



Government of Western Australia
Department of Mines and Petroleum

WESTERN AUSTRALIAN MINERAL AND PETROLEUM STATISTICS DIGEST 2010-11



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

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Welcome to the Mineral and Petroleum Statistics Digest for 2010–11. This publication brings together a range of statistical information to provide a comprehensive overview of Western Australia's mineral and petroleum industry.

The statistics in this Digest show that the value of mineral and petroleum sales from Western Australia increased sharply by 39 per cent in 2010–11 to be worth a record \$101 billion. This is the first time resource sales have reached the \$100 billion mark signifying another major milestone for the State's mineral and petroleum industry which has rebounded strongly since the global financial crisis.

The outstanding sales result in 2010–11 reflects robust overseas demand for Western Australia's resources and high commodity prices which are supporting a substantial pipeline of investment activity. It also demonstrates the resilience of mineral and petroleum producers who experienced extensive flooding created by a longer than normal wet season, skills shortages and a strong Australian dollar.

The State's resources industry has grown considerably over the past decade with the value of mineral and petroleum sales increasing on average by 17 per cent each year. Expansion is being driven by rapid industrialisation in Asia which has underpinned steady demand for Western Australia's commodity exports. In 2010–11, mineral and energy exports contributed a dominant 95 per cent share of the State's merchandise exports earnings.

Western Australia is one of the great mineral provinces of the world. It hosts an impressive 545 commercial mineral projects, embracing 966 operating mine sites which produce over 50 different minerals. In 2010–11, there were also 73 operating oil and gas fields. The resources industry continues to play a key role in the economic development and prosperity of the State and the nation.



Whilst not immune to external economic conditions, the State's mineral and petroleum industry is globally competitive and is in a very strong position as shown by record sales in 2010–11 and huge investment in resource projects. The Department is focused on ensuring that Western Australia remains a destination of choice for responsible resource exploration and development.

It is not possible to prepare such a comprehensive range of information without assistance from outside this Department. I would like to thank the various resource companies, Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES), Australian Bureau of Statistics (ABS) and the Western Australian Department of Treasury for their cooperation in compiling this Digest.

Richard Sellers
Director General
Department of Mines and Petroleum

1. EXPLORATION AND MINERAL TITLES

1.1 MINERALS EXPLORATION

In 2010–11, mineral exploration expenditure in Western Australia increased significantly to an all-time record of \$1.59 billion. This result was 28 per cent higher than for 2009–10 and is 90 per cent higher than five years ago.

Nationally mineral exploration metres drilled increased by 17 per cent (9.7 million metres) over the previous year. However, expenditure on drilling increased by 32 per cent. This higher level of expenditure reflects increased costs associated with exploration activity.

Mineral exploration expenditure in Australia totalled \$2.9 billion in 2010–11 and was \$697.7 million (32 per cent) higher than in 2009–10. Most of this drilling occurred in areas of existing deposits which accounted for 65 per cent with the remaining 35 per cent on new ground.

The bulk of Australia's mineral exploration activity occurs in Western Australia. The State accounted for 54 per cent of national mineral exploration expenditure in 2010–11. The following list shows the order of State and Territory share of national expenditure on mineral exploration:

- Western Australia _____ 54%
- Queensland _____ 22%
- South Australia _____ 9%
- New South Wales _____ 5%
- Northern Territory _____ 7%
- Victoria _____ 2%
- Tasmania _____ 1%

In 2010–11, the majority of Western Australia's mineral exploration expenditure was spent on existing deposits which accounted for 64 per cent or \$1023.7 million. The remaining 36 per cent, or \$566.4 million, was spent on greenfield areas.

In terms of expenditure by mineral, in 2010–11, uranium recorded an increase of 82 per cent, copper rose 71 per cent, nickel–cobalt went up 34 per cent and gold recorded a 30 per cent increase.

Iron ore exploration dominated once again and accounted for 37 per cent, or \$585 million, of Western Australian mineral exploration expenditure. This was around 18 per cent higher than in 2009–10. Expenditure on uranium exploration reached \$100.7 million in 2010–11 and accounted for 47 per cent of total expenditure on uranium exploration in Australia.

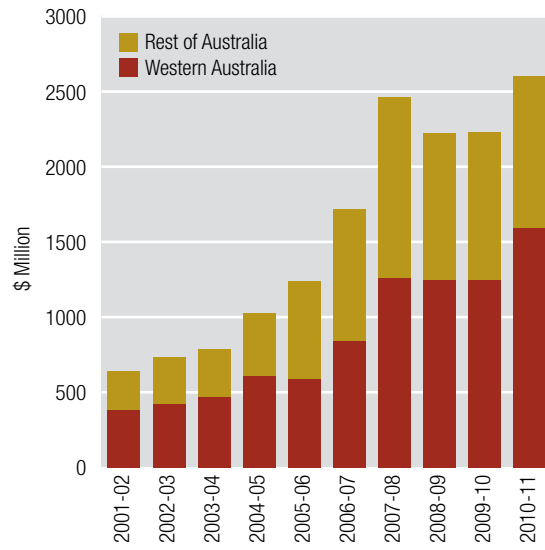


Figure 1 | **Mineral Exploration Expenditure**
Source: ABS

Expenditure on gold exploration in Western Australia increased in 2010–11 to \$452.5 million. In the same period, gold accounted for 28 per cent of the State's mineral exploration expenditure and ranks second behind iron ore.

Among the base metals, most of the expenditure was attributable to nickel exploration which amounted to \$261 million in 2010–11, an increase of 34 per cent. Nickel accounted for 16 per cent of the State's total exploration expenditure in 2010–11.

Together, iron ore, gold and nickel accounted for 84 per cent or \$1.3 billion of total mineral exploration expenditure in Western Australia in 2010–11.

The cornerstone of growth in the mining industry is exploration and investment. In 2009, the Western Australian government announced its \$80 million Exploration Incentive Scheme (EIS), an initiative that aims to encourage exploration in under-explored greenfield regions of the State. The scheme will be funded over a five-year period. Further details on the initiative's six programs can be found on the Department's website at www.dmp.wa.gov.au/EIS.

1.2 PETROLEUM EXPLORATION

In 2010–11, petroleum exploration expenditure in Western Australia reached \$2.4 billion. This represented a decrease of six per cent from 2009–10. In the past five years, spending on petroleum exploration in this State has risen on average 12 per cent each year.

At the national level, expenditure on petroleum exploration fell by five per cent to \$3.3 billion in 2010–11. At the same time, Western Australia attracted 72 per cent of national petroleum exploration expenditure, up slightly from 71 per cent in 2009–10. For the fourth consecutive year, Western Australia has attracted over 70 per cent of Australia’s petroleum exploration expenditure.

The following list shows State and Territory share of national expenditure on petroleum exploration in 2010–11:

- Western Australia _____ 72%
- Queensland _____ 14%
- Northern Territory _____ 4%
- New South Wales _____ 3%
- Victoria _____ n/a
- South Australia _____ n/a
- Tasmania _____ n/a

Offshore basins continue to attract the majority of petroleum exploration expenditure in Australia and accounted for 77 per cent of total spending in 2010–11. The proportion of petroleum exploration expenditure spent onshore in Australia rose from 16 per cent in 2006–07 to 23 per cent in 2010–11.

Further information on petroleum exploration activity in Western Australia can be found in the publication “Petroleum in Western Australia” which is produced by

the Department of Mines and Petroleum. This publication contains a comprehensive overview of petroleum exploration activities in this State together with details on the award of petroleum exploration permits.

1.3 MINERAL TITLES

In 2010–11, the total amount of land covered by mineral tenements in force in Western Australia increased by 17 per cent to 60.3 million hectares.

Exploration Licences cover the majority of mineral tenements (87 per cent), with Mining Leases covering only four per cent. Most of the increase in area covered was accounted for by Exploration Licences which were up 18 per cent to 52.2 million hectares with the actual number of Exploration Licences increasing by 14 per cent from 5297 to 6050. Mining Leases rose in number marginally from 5297 in 2009–10 to 5764 in 2010–11 and the total area covered by these licences increased from 2.125 million hectares to 2.233 million hectares.

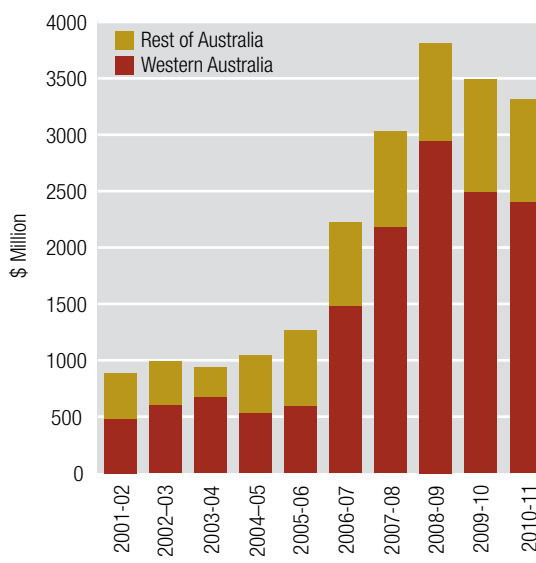


Figure 2 | **Petroleum Exploration Expenditure**
Source: ABS

| TABLE 1. MINERALS TENEMENTS IN FORCE 1978 ACT | | | | | | | | | | |
|---|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | 2006–07 | | 2007–08 | | 2008–09 | | 2009–10 | | 2010–11 | |
| | Number | 000 ha | Number | 000 ha | Number | 000 ha | Number | 000 ha | Number | 000 ha |
| Prospecting Licences | 5,376 | 682 | 6,260 | 800 | 7,110 | 913 | 7,032 | 890 | 7,106 | 897 |
| Exploration Licences | 4,766 | 40,031 | 5,427 | 51,790 | 4,959 | 42,367 | 5,297 | 44,123 | 6,050 | 52,205 |
| Mining Leases | 5,090 | 1,824 | 5,475 | 2,036 | 5,618 | 2,065 | 5,764 | 2,125 | 5,845 | 2,233 |
| Other | 3,629 | 3,248 | 3,678 | 4,119 | 2,512 | 3,477 | 2,884 | 4,541 | 2,995 | 4,926 |
| Mineral Claims and Other 1904 Act | 186 | 21 | 186 | 21 | 186 | 21 | 186 | 21 | 186 | 21 |
| Total | 19,047 | 45,806 | 21,026 | 58,766 | 20,385 | 48,843 | 21,163 | 51,700 | 22,182 | 60,282 |

Source: DMP

1.4 PETROLEUM TITLES

In 2010–11, the total area covered by petroleum titles (including Commonwealth waters) in force both offshore and in Western Australia totalled 742 thousand square kilometres.

The *Offshore Petroleum and Greenhouse Gas Storage Act 2006* titles totalled 254 covering some 392 thousand square kilometres. Exploration permits accounted for 136 (365 thousand square kilometres), followed by 46 production permits (14 thousand square kilometres). The balance includes 27 being held under retention leases and a further 45 Access Authority and Infrastructure/Pipeline licences.

The *Petroleum (Submerged Lands) Act 1982* totalled 44 titles covering 39 thousand square kilometres. Pipeline licences accounted for 23 of these titles, production licences nine, retention leases six, exploration permits five and one Access Authority.

The *Petroleum and Geothermal Energy Resources Act 1967* totalled 146 titles covering 311 thousand square kilometres. This was made up of 74 Exploration permits covering 243 thousand square kilometres and 43 Geothermal exploration permits covering 63 thousand square kilometres. 15 production licences cover three thousand square kilometres, five retention leases (411 square kilometres) and the remaining nine are made up of other miscellaneous licences/authorities.

There were a total of 80 pipeline licences held under the *Petroleum Pipelines Act 1969* in 2010–11 covering six thousand square kilometres.

**TABLE 2. PETROLEUM PERMITS IN FORCE
SEPTEMBER 2011**

| Title Type | Area 000 km ² | Number of titles |
|---|--------------------------|------------------|
| <i>Offshore Petroleum and Greenhouse Gas Storage Act 2006</i> | | |
| Access Authority | 0 | 18 |
| Exploration Permit | 364 | 136 |
| Infrastructure Licence | 0 | 2 |
| Pipeline Licence | | 23 |
| Production Licence | 14 | 46 |
| Retention Lease | 8 | 27 |
| Special Prospecting Authority | 6 | 2 |
| | 392 | 254 |
| <i>Petroleum (Submerged Lands) Act 1982</i> | | |
| Access Authority | 0 | 1 |
| Exploration Permit | 36 | 5 |
| Pipeline Licence | | 23 |
| Production Licence | 2 | 9 |
| Retention Lease | 1 | 6 |
| | 39 | 44 |
| <i>Petroleum and Geothermal Energy Resources Act 1967</i> | | |
| Access Authority | 0 | 1 |
| Access Authority to Deviated | 0 | 4 |
| Drilling Reservation | 0 | 2 |
| Exploration Permit | 243 | 74 |
| Geothermal Exploration Permit | 63 | 43 |
| Petroleum Lease | 0 | 1 |
| Production Licence | 3 | 15 |
| Retention Lease | 0 | 5 |
| Special Prospecting Authority | 1 | 1 |
| | 310 | 146 |
| <i>Petroleum Pipelines Act 1969</i> | | |
| Pipelines Licence | | 80 |
| | 741 | 524 |

2.1 OVERVIEW

The value of Western Australia's mineral and petroleum industry reached a record high of \$101.2 billion in 2010–11 representing an increase of 39 per cent over the previous year. This is the first time resource sales have exceeded \$100 billion and is particularly significant considering the 12 per cent appreciation of the Australian dollar against the US dollar during 2010–11.

This outcome was supported by exceptionally high commodity prices and robust overseas demand for the State's resources. The sales record was delivered against a backdrop of extensive flooding from a longer than normal wet season and included a subsequent train derailment. The industry also continues to face increasing costs and skills shortages which are hampering expansions and developments designed to meet increasing demand.

The most outstanding sales outcome in 2010–11 came from the iron ore sector. Coupled with petroleum and gold, these three sectors accounted for 88 per cent or \$88.7 billion of all mineral and petroleum sales.

Western Australia is very prominent in the global iron ore industry. In 2010–11 another sales record was set and has averaged a 35 per cent increase in value each year over the past five years. With its close proximity to Asia, vast iron ore reserves and project expansions to meet demand, Western Australian producers are well placed to remain a significant contributor to growth in the national economy.

The strong Australian dollar which has been trading near post-float highs and in 2010–11 averaged US99 cents. High commodity prices helped to compensate for the strengthening Australian dollar and played an important role in raising the value of Western Australian mineral and petroleum sales in 2010–11.

The list below shows average commodity price movements between 2009–10 and 2010–11 in both US and Australian dollar terms:

| Commodity | US\$ | A\$ |
|-----------|---------|----------|
| Iron Ore | Up 76% | Up 59% |
| Tin | Up 63% | Up 45% |
| Nickel | Up 24% | Up 10% |
| Copper | Up 30% | Up 16% |
| Zinc | Up 8% | Down 3% |
| Crude Oil | Up 25% | Up 12% |
| Alumina | Up 21% | Up 8% |
| Gold | Up 26% | Up 13% |
| Lead | Up 14% | Up 2% |
| Cobalt | Down 5% | Down 15% |

In 2010–11, Western Australia accounted for a record 46 per cent of Australia's merchandise exports which were worth \$244.6 billion. Queensland followed with 20 per cent, New South Wales 15 per cent and Victoria contributed around eight per cent.

Mining and petroleum dominated Western Australia's merchandise exports accounting for 95 per cent of the total in 2010–11 with China remaining the State's largest market, taking 42 per cent. Commodity exports are forecast to increase over the next five years as a number of significant iron ore and LNG projects come on-stream across the State.

The magnitude of the State's mining developments is demonstrated in the Australian Bureau of Statistics (ABS) figures for 2010–11. This data shows that Western Australia's share of national mining capital expenditure rose 29 per cent to \$28.3 billion and accounted for 60 per cent of the total (\$47.2 billion). Over the past five years, private new capital expenditure by the industry has grown on average by 21 per cent.

Western Australia attracted the bulk of mineral and petroleum exploration expenditure in Australia drawing in 54 and 72 per cent respectively in 2010–11.

As highlighted by record sales in 2010–11, the State's mineral and petroleum industry remains globally competitive and is in a very strong position given the uncertain global economic outlook. This follows a decade of rapid expansion where the value of resource sales has increased on average by 14 per cent each year. Supported by a substantial pipeline of resource investment activity, the industry is well placed to take advantage of rapid industrialisation in Asia and the resultant strong demand for commodities.

HIGHLIGHTS IN 2010–11

Iron ore is the State's largest sector accounting for a record \$57.3 billion in 2010–11 an increase of 62 per cent on last year. This also represents 57 per cent of total sales in 2010–11. Australian dollar prices for all grades of iron ore from Western Australian producers increased by an average of 60 per cent over the year. Adverse weather conditions early in 2011 affected shipments of iron ore and overall were only three per cent higher than the previous year reaching 396 million tonnes.

Petroleum, which includes crude oil, condensate, LNG, natural gas, LPG butane and propane, is Western Australia's second-largest resource sector after iron ore accounting for \$23.2 billion or 23 per cent of total sales in 2010–11. This represents a 24 per cent increase in overall value compared to the previous year.

LNG was the second most valuable commodity in the State in 2010–11. Output increased by eight per cent to 17 million tonnes and the value of LNG sales rose by 25 per cent to \$8.7 billion. LNG production is forecast to grow in the period ahead due to increased demand from Asia and supply from new projects including Woodside Energy's Pluto LNG project which is expected to commence production in March 2012.

The value of **crude oil** sales from Western Australia rose by 32 per cent to \$8.4 billion in 2010–11, making crude oil the third most valuable commodity. International events pushed up the Tapis crude oil price by 29 per cent to average US\$101 a barrel in 2010–11. This reflects disruptions to oil supply in Libya, political unrest in the Middle East and North Africa, and an increase in Japan's oil-fired electricity generation following the March 2011 earthquakes and tsunami.

Crude oil output increased by 18 per cent to 87.6 million barrels reflecting the ramp-up in production during the period from the Pyrenees and Van Gogh fields.

The value of **condensate** increased by 14 per cent to reach almost \$4 billion, however output fell by seven per cent to 43.3 million barrels.

Gold ranked fourth in terms of overall value and reached \$8.2 billion, representing eight per cent of all sales in 2010–11. This reflected continued interest in gold as a 'safe haven' for investment amid concerns regarding the world economy. The price of gold was up by 26 per cent in US dollar terms with gold producers responding to the higher prices increasing output by 12 per cent to 5.9 million ounces.

Nickel, in fifth place, contributed \$4.6 billion or five per cent to the total value of the State's resources in 2010–11. A 24 per cent increase in the US dollar nickel price resulted in the value of nickel sales rising by 13 per cent. Nickel production was up by four per cent to 187 thousand tonnes.

Alumina claimed sixth place in 2010–11 with output down marginally by three per cent to 12.3 million tonnes. However, the 21 per cent rise in the US dollar price for alumina meant that the value of alumina sales increased by only four per cent to reach almost \$4 billion. This was due to the strengthening of the Australian dollar.

Base metals were up in terms of overall value by nine per cent to \$1.6 billion in 2010–11.

Copper dominated base metals in terms of value however output remained almost static at 148 thousand tonnes in 2010–11. US dollar copper prices were up by 30 per cent compared to 2009–10 which resulted in the value of copper sales rising by 13 per cent to \$1.3 billion.

Lead production rose by 55 per cent to 40 thousand tonnes in 2010–11 and sales followed with a rise of 53 per cent to \$94 million.

Sales values of **zinc** were down by 24 per cent to \$159 million and volumes were down by 20 per cent to 70 thousand tonnes in 2010–11.

Domestic **natural gas** sales fell by five per cent to 8.9 billion cubic metres in 2010–11 whilst the value of sales rose slightly by three per cent to \$1.4 billion. However the output of LPG butane and propane fell by five per cent and the sales value increased to \$774 million, which is a 20 per cent increase on the previous year.

The total value of **mineral sands** sales was down by 33 per cent to \$468 million in 2010–11. The reduction in the value of sales was mainly due to cutbacks in output by the leading producer. This resulted in falls in value for rutile (54 per cent), leucoxene (51 per cent), synthetic rutile (30 per cent), zircon (30 per cent) and ilmenite (23 per cent). Output tonnage also fell in similar amounts with the exception of zircon which fell only 15 per cent.

In 2010–11, the value of **salt** sales fell by 12 per cent to \$367 million largely due to a strong Australian dollar. Volumes increased by 12 per cent to 12.2 million tonnes.

Coal production rose by eight per cent to 7.2 million tonnes in 2010–11 with sales revenue falling by two per cent to reach \$319 million.

Diamond sale volumes fell sharply in 2010–11 decreasing by 38 per cent to 10.1 million carats. Declining grades in the Argyle mine together with a heavy wet season were responsible for reduced production.

Output for **cobalt**, as a by-product of nickel mining, fell by 15 per cent in 2010–11. A five per cent fall in the average US dollar price of cobalt in 2010–11 contributed to a 24 per cent fall in the value of sales which reached \$145 million.

Western Australia's mineral and petroleum resources in order of value for 2010–11 are:

| Commodity | \$ Billion |
|--------------------------|--------------|
| Iron Ore | 57.3 |
| Crude Oil and Condensate | 12.4 |
| LNG | 8.7 |
| Gold | 8.2 |
| Nickel | 4.6 |
| Alumina | 4.0 |
| Others | 6.0 |
| Total | 101.2 |

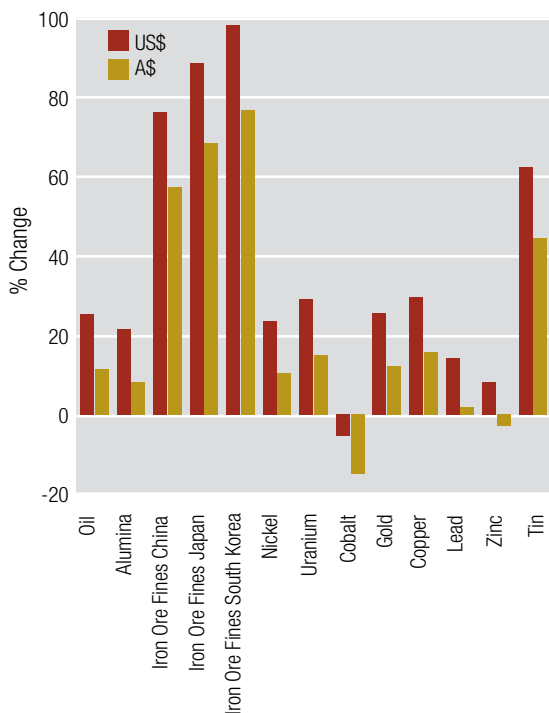


Figure 3 | **Average Price Comparison 2009–10 and 2010–11**
Source: LME, Kitco, Metal Prices and DMP

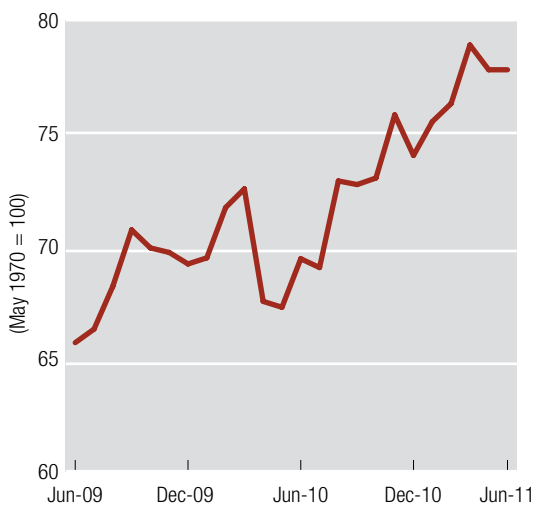


Figure 4 | **Exchange Rate Trade-Weighted Index (units of foreign currency per A\$)**
Source: Reserve Bank of Australia

Definition: "Trade-weighted index" is the average value of A\$ in relation to the currencies of Australia's major trading partners.

RESERVE BANK OF AUSTRALIA (RBA) COMMODITY PRICE INDEX

The Reserve Bank of Australia Commodity Price Index is based on the price of 20 major commodities exported by Australia. These commodities collectively account for around two-thirds of total commodity exports. The index is apportioned into three sections – rural, non-rural and base metals.

The non-rural index comprises base metals (which consist of aluminium, copper, nickel, zinc and lead), gold, coking coal, steaming coal, iron ore, alumina, crude oil and LNG. The index is compiled monthly and is expressed in US dollars, Australian dollars and Special Drawing Rights (SDR).

The RBA's index, expressed in US dollar terms, is useful because most commodities traded in world markets are in US dollars. However such an index is subject to changes in the US dollar exchange rate (as it is based on spot prices). In this respect, the SDR index is a better indication of underlying supply and demand for commodities than the US dollar index.

SDR is a unit of account used by the International Monetary Fund (IMF). Its value is based on a basket of currencies comprising the euro, Japanese yen, English pound and US dollar. Weights are assigned to each of these currencies to reflect their relative importance in world terms. The RBA expresses the SDR component of its index in US dollar terms, with commodity prices derived from the London Metal Exchange and Bloomberg and converted to monthly averages of daily data.

Alternatively, the Australian dollar index is useful for gauging the domestic currency price received by Australian commodity exporters as it reflects the interrelation between world commodity prices and the Australian exchange rate. For example, if prices in foreign currency terms remain unchanged but the Australian dollar depreciates, this will be recorded as a favourable upward shift in the index, which would not be evident in either the SDR or US dollar index.

The RBA index is a fixed-weight Laspeyres index, using 2008–09 as the base year. The index is re-based periodically in order to make long-run reliable comparisons, unlike the national accounts that are re-based annually to track short-run movements. Base-period weights indicate the relative importance given to individual commodities. These weights change over time to reflect changes in the composition of commodity exports. Movements in the index from one period to the next reflect underlying price movements and do not take into account changes in volumes.

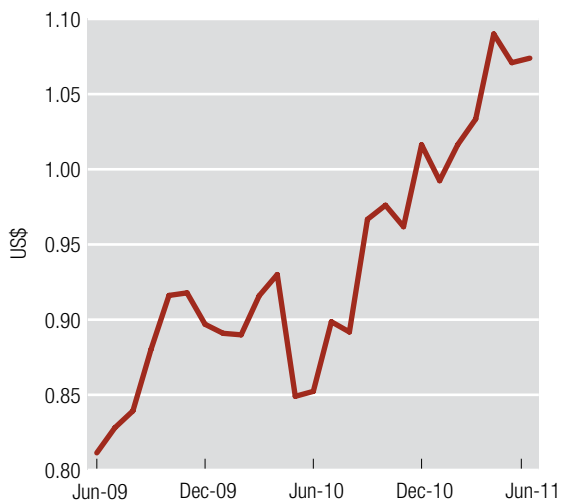


Figure 5 | **Exchange Rate US\$:A\$**
Source: Reserve Bank of Australia

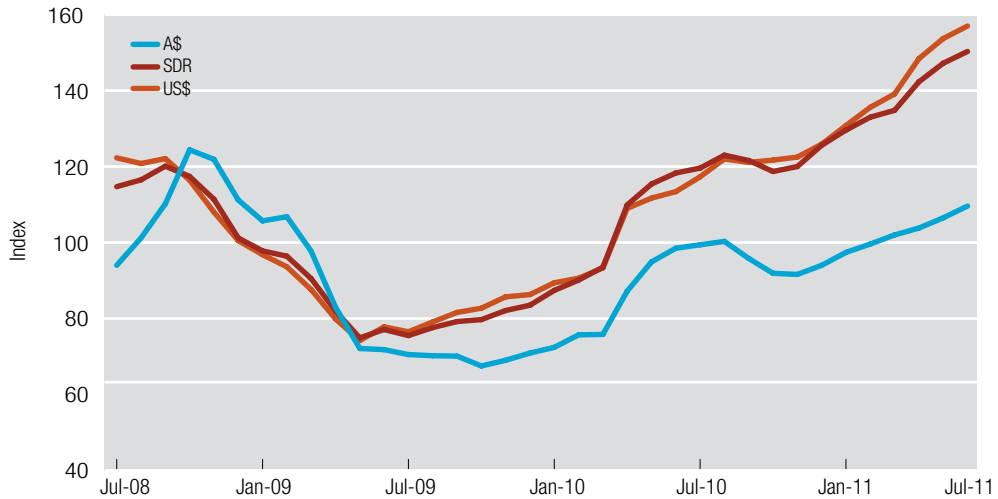


Figure 6 | **Non-rural Commodity Price Index (2008-09 = 100)** Source: Reserve Bank of Australia

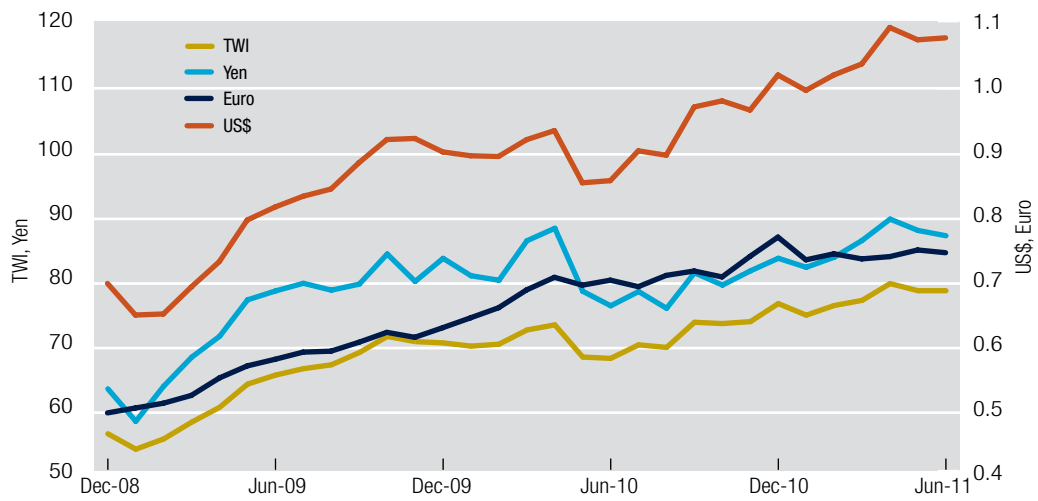


Figure 7 | **Australian Dollar Exchange Rate against Major Currencies May 1970 = 100**
Source: Reserve Bank of Australia

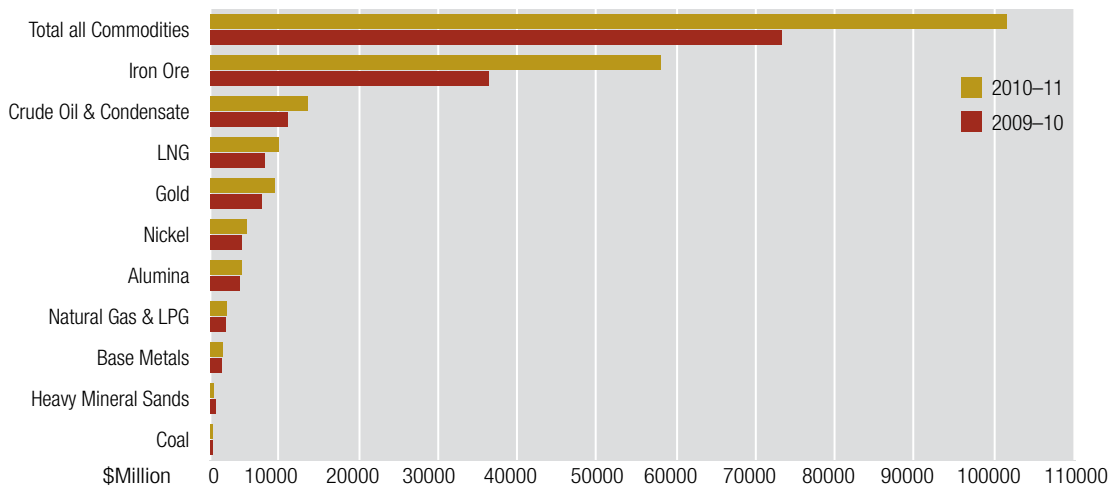


Figure 8 | **Major Commodities by Value** Source: DMP

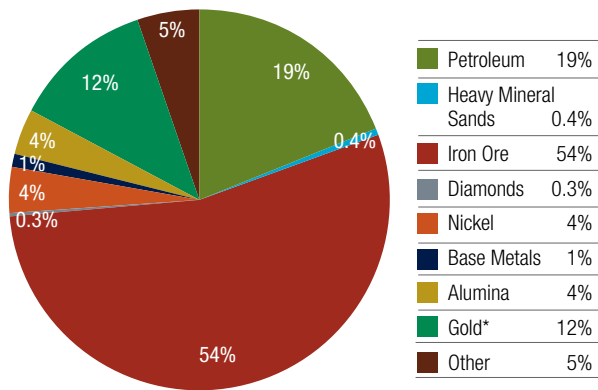


Figure 9 | **Western Australian Mineral and Petroleum Exports 2010-11 – Total Value \$106.4 Billion** Source: DMP
 * Includes \$5.4 billion of gold refined/processed and exported from Western Australia, but produced from mining operations in other States, Territories and overseas.

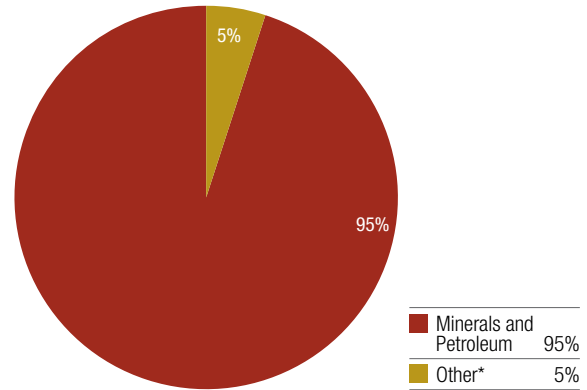


Figure 10 | **Western Australian Merchandise Exports 2010-11 \$111.7 Billion** Source: DMP and ABS
 * Other includes wheat, wool, wood chips, live animals, seafood, meat, pearls and other agricultural and manufactured items

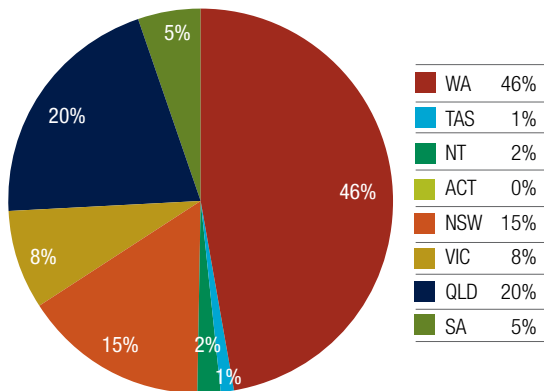


Figure 11 | **Australian Merchandise Exports 2010-11 \$244.6 Billion** Source: ABS
 Note: These percentages are based on data which includes \$8.1 billion of re-exported goods and of no State origin available and account for around 3% of the total.

