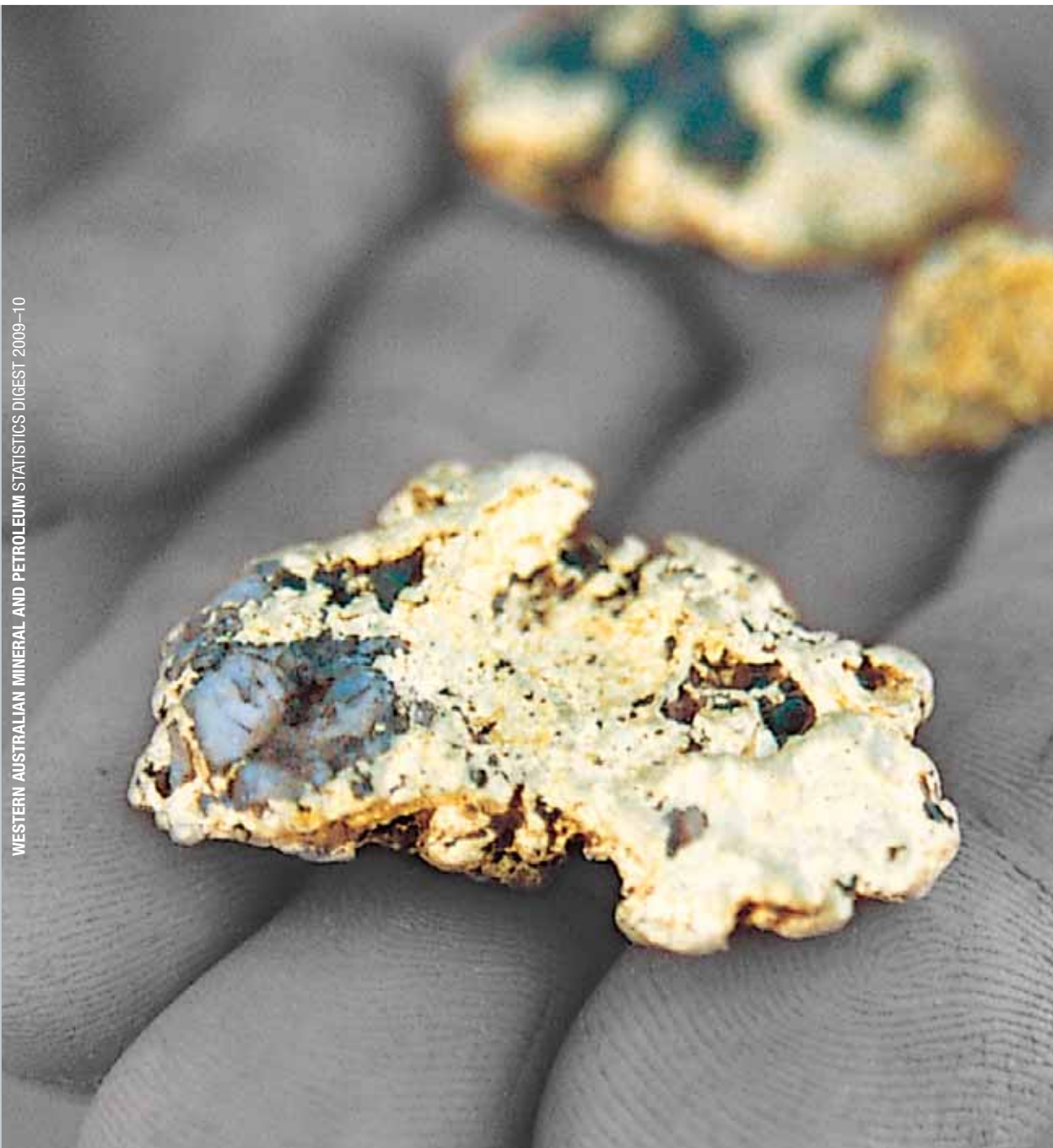




Government of Western Australia  
Department of Mines and Petroleum



# WESTERN AUSTRALIAN MINERAL AND PETROLEUM STATISTICS DIGEST 2009–10

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Welcome to the Mineral and Petroleum Statistics Digest for 2009–10. 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 in 2009–10 the value of sales by the State's mineral and petroleum industry reached \$71 billion. This result was achieved during a challenging economic period and follows a decade of average annual growth of around 14 per cent.

The resources industry is vital to both the State and the nation's economic development and prosperity. It is by far the largest contributor to the Western Australian economy, representing almost 30 per cent of Gross State Product and is a key driver of economic growth in Australia. Underpinned by strong demand from major trading partners in Asia, mineral and petroleum exports accounted for a substantial 89 per cent of the State's income from merchandise exports in 2009–10.

Western Australia is one of the great mineral provinces of the world. It hosts an impressive 540 commercial mineral projects, embracing 968 operating mine sites which produce over 50 different minerals. In 2009–10, there were also 68 operating oil and gas fields.

The Department is working hard to ensure Western Australia is positioned as a destination of choice for responsible resource exploration and development and that the resources sector continues to grow to maximise long-term benefits to the community.

With global economic conditions improving and a broad range of expansions and new developments underway, it is expected that growth of the Western Australian minerals and petroleum sectors will continue in 2010–11 and beyond.

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 (ABARE), Australian Bureau of Statistics (ABS) and the Western Australian Department of Treasury and Finance for their cooperation and help in the preparation of this Digest.



**Richard Sellers**  
**Director General**  
**Department of Mines and Petroleum**

# 1. EXPLORATION, MINERAL TITLES AND APPROVALS PROCESS

## 1.1 MINERALS EXPLORATION

In 2009–10, mineral exploration expenditure in Western Australia reached \$1.24 billion. Whilst slightly down on 2008–09, it is the third consecutive year that mineral exploration expenditure has surpassed the billion dollar mark. The high level of expenditure also reflects increased costs associated with exploration activity.

Mineral exploration expenditure in Australia totalled \$2.2 billion in 2009–10 and was \$9.4 million higher than in 2008–09. Nationally the number of metres drilled increased by five per cent from 2008–09 to reach 8.3 million metres in 2009–10. Most of this drilling occurred in areas of existing deposits which accounted for 63 per cent with the remaining 37 per cent on new ground.

The bulk of Australia's mineral exploration activity occurs in Western Australia which accounted for 56 per cent of national mineral exploration expenditure in 2009–10. This percentage share is the same as for 2008–09. The following list shows the order of State and Territory share of national expenditure on mineral exploration:

- Western Australia \_\_\_\_\_ 56%
- Queensland \_\_\_\_\_ 20%
- South Australia \_\_\_\_\_ 7%
- New South Wales \_\_\_\_\_ 6%
- Northern Territory \_\_\_\_\_ 6%
- Victoria \_\_\_\_\_ 4%
- Tasmania \_\_\_\_\_ 1%

In 2009–10, the majority of the State's mineral exploration expenditure was spent on existing deposits which accounted for 61 per cent or \$760.7 million. The remaining 39 per cent, or \$483.3 million, was spent on greenfield areas.

In terms of expenditure by mineral, in 2009–10, uranium recorded an increase of 96 per cent, copper rose 63 per cent and gold recorded a 33 per cent increase. Iron ore exploration dominated once again and accounted for 40 per cent, or \$497 million, of Western Australian mineral exploration expenditure. This was however, around 11 per cent lower than in 2008–09. Expenditure on uranium exploration reached \$55.4 million in 2009–10 and accounted for 33 per cent of total expenditure on uranium exploration in Australia.

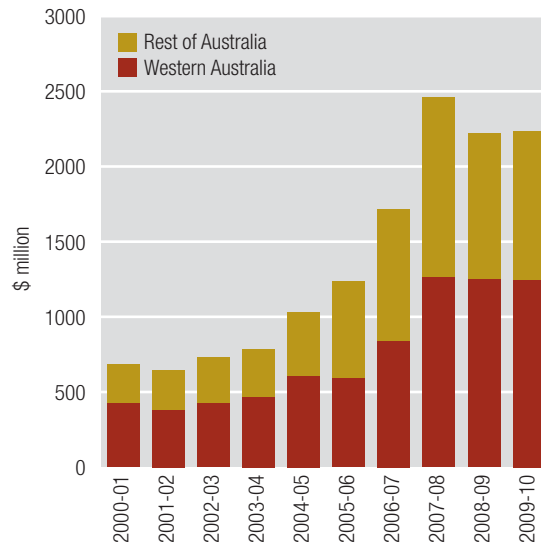


Figure 1 | **Mineral Exploration Expenditure**  
Source: ABS

Expenditure on gold exploration in Western Australia increased in 2009–10 to \$348.5 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 \$194.7 million in 2009–10, a fall of 21 per cent. Nickel accounted for 16 per cent of the State's total exploration expenditure in 2009–10.

Together, iron ore, gold and nickel accounted for 84 per cent or a little over \$1 billion of total mineral exploration expenditure in Western Australia in 2009–10.

One of Australia's most significant new mineral discoveries was announced during the year by Sandfire Resources NL 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. Sandfire has an intensive exploration campaign underway and is conducting a definitive feasibility study which could see mining take place in the second quarter of 2012.

Companies with neighbouring tenements to the DeGrussa deposit along the Jenkin Fault that traverses the area are stepping up exploration plans in the hope of making a similar find.

## 1.2 PETROLEUM EXPLORATION

In 2009–10, petroleum exploration expenditure in Western Australia totalled \$2.5 billion which was down 16 per cent on the previous record year.

At the national level, expenditure on petroleum exploration in Australia also fell in 2009–10 by eight per cent to \$3.5 billion. As a result, Western Australia’s share of national petroleum exploration expenditure was 71 per cent in 2009–10 down from 77 per cent in 2008–09.

The following list shows State and Territory share of national expenditure on petroleum exploration in 2009–10:

- Western Australia..... 71%
- Queensland..... 14%
- Northern Territory..... 4%
- New South Wales..... 3%
- Victoria ..... 1%
- South Australia ..... n/a
- Tasmania ..... n/a

Offshore exploration continues to dominate exploration activity. At the Australian level for which statistics are available, 79 per cent of total petroleum exploration expenditure was spent offshore. In Western Australia, the focus of exploration activity is on offshore basins such as the Carnarvon and Browse basins.

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 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

The total amount of land covered by mineral tenements in force in Western Australia increased by six per cent in 2009–10 to 51.7 million hectares.

Exploration Licences cover the majority of mineral tenements (85 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 four per cent to 44.1 million hectares with the actual number of Exploration Licences increasing by seven per cent from 4959 to 5297. Mining Leases rose in number by three per cent to 5764 and the total area covered by these licences increased from 2.065 million hectares to 2.125 million hectares.

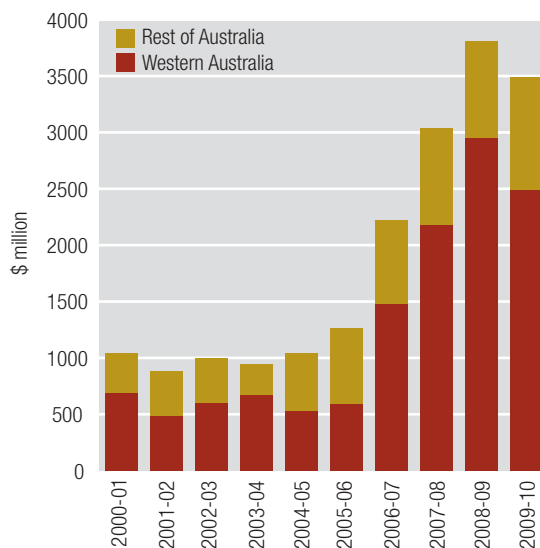


Figure 2 | **Petroleum Exploration Expenditure**  
Source: ABS

## 1.4 APPROVALS PROCESS

The State Government's goal is for Western Australia to be recognised as the most welcoming destination in Australia for resources industry investment. A key factor in this goal is ensuring that the State has an efficient and transparent system for project approvals.

The Department of Mines and Petroleum (the Department) has been publishing quarterly approval performance data since 2009 on its performance against internal timeline targets. Table 2 represents the number of applications received and processed by the Department for its key approval processes in 2009–10. For applications that completed the approvals process, an assessment of the Department's performance against timeline targets is also provided. [Note that the timeline target applies only to parts of the process completed by the Department and does not include, for example, the time taken for assessment by other government agencies or where the assessment process is put on hold while additional information is being sought from applicants.]

Over the course of the year, the Department maintained a high level of compliance with the timeline targets for the majority of the approval processes measured. The data also shows that the Department has been successful in maintaining a steady reduction in the total number of pending mining and petroleum tenement applications.

A significant increase in exploration activity during the recovery from the global financial crisis resulted in an increased number of exploration tenement applications in late 2009, in both the mining and petroleum sectors. This flowed through to the demand for environmental approvals. Even though the Department continued to maintain a high level of compliance with its timeline targets for environmental approvals, the large number of applications received has resulted in an increase in the number of pending applications.

The ability of the Department to manage this increased workload has been greatly assisted by the development of its computer systems and its work with other key approvals agencies to implement the State Government's lead agency framework.

**TABLE 1. TENEMENTS IN FORCE 1978 ACT**

	2005–06		2006–07		2007–08		2008–09		2009–10	
	Number	000 ha	Number	000 ha	Number	000 ha	Number	000 ha	Number	000 ha
Prospecting Licences	5,056	638	5,376	682	6,260	800	7,110	913	7,032	890
Exploration Licences	3,966	30,822	4,766	40,031	5,427	51,790	4,959	42,367	5,297	44,123
Mining Leases	5,118	1,806	5,090	1,824	5,475	2,036	5,618	2,065	5,764	2,125
Other	3,432	3,037	3,629	3,248	3,678	4,119	2,512	3,477	2,884	4,541
Mineral Claims and Other 1904 Act	186	21	186	21	186	21	186	21	186	21
<b>Total</b>	<b>17,758</b>	<b>36,324</b>	<b>19,047</b>	<b>45,806</b>	<b>21,026</b>	<b>58,766</b>	<b>20,385</b>	<b>48,843</b>	<b>21,163</b>	<b>51,700</b>

Source: DMP

**TABLE 2. DEPARTMENT OF MINES AND PETROLEUM APPROVALS PERFORMANCE REPORT 2009–10**

Minerals Sector								
	Timeline target (Business Days)	No. carried over as at 1 July 2009	No. received	No. approved	No. otherwise dealt with <sup>1</sup>	No. approved within timeline target	% approved within timeline target	No. carried over to 1 July 2010
<b>Tenure Applications</b>								
Data used to assess performance against the timeline target only applies to applications received since 1 January 2009 (when the tracking of applications commenced).								
The percentage approved within the timeline target calculation for mining tenure applications are calculated on all determined tenements (i.e. all approved and otherwise dealt with applications).								
Prospecting Licence	65	2,361	1,401	1,456	495	675	85%	1,811
Exploration Licence	65	3,895	3,251	1,469	1,377	1,250	89%	4,300
Mining Lease	65	2,105	138	262	510	36	90%	1,471
Others (Misc. Licence, General Purpose Lease, Retention Licence)	65	559	250	206	108	120	92%	496
<b>Total</b>		<b>8,920</b>	<b>5,040</b>	<b>3,393</b>	<b>2,490</b>	<b>2,081</b>	<b>88%</b>	<b>8,078</b>
<b>Environmental Approvals</b>								
DMP processes Native Vegetation Clearing permits for the resources sector via a delegation from the Department of Environment and Conservation. Performance measures are published on DEC's website.								
Program of Work (Exploration)	30	229	2,052	1,884	144	1,765	94%	249
Mining Proposals	30	112	345	250	89	210	84%	114
<b>Total</b>		<b>341</b>	<b>2,397</b>	<b>2,134</b>	<b>233</b>	<b>1,975</b>	<b>93%</b>	<b>363</b>
Petroleum and Geothermal Sector								
	Timeline target (Business Days)	No. carried over as at 1 July 2009	No. received	No. approved	No. otherwise dealt with <sup>1</sup>	No. approved within timeline target	% approved within timeline target	No. carried over to 1 July 2010
<b>Tenure Applications</b>								
Includes grant or renewal of Exploration Permits, Production Licences and Retention Leases; grant, renewal or variation of Pipeline Licences; "Surveys" also incorporate Special Prospecting/Access Authorities and Scientific Investigations.								
Exploration Permit	120	79	64	76	26	63	83%	41
Production Licence Retention Lease	90	42	16	40	4	24	60%	14
Pipeline Licence	90	16	25	29	2	22	76%	10
Well	40	22	88	81	17	80	99%	12
Survey	40	24	72	57	18	55	96%	21
<b>Total</b>		<b>183</b>	<b>265</b>	<b>283</b>	<b>67</b>	<b>244</b>	<b>86%</b>	<b>98</b>
<b>Environmental Approvals</b>								
Incorporates environmental plans and oil spill contingency plans for petroleum operations in both Commonwealth and State areas.								
Environmental Plans	30	40	200	130	69	126	97%	21

**EXPLANATORY NOTES**

1 "Otherwise dealt with" refers to applications that did not complete the approvals process, i.e. were refused, lapsed, rejected or withdrawn.



