment data for the mineral and exploration industries by commodity on a monthly basis since 2001
- historic calendar year employment data (by commodity) for 1987–2000.

1.6.1 Mining

Western Australia's mining industry directly employed an average of 102,258 people during 2015–16. This figure included people employed in mineral exploration, construction of mine site infrastructure, mineral processing, mine site surveying, transport and catering – essentially those people operating on site.

Mining-related employment declined for the second consecutive year after peaking at 107,871 people in 2013–14.

The iron ore sector remained the State's largest employment sector, employing an average of 53,229 people. Gold and nickel followed with 23,417 and 5,644 people respectively. The iron ore, gold and nickel sectors accounted for 80 per cent of mineral sector employment.

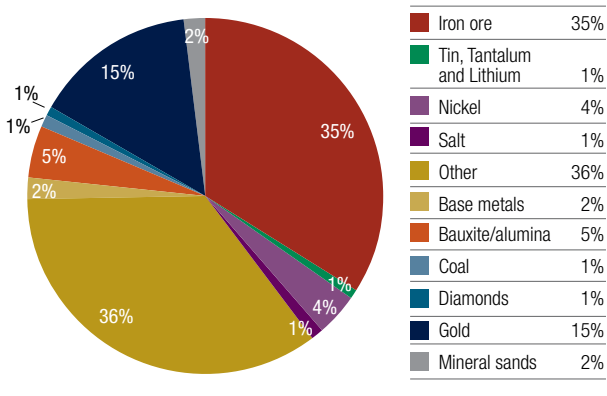


Figure 18 | **WA Minerals direct employment by mineral commodity 2015–16**
Source: DMP

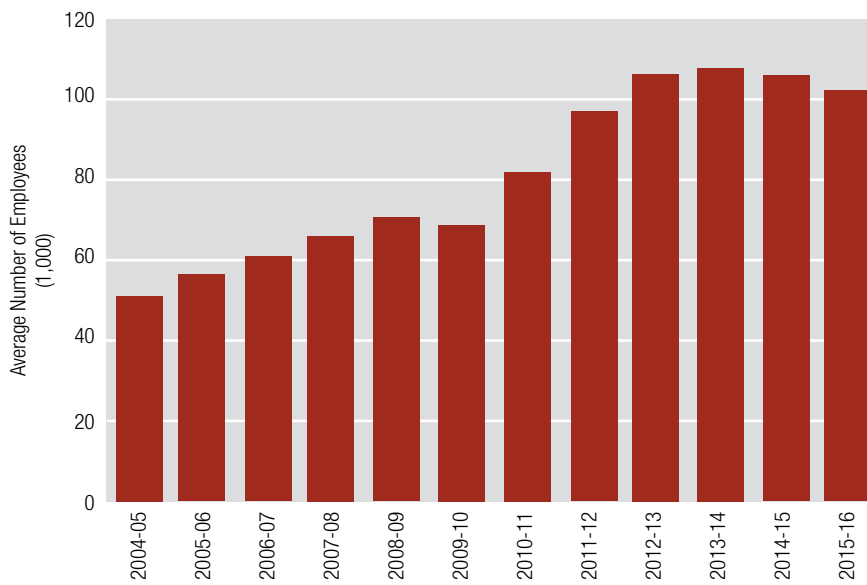


Figure 19 | **WA mining employment 2004–05 to 2015–16**
Source: DMP
Does not include petroleum data.

DMP collects mining employment data from monthly accident reports which to all operating mines, as well as companies undertaking exploration activities on exploration and mining leases, are required to submit.

The Resources Safety Division AXTAT reporting system identifies the number of direct employees and contractors (including exploration personnel) working on operating mining leases, as well as exploration personnel working on greenfield sites.

This data includes sites under State Agreement Acts, but does not include personnel in administrative locations not on operating sites. Employment data collected and published by the ABS is classified using ANZSIC and is not directly comparable to data collected by DMP.

The data is reported in two ways:

1. Full Time Equivalent (FTE): the total number of positions that would be available within the mining industry if all work was performed by standardised full time employees.
2. Total Number of Individuals (NoI): the number of individual people who have performed at least one hour's work on a mine site or for a mining company.

In a typical industry, the average number of individuals would be expected to be higher than the number of FTEs because a part-time employee is counted as one in NoI figures, but only as a fraction of one for FTE purposes. The below graph shows both NoI and FTE data from 2001 to 2015. It tells us that the mining industry is not typical in terms of the NoI/FTE numbers and that during some periods, FTE numbers are actually higher. Historically, this is attributed to the relatively low proportion of part-time workers and individuals working hours greater than the equivalent of one FTE. In the past, mining employment FTE and NoI figures have been fairly close, with the difference rarely exceeding 5 percent from 2001 to 2012. However, this changed in 2013, when the number of FTEs began to decline relative to NoIs, reflecting the rise in contractor and consultant-based work among mining professionals as companies cut costs in response to declining commodity prices (especially iron ore).

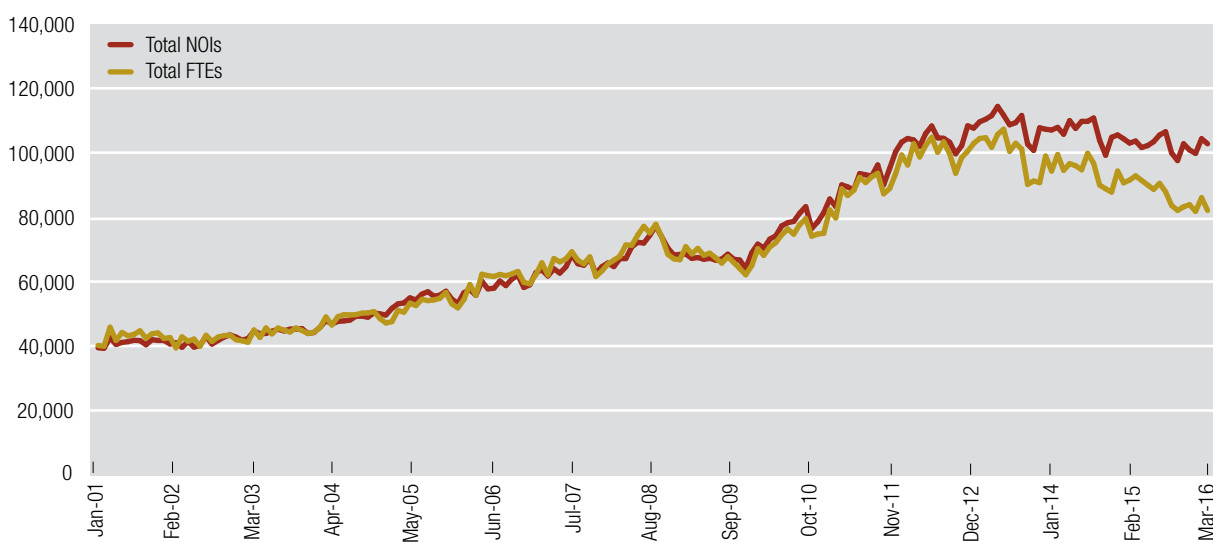


Figure 20 | **Number of mining sector FTEs versus individuals** Source: DMP

1.6.2 Petroleum

Western Australia's petroleum industry employed an average of 1380 people in 2015–16, down 33 per cent from an average of 2058 in 2014–15.

Generally, after the construction phase, only one in 10 LNG jobs is retained, compared with one in three iron ore jobs. The fall in petroleum employment came mostly from just two projects. The Dampier to Bunbury Natural Gas Pipeline (Transition pipeline) project reported the biggest decline in 2015–16 average employment numbers, down 54 per cent on the previous year. Chevron's Gorgon project reported the second biggest fall with numbers down 44 per cent from year to year.

Petroleum employment data is limited to operations subject to State petroleum legislation, and includes petroleum facilities and pipelines onshore and in coastal waters, but does not include LNG and land-based service facilities.

The data represents the average number of people employed at operating sites, including contractor employees.

Following the transfer of administrative responsibility from the State to the Commonwealth on 1 January 2012, data for operations in Commonwealth offshore areas is not available.

Employment data collected and published by the ABS is classified ANZSIC and is not directly comparable to data collected by DMP.

1.7 ROYALTIES

Royalties for all minerals and petroleum produced on State land and in State waters are paid into the Government's Consolidated Revenue Fund. The State also receives about 65 per cent of the royalties from the petroleum produced by the North West Shelf Project, in the form of Commonwealth grants, in accordance with an agreement between the Western Australian and Australian Governments.

The Western Australian Government received royalties from the State's mineral and petroleum producers totalling \$4.6 billion in 2015–16, a decline of 21 per cent on 2014–15.

Iron ore (75 per cent) provided the bulk of collections for 2015–16, followed by gold (5 per cent) and alumina (less than 2 per cent). The State also received \$615 million in grants for North West Shelf projects, which contributed 13 per cent of Western Australia's royalty receipts.

A NOTE ABOUT IRON ORE ROYALTIES

Included in the State's royalty receipts for iron ore is an additional lease rental amount which is currently applied under iron ore State Agreement Acts and the Mining Act. The rate is 25 cents per tonne. In the case of some older Agreement Acts, the rate is 25 cents per imperial ton.

The additional lease rental applies to iron ore obtained from a mining lease following 15 years from the date the iron ore was first obtained from the mining tenement, by the lessee.

There is currently one project operating under the Mining Act that is subject to the additional rental.



The economic indicators resources data file contains:

- a breakdown of royalty receipts per commodity for the most recent calendar and financial year
- historic royalty receipts and North West Shelf grants from 1984–present.

TABLE 2. ROYALTY RECEIPTS 2014–15 AND 2015–16

COMMODITY	2014–15 Total A\$	2015–16 Total A\$	2015–16 Growth A\$	%
Alumina	77,738,390	84,323,526	6,585,136	8.5%
Copper, Lead & Zinc	67,389,606	59,238,461	-8,151,145	-12.1%
Diamonds	15,408,890	18,324,338	2,915,448	18.9%
Gold	218,596,724	239,553,825	20,957,101	9.6%
Mineral sands	11,965,647	16,818,397	4,852,750	40.6%
Iron ore	4,389,842,803	3,472,765,664	-917,077,139	-20.9%
Nickel	82,878,024	54,093,242	-28,784,782	-34.7%
Petroleum *	8,716,839	7,239,110	-1,477,729	-17.0%
Other	72,449,831	69,692,154	-2,757,677	-3.8%
Total Royalty Receipts	4,944,986,754	4,022,048,717	-922,938,037	-18.7%
North West Shelf Grants	943,795,896	615,475,000	-328,320,896	-34.8%
Total Revenue	5,888,782,650	4,637,523,717	-1,251,258,933	-21.2%

Note: All royalty revenue shown above is paid into the State's Consolidated Revenue Fund. Added to the table shown separately is the State's share of the North West Shelf project royalty payments to the Commonwealth (which are provided as a grant from the Commonwealth to the State).

* Includes the Commonwealth's share of royalties collected under the Western Australian *Petroleum (Submerged Lands) Act 1982* (PSLA).

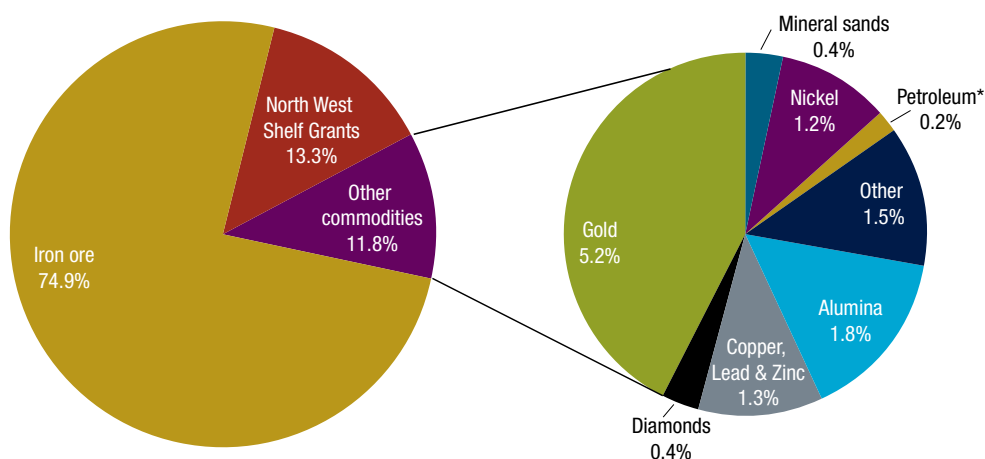


Figure 21 | **Royalty receipts 2015–16 and North West Shelf grants \$4.64 Billion**
Source: DMP and WA Treasury

2. COMMODITY REVIEW

2.1 IRON ORE

Pricing

Market fundamentals of high supply and weak demand again contributed to lower iron ore prices throughout 2015–16. Prices fell 28 per cent to an average of US\$50 per tonne, following a 43 per cent fall in the previous period.

During 2015–16, the iron ore price was fairly volatile. After starting the financial year at a monthly average of US\$51 per tonne, it fell to a monthly average of just US\$39 per tonne in December 2015. Iron ore then started 2016 strongly, recording a 49 per cent increase to April 2016. This was due to a temporary rise in construction activity in China. However, this stimulus was short-lived with the price dropping to a level more consistent with supply and demand at US\$53 per tonne by July 2016.

A weaker Australian currency against the US dollar partially offset the fall in the iron ore price for Western Australia's producers. In Australian dollar terms, the iron ore price fell 17 per cent to an average of \$69 per tonne in 2015–16.

The current supply surplus is reportedly affecting the prices received by some companies as larger discounts are applied to the sale of low grade ores.

Quantity and value

Iron ore sales reached a record 756 million tonnes in 2015–16, despite the effects of certain events, e.g. Tropical Cyclone Stan, on some producers. The 5 per cent increase on the previous period was largely on the back of increases in production by the three major producers, Rio Tinto, BHP Billiton and Fortescue Metals Group (FMG).

The effect of continued low prices saw the value of Western Australian iron ore fall 11 per cent, from \$54.3 billion in 2014–15 to \$48.3 billion in 2015–16.

Despite the fall in the sales value, iron ore continued to be Western Australia's most valuable commodity. In 2015–16, it accounted for 55 per cent of all mineral and petroleum sales and 70 per cent of mineral sales.

The major share (82 per cent or \$40 billion) of Western Australia's iron ore was exported to China. Other major export markets comprised Japan (9.6 per cent), Republic of Korea (6 per cent) and Taiwan (2 per cent).

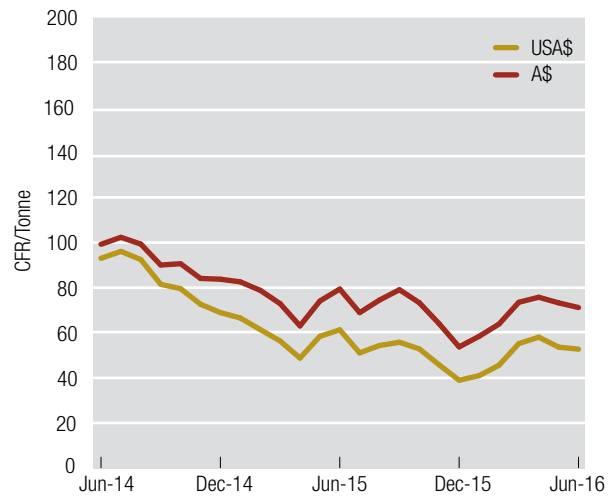


Figure 22 | **Iron ore fines (average price 62% fines CFR China)**
Source: Metalprices.com

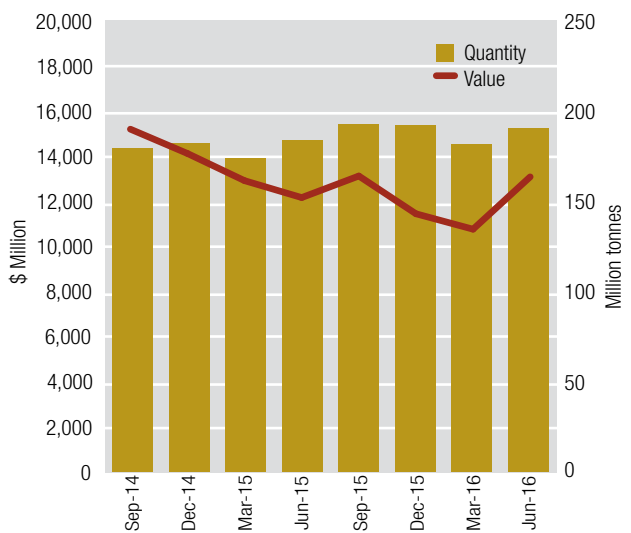


Figure 23 | **Iron ore quantity and value by quarter**
Source: DMP and DIIS

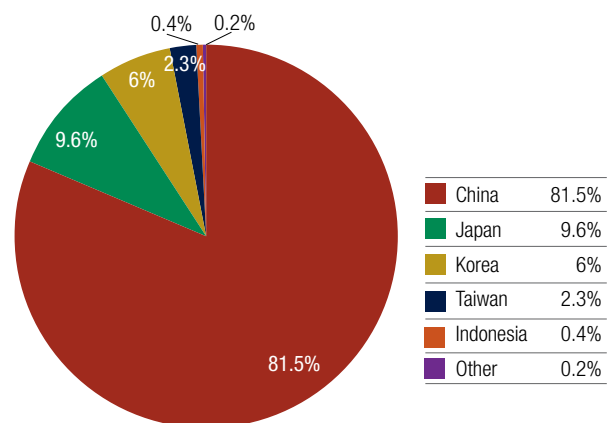


Figure 24 | **Iron ore exports \$49.5 Billion** Source: ABS

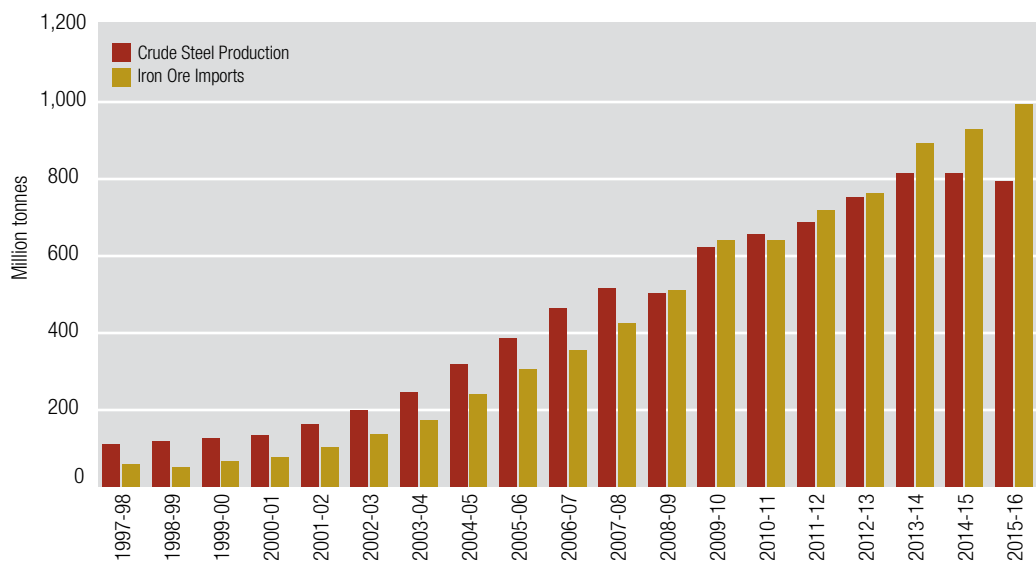


Figure 25 | **China's crude steel production and iron ore imports**
Source: World Steel Association

Notable events

Direct shipping ore

Rio Tinto started mining at its Silvergrass project, which is part of its Pilbara iron ore production goal of 360 million tonnes per annum.

The start of a 24-month rail maintenance program involving the replacement of track, ballast and sleepers to handle extra loads hindered BHP Billiton's progress towards its Western Australian iron ore production target of 290 million tonnes per annum. BHP Billiton did proceed with adding capacity at the Jimblebar operations, through the installation of a new primary crusher and additional conveying capacity. This project is expected to be completed in the December 2016 quarter.

FMG successfully reduced its production costs (C1 excluding freight and royalties) 35 per cent to US\$14.31 per tonne in the June 2016 quarter. This placed it among the world's lowest cost iron ore producers with Rio Tinto and BHP Billiton

Construction of Hancock Prospecting's Roy Hill project was completed with a first ore shipment achieved in December 2015. It continues to ramp-up towards a production capacity of 55 million tonnes per year by the end of 2016.



Figure 26 | **Iron ore exploration expenditure 2015-16**
Total Australian spend \$291.2 million Source: ABS

Other notable events during the reporting period include:

- Rio Tinto announced 170 job cuts from its Pilbara iron ore operations, with another 300 roles going at its Perth offices.
- FMG announced a possible deal with Brazilian metals and mining corporation Vale SA to blend 80 million tonnes to 100 million tonnes of low-grade iron ore for sale into China.
- Atlas Iron resumed full production and successfully restructured its debts to help ensure the company's future viability and continued operations in Western Australia.

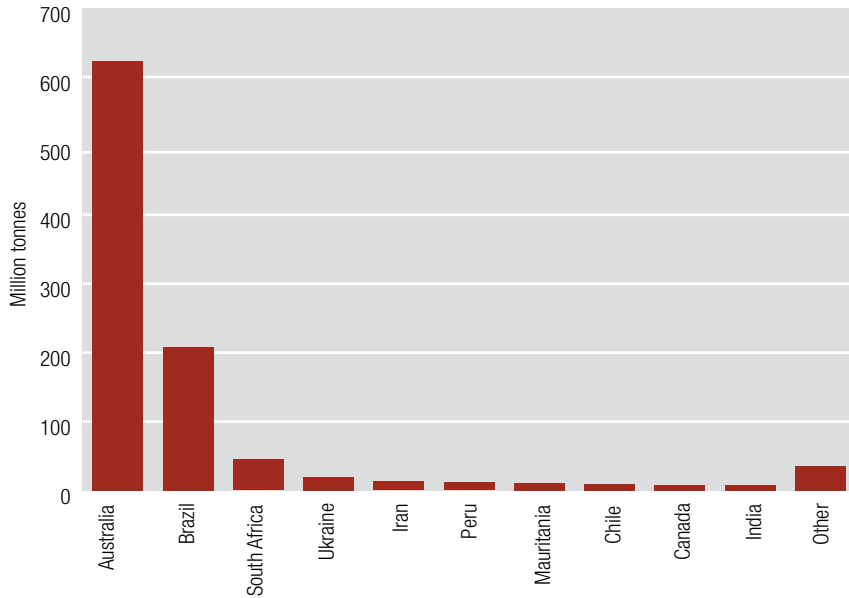


Figure 27 | **China's iron ore imports by country for 2015-16** Source: TEX Report

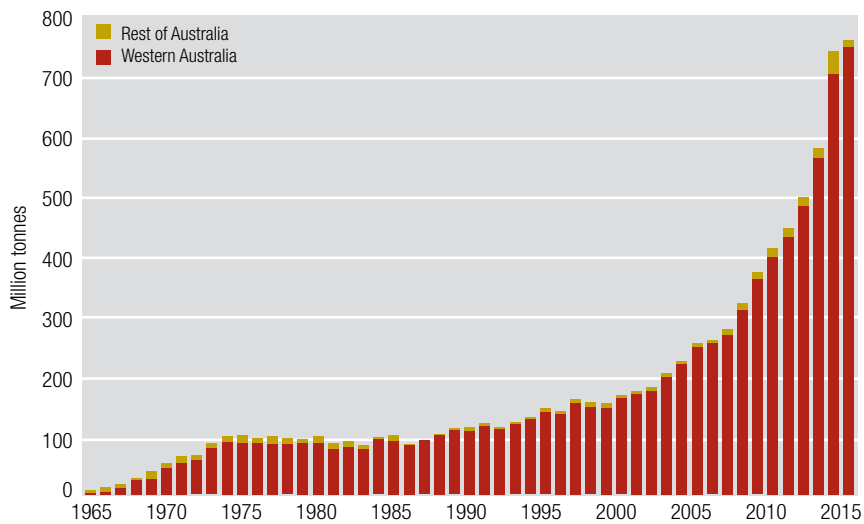


Figure 28 | **Iron ore quantity** Source: DMP and DIIS

- The Nullagine joint venture operation between BC Iron (75 per cent) and FMG (25 per cent) were suspended due to weak iron ore prices.
- Mount Gibson's Koolan Island operations transitioned to care and maintenance after the completion of mining and sales from the Acacia East satellite pit.
- The State Government provided financial assistance to Atlas Iron and Mineral Resources by extending the discounts on export charges at the Utah Point Bulk Handling Facility to 30 June 2017.