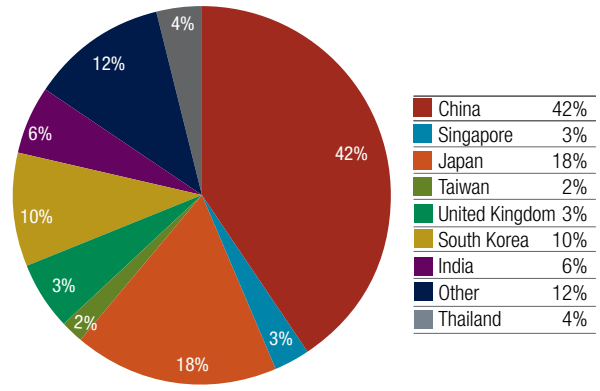


Figure 12 | **Western Australian Merchandise Exports by Country 2010-11 – \$111.7 Billion** Source: ABS

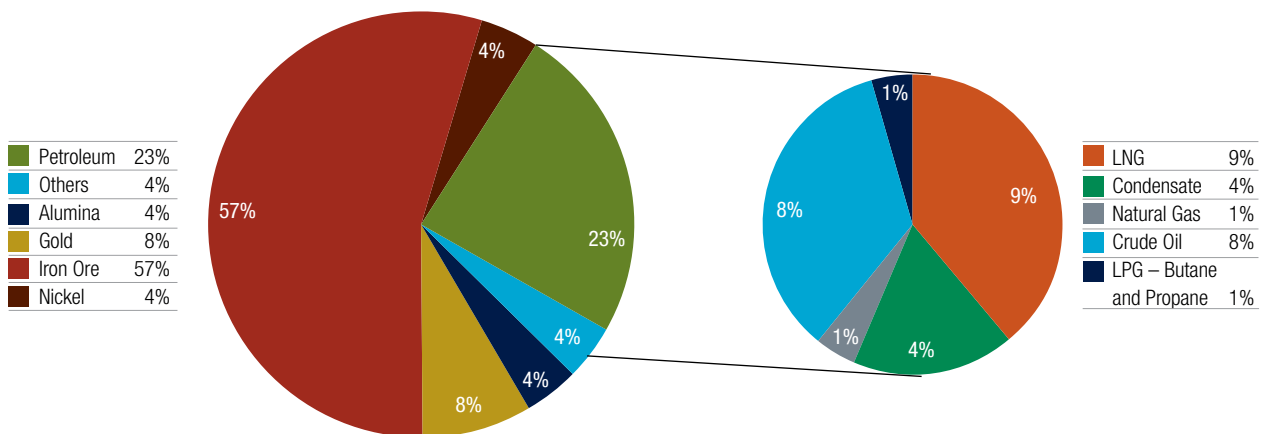


Figure 13 | **Value by Commodity 2010-11 – \$101.2 Billion** Source: DMP

2.2 IRON ORE

Over the past ten years the State's iron ore industry has experienced a period of unprecedented growth fuelled in the main by China's demand. On average, the annual growth in the value of sales from Western Australia's iron ore industry during this period has been 33 per cent per annum.

This has been reflected in the level of interest by investors in iron ore and is exemplified by the number of iron ore tenements and major projects held or awaiting approval. As shown in Map 1 and Map 2 (pages 14 and 15 respectively), the area of the Pilbara covered by iron ore tenements in 2002 was 22 thousand square kilometres. However by 2011 this had increased by nearly seven hundred per cent to almost 153 thousand square kilometres.

Although 2010–11 saw only a modest increase of 11 million tonnes in the volume of sales to 396 million tonnes, the value of the output grew by 62 per cent to reach \$57 billion. This reflected a significant increase in iron ore prices resulting from an extremely tight international supply–demand situation. As a result iron ore continued to be the most valuable resource sector in Western Australia accounting for 57 per cent of the total value of the State's mineral and petroleum sales.

China continued to dominate Western Australia's iron ore exports, accounting for 68 per cent or almost \$39 billion of the total amount shipped in 2010–11. Other major markets included Japan, which received 18 per cent during 2010–11, South Korea (10 per cent) and Taiwan (3 per cent).

Iron Ore Producers

Whilst the larger iron ore operations and two smaller operators are based in the Pilbara region of Western Australia, there are also four mines in the Mid West region, three in the Kimberley region and one in the Wheatbelt.

Rio Tinto Limited, together with its various joint venture partners and BHP Billiton (BHPB) dominate the industry in Western Australia and account for around 87 per cent of the State's iron ore production.

Rio Tinto Limited is the largest iron ore producer in the Pilbara region. Its wholly-owned subsidiary Hamersley Iron Pty Ltd owns seven mines, comprising Brockman 2, Brockman 4, Marandoo, Mt Tom Price, Nannuldi, Paraburdoo and Yandicoogina.

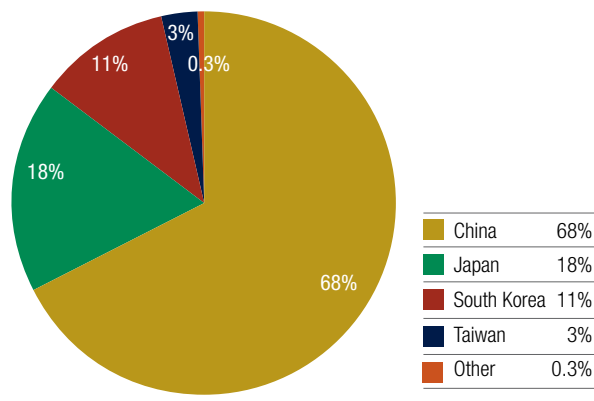


Figure 14 | **Iron Ore Exports – Total Value \$56.5 Billion**
Source: DMP

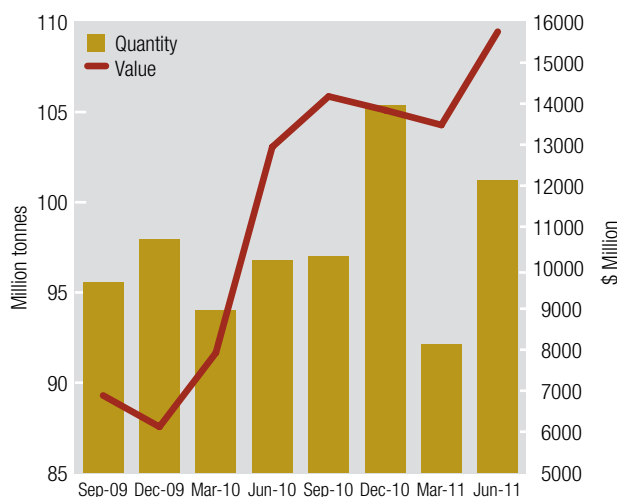


Figure 15 | **Iron Ore Quantity and Value by Quarter**
Source: DMP

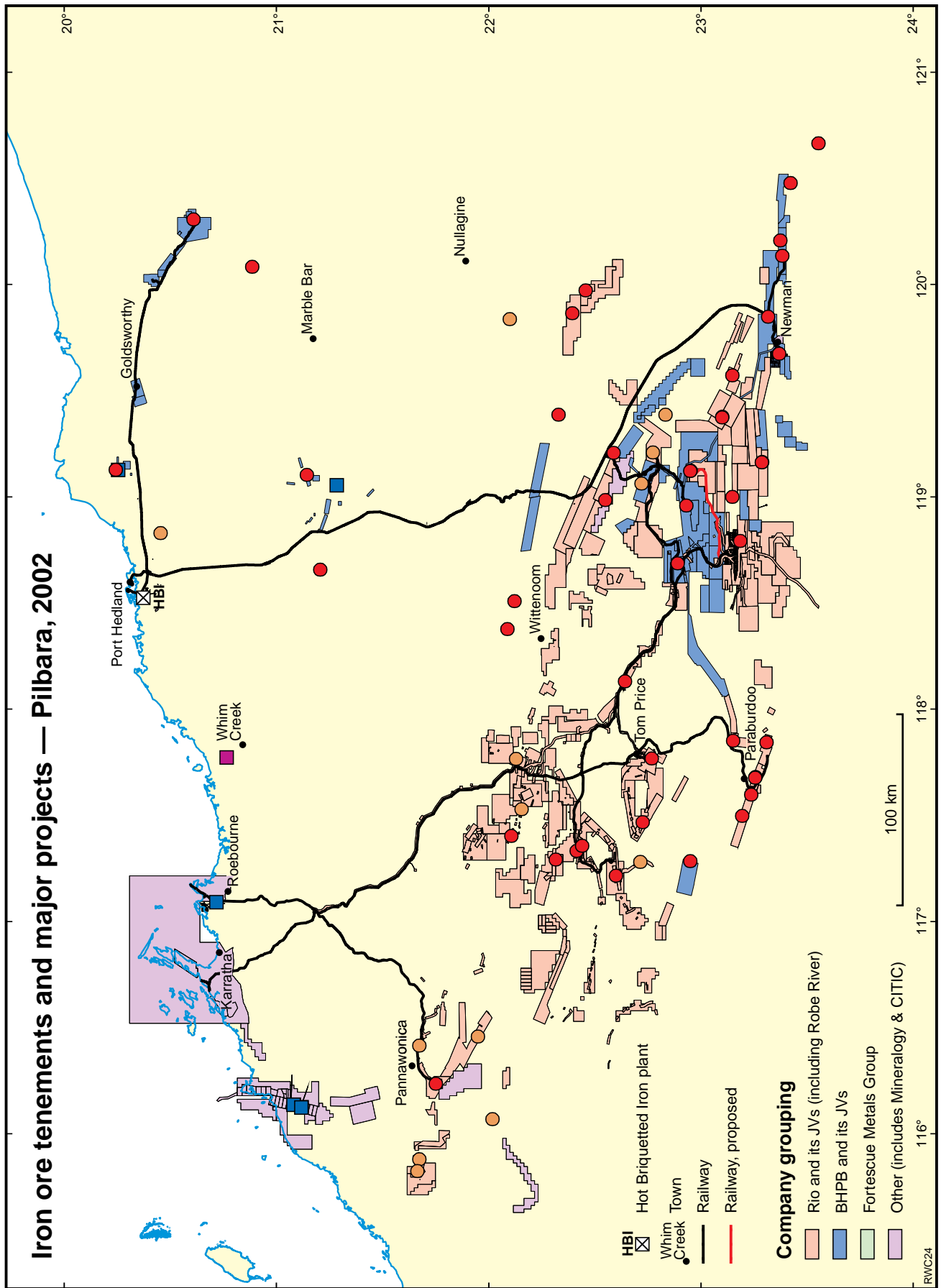
Hamersley also operates several other mines in joint ventures, which are:

- Channar (60% – a joint venture with an Australian subsidiary of the China Iron & Steel Trade Group).
- Eastern Range (54% – a joint venture with Shanghai Baosteel Group Corporation).
- Hope Downs Iron Ore Operations (50% – a joint venture between Rio Tinto Iron Ore and Hancock Prospecting Pty Ltd).
- Robe River Iron Ore Operation (53% – a joint venture with Robe River Iron Associates) and includes Pannawonica, Mesa A (Waramboo), Mesa J (nearing the end of its mine life) and West Angelas.

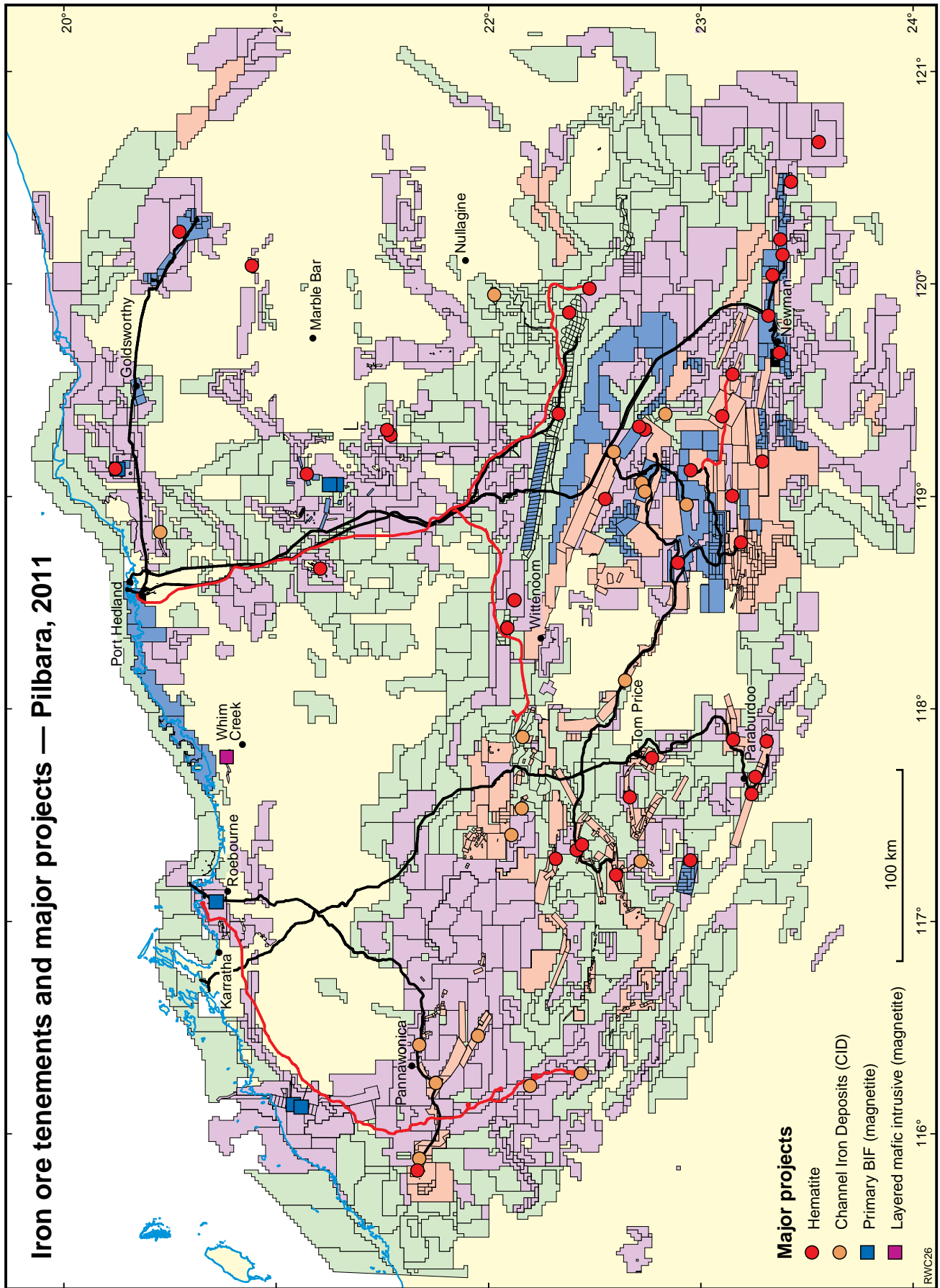


Loading a ship at Parker Point iron ore terminal.

© RIO TINTO



Map 1. Iron Ore Tenements and Major Projects – Pilbara 2002



Map 2. Iron Ore Tenements and Major Projects – Pilbara 2011

BHPB is the State's second largest iron ore producer and operates seven mine sites including one of the largest single-pit, open-cut ore mines in the world – the massive Mt Whaleback mine in Newman. It is five kilometres long and nearly 1.5 kilometres wide. Nearby are the satellite ore bodies 18, 23, 25, 29, 30 and 35, Jimblebar, Yandi, Area C and Yarrie.

Fortescue Metals Group (FMG), with its Chichester Range Cloud Break and Christmas Creek iron ore mines, is the third-largest mining company in the Pilbara.

The smaller producers comprise:

- Cliffs Natural Resources Koolyanobbing operation about 50 kilometres northeast of Southern Cross. It is undergoing a \$320-million expansion which will upgrade existing operational facilities and rail infrastructure. These improvements will allow Cliffs to produce 11 million tonnes of iron ore annually. It is anticipated that these improvements will be completed in the second half of 2012.
- Cliffs also operates the Cockatoo Island mine, around 140 kilometres north of Derby. The Cockatoo Island mine is only accessible by sea and air, produces high grade ore (greater than 66 per cent iron) and is the only known sub-sea mining operation in the world. To make mining possible, a 15-metre high sea-wall was constructed to prevent tidal water from flowing into the pit.
- Mount Gibson Mining Ltd – Tallering Peak mine, 175 kilometres east of Geraldton, Extension Hill mine 260 east-southeast of Geraldton and the Koolan Island hematite mine, located in Yampi Sound off the Kimberley coast. Construction of a 13.5 metre sea-wall to access high grade ore in the Koolan Island main pit is scheduled for completion at the end of 2011.
- Sinosteel Midwest Corporation Limited with its Koolanooka – Blue Hills (Mungada) hematite operation, 200 kilometres east-southeast of Geraldton.
- Crosslands Resources Ltd's (a 50:50 joint venture between Murchison Metals Ltd and Japan's Mitsubishi Development Pty Ltd) – Jack Hills mine, located 140 kilometres northwest of Meekatharra and 380 kilometres northeast of Geraldton.
- Atlas Iron Limited has two currently exporting iron ore operations. Pardoo is 56 kilometres east-northeast of Port Hedland and Wodgina which is located approximately 90 kilometres south of Port Hedland.
- BC Iron Ltd in joint venture with Fortescue Metals Group commenced iron ore exports from its Nullagine iron ore project in February 2011.
- Moly Mines Ltd iron ore operation located within its Spinifex Ridge Molybdenum Project commenced production in late 2010. Moly Mines expects to produce one million tonnes per annum of iron ore during its five-year mine life.
- Karara Mining Ltd's Karara Iron Ore Project is located 45 kilometres east of Koolanooka. The first shipment of Karara Direct Shipping Ore (DSO) was made at the end of March 2011, and production is expected to ramp-up to 2 million tonnes per annum in 2012.
- The Kimberley Metals Group Pty Ltd (KMG) Ridges iron ore project is the latest company to commence production. Located in the Kimberley region, 165 kilometres south of Wyndham the mine has a projected life of around four years. KMG commenced shipping out of Wyndham in July 2011 to markets in China and plans to export 2.5 million tonnes per annum.

Project expansions and new projects in the Pilbara

During the year there were a number of iron ore project expansions underway in the Pilbara region.

BHPB's US\$4.8-billion Rapid Growth Project 5, approved in November 2008, is now 98 per cent complete. The project is designed to increase capacity at its Western Australia iron ore operations by 50 million tonnes to 205 million tonnes per annum by late 2011. Work included the duplication of the railway track between the Yandi mine and Port Hedland and expansion of the inner harbour at Port Hedland.

In March 2011 BHPB announced a US\$6.6-billion investment to continue production growth in its Pilbara iron ore operations. The investment included:

- US\$3.3 billion to expand Jimblebar Mine and rail links;
- US\$1.9 billion for the expansion of the inner harbour at Port Hedland; and
- US\$1.4 billion for port blending and rail yard facilities.

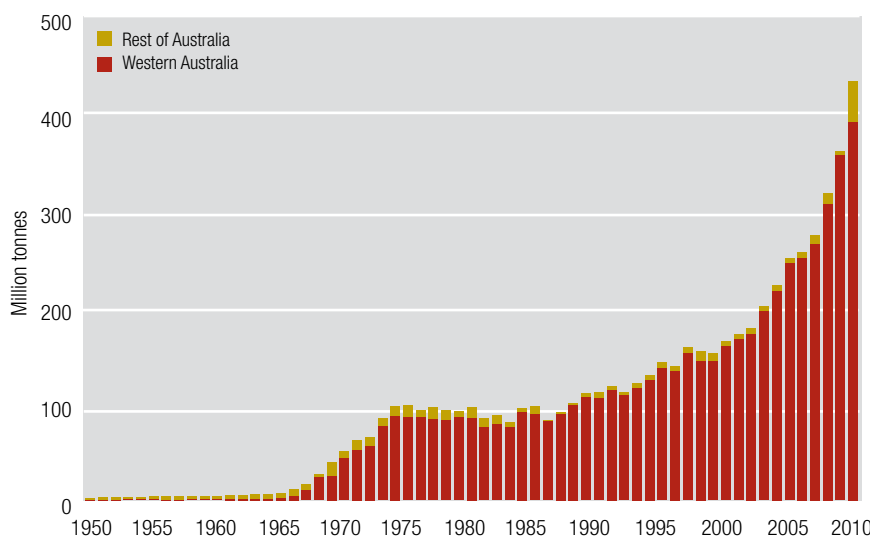


Figure 16 | **Iron Ore Quantity up to 2010**
Source: DMP and ABARES

With internal port facilities at their maximum, BHPB are considering expanding port operations at Port Hedland to the outer harbour with a \$14-billion four-kilometre jetty, wharf and berthing facilities.

In June 2011, Rio Tinto announced an acceleration of its iron ore expansion in the Pilbara. As a result Rio Tinto has brought forward its date for expansion to 333 million tonnes to the first half of 2015. The upgraded schedule is:

- 230 million tonnes per annum by quarter one 2012
- 283 million tonnes per annum by the second half of 2013
- 333 million tonnes per annum by the first half of 2015

To support its expansion to 283 million tonnes per annum, Rio Tinto will be investing US\$520 million on power and gas network upgrades. This will include a new power station at the West Angelas mine and a 40-megawatt gas turbine at the existing Yurralyi Maya power station near Dampier.

In addition, Rio Tinto will invest over US\$600 million on additional fuel storage capacity and water supply development.

The Pilbara expansion to 333 million tonnes per annum centres on increasing Rio Tinto's Cape Lambert port capacity from 80 million tonnes to 180 million tonnes by 2015. This is to be achieved through construction of a new 1.8-kilometre jetty and four-berth wharf to run parallel to the existing jetty. Early works have commenced and these include dredging for a new wharf.

Another development relevant to Rio Tinto is the A\$2.6-billion Hope Downs 4 mine expansion in the Pilbara (a joint venture between Rio Tinto Iron Ore and Hancock Prospecting Pty Ltd) which is currently awaiting approvals to proceed.

The Fortescue Metals Group (FMG) commissioned its US\$630-million Christmas Creek operations expanding output to 55 million tonnes per annum during 2011. Phase 1 of the expansion included an 800-bed permanent operations village, extension of the rail line from Cloudbreak through to Christmas Creek, primary and secondary crushing facilities, a power station, process water lines and internal roads.

FMG's US\$1.3-billion Christmas Creek Phase 2 Expansion commenced in the June 2011 quarter and is on schedule, targeting ore from the expanded plant in the September quarter of 2012. In addition FMG is proceeding with its US\$2.5-billion Solomon hub project plus expansion at Herb Elliott Port and rail construction project on both the mainline and Solomon spur. It is expected train operations to the Solomon hub will commence late 2012.

The Roy Hill project is operated by Hancock Prospecting Pty Ltd (in joint venture with the South Korean Posco group) with an estimated cost of US\$6.6 billion and is located 100 kilometres north-northeast of Newman. The Roy Hill project has been granted approval for the construction, operation and maintenance of a dedicated 342-kilometre heavy haul railway. The joint venture plans to be in production by 2014.

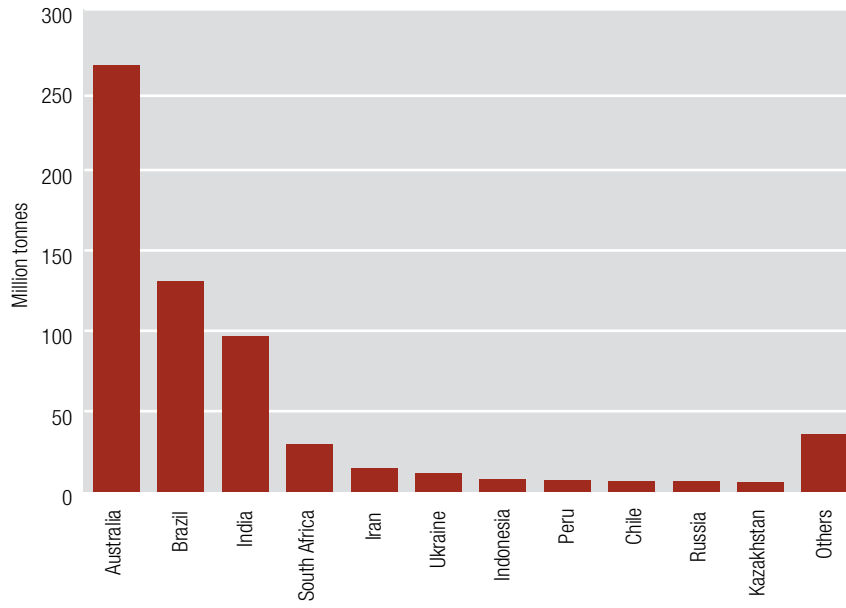


Figure 17 | **China's Iron Ore Imports by Country for 2010** Source: TEX Report

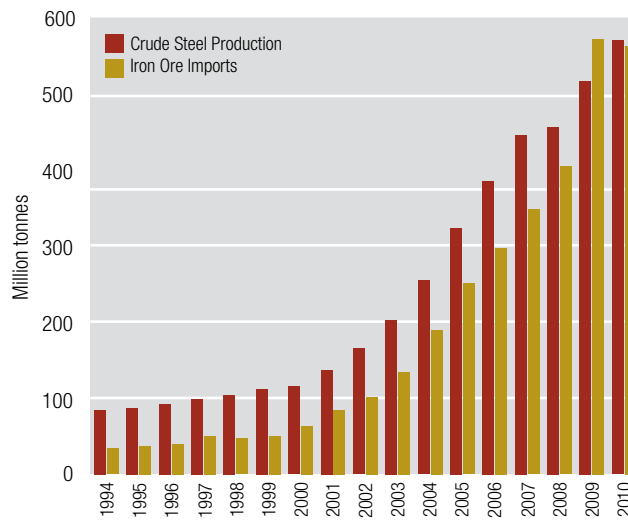


Figure 18 | **China's Crude Steel Production and Iron Ore Imports**
Source: TEX Report and Interfax China Ltd

Two other projects which may be developed in the Pilbara are Aquila Resources Ltd's West Pilbara Iron Ore Project and Brockman Resources' Marillana project.

For the past 40 years, all iron ore mined in Western Australia has been hematite ore or Direct Shipped Ore (DSO). However the State also has massive resources of magnetite ore.

Hematite ore does not have to undergo costly concentration to make it saleable. However, Chinese steel producers have long used magnetite with well established technology and have led a push to develop a number of magnetite projects in Western Australia. The first of these is CITIC Pacific Ltd's Cape Preston Sino Iron Project.

CITIC Pacific Ltd, the largest specialist steelmaker in China has acquired mining rights from Mineralogy for two billion tonnes of magnetite ore with rights and options for a further four billion tonnes.

CITIC Pacific Mining Management (a subsidiary of CITIC Pacific Ltd) is developing the Sino Iron Project located at Cape Preston, about 100 kilometres southwest of Karratha. When operational, it plans to export 27.6 million tonnes per annum of a mixture of high grade iron ore concentrate and pellets over a period of 25 years. Production and export of concentrate is expected in the first half of 2012.

Total investment in the project is estimated to be US\$6.1 billion and includes the construction of:

- production and processing facilities
- port and materials handling facilities
- 25-kilometre slurry pipeline
- Accommodation, infrastructure and an airport.

CITIC Pacific is also building a 450-megawatt (MW) gas-fired power plant and accompanying transmission lines near its production plants as well as a 51 gigalitre (GL) desalination plant near its port development to supply water for the project.

Projects in the Mid West

The Mid West is growing in significance as an iron ore producing region. Currently only four projects, Koolanooka, Talling Peak, Jack Hills and Karara Blue Hills Gindalbie operate in the area. However many new projects are now either under development or consideration. These include:

- Karara Mining, a joint venture between Gindalbie Metals and the Anshan Iron and Steel Group (Ansteel), is developing the Karara Iron Ore Project in the Mid West. Karara will initially deliver around ten million tonnes per annum of iron products of which eight million tonnes per annum will be high grade magnetite concentrate and blast furnace quality pellets. Production is expected to commence in mid-2012.
- Mt Gibson Iron Limited's \$91-million Extension Hill hematite project is located 260 kilometres east-southeast of Geraldton. Construction is substantially complete and first shipment of ore is expected in early 2012. Annual production will be around three million tonnes per annum.
- Asia Iron Holdings Limited (wholly-owned by Sinom Investments Limited) \$2-billion Extension Hill magnetite project which is expected to ship its first concentrate from Geraldton in 2013.
- Sinosteel Midwest Corporation Limited has been developing a \$2-billion Weld Range iron ore project which is 65 kilometres southwest of Meekatharra. Sinosteel Midwest was aiming to commence production in 2015 and to load its first ship with iron ore in 2016. However, in June 2011 Sinosteel announced it was putting the project on hold.

Projects outside the Pilbara and Mid West

A number of projects are also being developed outside the Pilbara and Mid West.

For example Polaris Metals (wholly-owned by Mineral Resources Limited) is developing its Yilgarn Iron Ore Project. This project is located 60 kilometres north of Koolyanobbin. Mining commenced in April 2011. Access to haulage roads have recently been negotiated together with Heads of Agreement with QR Freight and pending approvals, ore will be shipped from the Kwinana Bulk Terminal.

Further south, Grange Resources Limited and Sojitz Resources and Technology have their Southdown magnetite project, located 80 kilometres northeast of Albany. The venture is expected to produce up to 6.6 million tonnes of magnetite concentrate per annum with an estimated mine life of 22 years.

The magnetite will be pumped as slurry, approximately 100 kilometres to a concentrate storage facility at the Port of Albany before being loaded on to vessels and shipped to an iron ore pellet plant currently planned for Kemaman in Malaysia. In Albany, construction of a new berth will be required and the Albany Port Authority will need to reclaim land to accommodate a concentrate storage facility and ship-loading infrastructure.

A decision to proceed is expected to be made some time in 2012.

Supply and Demand

In 2010–11, Western Australian producers were only able to increase output by three per cent due to a heavier and longer than normal wet season. This included flooding and a train derailment which hampered expansion plans designed to meet increased demand.

There is a massive number of investment projects planned. However, it is expected the market will remain tight over the next couple of years. While the large iron ore producers can implement their expansion plans with a great deal of flexibility, transport capacity will be a limiting factor.

China will continue to play a pivotal role in the future of the Western Australian iron ore industry. In 2010–11, it accounted for 68 per cent, or almost \$39 billion, of the total iron ore shipped from Western Australia. In 2010, China's iron ore imports amounted to 619 million tonnes, representing 59 per cent of total world imports.

In 2010, China's total iron ore imports fell 1.4 per cent to 619 million tonnes (628 million tonnes in 2009). This represented 59 per cent of total world imports. Other major global importers of iron ore are Japan with 134 million tonnes in 2010 and South Korea with 56 million tonnes.

However, China's customs data indicates that total iron ore imports from Australia, India and Brazil were down from 81 per cent in 2010 to 75 per cent in the first half of 2011.

China's iron ore imports from countries other than Australia, Brazil and India accounted for 19 per cent of imports, up almost four per cent from last year.

In an effort to reduce reliance on the major producers, the China Iron and Steel Association also plans to source 50 per cent of iron ore from Chinese-invested overseas resources, up from 10 per cent now, over the next five to 10 years.

Moves by China to source alternative supplies of lower grade iron ore is not expected to significantly reduce its dependence on BHP Billiton, Rio Tinto and Vale.

China is also a large producer of iron ore itself. However the Fe-grade of Chinese iron ore from its big mines has been steadily declining from 31.2 per cent in 2003 to 23.2 per cent in 2010. The decline in medium to small mines is even greater, from 53.1 per cent in 2003 to 14.1 per cent in 2010. High production costs and an appreciation of the Yuan against the US dollar is also making Chinese mines less competitive.

Iron Ore Prices

During 2010, the end of the annual benchmark pricing system was confirmed, but the impact on market transparency has been mixed. There is little official information about prices actually agreed by identified parties (although the prices applied appear relatively widely known). However, the introduction of at least three competing price indices (Metal Bulletin, Platts and the Steel Index) has made it easier for market participants to judge the direction in which prices are moving.

CIF spot prices for 62 per cent Fe for 2010–11 reached US\$194 per tonne for lump and US\$184 per tonne for fines.

Across all grades and markets, Western Australian producers achieved an average free-on-board price of \$156 per tonne for lump and \$135 per tonne for fines in 2010–11.

The world economic outlook remains uncertain. Short-term forecasts for consumption of iron ore show increases of around five per cent over the next two years. However, there are expectations that by 2013 a balance between supply and demand will have been reached.

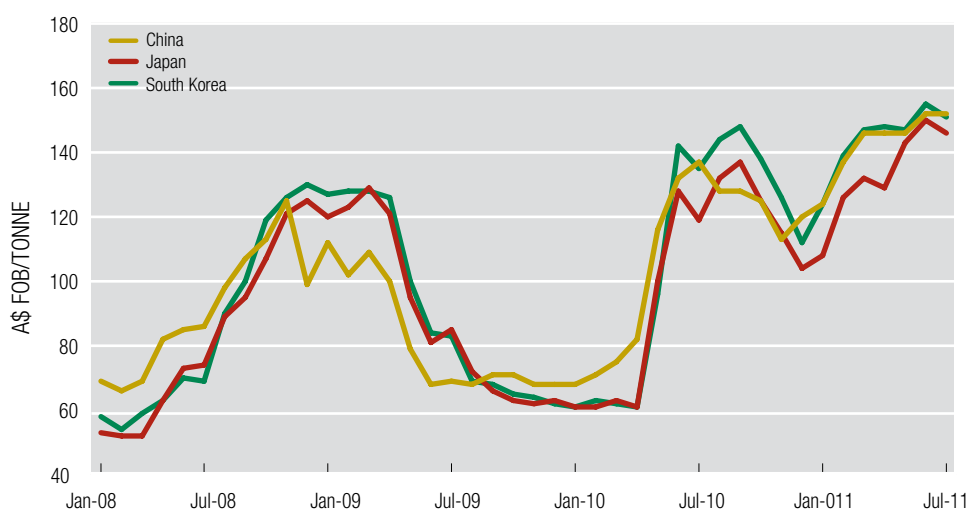


Figure 19 | **Average Iron Ore Fines (all grades)**
Received by Western Australian Producers | Source: DMP

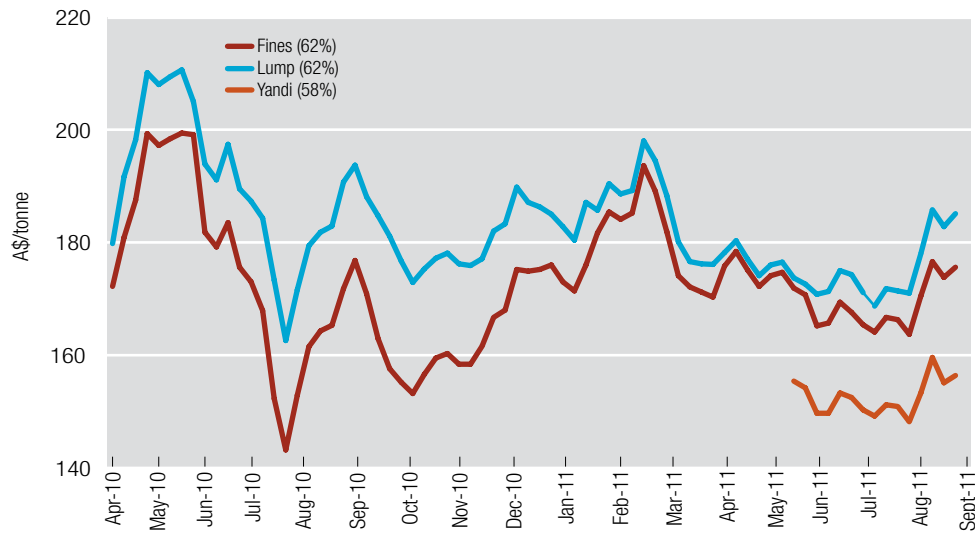


Figure 20 | Australian Iron Ore Prices CIF China Source: SteelHome

2.3 PETROLEUM

The value of Western Australian petroleum sales amounted to a record \$23.2 billion in 2010–11. This represented 23 per cent of the State’s total value of resource sales placing petroleum as the second most valuable resource sector after iron ore. As the nation’s premier petroleum producer, Western Australia accounted for 69 per cent of conventional natural gas (including LNG feedstock but excluding coal seam methane) and 95 per cent of crude oil and condensate production in 2010–11.

High oil prices, increased LNG shipments and ramped-up capacity at the Pyrenees and Van Gogh oil fields contributed to a solid 24 per cent increase in the overall value of petroleum sales in 2010–11. These factors more than offset declining recovery from mature oil fields, disruptions to production due to maintenance and higher than normal tropical cyclone activity in the northwest of the State in early 2011.

LNG was the major contributor to petroleum sales accounting for 37 per cent of value. This was followed by oil and condensate with 36 per cent and 17 per cent respectively. Together these commodities accounted for 90 per cent of the State’s petroleum sales. The remainder comprised natural gas (six per cent) and LPG (four per cent).

Over the past ten years, the value of Western Australia’s petroleum sales has increased on average by almost ten per cent each year. This impressive record of growth is set to continue as large oil and gas projects are developed off the State’s northwest coast to meet Asia’s growing energy needs. This includes the scheduled commencement of Woodside Energy’s Pluto LNG project in March 2012 and construction of the \$43-billion Gorgon LNG project.

Oil and Condensate

The value of crude oil sales from Western Australia reached \$8.4 billion in 2010–11, an increase of 32 per cent from 2009–10. This rise in sales revenue was largely attributed to higher rates of production from the Pyrenees field which commenced in March 2010. Stronger oil prices during the period also lifted sales values and helped counteract natural field decline.