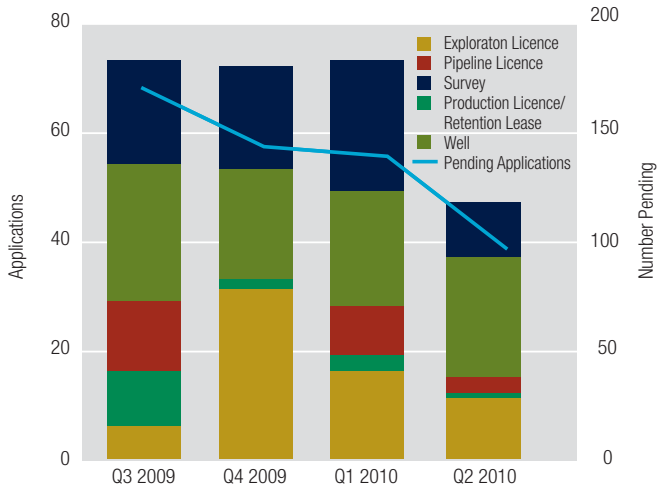


Figure 3 | **Petroleum Tenure Applications Received**  
Source: DMP

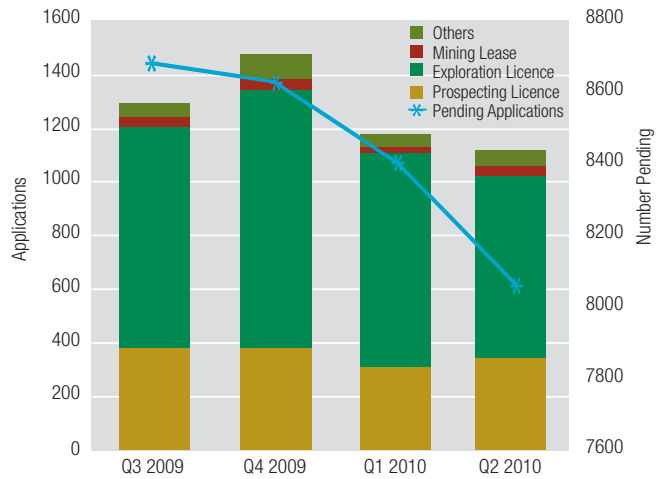


Figure 4 | **Mining Tenure Applications Received**  
Source: DMP

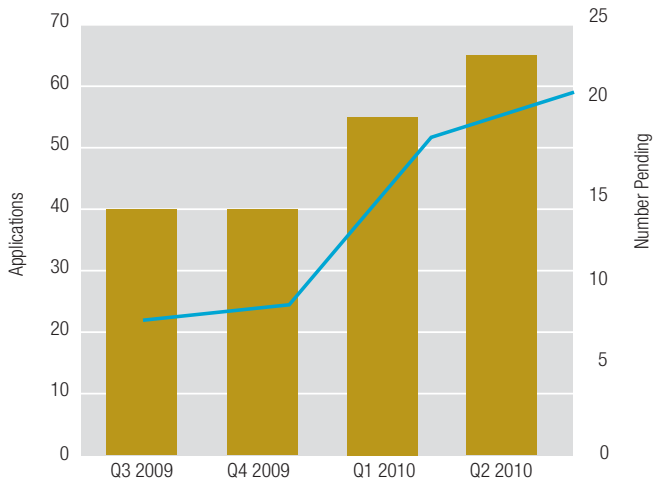


Figure 5 | **Petroleum Environmental Applications Received**  
Source: DMP

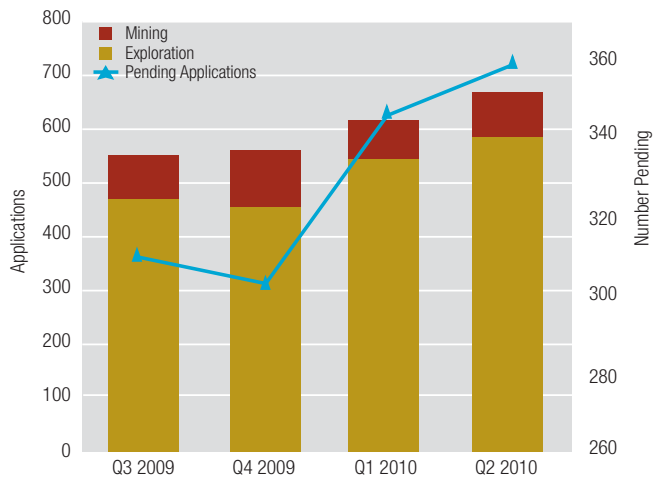


Figure 6 | **Mining Environmental Applications Received**  
Source: DMP

## 2. MINERAL AND PETROLEUM INDUSTRY 2009–10 REVIEW

### 2.1 OVERVIEW

The value of Western Australia's mineral and petroleum industry reached \$70.9 billion in 2009–10. This remarkable result was achieved during a challenging economic period and featured record results from iron ore and the gold sector.

Despite lower overall average iron ore prices and a stronger Australian dollar the value of the State's resources industry almost equalled its previous record of \$71.3 billion which was reached in 2008–09. On average, during the past ten years the resource industry's sales value has grown a healthy 14 per cent per annum.

Iron ore, petroleum and gold together accounted for 83 per cent, or \$59 billion, of all mineral and petroleum sales in 2009–10. These three sectors currently form the backbone of the Western Australian economy.

Western Australia leads all other states with mining investment. The latest ABS investment figures for 2009–10 show the amount of capital expenditure on mining in Western Australia amounted to \$21.7 billion which was a seven per cent decrease compared to the previous financial year. This also represented 71 per cent of the State's total (\$30.4 billion) new capital expenditure for 2009–10.

Mineral and petroleum exports contributed a substantial 89 per cent towards the State's total merchandise exports in 2009–10 with China continuing its lead as the major market for our resources.

Western Australia maintained its status as the nation's largest exporter in 2009–10 contributing 42 per cent (\$83 billion) to Australian merchandise exports which totalled a little over \$200 billion. Queensland followed with 21 per cent, New South Wales with 16 per cent and Victoria contributed around nine per cent.

In 2009–10, the Australian dollar appreciated strongly against the US dollar rising by 18 per cent to an average of US88 cents for the year.

A relatively more positive global economic outlook during 2009–10 saw the majority of commodity prices rebound from the lows reached in early 2009. Unfortunately the strong Australian dollar negated the effect of some of these increases. The list below shows average commodity price movements between 2008–09 and 2009–10 in both US and Australian dollar terms:

Commodity	US\$	A\$
Zinc	Up 48%	Up 26%
Nickel	Up 45%	Up 25%
Lead	Up 44%	Up 23%
Copper	Up 36%	Up 18%
Gold	Up 25%	Up 6%
Iron Ore Spot Fines	Up 23%	Up 4%
Tin	Up 12%	Down 4%
Crude Oil	Up 8%	Down 6%
Alumina	Down 4%	Down 19%
Cobalt	Down 8%	Down 21%
Iron Ore Contract Fines	Down 9%	Down 24%

The State's mineral and petroleum industry has proven to be resilient during an uncertain economic climate and is well positioned to build on its strengths as a reliable supplier of quality resources at world cost-competitive prices. Strong growth in developing economies including China and India is expected to underpin steady demand for Western Australia's mineral and petroleum products in the coming years. Based on the high levels of investment on expansions and new projects the future of the industry is currently very positive.

### HIGHLIGHTS IN 2009–10

One of the most significant events in 2009–10 was the shift away from the forty-year-old annual benchmark pricing system for iron ore. The period also saw a greater number of spot price iron ore shipments with prices for these well above previously negotiated contract rates. A new quarterly benchmark system is being based on an averaged index price of the previous quarter's average.

**Iron ore** remained the State's largest sector in terms of value accounting for \$33.7 billion or a massive 48 per cent of total sales in 2009–10. For the first three quarters of the period the increase in spot price sales was not enough to counteract the effect of lower contract prices and the strong Australian dollar contributed to lower returns. However, in the June quarter, when the new quarterly benchmark system started to take hold, prices improved considerably with sales values almost doubling. On average, during the past ten years the value of iron ore has increased by a massive 28 per cent per annum. The sector shipped record tonnages of iron ore in 2009–10, increasing by 25 per cent to reach 396 million tonnes.

**Petroleum**, which includes crude oil, condensate, LNG, natural gas, LPG (butane and propane), is Western Australia's second-largest sector accounting for 27 per cent (\$19 billion) of total sales. This represented a 12 per cent fall in overall value due mainly to maturing oil fields and appreciation in the value of the Australian dollar.

The Tapis oil price averaged US\$79 per barrel in 2009–10, up nine per cent from 2008–09. This increase in price reflected higher energy consumption following the world economic recession. However, the value of crude oil sales from Western Australia fell by 17 per cent to \$6.4 billion. This was chiefly due to production contracting by eight per cent to 74.5 million barrels in 2009–10 because of the natural decline of mature fields.

**Condensate** output increased by 11 per cent to 46.7 million barrels, while sales value also increased by 13 per cent to \$3.5 billion. As a by-product of gas production, the increased output was largely due to a return to normal gas production after the Varanus Island incident in 2008 and production from the new Angel field.

In 2009–10, **LNG** production increased by 13 per cent to 15.7 million tonnes. However, the value of sales fell by 19 per cent to \$6.9 billion and kept LNG as the third most valuable commodity in the State.

**Gold** ranked fourth in terms of overall value and now accounts for nine per cent of all sales. In 2009–10, the sector generated a record \$6.6 billion which was up by 26 per cent. This impressive result can be attributed to continued strength in the gold price which averaged US\$1091 per ounce, an increase of 25 per cent from 2008–09. The State's gold producers have responded to the higher gold prices with output increasing by 20 per cent to 5.3 million ounces.

**Nickel**, in fifth place, contributed \$4.1 billion to the total value of the State's resources in 2009–10. A substantial 45 per cent increase in the US dollar nickel price resulted in the value of nickel sales rising by 36 per cent. In contrast, nickel production remained almost static at 177 thousand tonnes.

**Alumina** claimed sixth place in 2009–10 with 12.6 million tonnes of alumina being shipped. This represented an increase in output of three per cent compared with 2008–09. The effect of the strengthening Australian dollar and a slightly weaker US dollar price for alumina saw the value of alumina sales fall by 17 per cent to \$3.8 billion.

The recovery in global economic activity and stronger commodity prices saw the value of **base metals** increase by 51 per cent to \$1.4 billion in 2009–10.

**Copper** recorded a 17 per cent increase in output which totalled 149 thousand tonnes in 2009–10. Strong copper prices (up by 36 per cent in US dollar terms from the previous year) saw the value of sales grow by a massive 74 per cent to \$1.1 billion.

Sales volumes of **zinc** were down by a sizeable 40 per cent to 86 thousand tonnes in 2009–10. A solid 48 per cent rise in the US dollar price was not enough to put zinc in the black and 2009–10 saw sale values fall by 12 per cent to \$203 million.

**Lead** production rose marginally by three per cent to 25.9 thousand tonnes in 2009–10. The US dollar price of lead rose 44 per cent from the previous year and over the same period the value of lead sales increased 41 per cent to \$59 million.

Domestic **natural gas** sales volumes increased by nine per cent to 9.4 billion cubic metres in 2009–10 with the sale value of this gas increasing by seven per cent to \$1.3 billion. This increase was largely due to a return to normal production after the Varanus Island incident in 2008 and the new Angel field. **LPG (butane and propane)** followed a similar trend with output rising by 13 per cent and sale values up by 14 per cent to \$647 million.

The total value of **mineral sands** sales was down by nine per cent to \$665 million in 2009–10. The reduction in value of sales was mainly due to volumes being down for ilmenite and synthetic rutile which fell two per cent and 30 per cent respectively. Zircon volumes rose by 32 per cent whilst rutile tonnages increased a healthy 46 per cent. The value of sales for zircon was up by 19 per cent whilst rutile values were up by 34 per cent.

In 2009–10, the value of **salt** sales increased by eight per cent to \$417 million whilst volumes increased by four per cent to 11 million tonnes.

**Coal** production fell during the period by nearly four per cent to 6.7 million tonnes in 2009–10 with sales revenue also falling by two per cent from \$333 million in 2008–09 to \$326 million in 2009–10.

**Diamond** sale volumes recovered from the sharp fall in 2008–09, rising by 77 per cent to reach 16.3 million carats in 2009–10.

Output for **cobalt**, as a by-product of nickel mining, fell by 14 per cent and was one of the few commodities where prices fell during the year. An eight per cent drop in the US dollar price of cobalt together with the strong Australian dollar saw sale values for cobalt fall by 14 per cent to \$189 million in 2009–10.

Western Australia's mineral and petroleum resources in order of value for 2009–10 are:

Commodity	\$ Billion
Iron Ore	33.7
Crude Oil and Condensate	9.9
LNG	6.9
Gold	6.6
Nickel	4.1
Alumina	3.8
Others	5.9
Total	70.9



Figure 7 **Exchange Rate US\$/A\$**  
Source: Reserve Bank of Australia

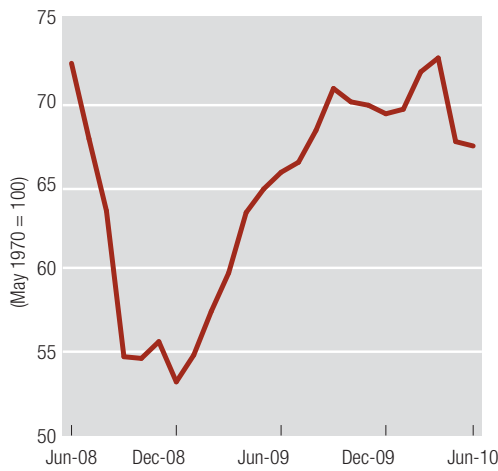


Figure 8 **Exchange Rate Trade Weighted Index (units of foreign currency per A\$)**  
Source: Reserve Bank of Australia  
*Definition: "Trade weighted index" is the average value of A\$ in relation to the currencies of Australia's major trading partners.*

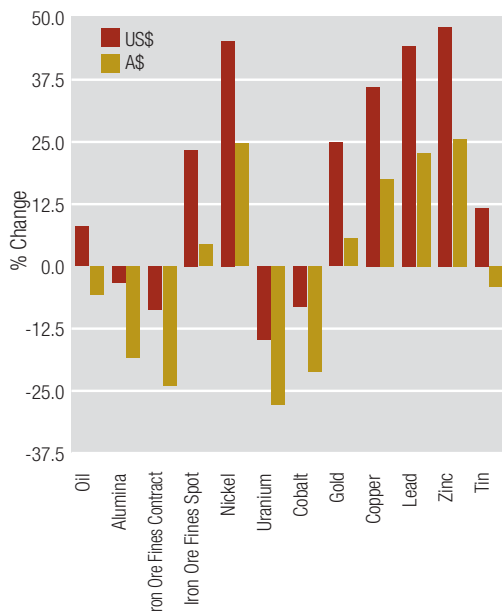


Figure 9 **Average Price Comparison 2008-09 and 2009-10**  
Source: LME, Kitco, TEX Report, Metal Prices, Interfax China Ltd, UX Consulting Company

## 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.

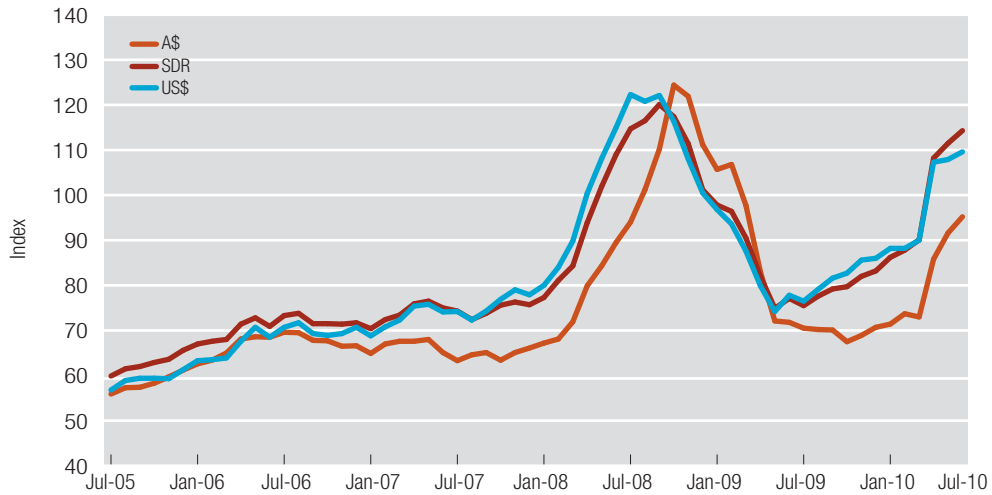


Figure 10 | **Non-rural Commodity Price Index (2008-09 = 100)** Source: Reserve Bank of Australia

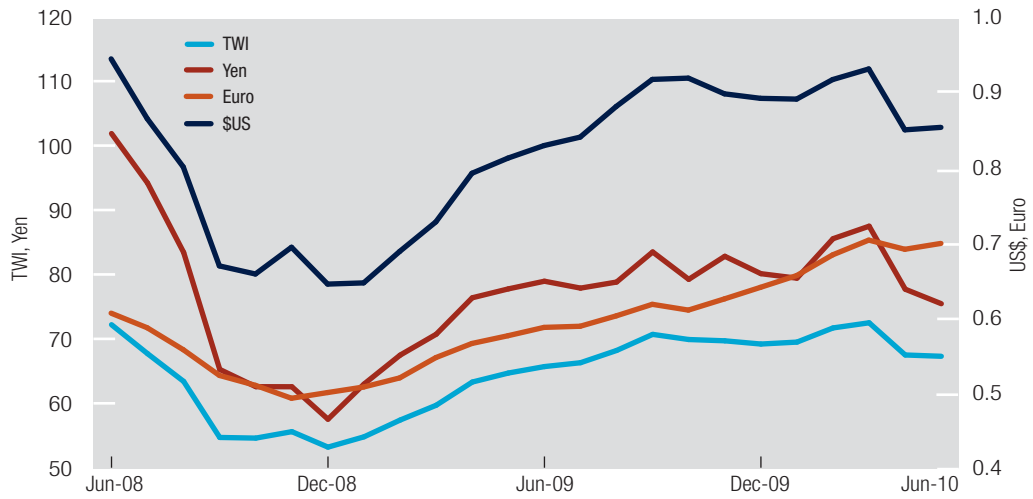


Figure 11 | **Australian Dollar Exchange Rate against Major Currencies May 1970 = 100** Source: Reserve Bank of Australia