Magnetite

The State's largest magnetite mining and processing operation, CITIC Pacific Limited's Sino iron project, continued to increase production in 2015–16. Production lines three and four began producing in the December 2015 quarter, with commissioning on the final two production lines starting in May 2016. It is now expected to achieve its full 24 million tonnes per year production rate in the next 18 to 24 months.

The immediate future of the Karara project (a 48:52 joint venture between Gindalbie Metals and Anshan Iron and Steel Group) was secured through the execution of a US\$200 million loan facility from Ansteel. This provided the project with additional working capital to support continued production.

The Sino and Karara projects continued to receive support under the Western Australian Government's magnetite financial assistance program. The program, which provides eligible producers with a 50 per cent royalty rebate, was extended by two years to April 2018.

State Government assistance is also being provided to the Karara project through discounted port charges at the Port of Geraldton to 2018.



The major commodities resources data file contains the following detailed information:

- quarterly production and sales value figures for iron ore in Western Australia
- historic annual average price of iron ore and recent monthly prices
- value of iron ore exports from Western Australia by destination
- annual historic iron ore production in Western Australia as compared to the rest of Australia
- annual historic calendar year iron ore imports and crude steel production in China since 1980 and a detailed breakdown of iron ore imports to China, including Australia's contribution
- annual historic financial year iron ore imports and crude steel production in China since 1990–91 and a detailed breakdown of iron ore imports to China, including Australia's contribution.

2.2 PETROLEUM

In 2015–16, the value of petroleum products produced in State areas, onshore and offshore, and in adjacent Commonwealth offshore areas amounted to \$18.4 billion, down 24 per cent from \$24 billion in 2014–15. Petroleum production accounted for 21 per cent of the value of mineral and petroleum sales for Western Australia, making the petroleum sector the second most valuable after iron ore.

Japan remained the primary export destination for petroleum, taking 58 per cent, or \$8.4 billion, of Western Australia’s petroleum production. China and the Republic of Korea followed with 14 per cent and 11 per cent of petroleum exports respectively.

In early 2016, changes in information sharing between the Australian and Western Australian Governments resulted in DMP losing access to data relating to Western Australian offshore petroleum fields administered by the Commonwealth. Although DMP is working to regain access to this data, it was not available for this release.

While DMP was able to source alternative data, it is not comparable with the sales data previously provided by the National Offshore Petroleum Titles Administrator, resulting in the need for some estimates. From Q1 2016, DMP has relied on externally sourced production data and DMP estimated the value of production from these offshore fields, based on total production and the prevailing market prices at the time.

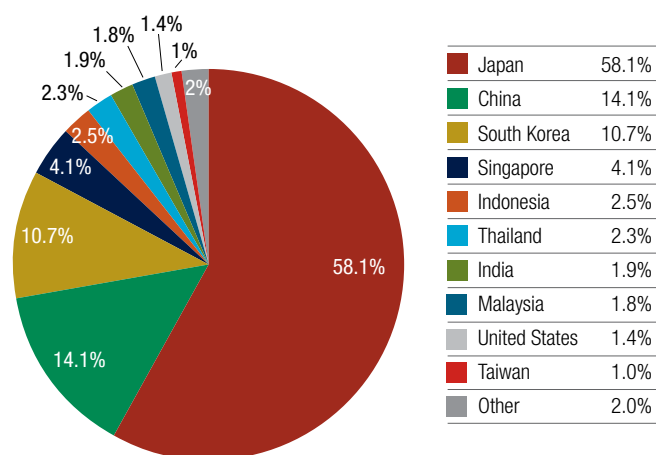


Figure 29 | **Petroleum exports**
\$14.5 Billion Source: DMP and ABS

2.2.1 Liquefied natural gas (LNG)

Pricing

Many LNG contracts are benchmarked to the oil price and consequently LNG prices were affected by the drop in global oil prices.

Contract prices for LNG fell considerably for the second consecutive year. For example, the average price of LNG delivered to Japan was US\$8.05 per million British thermal units (Btu) in 2015–16, down 59 per cent from 2014–15 prices and 50 per cent from 2013–14 prices.

Generally, LNG prices also ended the year significantly lower than they started. For instance, the monthly average price for LNG delivered to Japan fell 34 per cent between July 2015 and June 2016.

The Henry Hub spot gas price also declined. Having started the financial year with a monthly average of US\$2.84 per million Btu, then falling to a low of US\$1.73 in March 2016, the spot price finished with a monthly average of US\$2.59 in June for a yearly average of US\$2.26.

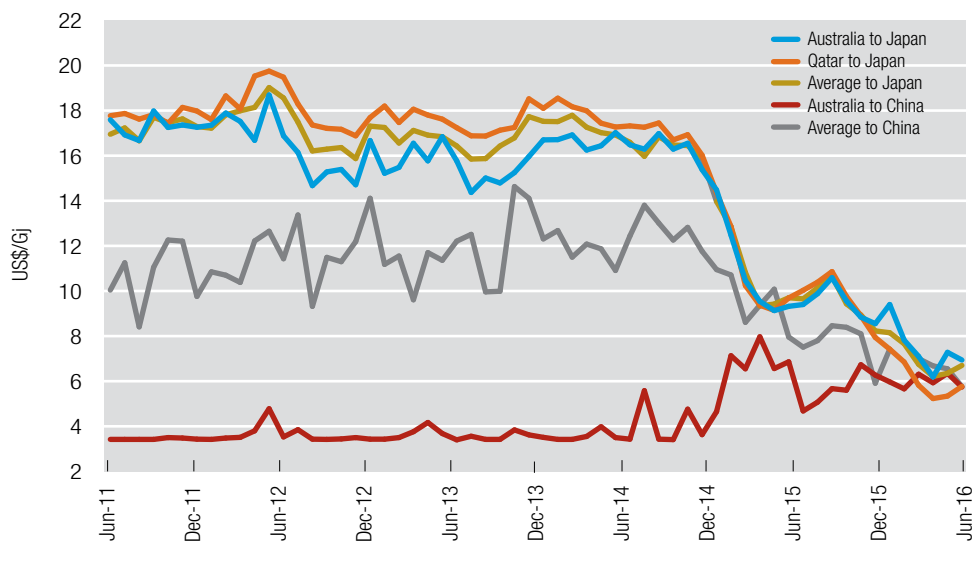


Figure 30 | **LNG import prices** Source: EnergyQuest and Argus Monthly LNG

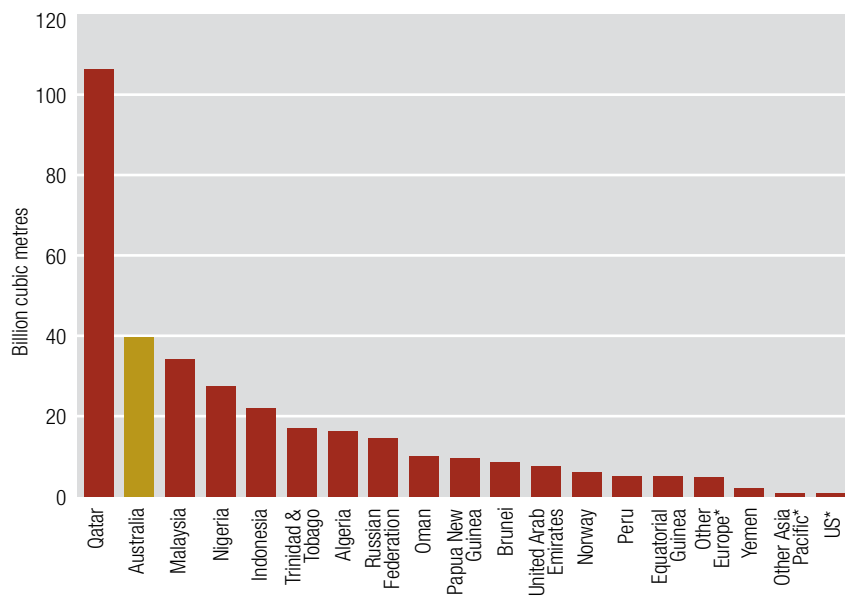


Figure 31 | **World LNG rankings 2015**
Source: BP World Energy Statistics 2016
**Note: Includes Re-Exports*

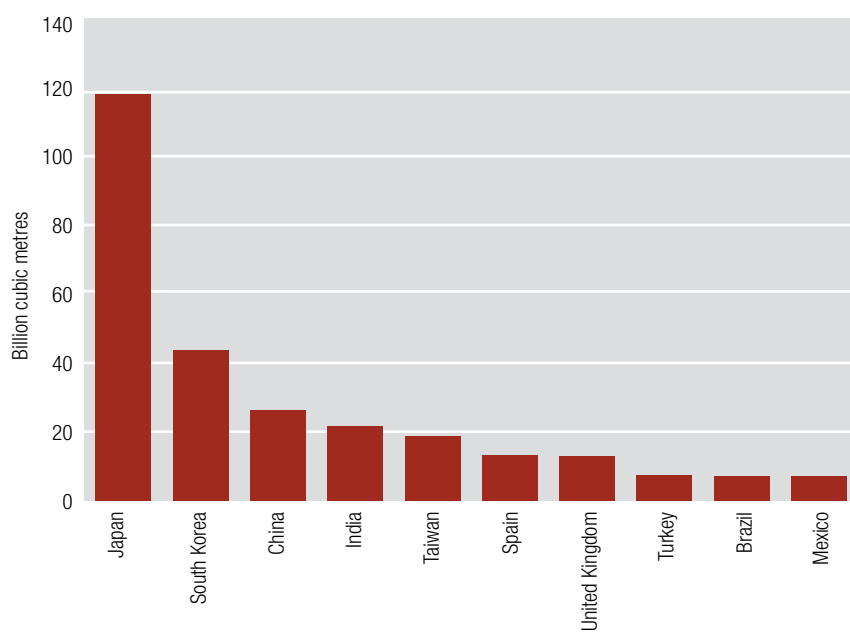


Figure 32 | **Countries importing LNG in 2015**
Source: BP World Energy Statistics 2016

Quantity and value

LNG production in Western Australia has steadily increased since production began. This reporting period was no exception with an increase of 2.5 per cent taking LNG volumes to just less than 21 million tonnes.

LNG is easily Western Australia's most valuable petroleum product, accounting for 12 per cent of the value of the State's mineral and petroleum sales in 2015–16. However, the decline in prices meant a substantial decline in the value of LNG sales, which fell 22 per cent from \$13.8 billion in 2014–15 to \$10.8 billion in 2015–16.

Notable events

After a six-year construction period, Chevron made its first shipment from Train 1 of the Gorgon LNG project on 21 March 2016. A mechanical problem delayed a second shipment until early July 2016. Construction is continuing with production from Train 2 expected in the December 2016 quarter and from Train 3 in the June 2017 quarter.

Chevron also signed a series of LNG supply agreements with Chinese customers, including:

- a five-year agreement with JOVO for 0.5 million tonnes per annum of LNG from 2018
- 10-year agreements with Huadian Green Energy for one million tonnes per annum of LNG, and with ENN for 0.65 million tonnes per annum of LNG.

The State's largest LNG producer, the North West Shelf project, recorded several significant events:

- First gas from the Greater Western Flank Phase 1 project was delivered ahead of schedule in late 2015.
- The \$2.75 billion Greater Western Flank Phase 2 project was approved to develop the Keast, Dockrell, Sculptop, Rankin, Lady Nora and Pemberton hydrocarbon fields via a subsea tie-back to the Goodwyn A platform.
- Hess and Woodside announced they had begun Front-end Engineering and Design (FEED) work on a tie-in of Equus gas.

Other notable events for the LNG sector included:

- Capacity enhancements at Woodside's Pluto LNG projects boosted its production rate to 4.9 million tonnes per annum, up from the previous capacity of 4.3 million tonnes per annum
- Woodside's deferral of the Browse LNG project in March 2016 following the completion of FEED work on a Floating LNG concept due to low oil and gas prices
- Construction of the Wheatstone project continued, although Chevron announced further delays, with first LNG export now expected in mid-2017.

2.2.2 Crude oil and condensate

Pricing

The oil price continued to be negatively affected by high levels of production and excess supply.

The annual average oil price, based on a combination of Brent, West Texas Intermediate and Tapis, was US\$43 per barrel in 2015–16, down 41 per cent from US\$73 per barrel in 2014–15, which follows a 33 per cent fall in the previous reporting period.

The oil price dropped to a monthly average low of US\$32 per barrel in January 2016, before a partial recovery to US\$49 per barrel by June 2016.

The rally reflected several supply side factors, notably sudden disruptions in Iraq, Kuwait, Canada, and Nigeria. There were also signs of a supply shortfall in Saudi Arabia with oil inventories falling to their lowest level in 18 months. In addition, oil production in the United States fell for the first time in several years. Expectations of a production freeze among some Organization of the Petroleum Exporting Countries (OPEC) and non-OPEC countries also helped to sustain the price.

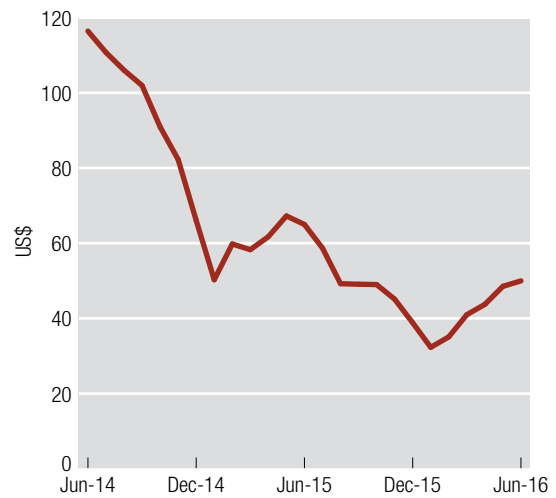


Figure 33 | **Tapis crude oil price US\$/bbl**
Source: WA Treasury Corporation and DMP

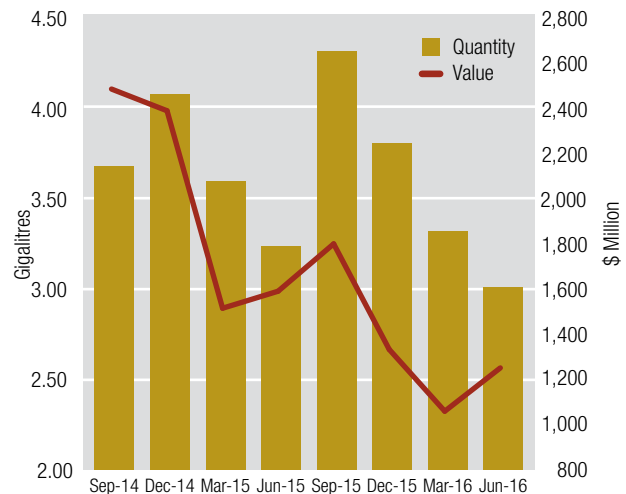


Figure 34 | **Crude oil and condensate quantity and value by quarter**
Source: DMP and DIIS

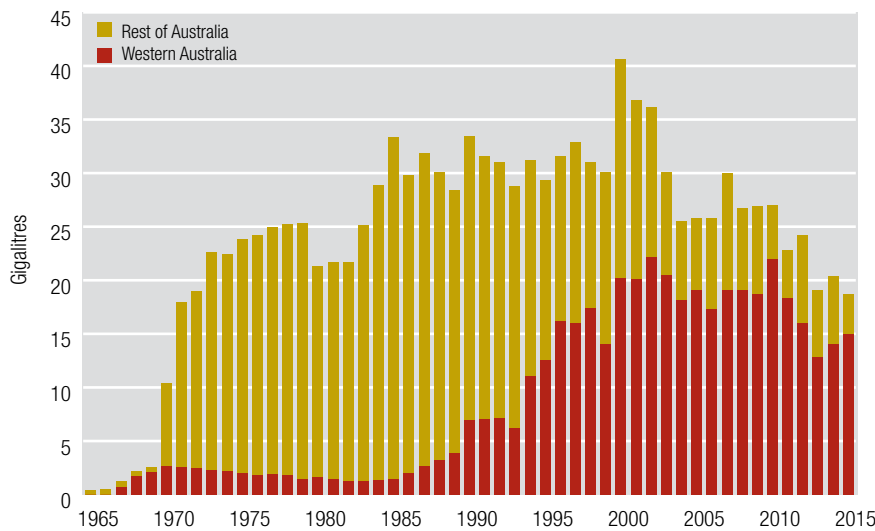


Figure 35 | **Crude oil and condensate quantity** Source: DMP and EnergyQuest

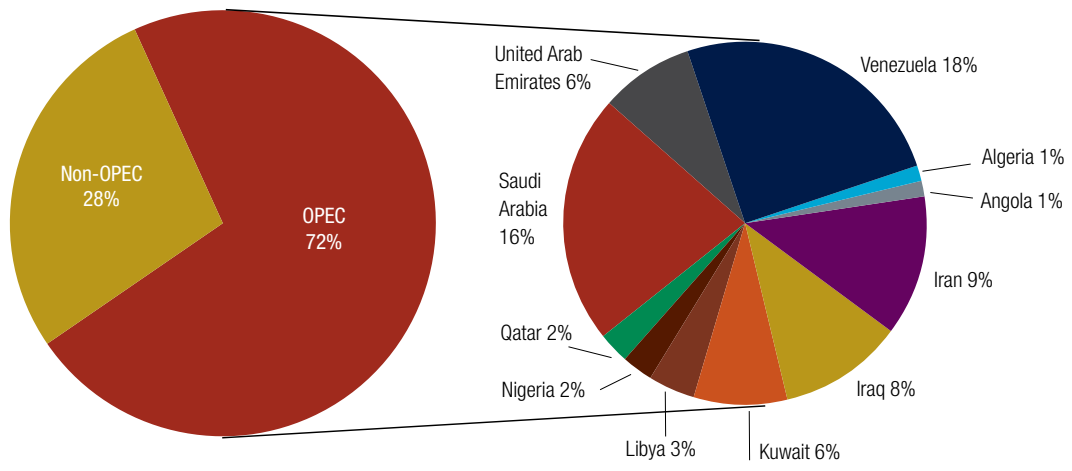


Figure 36 | **OPEC share of world crude oil reserves 2015** Source: BP Statistical Review of World Energy 2015

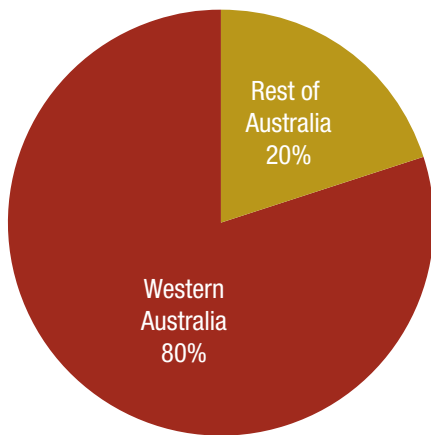


Figure 37 | **Crude oil and condensate production 2015**
Source: DMP and EnergyQuest

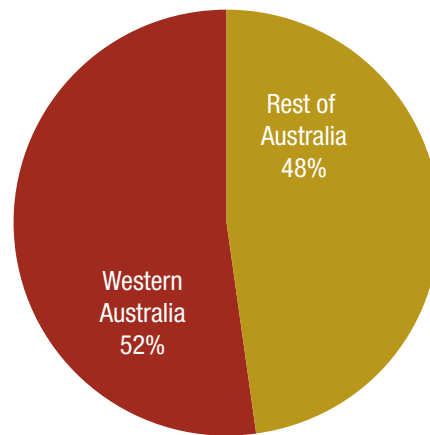


Figure 38 | **Natural gas production 2015**
Source: DMP and EnergyQuest

OPEC is a permanent inter-governmental organisation of oil-exporting developing nations that coordinates and unifies the petroleum policies of its member countries.

OPEC's 14 member countries comprise Algeria, Angola, Ecuador, Gabon, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, United Arab Emirates and Venezuela.

Most OPEC oil is produced for export whereas many non-OPEC countries, such as the US, produce oil primarily to meet their domestic needs.

Non-OPEC countries account for less than 25 per cent of the world's proven oil reserves, but produce 41 per cent of the world's oil. They also possess most of the world's capacity for refining crude oil into petroleum products such as petrol and heating oil.

Quantity and value

Based largely on the falling oil price, the value of crude oil and condensate sales fell 33 per cent and 32 per cent respectively in 2015–16. The value of crude oil production fell from \$4.5 billion in 2014–15 to \$3 billion in 2015–16, while condensate sales fell from \$3.5 billion to \$2.4 billion.

In 2015–16, crude oil volumes were down 3 per cent to 7.7 million kilolitres, while condensate production increased slightly (0.3 per cent). Western Australia's condensate production is a by-product of natural gas production from fields on the North West Shelf.

The volume of LPG (butane and propane) sold in 2015–16 fell almost 4 per cent, from 553,055 tonnes to 531,595 tonnes, with the value of LPG sales falling 39 per cent against the previous reporting period to \$249 million.

Notable events

The Greater Enfield oil development received a positive final investment decision in June 2016 with Woodside (60 per cent) and Mitsui (40 per cent) committing to a US\$1.9 billion project.

Production at Buru Energy's Ungani oil field was suspended at the end of January 2016 due to the low oil price and high transport costs. Commercial oil production started in July 2015.

In March 2016, production ceased from Woodside's Balnaves oil field.

- Triangle Energy completed the purchase of AWE's 57.5 per cent stake in the Cliff Head oil field.
- Santos and Quadrant Energy completed the sale of the Stag oil field to Mitra Energy.

2.2.3 Domestic natural gas supply

Pricing

The average price of gas sold into the Dampier to Bunbury Natural Gas Pipeline (DBNGP) was \$4.92 per gigajoule in 2015–16, representing a small increase from \$4.89 in 2014–15.

Production and value

In 2015–16, the quantity of natural gas supplied into the domestic market increased 3.5 per cent to 10.2 billion cubic metres.

The value of domestic gas sales is based on the total sales value at the points of entry into the DBNGP, Parmelia pipeline and Goldfields pipeline. The value of domestic gas sales increased almost 5 per cent to reach \$1.9 billion, up from \$1.8 billion in 2014–15. This marginal increase was consistent with contractual prices, which can be linked to changes in the consumer price index.

Notable events

- The North West Shelf joint marketing agreement ceased at the end of 2015, with natural gas supply now being sold on a partner-by-partner basis. This is expected to introduce greater competition into the market and benefit gas market consumers by helping deliver the best available contract terms and conditions.
- The first sale agreement under this new marketing arrangement was completed between Synergy and Woodside in August 2016.
- A new domestic gas supply deal was signed between Alinta Energy and Chevron for 20 petajoules of natural gas annually from Wheatstone over seven years, starting in 2020.



The major commodities resources data file contains more detailed information including:

- quarterly production and value figures for crude oil and condensate
- quarterly production and value figures for natural gas, LNG and LPG (butane and propane)
- historic annual average Tapis crude oil prices, and recent monthly prices
- value of exports of petroleum products from Western Australia by destination
- annual historic crude oil and condensate production in Western Australia compared to the rest of Australia
- production and domestic consumption of natural gas in Western Australia, compared to the east coast of Australia
- global trade in LNG, including Western Australia and Australia's position within the global market
- proven global oil reserves, by country and OPEC affiliation.