Over the course of 2010–11, the price of oil based on a combination of Brent, West Texas Intermediate (WTI) and Tapis, averaged US\$94.45 per barrel. This represented a 26 per cent increase compared to the equivalent average price in 2009–10. Resurgent demand for oil, strong consumption growth in developing economies and disruptions to oil supply underpinned rising oil prices in 2010–11. Market dynamics during the year have also seen a growing price differential between the WTI crude oil price and other benchmark oil prices around the world including Tapis.

Oil prices increased sharply in the first half of 2011. In the six months to June 2011, the Tapis oil price averaged US\$115.92 a barrel, peaking at US\$132.26 a barrel in April. This reflected market concerns over conflict in Libya and political unrest in the Middle East and North Africa. Some members of the Organization of the Petroleum Exporting Countries (OPEC) increased their production in response to Libyan production shut-ins which caused a reduction in OPEC’s spare production capacity. In addition, the damage to Japan’s nuclear power capacity from the March 2011 earthquake also resulted in an increase in oil demand from Japan, the world’s third-largest consumer of oil.

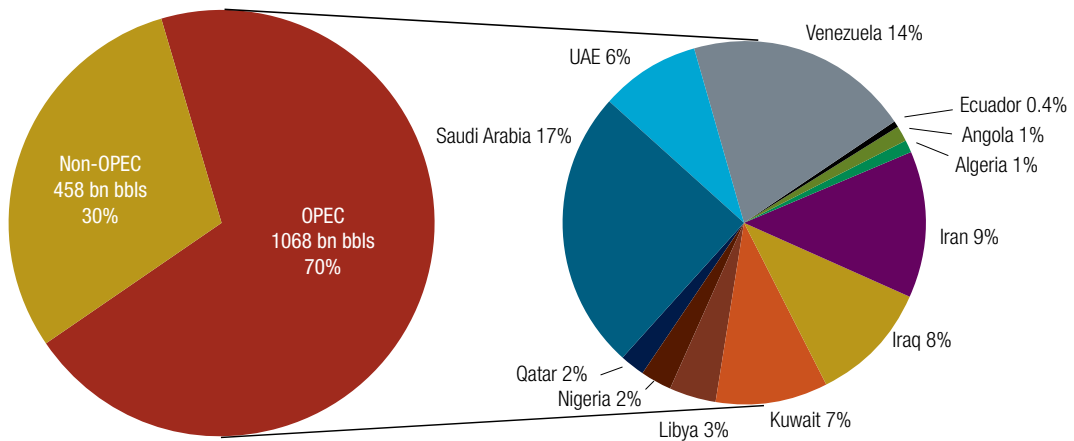


Figure 21 | **OPEC Share of World Crude Oil Reserves (2010)** Source: BP World Energy Statistics 2011

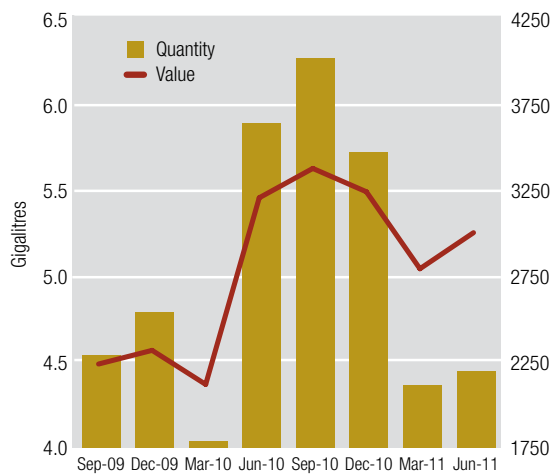


Figure 22 | **Crude Oil and Condensate Quantity and Value by Quarter** Source: DMP

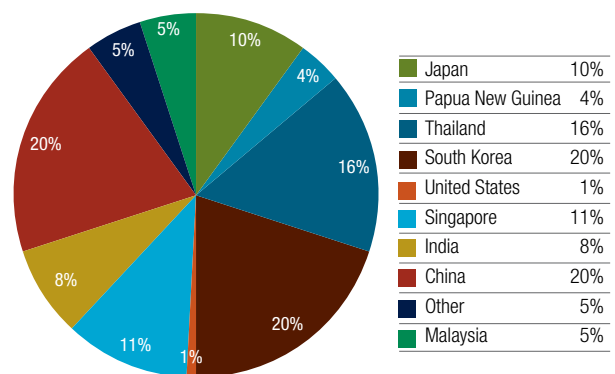


Figure 23 | **Crude Oil and Condensate Exports - Total Value \$11 Billion** Source: DMP and ABS

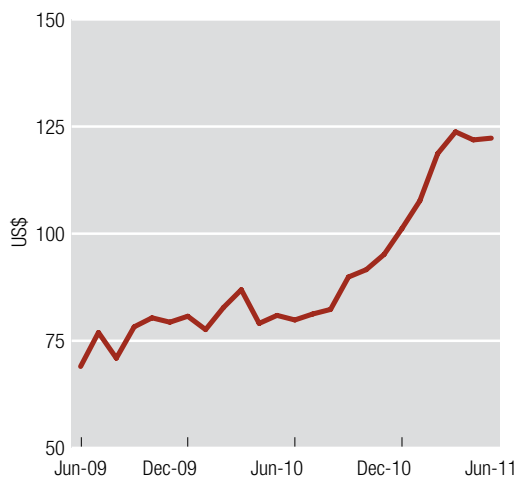


Figure 24 | **Tapis Crude Oil Price US\$/bbl** Source: WA Treasury Corporation

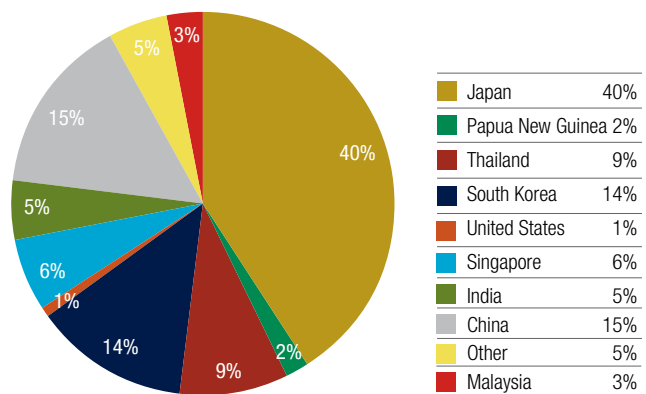


Figure 25 | **Petroleum Exports - Total Value \$18.8 Billion** Source: DMP and ABS

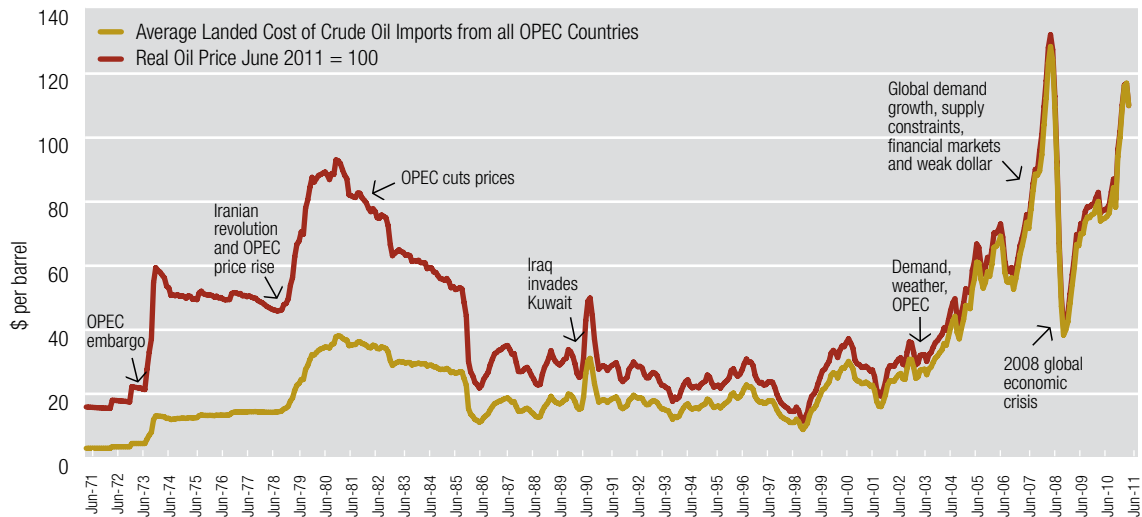


Figure 26 | **Historic Oil Prices** Source: Energy Information Administration, US Department of Energy, DMP

Non-OPEC countries contain less than a quarter of the world's proven oil reserves but produce 55 per cent of the world's oil. They also possess the majority of the world's capacity for refining crude oil into petroleum products such as gasoline and heating oil. Because non-OPEC countries have smaller reserves which are being depleted more rapidly than in OPEC countries, their overall reserves-to-production ratio – an indicator of how long proven reserves would last at current production rates – is much lower (about 14 years for non-OPEC compared to 73 years for OPEC). In the future, growth in non-OPEC production is expected to slow compared to OPEC output. As a result, non-OPEC output is forecast to shrink to less than 50 per cent of total world oil production by 2015.

Most OPEC oil is produced for export and many non-OPEC countries, such as the United States, produce oil primarily to meet their domestic demand for petroleum.

There are currently 12 member countries of OPEC comprising Algeria, Angola, Ecuador, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, United Arab Emirates and Venezuela.

High oil prices helped to offset the strong appreciation of the Australian dollar which weighed on petroleum export earnings. In 2010–11, the Australian dollar appreciated by 12 per cent against the US dollar to average US99 cents for the year.

In volume terms Western Australia's crude oil output increased by 18 per cent in 2010–11 to 87.6 million barrels or 13.9 million kilolitres. This increase was mainly attributable to the first full year of production from the Pyrenees field and to a lesser extent the Van Gogh field which are both located in the Exmouth Basin.

As one of Australia's largest oil projects in the last decade, the BHP Billiton-operated Pyrenees development was very prominent in 2010–11, accounting for 36 per cent of the State's total crude oil production. Since operating ahead of schedule in March 2010, Pyrenees has produced at very high rates and has the capacity to produce up to 96 thousand barrels of oil per day. The project also re-injects up to 60 million cubic feet of gas per day at the nearby Macedon field for future recovery.

The Van Gogh development, operated by Apache, also recorded a strong production increase in 2010–11. Located, 53 kilometres northwest of Exmouth, the development incorporates a floating production, storage and offloading facility (FPSO), with a capacity to process 150 thousand barrels of liquids per day including 63 thousand barrels of oil.

In contrast, production volumes for most fields were generally down in 2010–11 due to oil field natural decline, increased tropical cyclone activity in the northwest in early 2011 and scheduled maintenance. Planned outages arising from the North West Shelf (NWS) Oil Redevelopment Project also contributed to lower volumes for the NWS oil fields. The \$1.8-billion redevelopment included the installation of the Okha FPSO facility which commenced production in September 2011.

Against a background of declining production from maturing fields, exploration will play a key role in supporting future output of crude oil in Western Australia. Promising targets include Woodside's Laverda discovery which potentially holds more than 100 million barrels of recoverable oil and could result in production as early as 2015. The Finucane South discovery which is being drilled by Santos and located near the Mutineer–Exeter fields also has good development prospects. Finally, Apache is developing the Balnaves oil and gas field at an estimated cost of \$445 million with first production expected in 2014 at 30 thousand barrels of oil equivalent per day.

In 2010–11, 43.3 million barrels or 6.9 million kilolitres of condensate was sold from Western Australia. In sales value terms, this was worth almost \$4 billion, an increase of 14 per cent from the previous year largely reflecting higher prices.

As a by-product from natural gas fields, nearly all of the State's condensate production comes from fields located in the North West Shelf. Sales volumes of condensate decreased by seven per cent in 2010–11 corresponding with a five per cent fall in domestic natural gas output over the same period. Most of the decrease came from the Goodwyn and Angel fields. A notable exception was the North Rankin field which recorded an increase in production levels and accounted for 43 per cent of total State condensate output.

The volume of LPG (butane and propane) sold in 2010–11 increased by almost five per cent to 923 763 tonnes. At the same time, the total value of LPG sales rose solidly by 20 per cent to \$774 million.

Liquefied Natural Gas (LNG)

LNG is second only to iron ore, in terms of sales value to the State. Currently, all LNG from Western Australia originates from the Northwest Shelf Venture's (NWSV) project at Karratha. In 2010–11, LNG reported output from the NWSV increased by almost 8 per cent to 17 million tonnes and the value of sales rose by 25 per cent to \$8.7 billion.

The LNG quantity published in the Digest is sourced from Woodside's quarterly Australian Stock Exchange reports. A value is obtained by multiplying this quarterly figure by an LNG price using Woodside's published share of LNG sales revenue.

Upcoming LNG Projects

Pluto

On 17 June 2011, Woodside revised the expected cost and schedule of the Pluto LNG Project. The first LNG cargo is now estimated for March 2012 and the revised estimate of capital expenditure is expected to total A\$14.9 billion. The joint venture includes Woodside (90 per cent), Tokyo Gas (five per cent) and Kansai Electric (five per cent).

The project is based on process gas from the Pluto and Xena gas fields located about 190 kilometres northwest of Karratha. It is estimated that these two fields contain a total recoverable reserve volume of approximately 4.8 trillion cubic feet of gas.

The initial phase will include a single LNG train, producing 4.3 million tonnes per annum with associated infrastructure located on the Burrup Peninsula. It will be connected by a 180-kilometre, 36-inch offshore pipeline to a platform which is connected to five sub-sea wells in the Pluto field.

The project is underpinned by 15-year sales agreements totalling up to 3.75 million tonnes per annum of LNG with Tokyo Gas and Kansai Electric of Japan. They will also each construct and operate an LNG ship to transport a combined 2.6 million tonnes per annum of LNG to Japan.

As joint venture partners, Tokyo Gas and Kansai Electric also have options to participate in two additional Pluto trains and three Woodside exploration permits (WA-347-P, WA-348-P and WA 353 P).

Woodside has completed onshore front-end engineering design for trains 2 and 3 which could ultimately triple output and increase capacity to 12.9 million tonnes per annum. However, a final investment decision for the expansion remains contingent on securing sufficient volumes of economically viable gas resources.

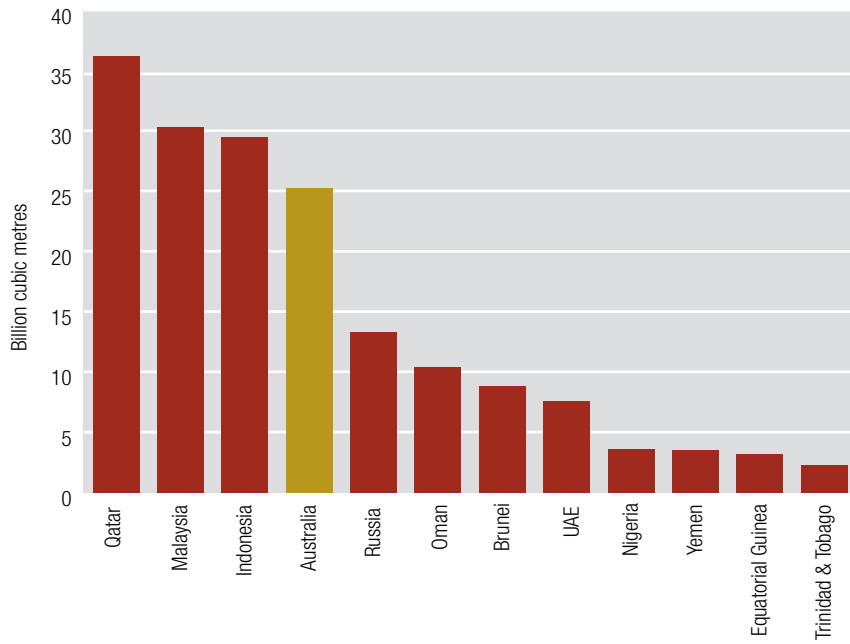


Figure 27 **Asia-Pacific Region LNG Imports 2010 by Exporting Country**
Source: BP World Energy Statistics 2010

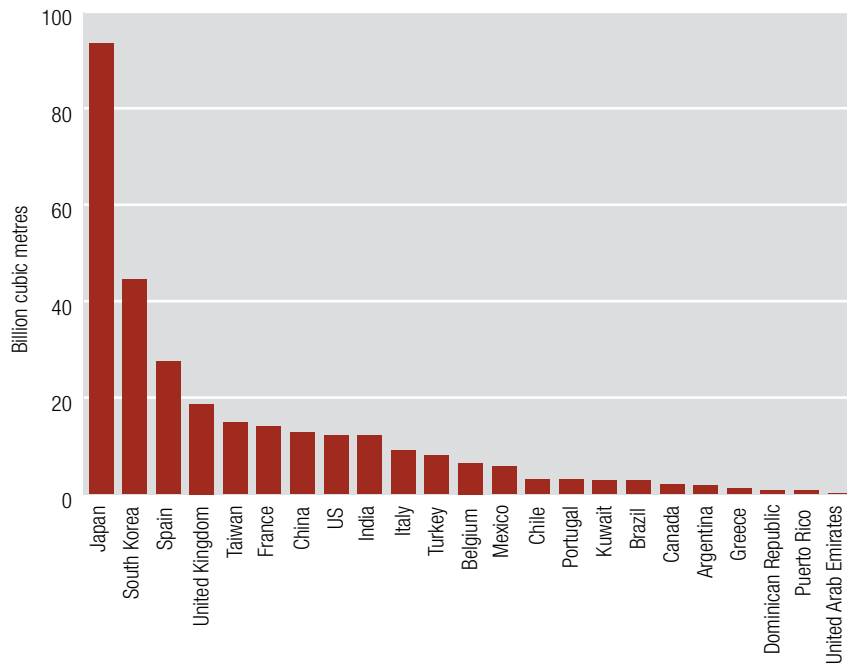


Figure 28 **Countries Importing LNG in 2010**
Source: BP World Energy Statistics 2011

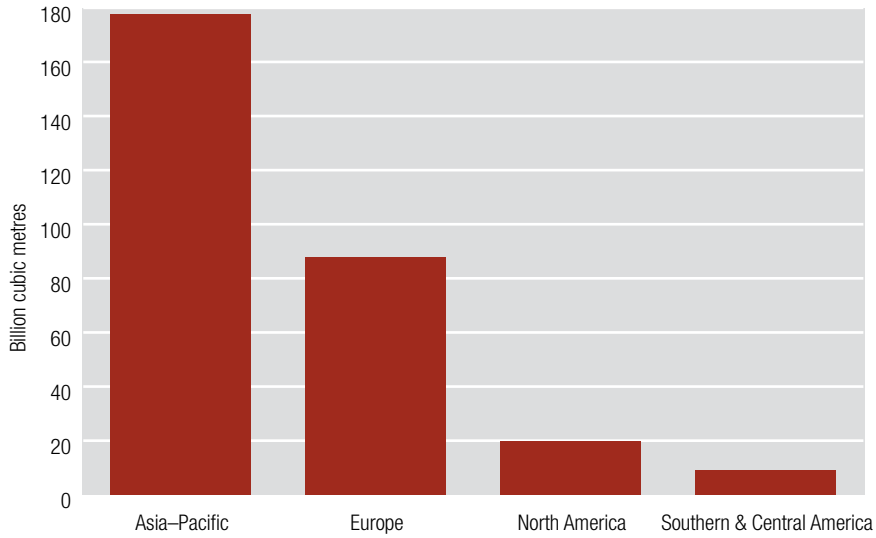


Figure 29 | **World LNG Imports by Region 2010**
Source: BP World Energy Statistics 2011

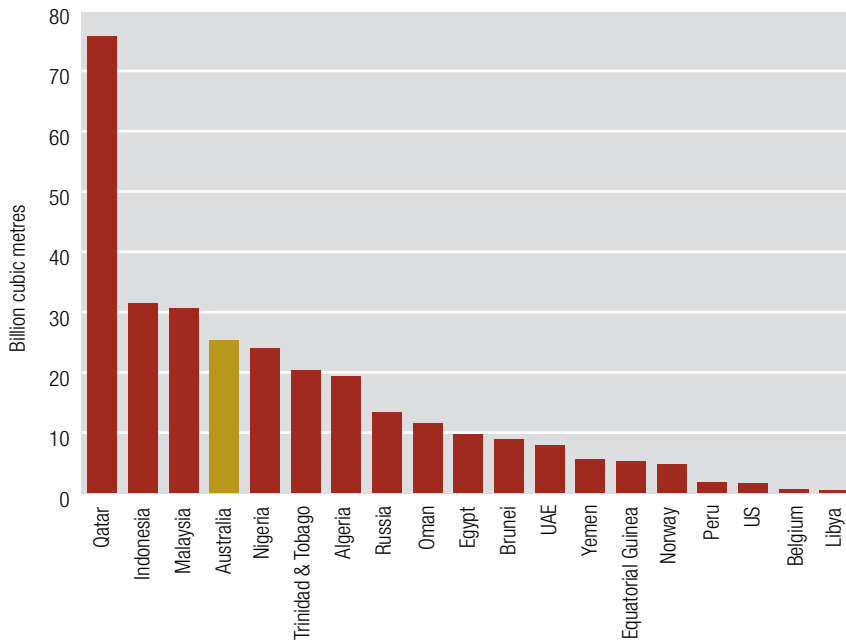


Figure 30 | **World LNG Ranking 2010**
Source: BP World Energy Statistics 2011

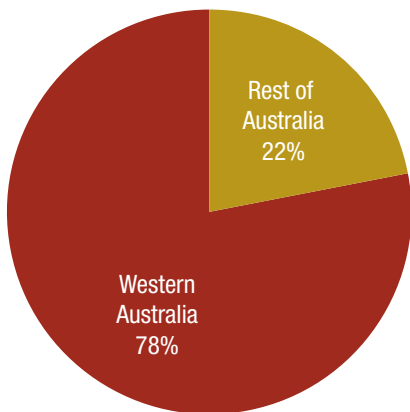


Figure 31 | **Crude Oil and Condensate Production 2010-11**
Source: EnergyQuest and DMP

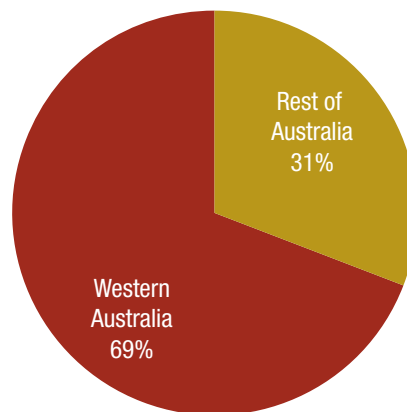


Figure 32 | **Natural Gas Production 2010-11**
Source: DRET and DMP (Data includes LNG feedstock)

Gorgon

The Greater Gorgon Area gas fields are Australia's largest known gas resource and contain about 40 trillion cubic feet of gas. Chevron, ExxonMobil and Shell comprise the Gorgon Project partners, with interests of 47, 25 and 25 per cent respectively. Osaka Gas (1.25 per cent), Tokyo Gas (1.1 per cent) and Chubu Electric (0.417 per cent) make up the balance.

The project will comprise three LNG trains, constructed on Barrow Island, capable of producing a combined 15 million tonnes per annum, with first gas expected in 2014. In addition, under the *Barrow Island Act 2003*, the joint venturers are required to reserve 2000 petajoules of gas for the domestic gas market. A domestic gas plant will eventually provide 300 terajoules per day.

Total expenditure for the Gorgon Project in Australia is expected to reach \$20 billion during the five-year construction period. Contracts include fabrication and assembly of main LNG modules, construction of the 2.1-kilometre LNG jetty and marine structures, LNG tank construction and offshore pipe-lay. In excess of \$9 billion of construction works has already been committed to Australian companies across the country, including more than 90 per cent in Western Australia.

Under the *Barrow Island Act 2003*, the Gorgon development will be required to implement geosequestration as a means of reducing carbon emissions from the project. As a result the Gorgon project will include the world's largest commercial-scale greenhouse gas storage site, with up to 3.75 million tonnes per year of carbon dioxide being injected and stored in a deep sandstone reservoir within the DuPuy

formation, approximately 2.4 kilometres beneath Barrow Island. Successful implementation of this would make the Gorgon project one of the first projects worldwide to implement geosequestration commercially.

Wheatstone

In September 2011, Chevron announced that it will begin construction immediately on the \$29-billion Wheatstone project at Ashburton North, 12 kilometres west of Onslow on the Pilbara coast.

The Wheatstone Project is planned to eventually comprise five LNG processing trains producing up to 25 million tonnes of LNG a year. The first phase of the Project will consist of two LNG processing trains with a combined capacity of 8.9 million tonnes per annum, and a domestic gas plant. The project includes a sub-sea gas gathering system from the Wheatstone and Iago fields. Infrastructure is proposed to be located at Ashburton North, approximately 12 kilometres west of Onslow on the Pilbara coast.

The Wheatstone project has attracted third-party gas with Apache Corporation and Kuwait Foreign Petroleum Exploration Company (KUFPEC) signing deals in October 2009 to join the project as natural gas suppliers and 25 per cent equity participants. Gas from the Apache and KUFPEC's Julimar and Brunello fields will extend the life of the first two Wheatstone LNG trains.

In January 2010, Kyushu Electric Power Company signed a Heads of Agreement to acquire 1.83 per cent of Chevron's equity share in the Wheatstone field licences and a 1.37 per cent interest in the Wheatstone natural gas-processing facilities, which included taking delivery of 0.8 million tonnes per annum of LNG.

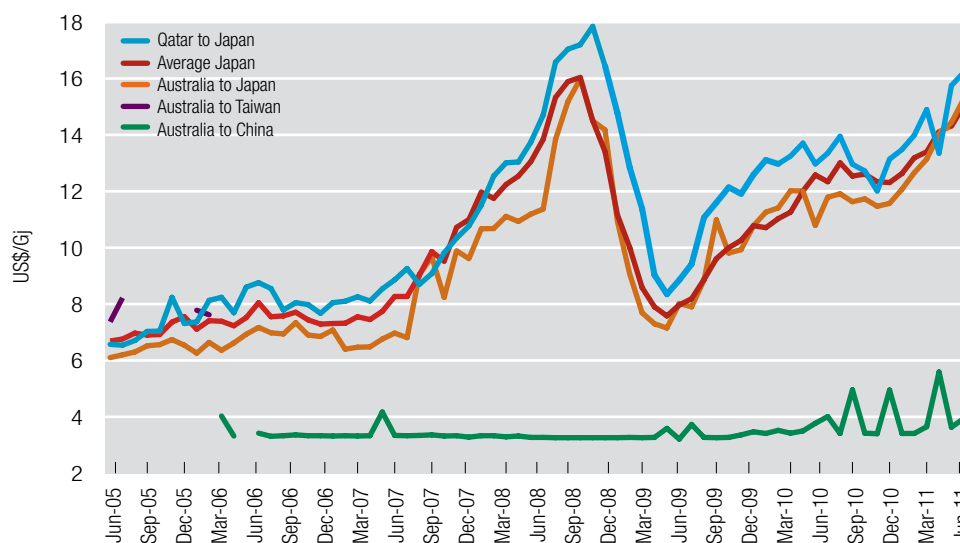


Figure 33 | LNG Import Prices Source: Argus Monthly LNG (Prices include freight and regassing)

In July 2010, Chevron signed-up Korea Gas Corporation (Kogas) as a foundation customer of the Wheatstone LNG project. Kogas will buy 1.5 million tonnes of LNG per annum for up to 20 years and it will also take up a five per cent stake in the Wheatstone project. This includes the field licences, the LNG plant and domestic gas-processing facilities. Including their equity participation, Kogas plans to take delivery of a total of approximately 1.95 million tonnes of LNG per annum from Wheatstone.

In April 2011, Chevron Corporation announced it had signed agreements with Shell Development (Australia) Pty Ltd to bring Shell into the Wheatstone Project as an equity participant. Under a unitization agreement Shell assumed an 8 per cent participating interest in the Wheatstone and Iago natural gas fields in the Chevron-operated permits WA-253-P, WA-17-R and WA-16-R. Shell also assumed a 6.4 per cent participating interest in the project facilities.

In July 2011, Tokyo Electric Power Company (TEPCO) signed a Sales and Purchase Agreement for the delivery of 3.1 million tonnes per annum of LNG for a period of up to 20 years.

Final environmental approval for the project was given by the Western Australian Government in August 2011, with 25 conditions enforced on the project.

Browse Basin

The Browse Basin lies offshore approximately 425 kilometres north of Broome and covers about 140 thousand square kilometres. Exploration commenced in the Browse Basin in 1967 when the Burmah Oil Company Australia Ltd acquired 1600 kilometres of regional seismic data.

The Browse Basin's P50 (50 per cent certainty of recovery) resources were estimated at 31.4 trillion cubic feet as of 31 December 2010. All Browse Basin fields are currently undeveloped, primarily due to their isolated location 300 kilometres from the mainland in water depths of 300 to 500 metres.

The Browse Basin is currently the focus of several LNG development considerations.

In February 2011, Woodside as operator, in partnership with BP, BHP Billiton, Chevron and Shell selected James Price Point as the preferred location for its Browse LNG development. The proposed Browse LNG development includes the Torosa, Brecknock and Calliance fields and is located approximately 42 kilometres north of Broome. Combined, these fields contain an estimated 14 trillion cubic feet of gas and 370 million barrels of condensate (as at September 2011).

In May 2011 the traditional owners of James Price Point reached a consent agreement with Woodside and the Western Australian Government for development of the site. Woodside expects to be in a position to make a final investment decision by mid-2012, and to be processing its first gas from Browse by 2017.

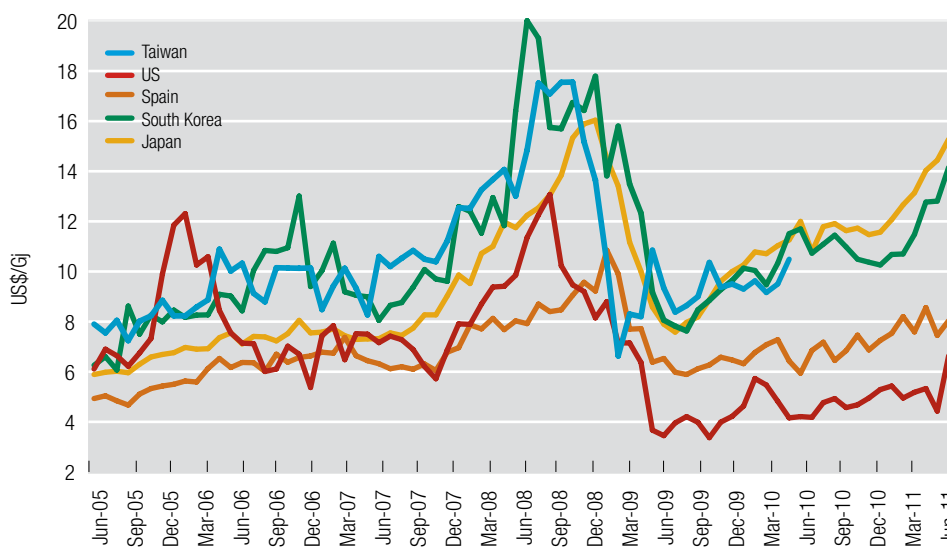


Figure 34 | Average LNG Import Prices Source: Argus Monthly LNG (Prices include freight and regassing)

Prelude

On 20 May 2011, Shell reached a final investment decision (FID) to proceed with its Prelude floating liquefied natural gas (FLNG) project in the Browse Basin. Shell anticipates operations commencing in late 2016 or early 2017. The FLNG facility will be the largest floating structure ever built at 488 metres long and 74 metres wide. Once constructed the facility will be towed to the Prelude field (WA-371-P) where it will be permanently moored for its 25-year project lifespan. The Concerto field will also be developed as part of this project. The proposed FLNG would have a capacity to produce around 3.5 million tonnes of LNG per annum.

In July 2010, Shell signed its first sales agreement with Japan's Osaka Gas to permit sales from the FLNG project. It comprised a 25-year, 0.8-million-tonnes-per-annum sale and purchase agreement.

Ichthys

The Ichthys Field in the Browse Basin has an estimated resource of 12.8 trillion cubic feet of gas and 527 million barrels of condensate. In September 2008 INPEX (operator 76 per cent) and its joint venture partner Total (24 per cent) selected Middle Arm Peninsula at Blaydin Point in Darwin Harbour as the preferred site for development for Ichthys' onshore infrastructure. The project's total cost has been estimated at more than \$20 billion.

The project is projected to have an initial capacity to produce 8.4 million tonnes of LNG per annum, approximately 1.6 million tonnes of liquefied petroleum gas (LPG) per annum as well as 100 thousand barrels of condensate per day at peak. It is expected to employ 300 people on an ongoing basis and will operate for at least 40 years.

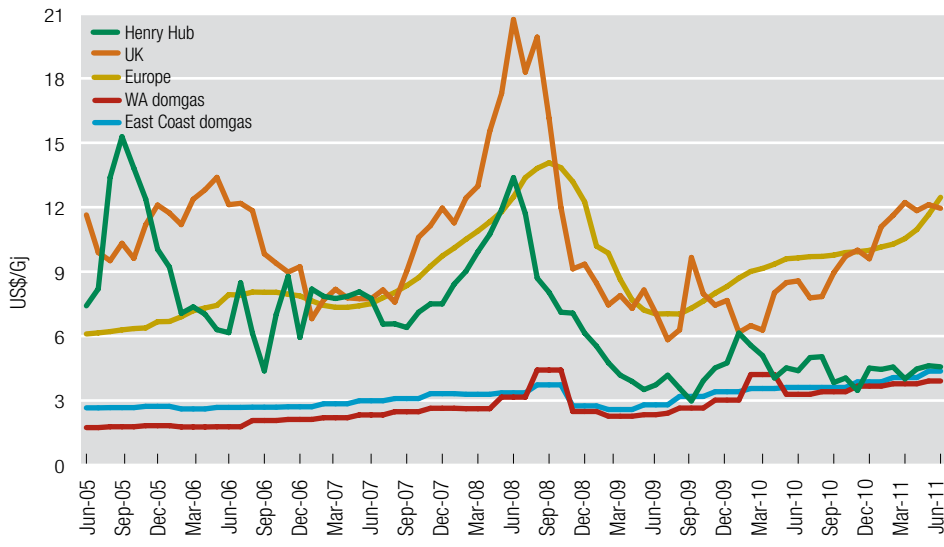


Figure 35 | **Average Natural Gas Prices** Source: Argus Monthly LNG, EnergyQuest, DMP

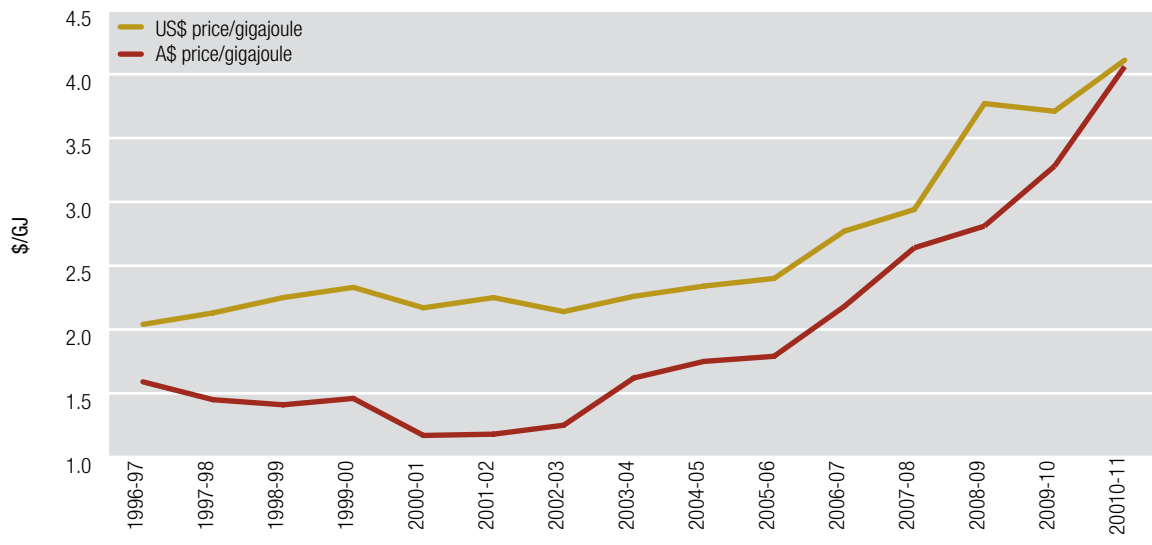


Figure 36 | **Western Australian Average Domestic Natural Gas Price** Source: DMP

The Ichthys Project Joint Venture has already reached an agreement with Chubu Electric Power Company for sales of 0.49 million tonnes of LNG per annum, with Toho Gas Company for sales of 0.28 million tonnes of LNG per annum and with CPC Corporation, Taiwan on LNG sales of 1.75 million tonnes per annum, over 15 years commencing in 2017. INPEX and a Total affiliate will also take a total of 1.8 million tonnes per annum of LNG from the Ichthys Project.