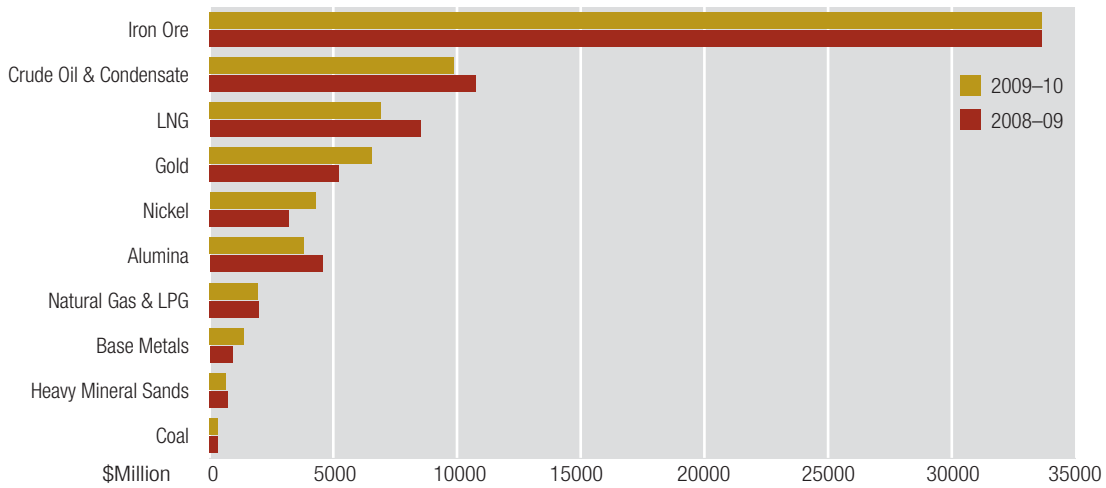


Figure 12 | **Major Commodities by Value** Source: DMP

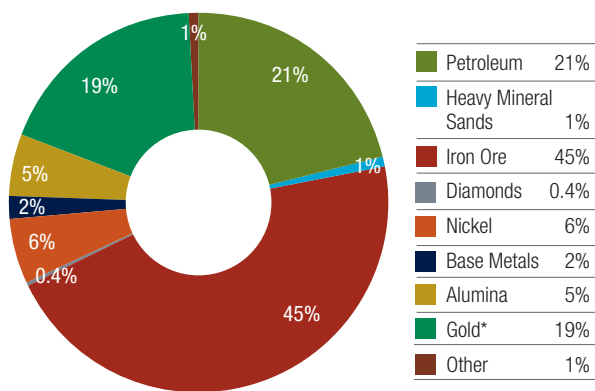


Figure 13 | **Western Australian Mineral and Petroleum Exports 2009-10 – Total Value \$73.7 Billion** Source: DMP  
 \* Includes \$7.1 billion of gold refined/processed and exported from Western Australia, but produced from mining operations in other States, Territories and overseas.

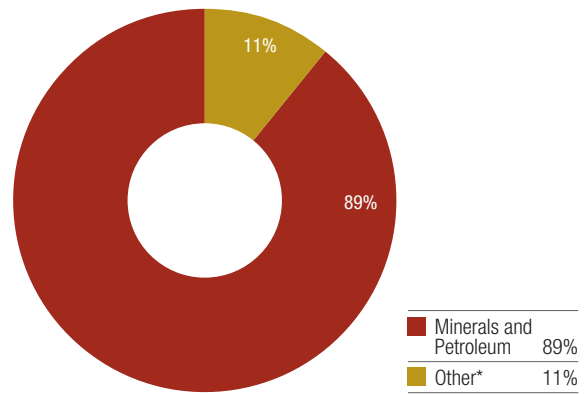


Figure 14 | **Western Australian Merchandise Exports 2009-10 – \$83.1 Billion** Source: DMP and ABS  
 \* Other includes wheat, wool, wood chips, live animals, seafood, meat, pearls and other agricultural and manufactured items

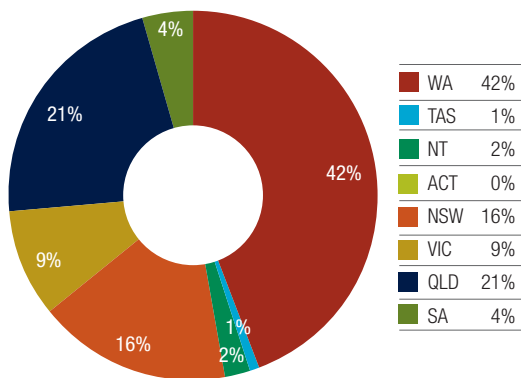


Figure 15 | **Australian Merchandise Exports 2009-10 – \$200.07 Billion** Source: ABS  
 Note: These percentages are based on data which includes \$8.4 billion of re-exported goods and of no State origin available and account for around 5% of the total.

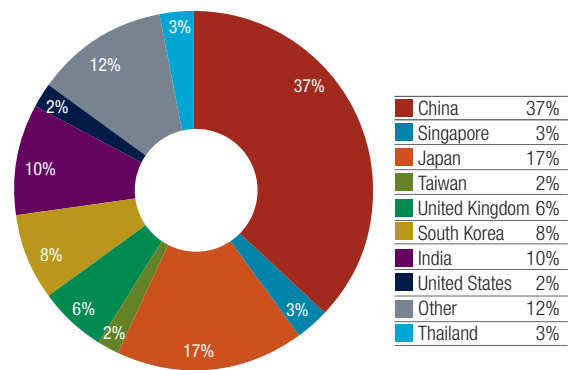


Figure 16 | **Western Australian Merchandise Exports 2009-10 – \$83.1 Billion** Source: ABS

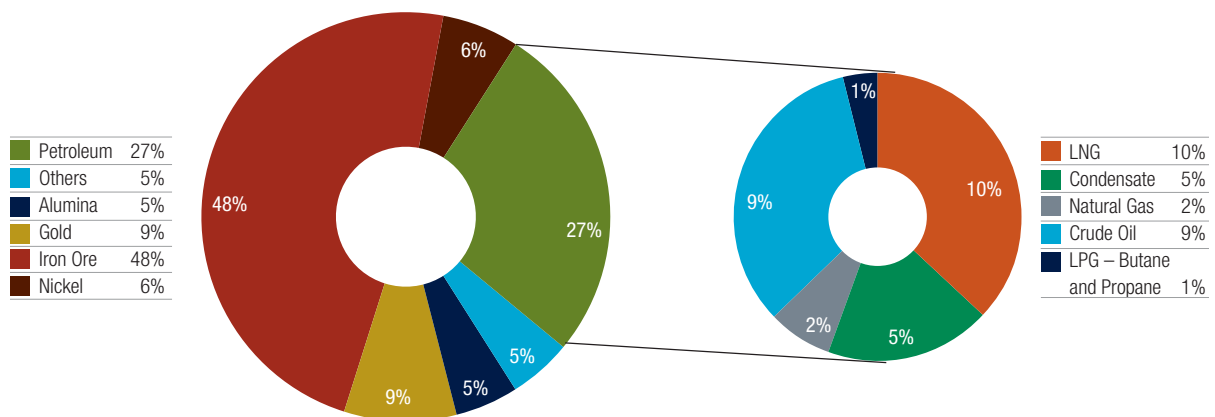


Figure 17 | **Value by Commodity 2009-10 – \$71 Billion** Source: DMP

## 2.2 IRON ORE

Over the past eight years the State's iron ore industry has experienced a period of unprecedented growth fuelled in the main by China's demand. On average, during the past ten years the value of Western Australia's iron ore industry has grown by 28 per cent per annum.

The level of interest by investors in iron ore is exemplified by the number of iron ore tenements and major projects held or awaiting approval. As shown in Maps 1 and 2, the area of the Pilbara covered by iron ore tenements in 2002 was a little over 22 thousand square kilometres. However by the end of 2009 this had increased six hundred per cent to almost 132 thousand square kilometres.

The global financial crisis, which took hold in the second half of 2008, only temporarily slowed demand. The economic instability however did set the stage for the demise of the annual iron ore benchmark pricing system. In 2009–10 Western Australia's iron ore industry weathered global financial developments and broke new records in terms of output, growing by 25 per cent to reach 396 million tonnes.

The value of iron ore equalled the previous year's record to reach \$33.66 billion in 2009–10. This makes iron ore the most valuable resource sector in Western Australia accounting for 48 per cent of the total value of the State's resources.

China currently dominates Western Australia's iron ore exports, accounting for 70 per cent or almost \$24 billion of the total amount shipped for 2009–10. Japan received 18 per cent during 2009–10 whilst other markets were South Korea (9 per cent), Taiwan (3 per cent) and a small amount went to Europe.

### Iron Ore Producers

Whilst the larger iron ore operations are based in the Pilbara region of Western Australia, there are also three mines in the Mid West region, two 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 six mines, comprising Brockman, Marandoo, Mt Tom Price, Paraburdoo, Yandicoogina, and Nammuldi.

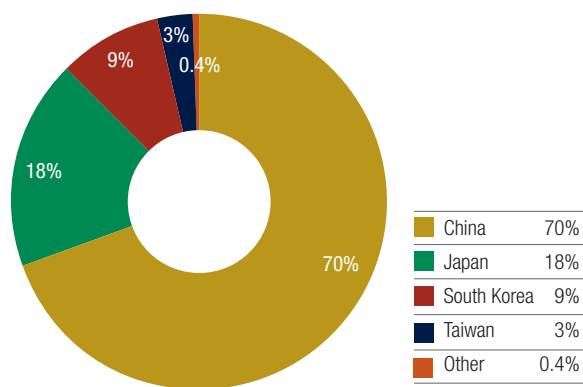


Figure 18 | **Iron Ore Exports – Total Value \$33.7 Billion**  
Source: DMP

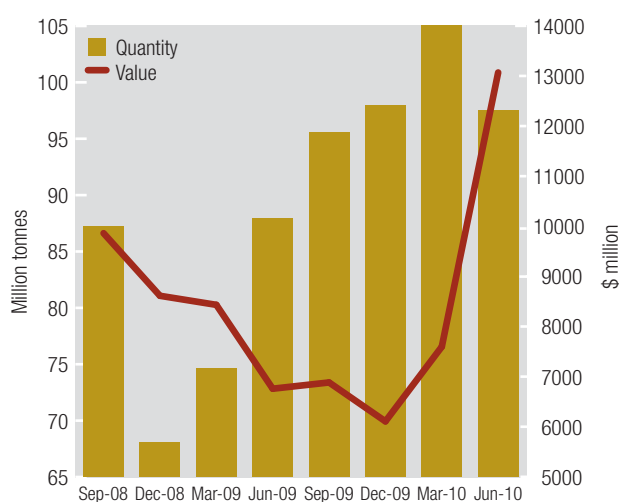


Figure 19 | **Iron Ore Quantity and Value by Quarter**  
Source: DMP

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

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

BHPB 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, being 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. Shipments commenced in May 2008 transporting ore along their 260-kilometre multi-user railway to FMG's open-access Herb Elliott Port in Port Hedland.

The smaller producers consist of:

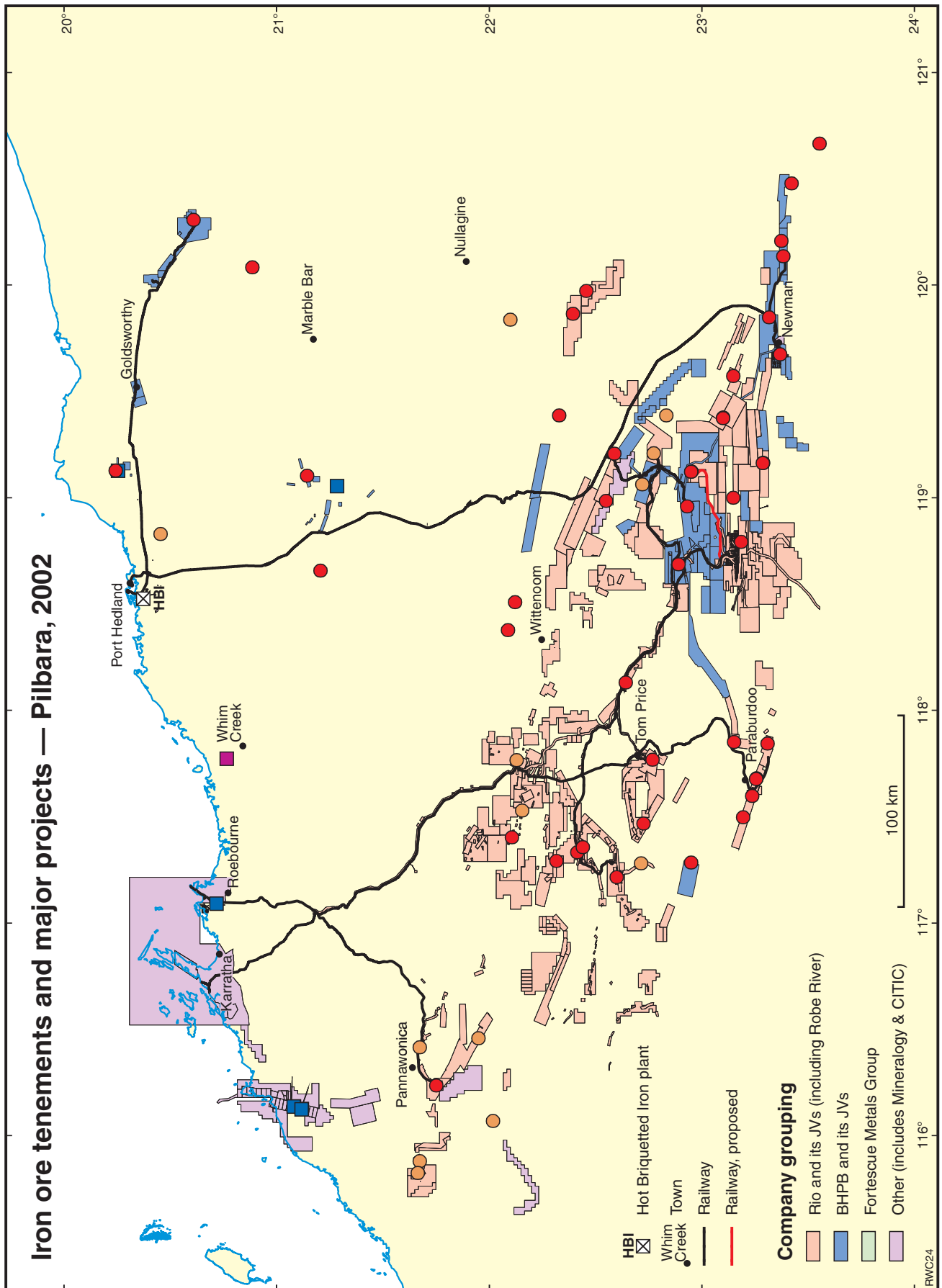
- Cliffs Natural Resources – Koolyanobbing operation about 50 kilometres northeast of Southern Cross and its smaller operation at Cockatoo Island, around 140 kilometres north of Derby. The Cockatoo Island mine is only accessible by sea and air, produces high grade (68 per cent iron) ore and is the only known sub-sea mining operation in the world. Operations have been suspended whilst phase 3 of the seawall is completed early in 2011.
- Mount Gibson Mining Ltd – Tallering Peak operation, 50 kilometres north-northeast of Mullewa, and its Koolan Island hematite mine, located in Yampi Sound off the Kimberley coast.
- 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 – Pardoo Iron Ore Operation 56 kilometres east-northeast of Port Hedland. Also in June 2010 Atlas commenced mining at their second mine at Wodgina which is located approximately 90 kilometres south of Port Hedland.