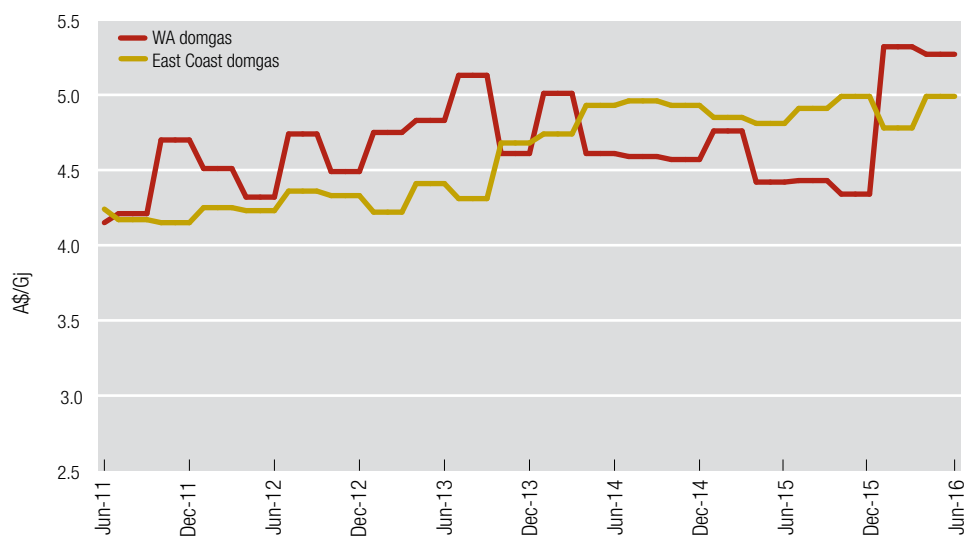


Figure 39 | Average natural gas prices Source: EnergyQuest and DMP

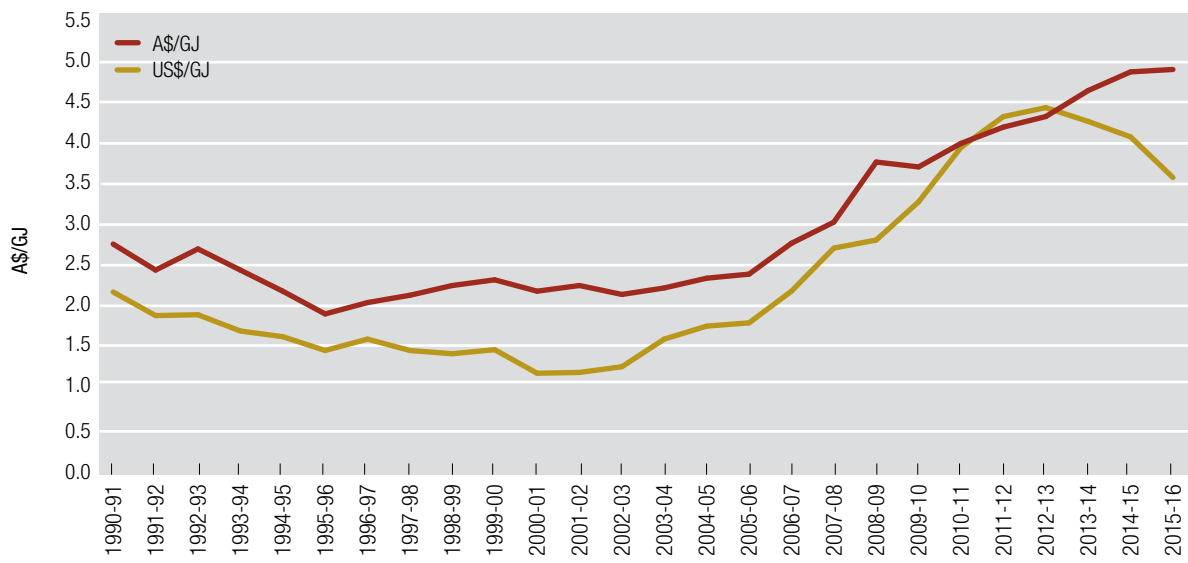


Figure 40 | Western Australian average domestic natural gas price Source: DMP
The value of Western Australian domestic gas sales is based on the summation of total domestic gas sale values as at the point of entry into the Dampier To Bunbury Natural Gas Pipeline (DBNGP) or where applicable, the Parmelia pipeline and Goldfields pipeline.

2.3 GOLD

Pricing

In US dollars, the average yearly price of gold has been declining since 2011–12. The average price fell again in 2015–16, down almost 5 per cent from US\$1224 per ounce in the previous reporting period to US\$1167 per ounce.

While the gold price was fairly stagnant to December 2015, it made substantial gains across the first six months of 2016 as investors looked for secure assets amid weak global economic growth, as well as global political and economic instability. The gold price rose 16 per cent from a monthly average of US\$1097 per ounce in January 2016 to US\$1276 per ounce in June 2016.

In 2013, the gold price fell sharply. At the time, the Australian dollar was trading around US\$0.95. In response, many Western Australian gold producers aggressively cut costs. Now that the Australian dollar has dropped, and gold producers are operating at a much lower cost base than in the past, Australian producers are enjoying a period of strong profitability.

The average Australian dollar price of gold increased for the second successive year. In 2015–16, the average price rose 9 per cent to \$1613 per ounce, up from \$1479 in 2014–15. In June 2016, the monthly average price reached \$1731, a high not seen since November 2011.

Quantity and value

Following further improvements in the Australian dollar gold price, the value of sales reached a record \$10 billion in 2015–16, a 10 per cent increase on the 2014–15 value of \$9.1 billion.

The value of gold sales represented 11 per cent of all mineral and petroleum sales in Western Australia in 2015–16.

Western Australia is Australia's major gold producer, accounting for about 70 per cent of Australia's production.

In 2015–16, Western Australia's gold production reached more than 6.3 million ounces, up slightly from 6.2 million ounces in 2014–15.

Ten gold projects accounted for 64 per cent of the State's total gold production. They were:

- Newmont Mining Corporation's Boddington mine (12 per cent with 779,279 ounces)
- KCGM's Kalgoorlie Super Pit (11 per cent with 667,484 ounces)

- AngloGold Ashanti's Tropicana mine (7 per cent with 452,427 ounces)
- Newcrest's Telfer mine (7 per cent with 440,160 ounces)
- Gold Field's St Ives mine (6 per cent with 363,147 ounces)
- Regis Resources' Duketon operations (5 per cent with 310,676 ounces)
- Gold Field's Granny Smith mine (5 per cent with 297,560 ounces)
- St Barbara Ltd's Gwalia operations (4 per cent with 267,353 ounces)
- AngloGold Ashanti's Sunrise Dam mine (3 per cent with 215,875 ounces)
- Northern Star Resources' Jundee mine (3 per cent with 209,572 ounces)

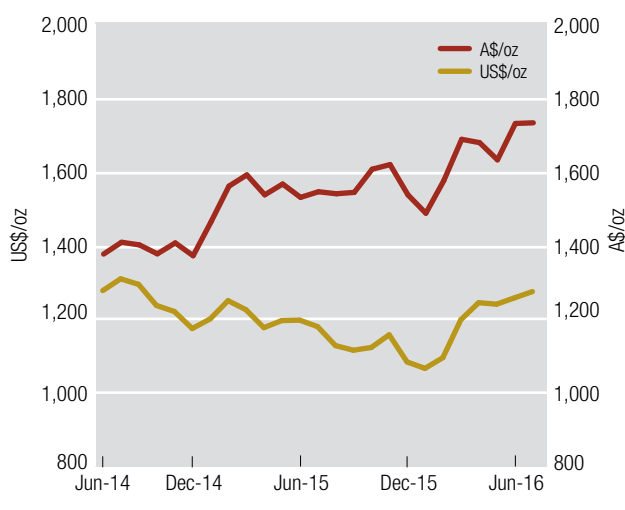


Figure 41 | Gold price Source: DMP and DIIS

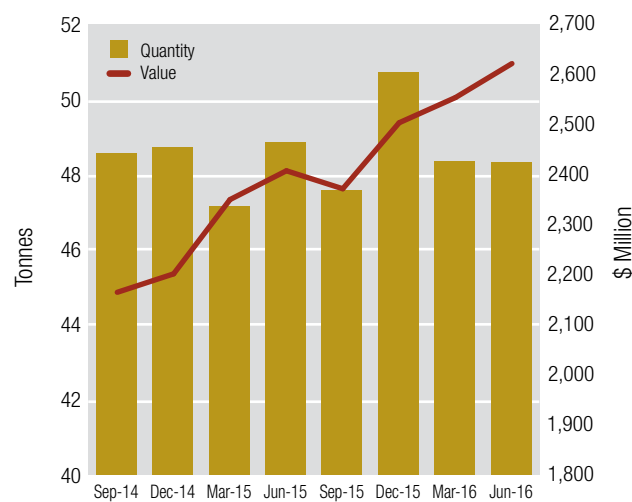


Figure 42 | Gold quantity and value by quarter Source: DMP and DIIS

As an indication of the strength of the gold market in 2015–16, the number of principal gold projects, those that produced more than 2500 ounces of gold, increased from 32 to 39.

Notable events

- Western Australia’s newest gold mine, Doray Minerals’ Deflector gold project, started mining in May 2016. Deflector is a high-grade, gold–copper deposit in the southern Murchison region. The project has an initial mine life of six years and is reported to have significant exploration potential.
- Tropicana celebrated production of its one millionth ounce of gold on schedule after only two years of operation. The 292 kilometre-long gas pipeline servicing the Tropicana project was also completed.
- Saracen Mineral Holdings completed the re-opening of the Thunderbox gold mine, with commercial production achieved in April 2016. The project has a five-year open pit mine life and is reported as having potential for underground expansion.

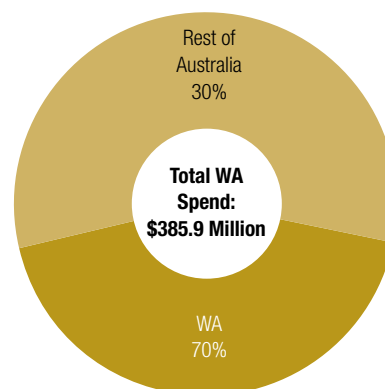


Figure 44 | **Gold exploration expenditure 2015–16**
Total Australian spend \$548.1 Million Source ABS

- Metals X resumed open pit and underground mining in the Central Murchison region in June 2015. The project is expanding historic mines and has an estimated 13-year mine life. In November 2015, Metals X and Southern Gold also began a planned eight month production schedule at the Cannon Mine east of Kalgoorlie.
- Underground production at Ramelius Resources’ re-opened Vivien gold mine began at the end of 2015. The project has an expected three-year mine life.

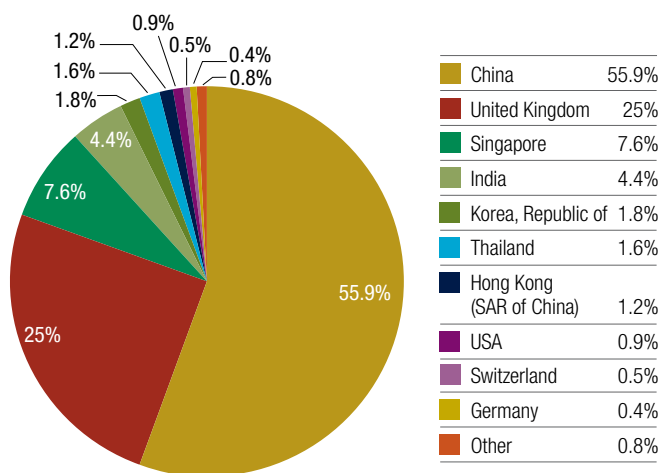


Figure 43 | **Gold exports**
\$15.7 Billion Source: ABS and DMP estimate
Note: Includes gold refined/processed and exported from Western Australia, but produced from mining operations in other States, Territories and overseas.

A NOTE ABOUT GOLD EXPORT DATA

The ABS releases Western Australian export trade data which shows a value for the export of gold that is significantly higher than the gold actually produced. This export data should be interpreted with some caution.

The Perth Mint operates Australia’s only London Bullion Market Association accredited gold refinery. It refines gold produced in other Australian states and territories, as well as from surrounding countries. It also refines secondary gold, mainly from Asia. This refined gold is then exported from Western Australia.

Therefore, the ABS export figure for Western Australia includes gold produced in other jurisdictions.

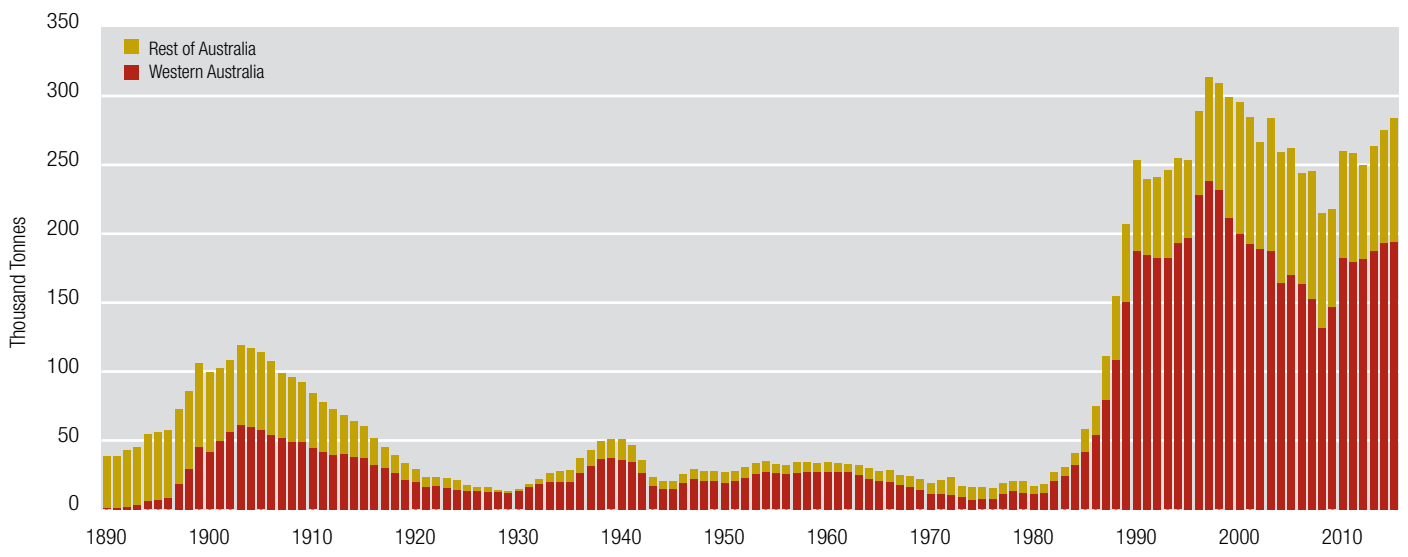


Figure 45 | **Gold production** Source: DMP and DIIS

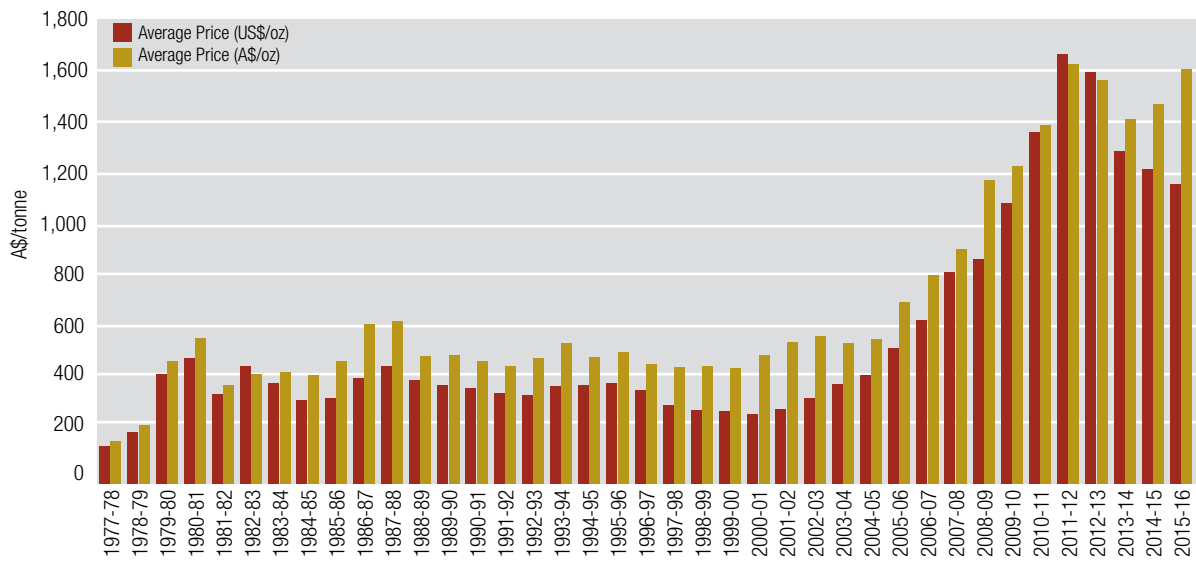


Figure 46 | **Historic monthly gold price, per ounce** Source: DMP

2.4 ALUMINA AND BAUXITE

Pricing

The Australian dollar alumina price continued its downward trend in 2015–16, falling 5.5 per cent to finish the financial year with an average of \$346 per tonne. The US dollar price was affected more substantially, dropping 17 per cent throughout the financial year to finish with an average price of \$252 per tonne for 2015–16.

The continued low prices have started to trigger a reduction in global production with many Chinese refineries opting to cut output. Alcoa also reduced its global production capacity by 10 per cent.

Quantity and value

Western Australian alumina sales have gradually increased year on year since 2010–11. In 2015–16, sales volumes increased a little more than 1 per cent to reach 13.9 million tonnes, up from 13.7 million tonnes in 2014–15.

The lower alumina price reduced the value of sales in 2015–16 to \$4.9 billion, a decrease of almost 2 per cent. This followed the record \$5 billion achieved in 2014–15. Even still, Alumina was Western Australia's fourth most valuable commodity, accounting for almost 6 per cent of the mineral and petroleum sales value.

The United Arab Emirates remained the top destination for Western Australian alumina, increasing its share to 21 per cent of alumina exports. China and Bahrain accounted for 14 per cent and 11 per cent of exports respectively, while South Africa's share fell to less than 10 per cent.

Notable events

In February 2016, Alcoa celebrated having mined one billion tonnes of bauxite over its 53 years of operations in Western Australia.

In the past, all Alcoa bauxite was refined into alumina before export. However, Alcoa received State Government approval for an export trial of up to 500,000 tonnes of bauxite, with a maiden shipment of 47,000 tonnes departing in June 2016.

The State's other alumina producer, Worsley Alumina, undertook an operational restructure to reduce costs and improve profitability, resulting in about 390 job losses.



The major commodities resources data file contains detailed information about alumina including:

- quarterly production and value figures
- historic annual average prices and recent monthly prices
- value of alumina exports from Western Australia by destination
- annual historic production in Western Australia compared to the rest of Australia.

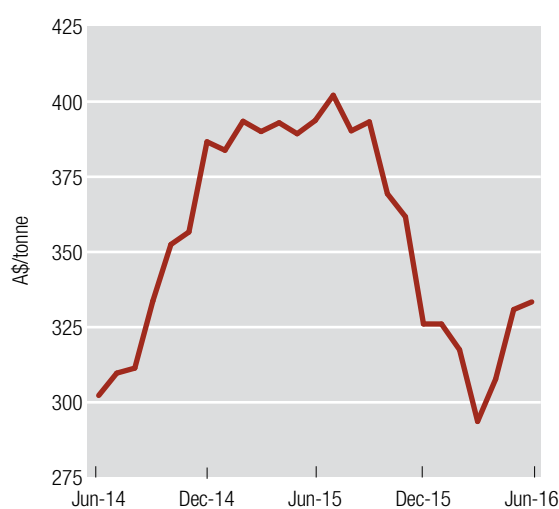


Figure 47 | Alumina price – A\$/tonne
Source: DMP and DIIS

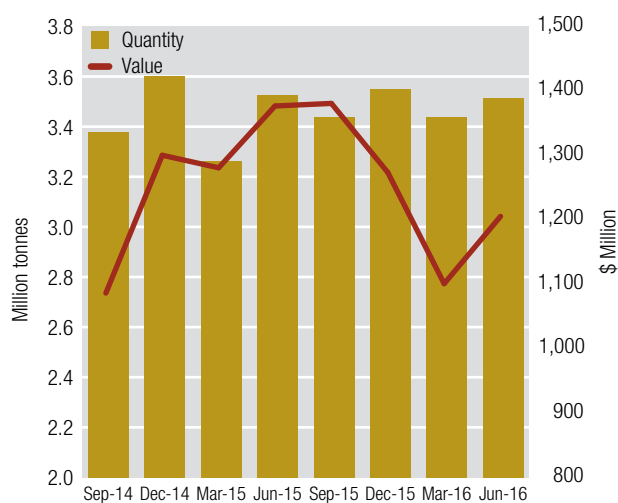


Figure 48 | Alumina and bauxite quantity and value by quarter
Source: DMP and DIIS

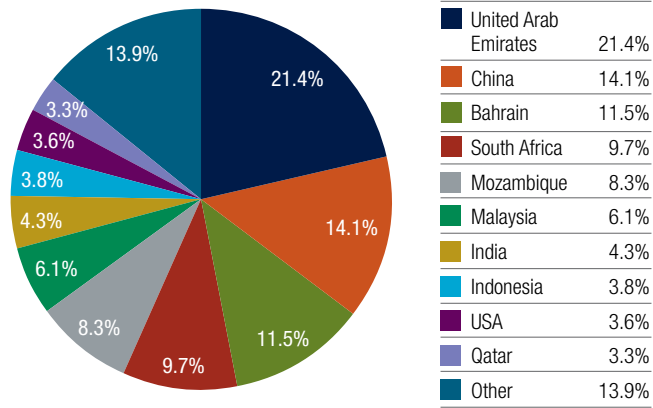


Figure 49 | **Alumina exports**
\$4.6 Billion Source: DMP estimate

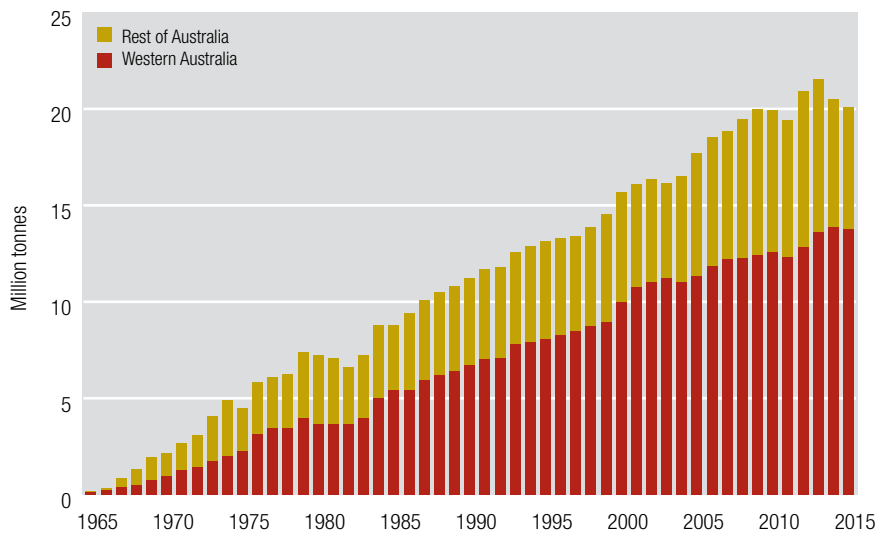


Figure 50 | **Alumina quantity** Source: DMP and DIIS

2.5 NICKEL

Pricing

The nickel industry struggled through another period of low prices, principally due to large global inventories and weak demand.

The average nickel price was US\$9321 per tonne in 2015–16, down almost 40 per cent from an average of US\$15,435 the previous year. In February 2016, it reached a monthly average low of just US\$8310 per tonne – its lowest level in 13 years. The yearly average price has fallen consistently since 2010–11.