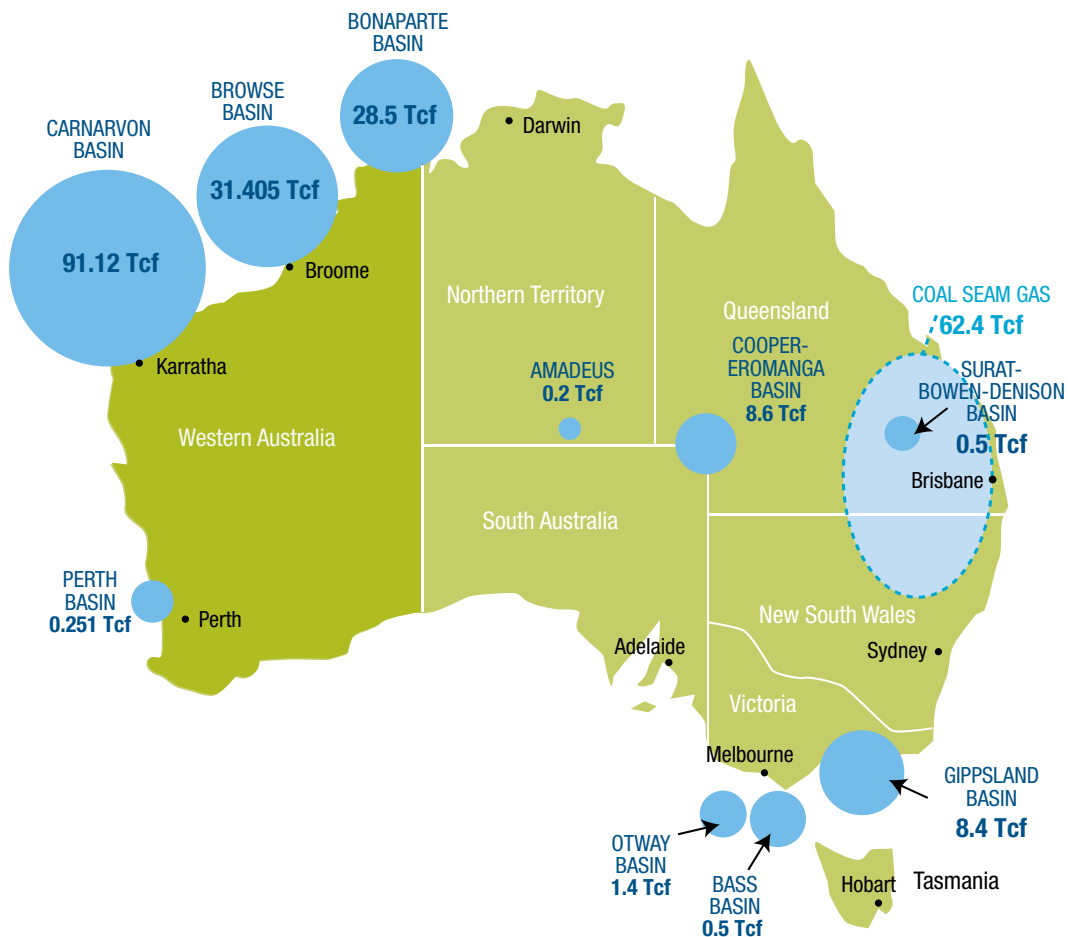
In addition to the above agreements, the company has indicated that LNG marketing negotiations are close to being finalised with five major Japanese utility companies. If successful this would see the Ichthys Project fully contracted for its 8.4 million tonnes per annum capacity.

Other Developments

Wesfarmers Ltd also utilises Western Australia's gas resources at its small-scale LNG plant in Perth at Kwinana. Opened in May 2009, the LNG plant has the capacity to produce 175 terajoules per day of gas and supports 130 heavy-duty vehicles, two remote power stations and a large industrial customer.

Future Developments

BHP Billiton and ExxonMobil (a 50:50 joint venture) are studying the development of the huge Scarborough and Thebe fields located 300 kilometres northwest of Onslow in the Carnarvon Basin. Scarborough is estimated to hold around 10 trillion cubic feet of gas. Thebe (100 per cent owned by BHP Billiton) is estimated to contain between 2 and 3 trillion cubic feet of gas.



AUSTRALIAN NATURAL GAS RESOURCES Source: DMP. Current as at end 2010.

Map 3. Australian Natural Gas Resources

Domestic Natural Gas Supply

Western Australia

The quantity of natural gas supplied into the domestic market in 2010–11 fell by 5 per cent to 8.9 billion cubic metres compared to the previous year. However, the value of sales moved in the opposite direction increasing by three per cent to almost \$1.4 billion. This value of gas is based on the summation of total domestic gas sales values at the point of entry into the Dampier-to-Bunbury natural gas pipeline (DBNGP), or where applicable, the Parmelia pipeline.

The graph included showing the price of domestic gas in Western Australia is calculated on this value and the aforementioned total volume of sales.

The average price of gas sold into the DBNGP in Western Australia rose by nine per cent in 2010–11 and averaged \$4.11 per gigajoule. Prior to the 2010–11 period the average annual growth rate of domestic gas prices, during the previous ten years, had been five per cent.

Devil Creek Project (Reindeer field)

Future domestic gas production is expected to increase with new projects such as Devil Creek (Apache (55 per cent) and Santos (45 per cent)) increasing supply and expanding domestic gas processing capacity. The Devil Creek plant is located 40 kilometres southwest of Dampier and will have the capacity to supply up to 220 terajoules per day into the domestic market. Initially gas will be supplied into the Devil Creek facility from the Reindeer field located in the offshore WA-209-P block.

Reindeer is expected to provide gas at a rate of 110 terajoules per day into the Devil Creek facility and to produce around 500 barrels per day of condensate.

Halyard and Spar Fields

Apache recently commenced gas and condensate production at the Halyard-1 discovery well. The Halyard gas field is located in permit WA-13-L in the Carnarvon Basin. Spar is situated in permit WA-4-R about 70 kilometres west of Varanus Island and two kilometres from Halyard. Apache is the operator of the project with a 55 per cent interest and Santos holds the remaining 45 per cent.

Production from the Halyard well will be through an existing pipeline to the East Spar field facilities and through to Apache's Varanus Island hub. The development of the Spar field, located in adjacent licence WA-4-R, is expected to follow in late 2012 as additional capacity becomes available at Varanus Island.

Macedon Project

In September 2010, BHP Billiton approved the development of the US\$1.57-billion Macedon gas field located 50 kilometres north of Exmouth. The Macedon development involves four offshore production wells and a gas treatment plant to be built at Ashburton North, 17 kilometres southwest of Onslow. First production is expected in 2013.

Onshore Gas Development

Gingin

Empire Oil and Gas is looking to commercialise its Gingin West and Red Gully gas fields (EP389) in the Perth Basin. Gingin West-1 is the largest gas flow in the area and is the closest discovery to Perth.

Plant under consideration to commercialise the fields would have an initial operational processing capacity of around 10 million cubic feet per day of gas and 500 barrels per day of condensate. This could be doubled with an additional train. The final design of the plant is dependent on whether gas is transported in the Parmelia or Dampier-to-Bunbury natural gas pipelines, both 2.8 kilometres away.

Warro

The Warro Gas Project is contained within Exploration Permits EP407 and EP321. The Warro gas field is estimated to a P50 recoverable resource of 1.1 trillion cubic feet. The field is 31 kilometres from both the Dampier-to-Bunbury and Parmelia pipelines, which provide easy access to gas consumers both north and south of the field.

Warro is partly funded by Alcoa, which has taken up to a 65 per cent stake in the Warro field in return for spending up to \$100 million on appraisal and development activities. Transerv Energy has retained a 35 per cent stake in the field and is operator of the project.

Future plans for the development include a pipeline in late 2012 and anticipated gas production by end of 2013 or beginning of 2014.

Domestic Gas Sourced from LNG Projects

While the focus has been on LNG production, the Gorgon Project will also progressively provide up to 300 terajoules per day of domestic gas to Western Australia. This gas will be delivered through a tie-in to the existing DBNGP, with delivery expected to begin in 2015.

The Western Australian Government is also negotiating with Chevron and its joint venture partners to formalise the implementation of the Western Australian Domestic Gas Policy. Under the policy, the Government will be looking to reserve for domestic use up to 15 per cent of gas feeding into the Wheatstone Project.

2.4 GOLD

In 2010–11, the State's gold sector set a new record with sales valued at \$8.2 billion. This represented a 25 per cent increase from the previous year and accounted for eight per cent of all mineral and petroleum sales in Western Australia in 2010–11.

Gold has a dual character as both a commodity and a monetary asset. Over the past ten years the gold price has risen over six-fold from a low just above US\$282 per ounce in September 2001 to an all-time record of US\$1918 per ounce in August 2011.

The gold price averaged US\$1371 per ounce in 2010–11, representing a 26 per cent increase from 2009–10. In Australian dollar terms, the gold price averaged \$1395 per ounce in 2010–11 which was thirteen per cent higher than the previous year.

In 2010–11, the State's gold output increased by ten per cent to 184 tonnes or 5.9 million ounces. Over the same period, Australia's gold production increased by three per cent to 247 tonnes (7.9 million ounces). In 2010–11, Western Australia accounted for around 75 per cent of Australia's gold production.

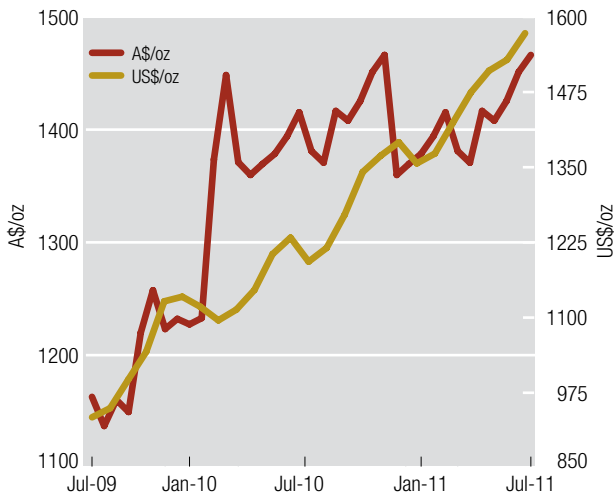


Figure 37 | **Gold Price** Source: Perth Mint and London Fix

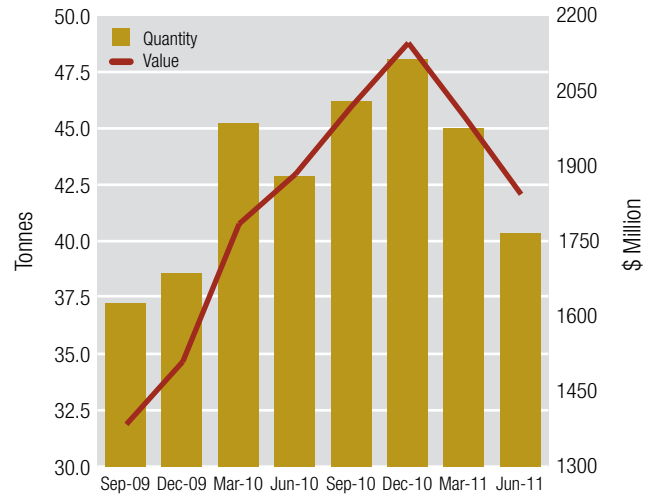


Figure 38 | **Gold Quantity and Value by Quarter** Source: DMP

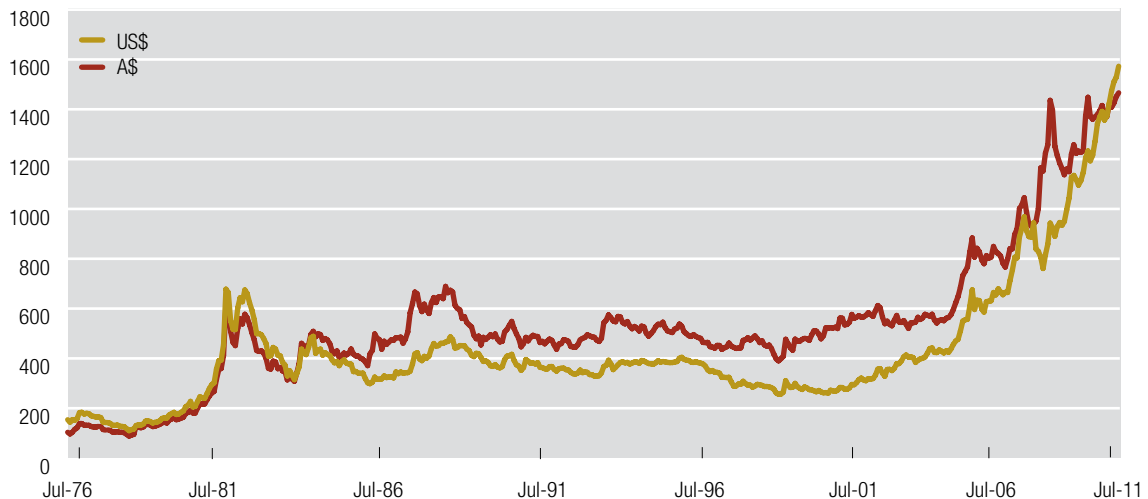


Figure 39 | **Historic Gold Price, Per Ounce** Source: Perth Mint and London PM Fix

Western Australia's ten largest projects accounted for 66 per cent of the State's gold output in 2010–11. These projects comprised:

- Golden Mile (Kalgoorlie Consolidated Gold Mines Pty Ltd (KCGM)) – 23.7 tonnes
- Boddington (Newmont Boddington Gold Pty Ltd) – 22.3 tonnes
- Telfer Gold (Newcrest Mining Limited) – 19.3 tonnes
- St Ives (Gold Fields Ltd) – 14.7 tonnes
- Jundee Nimary (Newmont Mining Corp) – 10.2 tonnes
- Sunrise Dam (AngloGold Ltd) – 10.1 tonnes
- Kanowna Belle (Placer Dome Inc) – 6.5 tonnes
- Agnew (Gold Fields Ltd) – 5.3 tonnes
- Higginsville (Avoca Resources Limited) – 5.1 tonnes
- Granny Smith (Barrick Gold Corporation) – 5.0 tonnes

Gold exports from the State totalled \$13.4 billion in 2010–11; however only 60 per cent of this amount (\$8.2 billion) is attributable to Western Australian mines (see Gold Export update 2010–11 in this section). India was the State's largest gold export destination accounting for 32 per cent of total gold exports. The United Kingdom was second with 26 per cent, followed by Thailand at 18 per cent. Other destinations include Singapore (eight per cent), Hong Kong (four per cent) and South Korea (three per cent). A host of other countries made up the remaining balance.

The large number of gold exports going to the United Kingdom reflects London's central role in the international gold market where it is often used as a shipping destination to be on-sold from London accounts.

Gold Export update 2010–11

The Australia Bureau of Statistics (ABS) release Western Australian export trade data which shows exports of gold that are significantly higher than gold produced in this State. This apparent increase in gold exports from Western Australia is due to a restructuring of Australia's gold refining industry in the late 1990's through to October 2002. Gold export data published by the ABS must therefore be interpreted with some caution.

Gold Corporation, or as it is more commonly known, The Perth Mint, operates Australia's only London Bullion Market Association (LBMA) accredited gold refinery. It refines gold produced in other States and Territories, gold from surrounding countries and also secondary gold, mainly from Asia, which is refined and exported from Western Australia.

This export figure for Western Australia is therefore larger than Western Australia's own level of gold production.

The Victorian refinery still refines silver and jewellery products.

The ABS estimates that gold exports from Western Australia in 2010–11 amounted to approximately \$13.4 billion. Approximately 61 per cent or \$8.2 billion was gold produced in Western Australia. The remaining 40 per cent (approximately \$5.2 billion) can be attributed to gold refined and exported from Western Australia but produced from mining operations in other States, Territories and overseas.

Overseas imported gold also includes scrap which is refined in Western Australia and exported.

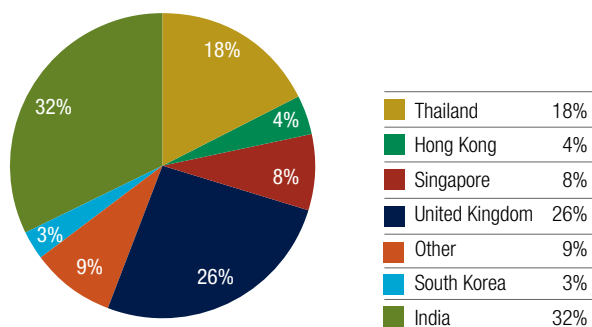


Figure 40 **Gold Exports – Total Value \$13.4 Billion** Source: ABS and DMP
Note: Includes gold refined/processed and exported from Western Australia, but produced from mining operations in other States, Territories and overseas.

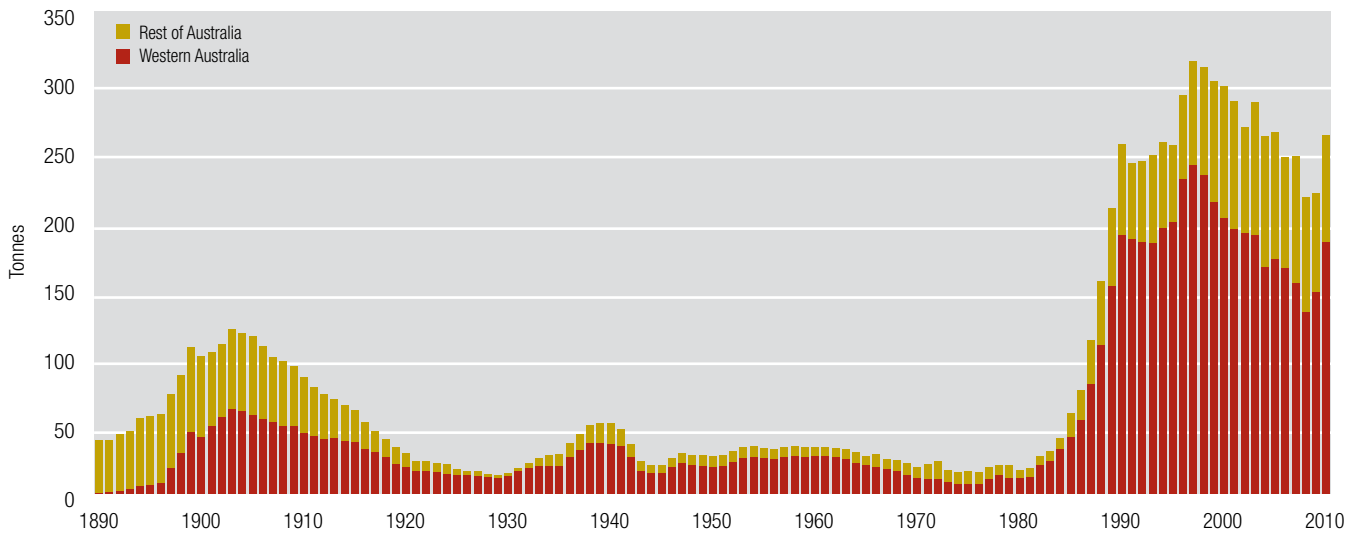


Figure 41 | **Gold Production up to 2010** Source: DMP and ABARES

Recent turbulence in financial markets has worked in gold's favour. In general, forecasts indicate that gold prices will remain relatively high. This is supported by the deterioration in sentiment toward the economic outlook for the US and the weaker members of the European Union plus ongoing problems in North Africa and the Middle East.

Demand is being driven by an increased appetite for jewellery and gold investment from China and India, due to rising living standards together with the world's central banks now being net buyers of gold.

In 2010, the central banks became a net buyer of gold for the first time in 21 years, signalling the end of an era in which the central banks had been a source of significant supply to the gold market.

There were also major shifts in investment demand in 2010 with investment in gold bars/ingots recording an annual gain of 56 per cent whilst Exchange-traded Funds (ETFs) and similar products were unable to sustain previous year's remarkable levels and was consequently down 45 per cent on an annual comparison.

This demand for gold from both the jewellery and investment sectors are supporting high prices which augurs well for gold production in Western Australia.

Listed below are details of some of the mines which have recently commenced operations in Western Australia, completed expansions or plan to open in the near future.

- Integra Mining Ltd poured its first gold from its Randall's gold project near Kalgoorlie at the end of September 2010 and has already completed an upgrade which will target production of 100 thousand ounces per annum.
- Focus Minerals Ltd's The Mount underground gold mine near Widgiemooltha commenced production in the March 2011 quarter and is projected to produce between 40 and 60 thousand ounces per annum.
- AngloGold Ashanti Ltd and joint venture partner Independence Group NL have commenced the development of the Tropicana Gold project located northeast of Kalgoorlie. The capital cost of the project is around \$700 million with a targeted production rate of 3.45 million ounces over a ten-year mine life. First production is targeted for the December quarter of 2013.
- In April 2011, Sandfire Resources NL commenced development at its Doolgunna Copper-Gold Project's DeGrussa deposit 140 kilometres north-northeast of Meekatharra. Sandfire's latest indicated inferred resources at DeGrussa show 600 thousand tonnes of contained copper, 660 thousand ounces of gold and 5.1 million ounces of silver. Production is scheduled for early in 2012.

- Ausgold Limited has made an exciting discovery within its Boddington South Project which has confirmed mineralisation consistent with the levels found at the Boddington gold–copper mine. Ausgold has contracted seven drilling rigs to carry out an intensive drilling program at its Katanning Gold Discovery in the second half of 2011.
- Millennium Minerals Ltd has commenced developing its 500 000-ounce Nullagine gold project located in the East Pilbara region. Completion is targeted for the third quarter of 2012.
- Ramelius Resources Ltd is reopening its Mt Magnet gold mine and plans to be in production early in 2012. Ramelius expects to produce around 520 000 ounces of gold over a six-year period from Mt Magnet.
- St Barbara Ltd's King of the Hills new underground mine commenced production in the June quarter of 2011 and is expected to produce 55 to 60 000 ounces of gold annually for the next five to six years.

There are many additional gold projects in various stages of exploration and feasibility in an effort to capitalise on the buoyant gold market.

World gold mine production reached 2590 tonnes in 2010 which was ten per cent higher than 2009 and only 50 tonnes below the record of 2640 tonnes in 2001. China is ranked at the top of the list of world gold producers with Australia holding second place.

2.5 NICKEL

Western Australia is the sole producer of nickel in Australia and accounts for about 12 per cent of the world's nickel output. In 2010–11, nickel production for the State totalled 186 943 tonnes, 6791 tonnes higher than in 2009–10. Most of this production comes from nickel sulphide mines (85 per cent) and the balance comes from the State's only operating laterite mine, Murrin Murrin.

The value of Western Australian nickel sales increased by 13 per cent to nearly \$4.6 billion. This was mainly attributable to a 24 per cent rise in nickel prices which averaged US\$24 000 per tonne for the year. The strengthening nickel price offset the negative impact of the high Australian dollar to average \$24 271 per tonne in Australian dollar terms.

Current producers in Western Australia comprise:

- BHP Billiton's Nickel West which is the largest producer of nickel in Western Australia. This operation incorporates concentrators at Mt Keith, Leinster and Kambalda, the Kalgoorlie smelter and the Kwinana refinery. Nickel West is also the world's third-largest producer of nickel in concentrate.
- Minara Resources Ltd – Murrin Murrin laterite operation located between Leonora and Laverton in the northeast goldfields of Western Australia.
- Mincor Resources NL – Carnilya Hill, McMahon, Otter Juan, Mariners and Miitel nickel mines.
- Western Areas NL – Forrestania Nickel Operation incorporating Flying Fox and Spotted Quoll nickel mines.

Overall, Western Areas' Forrestania Nickel Project will comprise five mines by 2011, with a targeted production around 35 thousand tonnes of nickel per annum. With ongoing high levels of production from Flying Fox and Spotted Quoll mines, Western Areas are considering a further plant upgrade at Forrestania to increase capacity from 550 thousand tonnes per annum to 750 thousand tonnes per annum.

Western Areas also has off-take agreements in place to sell nickel concentrate to BHP Billiton in Australia and the Jinchuan Group in China.

- Panoramic Resources Limited – Lanfranchi nickel operation incorporating four separate orebodies (Lanfranchi, Helmut South, Winner and Deacon) and the Savannah nickel mine.
- Xstrata Nickel Australasia Pty Ltd – Cosmos nickel operation incorporating Alec Mairs, Cosmos South (Prospero) Tapinos and their Sinclair nickel mine.
- Kagara Limited is the most recent producer with their Lounge Lizard nickel deposit. Kagara has agreed to develop the deposit as part of Western Areas' Flying Fox underground operation.

The arrangement between Kagara and Western Areas will result in the consolidation of one of the largest high-grade nickel mines in Australia.

A range of nickel sulphide producers also have toll treatment and concentrate purchase agreements in place with Nickel West, trucking ore to be concentrated at the Nickel West Kambalda concentrator. In 2010–11, these operations included:

- Independence Group NL's Long mine;
- Mincor Resources' Miitel and Carnilya Hill projects; and
- Panoramic Resources Ltd's Lanfranchi Tramways operation.

In other State developments, First Quantum Minerals plans to restart production later this year from the Ravensthorpe laterite nickel mine. This mine has been on care and maintenance for over two years. First Quantum acquired the mine from BHP Billiton in February 2010. The Ravensthorpe project includes an open cut mine and hydrometallurgical process plant. Commissioning of the project started in August 2011 and it is expected to be in full production by the end of 2011.

Another significant development was the re-opening of Norilsk Nickel's Maggie Hays underground nickel mine at its Lake Johnston project in July 2011. The mine was placed on care and maintenance in 2009 but output is now expected to reach 9000 tonnes in 2012.

In early 2011, Poseidon Nickel announced that it had restarted underground dewatering operations at the Mt Windarra mine. It is expected to be completed by the end of 2011. The dewatering will allow refurbishment of the haulage shaft and access to the old underground crusher area. This will allow further ore resource drilling and further ore to be extracted from Mt Windarra Deeps.

Fox Resources is looking to commence operations at its Radio Hill and Scholl Heap Leaching projects. Adverse exchange rates and commodity price fluctuations have been cited as obstacles to a final decision to proceed.

The nickel market is dominated by the purchasing patterns of the stainless steel industry. Around 65 per cent of nickel is used to manufacture stainless steel, 20 per cent in other non-ferrous (including "super") alloys, nine per cent is used for plating and six per cent in other uses including coins and a variety of nickel chemicals.

Although world nickel prices finished 2010–11 at an average of US\$24 000 per tonne (US\$10.89 per pound), prices have been on a downward trend since February 2011, declining 21 per cent over the six months to June. See nickel price graphs on this page. This trend has continued for the remainder of 2011.

In 2007, when nickel prices reached an all-time high of over US\$20 per pound China developed a different technology for processing low grade laterite ores to produce nickel pig iron. However the higher production costs of nickel pig iron mean that it is not a sustainable source of long-term supply, but it does act as a ceiling on the nickel price of around US\$8 per pound.

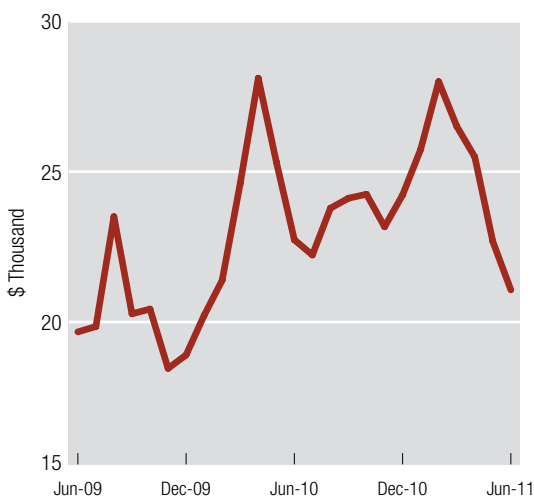


Figure 42 | **Nickel Price A\$'000/tonne**
Source: LME Cash, Monthly Average

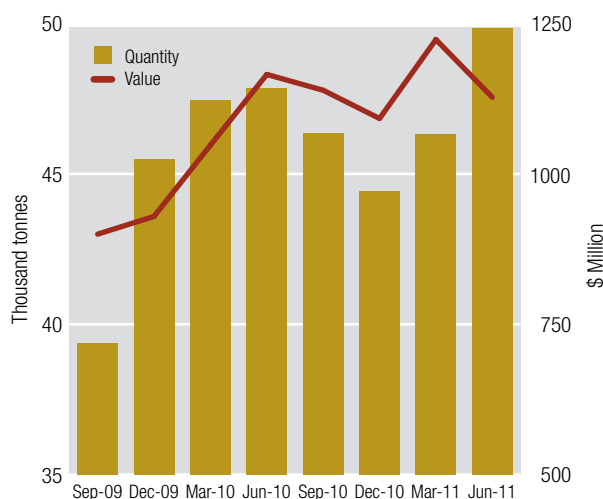


Figure 43 | **Nickel Quantity and Value by Quarter**
Source: DMP

Nickel pig iron is a low purity ferro-nickel with 1.5 to 8 per cent nickel grade being produced from blast furnaces and 10 to 25 per cent nickel grade from electric furnaces (much lower than conventional ferro-nickel, which averages 25 to 40 per cent nickel content) with iron accounting for the balance.

Initially China utilised low grade nickel laterite ore which was mined in the Pacific region and imported into China to produce nickel pig iron. However it is now widely produced in China as well as being imported into China from the Philippines and Indonesia. This low grade laterite ore makes up the bulk of nickel ore imports into China.

China has been expanding its nickel refining capacity and nickel pig iron accounts for the largest proportion of this additional capacity. In September 2011, Jinchuan, China's top nickel producer announced it will join the Zamora Group and Cacroasia Group to develop two mines in the Philippines to produce nickel pig iron. Jinchuan, which operates the country's biggest nickel mine, needs more nickel ores as it expands metal production.

In general, forecasts show a modest expansion of refined nickel for the coming year however US and European consumption will moderate given the economic troubles they are currently experiencing and which are not expected to be resolved in the short term.

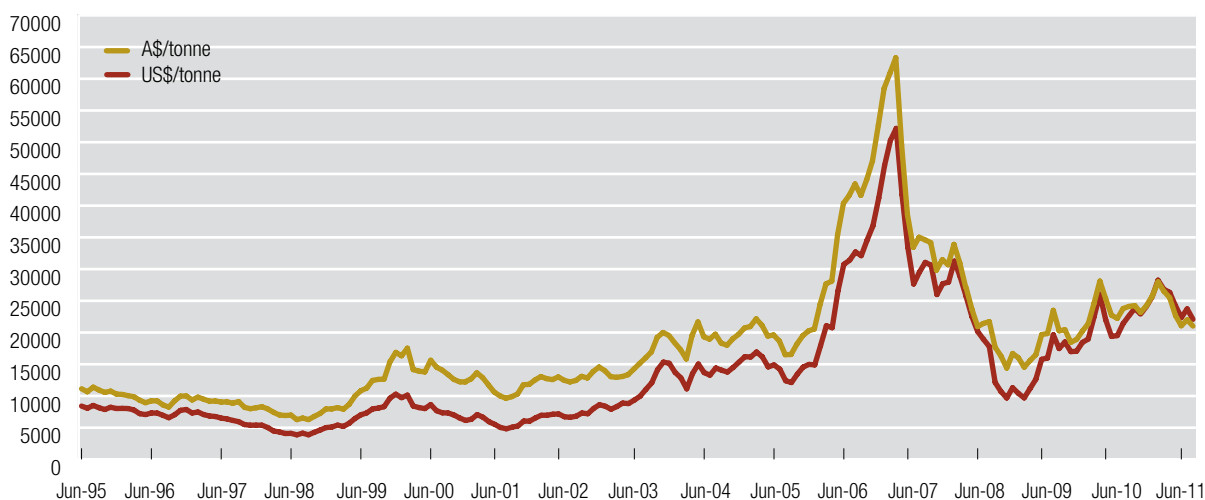


Figure 44 | **Historic Nickel Price per tonne** Source: LME

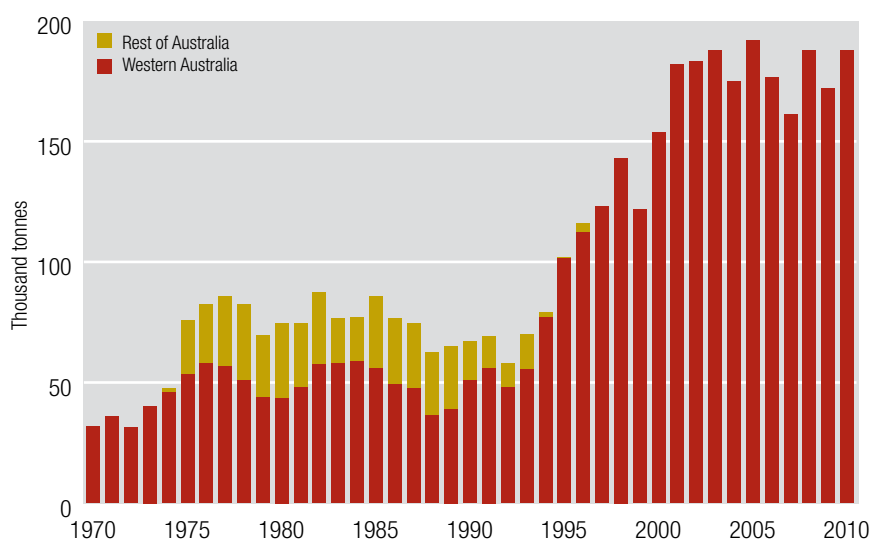


Figure 45 | **Nickel Quantity up to 2010** Source: DMP and ABARES

2.6 ALUMINA

With a total sales value of a little under \$4 billion in 2010–11, alumina was the fifth-largest sector of the State’s resources industry and represents one of the State’s key value-added products. The sales value was four per cent higher than for the same period last year (\$3.8 billion). However the quantity of alumina sold was down by almost three per cent from 12.6 million tonnes to 12.3 million tonnes in 2010–11.

In 2010–11, the alumina price increased by 21 per cent over the previous period to average US\$323 per tonne. This was largely driven by the price of aluminium. In Australian dollar terms, the price for alumina increased eight per cent to \$326 per tonne in 2010–11.

Alumina (aluminium oxide) is a white granular material produced from the refining of bauxite. Around 90 per cent of the world’s alumina is smelted to produce aluminium metal. Around two tonnes of alumina is required to produce one tonne of aluminium.

Aluminium has become the second-most-used metal in the world after steel. Its unique combination of properties makes it suitable for many applications, most notably with respect to the automotive industry, due to its high strength-to-weight ratio. It is also unique in that it is 100 per cent recyclable, with nearly three-quarters of all aluminium produced remaining in use today.

The aluminium price averaged US\$2384 in 2010–11. This was eighteen per cent higher than in 2009–10, but still significantly lower than the peak of US\$3292 per tonne back in July 2008.

Australia is the world’s largest bauxite producer and the second-largest producer of alumina. In 2010–11, Western Australia produced 63 per cent of the country’s total alumina output. Reserves of bauxite ore are sufficient to last more than 50 years at current production levels.

Current production of alumina is focused in the South West of the State, with the Darling Scarp containing considerable deposits of bauxite. The 12.3 million tonnes of alumina sold in 2010–11 was accounted for by two producers: Alcoa World Alumina and Worsley Alumina Pty Ltd.