## Project Expansions

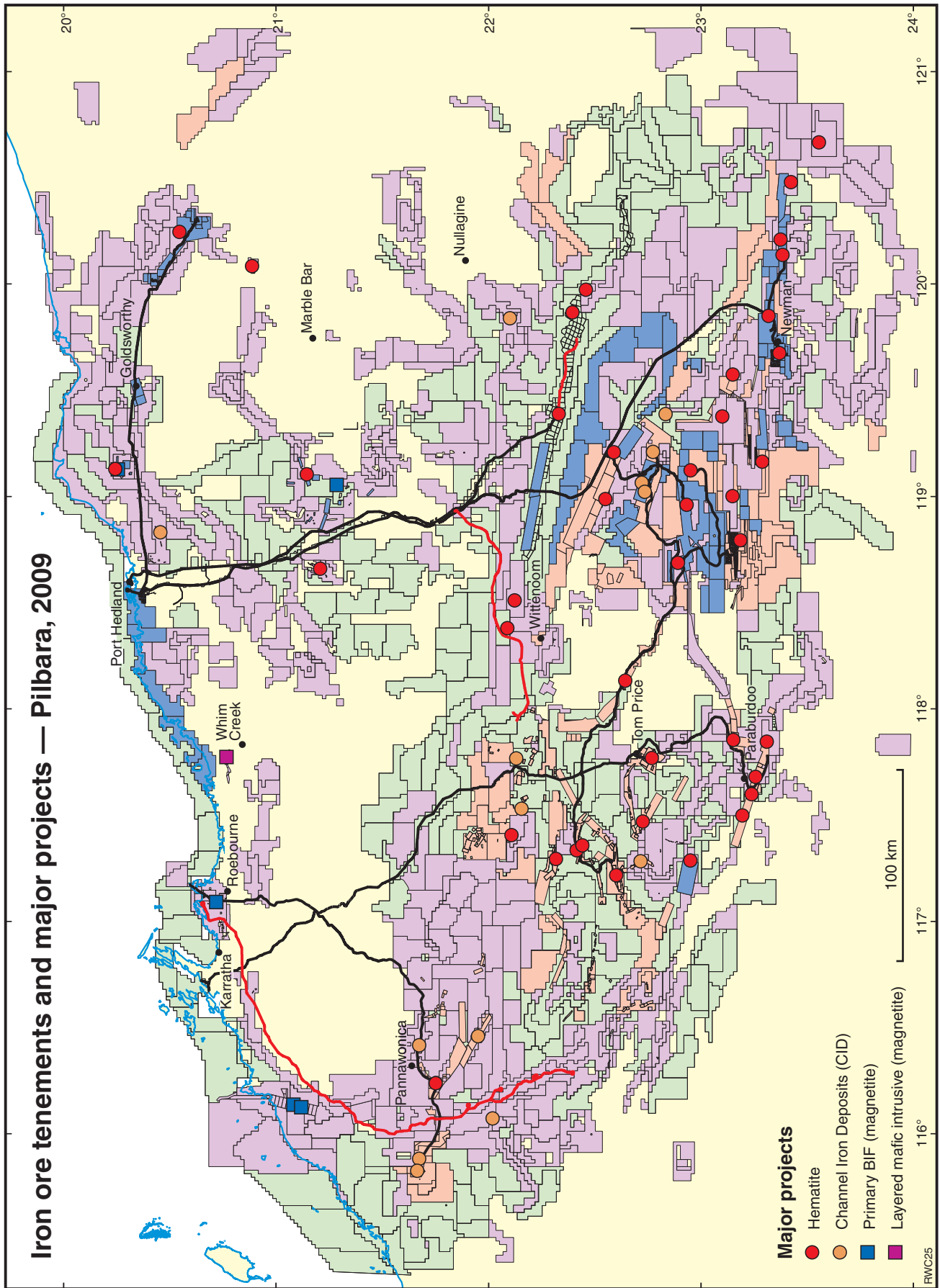
During the year there were a number of iron ore project expansions underway in the Pilbara region. Listed below is a summary of these works:

- BHPB's US\$1.85-billion Rapid Growth Project 4 (RGP4), which was approved in March 2007, will increase BHPB's Western Australian iron ore output to 155 million tonnes per annum by 2010. Key elements included the development of a new crushing and screening plant, additional stockyards, car-dumping facilities and train-loading facilities at Mt Whaleback. At Yandi, there is a new ore-processing handling facility. Upgrades have been made at Jimblebar and Yandi along with infrastructure improvements at Nelson Point and Finucane Island. Commissioning and ramp-up of RGP4 is taking place during 2010.
- BHPB's US\$4.8-billion Rapid Growth Project 5 (RGP5) was approved in November 2008 and will further increase installed capacity at its Western Australia iron ore operations by 50 million tonnes to 205 million tonnes per annum during 2011. Work will include the duplication of the railway track between the Yandi mine and Port Hedland and expansion of the inner harbour at Port Hedland.
- Rio Tinto is to invest a further US\$790 million in port expansions at Cape Lambert increasing shipping capacity from 80 million tonnes per annum to 180 million tonnes per annum by 2016, taking its total capacity in the Pilbara to 320 million tonnes per year.
- Rio Tinto is investing in more sustainable power generation and transmission infrastructure near Karratha worth US\$538 million to supply electricity to its port and mine operations. It will use natural gas turbines, resulting in a significant reduction in emission rates compared with the two, steam-power stations currently in operation at the Cape Lambert and Dampier ports, which will be decommissioned. The four gas turbines are being commissioned and will come on line progressively during 2010.
- Fortescue Metals Group is expanding its Christmas Creek operations to 55 million tonnes per annum and is on target for a March 2011 commissioning. The expansion includes 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.
- Hope Downs Iron Ore Operations (a joint venture between Rio Tinto Iron Ore and Hancock Prospecting Pty Ltd) is awaiting approvals to commence its Hope Downs 4 mine and could potentially be producing 30 million tonnes per annum in 2013.





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



Map 2. Iron Ore Tenements and Major Projects – Pilbara 2009

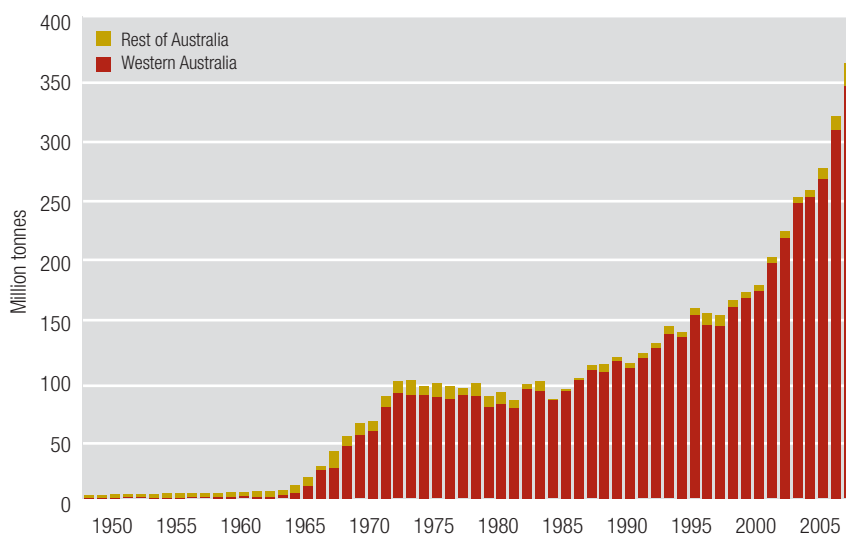


Figure 20 | **Iron Ore Quantity up to 2009**  
Source: DMP and ABARE

In addition to the extensive expansions being carried out on existing mines in the Pilbara, there are several projects being developed or planned. Some of these are:

- Rio Tinto has a planned growth program for its Pilbara iron ore operations to reach 330 million tonnes per annum. The final investment decision, if made, could reach a record \$11 billion plus. This plan consists of the following steps:
  - 225 million tonnes per annum by Quarter one 2011 (in implementation)
  - 230 million tonnes per annum by Quarter two 2012 (in feasibility study)
  - 280 million tonnes per annum by the first half of 2014 (in feasibility study)
  - 330 million tonnes per annum by the first half of 2016 (pre-feasibility study)
- BHP Billiton US\$1.93 billion Rapid Growth Project 6 has been approved for development and is expected to increase production capacity to 240 million tonnes per annum during 2013.
- Fortescue Metals is in the process of finalising studies for a further expansion of the Chichester Hub (Cloudbreak and Christmas Creek) beyond the current 55 to 95 million tonnes per annum. It is also working to complete a Definitive Feasibility Study for the Solomon Hub and is reviewing opportunities including the Western Hub and magnetite.
- Hancock Prospecting (with their Korean partners Posco and STX Corp) are looking to develop their \$7.2 billion Roy Hill prospect. Located 277 kilometres due south of Port Hedland it sits at the eastern end of the Chichester Range. Construction is expected to commence in mid-2011 and will comprise a dedicated railway with associated port infrastructure in Port Hedland. With an expected mine life of 20 years and an estimated production rate of 55 million tonnes per annum, production could commence in 2014.
- BC Iron commenced construction of its Nullagine iron ore project in August 2010. Commercial mining is planned for the second half of 2010 under BC Iron's Joint Venture with Fortescue Metals Group. First shipment of ore is targeted for December 2010.
- Hanlong Mining Investment Pty Ltd, a subsidiary of the China-based, privately owned, Sichuan Hanlong Group Co. Ltd, holds a 57 per cent interest in Moly Mines Limited which is constructing a small iron ore mine in tandem with its molybdenum-copper mine at its Spinifex Ridge project. The Moly Mines' open cut iron ore operation will produce one million tonnes per annum when it comes into production in the second half of 2010 and is expected to have a five-year mine life. Located just 50 kilometres northeast of Marble Bar, its ore will be transported by road and shipped from the new Utah Point bulk commodity terminal in Port Hedland.

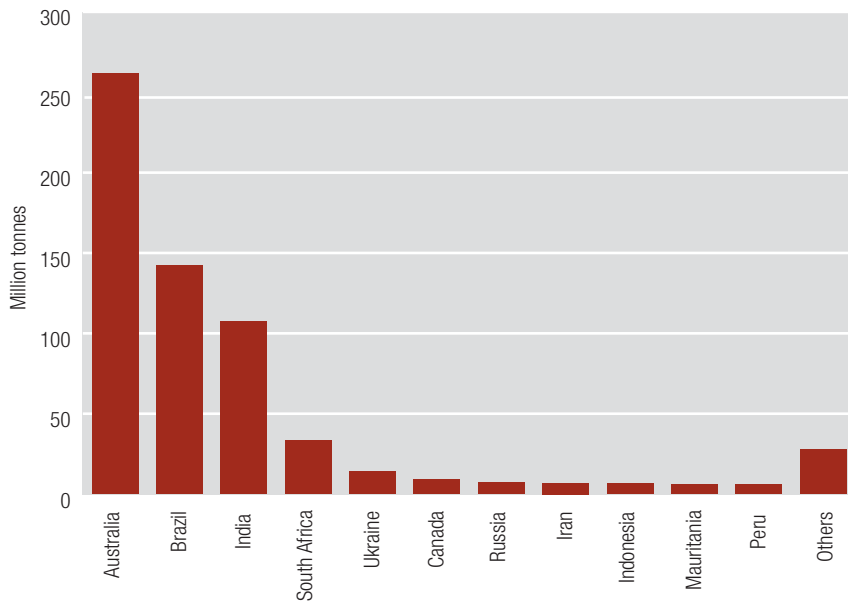


Figure 21 | **China's Iron Ore Imports by Country for 2009** Source: Interfax China Ltd

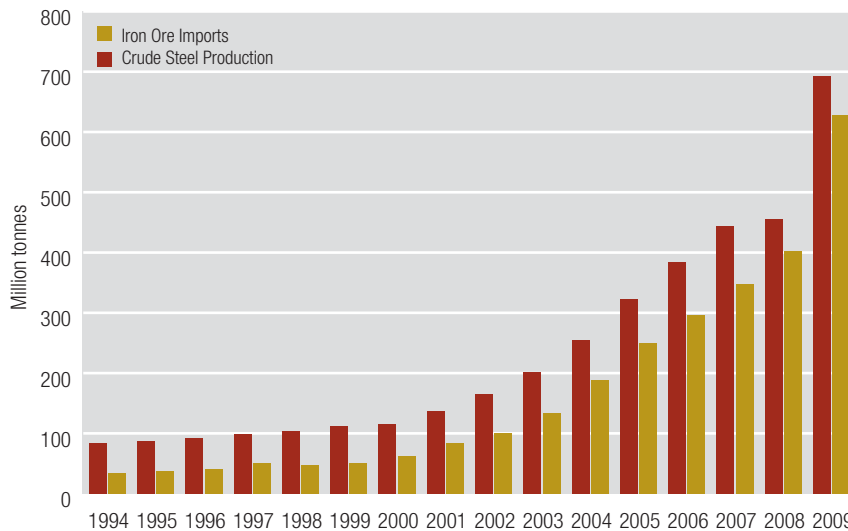


Figure 22 | **China's Crude Steel Production and Iron Ore Imports** Source: TEX Report and Interfax China Ltd

- Cliffs Natural Resources have approved a \$320-million expansion of its Koolyanobbing complex which will upgrade existing operational facilities and rail infrastructure and increase rolling stock. 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.
- Aquila Resources Limited released definitive feasibility study results in July 2010 for a 30-million-tonne-per-annum first-stage iron ore project in the West Pilbara.
- Brockman Resources is looking to release a definitive feasibility study in the second half of 2010 on its Marillana iron ore project and expect final government

approval early in 2011. Located 100 kilometres northwest of Newman, Marillana is close to existing rail, road and port infrastructure and could commence production in late 2013 at an initial rate of around 18 million tonnes per annum.

For the past 40 years, all iron ore mined in Western Australia has been hematite ore or Direct Shipped Ore (DSO); however the State has massive resources of magnetite ore. The advantage of hematite ore is that it does not have to undergo costly concentration to make it saleable. Chinese steel producers have long used magnetite with well established technology and have been behind an unprecedented push to develop a number of magnetite projects in Western Australia. The first of these developments is the 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 Pty Limited (a subsidiary of CITIC Pacific Ltd) is developing the Sino Iron project which is 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. Commissioning is expected to commence by the end of 2010 with first shipments of concentrate in the first half of 2011.

Total investment in the project is estimated to be \$5.9 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 building a 450-megawatt (MW) gas-fired its production plants as well as a desalination plant near its port development to supply water for the project.

Outside of the Pilbara, the Mid West is growing in significance as an iron ore producing region. Up to now only three projects, Koolanooka, Talling Peak and Jack Hills have operated in the area. However many new projects are now either under development or consideration. Some of these are:

- Gindalbie Metals Ltd's Karara Iron Ore Project is located 45 kilometres east of Koolanooka. Gindalbie is developing Karara through a 50:50 joint venture with Anshan Iron and Steel Group Corporation (AnSteel), one of the largest iron ore miners and steel producers in China.

Karara will deliver around ten million tonnes per annum of iron products from 2010, comprising eight million tonnes per annum of high grade magnetite concentrate and blast furnace quality pellets and two million tonnes per annum of Direct Shipping Ore (DSO) hematite. It is anticipated that the mine will have a 60-year life at initial production rates. First shipments of DSO are scheduled for the first half of 2011 with magnetite concentrate and pellets scheduled to commence mid-2011.

- Mt Gibson Iron Limited's \$91-million Extension Hill hematite project, located 85 kilometres east of Perenjori. Mt Gibson expects to commence shipments in the third quarter of 2011. Its Koolan Island seawall construction, dewatering and footwall rehabilitation is scheduled for completion in late 2011 which will allow access to the high grade Main Pit deposit.

- Asia Iron Holdings Limited (wholly-owned by Sinom Investments Limited) Extension Hill magnetite project has an expected start-up date of 2011 with production of 10 million tonnes per annum with staged expansions to 20 million tonnes per annum and then 40 million tonnes per annum.

- Sinosteel Midwest Corporation Limited is looking to develop its \$800-million Weld Range direct shipping ore project which is located 50 kilometres northwest of Cue. Once in operation Weld Range is expected to operate at 15 million tonnes per annum over 15 years and could commence shipping in 2013.

- Golden West Resources Limited's Wiluna West project approximately 40 kilometres west of Wiluna.

Given the amount of interest there has been in these magnetite projects in the Mid West and the pressure they will put on the Geraldton Port, it has resulted in the development of a new deepwater port at Oakajee, 25 kilometres north of Geraldton. The port will have an initial capacity of 35 million tonnes per annum and will be linked to mines in the Mid West region through approximately 550 kilometres of heavy haulage rail. The development is a 50:50 joint venture between Murchison Metals and Japan's Mitsubishi Development. Construction could commence in 2011.

Outside the Pilbara and Mid West, in the Wheatbelt, Polaris Metals (wholly-owned by Mineral Resources Limited) is planning to develop its Yilgarn Iron Ore Project Stage 1 with mining on track to commence in January 2011 at an initial production rate of four million tonnes per annum. First ore shipments are targeted for March 2011. The project is located 60 kilometres north of Koolyanobbing just 50 kilometres from the Perth-Kalgoorlie railway. 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 (70 per cent) and Sojitz Resources and Technology Pty Ltd (30 per cent) have their Southdown magnetite project, located 80 kilometres northeast of Albany. The venture will produce up to 6.6 million tonnes of magnetite concentrate per annum with an expected 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. At Albany Port, the 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.

## Innovation

In a demanding trade environment, the success of the State's iron ore industry rests critically on reliability, competitiveness and quality control. Since its inception in the sixties, the industry has continued to improve its competitiveness in mining practices, technological innovation and management processes.

In June 2010, Rio Tinto formally opened its new high-technology Remote Operations Centre near Perth Airport. The Remote Operations Centre is manned by approximately 430 technical, planning and support staff. It is now the control centre for Rio Tinto's network of mines, rail systems, infrastructure facilities and port operations in the Pilbara (up to 1500 kilometres away).

## Iron Ore Price, Supply and Demand

A significant development in 2009–10 was the abandonment of the traditional forty-year-old annual benchmark pricing system for iron ore.

For decades, the two major Western Australian iron ore producers, BHPB and Rio Tinto, together with Brazil's Vale, set iron ore prices annually with buyers for long-term contracts. Negotiations for this benchmark pricing system would begin in September/October each year with agreed prices taking effect the following April for twelve months. Historically, smaller producers would follow the lead of BHPB and Rio Tinto and use the negotiated benchmark price as a guide when marketing their ore.

Should an agreement not be reached by April, producers would ship at provisional prices for contracted ore which would be adjusted later when a more formal benchmark price had been agreed. Non-contracted ore was generally shipped at spot prices.

As a result of the global financial crisis and the general turmoil engulfing world commodity prices, in late May 2009, Rio Tinto settled prices for the contract year commencing 1 April 2009 with customers in Japan, South Korea and Taiwan at a discount on 2008 prices of 33 per cent for fines (US\$0.97 dry metric tonne unit) and 44 per cent for lump (US\$1.12 dry metric tonne unit).

In late July 2009, BHPB announced similar pricing terms for the 2009 contract year with a range of its iron ore customers.

However, agreement with Chinese steel mills was not reached and negotiations continued with around 50 per cent of cargoes produced in the first half of 2009 being sold at spot prices.