For Australian producers, the exchange rate again provided a small cushion against the global price falls. In Australian dollars, the average price of nickel was \$12,800 per tonne in 2015–16, down 30 per cent from an average of \$18,389 per tonne in 2014–15. The Australian dollar price hit its lowest point for the period in March 2016 with a monthly average of \$11,590 per tonne.

Quantity and value

In 2015–16, nickel sales were down 4 per cent to 175,722 tonnes. The closure of BHP Billiton's Kalgoorlie smelter for maintenance for 21 days during October 2015 had a small effect on volumes of about 7000 tonnes. Western Australian volumes have been trending down since 2012–13, a full two years after the start of the current downwards price trend.

The value of Western Australian nickel sales fell slightly more than 31 per cent from \$3.2 billion in 2014–15 to \$2.2 billion in 2015–16. The steep price falls and the closure of mines in Western Australia contributed to the lower value.

Western Australia's largest export market for nickel in 2015–16 was Malaysia at 41 per cent. Singapore overtook China as the State's second largest market with almost 14 per cent, up from 6 per cent the previous year.

Notable events

Western Australian nickel producers are typically fairly low-cost operations. However, the low nickel price continues to place pressure on the viability of mines. Small, high-grade mines, such as Independence Group's new Nova development and Western Areas-owned Forrestania, appear to be well placed to weather the lower prices. Other mines at the higher end of the cost curve could be finding it tougher.

This was highlighted at the end of 2015 and the start of 2016 when the State's nickel sector was dominated by mine closures and job losses, including:

- Mincor Resources suspended the Miitel project at the end of January 2016
- Panoramic Resources' Savannah and Lanfranchi operations were placed on care and maintenance
- Independence Group cut 30 jobs and suspended a \$15 million exploration program at its Long nickel mine.

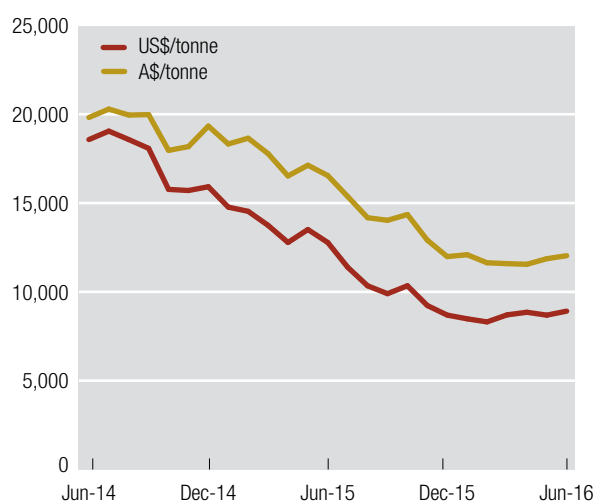


Figure 51 | Nickel price Source: DMP and DIIS

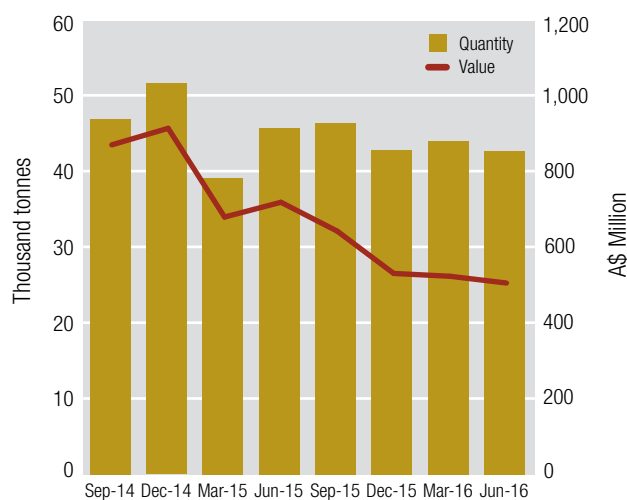


Figure 52 | Nickel quantity and value by quarter Source: DMP and DIIS

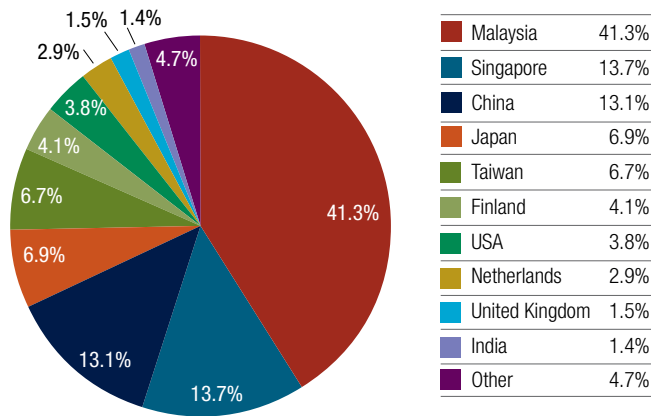


Figure 53 | **Nickel exports**
\$2 Billion Source: DMP

Despite these challenging conditions, there have been some positives for the nickel industry.

- As at the end of May 2016, Independence Group's Nova nickel mine project was more than 90 per cent complete. The company reports that the project remains on schedule and on budget for commissioning in late 2016, with production of first concentrates expected in December 2016.
- BHP Billiton announced its aim to shave \$440 million from the annual costs of Nickel West. It also plans to extend the life of its Nickel West operations until at least 2032 through several possible investments including spending US\$15 million to US\$20 million to access the Venus orebody, and the development of the Yakabindie deposit, which would eventually replace production at Mount Keith. A US\$150 million rebuild of the Kalgoorlie smelter was also proposed for 2023 to extend its life to 2040.
- Panoramic Resources announced a major resource upgrade at the Savannah North prospect within the Savannah operations. Panoramic was able to raise \$10.7 million to support exploration and to complete a feasibility study for the project.



The major commodities resources data file contains the following information relating to nickel:

- quarterly production and value figures
- historic annual average prices and recent monthly prices
- value of nickel exports from Western Australia by destination
- annual historic nickel production in Western Australia compared to the rest of Australia.

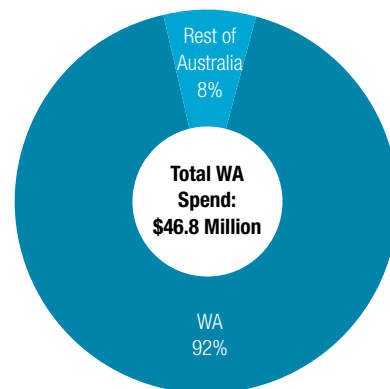


Figure 54 | **Nickel cobalt exploration expenditure 2015-16**
Total Australian spend \$50.6 Million Source: ABS

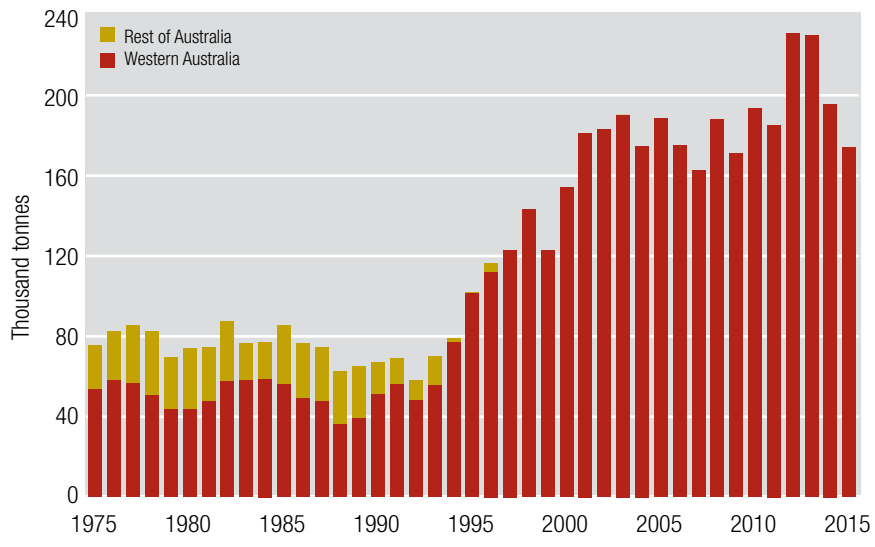


Figure 55 | **Nickel quantity** Source: DMP and DIIS



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2.6 BASE METALS

For the purposes of the Statistics Digest, 'base metals' refer to copper, lead and zinc.

Pricing

Base metals all followed the downward commodity price trend for 2015–16.

The copper price continued to be hampered by excess supply with the average price for copper falling for the fifth consecutive year from US\$6371 per tonne to US\$4884 per tonne. This was a 23 per cent decrease and included a seven-year monthly average low of US\$4463 per tonne in January 2016.

In Australian dollars, copper prices averaged \$6706 per tonne for 2015–16, a decrease of 12 per cent from the 2014–15 average.

The average US and Australian dollar price of zinc fell 20 per cent and 9 per cent respectively. This followed gains in the average price during 2014–15. The US dollar price averaged US\$1761 per tonne for 2015–16, while the Australian dollar price averaged \$2415 per tonne for the year. The relatively improved price across the first six months of 2016 was driven by the closure of several mines around the world, leading to a draw-down on stockpiles.

Lead was the better performer of the base metals, though prices were still lower than in the previous financial year. Lead averaged US\$1713 per tonne for 2015–16, down from US\$1984 per tonne (14 per cent), compared to 2014–15. The Australian dollar price fared better with only a small decline to \$2352 per tonne from \$2374 per tonne in 2014–15. The average monthly price of lead reached a 13-month high in February 2016 of \$2481 per tonne.

Quantity and value

The value of base metals sold in 2015–16 was \$1.4 billion, a decrease of 16 per cent from 2014–15 and the lowest value since 2011–12.

This fall was in spite of rising copper and zinc production, which reflects the overall weakness in base metals prices.

Copper accounted for 85 per cent of the total value of base metals at \$1.2 billion. This was down marginally from \$1.3 billion in 2014–15.

However, copper volumes were up 4 per cent to 190,830 tonnes. Copper sales volumes were dominated by DeGrussa (35 per cent), Boddington (20 per cent), Nifty (10 per cent) and Telfer (9 per cent).

Zinc output rose to 80,210 tonnes, resulting in sales valued at \$190 million. Production and sales were both at their highest level since 2009–10. This is despite MMG Limited shifting to campaign milling at Golden Grove, the State's major zinc producing project. Independence Group's Jaguar operation was responsible for all of the remaining production.

Lead production fell to its lowest level in more than a decade following the temporary closure of Paroo Station in January 2015 amid difficult market conditions. Just 6040 tonnes was produced in 2015–16 valued at \$14.6 million. All production was from the Golden Grove project.

The Republic of Korea displaced China as the major export destination for Western Australian base metals in 2015–16, accounting for 27.5 per cent of exports. China was the State's second largest base metals customer with 26 per cent followed by Japan (16 per cent), the Philippines (13 per cent) and Germany (10 per cent).

Notable events

The State's largest copper producing project, Sandfire Resources' DeGrussa operation, celebrated the export of its one millionth tonne of copper concentrate in March 2016, four years since the start of mining.

Sandfire Resources also completed a \$40 million off-grid solar and battery storage facility at the mine in June 2016 to supplement an existing 19MW diesel-fired power station. The solar project is expected to supply about 20 per cent of DeGrussa's power requirements, reducing diesel consumption and cutting carbon emissions by more than 12,000 tonnes of carbon dioxide annually.

The Golden Grove copper-lead-zinc project reduced production in January 2016 to preserve the value of its resource amid low prices and also shifted to campaign milling to reduce costs. As a result, more than 100 jobs were lost at the project.

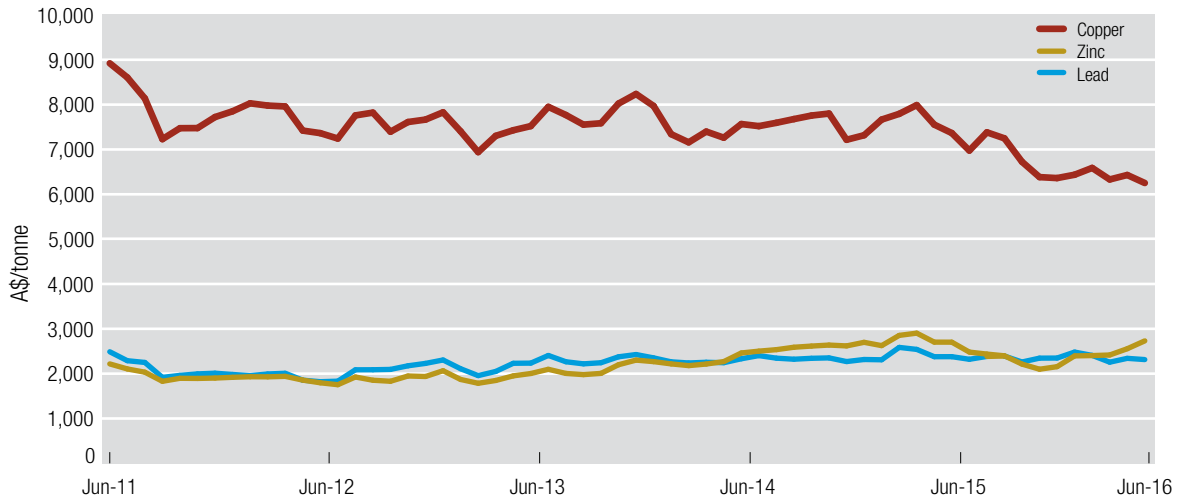


Figure 56 | **Copper, zinc and lead price** Source: LME via Metalprices.com

An estimated eight jobs were also lost at Independence Group's Jaguar project in late 2015.

Metals X assumed control over the Nifty copper mine following a takeover of Aditya Birla Minerals in August 2016.

Updates to possible future projects included:

- KBL Mining again announced a delay to its Sorby Hills lead project feasibility study. Production from the project is now not likely until at least 2018
- Kagara Mining sold the Admiral Bay zinc project to Metalicity. Admiral Bay is estimated to contain Australia's largest zinc deposit with an inferred resource of 170 million tonnes containing 7.5 per cent zinc equivalent, or 4.1 per cent zinc, 2.7 per cent lead, and 25 grams per tonne of silver.



The major commodities resources data file contains:

- quarterly production and value figures for base metals
- historic annual average prices for copper, lead and zinc and recent monthly prices
- value of base metals exports from Western Australia by destination
- annual historic base metals production in Western Australia compared to the rest of Australia.

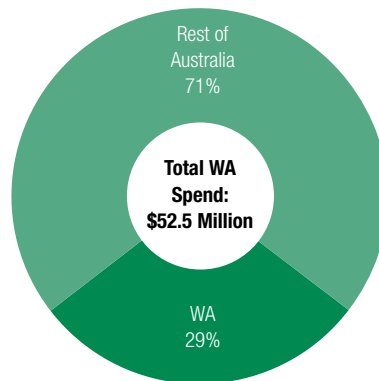


Figure 57 | **Copper, lead, zinc exploration expenditure 2015-16**
Total Australian spend \$180.3 Million Source: ABS

2.7 MINERAL SANDS

Pricing

Demand for mineral sands products remained subdued in 2015–16 amid weak global economic conditions. Prices for rutile, zircon and titanium dioxide were, on average, fairly stable compared to those in 2014–15.

However, prices did end the year lower than where they started. Monthly average prices fell 4 per cent for rutile, 2 per cent for titanium dioxide and 15 per cent for zircon.

Quantity and value

Mineral sands production in Western Australia mostly comprises titanium minerals (ilmenite, leucoxene, synthetic rutile and rutile) and zircon. Other products, such as garnet sand and staurolite, are also produced.

The mineral sands industry grew strongly off a relatively low base in 2014–15, with a 10 per cent increase in sales value to \$539 million. Industry strength varied considerably quarter to quarter, with the strongest quarter (December) representing 35 per cent of sales and the weakest quarter seeing only 18 per cent.

Volumes and sales value for titanium group minerals increased substantially in 2015–16 largely due to constrained production in the previous period, with substantial capacity at Tutunup South and Capel going unused for much that year. With these sites back in production, ilmenite volumes effectively doubled.

Garnet and zircon sales volumes decreased 16 per cent and 10 per cent respectively, but improvements in the average price slightly cushioned the drop in sales value for garnet, which fell only 13 per cent.

Sales were dominated by two producers, Tronox and Iluka Resources. These companies accounted for about 82 per cent (by value) of the State's mineral sands in 2015–16.

The United States and China were the State's major export markets, accounting for nearly 40 per cent of exports. Other export destinations were the United Kingdom (11 per cent) and the Netherlands (10 per cent).

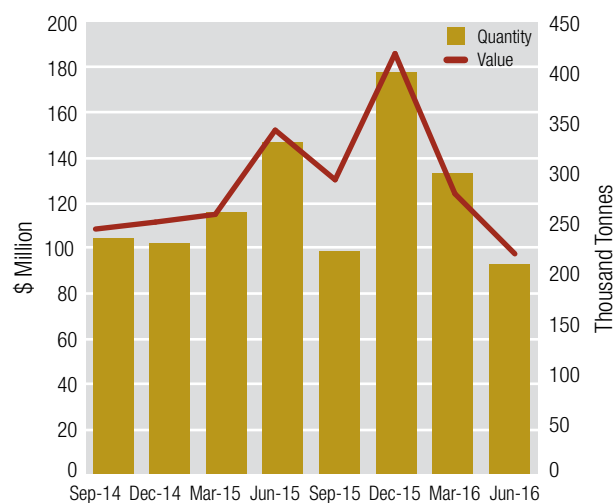


Figure 58 **Mineral sands quantity and value by quarter**
Source: DMP and DIIS

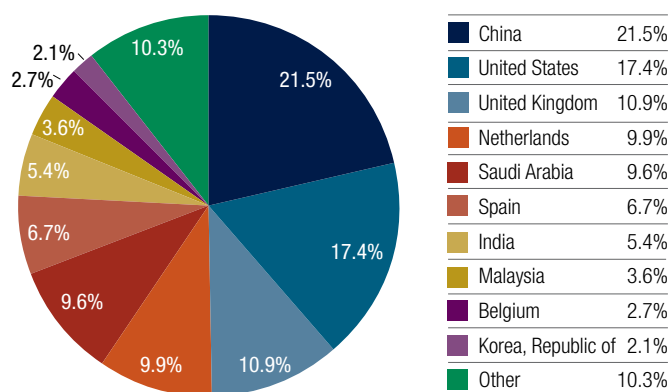


Figure 59 **Mineral sands exports \$850 Million** Source: DMP estimate
Note: Exports include titanium dioxide and product sourced from private land, overseas and other States and processed in Western Australia.

Notable events

MZI Resources officially opened its Keysbrook mineral sands project in April 2016. The project is the State's first primary producer of leucoxene, which is used in pigments for paints and paper and in the production of lightweight titanium metal. The project is also a major producer of zircon concentrate used in ceramics and refractories and specialty industrial applications. Keysbrook represents one of the largest new project developments in the Peel region and is designed to produce more than 95,000 tonnes of high-value mineral sands products per annum. As this project is operated on 'minerals to owner' land, it is not captured by DMP's quantity and value reporting.

In April 2016, Iluka suspended its Jacinth-Ambrosia mine in South Australia for 18 to 24 months, depending on market conditions. Concentrates

from this project are processed through mineral separation plants in Western Australia and Victoria. However, the Western Australian processing operations were not immediately affected as they continued to receive concentrate from the mine's inventories.

Notable mineral sands projects on the horizon include Sheffield Resources' Thunderbird project near Derby in the north of the State. In 2015–16, Sheffield established a maiden resource and updated its pre-feasibility study to suggest a 40-year mine life for the project. Start of construction is expected in 2017.

Iluka is also planning to develop its mineral sands deposit at Cataby, a chloride ilmenite deposit that will also produce zircon and rutile over an expected 8.5-year mine life.

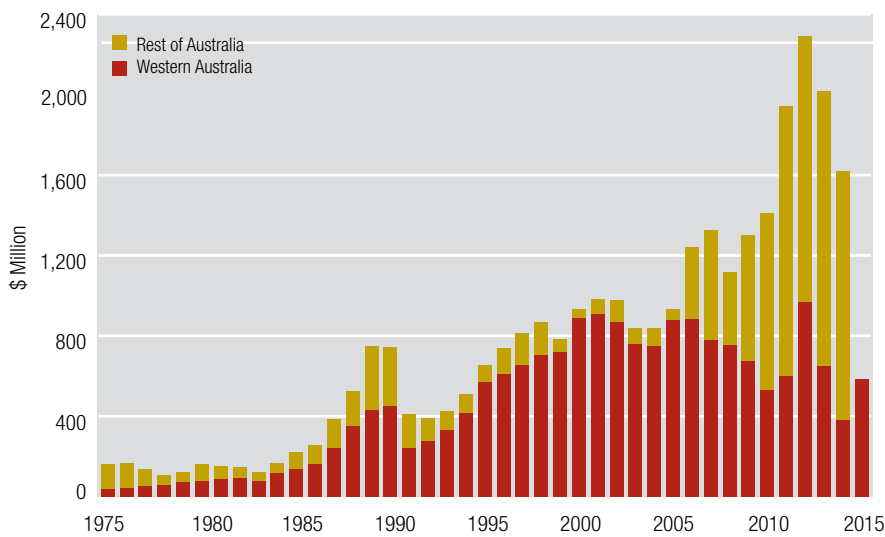


Figure 60 | **Mineral sands quantity**
Includes Ilmenite, Leucoxene, Upgraded Ilmenite, Rutile, Zircon and Monazite
Source: DMP and DIIS
2015 data for "Rest of Australia" was not available at time of publication

2.8 DIAMONDS

Pricing

There is no universal, transparent market price for diamonds and little publicly available data on prices received by mining companies. However, it is apparent Western Australia's diamond producers received lower prices for their rough diamonds in 2015–16 compared to 2014–15, with prices appearing to drop about 23 per cent. This continues the downward trend seen in the previous financial year.

Quantity and value

Diamond sale volumes in Western Australia were 13.9 million carats in 2015–16, a significant jump of more than one third on the 10.4 million carats sold in 2014–15, and the highest since 2009–10. However, the decreased price received for these diamonds resulted in an increase in sales value of only 3 per cent to \$353.7 million.

Given that operations at Kimberley Diamond's Ellendale mine were suspended on the first day of the financial year, only stockpile sales were made from that mine, making Rio Tinto's Argyle diamond mine essentially the State's only source of diamond sales in 2015–16.

Notable events

On 1 July 2015, operations at the Ellendale diamond mine were suspended after Kimberley Diamonds Company Proprietary Limited (KDC), a subsidiary of Kimberley Diamonds Limited and the former holder of the Ellendale mining lease, went into voluntary administration. This was reportedly due to reduced revenues from a sharp decline in rough diamond prices received at auction in June 2015.

During the year, the KDC liquidators auctioned site assets resulting in a significant portion of Ellendale's plant and equipment being sold and removed. DMP has undertaken works to manage safety and environmental risks while the site is effectively on care and maintenance.

2.9 OTHER

2.9.1 Coal

Pricing

In a global context, world coal prices remained relatively stable throughout most of 2015–16. Western Australian coal managed an average price of about \$49 per tonne, an increase of 4.3 per cent on 2014–15.

Quantity and value

Western Australia has two black coal mines, both in Collie in the South-West. The amount of coal sold increased 5 per cent from 6.5 million tonnes in 2014–15 to 6.9 million tonnes in 2015–16. The value of coal sales rose almost 10 per cent to \$336 million.

Around 90 per cent of Collie coal is used as thermal coal, mostly in power stations, but some is used to fire cement kilns in Perth. The remainder is used for metallurgical purposes by the mineral sands industry to transform ilmenite to synthetic rutile while a small amount is used to reduce silica sand to silicon.

To date, the export of raw coal through Kwinana port has been minimal.

Notable events

In April 2016, China announced a cut to the statutory working days of coal miners from 330 to 276 days a year in a bid to help address a perceived over supply in the country.