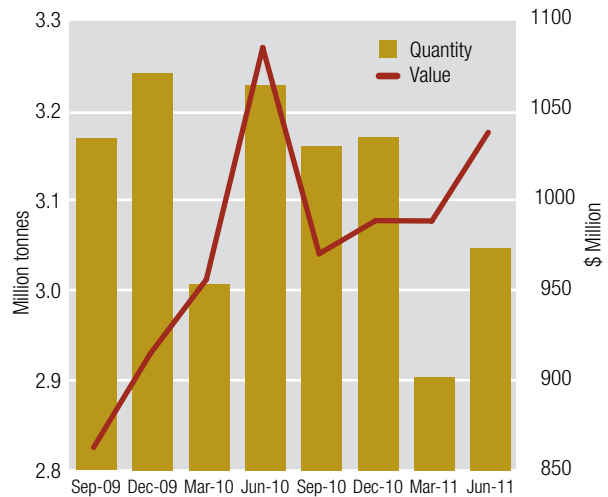


Figure 46 | Alumina Quantity and Value by Quarter
Source: DMP

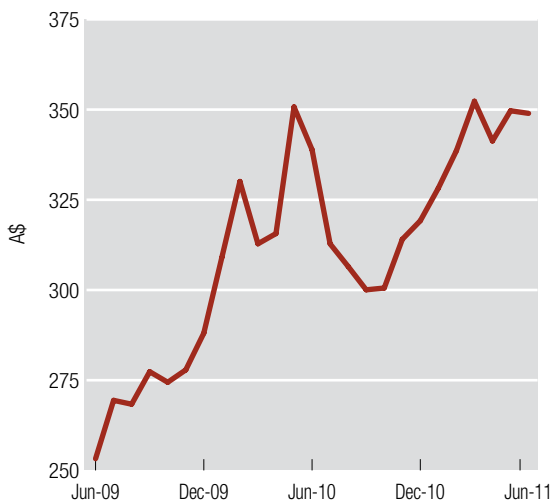


Figure 47 | Alumina Price – A\$/tonne Source: ABS

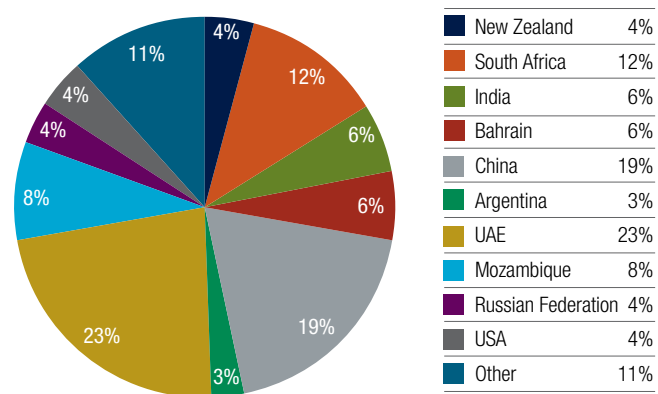


Figure 48 | Alumina Exports – Total Value \$3.5 Billion Source: DMP

Alcoa's first bauxite mine at Jarrahdale opened in 1963 to supply the Kwinana alumina refinery and produced 168 million tonnes before closing in 1998. The company currently has two operating bauxite mines, Huntly and Willowdale. Huntly was established in the early 1970s to supply bauxite to Alcoa's alumina refineries in Kwinana and Pinjarra and is currently the largest bauxite mine in the world. The other operating mine, Willowdale, was established in 1984 to supply bauxite to the Wagerup refinery. Combined, the three refineries have a production capacity of about 10 million tonnes of alumina per year.

Alcoa has government approval for a \$1.5-billion expansion of the Wagerup refinery to increase alumina capacity from 2.6 million tonnes per annum to 4.7 million tonnes per annum. However, the expansion was suspended in November 2008 due to the economic downturn.

Worsley Alumina established its bauxite mine and alumina refinery in the early 1980s. The mine is located near Boddington and the bauxite is transported 51 kilometres by conveyor belt to the refinery at Worsley. Alumina is then transported 50 kilometres by rail and exported through the Port of Bunbury.

Worsley's operations are currently undergoing an expansion and efficiency upgrade designed to increase the production capacity of the refinery from 3.5 million tonnes per annum to 4.6 million tonnes per annum in 2011. This project, at the cost of around \$2.7 billion, is one of the largest single industrial investments in Western Australia's South West region. A further \$500 million is also being spent on a new multi-fuel cogeneration power plant at the refinery.

Other companies have interests in bauxite mining in the South West, including Bauxite Resources Limited which produced a small amount of bauxite ore for trial shipments to China during 2009–10. Extensive undeveloped bauxite deposits are also located in the Mitchell Plateau and Cape Bougainville areas in the north of the State.

Around 90 per cent, or \$3.5 billion, of the alumina produced in Western Australia was exported in 2010–11, with a relatively small amount shipped by Alcoa to its aluminium smelters in Victoria. The State's main export market in 2010–11 was the United Arab Emirates which took 23 per cent of the States alumina. China, the world's largest consumer and major producer of aluminium accounted for 19 per cent. Other major customers include South Africa (12 per cent), Mozambique (eight per cent), Bahrain and India (six per cent each), New Zealand, the United States and the Russian Federation (4 per cent each).

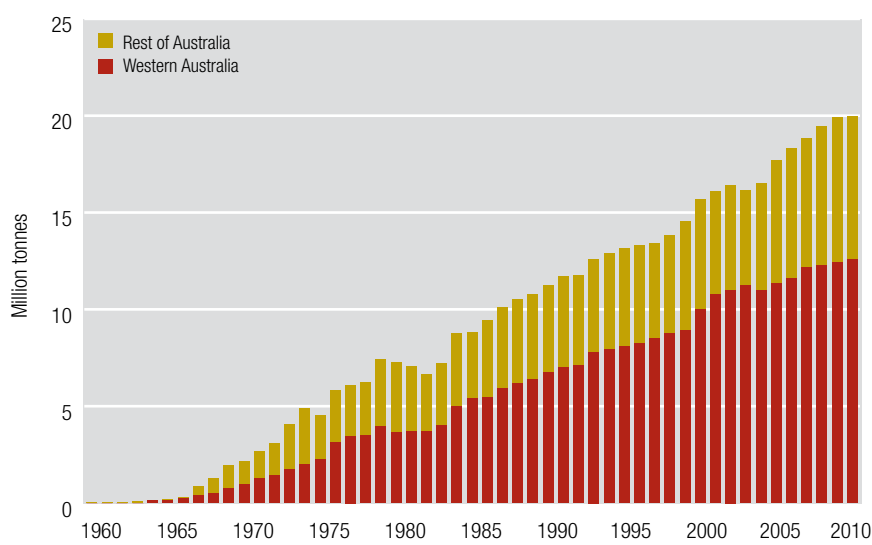


Figure 49 | **Alumina Quantity up to 2010**
Source: DMP and ABARES

2.7 BASE METALS

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

Continued economic recovery and increasing commodity prices saw the value of base metals produced in Western Australia in 2010–11 increase by nine per cent on the previous year to almost \$1.6 billion.

This is largely attributable to a 13 per cent increase in the value of the State's most valuable base metal, copper, which achieved just over \$1.3 billion in sales.

While the total physical amount of copper produced decreased marginally (by one per cent), the trading prices for all base metals finished above 2009–10 levels but still below pre-global financial crisis highs.

The average price for copper rose sharply for a second consecutive year to US\$8671 per tonne representing a 30 per cent increase on 2009–10 levels. This rise is a result of demand for copper outstripping supply and a decreasing global inventory. In Australian dollar terms, copper prices averaged A\$8753 per tonne, an increase of 16 per cent over 2010–11.

The average prices for zinc and lead also rose for a second consecutive year by eight per cent to US\$2244 per tonne and 14 per cent to US\$2396 per tonne respectively. However, in Australian dollar terms, lead increased only marginally by two per cent to \$2419 per tonne and zinc fell by three per cent to \$2271 per tonne.

In 2010–11, increased galvanisation drove the demand for zinc as Chinese urbanisation continued to support growing steel consumption. However, world production remained above demand resulting in a surplus for zinc.

The strong lead price was driven by increased demand, particularly from China. However, high lead inventories contributed to a dampening of prices. Supply was driven by increasing production in China, India, Mexico and Australia.

The production of base metals in Western Australia is dominated by two operations – Aditya Birla Minerals Ltd's Nifty copper mine and Minerals and Metals Group's Golden Grove copper–lead–zinc mine. Nifty produced 33 per cent of the total value of base metals, while Golden Grove produced 22 per cent.

The other major producers include Newcrest's Telfer gold–copper operation (16 per cent), Newmont's gold–copper mine at Boddington (12 per cent) and Independence Group Jaguar copper–zinc–silver operation (six per cent).

Some production of base metals also emanates as a by-product of nickel mining and in 2010–11 this accounted for four per cent of the total value of the State's base metal sales.

Copper

Copper is ranked as the third most used metal in the world after iron and aluminium. It is corrosion-resistant, ductile and an excellent conductor. Copper is mainly used in electrical circuits, wiring and other cables. It is also used widely in the construction industry in pipes for plumbing and heating.

During 2010–11, the total quantity of copper sold out of Western Australia was 147 797 tonnes, at a total value of \$1.3 billion.

Nifty, located 350 kilometres east of Port Hedland, is the State's largest copper producing mine. In 2010–11 it produced 58 034 tonnes of copper in concentrate from its large sulphide resource. The concentrate product is trucked to Port Hedland for shipping to Hindalco Copper's Dahej smelting and refining facilities in India.

Telfer, located 310 kilometres northeast of Newman, produced 32 077 tonnes of copper in concentrate, followed by Golden Grove, located 55 kilometres south of Yalgoo in the Mid West, which produced 29 163 tonnes of copper in 2010–11.

With improved copper prices, Golden Grove's Scuddles mine, placed in care and maintenance in 2008, was restarted in April 2011. Scuddles is projected to produce up to 270 000 tonnes of copper concentrate containing 56 000 tonnes of copper from 2011 to 2014.

Boddington was the next major producer at 26 762 tonnes and Jaguar was the smallest copper producer with 8468 tonnes.

Copper was also produced as a by-product (approximately five per cent of the total) from a number of nickel operations, with eight mines selling 7671 tonnes. The largest of these producers was Panoramic Resources Limited's Savannah nickel mine, producing 3718 tonnes of copper in concentrate.

The next copper mine to come into production will be Sandfire Resources DeGrussa high grade copper–gold mine which is located 140 kilometres northeast of Meekatharra. First ore from stage one was mined in July 2011. However it is not expected to commence commissioning processing facilities until sometime during 2012. DeGrussa is expected to have a mine life of around seven years.

Zinc

Over 50 per cent of global zinc production is utilised in the galvanising of iron to prevent corrosion, with the next major uses, at 17 and 16 per cent respectively, being for manufacture of brass/bronze and other alloys.

Western Australia has two zinc producers: Minerals and Metals Group's Golden Grove mine and Independence Group's Jaguar Project, located 60 kilometres North of Leonora.

During 2010–11, zinc production at Golden Grove amounted to 58 906 tonnes of metal in concentrate, down from 80 195 tonnes in 2009–10. Zinc production at Jaguar amounted to 14 671 tonnes of metal in concentrate, down from 24 184 tonnes in 2009–10.

Recent upgrades to Jaguar's resources have extended the projects life beyond eight years.

Lead

Lead is a very soft, highly malleable and ductile metal. Its primary use, accounting for almost 80 per cent of the world's consumption, is in lead–acid batteries. These batteries are used in cars and are the preferred energy supply devices for critical infrastructure systems including computers and telecommunications, emergency power supplies and storage devices for renewable energy systems. Other uses for lead include pigments and compounds and rolled or extruded products for uses such as lead shielding and in architecture.

Lead sales in Western Australia increased by 55 per cent to 40 388 tonnes in 2010–11. Production was limited to two producers – Ivernia's Magellan lead operation, located 30 kilometres West of Wiluna and Golden Grove.

In 2010–11, Magellan produced 38 800 tonnes of lead, most of which was sent to China for smelting by the Yunnan Metallurgical Group. Operations at Magellan are currently under review with the mine now placed on care and maintenance.

Golden Grove reported a decrease in annual production, down from 7145 tonnes in 2009–10 to 6052 tonnes in 2010–11.



MMG Golden Grove base and precious metals underground mine in Western Australia's Mid West.

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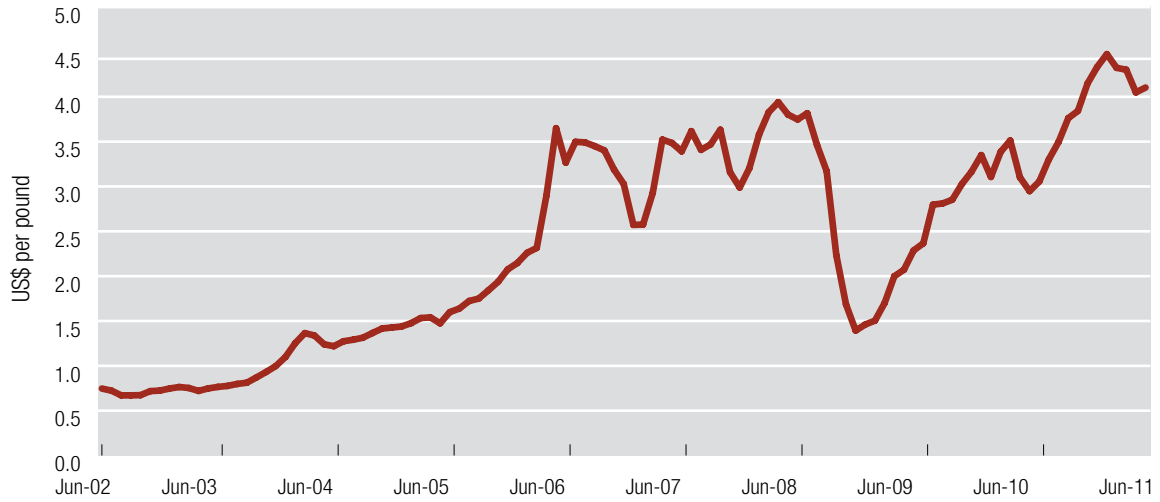


Figure 50 | **Copper Price** Source: Metalprices.com



Figure 51 | **Lead Price** Source: Metalprices.com



Figure 52 | **Zinc Price** Source: Metalprices.com

2.8 MINERAL SANDS

Production of mineral sands in Western Australia predominantly comprises titanium minerals (ilmenite, leucoxene, synthetic rutile and rutile) and zircon. Other products such as garnet sand and staurolite are also produced on a smaller scale and are used as commercial sandblasting abrasives.

In 2010–11, the value of Western Australian mineral sands sales was \$468 million, around one-third lower than the \$696 million sold in 2009–10. This drop in value is largely attributed to the scaling back of Iluka Resource's Western Australian operations.

A 30 per cent fall in the overall amount of synthetic rutile sold (251 619 tonnes), coupled with a stronger Australian dollar, saw the value of the highest value titanium mineral product decline by 35 per cent in 2010–11 to \$123 million.

Similarly, the value of zircon sold (\$201 million) decreased by 30 per cent with quantities shrinking by some 15 per cent (294 997 tonnes). Ilmenite sales fell by 23 per cent to \$53 million and 394 096 tonnes whilst rutile fell by over 50 per cent to \$35 million and 49 745 tonnes.

The global financial crisis had a significant impact on titanium minerals. However, with some recovery in 2011 and the expiration of some historical contractual price caps, new arrangements have provided for greater flexibility with pricing reaching near record levels during the first half of 2011.

So far in 2011, zircon has experienced a US dollar price increase of around 50 per cent to average US\$1324 per tonne over average prices for 2010. Whilst titanium pigment (TiO₂) and titanium feedstock's price increase for the same period, is 20 per cent, averaging US\$2865 per tonne and US\$660 per tonne respectively.

Mineral sands production in Western Australia is dominated by two producers, Iluka Resources and the Tiwest Joint Venture (a 50:50 joint venture between Tronox Western Australia Pty Ltd and subsidiaries of Exxaro Resources Limited). Together these two companies accounted for around 73 per cent (by value) of all the State's mineral sands produced in 2010–11.

In the aftermath of the global financial crisis, with weakening markets and declining grades, Iluka significantly reconfigured its Australian mineral sands

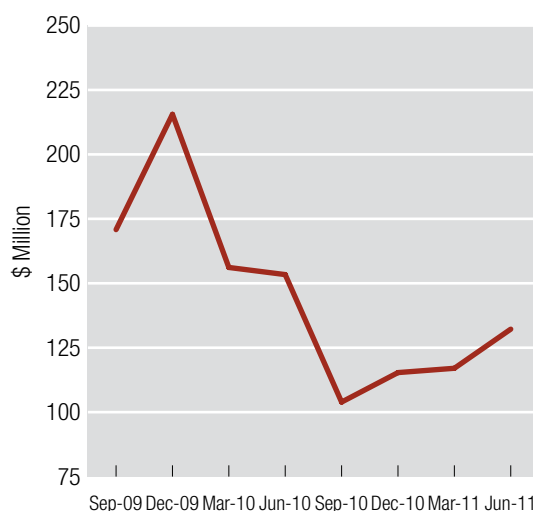


Figure 53 | **Heavy Mineral Sands – Value by Quarter**
Source: DMP

operations, resulting in the closure of around 50 per cent of its Western Australian operations. While the company still controls significant resources in Western Australia, its primary focus for development in recent years in Australia has been on the Murray Basin in Victoria and the Eucla Basin in South Australia.

Iluka's past investment in capital-intensive processing facilities in Western Australia enables processing of mineral sands in this State to continue past the life of their mine sites. For example, the economic life of the Nangulu processing facilities has been extended through an expansion program which allows the processing of heavy mineral concentrate from Iluka's Jacinth–Ambrosia deposit in the Eucla Basin. The company now exports zircon, originating from its Jacinth–Ambrosia mine in South Australia, through the Nangulu processing plant which is located near Geraldton.

Iluka's current Western Australian operations now consist of mineral sands resources, mineral processing plants and synthetic rutile production facilities in two main operational areas centred around Nangulu in the Mid West and Capel in the South West.

With improving market conditions during 2010–11, Iluka commenced the development of the Tutunup South deposit which is located 195 kilometres south of Perth. The mine is expected to produce approximately 1.2 million tonnes of heavy mineral concentrate over the next four to five years. The concentrate will be processed at the North Capel site where it will provide ilmenite feedstock for Iluka's synthetic rutile number two kiln.

In late July 2011, with supply-constrained markets and strong demand for high grade product, Iluka announced plans to reopen its Eneabba mining area and prepare its synthetic rutile kiln three for a three-year commercial campaign starting in 2012. Mining at Eneabba is due to resume at the end of 2011.

The Tiwest Joint Venture, established in 1988, is the world's largest integrated titanium dioxide project. Its facilities include the Cooljarloo mineral sands mine situated approximately 170 kilometres north of Perth; a dry mill and synthetic rutile plant 110 kilometres to the south at Chandala; and a titanium dioxide pigment plant at Kwinana.

Most of the ilmenite produced is processed into synthetic rutile at the Chandala complex. This synthetic rutile is then used as feedstock for the production of titanium dioxide pigment at Kwinana for both the Australian and international markets. Rutile, leucoxene, zircon and staurolite are also produced for export.

In 2010–11, other companies producing titanium minerals and zircon in the South West include Doral Mineral Sands Pty Ltd, the Saudi Arabian owned Cristal Global operating as Cable Sands (WA) Pty Limited and GMA Garnet Pty Ltd.

In the new financial year, ownership structures have changed. In late July 2011, Cristal announced the sale of its Western Australian operations to Minerals Commodities Limited. The acquisition of the Bunbury mineral separation plant will provide the capability to process mineral sands from its South African-based projects. As part of the sale agreement Minerals Commodities will also toll process 248 thousand tonnes of Cristal's Murray Basin non-magnetic mineral concentrate this coming year.

Minerals Commodities are looking to expand Western Australian production with the acquisition of highly prospective mineral sands tenements in close proximity to existing Cable Sands operations and infrastructure in the South West.

Around 95 per cent of the titanium minerals produced globally are used as feedstock to produce titanium dioxide pigment. Titanium dioxide pigment is used in the manufacture of products such as paints, paper and plastics. A small proportion is also used in titanium metal, predominantly for the aerospace industry.

Zircon has a number of applications, principally in the manufacture of ceramic tiles and sanitary ware.

Western Australia also produces garnet through GMA Garnet Pty Ltd. GMA is a leading global producer of industrial garnet for blast cleaning and water-jet cutting. GMA's mining operation is located in the Mid West and is the sole Western Australian producer.

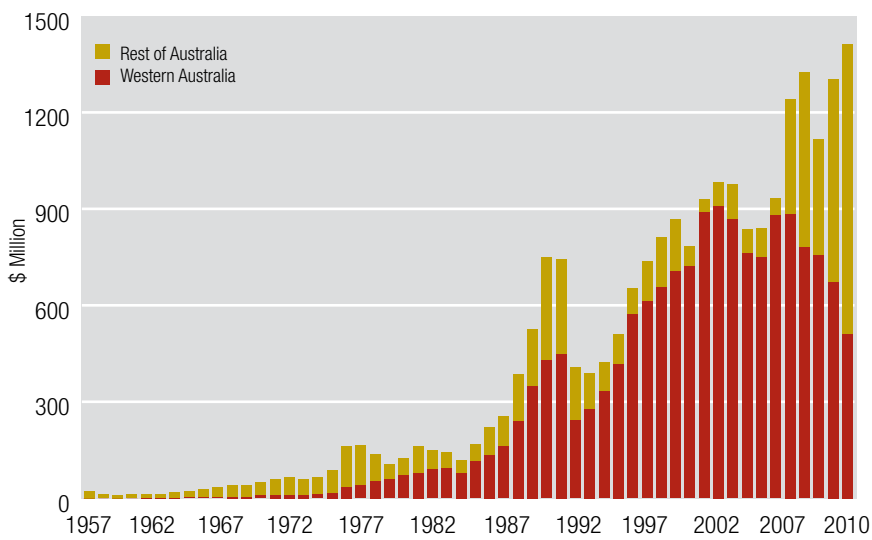


Figure 54 | **Heavy Mineral Sands Value of Production to 2010**
Includes Ilmenite, Leucoxene, Upgraded Ilmenite, Rutile, Zircon and Monazite
Source: DMP and ABARES

2.9 DIAMONDS

Diamond sales volumes fell by 38 per cent in 2010–11 to 10.1 million carats.

Demand for diamonds dropped dramatically when the global financial crisis hit in the second half of 2008. It was not until around mid-September 2009 that prices started to recover. In many categories, rough diamond prices are now above their highs of 2008 before the global financial crisis.

The recent strength in rough diamond prices can be attributed to increased demand from emerging markets such as India and China and a diminishing supply of rough and polished diamonds in the cutting centres. This trend is set to continue with a lack of large diamond mines coming on stream in the past five years. Currently, outside of Zimbabwe, it appears unlikely that any significant new supply will come on-stream within the next ten years.

Rio Tinto's Argyle mine, 112 kilometres south-southwest of Kununurra, accounts for the bulk of diamond production in Western Australia and celebrated its 25th anniversary in 2011. The Argyle mine accounts for around seven per cent of annual global diamond output by volume.

Argyle commenced mining its main ore body in 1985 and has since produced over 760 million carats of diamonds. Mining is planned to conclude in the open pit around mid-2012 when it will transition to an underground operation which is expected to extend the life of the mine until at least 2019.

In 2010–11, Argyle produced 7.88 million carats, a decrease of 28 per cent from the previous year. This fall reflects the fact that the open pit mine is in its final stages prior to an underground mine accessing higher grades.

The expansion to underground mining at Argyle commenced in 2005. However progress slowed in 2009 in response to global market conditions when construction was around 50 per cent complete. In February 2011, in response to improving market conditions, a decision was made to ramp-up construction of the underground operation. Once completed in 2013, the underground mine is expected to reach a full operating capacity of 10 million tonnes per year and is expected to produce an average of 20 to 25 million carats annually.

The Argyle mine is famous for its pink diamonds and at peak production accounted for around 90 per cent of the world's output of this type of diamond (though they represent less than half of one per cent of the mine's output). The colour range also includes white, champagne and cognac. Argyle production consists of five per cent gem and 70 per cent near-gem with the remaining 25 per cent of the volume being industrial diamonds. The entire gem and near-gem diamonds are polished and account for more than 90 per cent of the value of Argyle's rough diamond sales.

Gems Diamonds, with its Ellendale mine, is located 100 kilometres east of Derby and is the State's only other producing diamond mine. Due to the wet season, when no mining activities can take place at Ellendale, the first quarter of each year is generally dedicated to the treatment of stockpiled ore. These stockpiles are accumulated during the previous nine months and allow the mine to process ore all year round.

During 2010–11, the Ellendale mine produced around 138 thousand carats which was down nearly 29 per cent on the previous year. This fall in production can be attributed to a heavier and longer than normal wet season. As a result of the global financial crisis, production at Ellendale was slowed and supply from this mine remains well below 2007–08 levels of 488 thousand carats.

Ellendale produces predominantly gem and near-gem quality diamonds and is the world's single largest producer of rare fancy and vivid yellow stones. The Ellendale mine has a long-term sales agreement with Tiffany and Co., spanning the economic life of the mine, for these rare diamonds. Recent price negotiations with Tiffany included a change from six monthly to monthly pricing adjustments to better reflect changing market conditions.

In the first half of 2011, the company achieved a record average price per carat of \$4045 for its yellow diamonds compared to \$2588 for the first half of 2010. This record price has provided Ellendale with the opportunity to review the recommencement of mining in areas previously shutdown as well as investigating the viability of other sites within the mining area.

2.10 OTHER

Coal

Western Australia has two coal producers – Wesfarmers Premier Coal Limited and Lanco Infratech Ltd an Indian electricity generator which acquired the Griffin Coal Company Pty Ltd in December 2010. Both companies' mines are located at Collie in the South West of the State.

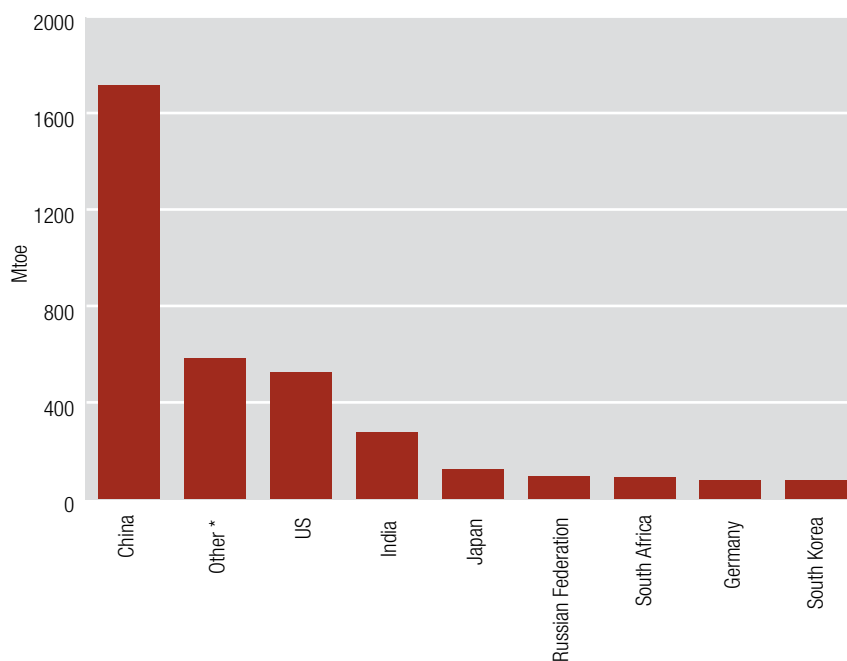


Figure 55 **World Coal Consumption 2010** Source: BP World Energy Statistics 2011
 * Other consists of 50 countries including Australia

At the time of writing, Wesfarmers had agreed to sell its Premier Coal business to the Chinese-controlled Austar Coal Mine Pty Ltd. The sale is subject to approvals from the Australian Foreign Investment Review Board and Chinese government authorities.

In 2010–11, the quantity of all coal sold from Collie increased by eight per cent to 7.2 million tonnes whilst the value decreased by almost two per cent to \$320 million.

About 90 per cent of Collie coal is used as thermal coal, mostly in power stations and the majority of the remainder is used in metallurgy by the mineral sands industry to transform ilmenite to synthetic rutile.

In the past, all of Western Australia's coal supplies have been sold domestically from the coal mines in Collie to Verve Energy and other large local energy users, mainly in the mineral-processing sector. In 2007, Griffin Coal commenced trial export shipments and up to June 2011, 64 cargoes had been exported to India and China through the Port of Kwinana.

Coal currently fuels around 35 per cent of Western Australia's power generation. Gas represents about 60 per cent of the total fuel used while fuel oil and renewable energy sources such as wind and hydro make up the remainder.

In 2008, research was undertaken on gasification of Collie coal by the Cooperative Research Centre for Coal in Sustainable Development (CCSD) through its participant, CSIRO Energy Technology, in Brisbane. Part of the study was conducted at the Siemens Gasification Test Facility in Freiberg, Germany. The results of the study support the proposal to use clean-coal technologies in power generation in Western Australia.

Possible Coal Developments

Rey Resources Limited has completed a definitive feasibility study on their \$199-million Duchess–Paradise coal project in the Canning Basin. Located 150 kilometres southeast of Derby, the project has potential to export thermal coal to Asian power generation markets. Subject to approvals, Rey Resources could potentially commence construction in 2012 and may be in production in 2013. The initial proposed operation has a mine life of more than ten years.

There are several coal associated developments in the South West which include:

- The Collie hub carbon capture and storage (CSS) project is a Western Australian government–industry partnership. The Collie hub aims to develop a multi-user Carbon Capture and Storage facility featuring six participating companies – Perdaman Chemicals and Fertilisers, BHP Billiton, Worsley Alumina, Alcoa, Griffin Energy, Wesfarmers Premier Coal and Verve Energy.

- Wesfarmers Premier Coal is proposing a potential coal char plant on a 55-hectare site within the hub.
- Perdaman is proposing a \$3.8-billion coal-to-urea manufacturing plant on a 125-hectare site within the Shotts Industrial Park. Subject to the necessary approvals the project could commence construction towards the end of 2011 with production commencing in the second half of 2013. The Perdaman Collie Urea project would be Australia's first gasification plant, turning Collie coal into urea.
- The Blackham Resources Limited (operator) and Wesfarmers Limited joint venture is continuing to advance the development of their Scaddan and Zanthus coal to liquids (CTL) project near Esperance. Blackman completed a mining study in May 2010 and in early 2011 began a Preliminary Processing Study.

Necessary amendments to incorporate underground coal gasification into the *Mining Act 1978* are to be included in a general mining amendment package in 2011.

The recently published data in the BP World Energy Statistics 2011 shows that Australia's domestic coal consumption represents just 1.2 per cent of the total world's coal consumption. Accounting for around 63 per cent of consumption is China (48.2 per cent), followed by the United States (14.8 per cent).

Salt

Western Australia accounts for approximately 80 per cent of national salt production and is the country's dominant exporter. In 2010–11, the volume of Western Australian salt sales rose by twelve per cent to nearly 12.2 million tonnes. However sale values fell to \$367 million. A twelve per cent strengthening of the Australian dollar offset long-term price contracts which had been negotiated at pre-global economic crisis levels. At the time of price negotiations there was strong demand from industries in Asia and supply of good quality salt was limited.

Dampier Salt Limited has operations in Dampier, Port Hedland and Lake MacLeod in the Pilbara. The company accounts for around 75 per cent of the total salt produced in Western Australia and is the world's largest exporter of high-quality bulk, solar salt. Production involves solar evaporation of seawater (Dampier and Port Hedland) and underground brine (Lake MacLeod).

Onslow Salt Pty Ltd's operation at Onslow is the next largest operation. The Shark Bay Joint Venture at Useless Loop (which commenced operations in 1968) and the WA Salt Supply's Lake Deborah East (at Koolyanobbing) and Pink Lake (at Esperance) operations make up the smaller producers.

Salt is primarily used as a feedstock for the production of chemicals, glass and plastic. Recent increased demand from synthetic soda ash production, food processing and de-icing, is placing pressure on an already tight market. With consistent growth in China, world demand for salt is likely to increase by around three per cent annually for the next five years and Western Australian salt producers are well placed to take advantage of this growing market.

In June 2010, Dampier Salt Limited signed a five-year contract to supply approximately 500 thousand tonnes per year of gritting salt to local United Kingdom (UK) authorities. This allows the UK to be better prepared for unpredictable winter weather conditions and will not have to rely on emergency supplies from other European regions.

China accounts for over 30 per cent of world salt consumption putting it ahead of Europe and North America. China, the USA, India and Germany are the key salt-producing countries.

Lithium, Tin and Tantalum

Tantalum production in Western Australia has traditionally come from two mines, Greenbushes in the South West and Wodgina in the Pilbara region. In December 2008, due to slow demand for tantalum products by the consumer electronics and other specialist industries, these mines were placed on care and maintenance. When operational, Wodgina and Greenbushes have the capacity to produce up to 50 per cent of the world's tantalite concentrate supply.

In March 2011, against a backdrop of tightening supply and a doubling of contract prices since 2008, Global Advanced Metals resumed operations at the Wodgina mine. This produces primary tantalum concentrate which is then sent to the Greenbushes operation for secondary processing. Strong demand is initially being met from existing stockpiles at Greenbushes and Global has already secured long-term contracts for Wodgina's entire 700 000 pound annual start-up production.

Global Advanced Metals also has an agreement to purchase tantalum pentoxide from Galaxy Resources Australia Limited's recently opened Mt Catlin lithium mine.

Tantalum is a rare, grey-blue metal used primarily in the electronics industry in the manufacture of capacitors and therefore found in many everyday devices such as mobile phones, lap-top computers and video cameras. Another increasing application for tantalum is as a “superalloy” in the manufacture of turbine blades for power stations and jet engines.

Greenbushes also produces lithium (spodumene) and until recently has been Western Australia’s sole producer. The lithium side of Greenbushes production is operated by Talison Lithium Australia Pty Ltd with a nominal production capacity of approximately 260 thousand tonnes per annum of lithium concentrate.

Greenbushes contains the largest hard rock lithium mineral resource in the world and Talison is the world’s largest producer of spodumene concentrate, accounting for one-quarter of global lithium supply.

New Producers

In October 2010, Galaxy Resources Limited’s \$68-million Mt Cattlin lithium–tantalum project commenced production becoming Western Australia’s second lithium producer. Mt Cattlin is located close to the town of Ravensthorpe in the South West of the State. Galaxy’s first shipment of spodumene was shipped in March 2011 to its value-adding lithium carbonate plant in China. Mt Cattlin will also produce tantalum as a by-product.

In late July 2011, Galaxy announced that they had entered into a technology licence agreement with US lithium ion battery producer K2 Energy Solutions Inc. Having completed a feasibility study in late 2010, this is the one of the first steps toward a proposed battery project at Galaxy’s plant in China.

Early in 2011, Reed Resources Ltd (in joint venture with Mineral Resources Limited) commenced development of their Mt Marion lithium project which is located approximately 35 kilometres south of Kalgoorlie. Plans are in place for initial production at around 200 thousand tonnes a year. The project also has the potential to recover mica, tantalum and potash–feldspars by-products.

Lithium is used in the glass and ceramics industry and increasingly in the production of lithium chemicals for the battery market, with a significant growth in demand forecast for the electric vehicle market in China and around the world.

Lithium is the lightest of all metals. It does not occur as a pure element in nature but is contained within stable minerals or salts including a range of rock types, brine lakes and sea water. The contained concentration of lithium is generally low and there are only a limited number of resources where lithium can be economically extracted. These are lithium-rich brine lakes and mineral deposits. Extraction of lithium from brine lakes requires a different method to hard-rock mining and is generally cheaper.

Global demand for lithium is expected to increase due to development of rechargeable batteries for electric cars. The United States, China, Japan and a large number of European countries are making a significant investment in electric vehicle development and associated infrastructure.

Talison also produces a small amount of tin as a by-product from Greenbushes and this is all exported. In 2010–11, the total value of tin sold from Western Australia was \$282 thousand.

Manganese and Chromite

The value of manganese sold in 2010–11 amounted to \$371 million which was a fall of three per cent compared to the previous period.

The major producer of manganese in Western Australia is Pilbara Manganese Pty Ltd, a wholly-owned subsidiary of the Ukraine-based Palmary Enterprises Ltd. Pilbara Manganese operates the Woodie Woodie mine and produces around one million tonnes of manganese ore per annum with an average grade of 46.2 per cent. The Woodie Woodie mine currently has a mine life of around five years with potential to extend beyond this time.