In August 2009, FMG (which sells all of its product directly into the Chinese market) did not follow the lead of BHPB and Rio Tinto and instead directly settled with the China Iron and Steel Association and Boasteel to supply 20 million tonnes of ore between July and December 2009 at a 35 per cent discount on the 2008 benchmark for fines (two per cent lower than the 2009 benchmark with Japan, South Korea and Taiwan). At the same time, the China Iron and Steel Association and Boasteel agreed to fund a \$7.2-billion package which will underpin major expansions of FMG's operations.

With no agreement on a 2009 benchmark price between Australian producers and China (other than the one with FMG), this left many Chinese steel mills in the position of having to pay for their long-term contracted deliveries based on provisional prices and any additional purchases at a spot price. In order to maintain supply, many steel mills took cargoes on a spot basis. In the second half of 2009, these spot prices had reached more than double the other markets' agreed 2009 benchmark price.

Early in 2010, when contracts expired, FMG switched to the shorter term price contracts in line with the larger global iron ore miners.

It now appears that the long-term benchmark system has lost its role as the dominant method of establishing prices for iron ore. It is being replaced by shorter, quarterly semi-negotiated price agreements with the spot market playing an important role in establishing an index base for prices. This development means that the market will be less transparent at least during a transitory period and as a consequence it will be more difficult to accurately track price movements.

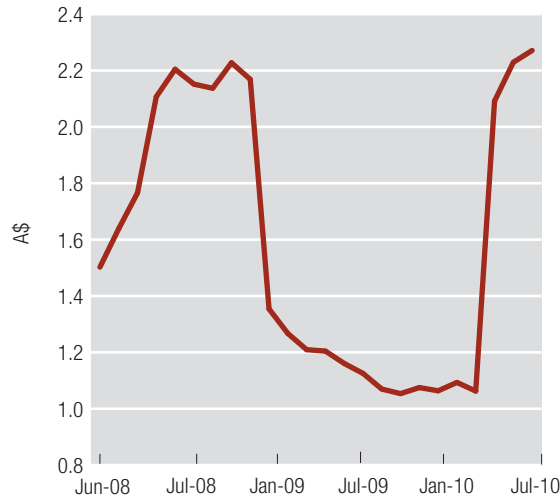


Figure 23 | **Iron Ore Price A\$/Fe unit**  
Source: Tex Report, High Grade Fine Ore Prices

Price is per 1%. An 'Fe unit' is equivalent to each 1% of iron ore. Hence, ore shipped at 63% Fe commands a price of 63 x 'Fe unit price'.

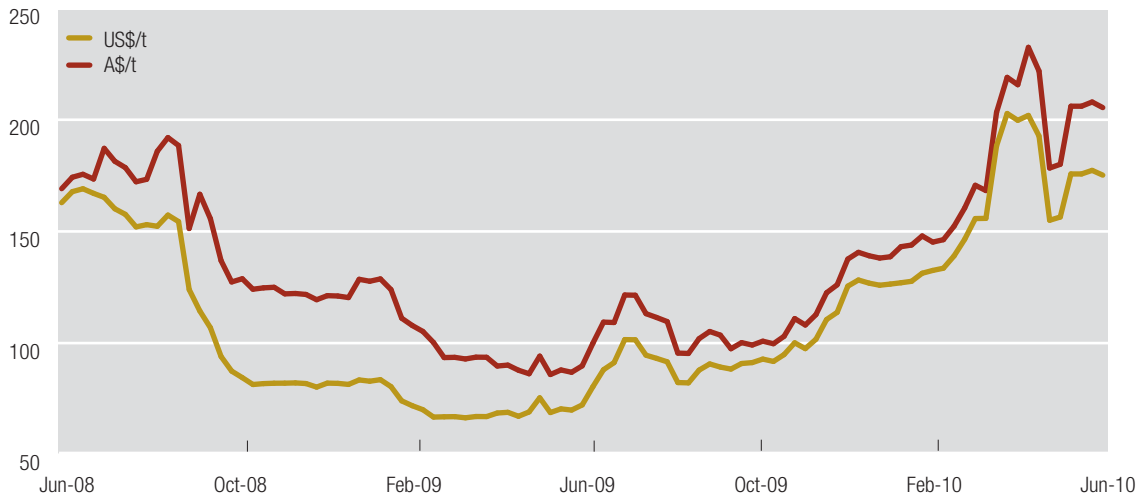


Figure 24 | **Average Iron Ore Fines Spot Price - 62.5 per cent (WA to China)** Source: Interfax China Ltd

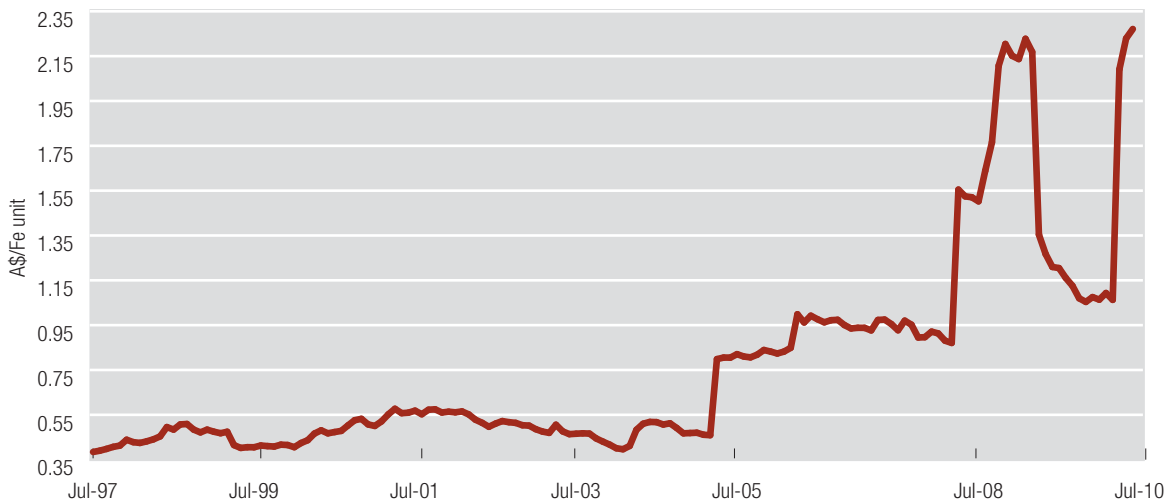


Figure 25 | **Iron Ore Contract Price A\$/Fe unit** Source: Tex Report, High Grade Fine Ore Prices

The new system refers to the cost, insurance and freight (CIF) price, whereas the annual system used the free-on-board (FOB) price, so freight differentials play an important role in the new system.

Strong bargaining on prices continues to exist, with some markets finding it difficult to adapt to the shorter term and more volatile pricing structure that the new system offers.

China will play a pivotal role in the future of the Western Australian iron ore industry. In 2009, China accounted for 67 per cent (628 million tonnes) of total world iron ore imports, an increase of 41 per cent over 2008. Elsewhere, imports generally fell as a result of the economic recession.

The Chinese economy is changing direction toward internal consumption rather than exports. The change is targeted for 2011 to 2015 and will include a strong focus on infrastructure. Demand for iron ore is expected to continue throughout this period with seven trillion yuan (\$1.15 trillion) being earmarked for public works and facilities over this period. This includes one trillion yuan to be devoted to urban railway systems.

During the first two months in 2010, Chinese consumer durables (most of which are not intended for export) grew substantially. Compared with the same period in 2009, production of automobiles increased by 90 per cent, washing machines 48 per cent, refrigerators 46 per cent and air conditioners 28 per cent.

In outright tonnage, China is the world's largest producer of iron ore however, its overall grade is low, averaging less than 30 per cent (compared with many other countries which produce ore with an iron content of above 60 per cent). Adjusting China's iron ore tonnage for content equivalent to the world average, places it in fourth place. Australia currently holds first place, followed by Brazil and then India.

The grade of iron ore in China is one of the most crucial determinants of future demand for iron ore imports into that country. Domestic Chinese iron ore production is sensitive to price. Output is unlikely to increase as grades fall and consequently, costs rise.

Beyond 2010, various forecasts predict that steel use and production will increase at an annual rate of just below four per cent. However, China is pivotal to this outcome given its importance in the global steel market.

Globally, there are a large number of iron ore expansions and projects in the investment pipeline and a considerable amount of capacity could be added over the next two to three years. The market is expected to remain tight over the next couple of years with a gradual adaptation to additional supply, by way of new capacity, to a continuous growing demand. Supply will gradually catch up and prices, whilst declining gradually, should remain relatively historically high.



*Iron Ore Staff, Port Hedland*

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## 2.3 PETROLEUM

In 2009, the Woodside-operated North West Shelf (NWS) project celebrated 25 years of pipeline gas production in Western Australia and 20 years of LNG exports. First discovered in 1970, it was not until September 1984 that first sales of gas were made to the State Energy Commission of Western Australia. First cargoes of LNG to Japan commenced in August 1989 and since that time more than 2800 cargoes of LNG have been delivered to customers in the Asia-Pacific region and other parts of the world.

The total value of all petroleum sales was \$18.8 billion for 2009–10. This represents 27 per cent of the State's total resource value and the State's petroleum industry is the second-most-valuable resource sector after iron ore. Whilst the total value of petroleum sales in 2009–10 was down, twelve per cent on the previous year, its average annual growth rate over the past ten years has been an impressive ten per cent.

Western Australia is the nation's primary petroleum producer, accounting for 72 per cent of conventional natural gas and 74 per cent of crude oil and condensate production.

### Oil and Condensate

Crude oil prices are very sensitive to factors such as geopolitical developments and the influence of the Organisation of Petroleum Exporting Countries (OPEC).

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 and include Algeria, Angola, Ecuador, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, United Arab Emirates and Venezuela.

Record high international oil prices during 2008 came to an abrupt end when the global financial crisis hit in the second half of that year. West Texas Intermediate prices had reached a high of US\$145.29 in July 2008 but plummeted to a low of US\$33.98 by February 2009. This was despite OPEC's cut in production in September 2008 and again on 1 January 2009 in an effort to stabilise the oil price. OPEC continues to maintain reduced levels of production in response to stabilising oil prices.

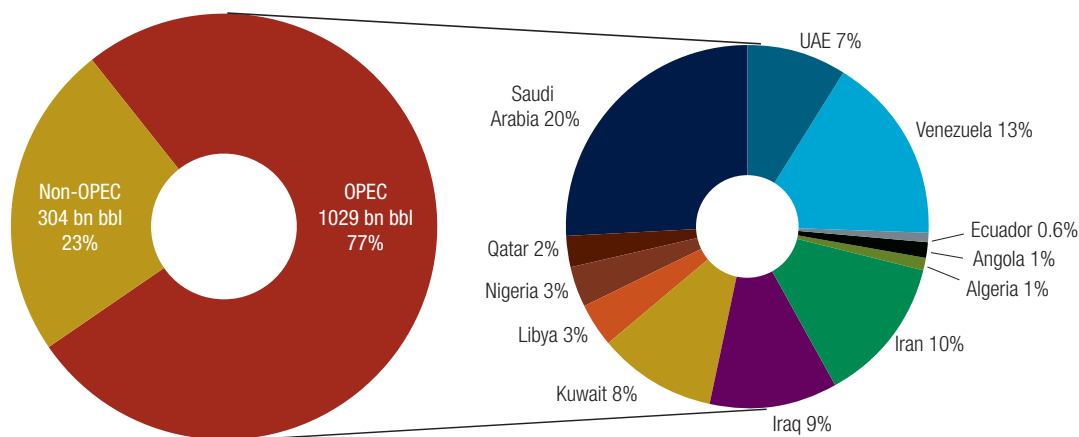


Figure 26 | **OPEC Share of World Crude Oil Reserves (2009)** Source: BP World Energy Statistics 2010  
 Note: Indonesia suspended OPEC membership in 2008 when it became a net importer of oil.

Although the stability of the macroeconomic environment will continue to influence demand and oil prices, in 2009–10, prices made a recovery to average around US\$76 per barrel (up eight per cent on the previous year). Local producers were unable to fully reap the benefits of the higher prices as during 2009–10 the Australian dollar strengthened by around 18 per cent against its US counterpart, averaging US\$0.88. This consequently led to lower export returns.

Against a Western Australian landscape of general decline in output from mature oil fields, crude oil production in 2009–10 continued to decrease, falling by eight per cent to 74.5 million barrels (11.8 million kilolitres). With a strengthening Australian dollar and lower output, the value of crude oil fell by 17 per cent to \$6.4 billion in 2009–10.

Increases from Vincent and commencement of production from Van Gogh and Pyrenees in the first half of 2010 were not enough to compensate for declines in other fields.

BHPB's new Pyrenees US\$1.7-billion oil development in the Exmouth Sub-basin (consisting of the development of the Crosby, Ravensworth and Stickle oil fields) commenced production ahead of schedule late in the first quarter of 2010. A joint venture between BHPB (operator) and Apache Corporation, Pyrenees is located in production licence WA-42-R and is expected to have a production life of 25 years. This development comprises a floating production, storage and offloading (FPSO) vessel capable of producing about 96 thousand barrels of oil per day.

Part of the Ravensworth field is located in production licence WA-43-L with BHPB as operator and Apache Corporation and Inpex as joint venture partners. This separate segment of the Pyrenees project will have its own wells and gathering system.

Gas produced by the Pyrenees development will be re-injected into the reservoir of the nearby Macedon gas field for future recovery.

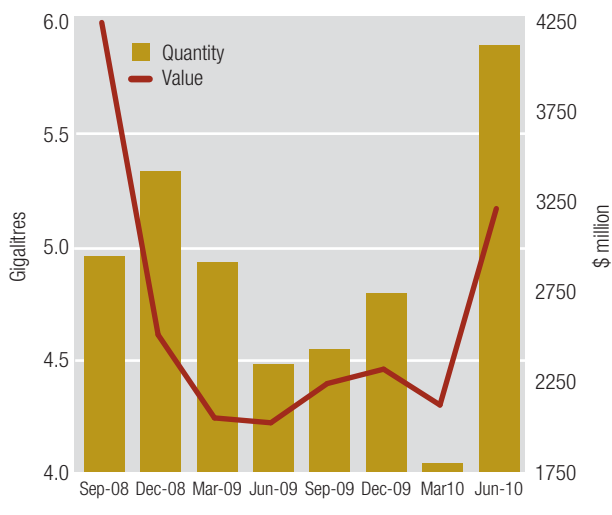


Figure 27 | **Crude Oil and Condensate Quantity and Value by Quarter** Source: DMP

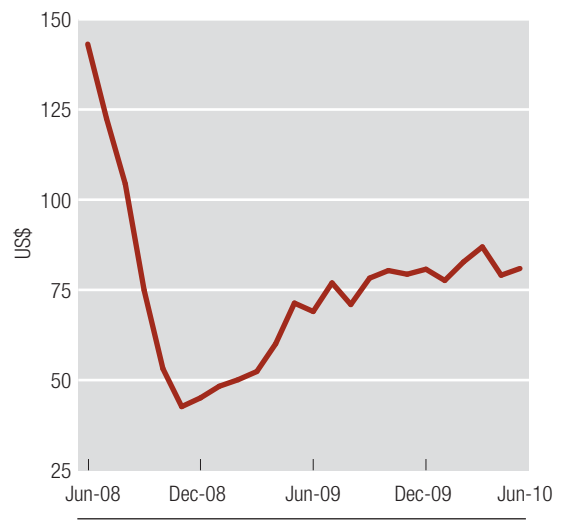


Figure 28 | **Tapis Crude Oil Price US\$/bbl** Source: WA Treasury Corporation

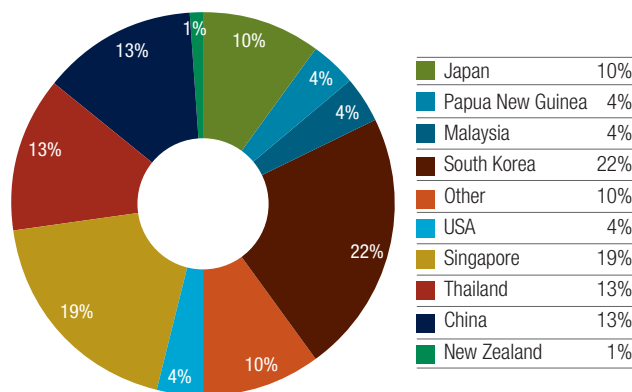


Figure 29 | **Crude Oil and Condensate Exports - Total Value \$8.8 Billion** Source: DMP and ABS

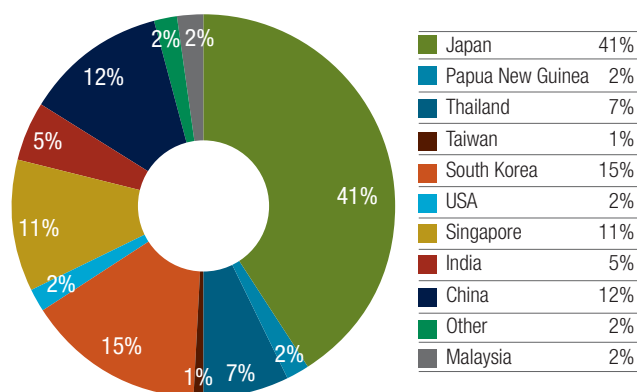


Figure 30 | **Petroleum Exports – Total Value \$15.7 Billion**  
Source: DMP and ABS

Van Gogh is located in Production Licence WA-35-L in the Exmouth Basin, 53 kilometres north-northwest of Exmouth and is part of the greater Vincent field. First discovered in 2003, it is operated by Apache Energy with Inpex owning an interest. Apache utilises an FPSO vessel, the Ningaloo Vision, which has a capacity to process 150 thousand barrels of liquids per day and store 540 thousand barrels of oil. Van Gogh is expected to have a life of between 12 and 15 years.