Also in April 2016, the Indian Energy Minister announced intentions to end the country's coal imports by emphasising domestic production and diversifying its energy sector away from coal. This was supported in June by the cancelling of contracts for four major coal-fired power plants. It is unclear whether this announcement applies only to thermal coal, but given India's expanding steel industry and limited domestic supplies, it seems likely that metallurgical coal imports will continue to grow.

Given Western Australia's low coal exports, these factors are unlikely to have a major effect on the local industry.

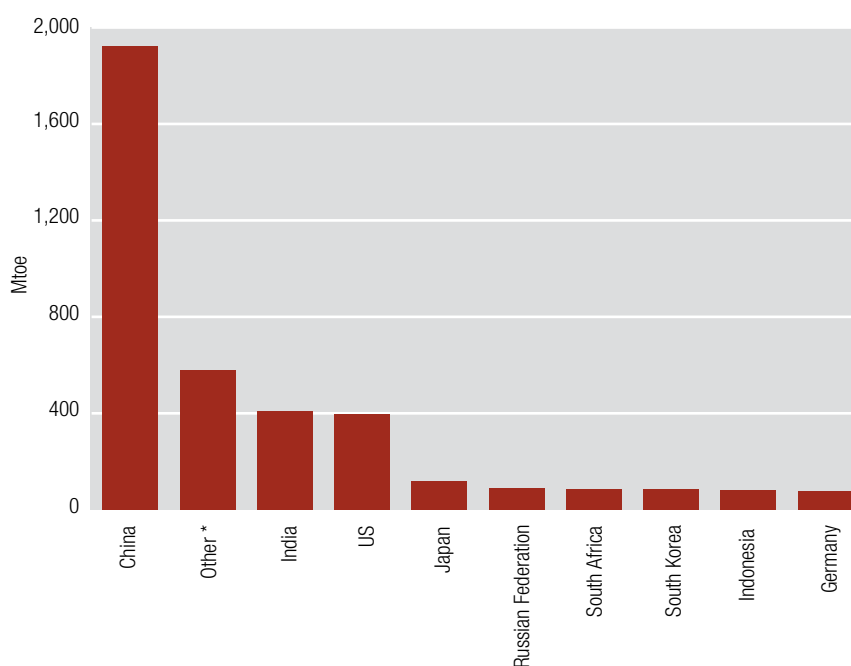


Figure 61 | **World coal consumption 2015** Source: BP World Energy Statistics 2016
 * Other consists of 50 countries including Australia

2.9.2 Salt

Pricing

The price received for Western Australian salt dropped slightly in the 2015–16 financial year, from \$31.90 per tonne in 2014–15 to \$30.60 per tonne.

Quantity and value

Western Australia accounts for most of Australia’s salt production. In 2015–16, salt sales totalled 11 million tonnes, a 6 per cent decrease on 2014–15. The decrease in sales volumes combined with the slight decrease in price contributed to a 10.2 per cent decrease in sales value to \$336 million.

Dampier Salt has operations in Dampier and Port Hedland in the Pilbara, and Lake MacLeod in the Gascoyne. The company accounted for about 74 per cent of the salt sold from Western Australia by volume in 2015–16 and is the world’s largest exporter of high-quality bulk, solar salt.

Onslow Salt’s operation at Onslow is Western Australia’s next-largest operation, with 16 per cent of production by volume.

Notable events

German potash and salt miner K + S Group announced a possible \$350 million salt project at Ashburton in the Pilbara region. The project is only in the early stages of development, with a final investment decision not expected until 2019.

2.9.3 Lithium, tantalum and tin

Quantity and value

The value of Western Australian lithium, tantalum and tin fell 15 per cent from \$251 million in 2014–15 to \$213 million in 2015–16.

Notable events

Global demand for lithium continued to increase during the year with growth underpinned by continuing use of rechargeable batteries in consumer electronics. Demand is expected to increase in the future from the use of lithium-ion batteries in the growing markets for electric vehicles and energy storage systems.

This saw the re-start of the Mount Cattlin project at a cost of \$7 million, with mining starting in April 2016 and a first shipment expected in the December 2016 quarter.

Construction of the Mount Marion project commenced in September 2015 with the first shipment expected in the December 2016 quarter. Both projects will produce spodumene concentrate (a source of lithium) with an average grade of around 6 per cent lithium oxide.

Another two lithium projects at Pilgangoora by Pilbara Minerals and Altura Mining completed pre-feasibility studies and successful capital raisings during the year. Exploration for lithium in Western Australia also intensified.

Pilbara Minerals Tabba Tabba tantalite project south-east of Port Hedland was suspended during commissioning in December 2015, after technical issues required modifications to the existing processing plant. These issues, combined with weak market conditions for tantalum, resulted in the project's indefinite suspension in January 2016.

Global Advanced Metals' Wodgina tantalum project, including mining tenements and infrastructure, was sold to Mineral Resources, which plans to re-open it as a lithium operation. The project has been closed since 2012.

2.9.4 Manganese

Pricing

Manganese ore is priced on a monthly basis using an Australian benchmark specification grade of 45.5 per cent manganese. In other markets, a grade of 38 per cent is used.

Manganese prices were highly volatile during 2015–16. From recent peaks at the start of 2015, manganese declined to historic low prices in early 2016, before outperforming the market and recovering up to 140 per cent (depending on the benchmark price used) in the first four months of the year. These price gains were apparently unsustainable and the price dropped after April, although it remained well above previous record lows.

Quantity and value

In 2015–16, the volume of manganese sold in Western Australia nearly halved from 800,985 tonnes to 423,317 tonnes.

The late surge in manganese ore prices came too late for substantial sales from the Woodie Woodie mine, with most of the sales occurring in the first half of the financial year. As such, the average sales price achieved was extremely low, and the overall value of the sector dropped more than 11 per cent in excess of the volume loss.

Notable events

The State's major manganese producer, Consolidated Minerals placed its Woodie Woodie project on care and maintenance on 1 February 2016 as a consequence of low manganese prices. This resulted in the loss of about 380 jobs, including contractors.

Hancock Prospecting's Nicholas Downs project is now the State's only active manganese project.

The State Government announced a discount on charges applied to manganese exports at the Utah Point Bulk Handling Facility to 30 June 2017.

2.9.5 Rare earth elements

Pricing

Western Australia's rare earths are mostly lanthanum, cerium, neodymium and praseodymium oxides. The prices for these commodities were relatively stable to slightly weaker over the course of 2015–16, however, prices for Mount Weld's rare earth oxide product fell about 10 per cent.

This fall in prices was likely due in part to the slight weakening of the market generally, and partly a delayed effect of the reduced prices in the previous financial year.

Quantity and value

Despite the slight price drop, the overall value of rare earth oxide sales from Western Australia increased 24 per cent to almost \$187 million. This was the result of a 36 per cent increase in output at Mount Weld to 18.8 million kilograms.

Notable events

Lynas Corporation, operators of Western Australia's only operating rare earth project at Mount Weld, delivered operational improvements in its production process, throughput rates and final product quality. This included the construction of a second tailings storage facility in December 2015, and successful commissioning and start-up of the final production train (Train 4) in the March 2016 quarter. By year's end, it had more than doubled its production rate from two years earlier. Mount Weld ranks as one of the world's richest rare earth mines.

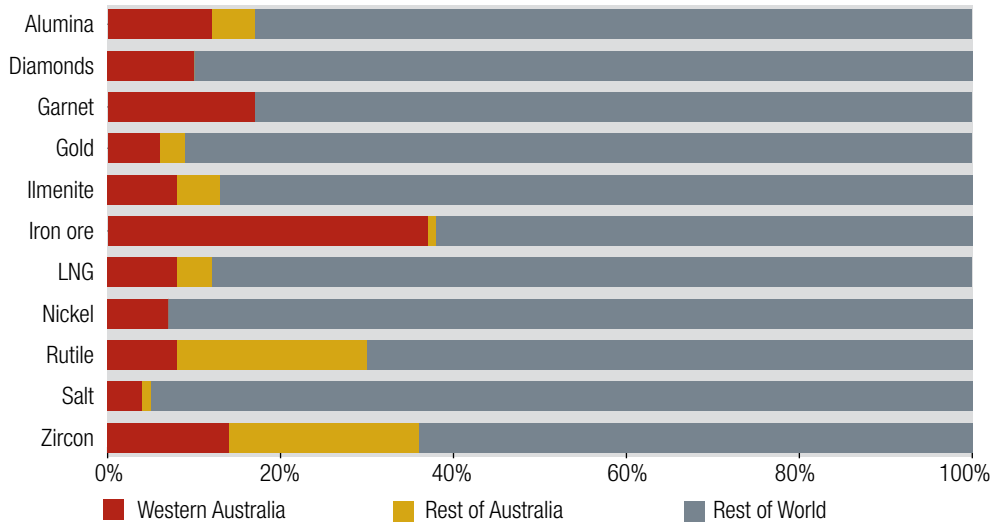


Figure 62 Selected WA commodities relative to world production ending 2015 by quantity

Source: DMP, DIIS, EnergyQuest and USGS
 The latest comparable data show that the Western Australian share (by quantity) of the world's output of the following products was: alumina 12%, garnet 17%, gold 6%, ilmenite 8%, iron ore 37%, LNG (sea-borne trade) 8%, nickel 7%, rutile 8%, salt 4%, zircon 14% and diamonds 10% (mainly industrial grade)

3. TABLES

TABLE 3. QUANTITY AND VALUE OF MINERALS AND PETROLEUM					
COMMODITY	UNIT	FINANCIAL YEAR 2014–15		FINANCIAL YEAR 2015–16	
		QUANTITY	VALUE	QUANTITY	VALUE
ALUMINA AND BAUXITE	t	13,771,412	5,022,721,218	13,941,288	4,939,245,356
BASE METALS					
Copper Metal	t	184,299	1,283,101,493	190,829	1,160,261,953
Lead Metal	t	59,248	136,949,662	6,040	14,602,646
Zinc Metal	t	77,831	197,040,406	80,208	189,594,217
TOTAL BASE METALS		321,379	1,617,091,561	277,077	1,364,458,816
CHROMITE	t				
CLAYS		17,670	1,043,438	21,969	1,104,708
COAL	t	6,553,064	306,733,911	6,890,951	336,466,825
CONSTRUCTION MATERIALS					
Aggregate	t	1,963,871	69,239,676	1,360,859	42,863,658
Gravel	t	193,968	2,161,823	200,934	2,264,091
Rock	t	1,746,693	47,505,138	304,395	4,685,177
Sand	t	6,042,214	56,115,401	3,547,485	38,359,044
TOTAL CONSTRUCTION MATERIALS			175,022,038		88,171,969
DIAMONDS	ct	10,387,926	342,313,664	13,868,048	353,736,681
DIMENSION STONE		21,250	2,892,731	3,752	2,086,202
GEM & SEMI-PRECIOUS STONES	kg	720,552	1,391,303	238,395	615,981
GOLD	kg	193,230	9,110,506,190	194,927	10,036,159,891
GYPSUM	t	577,079	11,801,996	551,910	13,371,056
MINERAL SANDS					
Garnet	t	299,022	n/a	251,162	n/a
Ilmenite	t	88,048	18,068,861	172,895	42,445,442
Leucoxene	t	16,656	14,325,490	18,413	16,729,550
Zircon	t	181,607	134,680,430	162,578	121,027,820
Other	t		320,748,221		358,503,049
TOTAL MINERAL SANDS			487,823,002		538,705,861
IRON ORE	t	718,822,363	54,367,366,632	756,526,398	48,385,254,500
LIMESAND-LIMESTONE-DOLOMITE	t	5,056,331	52,321,342	4,049,678	42,765,535
MANGANESE ORE	t	800,985	n/a	423,317	143,843,484
NICKEL INDUSTRY					
Cobalt	t	6,036	210,567,512	5,470	174,468,048
Nickel	t	183,320	3,169,605,001	175,722	2,181,363,111
Palladium and Platinum By-Product	kg	464	13,380,730	687	16,656,441
TOTAL NICKEL INDUSTRY			3,393,553,243		2,372,487,600
PETROLEUM					
Condensate	kl	6,753,213	3,528,826,231	6,775,142	2,397,646,227
Crude Oil	kl	7,952,478	4,567,638,161	7,685,922	3,042,849,325
LNG	t	20,447,845	13,817,042,487	20,955,641	10,767,668,144
LPG – Butane and Propane	t	553,055	405,565,516	531,595	249,059,073
Natural Gas	'000m ³	9,875,339	1,820,197,055	10,223,641	1,910,464,453

TABLE 3. QUANTITY AND VALUE OF MINERALS AND PETROLEUM Continued

COMMODITY	UNIT	FINANCIAL YEAR 2014–15		FINANCIAL YEAR 2015–16	
		QUANTITY	VALUE	QUANTITY	VALUE
TOTAL PETROLEUM			24,139,269,449		18,367,687,221
SALT	t	11,726,606	374,622,315	10,974,721	336,253,755
SILICA-SILICA SAND	t	483,809	17,927,564	580,938	15,386,305
SILVER	kg	151,130	96,323,316	154,226	100,453,697
TIN-TANTALUM-LITHIUM		n/a	251,051,748	362,853	213,069,830
OTHER (Includes Vanadium, Manganese, Rare Earths, Spongolite and Talc)			507,533,600		343,080,010
TOTAL VALUE			100,279,310,262		87,850,561,799

Note: Quantities used in this table apply only to commodities covered by the *Mining Act 1978*, the *Petroleum and Geothermal Energy Resources Act 1967*, the *Petroleum (Submerged Lands) Act 1982*, the *Offshore Petroleum Act 2006* and relevant State Agreement Acts.

Values are revised on a quarterly basis as DMP carries out its regular audit activities. Changes in quantity and value amounts reported in previous digests are therefore subject to change.

TABLE 4. QUANTITY AND VALUE OF SELECTED MAJOR COMMODITIES

COMMODITY	UNIT	2008-09		2009-10		2010-11	
		Quantity	Value \$M	Quantity	Value \$M	Quantity	Value \$M
ALUMINA AND BAUXITE	t	12,271,553	4,352,643,950	12,643,178	3,871,191,802	12,280,629	3,990,376,375
BASE METALS							
Copper Metal	t	128,232,434	656,718,319	151,963,349	1,172,476,451	150,030,321	1,332,356,150
Lead Metal	t	25,203,105	42,115,328	26,011,458	61,554,966	40,763,701	100,068,469
Zinc Metal	t	142,610,246	232,603,528	87,558,924	210,118,736	70,536,545	162,108,265
TOTAL BASE METALS			931,437,175		1,444,150,153		1,594,532,884
CHROMITE	t	74,898	n/a	59,034	n/a	81,925	n/a
CLAYS							
COAL	t	6,979,209	332,572,499	6,712,019	325,855,375	7,234,455	296,259,551
CONSTRUCTION MATERIALS							
Aggregate	t	3,941,262	91,104,572	3,167,934	79,231,292	1,934,860	43,801,514
Gravel	t	165,263	1,694,272	184,993	1,521,930	230,785	1,760,531
Rock	t	194,471	1,703,510	531,078	9,160,687	298,262	3,251,624
Sand	t	3,836,059	29,591,019	3,226,618	27,573,978	4,818,062	34,712,549
Other							
TOTAL CONSTRUCTION MATERIALS			124,093,373		117,487,887		83,526,218
DIAMONDS	ct	23,187,842	272,693,003	16,280,757	304,332,534	10,121,587	303,092,471
DIMENSION STONE		3,143	329,863	5,371	339,102	8,669	861,017
GEM & SEMI-PRECIOUS STONES	kg	316,420	210,961	300,509	308,238	292,458	288,460
GOLD	kg	137,010	5,248,100,000	164,040	6,558,260,000	183,750	8,184,190,000
GYPSUM	t	846,712	16,915,694	877,669	17,980,733	587,374	10,931,443
MINERAL SANDS							
Garnet	t	290,884	52,723,153	237,978	45,356,185	226,620	42,689,083
Ilmenite	t	452,044	65,165,654	508,584	68,516,763	394,033	52,763,228
Leucoxene	t	49,608	19,224,806	76,591	24,831,505	26,030	12,165,130
Rutile	t	74,034	53,162,367	118,234	77,691,649	49,745	35,431,242
Zircon	t	264,547	231,446,449	351,957	270,549,396	298,644	197,514,001
Other	t	858,319	282,879,839	606,241	177,539,532	421,723	135,619,863
TOTAL MINERAL SANDS		1,989,436	704,602,267	1,899,585	664,485,030	1,416,795	476,182,547
IRON ORE	t	316,545,933	33,621,877,297	384,964,868	35,214,420,583	397,604,213	57,533,101,329
LIMESAND-LIMESTONE-DOLOMITE		3,720,979	18,951,733	4,017,736	22,695,366	3,721,270	17,742,838
MANGANESE ORE	t	419,270	226,007,453	746,742	382,592,192	873,064	392,302,135
NICKEL INDUSTRY							
Cobalt	t	4,675	219,071,344	4,398	193,325,946	3,767	146,480,315
Nickel	t	178,365	2,996,908,794	180,152	3,976,771,529	194,177	4,686,173,467
Palladium and Platinum By-Product	kg	642	5,452,602	1,089	11,101,919	440	7,036,097
TOTAL NICKEL INDUSTRY			3,221,432,740		4,181,199,394		4,839,689,879
PETROLEUM							
Condensate	kl	6,657,101	3,108,787,292	7,418,012	3,501,186,255	6,881,791	3,988,524,336
Crude Oil	kl	13,036,933	7,710,496,697	11,842,075	6,385,071,844	13,924,847	8,528,862,521
LNG	t	13,943,724	8,517,503,874	15,717,041	7,494,248,320	17,290,205	8,328,719,118
LPG – Butane and Propane	t	866,534	750,825,346	987,896	696,901,992	923,763	774,197,459
Natural Gas	'000m ³	8,598,035	1,232,208,988	9,357,026	1,320,801,777	8,981,495	1,364,589,067
TOTAL PETROLEUM			21,319,822,197		19,398,210,189		22,984,892,501
SALT	t	10,519,491	386,254,379	10,969,479	417,460,428	12,246,504	366,935,890
SILICA-SILICA SAND	t	446,025	7,615,823	442,340	12,402,030	430,363	13,304,556
SILVER	kg	137,070	77,399,267	100,030	63,845,068	83,550	76,065,087
TIN-TANTALUM-LITHIUM							
Spodumene	t	223,756	80,063,204	n/a			
Tantalite	t	453				95	
Tin Metal	t	175	1,982,759	107	1,300,631	22	281,633
TOTAL TIN-TANTALUM-LITHIUM			162,596,005		74,737,442		131,425,734
OTHER (May include Feldspar, Red Oxide, Manganese, Vanadium Chromite, Rare Earths, Spongolite and Talc)	t		59,671,943		44,510,961		64,129,732
TOTAL VALUE			71,085,227,623		73,116,464,505		101,359,830,647

2011-12		2012-13		2013-14		2014-15		2015-16	
Quantity	Value \$M	Quantity	Value \$M	Quantity	Value \$M	Quantity	Value \$M	Quantity	Value \$M
12,424,860	4,010,219,382	13,530,752	4,027,810,217	13,717,952	4,295,348,699	13,771,412	5,022,721,218	13,941,288	4,939,245,356
159,171,312	1,180,779,699	209,266,335	1,423,043,554	211,186,322	1,559,565,610	184,299,170	1,283,101,493	190,828,930	1,160,261,953
6,921,706	13,839,831	16,640,840	35,049,525	78,650,710	178,764,058	59,248,420	136,949,622	6,040,460	14,602,646
63,503,201	121,984,210	55,847,680	103,867,913	54,060,290	118,261,576	77,830,910	197,040,406	80,207,630	189,594,217
	1,316,603,740		1,561,960,992		1,856,591,245		1,617,091,561		1,364,458,816
164,219	n/a	195,772	n/a	66,540	n/a	-	-	-	-
75,091	1,663,209							21,969	1,104,708
6,986,433	289,629,252	7,494,280	310,812,886	6,275,422	263,701,680	6,553,064	306,733,911	6,890,951	336,466,825
3,722,254	97,854,121	4,391,376	148,775,764	6,097,416	213,982,443	2,553,494	99,332,379	1,360,859	42,863,658
283,899	2,454,938	561,135	3,947,125	192,706	3,845,578	213,129	4,338,077	200,934	2,264,091
509,983	6,262,935	1,109,761	27,142,818	1,273,312	20,822,963	1,749,260	48,996,040	304,395	4,685,177
6,286,702	54,502,065	5,415,504	62,093,160	7,409,949	88,418,557	6,070,830	68,200,825	3,547,485	38,359,044
	161,074,059		241,958,866		327,069,541		220,867,321		\$88,171,969
8,689,501	343,293,394	9,608,685	355,964,877	11,646,712	401,672,122	10,423,821	342,313,665	13,868,048	353,736,681
7,590	1,450,510	4,196	1,221,243	5,021	1,365,020	6,126	3,089,486	3,752	2,086,202
227,963	280,727	197,832	254,158	309,575	401,960	660,552	523,940	238,395	615,981
180,770	9,421,480,000	179,850	9,022,520,000	196,072	8,890,992,062	193,230	9,110,506,190	194,927	10,036,159,891
334,178	4,690,980	1,575,769	7,027,903	532,919	9,496,857	585,449	10,374,332	551,910	13,371,056
301,945	59,591,878	317,336	64,834,324	357,266	68,896,504	299,022	73,737,571	251,162	63,979,007
332,012	58,190,544	270,770	72,680,422	78,900	19,515,066	88,048	18,068,861	172,895	42,445,442
22,231	16,691,847	29,071	31,231,788	29,268	26,205,650	16,656	14,325,490	18,413	16,729,550
38,870	52,250,227	46,938	80,261,379	65,084	65,938,306	30,206	29,582,184	39,368	39,268,543
180,429	219,219,649	215,831	189,547,782	212,068	114,307,405	181,607	134,680,430	162,578	121,027,820
540,074	458,168,418	475,411	372,123,979	335,684	176,168,377	440,970	217,428,401	487,532	255,255,499
1,415,561	864,112,563	1,355,357	810,679,675	1,078,271	471,031,307	1,056,509	487,823,002	1,131,948	538,705,861
454,385,064	60,972,726,991	511,760,416	56,204,322,877	623,507,315	75,165,582,340	718,822,363	54,367,377,224	756,526,398	48,385,254,500
4,157,630	21,403,515	4,091,849	24,239,571	3,116,623	23,378,197	3,482,602	25,521,548	4,049,678	42,765,535
846,293	331,693,574	649,695	n/a	711,536	n/a	800,984	n/a	423,317	143,843,484
4,950	143,627,596	6,200	159,147,805	6,236	175,117,788	6,036	210,567,512	5,470	174,468,048
209,370	3,721,964,396	227,463	3,511,711,762	209,710	3,419,023,118	183,315	3,169,605,001	175,722	2,181,363,111
626	14,909,443	658	15,045,619	1,015	28,523,097	464	13,380,730	687	16,656,441
	3,880,501,435		3,685,905,186		3,622,664,003		3,393,553,243		2,372,487,600
5,888,608	3,842,111,571	6,116,968	3,922,032,524	5,559,221	4,032,961,171	6,753,212	3,488,373,293	6,775,142	2,397,646,227
11,121,616	7,676,633,459	8,609,425	5,972,058,200	7,303,854	5,724,962,343	7,844,408	4,493,521,248	7,685,922	3,042,849,325
15,610,570	9,495,543,132	19,804,919	12,147,214,397	20,049,826	14,804,193,332	20,447,845	13,817,045,230	20,955,641	10,767,668,144
835,271	734,484,653	752,910	634,052,635	630,636	586,349,207	553,055	405,561,785	531,595	249,059,073
9,080,655	1,449,810,229	8,713,949	1,434,550,772	9,368,839	1,655,819,689	9,875,373	1,833,971,984	10,223,641	1,910,464,453
	23,198,583,045		24,109,908,528		26,804,285,741		24,038,473,539		18,367,687,221
12,807,461	353,776,447	12,389,643	381,652,888	12,992,042	410,097,847	11,726,606	374,622,315	10,974,723	336,253,755
452,638	14,742,316	498,232	16,886,756	449,587	15,847,051	483,809	17,927,564	580,938	15,386,305
120,080	115,704,896	123,740	100,560,679	137,180	93,414,212	151,133	96,323,318	154,226	100,453,697
461,121	138,413,821	485,879	178,786,684						
347	49,931,724	201	17,940,739	58	4,074,774	70	4,861,111	183	
62	1,372,580	193	2,703,339	-	-	14	316,250	22	407,792
	189,718,125		199,430,762		154,639,152		251,051,748		213,069,830
	103,198,080		425,002,389		494,402,726		507,533,600		199,236,526
105,594,883,030		101,488,120,454		123,301,981,762		100,160,402,974		87,850,561,799	