Woodie Woodie is recognised internationally as a supplier of reliable high-grade, low impurity manganese ore. Located 400 kilometres southeast of Port Hedland in the Pilbara region, the open-cut mine was first established in 1954. It continued operating until 1982 and re-opened in 1989 and currently exports to world markets.

Another smaller producer, Process Minerals International Pty Ltd (PMI) a wholly-owned subsidiary of Mineral Resources Limited, has been retreating tailings from Woodie Woodie as well as sourcing manganese from Peak Hill – Horseshoe by processing previously mined product. PMI have long-term contracts with Boasteel Resources Co. Ltd of China for the supply of both lump and fines manganese from these operations.

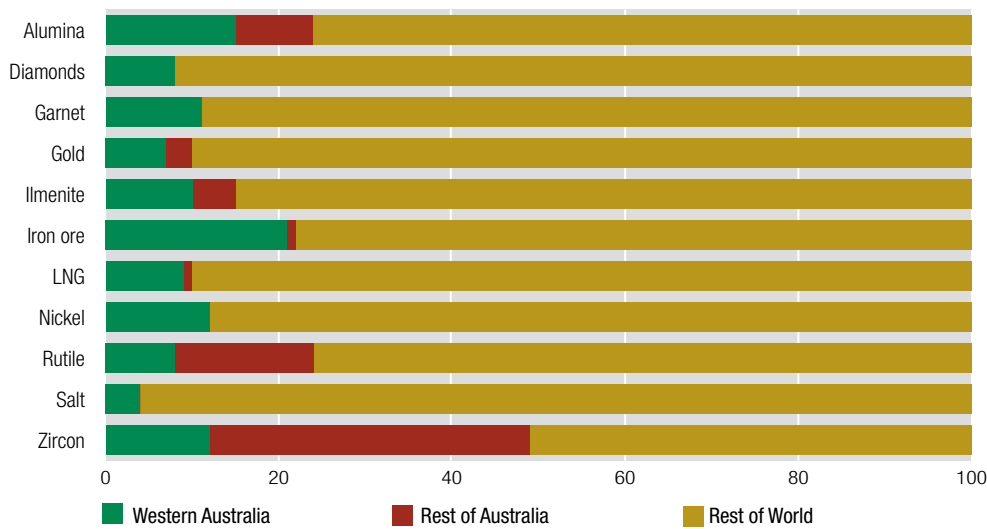


Figure 56 **Selected WA Commodities Relative to World Production Ending 2010 by Quantity** Source: DMP, ABARES, USGS

The latest comparable data show that the Western Australian share (by quantity) of the world's output of the following products was: alumina 15%, garnet 11%, gold 7%, ilmenite 10%, iron ore 21%, LNG (sea-borne trade) 9%, nickel 12%, rutile 8%, salt 4%, zircon 12% and 8% of diamonds (mainly industrial grade)

The newest manganese project to commence operations is Nicholas Downs, located 130 kilometres northwest of Newman. Nicholas Downs is a joint venture between Mineral Resources Limited (operator) and Hancock Prospecting Pty Ltd. First shipments commenced in the second half of 2010 with the completion of the new Utah Point port at Port Hedland.

Mesa Minerals Limited (64 per cent owned by Mineral Resources Ltd) is looking to start operating their Ant Hill mine, located 45 kilometres southeast of Nullagine. Two trial shipments of manganese ore were successfully completed to China during the period under review.

Consolidated Minerals is also the State's sole producer of chromite ore. Their Coobina mine is located 80 kilometres southeast of Newman and has an operating capacity of around 250 thousand tonnes per annum of high-grade ore. When the global financial crisis triggered the collapse in the stainless steel market in 2008, Coobina was placed on care and maintenance. However, with improving market conditions, the mine resumed operations in the second half of 2010. In the six months to June 2011, Consolidated sold 97.1 thousand tonnes of chromite.

Globally, chromite production is dominated by South Africa, India, Kazakhstan, Turkey and Brazil, which together account for around 85 per cent of world mine production.

Rare Earths

Rare earths are not found as free metals in the Earth's crust, rather within a mixed 'cocktail' of rare earth elements that need to be separated for their individual or combined commercial use. Despite their name, rare earths are relatively abundant in the Earth's crust; however, they are often of low quality and rarely present in economic concentration.

Rare earths have unique properties that make them indispensable for many technological applications. A range of unique chemical, catalytic, electrical, magnetic, metallurgical and optical properties enable them to play a major role in the advancement of materials technology.

June 2007 saw the commencement of mining operations at Lynas Corporation's Mt Weld Rare Earths project located 18 kilometres southeast of Laverton. The initial mining campaign was successfully completed in June 2008 with 773 300 tonnes of ore, at an average grade of 15.4 per cent rare earths oxide (REO) stockpiled. This provides sufficient stockpiled ore for the first two years of Lynas's downstream processing operation.

While the project was suspended in early 2009, due to the global financial crisis, improved economic conditions have since seen the project restart, feeding ore into the concentration plant in mid-May 2011. Throughput rates are ramping-up and are on schedule to synchronise with the ramping-up of the Lynas Advanced Materials Plant in Malaysia which is planned to be completed in the second half of 2011.

The Mt Weld deposit comprises world-class REO and niobium–tantalum deposits. Rare earths ore are mined crushed and blended at Mt Weld and will be trucked to Fremantle in containers for export to the Gebeng Industrial Estate in Malaysia where Lynas is establishing its processing operation.

The first phase of the project is designed to produce an estimated 11 thousand tonnes per annum whilst a second phase expansion would increase to 22 thousand tonnes per annum. The mine is expected to have at least a 20-year mine-life.

Mt Weld, with its very high grade, contains light rare earths and is also high in europium, a heavy rare earth, is currently the only commercially viable resource of significant size outside China. The operation is well placed to take advantage of a market where supply is currently being outstripped by demand.

China currently supplies approximately 95 per cent of the global rare earths output and is the dominant processor and user of refined compounds. This has evolved as processors in the rest of the world transfer production bases to China. In addition, more than 70 per cent of light rare earths are supplied from one mine in China.

China also holds 50 per cent of rare earth reserves, Commonwealth of Independent States (Russia) 17 per cent followed by the United States at 12 per cent and Australia with almost two per cent. Recent regulatory changes will reduce the amount of rare earths being extracted from within China and the supply of high demand elements will require the exploitation of other sources.

China's 2010 export quota was cut by around 40 per cent below 2009's figure of 50 145 tonnes to 30 259 tonnes. This set the stage for significant price increases for product sourced from China. Further reductions of 35 per cent were designated for 2011 and placed additional upward pressure on prices. However, in July 2011 China's Ministry of Commerce set the 2011 quota at 30 184 tonnes similar to last year's exports.

As well as reducing export quotas, China has introduced export tariffs of 15 per cent on light rare earths and 25 per cent on heavy rare earths.

Japan imports 50 per cent of China's rare earth shipments and Sojitz a major Japanese rare earth consumer, has signed a supply deal with Lynas Corporation. Japan, with its electronics and car industries, uses a fifth of the global supply, making it the world's largest importer of rare earths. Lynas has also signed seven other long-term customer agreements.

Molybdenum–Copper Development

Moly Mines Limited (55 per cent owned by Hanlong Mining Investment) is developing its Spinifex Ridge molybdenum–copper project located approximately 50 kilometres northeast of Marble Bar. Prior to the dramatic fall in molybdenum prices in 2008, the plan was to develop an open pit operation which would produce 20 million tonnes per annum. The collapse in world molybdenum prices delayed the project from starting and the company has now announced a smaller open pit operation of 10 million tonnes per annum.

Although prices have shown signs of recovery a lot of these gains have been negated by the strong Australian dollar and have presented challenging hurdles for the project. Spinifex Ridge is expected to have a 24-year mine-life.

Spinifex Ridge will be the world's first major molybdenum project in over 25 years.

The distribution of molybdenum reserves and production is concentrated in only a few countries. China, the United States, Chile and Canada hold around 87 per cent of reserves. The main three producers are China (39 per cent) the United States (25 per cent) and Chile (16 per cent).

Molybdenum is a high melting-point alloying metal used in iron, steels and super alloys to enhance hardness, strength, wear and corrosion-resistance.

Vanadium

Atlantic Ltd's Windimurra vanadium and iron ore project, located approximately 80 kilometres from Mount Magnet, with commissioning underway, is on track to commence production toward the end of 2011. The Windimurra mine is projected to have a mine life of around 24 years and is expected to produce approximately 5700 tonnes of vanadium in the form of ferro-vanadium per annum and one million tonnes per annum of hematite fines.

The Windimurra vanadium project is a restarted project. It was first discovered in the 1960's and first commenced production towards the end of 1999. The project was a joint venture between Precious Metals Australia Limited and a subsidiary of Xstrata. The mine operated for around four years eventually closing after processing 7.2 million tonnes of ore and producing 13 thousand tonnes of high quality vanadium pentoxide.

Vanadium is used to strengthen steel and titanium and around 85 per cent is used in the high performance steel industry. Worldwide, vanadium consumption is currently around 65 thousand tonnes per annum and it is anticipated that Windimurra production could meet around seven per cent of this demand.

3. EMPLOYMENT, INVESTMENT AND ROYALTIES

3.1 EMPLOYMENT

Mining

The Department of Mines and Petroleum's Resources Safety Division collects employment data from monthly accident reports which are required to be submitted by all operating mines and companies carrying out exploration on mineral and mining leases under the *Mining Act 1978*. These reports identify the number of direct employees and contractors (including exploration personnel) working on operating mining leases. In March 2008, legislation was introduced to capture exploration personnel working on greenfield sites.

This data must be interpreted with some caution as it can reflect employment changes relating to construction activity, depletion of resources, scheduled maintenance shut-downs, level of brownfield exploration activity and seasonal weather constraints on mine operations.

In addition, the data is not directly comparable with those sourced from the Australian Bureau of Statistics (ABS). This is due to the narrow definition of mining activities used by the ABS which is based on the Australian and New Zealand Standard Industrial Classification (ANZSIC). Under these, not all mining-related employment is reflected in ABS's Mining industry classification. For example, employees engaged in mineral processing, surveying, transport and catering are not included.

Continual efforts are made by the Department to improve data and evidence-driven safety regulation. This has involved introducing the Safety Regulation System (SRS) AXTAT+, a web-based database. The SRS is also designed to enhance data quality and analysis and report mine safety and occupational health information.

Statistics generated from the SRS AXTAT+ database for 2010–11 show that there were on average 92 564 persons directly employed in Western Australia's mining industry (including 3353 people employed in mineral exploration). This represents an increase of 17 per cent compared with 2009–10 which reached 79 245 employees.

Since 2003, when Western Australia's economy began to expand, mining employment has grown on average by around seven per cent a year. This growth has largely been driven by the contracting sector of the industry which can in part be attributed to the high degree of construction activity.

In 2010–11, iron ore was the largest employing sector in the State's mining industry with 30 274 employees. Gold and bauxite–alumina followed with 18 880 and 10 908 persons respectively. Together the iron ore, gold and bauxite–alumina sectors accounted for 65 per cent of total employment in the State's mining industry in 2010–11.

Strong demand for the State's natural resources from Asia is expected to underpin employment growth in the State's mining industry in coming years. This will also lead to the creation of indirect jobs including engineers, cooks, cleaners, transport drivers and other support roles. Issues relating to skills and labour shortages will continue to present challenges for the industry in the period ahead.

Petroleum

Unlike mining statistics, petroleum employment data cannot readily be extracted from monthly safety reports. To arrive at a meaningful employment number for petroleum, the Department of Mines and Petroleum makes contact with each individual operating company in the State requesting an average number of employees and contractors working on site for the period under review.

In 2010–11, the average number of employees in Western Australia's petroleum industry reached an estimated 6858 persons, a slight decrease of three per cent compared with 2009–10.

Although the petroleum industry is characterised by massive amounts of capital expenditure, it does not require the same level of operational labour as does mining. However, employment in the State's petroleum industry is set to increase substantially due to growing energy demand from Asia which is underpinning the development of large projects for the export of LNG.

As with mining, the construction phase of these projects will generate considerable demand for workers both in the State and across the nation.

The \$14-billion Pluto LNG project transitioned to operational in March 2011 and during the construction phase employed around 4000 people and has created 300 permanent jobs. Another important project under construction is the Gorgon Gas Project on Barrow Island which is Australia's largest development project valued at \$43 billion. To date, the project has created around 4000 jobs in Western Australia and is expected to employ 300 permanent workers once operational in 2015.

3.2 INVESTMENT

Western Australia is in the midst of a major investment cycle led by the construction of large mining and petroleum projects. The current surge in investment is evident from ABS statistics which show that private new capital expenditure by the State's mining industry reached \$28.3 billion in 2010–11. This represents an increase of 29 per cent or \$6.3 billion compared to 2009–10.

Western Australia attracted the majority of total mining capital expenditure in Australia accounting for a 60 per cent share in 2010–11. Over the same period, mining investment contributed 77 per cent of all business investment in Western Australia which totalled \$36.9 billion. Underpinned by the rapidly expanding resources sector, total private new capital expenditure in Western Australia grew by almost 21 per cent in 2010–11.

In the past five years, the total value of mining industry investment in Western Australia has more than doubled, rising on average by 22.3 per cent each year. This impressive record of investment growth has been driven by the need to develop mine sites and infrastructure to service increasing global demand for natural resources, particularly from China. The State is well placed to meet this demand due to its resource endowment and proximity to Asia.

It is important to note that the figures reported above do not capture all mining investment as the ABS uses classifications specified in the 2006 edition of the Australian and New Zealand Standard Industrial Classification (ANZSIC) (ABS catalogue number 1292.0). Accordingly, mining is broadly defined as the extraction of minerals occurring naturally as solids such as coal and ores, 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.

As part of monitoring resource investment activity in Western Australia, the Department of Mines and Petroleum maintains two databases (minerals and petroleum) to track actual and possible investment in major projects. Information is collated relating to expected capital expenditure, project timing and employment during both construction and operation.

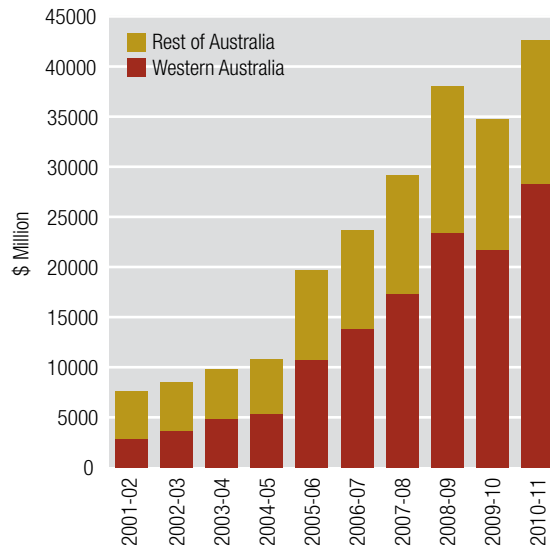


Figure 57 | Mining Investment Source: ABS

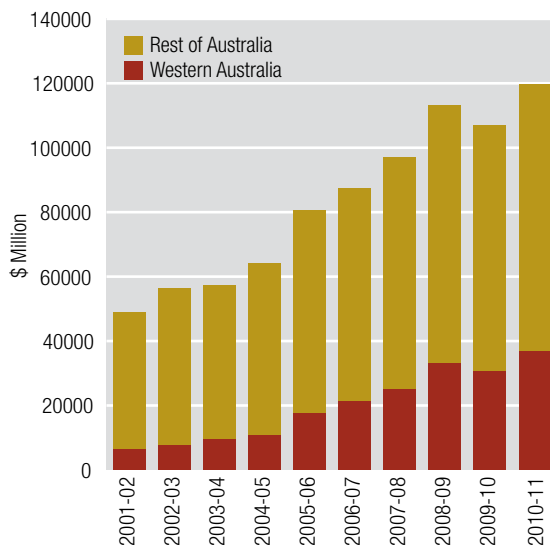


Figure 58 | New Capital Investment Source: ABS

The databases use information from various sources including ABARES Major Development Projects List, Access Economics' Investment Monitor, REPS' Major WA Projects Listing, on-line company research consultancy systems, media announcements and company websites. The combined mineral and petroleum databases currently contain approximately 130 major projects.

Projects are ranked according to understood project potential and level of advancement towards production. Mineral and petroleum projects are categorised as follows:

- Projects Under Construction are those actually under construction at the time of updating the database.
- Committed Projects have company commitment including a final investment decision (FID) but are waiting for approvals to proceed with construction.
- Planned Projects encompass 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 comprise those raising capital and not yet as advanced as those projects conducting definitive and bankable feasibility studies as well as projects on hold for various reasons.

Based on the database and information available up to 1 September 2011, a summary of total capital expenditure by commodity is provided in the table below. It should be noted that investment in a number of the projects is publicly reported in US dollar terms and the data may therefore vary over time in line with movements in the US:A\$ exchange rate.

In September 2011, Western Australia had \$138 billion worth of resource projects under construction or in the committed stage of development. A further \$169 billion has been identified for planned or possible projects in coming years. These high levels of investment expenditure will continue to drive expansion of the State's resources sector going forward.

Projects under construction are led by the \$43-billion Gorgon LNG project and iron ore developments in the Pilbara and the Mid West. Major iron ore projects include Hancock Prospecting's Roy Hill mine (\$6.7 billion), Sino Iron Project (\$6.2 billion), BHP Billiton's Rapid Growth Project 5 (\$4.9 billion), Rio Tinto's Pilbara expansion (\$3.4 billion), Gindalbie Metals Karara Magnetite Project (\$2.6 billion) and Fortescue Metals Group Solomon Hub Stage 1 Project (\$2.5 billion).

Other significant mineral projects under construction include Worsley Alumina's Alumina Refinery expansion (\$3 billion), Rio Tinto's Argyle Diamond Underground Development (\$1.6 billion) and Lynas Corporation's Mt Weld rare earths mine (\$570 million).

Projects in the committed category comprise the Oakajee Port and Rail development (\$5.9 billion), the Tropicana Gold Joint Venture (\$740 million), and the Carbon Capture and Storage Project located in Collie (\$300 million) and Chevron's \$30 billion Wheatstone LNG development.

The largest planned and possible project is the \$30 billion Browse LNG Precinct. Woodside is the operator of the Browse Joint Venture which also includes BHP Billiton, BP, Chevron and Shell. The joint venture participants are expected to make a FID decision in mid-2012.

Investment in Major Projects

(as at 1 September 2011)

| MAJOR PROJECTS Commodity | CAPEX \$Million | |
|---|-------------------------------------|----------------------|
| | Committed/ Under Construction | Planned/ Possible |
| Alumina | 3,030 | |
| Gold | 849 | 303 |
| Iron Ore | 26,582 | 37,167 |
| Nickel | 192 | 9,070 |
| Other Minerals and Commodities and Infrastructure | | |
| Sub-total | 57,509 | 76,112 |
| Crude Oil and Condensate | 1,800 | 1,833 |
| LNG | 73,000 | 87,018 |
| Gas | 5,921 | 3,002 |
| Pipelines and Infrastructure | | 1,050 |
| Sub-total | 80,721 | 92,903 |
| Total forecast investment | 138,230 | 169,015 |

3.3 ROYALTIES

Over the past ten years, royalties received by the Western Australian Government from Western Australian mineral and petroleum producers have increased 375 per cent from \$1.03 billion in 2001–02 to \$4.9 billion in 2010–11. This represents royalties paid into the Western Australian Government Consolidated Revenue Fund. It includes Western Australia’s share of royalties paid by petroleum projects, royalties collected in the Territorial Sea subsisting permit areas, Barrow Island and the North West Shelf (where the State receives approximately 65 per cent of royalties) that are shared with the Commonwealth.

Minerals and petroleum royalties now account for over 30 per cent of Western Australia’s own source revenue. Own source revenue comprises all State taxes and charges plus State royalties which includes the State’s share of North West Shelf project royalty payments.

The bulk of collections for 2010–11 (attributed directly to the State) came from iron ore (69 per cent) and petroleum (20 per cent).

A large part of the increase was the result of a historic new agreement with BHP Billiton and Rio Tinto on iron ore royalties for fines (the primary feedstock for making iron). From 1 July 2010, BHP Billiton and Rio Tinto’s royalty rates changed from 3.75 per cent to 5.625 per cent on

finer production to bring them into line with other iron ore producers. This new rate applies to all production by the companies.

In May 2011, the Western Australian State Government announced further reform of royalty rates with the removal of the iron ore fines concession rate. Royalties on fines will increase to 6.5 per cent on 1 July 2012 and 7.5 per cent on 1 July 2013 which is equivalent to the existing rate of lump ore.

While not collected by Western Australia, it is estimated that \$1.73 billion was also received by the Commonwealth in 2010–11 from petroleum resource rent tax. Approximately 52 per cent of this resource rent tax (\$900 million) could be attributed to operating fields within designated Commonwealth waters off the Western Australian coast.

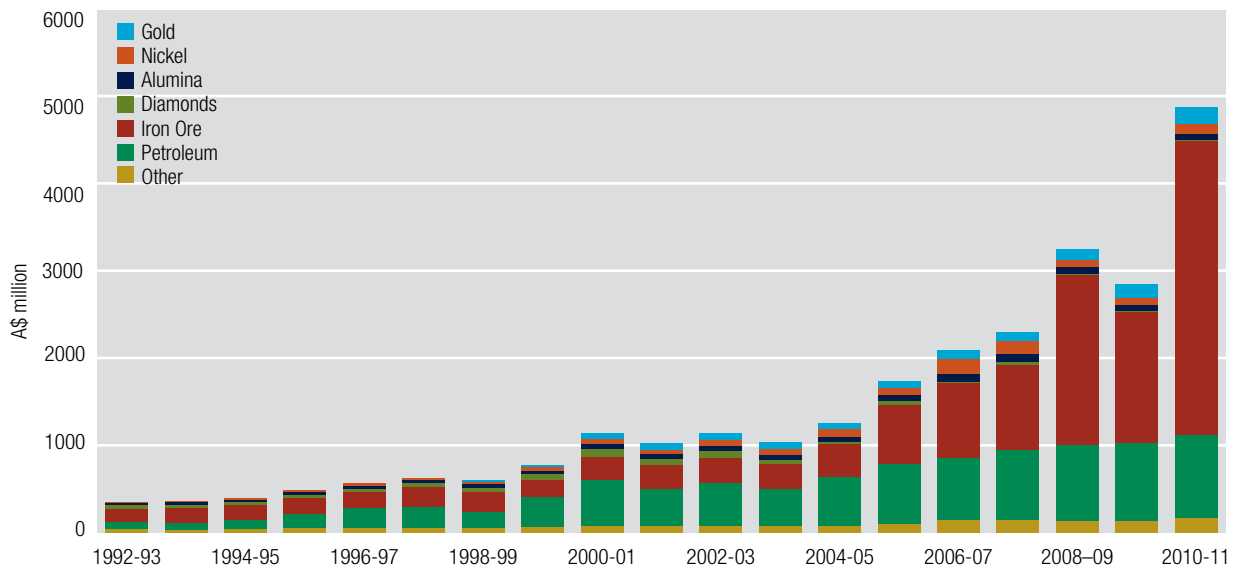


Figure 59 | Royalty Receipts by Commodity Source: DMP

TABLE 3. ROYALTY RECEIPTS 2009–10 AND 2010–11

| COMMODITY | 2009–10 | 2010–11 | 2010–11 Growth | |
|----------------------|----------------------|----------------------|----------------------|-----------|
| | Total A\$ | Total A\$ | A\$ | % |
| ALUMINA | 61,860,134 | 66,136,237 | 4,276,103 | 7 |
| DIAMONDS | 19,192,682 | 15,746,837 | -3,445,845 | (18) |
| GOLD | 152,528,649 | 197,792,516 | 45,263,867 | 30 |
| HEAVY MINERAL SANDS | 22,008,559 | 19,937,428 | -2,071,131 | (9) |
| IRON ORE | 1,495,438,193 | 3,358,628,676 | 1,863,190,483 | 125 |
| NICKEL | 83,359,668 | 112,934,304 | 29,574,636 | 35 |
| PETROLEUM | 897,025,331 | 955,228,166 | 58,202,835 | 6 |
| OTHER | 107,688,425 | 145,174,559 | 37,486,134 | 35 |
| TOTAL REVENUE | 2,839,101,641 | 4,871,578,723 | 2,032,477,082 | 72 |

Note: All Royalty Receipts above are only those paid into the State's Consolidated Revenue Fund during the period plus the State's share of North West Shelf project royalty payments. It does not include royalty receipts collected on behalf of the Commonwealth.

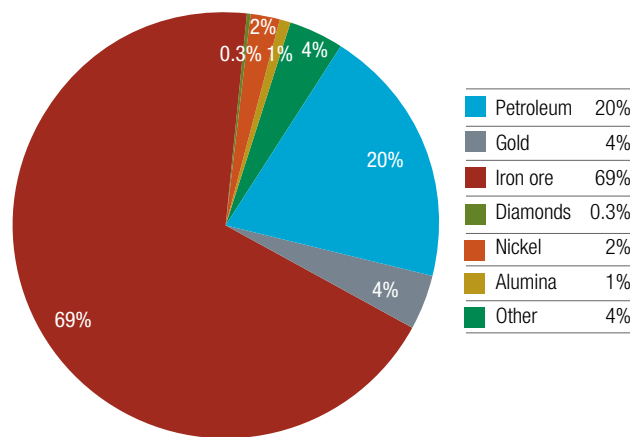


Figure 60 | **Royalty Receipts 2010–11 – \$4.9 Billion** Source: DMP

TABLE 4. QUANTITY AND VALUE OF MINERALS AND PETROLEUM

| COMMODITY | UNIT | FINANCIAL YEAR 2009-10 | | FINANCIAL YEAR 2010-11 | |
|---------------------------------------|------|------------------------|--------------------|------------------------|----------------|
| | | QUANTITY | VALUE | QUANTITY | VALUE |
| ALUMINA | t | 12,643,178 | 3,810,171,814 | 12,280,629 | 3,976,889,404 |
| BASE METALS | | | | | |
| Copper Metal | t | 149,812 (r) | 1,156,694,098 (r) | 147,797 | 1,310,227,253 |
| Lead Metal | t | 26,091 (r) | 61,587,249 (r) | 40,388 | 94,193,616 |
| Zinc Metal | t | 87,559 (r) | 210,118,736 (r) | 70,191 | 159,150,505 |
| TOTAL BASE METALS | | | 1,428,400,083 (r) | | 1,563,571,374 |
| CHROMITE | t | 59,034 (r) | n/a | 84,804 | n/a |
| CLAYS | | 58,435 | 1,187,324 | 61,484 | 1,184,395 |
| COAL | t | 6,711,998 (r) | 325,855,374 | 7,234,455 | 318,935,869 |
| CONSTRUCTION MATERIALS | | | | | |
| Aggregate | t | 3,167,934 (r) | 79,231,292 (r) | 1,887,348 | 43,476,679 |
| Gravel | t | 184,993 (r) | 1,521,930 (r) | 222,851 | 1,376,592 |
| Rock | t | 531,078 (r) | 9,160,687 (r) | 258,586 | 2,731,726 |
| Sand | t | 3,226,618 (r) | 27,573,978 (r) | 4,829,194 | 34,213,142 |
| TOTAL CONSTRUCTION MATERIALS | | | 117,487,887 (r) | | 81,798,139 |
| DIAMONDS | ct | 16,280,758 (r) | 304,332,535 (r) | 10,116,259 | 303,080,410 |
| DIMENSION STONE | | 5,371 | 339,102 (r) | 8,169 | 811,017 |
| GEM & SEMI-PRECIOUS STONES | kg | 588,070 | 463,867 (r) | 321,349 | 238,547 |
| GOLD | kg | 163,833 (r) | 6,548,806,018 (r) | 183,826 | 8,187,646,180 |
| GYPSUM | t | 877,685 | 17,980,894 | 589,540 | 11,091,331 |
| HEAVY MINERAL SANDS | | | | | |
| Garnet | t | 237,978 | n/a | 226,620 | n/a |
| Ilmenite | t | 508,584 (r) | 68,516,764 (r) | 394,096 | 52,766,190 |
| Leucoxene | t | 76,591 (r) | 24,831,503 (r) | 26,030 | 12,165,131 |
| Zircon | t | 347,753 (r) | 287,240,096 (r) | 294,997 | 200,850,834 |
| Other | t | | 315,278,457 (r) | | 202,709,142 |
| TOTAL HEAVY MINERAL SANDS | | | 695,866,820 (r) | | 468,491,297 |
| IRON ORE | t | 384,966,373 (r) | 35,325,941,441 (r) | 395,677,217 | 57,256,084,964 |
| LIMESAND-LIMESTONE-DOLOMITE | t | 4,001,994 (r) | 22,643,186 (r) | 3,731,407 | 24,131,868 |
| MANGANESE ORE | t | 730,304 (r) | 382,992,784 (r) | 816,883 | 371,458,999 |
| NICKEL INDUSTRY | | | | | |
| Cobalt | t | 4,358 (r) | 190,320,996 (r) | 3,704 | 144,847,809 |
| Nickel | t | 180,152 (r) | 4,041,293,439 (r) | 186,943 | 4,580,926,792 |
| Palladium and Platinum By-Product | kg | 1,089 (r) | 11,101,919 (r) | 440 | 7,036,097 |
| TOTAL NICKEL INDUSTRY | | | 4,242,716,354 (r) | | 4,732,810,699 |

| COMMODITY | UNIT | FINANCIAL YEAR 2009-10 | | FINANCIAL YEAR 2010-11 | |
|--|--------------------|------------------------|---------------------------|------------------------|------------------------|
| | | QUANTITY | VALUE | QUANTITY | VALUE |
| PETROLEUM | | | | | |
| Condensate | kl | 7,418,012 | 3,501,186,255 | 6,881,791 | 3,987,526,747 |
| Crude Oil | kl | 11,842,075 | 6,385,071,844 | 13,924,847 | 8,436,211,080 |
| LNG | t | 15,717,041 | 6,922,556,548 | 17,009,845 | 8,658,081,992 |
| LPG – Butane and Propane | t | 975,752 | 647,351,337 | 923,763 | 774,197,459 |
| Natural Gas | '000m ³ | 9,357,026 | 1,320,801,777 | 8,862,205 | 1,364,589,067 |
| TOTAL PETROLEUM | | | 18,776,967,761 | | 23,220,606,345 |
| SALT | t | 10,967,879 | 417,460,428 | 12,234,865 | 366,935,891 |
| SILICA-SILICA SAND | t | 442,340 | 12,402,030 | 430,363 | 13,304,556 |
| SILVER | kg | 100,942 (r) | 61,032,683 (r) | 76,993 | 65,136,970 |
| TIN-TANTALUM-LITHIUM | t | 247,542 | 74,737,442 | 346,213 | 129,840,059 |
| OTHER (Includes Feldspar, Red Oxide, Spongolite and Talc) | t | | 44,510,871 (r) | | 69,774,928 |
| TOTAL VALUE | | | 72,612,296,697 (r) | | 101,163,823,241 |

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

(r) Revised from previous edition

n/a Breakdown of chromite, feldspar, garnet, red oxide, talc, spodumene and tantalite not available.