The amount of condensate sold during 2009–10 increased to 46.7 million barrels (7.4 million kilolitres), representing an 11 per cent increase compared to the previous year. The majority of this increase came from a full year's production at the Angel field which commenced production in the last quarter of 2008 and accounted for 33 per cent of condensate production in 2009–10. Angel's condensate production of up to 50 thousand barrels per day utilises existing North West Shelf facilities. In sales value terms, total State condensate output was worth \$3.5 billion, an increase from the previous year of 13 per cent reflecting higher prices for the period.

The volume of LPG (butane and propane) sold increased by almost 13 per cent to 975 752 tonnes, however due to the strengthening Australian dollar and softer prices, the value decreased by 14 per cent to \$747 million.

## Liquefied Natural Gas (LNG)

### Western Australia

All LNG from Western Australia originates from the NWS joint venture project in Karratha which comprises five LNG production trains. Commissioned in September 2008, the 4.4-million-tonne-per-annum fifth train is Australia's largest single LNG production unit and boosts the NWS's total annual capacity to 16.3 million tonnes.

LNG output increased in 2009–10 by almost 13 per cent to 15.7 million tonnes. However, the value of sales fell by 19 per cent to \$6.9 billion. This resulted in LNG moving into second place, behind iron ore, in terms of value to the State. Again, exchange rate differentials played a large part in the lower revenue result for 2009–10.

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

In July 2007, Woodside's Board approved funding for the development of the Pluto LNG Project. The \$12-billion project is expected to become the fastest developed LNG project, from discovery in 2005 to the delivery of first gas in early 2011. The joint venture includes Woodside (90 per cent), Tokyo Gas (five per cent) and Kansai Electric (five per cent).

The project is based on the Pluto field located about 190 kilometres northwest of Karratha. It will later seek to incorporate the adjacent Xena gas field. It is estimated that these two fields contain a total recoverable reserve volume of five trillion cubic feet of gas.

The initial phase will include a single LNG train, forecast to produce 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.

In November 2009, Woodside awarded Front-end Engineering Design contracts for trains 2 and 3 which will ultimately triple output and increase capacity to 12.9 million tonnes per annum. This expansion will require an investment of a further \$8 billion. In 2010, the project is in transition from construction to the commissioning phase in preparation of first gas from the field in the first quarter of 2011.

Included in the project plan is funding towards additional infrastructure to facilitate future expansion for other Woodside or third-party gas, allowing the onshore plant to operate as an open-access facility with additional LNG trains.

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. Tokyo Gas and Kansai Electric 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).

### Gorgon

In September 2009, Chevron, as operator, announced that it will proceed with the development of the Gorgon project located off the northwest coast of Western Australia. 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 (one per cent) and Chubu Electric (0.417 per cent) make up the balance.

The project will comprise three LNG trains, capable of producing a combined 15 million tonnes per annum. An associated domestic gas plant will also provide 300 terajoules per day to Western Australia. This infrastructure is being constructed on Barrow Island and will also incorporate international shipping facilities.

Over \$20 billion in contracts have already been awarded for design, manufacture, delivery and commissioning and construction is well underway including initial accommodation, general utilities, telecommunications, site preparation and site development. 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.

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. Successful implementation of this would make the Gorgon project one of the first projects worldwide to implement geosequestration commercially.

### Wheatstone

Chevron, as operator of the Wheatstone project (holding an approximate 75 per cent interest), plans to develop two LNG processing trains each with a capacity of 5 million tonnes of LNG 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.

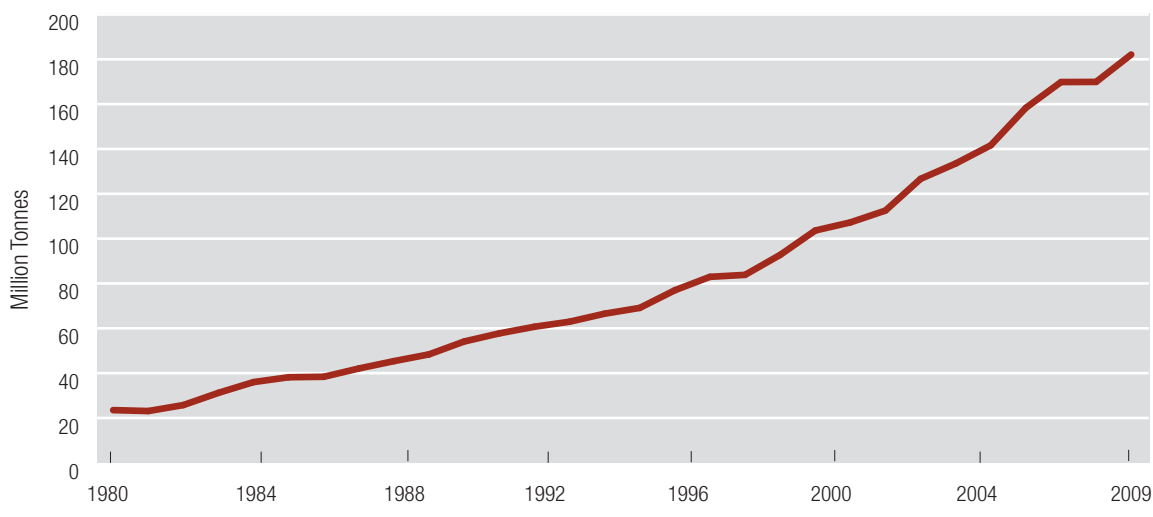


Figure 31 | World LNG Imports 1980 - 2009 Source: CEDIGAZ, EIA and BP World Statistics

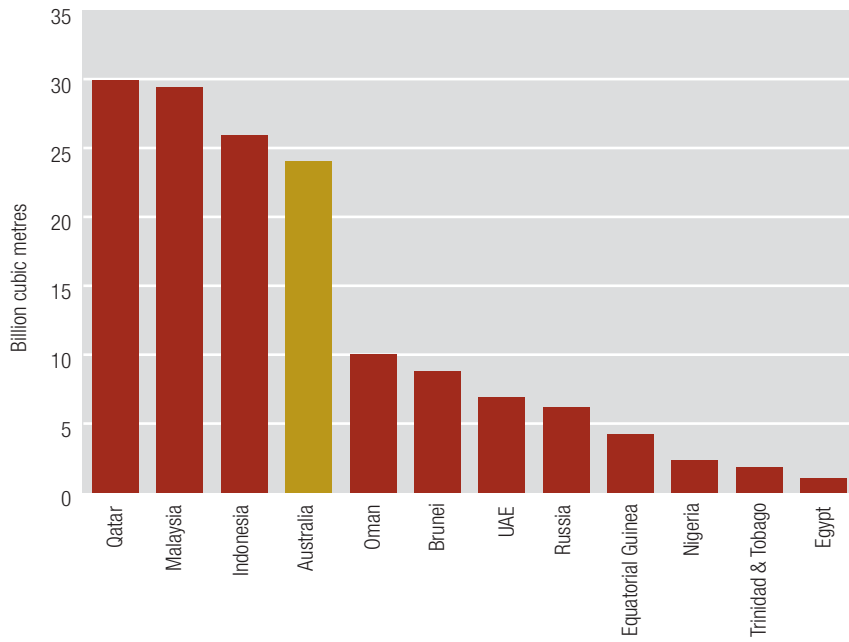


Figure 32 | **Asia-Pacific Region LNG Imports 2009 by Exporting Country**  
Source: BP World Energy Statistics 2010

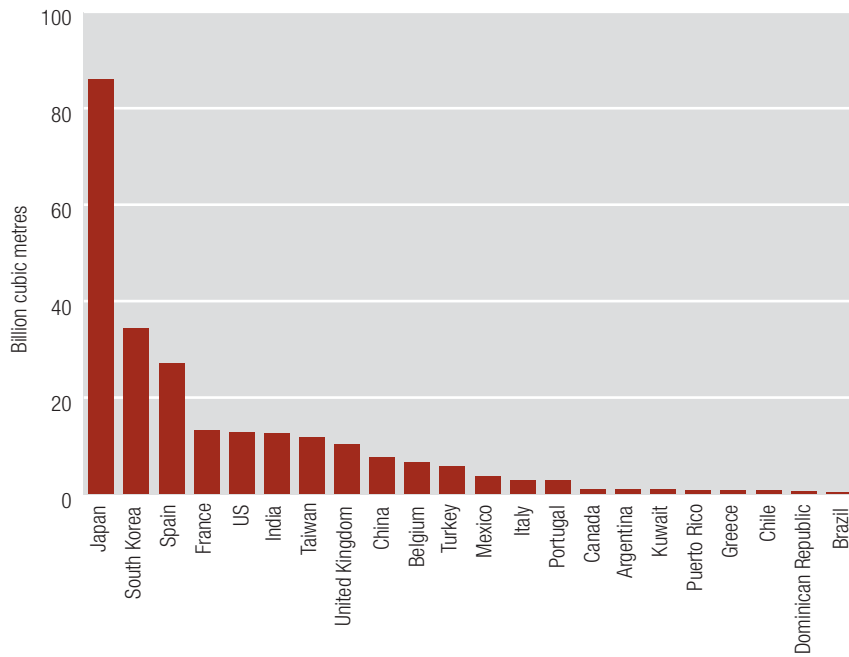


Figure 33 | **Countries Importing LNG in 2009**  
Source: BP World Energy Statistics 2010

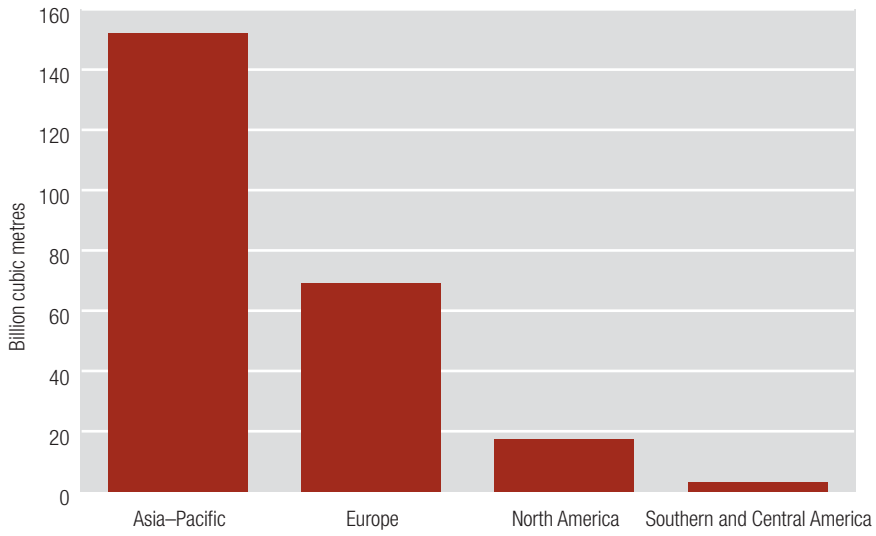


Figure 34 | **World LNG Imports by Region 2009**  
Source: BP World Energy Statistics 2010

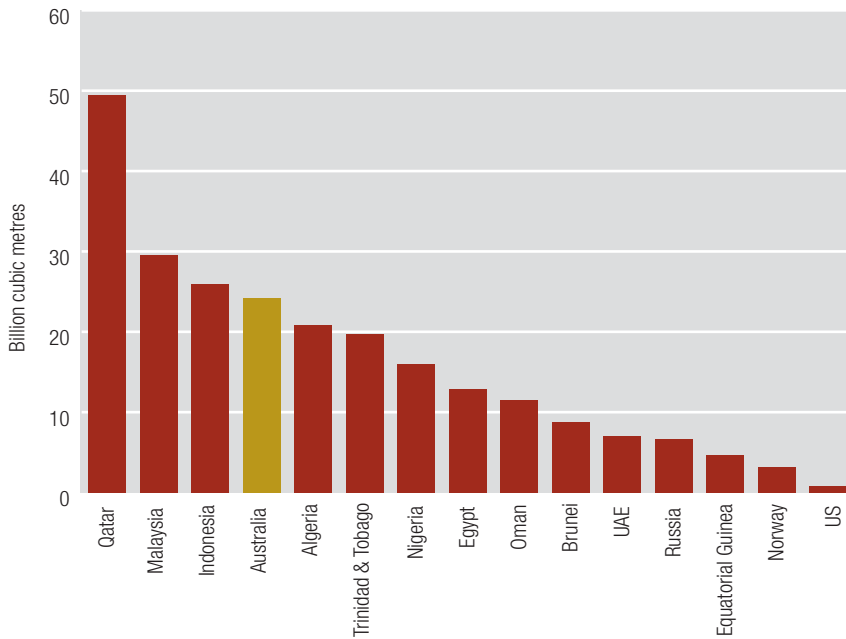


Figure 35 | **World LNG Ranking 2009**  
Source: BP World Energy Statistics 2010

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. Common use infrastructure will lower the economic hurdle for developing existing and future gas resources in the West Carnarvon Basin.

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 per annum from Wheatstone. Kogas is the largest LNG buyer in the world.

A final investment decision on Wheatstone is slated for 2011.

### Browse Basin

The Browse Basin lies entirely offshore approximately 425 kilometres north of Broome and covers about 140 000 square kilometres. The Browse Basin's P50 (50 per cent certainty of recovery) resources are estimated at 35.2 trillion cubic feet as of 2009. All Browse Basin fields are currently undeveloped, primarily due to their isolated location 300 kilometres from the mainland in water depths of 300–500 metres.

Exploration commenced in the Browse Basin in 1967 when the Burmah Oil Company Australia Ltd acquired 1600 kilometres of regional seismic data. To date, over 71 thousand kilometres of seismic data has been acquired, the majority of which is now publicly available.

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

Woodside as operator, in partnership with BP, BHP Billiton, Chevron and Shell, is considering development options for the Torosa, Brecknock and Calliance fields. Combined, these fields contain an estimated 13.3 trillion cubic feet of gas and 360 million barrels of condensate (as at December 2009).

The partners are targeting mid-2012 to enable a final investment decision. Woodside's 15 million tonnes per annum proposed Browse Basin LNG development is expected to require an infrastructure investment of approximately \$15 to \$25 billion.

Shell has a separate proposal for development of their Browse Basin's Prelude and Concerto fields which entails using its innovative floating liquefied natural gas technology (FLNG). This would involve a single vessel with processing and gasification capability moored in the direct vicinity of the field. At 600 thousand tonnes the Prelude production vessel will be the world's largest vessel and the world's first operational FLNG development. This would permit Shell to export directly from the Prelude field, without using onshore facilities. The proposed FLNG would have a capacity to produce around 3.5 million tonnes of LNG per annum. Shell plans to make a final investment decision in 2011 with possible production starting in 2016.

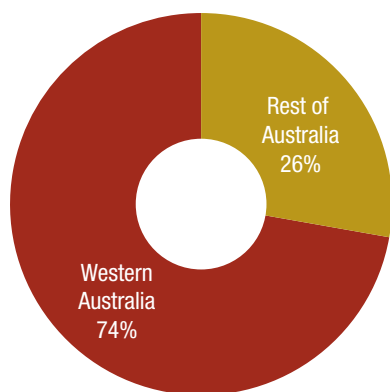


Figure 36 | **Crude Oil and Condensate Production 2009–10**  
Source: DRET

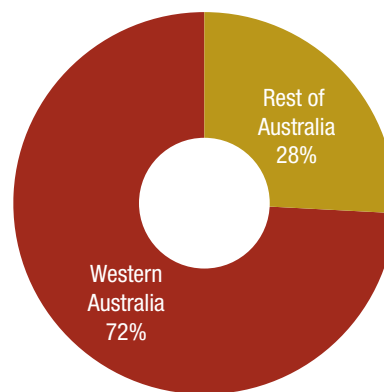


Figure 37 | **Natural Gas Production 2009–10**  
Source: DRET (Data includes LNG feedstock)

INPEX has also proposed to develop the Ichthys field for LNG export at a rate of eight million tonnes per annum. The company estimates resources of 12.8 trillion cubic feet of gas and 527 million barrels of condensate. Inpex has selected Middle Arm Peninsula at Blaydin Point in Darwin Harbour as the preferred site for development of the 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.

#### 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 Exxon Mobil (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 two and three trillion cubic feet of gas.

## Natural gas – domestic sales

### Western Australia

The quantity of domestic natural gas sales for 2009–10 increased from the previous year by nine per cent to 9.4 billion cubic metres. This increase was largely due to the Varanus Island fields being back in production, together with a full year's output from the new Angel field. Angel is remotely-operated and situated in 80 metres of water, approximately 49 kilometres east of Woodside's existing North Rankin production facility.

The value of sales increased by seven per cent to reach \$1.3 billion.

This value 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 fell two per cent in 2009–10 and averaged \$3.71 per gigajoule. The average annual growth rate of domestic gas prices during the past ten years has been five per cent.

Future domestic gas production is expected to increase with new fields such as Reindeer coming into production. First gas from this development is expected to flow at a rate of 110 terajoules per day in the fourth quarter of 2011. Reindeer will also supply around 500 barrels per day of condensate.