TABLE 5. VALUE OF MINERALS AND PETROLEUM BY REGION BY COMMODITY

REGION	2015–16 Value
Pilbara Region	
Iron Ore	46,642,452,525
Gold and Silver	996,389,618
Manganese Ore and Salt	386,539,718
Copper	313,592,726
Construction Materials	46,053,478
Other	2,805,359
Total	48,387,833,424

Offshore Petroleum	
Crude Oil and Condensate	5,416,719,474
Liquefied Natural Gas	10,767,668,144
Natural Gas	1,861,616,614
LPG Butane and Propane	249,059,073
Total	18,295,063,304

Goldfields–Esperance Region	
Gold	6,619,857,142
Silver	37,595,538
Nickel and Cobalt	1,921,103,512
Copper and Zinc	142,846,243
Rare Earth Oxide, Platinum and Palladium	203,379,085
Gypsum and Limesand Limestone	13,402,266
Construction Materials and Granite	9,209,550
Other	682,735
Total	8,948,076,071

Peel Region	
Gold, Silver and Copper	1,450,093,938
Total	1,450,093,938

Mid West Region	
Gold and Silver	899,628,652
Iron Ore	683,417,356
Copper, Lead and Zinc	673,897,866
Mineral Sands	101,791,931
Natural Gas	33,139,239
Condensate and Crude Oil	13,051,901
Gypsum and Talc	12,371,412
Limesand Limestone	3,445,967
Clays and Construction Materials	1,410,086
Gem and Semi Precious Stones	48,141
Total	2,422,202,551

REGION	2015–16 Value
Wheatbelt Region	
Iron Ore	993,718,344
Nickel and Copper	313,752,579
Mineral Sands and Construction Materials	308,150,157
Gold and Silver	296,649,762
Condensate and Natural Gas	20,824,278
Gypsum and Salt	14,102,780
Limesand Limestone and Dolomite	6,337,317
Silica and Silica Sand	2,970,348
Total	1,956,505,565

Kimberley Region	
Iron Ore	65,666,275
Diamonds and Crude Oil	359,345,181
Nickel, Copper and Cobalt	166,248,998
Construction Materials	7,644,578
Gem and Semi Precious Stones, Gold and Silver	25,252,136
Total	624,157,168

South West Region	
Alumina and Bauxite	1,711,381,695
Coal	336,466,825
Tantalum Pentoxide, Spodumene and Tin Metal	213,033,430
Mineral Sands	129,434,993
Sandstone and Limesand Limestone	863,161
Total	2,391,180,104

Gascoyne Region	
Salt	85,909,967
Gypsum and Limesand Limestone	4,773,481
Construction Materials and Gem and Semi Precious Stones	643,146
Total	91,326,593

Perth Metropolitan Region	
Alumina and Bauxite	3,227,863,661
Construction Materials	23,858,517
Silica and Limesand Limestone	23,912,309
Total	3,275,634,487

Great Southern Region	
Spongolite, Silica and Limesand Limestone	8,488,385
Total	8,488,385

TABLE 6. VALUE OF MINERALS AND PETROLEUM BY REGION BY LOCAL GOVERNMENT AREA

REGION	2015–16 Value
Pilbara Region	
East Pilbara	22,551,742,475
Ashburton	25,357,024,167
Port Hedland Town and Marble Bar	364,503,317
Karratha	114,563,465
Total	48,387,833,424

Offshore Petroleum	18,295,063,304
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Goldfields–Esperance Region	
Coolgardie	2,372,868,523
Kalgoorlie–Boulder	1,918,007,611
Leonora	1,617,020,571
Laverton	1,870,184,378
Ravensthorpe and Dundas	406,548,552
Menzies and Esperance	763,446,436
Total	8,948,076,071

Peel Region	
Waroona–Murray and Boddington	1,450,093,938

Mid West Region	
Meekatharra and Morawa	773,982,732
Yalgoo	513,942,601
Wiluna and Three Springs	348,419,018
Cue, Coorow and Geraldton	585,224,194
Mullewa and Mt Magnet	81,978,040
Northampton and Perenjori	37,805,795
Irwin	48,577,882
Carnamah	32,272,289
Total	2,422,202,551

Wheatbelt Region	
Yilgarn	1,182,185,217
Kondinin	313,869,725
Dandaragan	310,475,402
Lake Grace and Westonia	117,175,119
Gingin and Koorda	27,254,896
Moora and Wyalkatchem	3,452,993
Dalwallinu	1,517,100
Northam and Kellerberrin	575,113
Total	1,956,505,565

REGION	2015–16 Value
Kimberley Region	
Derby–West Kimberley	75,137,580
Wyndham–East Kimberley	352,116,699
Halls Creek	191,526,351
Broome	5,376,538
Total	624,157,168

South West Region	
Bridgetown–Greenbushes and Collie	2,260,881,950
Capel and Dardanup	129,434,993
Donnybrook–Balingup, Manjimup and Augusta–Margaret River	863,161
Total	2,391,180,104

Gascoyne Region	
Carnarvon	51,229,560
Exmouth, Shark Bay and Upper Gascoyne	40,097,034
Total	91,326,593

Perth Metropolitan Region	
Kalamunda, Swan and Mundaring	9,779,276
Wanneroo	16,908,787
Cockburn, Kwinana and Rockingham	3,248,946,634
Total	3,275,634,697

Great Southern Region	
Albany, Denmark and Plantagenet	8,488,385

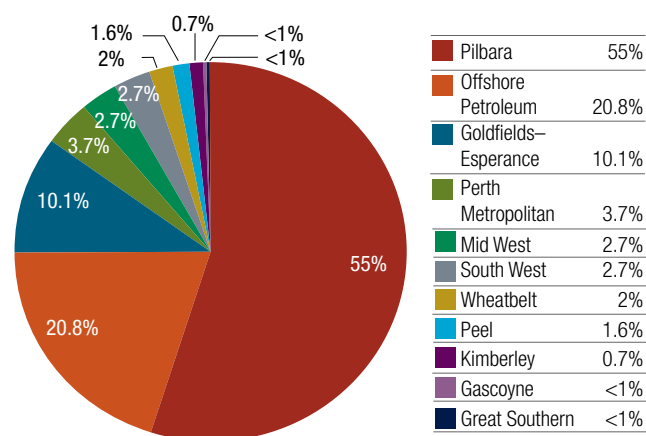


Figure 63 Value of minerals and petroleum by region 2015–16 \$87.9 Billion Source: DMP

TABLE 7. AVERAGE NUMBER OF PEOPLE EMPLOYED IN THE WA MINERALS INDUSTRY

Mineral	Company	Operating Site	2014–15	2015–16
Baryte total			0	2
Bauxite – Alumina	Alcoa of Australia Limited	Kwinana Operations	1,315	1,444
Bauxite – Alumina	Alcoa of Australia Limited	Pinjarra – Waroona Operations	1,227	1,140
Bauxite – Alumina	Alcoa of Australia Limited	Pinjarra Operations	1,673	1,590
Bauxite – Alumina	Alcoa of Australia Limited	Wagerup Operations	1,025	965
Bauxite – Alumina	South32 Worsley Alumina Pty Ltd	Boddington – Worsley Operations	2,241	1,981
Bauxite – Alumina total			7,481	7,120
Chemicals total			172	122
Chromite – Platinoids total			8	4
Clays total			148	132
Coal	Premier Coal Limited	Collie Operations	260	278
Coal	The Griffin Coal Mining Company Pty Limited	Ewington – Muja Operations	698	850
Coal total			958	1,128
Construction materials total			1,454	1,587
Base metals	Aditya Birla Minerals Limited	Nifty Operations	445	457
Base metals	Blackrock Metals Pty Ltd	Whim Creek Operations	6	7
Base metals	Independence Jaguar Limited	Jaguar Operations	347	336
Base metals	MMG Limited	Golden Grove Operations	864	704
Base metals	Qube Ports Pty Ltd	Greater Geraldton Operations	5	11
Base metals	LeadFX	Paroo Station Operations	81	8
Base metals	Sandfire Resources NI	DeGrussa Operations	783	837
Base metals total			2,531	2,358
Diamond	Argyle Diamond Mines Pty Ltd	Argyle Operations	1,205	986
Diamond	Kimberley Diamond Company Pty Ltd	Ellendale – Open Pit	205	2
Diamond	Merlin Diamonds Limited	Wangara Laboratory	3	0
Diamond total			1,413	988
Diatomite – Spongolite total			1	2
Dimension stone total			282	294
Gem & semi-precious stones total			1	6
Gold	A & C Mining Investment Pty Ltd	Kookynie Operations	0	5
Gold	Abalone (WA) Pty Ltd	Mount Magnet Operations	1	0
Gold	Abm Resources NI	Coyote Operations	12	33
Gold	Agnew Gold Mining Company Pty Ltd	Agnew Operations	676	737
Gold	Andy Well Mining Pty Ltd	Andy Well Operations	111	119
Gold	Anglogold Ashanti Australia Limited	Sunrise Dam Operations	783	830
Gold	Anglogold Ashanti Australia Limited	Tropicana Operations	826	1,345
Gold	Aragon Resources Pty Ltd	Fortnum Operations	0	8
Gold	Avoca Resources Pty Ltd	Higginsville Operations	444	464
Gold	Beacon Minerals Limited	Halleys East Operations	9	2
Gold	Big Bell Gold Operations Pty Ltd	North Murchison Operations	7	385
Gold	Bk Gold Mines Pty Ltd	British King Operations	3	11
Gold	Black Oak Minerals Limited	Sandstone Operations	2	3
Gold	Blue Tiger Mining Pty Ltd	Newminster – Open Pit	6	2

TABLE 7. AVERAGE NUMBER OF PEOPLE EMPLOYED IN THE WA MINERALS INDUSTRY Continued

Mineral	Company	Operating Site	2014–15	2015–16
Gold	Bnm Australia Group Pty Ltd	Cue Battery Tailings / BNM	6	2
Gold	Bullabulling Operations Pty Ltd	Bullabulling Operations	2	0
Gold	C.R Bartle & L.S Mahoney	Clampton Operations	0	1
Gold	Campbell, Ernest Edward	Cue – Meekatharra Operations	0	1
Gold	Capeview Pty Ltd	Warriedar Operations	1	1
Gold	Central Norseman Gold Corporation Pty Ltd	Norseman Operations	102	88
Gold	Clifton Earthmoving Pty Ltd	Hatts Reward Operations	2	2
Gold	Coolgardie Mining Company Pty Ltd	Burbanks Operations	8	76
Gold	Coolgardie Mining Company Pty Ltd	Gunga West Operations	0	0
Gold	Corinthian Mining Pty Ltd	Corinthia Operations	0	7
Gold	Dacian Gold Limited	Mt Morgans – Open Pit	18	6
Gold	Darlot Mining Company Pty Ltd	Darlot Operations	459	462
Gold	Deflector Mining Limited	Deflector Operations	0	79
Gold	Dulcie Operations	Dulcie Operations	2	2
Gold	Eastern Goldfields Limited	Davyhurst Operations	6	28
Gold	Eastern Goldfields Limited	Mt Ida Operations	2	3
Gold	Evolution Mining (Mungari) Pty Ltd	Mungari Operations	462	445
Gold	Evolution Mining (Phoenix) Pty Ltd	Blue Funnel – Underground	0	1
Gold	Evolution Mining (Phoenix) Pty Ltd	Kintore – Open Pit	26	4
Gold	Evolution Mining Limited	Edna May Operations	200	201
Gold	Excelsior Gold Limited	Kalgoorlie North Operations	0	79
Gold	Farno–McMahon Pty Ltd	Station Peak Operations	1	1
Gold	First National Pty Ltd	Lakewood Operations	9	
Gold	Focus Minerals (Laverton) Pty Limited	Laverton Operations	8	7
Gold	Focus Minerals Limited	Coolgardie Operations	6	4
Gold	Gme Resources Limited	Devon Operations	0	14
Gold	Golden Mile Milling Pty Ltd	Lakewood Operations	0	20
Gold	Goldfield Argonaut Pty Ltd	Mulwarrie Central – Open Pit	2	0
Gold	Goldfields Technical Services Pty Ltd	Mullewa Operations	0	6
Gold	Gotta Resources Pty Ltd	Yilgangi Queen Operations	0	2
Gold	Gsm Mining Company Pty Ltd	Granny Smith Operations	865	1,003
Gold	Halls Creek Mining Pty Ltd	Halls Creek Operations	21	42
Gold	Hanking Gold Mining Pty Ltd	Southern Cross Operations	255	575
Gold	Haoma Mining NI	Bamboo Creek Operations	6	10
Gold	Hbj Minerals Pty Ltd	South Kalgoorlie Operations	200	331
Gold	Kalgoorlie Consolidated Gold Mines Pty Ltd	Kalgoorlie Operations	2,248	2,244
Gold	Kalnorth Gold Mines Limited	Lindsays Operations	0	4
Gold	Keras (Gold) Australia Pty Ltd	Ora Banda – Paddington Operations	0	3
Gold	Kin Mining NI	Lewis Operations	0	2
Gold	Lloyd George Mining Pty Ltd	Gibraltar Operations	0	6

TABLE 7. AVERAGE NUMBER OF PEOPLE EMPLOYED IN THE WA MINERALS INDUSTRY Continued

Mineral	Company	Operating Site	2014–15	2015–16
Gold	Lukah Mining Pty Ltd	The Mount Operations	2	7
Gold	Matilda Operations Pty Ltd	Wiluna Operations	2	16
Gold	Mc Verde Minerals Pty Ltd	Kalgoorlie Operations	1	3
Gold	Millennium Minerals Limited	Nullagine Operations	260	313
Gold	Minjar Gold Pty Ltd	Kirkalocka Operations	0	2
Gold	Minjar Gold Pty Ltd	Minjar Operations	270	290
Gold	MKO Mines Pty Ltd	Bronzewing Operations	4	4
Gold	Mobile Gold Mining Pty Ltd	Westonia Operations	1	0
Gold	Monument Gold Operations Pty Ltd	Burnakura Operations	24	18
Gold	Mount Magnet South NI	Kirkalocka Operations	3	0
Gold	Mt Magnet Gold Pty Ltd	Mt Magnet Operations	113	126
Gold	Newcrest Mining Limited	Telfer Operations	1,673	1,957
Gold	Newmont Boddington Gold Pty Ltd	Boddington Operations	3,009	2,931
Gold	Nex Metals Explorations Limited	Kookynie Operations	5	0
Gold	Northern Star Resources Limited	Jundee Operations	695	730
Gold	Northern Star Resources Limited	Kalgoorlie Operations	526	997
Gold	Northern Star Resources Limited	Paulsens Operations	303	294
Gold	Northern Star Resources Limited	Plutonic Operations	486	422
Gold	Northwest Nonferrous Australia Mining Pty Limited	Indee Gold Mine	2	0
Gold	Norton Gold Fields Limited	Bullabulling Operations	0	10
Gold	Norton Gold Fields Limited	Paddington Operations	0	828
Gold	Paddington Gold Pty Ltd	Binduli	3	0
Gold	Paddington Gold Pty Ltd	Paddington Operations	766	0
Gold	Prumm Corporation Pty Ltd	Westonia Operations	0	1
Gold	Quartzvein Mining Pty Ltd	Gnows Nest Operations	1	0
Gold	Radman Mining Pty Ltd	Cue – Meekatharra Operations	0	2
Gold	Ramelius Milling Services Pty Ltd	Burbanks Operations	15	1
Gold	Ramelius Resources Limited	Kathleen Valley Operations	8	97
Gold	Ramelius Resources Limited	Vivien Operations	9	55
Gold	Regis Resources Limited	Garden Well Operations	449	477
Gold	Regis Resources Limited	Moolart Well Operations	215	250
Gold	Regis Resources Limited	Rosemont Operations	192	221
Gold	Rob Hoppmann Mining Pty Ltd	Mt Dimer Operations	0	1
Gold	Sand Queen Gold Mines Pty Ltd	Comet Vale Operations	1	3
Gold	Sandstone Industries Pty Ltd	Yundamindera Operations	2	2
Gold	Saracen Gold Mines Pty Ltd	Carosue Dam Operations	224	551
Gold	Saracen Metals Pty Ltd	Thunderbox Operations	5	387
Gold	Saxonwood Holdings Pty Ltd	Kalgoorlie Operations	2	4
Gold	Sherwood Engineers Pty Ltd	O'Connor Operations	3	3
Gold	Silver Lake Resources Limited	Mount Monger Operations	370	488
Gold	Silver Lake Resources Limited	Murchison Operations	14	2
Gold	St Barbara Limited	Gwalia Operations	577	556

TABLE 7. AVERAGE NUMBER OF PEOPLE EMPLOYED IN THE WA MINERALS INDUSTRY Continued

Mineral	Company	Operating Site	2014–15	2015–16
Gold	St Barbara Limited	King of the Hills	121	0
Gold	St Ives Gold Mining Company Pty Ltd	St Ives Operations	1,285	1,632
Gold	Stone Resources Australia Limited	Brightstar Operations	3	1
Gold	The Trustee For Fmr Unit Trust	Gordon Sirdar Operations	6	25
Gold	The Trustee For Fmr Unit Trust	Greenfields Operations	31	36
Gold	Western Australian Mint	Perth Airport Operations	105	111
Gold	Western Mining Pty Ltd	Cue Victory Operations	2	2
Gold total			19,587	23,556
Gypsum total			36	35
Mineral sands	BHP Titanium Minerals Pty Ltd	Beenup Operations	6	6
Mineral sands	Cristal Mining Australia Limited	South West Operations	149	144
Mineral sands	Doral Mineral Sands Pty Ltd	Dardanup – Picton Operations	320	249
Mineral sands	Gma Garnet Pty Ltd	Midwest Operations	146	157
Mineral sands	Iluka Resources Limited	Eneabba Operations	79	80
Mineral sands	Iluka Resources Limited	Geraldton Narngulu Operations	276	313
Mineral sands	Iluka Resources Limited	Gingin Operations	12	7
Mineral sands	Iluka Resources Limited	South West Operations	459	709
Mineral sands	Keysbrook Leucoxene Pty Ltd	Keysbrook Operations	35	267
Mineral sands	Tronox Management Pty Ltd	Chandala and Port Operations	381	153
Mineral sands	Tronox Management Pty Ltd	Cooljarloo Operations	377	253
Mineral sands total			2,241	2,336
Industrial pegmatite minerals total			29	23
Iron ore	Atlas Iron Limited	Marble Bar – Abydos Operations	142	142
Iron ore	Atlas Iron Limited	Marble Bar – Mt Webber Operations	123	187
Iron ore	Atlas Iron Limited	Mt Dove Operations	22	2
Iron ore	Atlas Iron Limited	Pardoo Operations	5	4
Iron ore	BBI Group Limited	Balla Balla Operations	4	5
Iron ore	BC Iron Limited	Nullagine Operations	537	214
Iron ore	BHP Billiton Iron Ore Pty Ltd	Boodarie – Port Hedland Operations	22	21
Iron ore	BHP Billiton Iron Ore Pty Ltd	Eastern Ridge Operations	1,969	1,805
Iron ore	BHP Billiton Iron Ore Pty Ltd	Jimblebar Operations	2,899	3,348
Iron ore	BHP Billiton Iron Ore Pty Ltd	Mining Area C Operations	3,334	2,741
Iron ore	BHP Billiton Iron Ore Pty Ltd	Mt Whaleback Operations	4,023	4,190
Iron ore	BHP Billiton Iron Ore Pty Ltd	Port Hedland Port Operations	2,786	2,496
Iron ore	BHP Billiton Iron Ore Pty Ltd	Yandi Operations	2,986	2,703
Iron ore	BHP Billiton Iron Ore Pty Ltd	Yarnima Power Station	226	35
Iron ore	BHP Billiton Iron Ore Pty Ltd	Yarrie – Nimingarra Operations	0	4
Iron ore	Brierty Limited	Western Turner Syncline Stage 2 Construction	91	5
Iron ore	Calibre Projects Pty Ltd	West Angelas Deposit B Project	161	3
Iron ore	Calibre Projects Pty Ltd	Western Turner Syncline	2	0

TABLE 7. AVERAGE NUMBER OF PEOPLE EMPLOYED IN THE WA MINERALS INDUSTRY Continued

Mineral	Company	Operating Site	2014–15	2015–16
Iron ore	Citic Pacific Mining Management Pty Ltd	Sino Iron Operations	3,255	4,191
Iron ore	Cliffs Natural Resources Pty Ltd	Koolyanobbing Operations	985	671
Iron ore	Crosslands Resources Limited	Jack Hills Operations	6	3
Iron ore	Fortescue Metals Group Ltd	Anderson Point Port Operations	1,623	1,274
Iron ore	Fortescue Metals Group Ltd	Christmas Creek Operations	4,409	3,222
Iron ore	Fortescue Metals Group Ltd	Cloudbreak Operations	3,384	2,758
Iron ore	Fortescue Metals Group Ltd	Solomon Operations	3,546	2,932
Iron ore	Fortescue Metals Group Ltd	Geraldton Port Operations	0	89
Iron ore	Hamersley Hms Pty Ltd	Hope Downs 1 Operations	1,035	1,063
Iron ore	Hamersley Hms Pty Ltd	Hope Downs 4 Operations	976	869
Iron ore	Hamersley Iron – Yandi Pty Limited	Yandicoogina Operations	1,152	1,324
Iron ore	Hamersley Iron Pty Limited	Brockman – West Pilbara Village	0	27
Iron ore	Hamersley Iron Pty Limited	Brockman 2 Nammuldi Operations	2,126	2,215
Iron ore	Hamersley Iron Pty Limited	Brockman 4 Operations	1,453	1,363
Iron ore	Hamersley Iron Pty Limited	Brockman Fuel Hub	23	17
Iron ore	Hamersley Iron Pty Limited	Dampier Port Operations	1,563	1,238
Iron ore	Hamersley Iron Pty Limited	Dampier Power Plant – Services	15	0
Iron ore	Hamersley Iron Pty Limited	Greater Paraburdoo Operations	1,284	1,372
Iron ore	Hamersley Iron Pty Limited	Kangaroo Hill Village	31	5
Iron ore	Hamersley Iron Pty Limited	Marandoo Operations	899	913
Iron ore	Hamersley Iron Pty Limited	Tom Price Operations	2,110	1,762
Iron ore	Hismelt (Operations) Pty Ltd	Hismelt Operations	21	0
Iron ore	IB Operations Pty Ltd	Port Hedland Operations	578	248
Iron ore	Karara Mining Limited	Karara Operations	713	547
Iron ore	Kimberley Metals Group Pty Ltd	Ridges – Open Pit	82	0
Iron ore	Koolan Iron Ore Pty Ltd	Mt Gibson Operations	0	136
Iron ore	Mine And Port Developments Joint Venture	RGP 4/5 / Port Hedland Pace Project	349	0
Iron ore	Mineral Resources Limited	Newman Operations	173	273
Iron ore	Moly Metals Australia Pty Ltd	Spinifex Ridge Operations	12	0
Iron ore	Mount Gibson Mining Limited	Extension Hill Operations	294	292
Iron ore	Mount Gibson Mining Limited	Mt Gibson Operations	416	0
Iron ore	Mount Gibson Mining Limited	Tallering Peak Operations	38	6
Iron ore	Pluton Resources Limited	Cockatoo Island Operations	76	20
Iron ore	Polaris Metals Pty Ltd	Carina Operations	188	214
Iron ore	Process Minerals International Pty Ltd	Newman Operations	32	2
Iron ore	Rio Tinto Iron Ore Pty Ltd	Brockman – West Pilbara Village	33	0
Iron ore	Rio Tinto Iron Ore Pty Ltd	Cape Lambert / RTIOEP	600	10
Iron ore	Robe River Mining Co. Pty Ltd	Cape Lambert Port Operations	1,452	1,553
Iron ore	Robe River Mining Co. Pty Ltd	Pannawonica Operations	876	913
Iron ore	Robe River Mining Co. Pty Ltd	West Angelas Operations	1,662	1,653
Iron ore	Robe River Mining Co. Pty Ltd	West Angelas Fuel Hub	1	0
Iron ore	Roy Hill Holdings Pty Ltd	Roy Hill – Port Hedland Operations	0	179