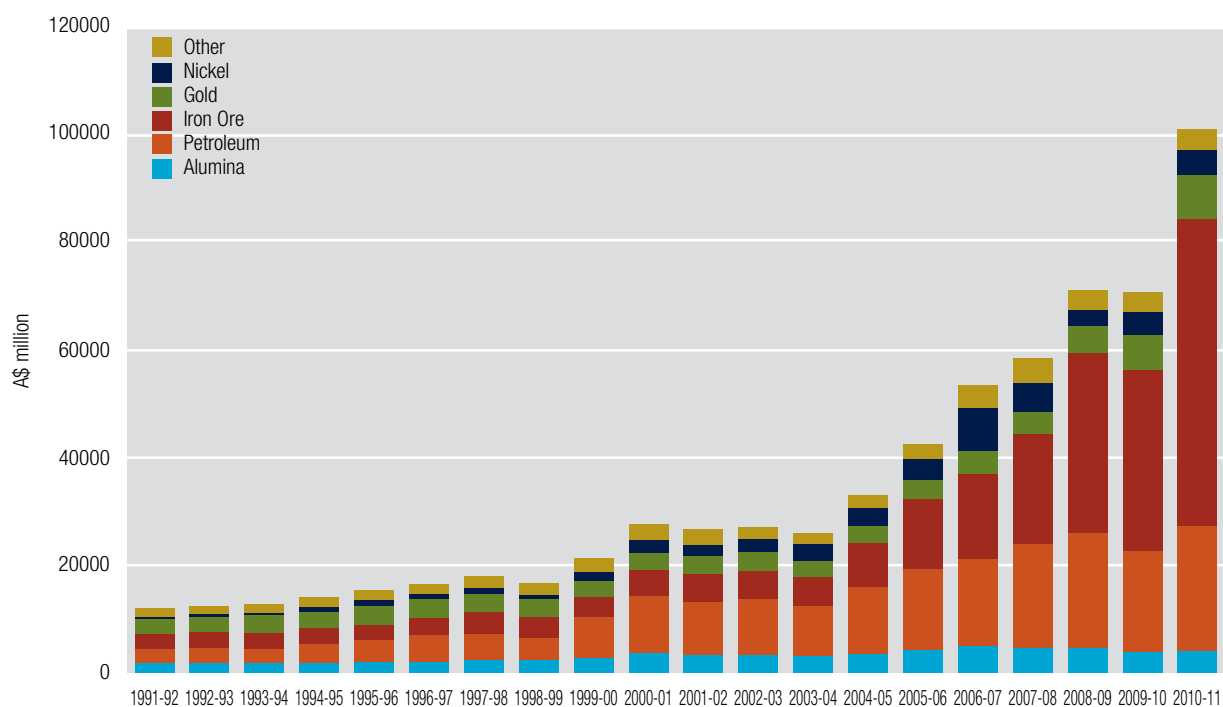


Figure 61 | Value of Minerals and Petroleum by Commodity Source: DMP

TABLE 5. QUANTITY AND VALUE OF SELECTED MAJOR COMMODITIES

| | | 2001-02 | | 2002-03 | | 2003-04 | | 2004-05 | |
|---|--------------------------|----------|------------------|----------|------------------|----------|------------------|----------|------------------|
| | Unit | Quantity | Value \$M | Quantity | Value \$M | Quantity | Value \$M | Quantity | Value \$M |
| ALUMINA | Mt | 10.86 | 3,584.38 | 11.13 | 3,204.65 | 11.17 | 3,085.11 | 11.16 | 3,461.63 |
| BASE METALS | | | | | | | | | |
| Copper Metal | kt | 53.50 | 122.57 | 59.45 | 138.78 | 53.29 | 155.82 | 61.93 | 243.73 |
| Lead Metal | kt | 75.08 | 36.72 | 70.02 | 31.85 | 29.45 | 10.57 | 2.32 | 0.31 |
| Zinc Metal | kt | 223.67 | 173.82 | 206.45 | 173.19 | 108.04 | 79.55 | 48.40 | 42.42 |
| TOTAL BASE METALS | | | 333.11 | | 343.82 | | 245.95 | | 286.46 |
| COAL | Mt | 6.16 | 258.13 | 6.32 | 272.89 | 5.98 | 274.28 | 6.28 | 271.72 |
| COBALT | kt | 4.43 | 127.36 | 4.92 | 124.18 | 4.55 | 213.14 | 4.50 | 202.38 |
| DIAMONDS | M ct | 25.69 | 489.34 | 38.89 | 773.3 | 32.50 | 519.72 | 22.80 | 467.8 |
| GOLD | t | 185.00 | 3,279.50 | 187.47 | 3,445.34 | 177.01 | 3,109.56 | 167.35 | 3,016.38 |
| HEAVY MINERAL SANDS | | | | | | | | | |
| Ilmenite | Mt | 0.80 | 128.75 | 0.96 | 136.51 | 0.76 | 91.03 | 0.71 | 79.55 |
| Rutile | kt | 122.61 | 106.74 | 113.57 | 82.53 | 138.77 | 84.57 | 101.71 | 63.02 |
| Upgraded Ilmenite (Synthetic Rutile) | kt | 585.91 | 380.21 | 597.27 | 353.10 | 592.18 | 307.00 | 652.94 | 336.37 |
| Zircon | kt | 317.77 | 218.84 | 411.15 | 255.81 | 433.14 | 251.97 | 420.04 | 298.37 |
| Other HMS | | | 19.78 | | 16.86 | | 20.53 | | 23.58 |
| TOTAL HEAVY MINERAL SANDS | | | 854.32 | | 844.81 | | 755.10 | | 800.89 |
| IRON ORE | Mt | 164.63 | 5,207.61 | 188.52 | 5,205.27 | 202.04 | 5,331.53 | 233.15 | 8,302.34 |
| MANGANESE ORE | kt | 474.27 | 68.62 | 619.65 | 75.38 | 584.97 | 81.78 | 606.94 | 116.32 |
| NICKEL | kt | 179.46 | 2,002.07 | 191.89 | 2,482.47 | 182.21 | 3,031.04 | 180.42 | 3,503.20 |
| PETROLEUM | | | | | | | | | |
| Condensate | Gl | 6.33 | 1,680.03 | 6.93 | 2,046.37 | 6.18 | 1,747.51 | 5.63 | 2,203.11 |
| Crude oil | Gl | 15.09 | 4,198.78 | 14.00 | 4,258.12 | 13.22 | 3,773.64 | 12.80 | 5,146.61 |
| LNG * | Btu 10 ¹² & t | 386.08 | 2,970.61 | 403.83 | 3,130.83 | 404.94 | 2,775.88 | 11.04 | 3,953.10 |
| LPG – Butane ** | kt | 482.20 | 193.71 | 460.47 | 221.47 | 383.92 | 154.13 | 77.17 | 421.74 |
| LPG – Propane ** | kt | 374.32 | 167.87 | 346.60 | 172.39 | 311.35 | 128.02 | | |
| Natural Gas | Gm ³ | 7.53 | 643.28 | 8.12 | 661.92 | 8.06 | 694.07 | 7.64 | 678.72 |
| TOTAL PETROLEUM | | | 9,854.28 | | 10,491.10 | | 9,273.25 | | 12,403.29 |
| SALT | Mt | 8.60 | 227.95 | 9.61 | 227.95 | 9.88 | 179.85 | 11.58 | 221.25 |
| OTHER | | | 409.47 | | 366.48 | | 316.87 | | 820.06 |
| TOTAL | | | 26,696.14 | | 27,857.66 | | 26,417.17 | | 33,405.91 |

* Expressed in million tonnes from 2004-05 onwards

** LPG Butane and Propane combined from 2004-05 onwards

| 2005-06 | | 2006-07 | | 2007-08 | | 2008-09 | | 2009-10 | | 2010-11 | |
|------------------|-----------|------------------|-----------|------------------|-----------|------------------|-----------|------------------|-----------|-------------------|-----------|
| Quantity | Value \$M | Quantity | Value \$M | Quantity | Value \$M | Quantity | Value \$M | Quantity | Value \$M | Quantity | Value \$M |
| 11.47 | 4,111.25 | 11.98 | 4,847.03 | 12.31 | 4,522.14 | 12.27 | 4,563.99 | 12.64 | 3,810.17 | 12.28 | 3,976.89 |
| 81.20 | 559.85 | 115.98 | 1,052.48 | 124.53 | 1,080.56 | 127.33 | 654.34 | 149.81 | 1,156.69 | 147.80 | 1,310.23 |
| 58.74 | 86.55 | 70.47 | 146.07 | 25.71 | 81.39 | 25.20 | 42.12 | 26.09 | 61.59 | 40.39 | 94.19 |
| 110.52 | 336.65 | 142.18 | 675.75 | 197.13 | 578.31 | 142.06 | 231.27 | 87.56 | 210.12 | 70.19 | 159.15 |
| | 983.05 | | 1,874.31 | | 1,740.27 | | 927.72 | | 1,428.40 | | 1,563.57 |
| 6.71 | 297.37 | 6.02 | 271.52 | 6.23 | 270.42 | 6.98 | 332.57 | 6.71 | 325.86 | 7.23 | 318.94 |
| 5.02 | 183.98 | 4.70 | 275.28 | 5.09 | 448.53 | 4.71 | 220.20 | 4.36 | 190.32 | 3.70 | 144.85 |
| 29.26 | 693.80 | 18.22 | 435.3 | 27.97 | 610.67 | 9.19 | 261.5 | 16.28 | 304.33 | 10.12 | 303.1 |
| 166.17 | 3,715.05 | 161.77 | 4,222.91 | 141.48 | 4,136.28 | 136.61 | 5,226.84 | 163.83 | 6,548.81 | 183.83 | 8,187.65 |
| 590.24 | 65.92 | 0.82 | 90.90 | 0.73 | 83.74 | 0.45 | 64.19 | 0.51 | 68.52 | 0.39 | 52.77 |
| n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| 402.42 | 357.34 | 323.56 | 282.18 | 262.63 | 204.76 | 255.64 | 231.44 | 347.75 | 287.24 | 295.00 | 200.85 |
| | 442.71 | | 414.98 | | 381.90 | | 414.01 | | 315.28 | | 202.71 |
| | 865.97 | | 788.06 | | 692.48 | | 728.87 | | 695.87 | | 468.49 |
| 242.63 | 12,699.09 | 257.64 | 15,732.60 | 291.00 | 21,949.80 | 316.54 | 33,633.37 | 384.97 | 35,325.94 | 395.68 | 57,256.08 |
| 888.43 | 117.97 | 902.05 | 153.32 | 373.47 | 382.75 | 417.70 | n/a | 730.30 | 382.99 | 816.88 | 371.46 |
| 183.56 | 3,815.11 | 173.66 | 8,059.38 | 172.36 | 5,141.53 | 178.39 | 2,996.72 | 180.15 | 4,041.29 | 186.94 | 4,580.93 |
| 5.63 | 2,791.73 | 5.86 | 2,970.82 | 6.19 | 3,971.79 | 12.94 | 3,108.79 | 7.42 | 3,501.19 | 6.88 | 3,987.53 |
| 11.16 | 5,935.12 | 13.99 | 7,398.31 | 12.77 | 8,697.92 | 13.96 | 7,659.58 | 11.84 | 6,385.07 | 13.92 | 8,436.21 |
| 11.68 | 4,625.22 | 12.21 | 4,481.79 | 12.15 | 5,105.96 | 866.53 | 8,524.45 | 15.72 | 6,922.56 | 17.01 | 8,658.08 |
| 871.98 | 654.42 | 898.61 | 605.08 | 818.39 | 683.35 | 866.53 | 750.83 | 975.75 | 647.35 | 923.76 | 774.20 |
| 7.71 | 703.28 | 8.71 | 919.49 | 9.16 | 1,025.20 | 8.60 | 1,232.18 | 9.36 | 1,320.80 | 8.86 | 1,364.59 |
| | 14,709.77 | | 16,375.49 | | 19,484.22 | | 21,275.82 | | 18,776.97 | | 23,220.61 |
| 10.83 | 229.85 | 10.42 | 236.15 | 10.59 | 232.93 | 10.52 | 386.25 | 10.97 | 417.46 | 12.23 | 366.94 |
| | 1,113.02 | | 866.73 | | 1,454.29 | | 698.13 | | 363.89 | | 775.81 |
| 42,841.48 | | 53,702.78 | | 60,072.89 | | 71,252.03 | | 72,612.30 | | 101,163.82 | |

TABLE 6. VALUE OF MINERALS AND PETROLEUM BY REGION BY COMMODITY

| REGION | 2010–11 VALUE |
|-----------------------|-----------------------|
| Pilbara Region | |
| Iron Ore | 54,897,498,513 |
| Gold and Silver | 983,733,303 |
| Copper | 765,111,556 |
| Manganese and Salt | 615,324,492 |
| Other | 77,144,398 |
| Total | 57,338,812,262 |

| | |
|---------------------------|-----------------------|
| Offshore Petroleum | |
| Crude Oil and Condensate | 12,400,842,560 |
| Liquefied Natural Gas | 8,658,081,992 |
| Natural Gas | 1,349,702,457 |
| LPG Butane and Propane | 774,197,459 |
| Total | 23,182,824,468 |

| | |
|------------------------------------|----------------------|
| Goldfields–Esperance Region | |
| Gold | 5,143,581,213 |
| Nickel, Platinum and Palladium | 3,186,940,657 |
| Cobalt | 126,207,594 |
| Copper and Zinc | 116,717,573 |
| Silver | 29,267,304 |
| Construction Materials | 6,168,495 |
| Gypsum and Limesand | 5,908,475 |
| Other | 2,187,872 |
| Total | 8,616,979,183 |

| | |
|-------------------------|----------------------|
| Peel Region | |
| Alumina | 3,976,889,404 |
| Gold, Silver and Copper | 1,194,224,288 |
| Total | 5,171,113,692 |

| | |
|-------------------------------|----------------------|
| Mid West Region | |
| Gold | 762,628,514 |
| Iron ore | 677,345,596 |
| Cobalt, Nickel and Talc | 531,586,041 |
| Copper, Lead and Zinc | 449,640,567 |
| Heavy Mineral Sands, Chromite | 197,956,325 |
| Crude Oil and Condensate | 21,351,611 |
| Silver | 19,368,681 |
| Natural Gas | 14,886,610 |
| Other | 4,297,109 |
| Total | 2,679,061,054 |

| REGION | 2010–11 VALUE |
|--------------------------------|----------------------|
| Wheatbelt Region | |
| Iron ore | 1,251,685,502 |
| Nickel, Copper and Salt | 718,807,209 |
| Gold and Silver | 256,416,094 |
| Gypsum and Heavy Mineral Sands | 225,165,514 |
| Other | 14,034,621 |
| Total | 2,466,108,940 |

| | |
|---------------------------|----------------------|
| Kimberley Region | |
| Iron Ore | 429,555,353 |
| Nickel, Copper and Cobalt | 221,738,890 |
| Diamonds and Crude Oil | 304,624,066 |
| Gold and Silver | 57,637,311 |
| Other | 8,445,455 |
| Total | 1,022,001,075 |

| | |
|-----------------------------|--------------------|
| South West Region | |
| Coal | 318,935,869 |
| Heavy Mineral Sands | 104,158,304 |
| Tin, Tantalum and Spodumene | 102,013,638 |
| Other | 315,447 |
| Total | 525,423,258 |

| | |
|-------------------------------|--------------------|
| Gascoyne Region | |
| Salt and Gems | 113,104,940 |
| Gypsum and Limesand–Limestone | 5,483,524 |
| Other | 109,344 |
| Total | 118,697,808 |

| | |
|---|-------------------|
| Perth Metropolitan Region | |
| Construction Materials, Silica Sand, Limesand–Limestone | 37,234,273 |

| | |
|--------------------------------------|------------------|
| Great Southern Region | |
| Spongolite, Silica Sand and Limesand | 5,567,228 |

TABLE 7. VALUE OF MINERALS AND PETROLEUM BY REGION BY LOCAL GOVERNMENT AREA

| REGION | 2010–11 VALUE |
|-----------------------------|-----------------------|
| Pilbara Region | |
| East Pilbara | 36,676,146,821 |
| Ashburton | 19,927,415,752 |
| Roebourne and Karratha | 140,011,329 |
| Port Hedland and Marble Bar | 595,238,360 |
| Total | 57,338,812,262 |

| | |
|---------------------------|-----------------------|
| Offshore Petroleum | 23,182,824,468 |
|---------------------------|-----------------------|

| | |
|------------------------------------|----------------------|
| Goldfields–Esperance Region | |
| Leonora | 2,555,051,070 |
| Coolgardie | 2,500,360,296 |
| Kalgoorlie–Boulder | 2,071,575,092 |
| Laverton | 1,257,461,261 |
| Menzies | 159,014,195 |
| Dundas | 71,595,867 |
| Esperance and Ravensthorpe | 1,921,402 |
| Total | 8,616,979,183 |

| | |
|--------------------|----------------------|
| Peel Region | |
| Waroona | 2,895,597,413 |
| Boddington | 2,275,516,279 |
| Total | 5,171,113,692 |

| | |
|--------------------------------------|----------------------|
| Mid West Region | |
| Wiluna and Three Springs | 1,174,383,213 |
| Yalgoo and Carnimah | 499,982,908 |
| Coorow and Geraldton | 12,111,623 |
| Mullewa and Mt Magnet | 377,009,172 |
| Meekatharra and Morawa | 329,141,720 |
| Irwin and Murchison | 233,878,341 |
| Northampton, Perenjori and Sandstone | 52,554,077 |
| Total | 2,679,061,054 |

| | |
|-------------------------|----------------------|
| Kimberley Region | |
| Derby–West Kimberley | 510,376,549 |
| Halls Creek | 279,376,327 |
| Wyndham–East Kimberley | 225,813,000 |
| Broome | 6,435,199 |
| Total | 1,022,001,075 |

| REGION | 2010–11 VALUE |
|-----------------------------------|----------------------|
| Wheatbelt Region | |
| Yilgarn | 1,421,856,589 |
| Dalwallinu and Kondinin | 725,571,371 |
| Dandaragan | 222,674,060 |
| Lake Grace and Westonia | 91,767,650 |
| Moora and Wyalkatchem | 2,842,430 |
| Gingin and Koorda | 1,012,294 |
| Mukinbudin, Northam, Kellerberrin | 384,546 |
| Total | 2,466,108,940 |

| | |
|--|--------------------|
| South West Region | |
| Bridgetown–Greenbushes, Capel and Collie | 444,949,876 |
| Bunbury, Dardanup and Manjimup | 80,473,382 |
| Total | 525,423,258 |

| | |
|---------------------------------------|--------------------|
| Gascoyne Region | |
| Carnarvon | 81,612,985 |
| Exmouth, Shark Bay and Upper Gascoyne | 37,084,823 |
| Total | 118,697,808 |

| | |
|----------------------------------|-------------------|
| Perth Metropolitan Region | |
| Kalamunda, Swan and Wanneroo | 24,145,278 |
| Cockburn, Kwinana and Rockingham | 13,088,995 |
| Total | 37,234,273 |

| | |
|---------------------------------|-----------|
| Great Southern Region | |
| Albany, Denmark and Plantagenet | 5,567,228 |

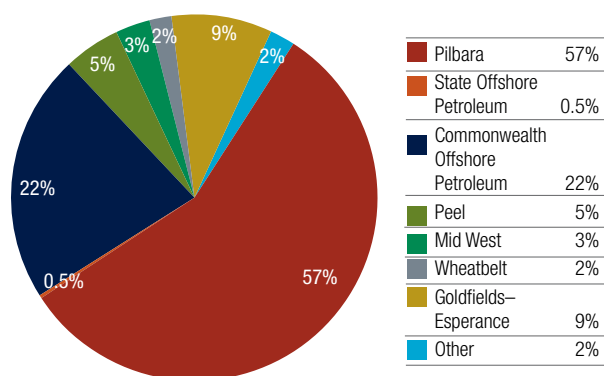


Figure 62 | **Value of Minerals and Petroleum by Region 2010–11**
Total \$101.2 Billion Source: DMP

TABLE 8. AVERAGE NUMBER OF PERSONS EMPLOYED IN THE WA MINERALS AND PETROLEUM INDUSTRIES

| MINERAL/Company | Operating Site | 2009–10 | 2010–11 |
|---------------------------------------|--------------------------------|----------------|----------------|
| BAUXITE – ALUMINA | | | |
| Australian Fused Materials Pty Ltd | Rockingham Fused Alumina Plant | 92 | 101 |
| Alcoa World Alumina Australia | Huntly | 823 | 819 |
| | Kwinana Alumina Refinery | 1,426 | 1,303 |
| | Pinjarra Refinery | 1,568 | 1,600 |
| | Wagerup Alumina Refinery | 1,053 | 1,058 |
| | Willowdale | 419 | 361 |
| Bauxite Resources Limited | Bindoon Bauxite Quarry | 22 | 0 |
| Worsley Alumina Pty Ltd | Boddington Bauxite | 413 | 495 |
| | Worsley Refinery | 3,096 | 5,171 |
| TOTAL BAUXITE – ALUMINA | | 8,912 | 10,908 |
| BASE METALS | | | |
| Birla (Nifty) Pty Ltd | Nifty | 619 | 746 |
| Jabiru Metals Ltd | Jaguar | 274 | 323 |
| Lennard Shelf Pty Ltd | Pillara | 30 | 16 |
| Magellan Metals Pty Ltd | Magellan | 148 | 201 |
| Minerals and Metals Group | Golden Grove | 828 | 950 |
| Sandfire Resources NL | DeGrussa Mine | 0 | 61 |
| Venturex Resources Limited | Whim Creek | 27 | 20 |
| TOTAL BASE METALS | | 1,926 | 2,317 |
| COAL | | | |
| Griffin Coal Mining Co. Pty Ltd | Muja Open Cut | 508 | 430 |
| Wesfarmers Premier Coal Ltd | Premier | 461 | 555 |
| TOTAL COAL | | 969 | 985 |
| DIAMONDS | | | |
| Argyle Diamond Mines Pty Ltd | Argyle Diamond Mine | 1,030 | 1,378 |
| Kimberley Diamond Company Ltd | Ellendale/Kimberley Diamonds | 302 | 305 |
| North Australian Diamonds Limited | Wangarra Laboratory | 3 | 4 |
| TOTAL DIAMONDS | | 1,335 | 1,687 |
| GOLD | | | |
| A1 Minerals Ltd | Brightstar Beta–Mikado | 31 | 48 |
| Agnew Gold Mining Company Pty Limited | Agnew–Emu | 417 | 435 |
| AngloGold Ashanti Australia Ltd | Sunrise Dam | 973 | 1,025 |
| | Tropicana Gold Mine | 0 | 6 |
| Apex Gold Pty Ltd | Wiluna Group | 429 | 300 |
| ATW Gold Corp Australia Pty Ltd | Burnakura | 33 | 0 |
| | Gullewa | 3 | 1 |
| Auzex / CCG JV | Bullabulling | 8 | 12 |
| Avoca Resources Ltd | Higginsville Gold Project | 642 | 588 |
| Barrick Gold of Australia Limited | Darlot | 396 | 487 |
| | Granny Smith | 519 | 778 |
| | Kalgoorlie West Group | 742 | 782 |

| MINERAL/Company | Operating Site | 2009–10 | 2010–11 |
|---|------------------------------|---------|---------|
| GOLD Continued | | | |
| | Lawlers | 334 | 393 |
| | Plutonic | 340 | 661 |
| Catalpa Resources Limited | Edna May Gold Project | 151 | 129 |
| Central Norseman Gold Corporation | Central Norseman Group | 266 | 307 |
| Crescent Gold Limited | Laverton Gold Project | 146 | 210 |
| Diora – HBJ Minerals Pty Ltd | South Kal Operations | 167 | 225 |
| Focus Minerals Ltd | The Mount | 4 | 25 |
| | Three Mile Hill | 145 | 174 |
| | Tindals | 97 | 116 |
| FMR Investments Pty Ltd | Greenfields Mill | 0 | 66 |
| | Gordon Sirdar Project | 0 | 58 |
| Haoma Pty Ltd | Bamboo Creek | 6 | 8 |
| Integra Mining Ltd | Randalls | 96 | 196 |
| Intrepid Mines Limited | Paulsens | 177 | 14 |
| Kalgoorlie Consolidated Gold Mines Pty Ltd | Golden Mile – Super Pit | 1,530 | 1,693 |
| Kalgoorlie Mining Company (Bullant) Pty Ltd | Bullant Mine | 0 | 14 |
| La Mancha Resources Australia Pty Ltd | Frogs Legs Group | 209 | 236 |
| | White Foil | 7 | 12 |
| Mc Verde Minerals Pty Ltd | Pithara Open Pit Mine | 0 | 4 |
| Mercator Gold Australia Pty Ltd | Meekatharra Gold Operations | 3 | 2 |
| Minjar Gold Pty Ltd | Minjar Gold Project | 45 | 19 |
| Mount Magnet Gold NL | Mt Magnet | 37 | 21 |
| Mount Magnet South NL | Kirkalocka | 0 | 6 |
| Mulgabbie Mining Pty Ltd | Burbanks / Barra Resources | 2 | 7 |
| Navigator (Bronzewing) Pty Ltd | Bronzewing | 74 | 208 |
| | Leonora | 11 | 0 |
| Newcrest Mining Ltd | Telfer | 1,738 | 1,946 |
| Newmont Boddington Gold Pty Ltd | Boddington | 2,558 | 2,495 |
| Newmont Mining Corporation | Jundee | 550 | 593 |
| Nex Metals Explorations Ltd | Orient Well | 0 | 5 |
| Norilsk Nickel Australia Pty Ltd | Bannockburn Gold Mine | 12 | 0 |
| Northern Star Resources Ltd | Paulsens | 0 | 168 |
| Northwest Resources Ltd | Blue Spec – Golden Spec Mine | 1 | 2 |
| Paddington Gold Mine Pty Ltd | Paddington Gold | 478 | 448 |
| | Binduli | 48 | 180 |
| Ramelius Milling Services Pty Ltd | Burbanks Treatment Plant | 16 | 19 |
| Ramelius Resources Ltd | Wattle Dam | 163 | 69 |
| | Hill 50 – Mt Magnet Group | 0 | 8 |
| Range River Gold Ltd | Indee Group | 4 | 7 |
| | Mt Morgans | 34 | 96 |
| Reed Resources Ltd | Sand Queen | 29 | 2 |

TABLE 8. AVERAGE NUMBER OF PERSONS EMPLOYED IN THE WA MINERALS AND PETROLEUM INDUSTRIES

| MINERAL/Company | Operating Site | 2009–10 | 2010–11 |
|---|---|----------------|----------------|
| GOLD Continued | | | |
| Regis Resources Limited | Duketon | 42 | 174 |
| Silver Lake Resources Limited | Christmas Flat | 15 | 0 |
| | Daisy–Milano | 109 | 161 |
| | Lakewood – Fintails Plant | 56 | 44 |
| Saracen Gold Mines Pty Limited | Carosue Dam | 229 | 331 |
| St Barbara Mines Ltd | Southern Cross – Marvel Loch and Hercules mines | 429 | 399 |
| | Leonora Operations – Sons of Gwalia | 454 | 511 |
| | King of the Hills Underground | 0 | 67 |
| St Ives Gold Mining Company Pty Limited | Kambalda/St Ives | 1,630 | 1,569 |
| Swan Gold Mining Ltd | Davyhurst | 5 | 3 |
| | Mt Ida Group | 5 | 4 |
| Tanami Gold NL | Coyote Group | 177 | 200 |
| The Perth Mint | Perth Mint | 112 | 87 |
| Troy Resources Ltd | Sandstone Group | 51 | 14 |
| Other | Various | 12 | 12 |
| TOTAL GOLD | | 16,997 | 18,880 |
| HEAVY MINERAL SANDS | | | |
| BHP Titanium Minerals Pty Ltd | Beenup | 3 | 3 |
| Bemax Resources Limited | Bunbury | 174 | 158 |
| Doral Mineral Sands Pty Ltd | Dardanup | 265 | 281 |
| Mintech Chemical Industries Pty Ltd | Rockingham Fused Materials | 18 | 30 |
| GMA Garnet Pty Ltd | Narngulu Garnet Plant | 30 | 30 |
| | Port Gregory | 33 | 30 |
| Iluka Resources Limited | Capel | 236 | 360 |
| | Eneabba | 202 | 35 |
| | Narngulu Synthetic Rutile Plants | 297 | 272 |
| | Gingin/Iluka | 11 | 5 |
| TiWest Pty Ltd | Chandala–Muehea | 340 | 401 |
| | Cooljarloo | 205 | 194 |
| | Bunbury Port | 15 | 13 |
| TOTAL HEAVY MINERAL SANDS | | 1,829 | 1,812 |
| IRON ORE | | | |
| Atlas Iron Ltd | Pardoo RSD Group | 94 | 83 |
| | Wodgina | 28 | 65 |
| BC Iron Limited | Nullagine | 0 | 215 |
| BHP Iron Ore Ltd | RGP4/5 Port Hedland Pace Project | 393 | 258 |
| | Boodarie HBI Plant | 42 | 58 |
| | Mining Area C | 1,341 | 1,687 |
| | Mt Newman Railway | 1,031 | 532 |
| | Mt Whaleback | 1,621 | 1,765 |
| | Nelson Point | 1,317 | 1,617 |

| MINERAL/Company | Operating Site | 2009–10 | 2010–11 |
|---|----------------------------------|---------|---------|
| IRON ORE Continued | | | |
| | Newman Joint Venture Hub | 248 | 0 |
| Calibre Engenium Joint Venture Pty Ltd | Mesa A Rail Construction | 157 | 0 |
| Citic Pacific Mining Management Pty Ltd | Cape Preston Group | 567 | 520 |
| Cliffs Natural Resources Pty Ltd | Koolyanobbing | 743 | 836 |
| Crosslands Resources Ltd | Cuddingwarra | 66 | 61 |
| | Geraldton Port Storage Facility | 55 | 55 |
| | Jack Hills | 126 | 126 |
| Fast IV (Fluor and SKM team) | Newman Switchyard | 1 | 4 |
| Ferro Metals Australia Pty Ltd | Balla Balla Group | 4 | 3 |
| Fortescue Metals Group Ltd | Anderson Point Port Facility | 239 | 380 |
| | Christmas Creek | 439 | 1,182 |
| | Cloudbreak | 2,821 | 3,316 |
| | Rail Ballast Quarry | 0 | 15 |
| Hamersley HMS Pty Ltd | Hope Downs | 1,053 | 1,390 |
| Hamersley Iron Pty Ltd | Brockman | 573 | 594 |
| | Dampier Port Operations | 1,531 | 1,685 |
| | Dampier Power Plant | 317 | 252 |
| | Hismelt Kwinana | 86 | 77 |
| | Marandoo | 392 | 383 |
| | Paraburdoo/Channar/Eastern Range | 1,290 | 1,454 |
| | Tom Price | 1,612 | 2,041 |
| | Yandicoogina | 1,020 | 1,093 |
| Henry Walker Eltin Cockatoo Pty Ltd | Cockatoo Island | 101 | 173 |
| Henry Walker Eltin Contracting Pty Ltd | Orebody 23/25 | 361 | 625 |
| | Yandi | 934 | 1,166 |
| Karara Mining Limited | Karara | 0 | 103 |
| Kimberley Metals Group Pty Ltd | Ridges Iron Ore Project | 0 | 16 |
| MacMahon Holdings Pty Ltd | Orebody 18 – Wheelarra | 428 | 459 |
| Mount Gibson Mining Limited | Extension Hill | 4 | 191 |
| | Geraldton Port Storage Facility | 21 | 24 |
| | Koolan Island | 529 | 556 |
| | Ruvidini Rail Terminal | 78 | 83 |
| | Tallering Peak | 286 | 310 |
| Ngarda Civil and Mining Pty Ltd. | Yarrie Nimingarra | 302 | 411 |
| Polaris Metals Pty Ltd | Carina Iron Ore Mine | 0 | 75 |
| Process Minerals International | Boodarie RSI | 20 | 33 |
| | Poondano | 0 | 10 |
| Rio Tinto Iron Ore Pty Ltd | Brockman 4 Operations | 188 | 827 |
| | Cape Lambert Power Station | 45 | 61 |
| | Cape Lambert Expansion | 6 | 154 |
| | Dampier Fuel Wharf | 0 | 81 |

TABLE 8. AVERAGE NUMBER OF PERSONS EMPLOYED IN THE WA MINERALS AND PETROLEUM INDUSTRIES

| MINERAL/Company | Operating Site | 2009–10 | 2010–11 |
|--|--|---------------|---------------|
| IRON ORE Continued | | | |
| Robe River Mining Co. Pty Ltd | Cape Lambert Port Operations and Power Plant | 1,159 | 1,258 |
| | Pannawonica | 655 | 667 |
| | West Angelas | 1,175 | 1,168 |
| Sinosteel Midwest Corporation Limited | Koolanooka | 15 | 76 |
| TOTAL IRON ORE | | 25,514 | 30,274 |
| MANGANESE | | | |
| Auvex Resources Limited | Ant and Sunday Hill | 2 | 1 |
| Pilbara Manganese Pty Ltd | Woodie Woodie | 707 | 782 |
| Process Minerals International | Peak Hill | 35 | 30 |
| | Nicholas Downs | 6 | 26 |
| | Woodie Woodie Tailings Treatment Plant | 30 | 28 |
| TOTAL MANGANESE | | 780 | 867 |
| NICKEL | | | |
| BHP Billiton Minerals Pty Ltd | Ravensthorpe | 16 | 0 |
| BHP Billiton (Nickel West) | Cliffs | 238 | 269 |
| | Kalgoorlie Nickel Smelter | 693 | 615 |
| | Kambalda | 190 | 189 |
| | Kwinana Refinery | 429 | 495 |
| | Leinster | 1,255 | 1,030 |
| | Mt Keith | 855 | 1,527 |
| Consolidated Nickel Pty Ltd | Beta–Hunt Nickel Group | 7 | 4 |
| First Quantum Minerals (Australia) Pty Limited | Ravensthorpe | 30 | 799 |
| Focus Minerals Ltd | Nepean | 1 | 1 |
| Fox Resources Pty Ltd | Radio Hill | 28 | 30 |
| Lake Johnston Ltd | Emily Ann | 18 | 78 |
| Lightning Nickel Pty Ltd | Long Shaft | 174 | 209 |
| Mincor Resources NL | Carnilya Hill | 51 | 41 |
| | Mincor Operations | 176 | 270 |
| | Otter Juan | 132 | 152 |
| Norilsk Nickel Avalon Pty Ltd | Avalon–Bulong Plant | 10 | 12 |
| | Black Swan | 32 | 22 |
| | Cawse | 15 | 15 |
| | Waterloo | 8 | 8 |
| Murrin Murrin Operations Pty Ltd | Murrin Murrin | 1,534 | 1,738 |
| Panoramic Resources Limited | Lanfranchi | 261 | 276 |
| | Savannah Group | 290 | 354 |
| Poseidon Nickel Ltd | Windarra Group | 1 | 13 |
| Xstrata Nickel Australasia Operations Pty Ltd | Cosmos | 280 | 307 |
| | Sinclair | 55 | 93 |
| Southern Cross Energy | Southern Cross Energy Power Group | 83 | 89 |
| Western Areas Limited | Forrestania | 404 | 532 |
| TOTAL NICKEL | | 7,266 | 9,168 |

| MINERAL/Company | Operating Site | 2009–10 | 2010–11 |
|---|--|--------------|--------------|
| PETROLEUM PRODUCTS | | | |
| Apache Energy Ltd | Harriet, John Brookes, Stag, Legendre | 198 (e) | 198 |
| | Devil Creek | 0 | 544 |
| AWE Energy Ltd | Dongara, Hovea–Eremia, Mt Horner, Woodada, Xyris | 168 (e) | 178 |
| BHP Billiton Petroleum (North West Shelf) Pty Ltd | Stybarrow, Pyrennes, Van Gogh | 54 | 70 |
| Buru Energy Limited | Blina | 3 | 56 |
| Chevron (Australia) Pty Ltd | Barrow Island, Crest, Roller–Skate, Saladin, | | |
| | Yammaderry Wheatstone and Gorgon | 1,994 | 2,506** |
| ENI Australia | Woollybutt | 150 (e) | 194 |
| Origin Energy Resources Ltd | Beharra Springs, Tarantula, Jingemina | 24 | 21 |
| Roc Oil (WA) Pty Ltd | Cliff Head | 17 | 40 |
| Santos Limited | Mutineer–Exeter and Halyard | 71 | 80 |
| Vermillion Oil and Gas Australia Pty Ltd | Wandoo | 22 | 39 |
| Woodside Energy Ltd | Athena, Cossack, Echo–Yodel, Goodwyn, Hermes, | | |
| | Laminaria East, North Rankin, Wanaea, Angel, | | |
| | Vincent, Enfield | 4,880 | 3,476* |
| TOTAL PETROLEUM PRODUCTS | | 7,581 | 7,402 |
| SALT | | | |
| Dampier Salt Ltd | Dampier | 373 | 667 |
| | Lake MacLeod | 203 | 221 |
| | Port Hedland | 170 | 168 |
| WA Salt Supply Koolyanobbing Pty Ltd | Lake Deborah | 10 | 11 |
| Onslow Solar Salt Pty Ltd | Onslow | 105 | 112 |
| Shark Bay Salt JV | Useless Loop | 119 | 115 |
| Western Salt Refinery Pty Ltd | Pink Lake | 5 | 1 |
| TOTAL SALT | | 985 | 1,295 |
| TIN, TANTALUM AND LITHIUM | | | |
| Altura Mining Ltd | Bald Hill West | 2 | 0 |
| Galaxy Resources Ltd | Mt Catlin (Spodumene) | 83 | 157 |
| Global Advanced Metals Greenbushes Pty Ltd | Greenbushes | 0 | 21 |
| | Wodgina | 0 | 98 |
| Nagrom and Co. | Kelmscott | 46 | 69 |
| Talison Minerals Pty Ltd | Greenbushes | 170 | 187 |
| | Wodgina | 38 | 23 |
| TOTAL TIN, TANTALUM AND LITHIUM | | 339 | 555 |
| OTHER COMMODITIES | | | |
| TOTAL CHROMITE | | 42 | 111 |
| TOTAL CLAYS | | 97 | 104 |
| TOTAL CONSTRUCTION MATERIALS | | 578 | 692 |
| TOTAL DIMENSION STONE | | 114 | 137 |
| TOTAL GYPSUM | | 15 | 30 |
| TOTAL INDUSTRIAL PEGMATITE MINERALS | | 23 | 24 |

| TABLE 8. AVERAGE NUMBER OF PERSONS EMPLOYED IN THE WA MINERALS AND PETROLEUM INDUSTRIES | | | |
|--|-----------------------|----------------|----------------|
| MINERAL/Company | Operating Site | 2009–10 | 2010–11 |
| TOTAL LIMESTONE–LIMESAND | | 135 | 176 |
| TOTAL MINERAL EXPLORATION | | 2,806 | 3,353 |
| TOTAL PHOSPHATE | | 144 | 159 |
| TOTAL RARE EARTHS | | 10 | 109 |
| TOTAL SILICA – SILICA SAND | | 200 | 450 |
| TOTAL SILVER | | 5 | 9 |
| TOTAL TALC | | 79 | 64 |
| TOTAL TUNGSTEN AND MOLYBDENUM | | 19 | 83 |
| TOTAL VANADIUM | | 19 | 111 |
| TOTAL VARIOUS PORTS | | 511 | 798 |
| ALL OTHER MATERIALS | | 15 | 4 |
| TOTAL | | 79,245 | 92,564 |

SOURCE: SRS AXAT+ Reporting System, Resources Safety Division, Department of Mines and Petroleum, for minerals data and petroleum-producing companies for petroleum data. Figures are as provided by the various operating companies and include employees as well as contractors.

* Does not include third party contractors

** Includes operational personnel as well as Gorgon and Wheatstone development personnel (both site and Perth-based, direct and contract).
(e) estimated by DMP

TABLE 9. PRINCIPAL MINERAL AND PETROLEUM PRODUCERS (EFFECTIVE 1 JULY 2011)

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/
aboutusoverview.asp](http://www.adityabirlaminerals.com.au/aboutusoverview.asp)

BHP Billiton (Nickel West)

191 Great Eastern Highway,
Belmont WA 6104,
(08) 6272 3000,
Kambalda.
www.bhpbilliton.com

Minmetals Australia Pty Ltd

Level 8,
564 St Kilda Road,
Melbourne Vic 3004,
(03) 9520 6800,
Golden Grove.
www.minmetals.com/index.jsp

Jabiru Metals Limited

Ground Floor,
1205 Hay Street,
West Perth WA 6005,
(08) 9426 8300,
Jaguar.
www.jabirumetals.com.au

Newcrest Mining Ltd

193 Great Eastern Highway,
Belmont WA 6104,
(08) 9270 7070,
Telfer.
www.newcrest.com.au

Newmont Boddington Gold Pty Ltd

Post Office Box 48,
Boddington WA 6390
(08) 9883 3400,
Boddington.
www.newmont.com

BAUXITE–ALUMINA

Alumina

Alcoa of Australia Limited

181–205 Davy Street,
Booragoon WA 6154,
(08) 9316 5111,
Del Park, Willowdale, Huntly.
www.alcoa.com.au

Worsley Alumina Pty Ltd

PO Box 344,
Collie WA 6225,
(08) 9734 8311,
Boddington.
www.wapl.com.au

CHROMITE

Consolidated Minerals

Level 1, 28 Ventnor Avenue,
West Perth WA 6005,
(08) 9460 7000,
Coobina.
www.consminerals.com.au

CLAY

Attapulgitte

Hudson Resources Ltd

2 Kemp Street, Narngulu,
Geraldton WA 6530,
(08) 9923 3604,
Lake Nerramayne.
www.hudsonresources.com

Clay Shale

Wesfarmers Premier Coal Ltd

Premier Road,
Collie WA 6225,
(08) 9780 2222,
Collie.
www.wesfarmers.com.au

Saponite

Watheroo Minerals Pty Ltd

PO Box 353,
Dunsborough WA 6281,
(08) 9756 6121,
Watheroo Clays.
www.bentoniteproductswa.com.au

COAL

The Griffin Coal Mining Company Pty Limited

Level 15, 28 The Esplanade,
Perth WA 6000,
(08) 9261 2800,
Collie.
www.griffincoal.com.au

Wesfarmers Premier Coal Ltd

Premier Road,
Collie WA 6225,
(08) 9780 2222,
Collie.
www.wesfarmers.com.au

CONSTRUCTION MATERIALS

Aggregate

Holcim (Australia) Pty Ltd

Technology Park,
18–20 Brodie–Hall Drive,
Bentley WA 6102,
(08) 9212 2000,
Burrup–Dampier, Newman,
Turner River.
www.holcim.com.au

Gravel

WA Limestone Co.