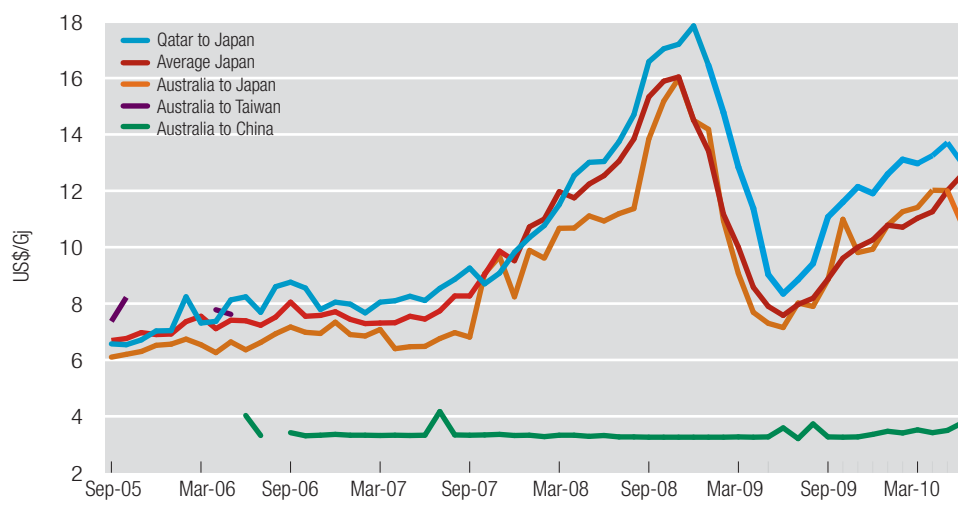


Figure 38 | **LNG Import Prices** Source: Argus Monthly LNG (Prices include freight and regassing)



Apache (55 per cent) and Santos (45 per cent) are responsible for the project, which is located offshore in permit WA 209 P in the Carnarvon Basin, approximately 45 kilometres southwest of Dampier. Sales gas is to be compressed and delivered to the Western Australian domestic market via the DBNGP. Onshore facilities are to be located near Dampier at Devil Creek.

Apache and Santos have confirmed plans to develop their Halyard field in the Carnarvon Basin which also could be in production by mid-2011. Gas from Halyard will be transported via a pipeline to Varanus Island for processing as domestic gas.

BHP Billiton has approved US\$1.5 billion for the development of the Macedon gas field located 50 kilometres north of Exmouth and estimated to contain 1.2 trillion cubic feet of natural gas. First production is expected during 2013.

Macedon was previously not viable for development due to the minimum quality gas specifications required on the DBNGP, which prevented supply of Macedon's gas through the pipeline. However, in August 2009 the State Government introduced legislation to widen the specification for gas that would be permitted to access the DBNGP and as a consequence, BHPB is progressing the development of Macedon.

In another development, Empire Oil and Gas are looking to commercialise its Gingin West-1 discovery in the Perth Basin. Gingin West-1 is the largest gas flow in

the area and is the closest discovery to Perth. Empire will continue with extended production tests until a Production Licence is granted. Gas could be transported via either of the adjacent pipelines (DBNGP or the Parmelia Pipeline).

Gas production may also be boosted in 2013 with the anticipated completion of the North Rankin Redevelopment Project. The project aims to recover remaining low-pressure gas from the North Rankin and Perseus gas fields and extend the lives of North West Shelf fields.

The project includes installation of a second platform (North Rankin B) which will be connected by a 100-metre bridge to the existing North Rankin A platform. The project will also include linking and refurbishment of North Rankin A. Upon completion both platforms will be operated as a single integrated facility, known as the North Rankin Hub.

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.

In April 2009, in response to increased demand, the DBNGP completed the final stage of a \$1.8-billion expansion program (which commenced in 2005) increasing the pipeline's capacity by some 50 per cent.

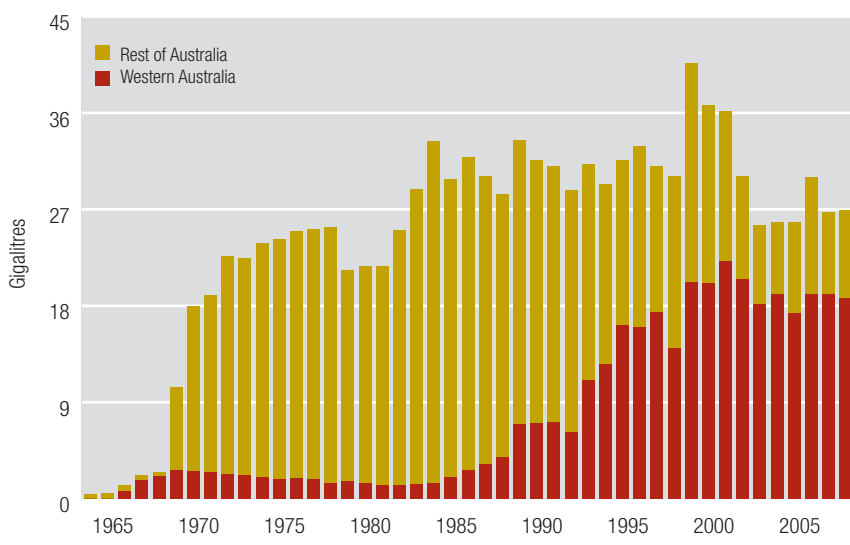


Figure 39 Crude Oil and Condensate Quantity up to 2009

Source: DMP and ABARE

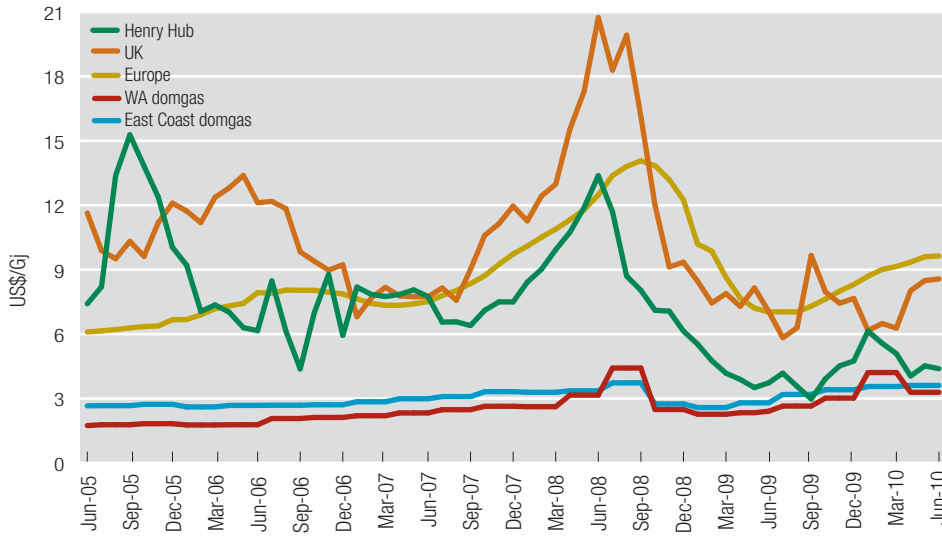


Figure 40 | **Average Natural Gas Prices** Source: Argus Monthly LNG, EnergyQuest, DMP

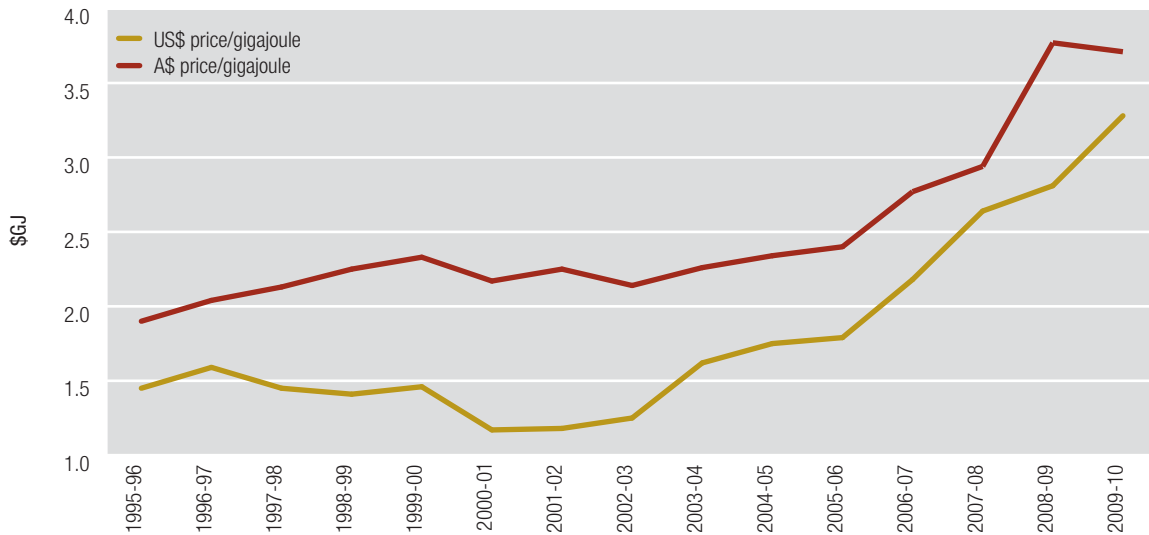


Figure 41 | **Western Australian Average Domestic Natural Gas Price** Source: DMP

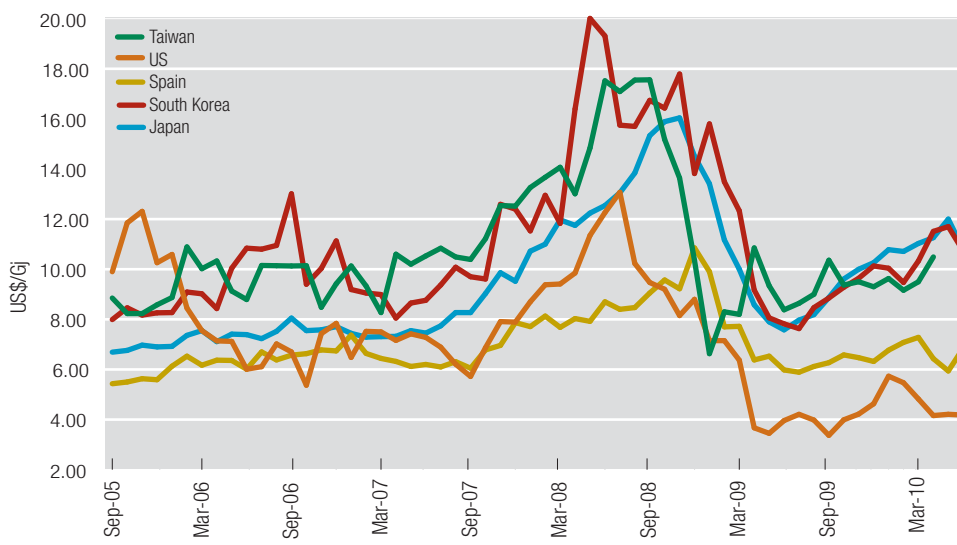
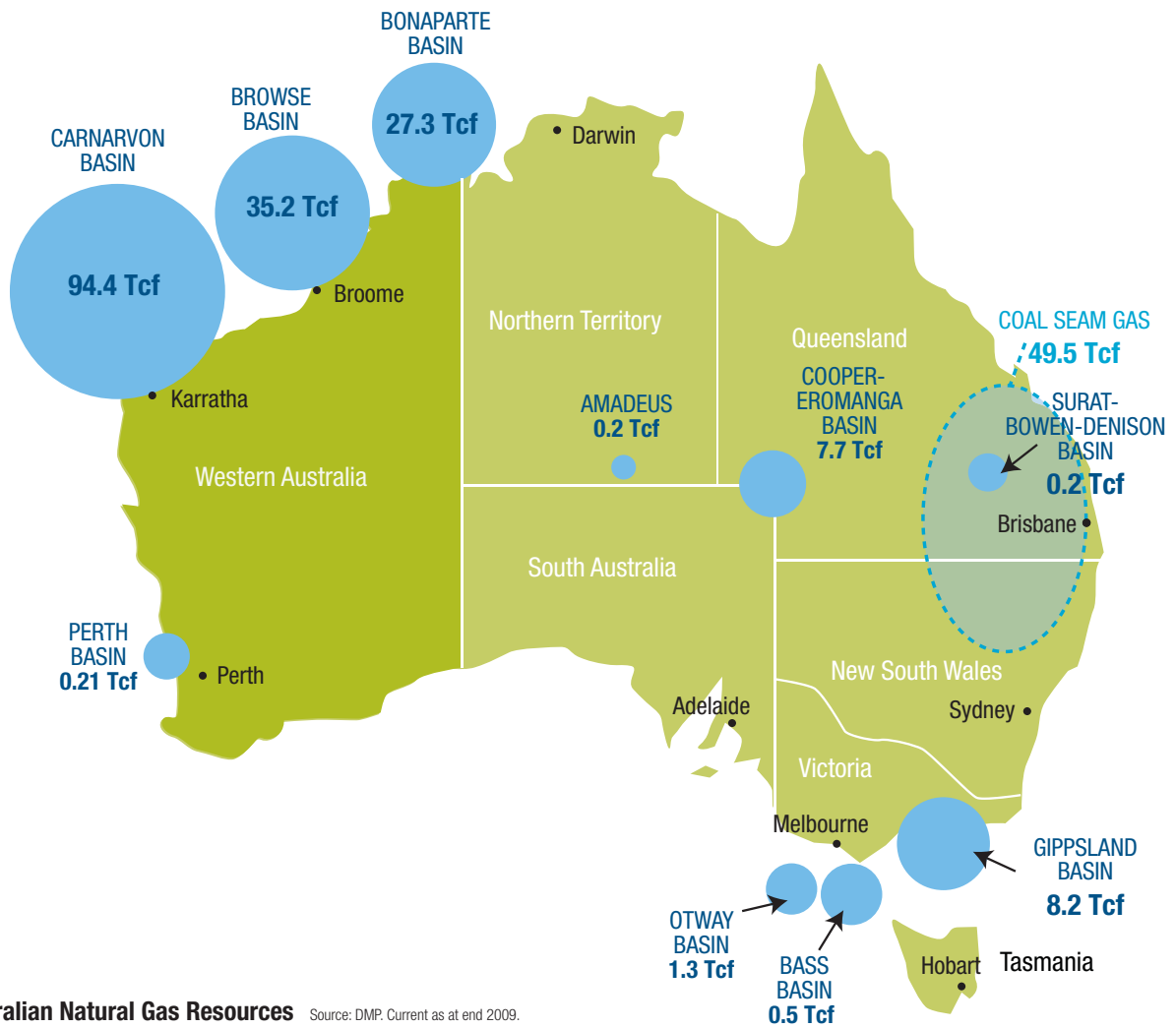


Figure 42 | **Average LNG Import Prices** Source: Argus Monthly LNG (Prices include freight and regassing)



Map 3. Australian Natural Gas Resources

## 2.4 GOLD

In 2009–10, the State's gold sector set a new record with sales valued at \$6.6 billion. It represents a 26 per cent increase from the previous year. Gold accounted for nine per cent of all mineral and petroleum sales in Western Australia in 2009–10.

Gold is a unique commodity given its dual character as a commodity and a monetary asset. Over the past ten years the gold price has risen over five-fold from a low just above US\$250 per ounce to an all-time record of US\$1309 per ounce in late September 2010. Uncertainty has been the friend of gold and the recent challenging global economic conditions have worked in its favour.

The gold price averaged US\$1091 per ounce in 2009–10, representing a 25 per cent increase from 2008–09. In Australian dollar terms, the gold price averaged AU\$1236 per ounce in 2009–10 which is six per cent higher than the previous year.

In 2008–09 Western Australian gold production had fallen to its lowest level in 20 years. This was a reflection of lower production from large established mines and the closure of several older mines.

However, in 2009–10, the State's gold output increased by 20 per cent to 164 tonnes or 5.3 million ounces. Over the same period, Australia's gold production increased by ten per cent to 239 tonnes (7.7 million ounces). In 2009–10, Western Australia accounted for around 71 per cent of Australia's gold production.

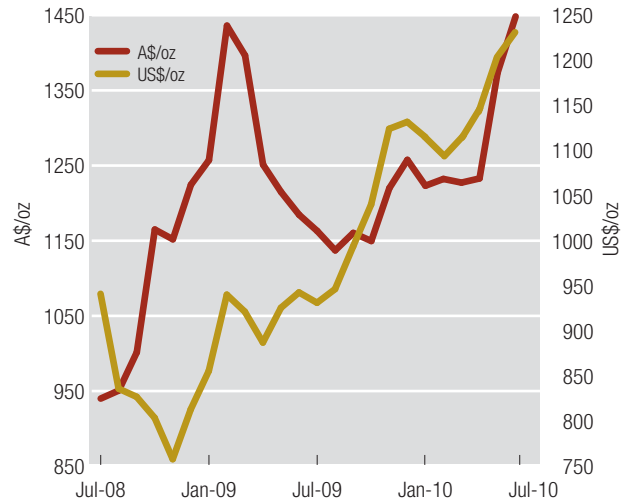


Figure 43 | **Gold Price** Source: Perth Mint and London Fix

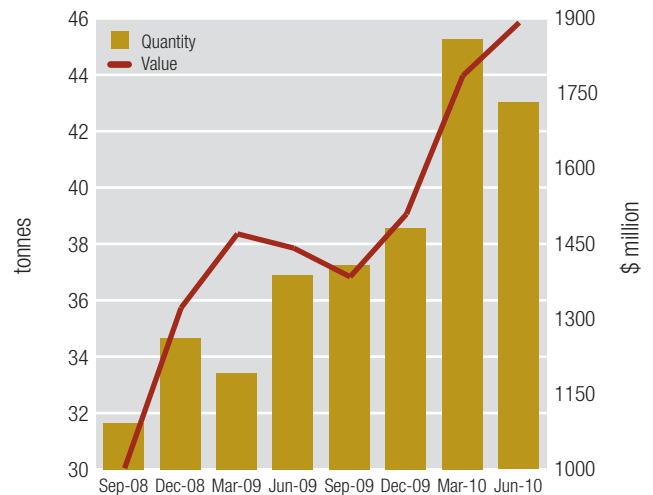


Figure 44 | **Gold Quantity and Value by Quarter** Source: DMP



Figure 45 | **Historic Gold Price, US\$/A\$ Per Ounce** Source: World Gold Council, Perth Mint and London PM Fix

Western Australia's ten largest projects accounted for 70 per cent of the State's gold output in 2009–10. These projects comprised:

- Golden Mile (Kalgoorlie Consolidated Gold Mines Pty Ltd (KCGM)) – 23.5 tonnes
- Telfer Gold (Newcrest Mining Limited) – 20.8 tonnes
- St Ives (Gold Fields Ltd) – 13.1 tonnes
- Sunrise Dam (AngloGold Ltd) – 12.7 tonnes
- Jundee Ninary (Newmont Mining Corp) – 12.1 tonnes
- Boddington (Newmont Boddington Gold Pty Ltd) – 11.9 tonnes
- Kanowna Belle (Placer Dome Inc) – 6.1 tonnes
- Higginsville (Avoca Resources Limited) – 5.7 tonnes
- Agnew (Gold Fields Ltd) – 5.1 tonnes
- Kundana East (Barrick Gold Corporation) – 4.3 tonnes
- Paddington (Barrick Gold Corporation) – 4.3 tonnes.