TABLE 7. AVERAGE NUMBER OF PEOPLE EMPLOYED IN THE WA MINERALS INDUSTRY Continued

Mineral	Company	Operating Site	2014–15	2015–16
Iron ore	Roy Hill Iron Ore Pty Ltd	Roy Hill Operations	1,925	1,829
Iron ore	Sinosteel Midwest Corporation Limited	Blue Hills Operations	68	2
Iron ore	Sinosteel Midwest Corporation Limited	Koolanooka – Open Pit	1	0
Iron ore	Top Iron Pty Ltd	Mummaloo Operations	55	11
Iron ore total			58,851	53,099
Limestone – Limesand total			258	288
Manganese ore	Pilbara Manganese Pty Ltd	Woodie Woodie Operations	517	332
Manganese ore	Process Minerals International Pty Ltd	Nullagine Operations	0	3
Manganese ore total			517	335
Nickel	BHP Billiton Nickel West Pty Ltd	Cliffs Nickel Operations	225	222
Nickel	BHP Billiton Nickel West Pty Ltd	Kalgoorlie – Kambalda Operations	515	536
Nickel	BHP Billiton Nickel West Pty Ltd	Kwinana Operations	356	424
Nickel	BHP Billiton Nickel West Pty Ltd	Leinster Operations	279	516
Nickel	BHP Billiton Nickel West Pty Ltd	Mt Keith Operations	734	608
Nickel	First Quantum Minerals (Australia) Pty Limited	Ravensthorpe Operations	823	0
Nickel	Fox Radio Hill Pty Ltd	Radio Hill Operations	5	3
Nickel	FQM Australia Nickel Pty Ltd	Ravensthorpe Operations	0	715
Nickel	Goldfields Mine Management Pty Ltd	Otter Juan Operations	0	4
Nickel	Independence Long Pty Ltd	Long Victor Operations	120	76
Nickel	Independence Nova Pty Ltd	Nova Nickel Operations	78	200
Nickel	Lanfranchi Nickel Mines Pty Ltd	Lanfranchi Operations	0	52
Nickel	Mincor Operations Pty Ltd	Carnilya Operations	0	0
Nickel	Mincor Operations Pty Ltd	Kambalda South Operations	182	46
Nickel	Mincor Resources NI	Otter Juan Operations	7	0
Nickel	Murrin Murrin Operations Pty Ltd	Murrin Murrin Operations	1,332	1,228
Nickel	Panoramic Resources Limited	Lanfranchi Operations	294	0
Nickel	Panoramic Resources Limited	Savannah Operations	388	0
Nickel	Poseidon Nickel Limited	Black Swan Operations	12	6
Nickel	Poseidon Nickel Limited	Lake Johnston Operations	57	12
Nickel	Poseidon Nickel Limited	Windarra Operations	32	6
Nickel	Salt Lake Mining Pty Ltd	Beta Hunt Operations	89	113
Nickel	Savannah Nickel Mines Pty Ltd	Savannah Operations	0	330
Nickel	Talisman Nickel Pty Ltd	Sinclair Operations	3	7
Nickel	Western Areas Limited	Cosmos Operations	0	7
Nickel	Western Areas Limited	Forrestania Operations	556	531
Nickel	Wingstar Investments Pty Ltd	Kalgoorlie Operations	8	4
Nickel	Xstrata Nickel Australasia Operations Pty Ltd	Cosmos Operations	4	0
Nickel total			6,099	5,645
Other	Mid West Ports Authority	Geraldton Port (Berths 1 to 6) Operations	99	98
Other	Sibelco Australia Limited	Jandakot Plant / Sibelco	1	0

TABLE 7. AVERAGE NUMBER OF PEOPLE EMPLOYED IN THE WA MINERALS INDUSTRY Continued				
Mineral	Company	Operating Site	2014–15	2015–16
Other	Transalta Energy (Australia) Pty Ltd	Southern Cross Energy Operations	83	72
Other total			183	171
Phosphate total			165	152
Potash total			0	4
Rare earths total			153	174
Salt	Dampier Salt Limited	Dampier Operations	191	183
Salt	Dampier Salt Limited	Lake MacLeod Operations	235	175
Salt	Dampier Salt Limited	Port Hedland Salt Operations	207	228
Salt	Onslow Salt Pty Ltd	Onslow Salt Operations	240	172
Salt	Shark Bay Resources Pty Ltd	Shark Bay Operations	84	90
Salt	W A Salt Koolyanobbing Pty Ltd	Lake Deborah East Operations	16	21
Salt	Western Salt Refinery Pty Ltd	Pink Lake Operations	1	1
Salt total			974	869
Silica – Silica sand total			346	226
Silver total			49	11
Talc total			60	67
Tin, Tantalum and Lithium	Alliance Mineral Assets Limited	Bald Hill Operations	8	9
Tin, Tantalum and Lithium	Atlas Iron Limited	Wodgina Operations	149	151
Tin, Tantalum and Lithium	General Mining Corporation Limited	Mt Cattlin Operations	9	36
Tin, Tantalum and Lithium	Global Advanced Metals Greenbushes Pty Ltd	Greenbushes Operations	12	11
Tin, Tantalum and Lithium	Global Advanced Metals Wodgina Pty Ltd	Wodgina Operations	45	30
Tin, Tantalum and Lithium	Process Minerals International Pty Ltd	Kambalda – Mount Marion Operations	0	40
Tin, Tantalum and Lithium	Tabba Tabba Tantalum Pty Ltd	Tabba Tabba Operations	0	10
Tin, Tantalum and Lithium	Talison Lithium Australia Pty Ltd	Greenbushes Operations	346	414
Tin, Tantalum and Lithium	Valdrew Nominees Pty Ltd	Kelmescott Operations	79	72
Tin, Tantalum and Lithium total			648	773
Unassigned	Fremantle Port Authority	Kwinana Bulk Terminal	117	112
Unassigned	Pilbara Ports Authority	Port Hedland Port Operations	340	373
Unassigned	Rey Derby Port Operations Pty Ltd	Derby Export Facility	1	0
Unassigned	Southern Ports Authority	Bunbury Port (Berths 1, 5 and 8) Operations	37	38
Unassigned	Southern Ports Authority	Esperance Port Operations	232	239
Unassigned	Process Minerals International Pty Ltd	Spinifex Ridge	24	0
Unassigned total			752	762
Uranium total			0	2
Vanadium – Titanium total			75	4
GRAND TOTAL:			105,470	102,273

SOURCE: AXTAT Reporting System, Resources Safety Division.
 Figures include employees as well as contractors.

TABLE 8. AVERAGE NUMBER OF PEOPLE EMPLOYED IN THE WA PETROLEUM INDUSTRY

Onshore facilities and pipelines covered under *Petroleum Pipelines Act 1969*, *Petroleum (Submerged Lands) Act 1982* and *Petroleum Geothermal Energy Resources Act 1967*

Company	Operating site	2014–15	2015–16
APA Group	Various laterals and pipelines	216	196
APT Parmelia Pty Ltd	Mondarra Gas Storage Facility	9	16
AWE Ltd	Dongara and Hovea Production Facilities, Mt Horner, Woodada and Well Intervention Activities	71	46
Barrick Gold	Plutonic Lateral	5	5
BHP Billiton Petroleum Pty Ltd	Macedon Gas Project	16	13
Buru Energy	Various Fields and Pipelines	75	74
Calenergy Resources (Aust) Ltd	Whicher Range–4 ST1	3	2
Chevron (Aust) Pty Ltd	Gorgon, WA Oil Asset and Drilling and Wheatstone	761	412
DBNGP (WA) Transmission Pty Ltd	Dampier–Bunbury Natural Gas Pipeline	516	237
Empire Oil Company (WA) Ltd	Rigs 1 & 3, Red Gully Pipeline and Processing Facility	7	17
Finder Shale Pty Ltd	Theia–1	3	6
Goldfields Gas Transmission Pty Ltd	Goldfields Gas Pipeline	90	65
Latent Petroleum Pty Ltd	Warro Gas Field	0	23
Midwest Joint Venture	Mid West Pipeline	12	10
Newgen Neerabup Partnership	Neerabup Pipeline–PL75	13	13
Newmont Yandal Operations Pty Ltd	Jundee Lateral	5	5
Norilsk	Cawse Lateral	5	5
Origin Energy	Cockburn Lateral, Jingemia and Beharra Springs	18	14
Pilbara Iron	Cape Lambert and Paraburdoo Gas Laterals	11	14
Quadrant Energy Pty Ltd	Devil Creek and Varanus	141	125
Redback Pipeline Pty Ltd	Magellan Lateral	5	4
Robe River Iron Ore Associates	West Angelas Petroleum (Gas) Pipelines and Stations	2	0
Roc Oil	Arrowsmith Stabilisation Facility	21	20
Southern Cross Pipelines Aust Pty Ltd	Mt Keith, Parkeston, Kambalda and Leinster Laterals	26	25
Other	Various laterals and pipelines	30	35
TOTAL WA ONSHORE AND COASTAL WATERS:		2,058	1,380

SOURCE: AXTAT Reporting System, Resources Safety Division.

Figures include employees as well as contractors.

TABLE 9. PRINCIPAL MINERAL AND PETROLEUM PRODUCERS (EFFECTIVE SEPTEMBER 2016)

BASE METALS

(Copper–Lead–Zinc)

Aditya Birla Minerals Ltd

Level 3, 256 Adelaide Terrace
Perth WA 6000
(08) 9366 8800
Nifty
www.adityabirlaminerals.com.au

BHP Billiton (Nickel West)

171 Collins Street
Melbourne VIC 3000
1300 55 47 57
Kambalda
www.bhpbilliton.com

MMG Ltd

Level 23, 28 Freshwater Place
Southbank VIC 3006
(03) 9288 0888
Golden Grove
www.mmg.com

Independence Group NL

Level 5, South Shore Centre
85 South Perth Esplanade
South Perth WA 6151
(08) 9238 8300
Kambalda, Teutonic Bore – Jaguar
www.igo.com.au

Newcrest Mining Ltd

234 Railway Parade
West Leederville WA 6007
(08) 9270 7070
Telfer
www.newcrest.com.au

Newmont Mining Corporation

Level 2, 388 Hay Street
Subiaco WA 6008
(08) 9423 6100
Boddington Gold
www.newmont.com

Sandfire Resources NL

Level 1, 31 Ventnor Avenue
West Perth WA 6005
(08) 6430 3800
DeGrussa-Doolgunna
www.sandfire.com.au

BAUXITE–ALUMINA

Alumina

Alcoa of Australia Ltd

181–205 Davy Street
Booragoon WA 6154
(08) 9316 5111
Jarrahdale – Kwinana
www.alcoa.com/australia

South32

Level 35, 108 St Georges Tce
Perth WA 6000
(08) 9324 9000
Worsley Alumina
www.south32.net

CLAY

Attapulgitite

Hudson Resources Ltd

Level 2, 131 Macquarie Street
Sydney NSW 2000
(02) 9251 7177
Lake Nerramayne
www.hudsonresources.com

Saponite

Watheroo Minerals Pty Ltd

14 Brushwood Brook Drive
Yallingup WA 6282
(08) 9756 6121
Watheroo Clays
www.bentonitewa.com.au

COAL

Griffin Coal Mining Company Pty Ltd

1st Floor, 677 Murray Street
Perth WA 6005
(08) 6188 2200
Lanco
www.griffincoal.com.au

Yancoal Australia Ltd

Level 26, 363 George Street
Sydney NSW 2000
(02) 8583 5300
Premier
www.yancoal.com.au

CONSTRUCTION MATERIALS

Aggregate

Holcim (Australia) Pty Ltd

18 Brodie Hall Drive
Bentley WA 6102
(08) 9212 2000
Newman, Nickol Bay, Turner River
www.holcim.com.au

Gravel

Norwest Sand & Gravel Pty Ltd

Lot 5 Wilson Way
Wickham WA 6720
(08) 9187 1488
Cossack, Mt Welcome, Nickol River

WA Limestone

401 Spearwood Avenue
Bibra Lake WA 6163
(08) 9434 7777
Pickering Brook
www.walimestone.com

Rock

Holcim (Australia) Pty Ltd

18 Brodie Hall Drive
Bentley WA 6102
(08) 9212 2000
Golden Mile Rock
www.holcim.com.au

Sand

Hanson Constructions Pty Ltd

Level 1, 35 Gt Eastern Hwy
Rivervale WA 6103
(08) 9311 8811
Gnangara, Jandabup
www.hanson.com.au

Holcim (Australia) Pty Ltd

18 Brodie Hall Drive
Bentley WA 6102
(08) 9212 2000
Baldivis, Turner River Dune, Turner
River Quarry
www.holcim.com.au

DIAMONDS

Argyle Diamond Mine

Lissadell Road
East Kimberley WA 6740
(08) 9168 4900
Argyle
www.riotinto.com

TABLE 9. PRINCIPAL MINERAL AND PETROLEUM PRODUCERS Continued (EFFECTIVE SEPTEMBER 2016)

GOLD

AngloGold Ashanti Australia Ltd

Level 13, 44 St Georges Terrace
Perth WA 6000
(08) 9425 4600
Sunrise Dam, Tropicana
www.anglogoldashanti.com

Barrick Gold of Australia Ltd

Level 9, 125 St Georges Terrace
Perth WA 6000
(08) 9212 5777
Golden Mile
www.barrick.com

Evolution Mining Ltd

Level 15, 37 St Georges Terrace
Perth WA 6000
(08) 6216 9700
Edna May
www.evolutionmining.com.au

Gold Fields Australia Pty Ltd

Level 5, 50 Colin Street
West Perth WA 6005
(08) 9211 9200
Agnew/Lawlers, Darlot, Granny Smith,
St Ives
www.goldfields.com.au

Metals X Ltd

Level 3, 18-32 Parliament Place
West Perth WA 6005
(08) 9220 5700
Central Murchison, Higginsville
South Kalgoorlie
www.metalsx.com.au

Newcrest Mining Ltd

234 Railway Parade
West Leederville WA 6007
(08) 9270 7070
Telfer
www.newcrest.com.au

Newmont Mining Corporation

Level 2, 388 Hay Street
Subiaco WA 6008
(08) 9423 6100
Boddington
www.newmont.com

Northern Star Resources Ltd

Level 1, 388 Hay Street
Subiaco WA 6008
(08) 6188 2100
Jundee, Kanowna, Kundana, Paulsens,
Plutonic
www.nsr ltd.com

Norton Gold Fields Ltd

Level 36, Exchange Plaza
2 The Esplanade
Perth WA 6000
Paddington, Binduli
www.nortongoldfields.com.au

Ramelius Resources Ltd

Level 1, 130 Royal Street
East Perth WA 6004
(08) 9202 1127
Kathleen Valley Gold, Vivien Gold
www.rameliusresources.com.au

Regis Resources Ltd

Level 1, 1 Alvan Street
Subiaco WA 6008
(08) 9442 2200
Garden Well, Moolart
www.regisresources.com.au

Silver Lake Resources Ltd

Suite 4, Level 3
85 South Perth Esplanade
South Perth WA 6151
(08) 6313 3800
Randalls
www.silverlakeresources.com.au

St Barbara Ltd

7 Rheola Street
West Perth WA 6005
(08) 9476 5555
Gwalia
www.stbarbara.com.au

Sandfire Resources NL

Level 1, 31 Ventnor Avenue
West Perth WA 6005
(08) 6430 3800
DeGrussa
www.sandfire.com.au

GYPSUM

CSR Ltd

Trinity 3
39 Delhi Road
North Ryde NSW 2113
(02) 9235 8000
Jurien Bay North
www.csr.com.au

Gypsum Industries of Australia

Suite 1, 110 Robinson Avenue
Belmont WA 6104
1800 644 951
Cowcowing Lakes South
www.aglime.com.au

Lake Hillman Mining Pty Ltd

70 Kalannie-Kulja Road
Kalannie WA 6468
(08) 9666 2045
Cowcowing Lakes North, Lake Hillman

Whitfield Minerals Pty Ltd

8 Sholl Street
Mandurah WA 6210
(08) 9535 9299
Lake Cowan

MINERAL SANDS

Garnet Sand

GMA Garnet Pty Ltd

122 Goulds Road
Narngulu WA 6532
(08) 9923 6000
Port Gregory
www.garnetsales.com

Ilmenite Leucoxene Rutile and Zircon

Doral Mineral Sands Pty Ltd

Lot 7, 1 Harris Road
Picton WA 6229
(08) 9725 5444
Dardanup
www.doral.com.au

Iluka Resources Ltd

Level 23, 140 St Georges Terrace
Perth WA 6000
(08) 9360 4700
Capel, Eneabba
www.iluka.com

TABLE 9. PRINCIPAL MINERAL AND PETROLEUM PRODUCERS Continued (EFFECTIVE SEPTEMBER 2016)

Tronox Australia Ltd

Brand Highway
Cataby WA 6507
(08) 9690 9200
Cooljarloo
www.tronox.com.au

IRON ORE

Atlas Iron Ltd

Level 18, Raine Square
300 Murray Street
Perth WA 6000
(08) 6228 8000
Abydos, Mt Webber, Wodgina
www.atlasiron.com.au

BC Iron Ltd

Level 1, 15 Rheola Street
West Perth WA 6005
(08) 6311 3400
Iron Valley, Nullagine JV
www.bciron.com.au

BHP Billiton Ltd

171 Collins Street
Melbourne VIC 3000
1300 55 47 57
Jimblebar, Yandi, Mining Area C
Newman
www.bhpbilliton.com

Citic Pacific Mining Management Pty Ltd

45 St Georges Terrace
Perth WA 6000
(08) 9226 8888
Sino – Cape Preston Iron
www.citicpacificmining.com

Cliffs Natural Resources Pty Ltd

The Quadrant Building
Level 12, 1 William Street
Perth WA 6000
(08) 9422 3405
Koolyanobbing
www.cliffsnaturalresources.com

Fortescue Metals Ltd

Level 2, 87 Adelaide Terrace
East Perth WA 6004
(08) 6218 8888
East Pilbara Solomon
www.fmg.com.au

Gindalbie Metals Ltd

6 Altona Street
West Perth WA 6059
(08) 9480 8700
Karara–Blue Hills
www.gindalbie.com.au

Hamersley Iron Pty Ltd

152 St Georges Terrace
Perth WA 6000
(08) 9327 2000
Hamersley Iron, Robe River –
Deepdale, Yandicoogina
www.hamersleyiron.com

Hancock Prospecting Pty Ltd

28–42 Ventnor Avenue
West Perth WA 6005
Roy Hill
www.hancockprospecting.com.au

Mineral Resources Ltd

1 Sleat Road
Applecross WA 6153
(08) 9329 3600
Carina
www.mineralresources.com.au

Mt Gibson Iron Ltd

Level 1, 2 Kings Park Road
West Perth WA 6005
(08) 9426 7500
Mt Gibson Iron, Koolan Island
Talling Peak
www.mtgibsoniron.com.au

LIMESAND–LIMESTONE

Aglime of Australia

Suite 1, 110 Robinson Avenue
Belmont WA 6104
(08) 9277 5529
Dongara–Denison, Lancelin
Jurien Bay
www.aglime.com.au

Archistone Pty Ltd

27 Jandakot Road
Jandakot WA 6164
(08) 9417 2444
Moore River,
Yanchep Reconstituted Stone
www.archistone.com.au

Cockburn Cement Ltd

Lot 242, Russell Road
Munster WA 6166
(08) 9411 1000
Cockburn, Coogee, Denison
Ledge Point, Wesco Rd
www.cockburncement.com.au

Lime Industries Pty Ltd

43 Hector Street
Osborne Park WA 6017
(08) 9241 1100
Boranup Limesand
www.limeindustries.com.au

Minara Resources

Level 10, Alluvion
58 Mounts Bay Road
Perth WA 6000
Mt Zephyr Calcrete
www.minara.com.au

WA Limestone

401 Spearwood Avenue
Bibra Lake WA 6163
(08) 9434 7777
Gregory West, Mt Minnie Granite,
Pickering Brook Gravel, Port Hedland,
Postans
www.walimestone.com

NICKEL

BHP Billiton (Nickel West)

125 St Georges Terrace
Perth WA 6000
1300 55 47 57
Kambalda, Leinster, Mt Keith,
Kalgoorlie, Kwinana
www.bhpbilliton.com

First Quantum Minerals Ltd

Level 1, 24 Outram Street
West Perth WA 6005
(08) 9346 0100
Ravensthorpe
www.first-quantum.com

Minara Resources

58 Mounts Bay Road
Perth WA 6000
(08) 9212 8400
Murrin Murrin
www.minara.com.au

TABLE 9. PRINCIPAL MINERAL AND PETROLEUM PRODUCERS Continued (EFFECTIVE SEPTEMBER 2016)

Western Areas Ltd
2 Kings Park Road
West Perth WA 6005
(08) 9334 7777
Forrestania operation
www.westernareas.com.au

PALLADIUM

BHP Billiton (Nickel West)
125 St Georges Terrace
Perth WA 6000
1300 55 47 57
Kambalda
www.bhpbilliton.com

PETROLEUM

AWE Ltd
Level 3, 1101 Hay Street
West Perth WA 6005
(08) 9480 1300
Corbyas
www.awexplore.com.au

BHP Billiton Petroleum (North West Shelf) Pty Ltd
125 St Georges Terrace
Perth WA 6000
1300 55 47 57
Macedon, Pyrenees
www.bhpbilliton.com

Chevron Australia Pty Ltd
Level 24, QV1 Building
250 St Georges Terrace
Perth WA 6000
(08) 9216 4000
Barrow Island, Gorgon
www.chevronaustralia.com

Origin Energy Resources Ltd
34 Colin Street
West Perth WA 6005
(08) 8635 3485
Beharra Springs
www.originenergy.com.au

Quadrant Energy Pty Ltd
Level 9, 100 St Georges Terrace
Perth WA 6000
(08) 6218 7100
East Spar, Harriet, John Brookes,
Reindeer, Stag, Van Gogh
www.quadrantenergy.com.au

Roc Oil (WA) Pty Ltd
Suite 2, Ground Floor
100 Havelock Street
West Perth WA 6005
(08) 9219 7111
Cliff Head
www.rocoil.com.au

Santos Ltd
Level 2, 40 The Esplanade
Perth WA 6000
(08) 9333 9500
Mutineer–Exeter
www.santos.com.au

Vermilion Oil and Gas Australia Pty Ltd
Level 5, 30 The Esplanade
Perth WA 6000
(08) 9215 0300
Wandoo
www.vermilionenergy.com

Woodside Energy Ltd
240 St Georges Terrace
Perth WA 6000
(08) 9348 4000
Amanda Claire/Belnaves/Brunello,
Angel, Athena, Cossack, Enfield,
Goodwyn, Hermes, North Rankin,
North West Shelf, Pluto Vincent,
Wanaea
www.woodside.com.au

PLATINUM

BHP Billiton (Nickel West)
125 St Georges Terrace
Perth WA 6000
1300 55 47 57
Kambalda
www.bhpbilliton.com

RARE EARTHS

Lynas Corporation Ltd
7 Tully Road
East Perth WA 6004
(08) 6241 3800
Mount Weld
www.lynascorp.com