41 Spearwood Avenue,
Bibra Lake WA 6163,
(08) 9434 2299,
Pickering Brook.
www.walimestone.com

Sand

Boral Resources (WA) Ltd

63–69 Abernethy Road,
Belmont WA 6104,
(08) 9333 3400,
Gnangara, Gosmont.
www.boral.com.au

Rocla Quarry Products

130 Fauntleroy Avenue,
Redcliffe WA 6104,
(08) 9475 2500,
Various sites.
www.rocla.com.au

TABLE 9. PRINCIPAL MINERAL AND PETROLEUM PRODUCERS (EFFECTIVE 1 JULY 2011) Continued

Holcim (Australia) Pty Ltd

Technology Park,
18–20 Brodie–Hall Drive,
Bentley WA 6102,
(08) 9212 2000,
Various sites.
www.holcim.com.au

Tuma Holdings Pty Ltd

T/as Action Sand Supplies
42 Noel Road,
Gooseberry Hill WA 6076,
(08) 9275 1100,
Mobile: 0408 923 801,
Chidlow.

DIAMONDS

Argyle Diamonds Australia

2 Kings Park Road,
West Perth WA 6005,
(08) 9482 1166,
Argyle.
www.argylediamonds.com.au

Kimberley Diamond Company

Level 3, 52 Kings Park Road,
West Perth WA 6005,
(08) 9426 9888,
Ellendale.
www.gemdiamonds.com

DIMENSION STONE

Granite

Fraser Range Granite NL

Eyre Highway,
Norseman WA 6443,
(08) 9039 3442,
Fraser Range Granite.

FELDSPAR

Sibelco Australia Limited

26 Tomlinson Road,
Welshpool WA 6106,
(08) 9362 1411,
Mukinbudin.
www.sibelco.com.au

GOLD

A1 Minerals Limited

Suite 34, 25 Walters Drive,
Osborne Park WA 6017,
(08) 9244 1400,
Brightstar.
www.a1minerals.com.au

Agnew Gold Mining Co Pty Ltd

PMB 10,
Leinster WA 6437,
(08) 9088 3822,
Agnew.
www.goldfields.co.za

AngloGold Australia Ltd

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

Apex Minerals NL

Level 1, 10 Ord Street,
West Perth WA 6005,
(08) 6311 5555,
Wiluna.
www.apexminerals.com.au

Alacer Gold Corp

Level 3, 18 Parliament Place,
West Perth WA 6005,
(08) 9226 0625,
Higginsville, South Kal Mines.
www.avocaresources.com.au

Barrick Gold of Australia Limited

Level 10, 2 Mill Street,
Perth WA 6000,
(08) 9212 5777,
Darlot, Lawlers, Plutonic, Granny
Smith, Kanowna Belle,
East Kundana, Kalgoorlie.
www.barrick.com

Catalpa Resources Ltd

Level 1, 9 Havelock Street,
West Perth WA 6005,
(08) 9216 9700,
Edna May.
www.catalparesources.com.au

Crescent Gold Limited

Level 2, 40 Subiaco Square,
Subiaco WA 6008,
(08) 6380 7100,
Laverton.
www.crescentgold.com

Focus Minerals Limited

Level 10, Exchange House,
68 St Georges Terrace,
Perth WA 6000,
(08) 9215 7888,
Coolgardie–Redemption.
www.focusminerals.com.au

Integra Mining Limited

168 Stirling Highway,
Nedlands WA 6009,
(08) 9423 5920,
Aldiss–Randalls.
www.integramining.com.au

**Kalgoorlie Consolidated Gold
Mines Pty Ltd**

Private Mail Bag 27,
Kalgoorlie WA 6433,
(08) 9022 1100,
Golden Mile Fimiston Super Pit.
www.superpit.com.au

La Mancha Resources Inc.

Level 1, 12 St Georges Terrace,
Perth WA 6000,
(08) 9268 4000,
Mungari East, Frogs Leg, White Foil.
www.lamancha.ca

Navigator Resources Limited

45 Richardson Street,
West Perth WA 6005,
(08) 9226 5311,
Bronzewing,
www.navigatorresources.com.au

Newcrest Mining Ltd

193 Great Eastern Highway,
Belmont WA 6104,
(08) 9270 7070,
Telfer.
www.newcrest.com.au

Newmont Mining Corporation

Level 1, 388 Hay Street,
Subiaco WA 6008,
(08) 9423 6100,
Boddington, Jundee, Kalgoorlie.
www.newmont.com

Norseman Gold Plc

Suite 1D, 21 Teddington Road,
Burswood WA 6100,
(08) 9473 2222,
Norseman.
www.norsemangoldplc.com

Northern Star Resources

Level 1, 24 Mumford Place,
Balcatta WA 6021,
(08) 6241 1888,
Paulsens.
www.nsr ltd.com

Paddington Gold Pty Ltd

Menzies Highway,
PO Box 1653,
Kalgoorlie WA 6430,
(08) 9080 6800,
Paddington, Navajo-Chief.
www.nortongoldfields.com.au

Ramelius Resources Limited

Level 1, 130 Royal Street,
East Perth WA 6004,
(08) 9202 1127,
Wattle Dam.
www.rameliusresources.com.au

Regis Resources Limited

Level 1, 1 Alvan Street,
Subiaco WA 6008,
(08) 9442 2290,
Moolart Well–Duketon.
www.regisresources.com

Saracen Mineral Holdings Limited

Level 5, 89 St Georges Terrace,
Perth WA 6000,
(08) 9212 4100,
Porphyry.
www.saracen.com.au

Silver Lake Resources Limited,

31 Malcolm Street,
West Perth WA 6005,
(08) 6313 3800,
Mt Monger–Silver Lake.
www.silverlakeresources.com.au

St Barbara Limited,

1205 Hay Street,
West Perth WA 6005,
(08) 9476 5555,
Marvel Loch–Southern Cross,
King of the Hills, Sons of Gwalia.
www.stbarbara.com.au

St Ives Gold Mining Co Pty Ltd,

PO Box 359,
Kambalda WA 6442,
(08) 9088 1111,
Kambalda–St Ives.
www.goldfields.co.za

Tanami Gold NL,

Level 4, 50 Colin Street,
West Perth WA 6005,
(08) 9212 5999,
Tanami Coyote.
www.tanami.com.au

GYP SUM**Dampier Salt Pty Ltd**

37 Belmont Avenue,
Belmont WA 6104,
(08) 9270 9270,
Lake MacLeod.
www.dampiersalt.com.au

Gypsum Industries

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

Lake Hillman Mining Pty Ltd

PO Box 1,
Kalannie WA 6468,
(08) 9666 2045,
Lake Hillman.

Wandhill Gypsum

PO Box 46,
Gibson WA 6448,
(08) 9075 3031,
Scaddan.

Whitfield Minerals Pty Ltd

PO Box 1363,
Mandurah WA 6210,
(08) 9535 9299,
Lake Cowan.

HEAVY MINERAL SANDS**Garnet Sand****GMA Garnet Pty Ltd**

Level 18 Exchange Plaza,
2 The Esplanade
Perth WA 6000,
(08) 9287 3200,
Port Gregory.
www.garnetsales.com

Ilmenite, Leucoxene, Rutile and Zircon**Bemax Resources Limited**

Koombana Drive, North Shore,
Bunbury WA 6230,
(08) 9721 0200,
Ludlow, Gwindinup Mine.
www.bemax.com.au

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

TiWest Pty Ltd

Technology Park,
1 Brodie–Hall Drive,
Bentley WA 6102,
(08) 9365 1333,
Cooljarloo.
www.tiwest.com.au

TABLE 9. PRINCIPAL MINERAL AND PETROLEUM PRODUCERS (EFFECTIVE 1 JULY 2011) Continued

IRON ORE

Atlas Iron Ltd

Level 9, Alluvion,
58 Mounts Bay Road,
West Perth WA 6005.
(08) 9476 7900,
Pardoo, Wodgina.
www.atlasiron.com.au

BC Iron Limited

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

BHP Billiton Iron Ore Ltd

225 St Georges Terrace,
Perth WA 6000,
(08) 6224 4444,
Jumblebar, Newman, Yandicoogina.
www.bhpbilliton.com

**BHP Billiton Iron Ore
(Goldsworthy) Ltd**

225 St Georges Terrace,
Perth WA 6000,
(08) 6224 4444,
Mining Area C.
www.bhpbilliton.com

Channar Mining Pty Ltd

152 St Georges Terrace,
Perth WA 6000,
(08) 9327 2327,
Channar.

Cliffs Natural Resources Pty Ltd

Level 12, 1 William Street,
Perth WA 6000,
(08) 9426 3333,
Cockatoo Island, Koolyanobbing.
www.cliffsnaturalresources.com

Fortescue Metals Limited

Level 2, 87 Adelaide Terrace,
East Perth WA 6004,
(08) 6218 8888,
Cloud Break, Christmas Creek.
www.fmgl.com.au

Gindalbie Metals Ltd

Level 9, London House,
216 St Georges Terrace,
Perth WA 6000,
(08) 9480 8700,
Karara–Blue Hills.
www.gindalbie.com.au

Hamersley Iron Pty Ltd

152 St Georges Terrace,
Perth WA 6000,
(08) 9327 2327,
Brockman, Namuldi, Mesa J,
Channar, Eastern Range, Hope
Downs, Marandoo, Paraburdoo, Tom
Price, West Angelas, Yandicoogina.
www.hamersleyiron.com

**Hope Downs Management
Services Pty Ltd**

152 St Georges Terrace,
Perth WA 6000,
(08) 9327 7000,
Hope Downs.

**Sinosteel Midwest Corporation
Limited**

7 Rheola Street,
West Perth WA 6005,
(08) 9429 4888,
Koolanooka.
www.smcl.com.au

Moly Mines Limited

46–50 Kings Park Road,
West Perth WA 6005,
(08) 9429 3300,
Spinifex Ridge.
www.molymines.com

Mt Gibson Iron Limited

1st Floor,
7 Havelock Street,
West Perth WA 6005,
(08) 9426 7500,
Tallering Peak, Koolan Island.
www.mtgibsoniron.com.au

Murchison Metals Ltd

Level 1, 5 Ord Street,
West Perth WA 6005,
(08) 9492 2600,
Jack Hills.
www.mml.net.au

Robe River Iron Associates

Level 22, Central Park,
152–158 St Georges Terrace,
Perth WA 6000,
(08) 9327 2000,
Pannawonica, West Angelas.
www.riotinto.com

LIMESAND–LIMESTONE

Cockburn Cement Ltd

Lot 242, Russell Road,
Munster WA 6163,
(08) 9411 1000,
Cockburn, Denison, Ledge Point,
Wanneroo.
www.cockburncement.com.au

Gypsum Industries of Australia

Suite 1, 110 Robinson Avenue,
Belmont WA 6104,
1800 644 951,
Cervantes, Dongara–Denison,
Lancelin, Jurien.
www.aglime.com.au/

**Limestone Resources Australia
Pty Ltd**

25–29 Frobisher Street,
Osborne Park WA 6017,
(08) 9340 0022,
Wanneroo, Moore River, Carabooda.
www.limestone-resources.com.au

WA Limestone Co.

41 Spearwood Avenue,
Bibra Lake WA 6163,
(08) 9434 2299,
Various sites throughout State.
www.walimestone.com/

MANGANESE

Pilbara Manganese Pty Ltd

Lot 2524 North West Coastal
Highway,
South Hedland WA 6722,
(08) 9172 0900,
Woodie Woodie.
www.consminerals.com.au

Process Minerals International Pty Ltd

1 Sleat Road,
Applecross WA 6153,
(08) 9329 3800,
Woodie Woodie.
www.processminerals.com.au

NICKEL

BHP Billiton (Nickel West)

191 Great Eastern Highway,
Belmont WA 6104,
(08) 6272 3000,
Kambalda, Leinster, Mt Keith,
Kalgoorlie, Kwinana.
www.bhpbilliton.com

Independence Group NL

Suite 1, 183 Great Eastern Highway,
Belmont WA 6104,
(08) 9479 1777,
Long Nickel.
www.independencgroup.com.au

Minara Resources Limited

Level 4, 30 The Esplanade,
Perth WA 6805,
(08) 9226 1099,
Murrin Murrin.
www.minara.com.au

Mincor Resources NL

Level 1, 56 Ord Street,
West Perth WA 6005,
(08) 9476 7200,
Carnilya Hill, Mariners,
Miitel, Otter Juan.
www.mincor.com.au

Panoramic Resources Ltd

Level 9, 553 Hay Street,
Perth WA 6000,
(08) 9225 0999,
Savannah, Lanfranchi Tramways.
www.panoramicresources.com

Western Areas NL

Level 1, 11 Ventnor Avenue,
West Perth WA 6005,
(08) 9334 7777,
Forrestania, Flying Fox,
Spotted Quoll.
www.westernareas.com.au

Xstrata Nickel Australasia

Level 3, 24 Outram Street,
West Perth WA 6005,
(08) 9213 1588,
Cosmos.
www.xstrata.com

PALLADIUM

BHP Billiton (Nickel West)

191 Great Eastern Highway,
Belmont WA 6104,
(08) 9479 0500,
Kambalda.
www.bhpbilliton.com

PETROLEUM

Apache Energy Ltd

Level 9, 100 St Georges Terrace,
Perth WA 6000,
(08) 6218 7100,
Albert, Artreus, Bambra,
Double Island, Gipsy, Gudrun,
Harriet, Hoover, Lee, Legendre,
John Brookes, Linda, Little Sandy,
Mohave, North Alkimos, Pedirka,
Rose, Simpson, Sinbad, South
Plato, Van Gogh, Victoria, West
Cycad, Wonnich.
www.apachecorp.com

AWE Ltd

Level 16, 40 Mount Street,
North Sydney NSW 2060,
(02) 8912 8000,
Apium, Corbyas, Hovea–Eremlia,
Mt Horner, Dongara, Woodada,
Xyris, Yardarino.
www.awexp.com.au/irm/content/home.html

Buru Energy Limited

Level 2, 97 William Street,
Perth WA 6000,
Freecall: 1800 337 330,
Blina, Lloyd.
www.buruenergy.com.au

BHP Billiton Petroleum (North West Shelf) Pty Ltd

Level 42, Central Park,
152–158 St Georges Terrace,
Perth WA 6000,
(08) 9338 4888,
Chinook–Scindian, Crosby,
Eskdale, Macedon, Pyrenees,
Ravensworth, Stickle, Stybarrow.
www.bhpbilliton.com

Chevron Australia Pty Ltd

Level 24, QV1 Building,
250 St Georges Terrace,
Perth WA 6000,
(08) 9216 4000,
Barrow Island, Cowle, Crest,
Roller–Skate, Saladin, Yammaderry.
www.chevron.com

ENI Australia Limited

Level 3, 40 Kings Park Road,
West Perth WA 6005,
(08) 9320 1111,
Blacktip, Woollybutt.

Origin Energy Resources Ltd

34 Colin Street,
West Perth WA 6005,
(08) 9324 6111,
Beharra Springs, Jingemlia,
Taranrula.
www.originenergy.com.au

Roc Oil Company Limited

Level 2, 201 Adelaide Tce,
East Perth WA 6004,
(08) 9219 7111,
Cliff Head.
www.rocoil.com.au

Santos Limited

Level 1, 40 The Esplanade,
Perth WA 6000,
(08) 9333 9500,
Mutineer–Exeter.
www.santos.com.au

TABLE 9. PRINCIPAL MINERAL AND PETROLEUM PRODUCERS (EFFECTIVE 1 JULY 2011) Continued

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,
Angel, Athena, Cossack,
Echo–Yodel, Goodwyn, Hermes,
Laminaria East, North Rankin,
Wanaea, Vincent, Enfield.
www.woodside.com.au

PLATINUM

BHP Billiton (Nickel West)

191 Great Eastern Highway,
Belmont WA 6104,
(08) 6272 3000,
Kambalda.
www.bhpbilliton.com

SALT

Dampier Salt Pty Ltd

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

Onslow Salt Pty Ltd

Level 16, 2 The Esplanade,
Perth WA 6000,
(08) 9265 8000,
Onslow Salt.

Shark Bay Salt Joint Venture

Level 16, 2 The Esplanade,
Perth WA 6000,
(08) 9265 8000,
Useless Loop.

WA Salt Supply Ltd

Cockburn Road,
Hamilton Hill 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,
Dalaroo, Kemerton.
www.simcoa.com.au

Silica Sand

Austsand Pty Ltd

570 Mindijup Road,
Manypeaks WA 6328,
(08) 9846 1222,
Mindijup.

Kemerton Silica Sand Pty Ltd

Suite 5, 363–367 Albany Highway
Victoria Park WA 6100,
(08) 9355 0266,
www.ksspl.com.au.

Rocla Quarry Products

3 Casella Place,
Kewdale WA 6105,
(08) 9353 9800,
Gnangara.
www.rocla.com.au

SPONGOLITE

Opalbase Nominees Pty Ltd

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

TALC

Luzenac Australia Pty Ltd

Perenjori Road,
Three Springs WA 6519,
(08) 9954 3000,
Three Springs.
www.luzenac.com

Sibelco Australia and New Zealand

26 Tomlinson Road,
Welshpool WA 6106,
(08) 9362 1411,
Mt Seabrook.
www.unimin.com.au

TIN–TANTALUM–LITHIUM

Spodumene

Galaxy Resources Ltd

Level 2, 16 Ord Street,
West Perth WA 6005,
(08) 9215 1700,
Mt Cattlin.
www.galaxyresources.com.au

Talison Minerals Ltd

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

Tantalum

Global Advanced Metals Pty Ltd

Ground Floor,
76 Kings Park Road,
West Perth WA 6005,
(08) 6217 2500,
Greenbushes, Wodgina.
www.globaladvancedmetals.com

Tin

Talison Minerals Ltd

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

ABBREVIATIONS

| | | | |
|-----------------|--|------|---|
| A\$ | Australian dollar | kt | thousand tonnes |
| ABARES | Australian Bureau of Agricultural and Resource Economics and Science | LME | London Metal Exchange |
| | | Mboe | Millions of barrels of oil equivalent |
| ABS | Australian Bureau of Statistics | Mtoe | Million tonnes of oil equivalent |
| bbbl | barrels of oil | Mct | million carats |
| Bcm | billion cubic metres | Moz | million ounces |
| Btu | British Thermal Units | Mt | million tonnes |
| ct | carat | oz | ounce |
| GDP | Gross Domestic Product | OPEC | Organization of Petroleum Exporting Countries |
| Gm ³ | billion cubic metres | RBA | Reserve Bank of Australia |
| ha | hectares | t/a | tonnes per annum |
| km | kilometres | Tcf | trillion cubic feet |
| km ² | square kilometres | US\$ | United States dollar |

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 (bbl) |
| | 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 (1 tonne LPG-butane = 1,720 litres) | | |
| LPG-propane | 25.4 MJ/L (1 tonne LPG-propane = 1,960 litres) | | |

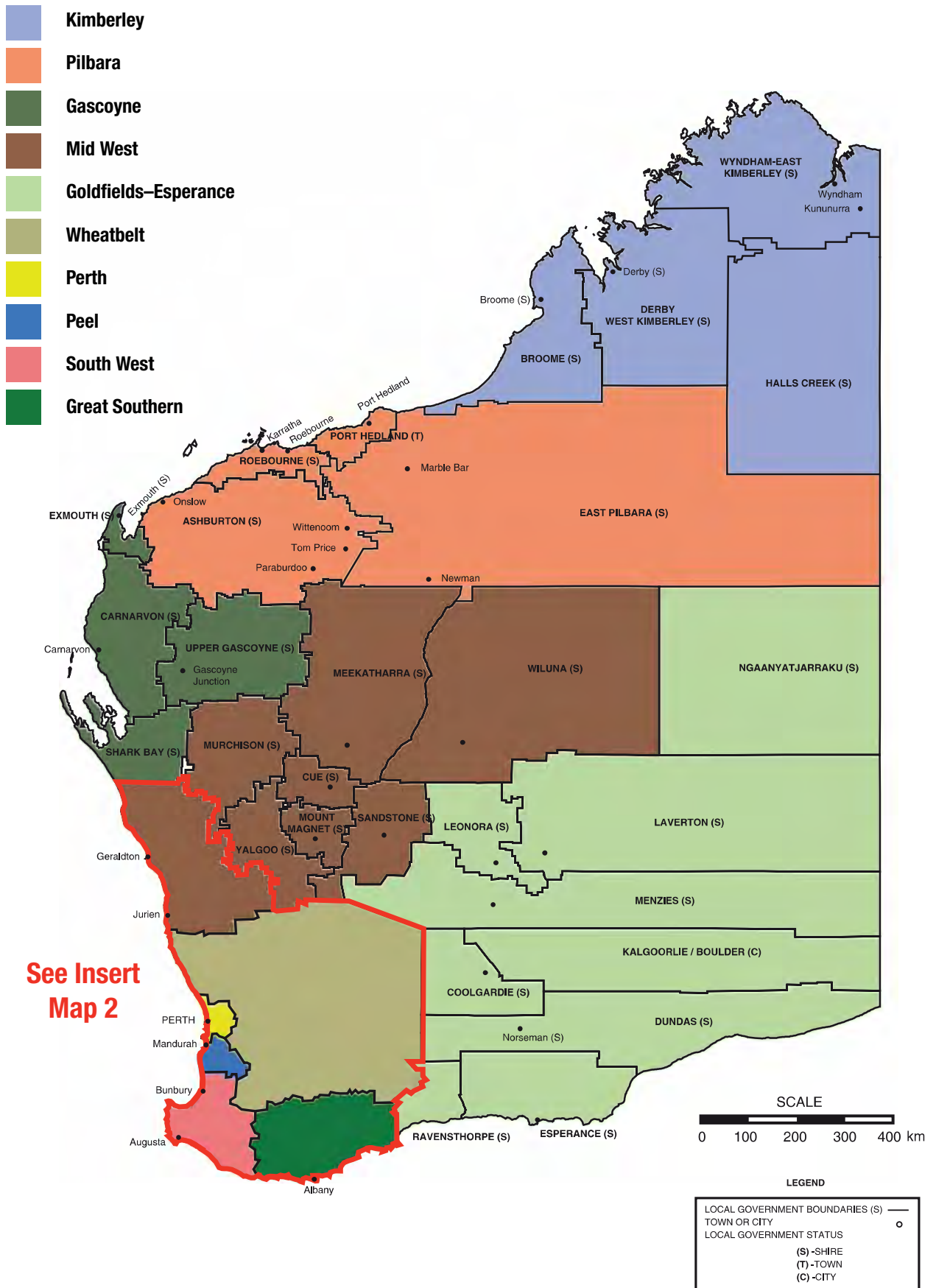
DATA SOURCES

Quantities and values for minerals and petroleum in this publication are collected from a variety of sources including:

The Department's royalty returns, various company annual reports and quarterly Australian Stock Exchange reports, State port authority statistics, the ABS and ABARES.

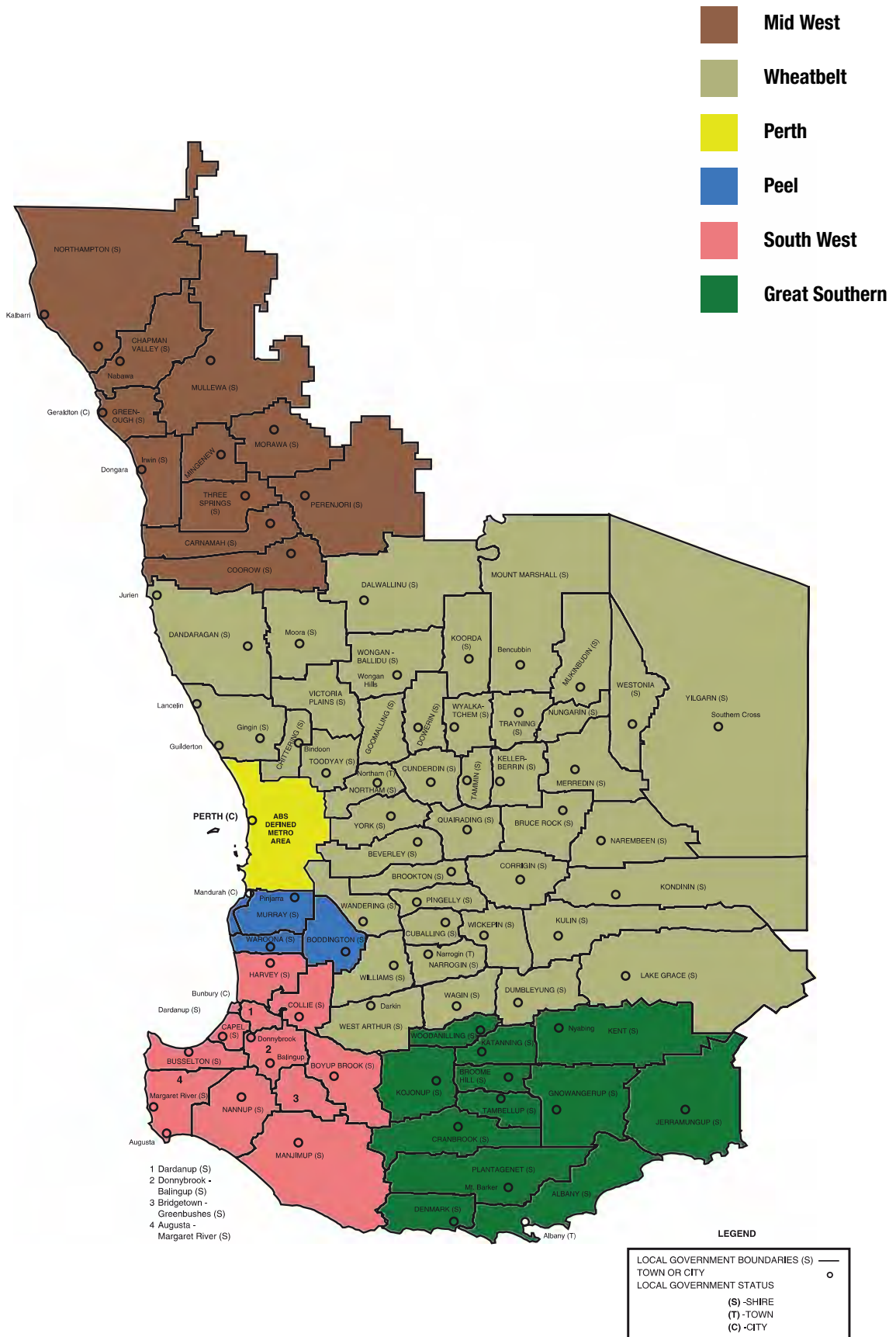
Quantities specified relate to either mine production or sales as listed below for each commodity.

| |
|--|
| 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 |
| Heavy Mineral Sands |
| Industrial Pegmatite Minerals |
| Iron Ore |
| Manganese |
| Nickel Industry (Nickel, Cobalt, Platinum and Palladium) |
| Petroleum |
| Pigments |
| Salt |
| Silver |
| Spongolite |
| Tin–Tantalum–Lithium |



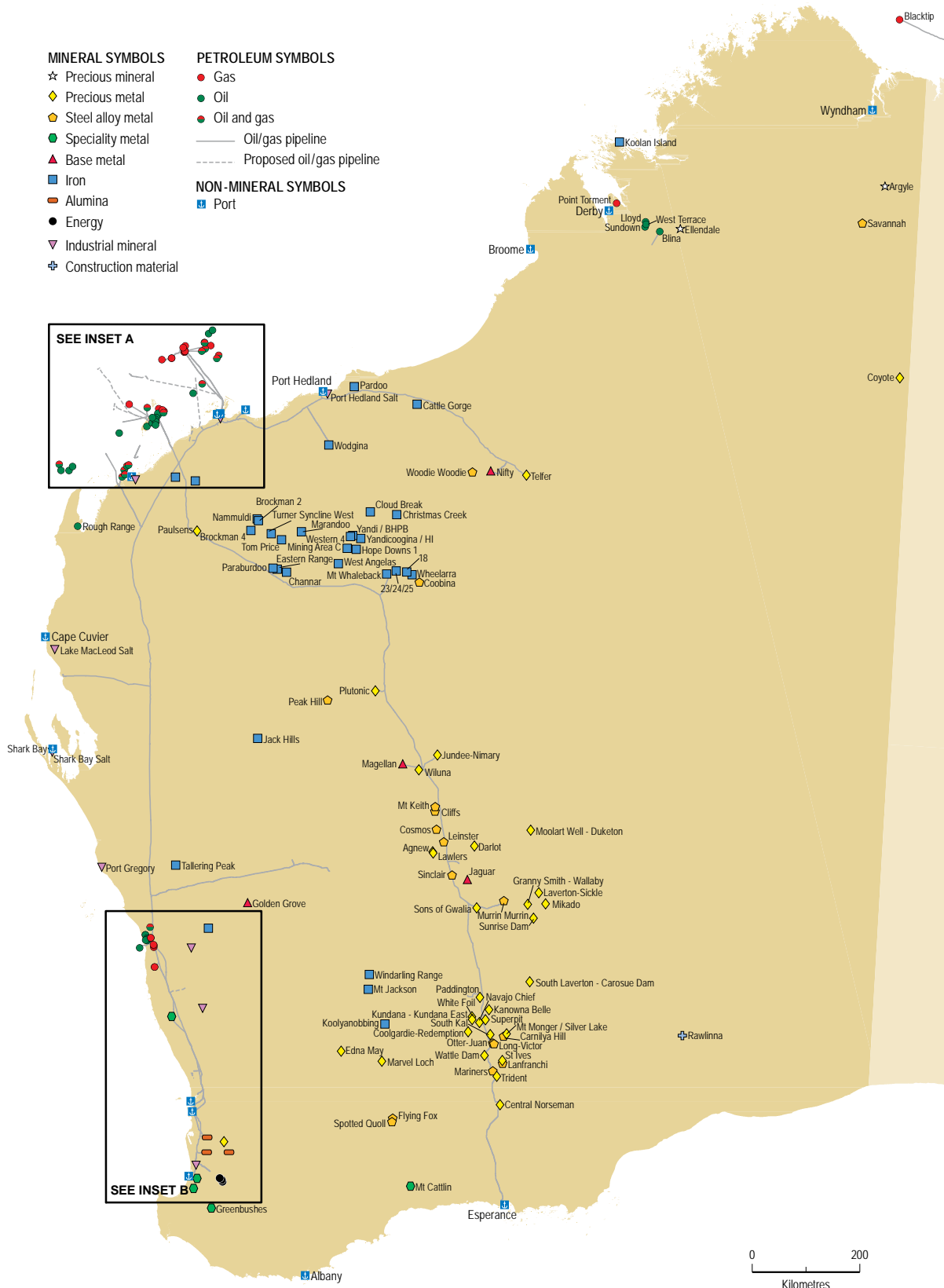
See Insert
Map 2

Map 4. Local Government and Regional Boundaries



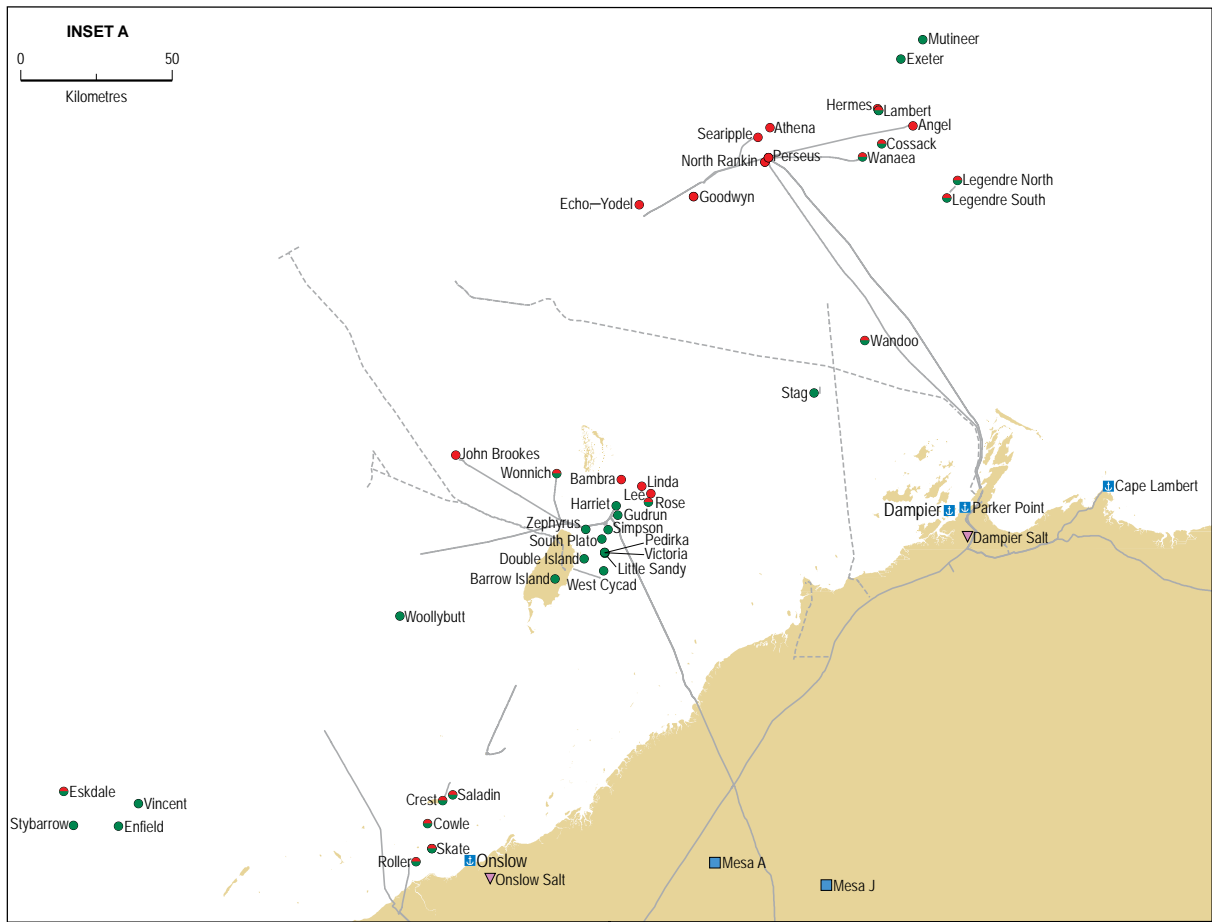
Map 5. Local Government and Regional Boundaries Insert

MAJOR MINERAL AND PETROLEUM PROJECTS IN WESTERN AUSTRALIA



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Map 6. Major Mineral and Petroleum Projects in Western Australia



MAJOR MINERAL AND PETROLEUM PROJECTS IN WESTERN AUSTRALIA

MINERAL SYMBOLS

- ◆ Precious metal
- Speciality metal
- Iron
- Alumina
- Energy
- ▽ Industrial mineral

PETROLEUM SYMBOLS

- Gas
- Oil
- Oil and gas
- Oil/gas pipeline
- - - - Proposed oil/gas pipeline

NON-MINERAL SYMBOLS

- Port



GS81_10006

Map 7. Major Mineral and Petroleum Projects in Western Australia Insert

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
Web: www.dmp.wa.gov.au

This publication is available as a PDF on the website

For specific enquiries regarding this publication
please email: jill.gregory@dmp.wa.gov.au