SALT

Dampier Salt Ltd
37 Belmont Avenue
Belmont WA 6104
(08) 9270 9270
Dampier, Lake MacLeod, Port Hedland
www.dampiersalt.com.au

Shark Bay Salt Pty Ltd
Level 16, 2 The Esplanade
Perth WA 6000
(08) 9265 8000
Onslow Salt, Shark Bay Salt

WA Salt Supply Ltd
185-187 Cockburn Road
North Coogee WA 6163
(08) 9431 9431
Lake Deborah East
www.wasalt.com.au

SILICA – SILICA SAND

Silica
Simcoa Operations Pty Ltd
973 Marriott Road
Wellesley WA 6233
(08) 9780 6666
Kemerton
www.simcoa.com.au

Silica Sand
AustSand Mining
Suite 5, 363-367 Albany Hwy
Victoria Park WA 6100
(08) 9361 6288
Mindijup
www.austsandmining.com.au

Hanson Constructions Pty Ltd
Level 1, 35 Gt Eastern Hwy
Rivervale WA 6103
(08) 9311 8811
Gnangara
www.hanson.com.au

Simcoa Operations Pty Ltd
973 Marriott Road
Wellesley WA 6233
(08) 9780 6666
Kemerton
www.simcoa.com.au

TABLE 9. PRINCIPAL MINERAL AND PETROLEUM PRODUCERS Continued (EFFECTIVE SEPTEMBER 2016)

SPONGOLITE

**Southern Spongolite Industries
Pty Ltd**

Red Gum Pass
Kendenup WA 6323
(08) 9841 7549
Red Gum Spongolite

TALC

Imerys Talc Australia Pty Ltd

Perenjori Road
Three Springs WA 6519
(08) 9954 3000
Three Springs Talc
www.imery.com

TIN–TANTALUM–LITHIUM

Spodumene

Talison Lithium Pty Ltd

Level 4, 37 St Georges Terrace
Perth WA 6000
(08) 9263 5555
Greenbushes
www.talisonlithium.com

Tantalum

Global Advanced Metals

Level 3, Centrepoint Tower
123B Colin Street
West Perth WA 6005
(08) 6217 2500
Greenbushes
www.globaladvancedmetals.com

Tin

Global Advanced Metals

Level 3, Centrepoint Tower
123B Colin Street
West Perth WA 6005
(08) 6217 2500
Greenbushes
www.globaladvancedmetals.com

ABBREVIATIONS

A\$	Australian dollar	Mct	million carats
ABS	Australian Bureau of Statistics	Mha	million hectares
bbbl	barrels of oil	MMbbl	million barrels
bbbl/d	barrels per day	Moz	million ounces
Bcm	billion cubic metres	Mt	million tonnes
Btu	British Thermal Units	Mtoe	million tonnes of oil equivalent
ct	carat	Mt/a	million tonnes per annum
DIIS	Department of Industry, Innovation and Science	OPEC	Organization of Petroleum Exporting Countries
GDP	Gross Domestic Product	oz	ounce
GJ	Gigajoule	oz/a	ounce per annum
Gm ³	billion cubic metres	PJ	petajoules
ha	hectares	RBA	Reserve Bank of Australia
kl	kilolitres	t	tonne
km	kilometres	t/a	tonnes per annum
km ²	square kilometres	Tcf	trillion cubic feet
kt	thousand tonnes	t/d	tonnes per day
LME	London Metal Exchange	TJ/d	terajoules per day
m	metre	US\$	United States dollar
Mboe	millions of barrels of oil equivalent		

WEIGHTS AND MEASURES

kilo	10 ³	1,000
mega	10 ⁶	1,000,000
giga	10 ⁹	1,000,000,000
tera	10 ¹²	1,000,000,000,000
peta	10 ¹⁵	1,000,000,000,000,000
exa	10 ¹⁸	1,000,000,000,000,000,000
zetta	10 ²¹	1,000,000,000,000,000,000,000
yotta	10 ²⁴	1,000,000,000,000,000,000,000,000

UNITS AND CONVERSION FACTORS

	Metric Unit	Symbol	Imperial Unit
Mass	1 gram	g	= 0.032151 troy (fine) ounce (oz)
	1 kilogram	kg	= 2.204624 pounds (lb)
	1 tonne	t	= 1.10231 United States short ton [1 US short ton = 2,000 lb]
	1 tonne	t	= 0.98421 United Kingdom long ton [1 UK long ton = 2,240 lb]
	1 tonne LNG	t	= 52,000,000 British Thermal Units (Btu)
Volume	1 kilolitre	kL	= 6.28981 barrels (bb)
	1 cubic metre	m ³	= 35.3147 cubic feet (ft ³) [1 kilolitre (kl) = 1 cubic metre (m ³)]
Energy	1 kilojoule	kJ	= 0.94781 British Thermal Units (Btu)
Energy Content		Prefix	
Coal	19.7 GJ/t	kilo (k)	10 ³
Condensate	32.0 MJ/L	mega (M)	10 ⁶
Crude oil	37.0 MJ/L	giga (G)	10 ⁹
LNG	25.0 MJ/L	tera (T)	10 ¹²
Natural gas	38.2 MJ/m ³	peta (P)	10 ¹⁵
LPG-butane	28.7 MJ/L (1tonne LPG-butane = 1,720 litres)		
LPG-propane	25.4 MJ/L (1tonne LPG-propane = 1,960 litres)		

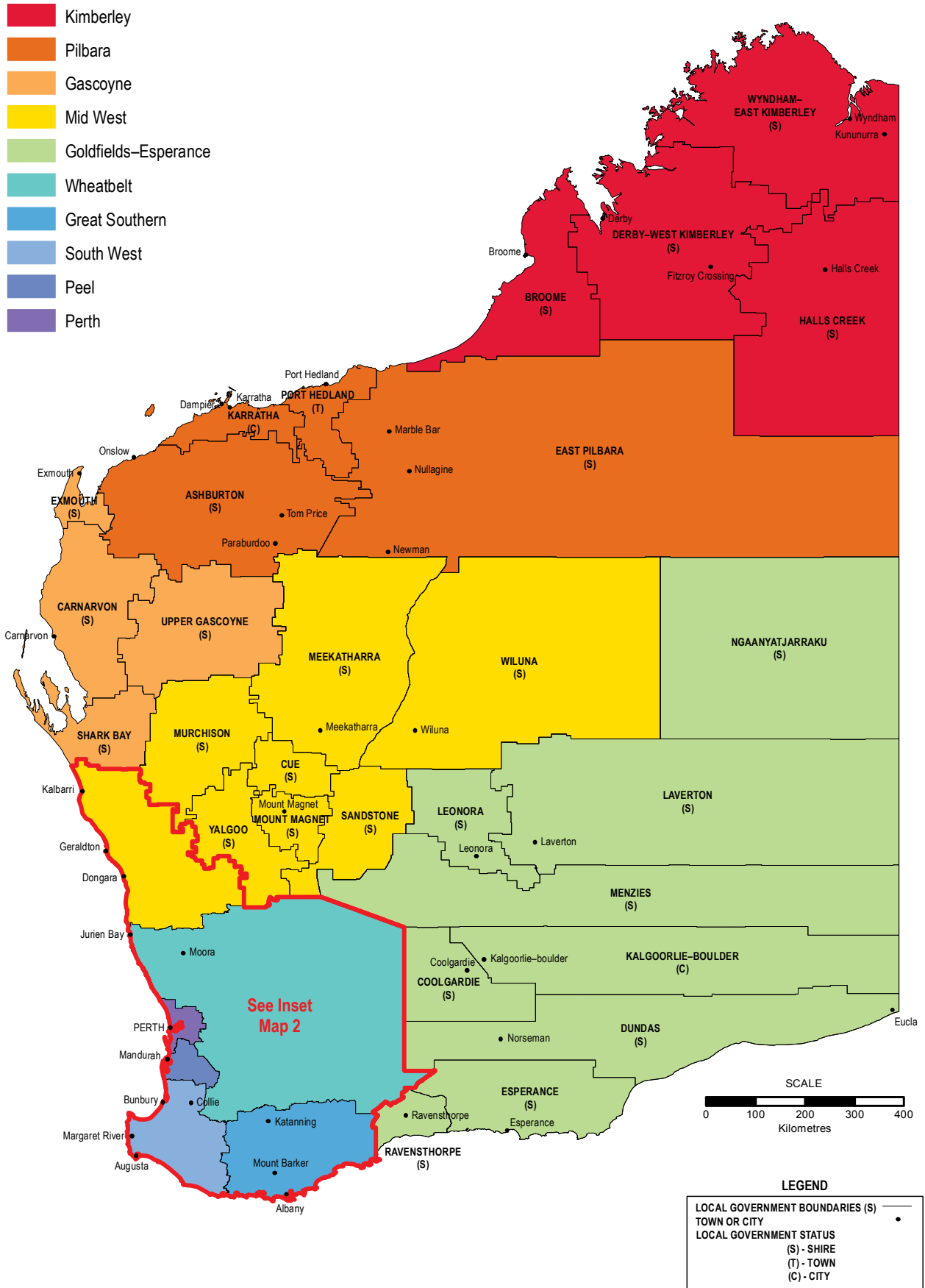
DATA SOURCES

Quantities and values for minerals and petroleum in this publication are collected from a variety of sources including royalty returns, various company annual reports, quarterly Australian Stock Exchange reports, State port authority statistics, the ABS and DIIS.

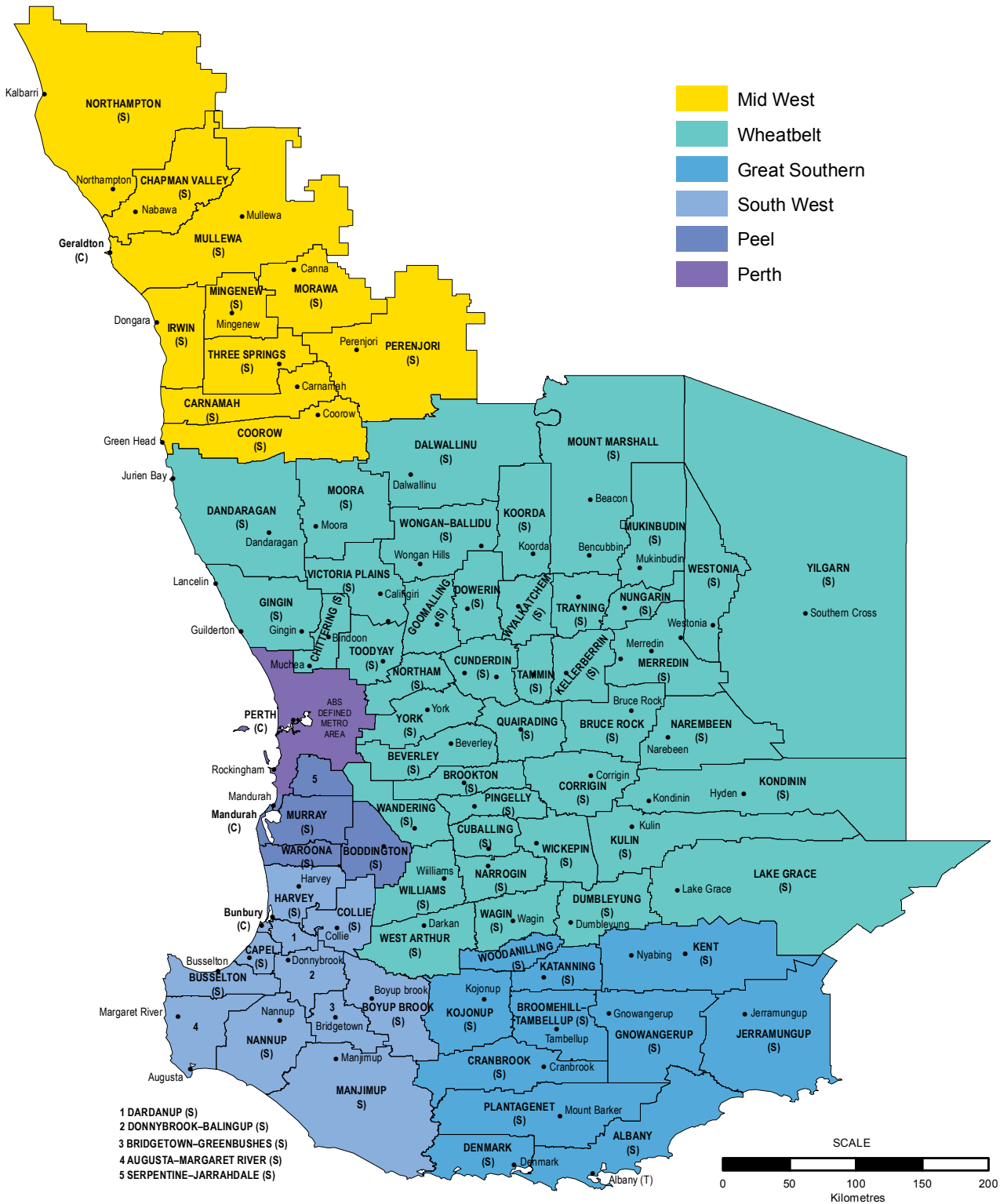
Quantities specified relate to either mine production or sales as listed below for each commodity.

Mine Production
Clays
Coal
Construction materials
Dimension stone
Gold
Gypsum
Limesand–Limestone–Dolomite
Silica – Silica Sand
Talc
Sales
Alumina
Base metals (Copper, Lead and Zinc)
Chromite
Diamonds
Gem and semi-precious stones
Mineral sands
Industrial pegmatite minerals
Iron ore
Manganese
Nickel industry (Nickel, Cobalt, Platinum and Palladium)
Petroleum
Pigments
Rare earths
Salt
Silver
Spongolite
Tin–Tantalum–Lithium
Vanadium

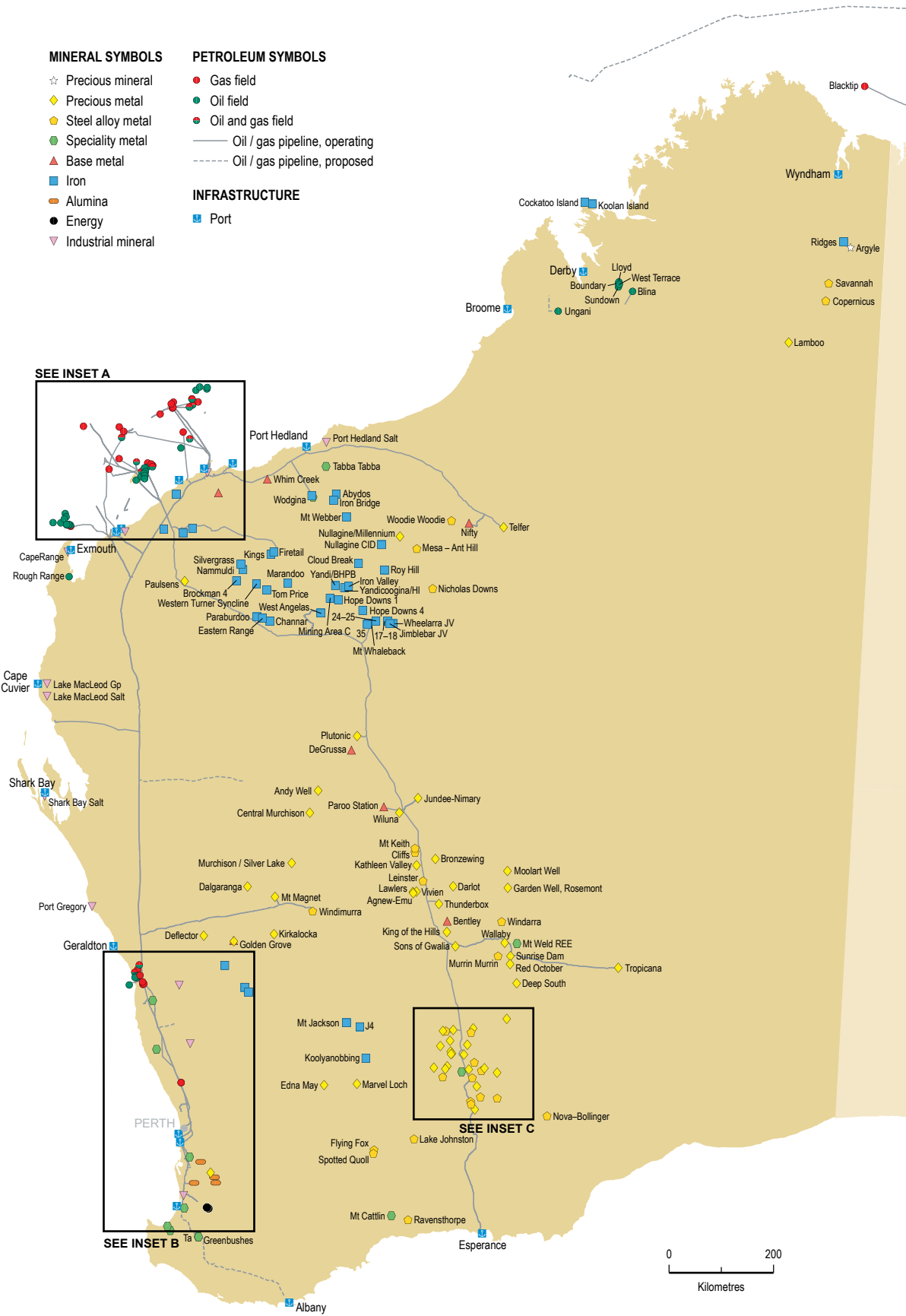
4. MAPS



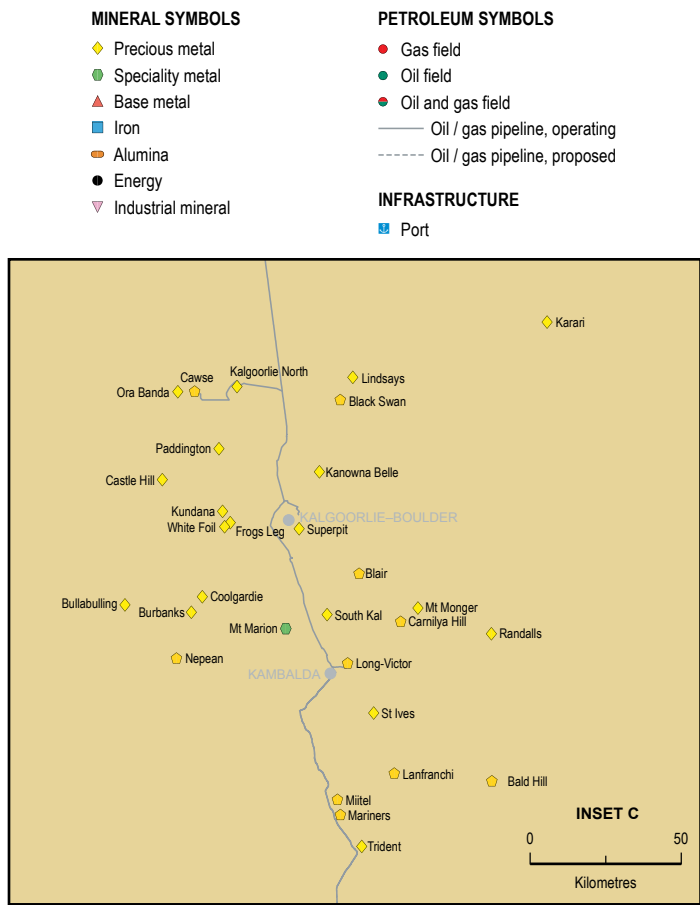
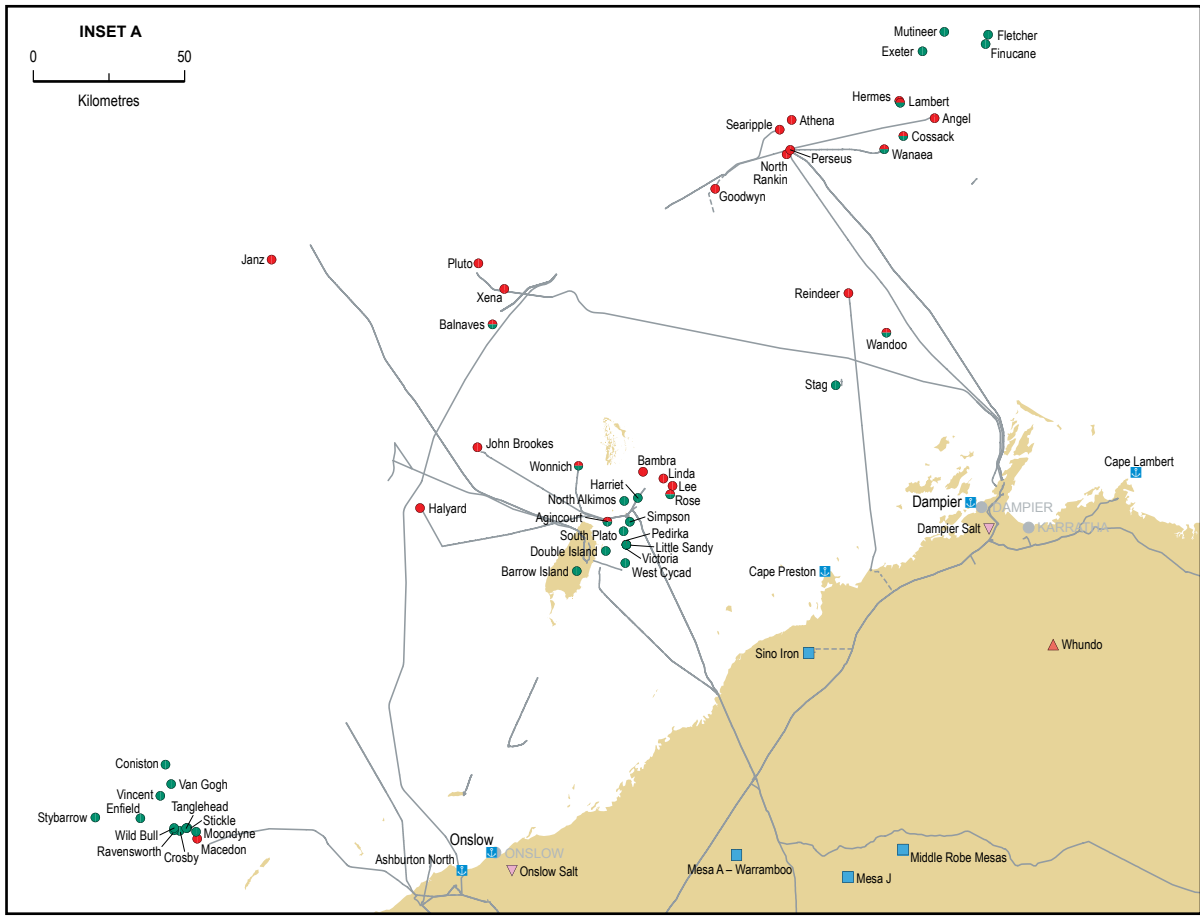
Map 1. Local Government and Regional Boundaries



Map 2. Local Government and Regional Boundaries Insert



Map 3. Major Mineral and Petroleum Projects in Western Australia



- | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>MINERAL SYMBOLS</p> <ul style="list-style-type: none"> ◆ Precious metal ● Speciality metal ▲ Base metal ■ Iron ■ Alumina ● Energy ▽ Industrial mineral | <p>PETROLEUM SYMBOLS</p> <ul style="list-style-type: none"> ● Gas field ● Oil field ● Oil and gas field — Oil / gas pipeline, operating - - - Oil / gas pipeline, proposed <p>INFRASTRUCTURE</p> <ul style="list-style-type: none"> ■ Port |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Map 4. Major Mineral and Petroleum Projects in Western Australia



Freight train loaded with iron ore.

Government of Western Australia
Department of Mines and Petroleum
Mineral House, 100 Plain Street
East Perth, Western Australia 6004

Tel: +61 8 9222 3333
Fax: +61 8 9222 3862
Email: dmp@dmp.wa.gov.au
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