Gold exports from the State totalled \$13.7 billion in 2009–10; however only 47 per cent of this amount (\$6.6 billion) is attributable to Western Australian mines (see Gold Export update 2009–10 in this section). India is the State's largest gold export destination accounting for 52 per cent of total gold exports. The United Kingdom was second with 30 per cent, followed by Thailand with ten per cent. Singapore and South Korea each took three per cent with a host of other countries making up the 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 2009–10

The Australian Bureau of Statistics (ABS) releases Western Australian export trade data that is 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. Therefore gold export data published by the ABS from Western Australia 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 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 2009–10 amounted to approximately \$13.66 billion. Approximately 47 per cent or \$6.56 billion was gold produced in Western Australia. The remaining 53 per cent (approximately \$7.1 billion) can be attributed to gold refined and exported from Western Australia but produced from mining operations in other States, Territories and from overseas. Overseas-imported gold also includes scrap which is refined in Western Australia and exported.

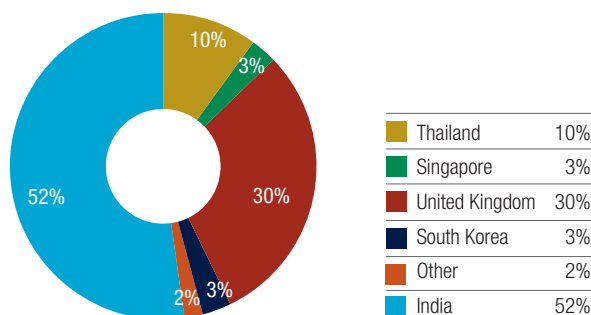


Figure 46 **Gold Exports – Total Value \$13.66 Billion** Source: ABS and DMP  
*Note: Includes gold refined/processed and exported from Western Australia, but produced from mining operations in other States, Territories and overseas.*

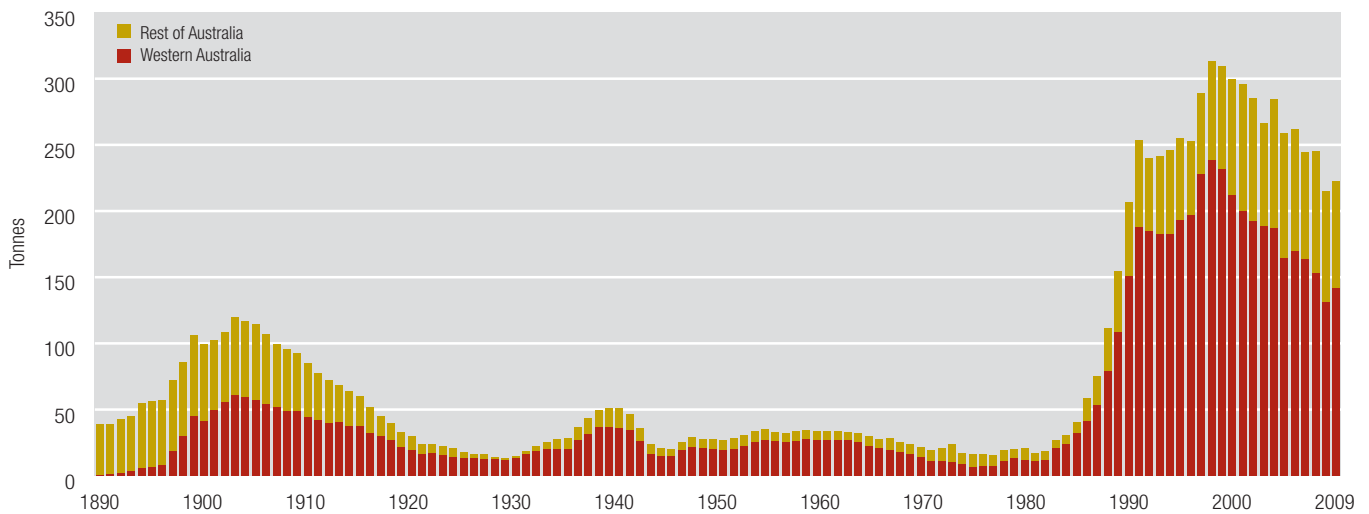


Figure 47 | **Gold Production up to 2009** Source: DMP and ABARE

In general, forecasts indicate that gold prices are to remain relatively high over the short to medium term. This has been supported by continued financial market and global economic uncertainty which is fuelling European and US investment in gold. Demand for gold was also expected to be strong entering into 2011, due to growing demand for jewellery in China and India.

In addition, the rising gold price has been underpinned by investor concerns regarding European sovereign debt issues and weakness in the US dollar associated with an easing of monetary policy. High prices are making for a positive outlook 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.

- Newmont Mining Corporation's Boddington gold mine near Pinjarra poured its first gold in September 2009. Boddington has a mine life of more than 20 years with capacity to produce in excess of 900 thousand ounces of gold per year and will soon challenge the Kalgoorlie Super Pit as Australia's leading gold producer.
- Kalgoorlie Super Pit – Kalgoorlie Consolidated Gold Mines Pty Ltd (KCGM) commenced the deepening of the Super Pit to 600 metres. This will extend the life of the open-cut mine by up to ten years. The Super Pit sits on the outskirts of Kalgoorlie–Boulder and is the largest producing gold mine in Australia.

- First ore from Norton Gold Fields' underground mine expansion at its Paddington Gold operations was delivered in November 2009. The company is aiming to produce 50 thousand ounces of gold per year starting in 2010, which will be in addition to the 100 thousand plus ounces produced annually from the open-cut operations at Paddington.
- Catalpa Resources Limited commissioned its \$92 million Edna May Gold mine located near Westonia in May 2009. It is expected to produce over 100 thousand ounces a year for a mine life of around six years.
- Saracen Mineral Holdings Ltd's South Laverton gold commenced production at its Carosue Dam mine in the first half of 2010. The company plans to achieve gold production in excess of 100 thousand ounces per annum.
- In March 2010, A1 Minerals Ltd poured its first gold from its Bright Star mine located near Laverton. The company aims to produce at a rate of 30 thousand ounces per annum.
- The re-commissioning of Navigator Resources Ltd's Bronzewing mine was completed in April 2009. Navigator aim to produce 100 thousand ounces per year over a five-year period from its Bronzewing mine which is located 80 kilometres northeast of Leinster.

- Regis Resources plans to be in production from their Duketon gold mine in the second half of 2010. Regis aims to produce an average 90 thousand ounces of gold annually for a period of at least six years.
- Integra Mining Ltd's Randalls Gold mine located east of Kalgoorlie will be in production in the second half of 2010. The first stage of the project is expected to produce approximately 75 thousand ounces of gold per annum over four years. Capital costs for the open pit operation are estimated at \$64 million.
- AngloGold Ashanti Ltd's and joint venture partner Independence Group NL are undertaking a bankable feasibility study of the Tropicana Gold project located northeast of Kalgoorlie. The capital cost of the project is \$500 million with a target production rate of 400 thousand ounces a year. Construction could start in the second half of 2010 with production commencing in the first half of 2013.
- Range River Gold have announced that it will reopen the Transvaal and Westralia underground mines at Mt Morgans and develop a further mine at Craic. The company plans on delivering around 215 thousand ounces of gold from these three mines over five years.

Once fully operational these mines alone could contribute up to 2.6 million ounces (82 tonnes) annually. Although perhaps not sufficient to reach the peak production of the nineties, the next five years could see these old records challenged.

World gold mine production reached 2570 tonnes in 2009 which was seven per cent higher than 2008 and only 70 tonnes below the record of 2640 tonnes in 2001. Although Australia is the world's second-largest gold producer, China's gold industry continues to expand even more rapidly with output reaching 159 tonnes in the first half of 2010, compared with Australia's production of 128 tonnes for the same period.

## 2.5 NICKEL

Western Australia is the sole producer of nickel in Australia. Output for the State in 2009–10 totalled 177 033 tonnes, 1352 tonnes lower than in 2008–09. Despite this, the corresponding value of sales increased over 2008–09 levels by 36 per cent to nearly \$4.1 billion.

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.
- 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. Total announced mineral resources for Flying Fox (excluding Lounge Lizard) and Spotted Quoll deposits are 3.9 million tonnes at an average grade of 5.3 per cent nickel containing 208 thousand tonnes of nickel.

Overall, Western Areas' Forrestania Nickel Project will comprise five mines by 2011, with a targeted production around 35 thousand tonnes of nickel per annum.

Leading up to this, the capacity of Western Areas' Cosmic Boy concentrator was successfully expanded and commissioned during the June quarter of 2010.

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

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 2009–10, 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, in September 2010 Fox Resources Ltd announced its intention to return to production at its Radio Hill nickel mine in the near term.

Earlier in February 2010, First Quantum Minerals Ltd finalised its acquisition of BHP Billiton's Ravensthorpe nickel exploration. The Ravensthorpe project includes an open cut mine and hydrometallurgical process plant. The project is expected to be commissioned in early 2011 and First Quantum is anticipating initial annual average production of 39 thousand tonnes.

World nickel prices finished 2008–09 at an average of US\$13 366 per tonne (US\$6.06 per pound). In 2009–10, the price of nickel continued a general upward trend to average US\$19 415 per tonne (US\$8.81 per pound). Despite appreciation of the Australian dollar during 2009–10, local producers still managed to achieve higher prices with an average of A\$21 984 per tonne (compared to A\$17 626 per tonne in 2008–09).

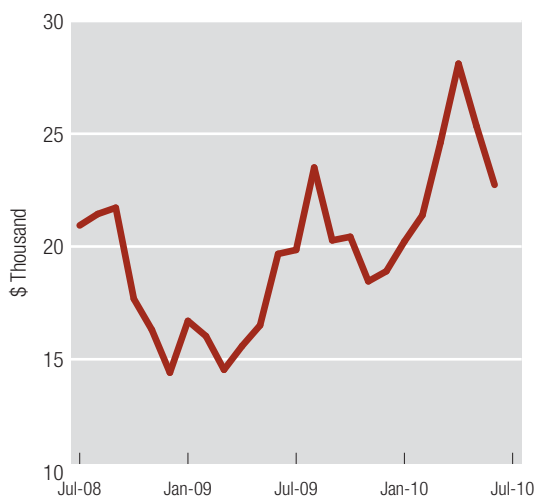


Figure 48 | **Nickel Price A\$/tonne**  
Source: LME Cash, Monthly Average

In April 2010 Reuters reported that Chinese manufacturers were re-exporting some imported refined nickel stocks as the uptake of nickel pig iron amongst mills continued to increase. This utilisation of nickel pig iron has seen refined nickel being used as an additive rather than the main raw material.

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. Other impurities include silica, phosphorus, sulphur, chromium and carbon.

The option to use lower-cost nickel pig iron tends to act as a ceiling on the nickel price at around \$8 per pound. However, higher production costs mean that it is not a viable long-term solution.

The recovery of prices for nickel in 2009–10 was to some extent passed on to stainless steel, which accounts for 60 per cent of world nickel use. Between June and August 2010, stainless steel prices increased by 8.7 per cent, representing a total increase for the year of 20 per cent, although this was also reflective of increased demand.

The Economist Intelligence Unit (EIU) has been watching developments in the Chinese market with the expectation it will drive nickel's demand in 2011. However, it expects that consumption in the US, Japan and the European Union for 2011 will remain below 2006 levels. In terms of supply, the EIU is expecting the start-up of projects in Caledonia, Indonesia and Madagascar to raise global output in 2010–11.

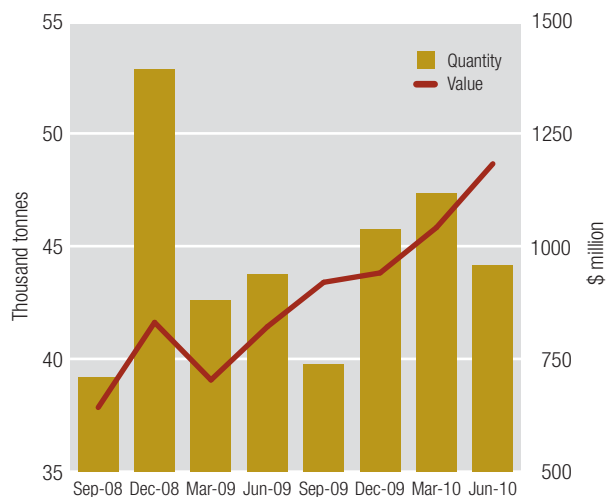


Figure 49 | **Nickel Quantity and Value by Quarter**  
Source: DMP



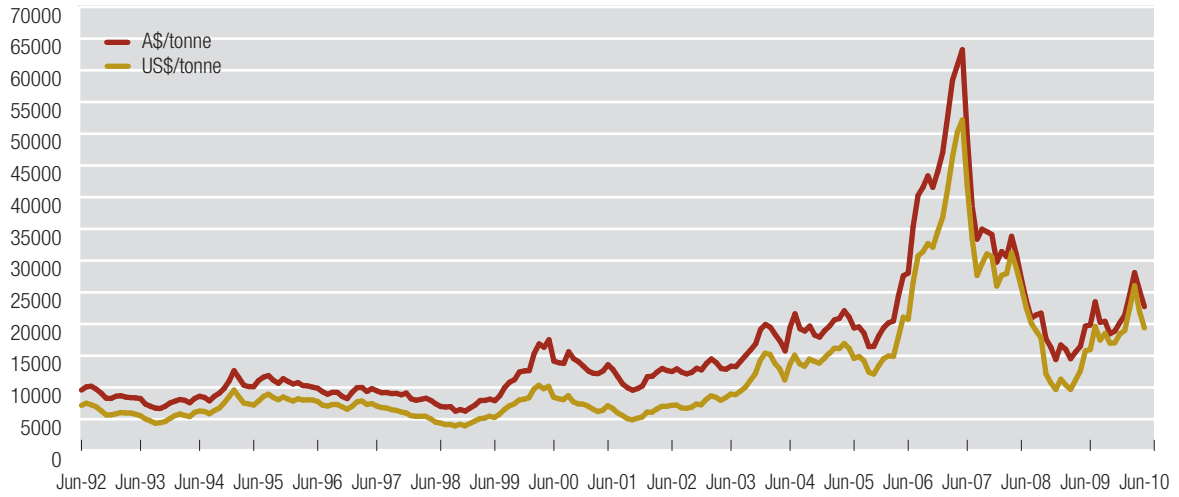


Figure 50 | **Historic Nickel Price** Source: LME

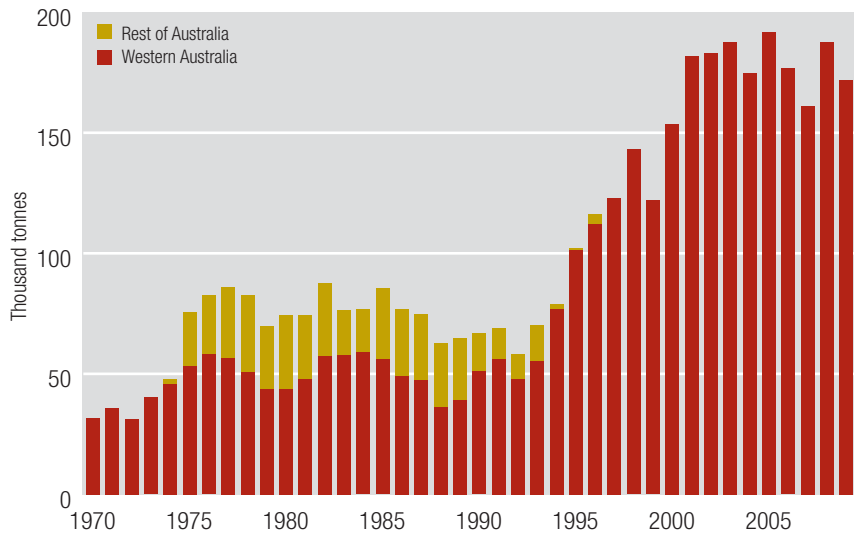


Figure 51 | **Nickel Quantity up to 2009** Source: DMP and ABARE



*The Murrin Murrin Nickel and Cobalt Joint Venture, Northern Goldfields Region of Western Australia*

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## 2.6 ALUMINA

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, making alumina the largest single component of the cash cost of producing aluminium.

With a total sales value of \$3.8 billion in 2009–10, alumina was the fifth-largest sector of the State's resources industry and represents one of the State's key value-added products. Even though a slightly greater quantity was sold, the total value was down from \$4.6 billion from that in 2008–09, due to lower prices received in the wake of the global financial crisis, together with the strengthening Australian dollar.

The alumina price, in Australian dollar terms, increased steadily over the year from \$269 per tonne in July 2009 to \$340 per tonne in June 2010, averaging \$301 per tonne. This is still well down, however, on the average price of \$369 per tonne achieved in 2008–09. The key driver of this recovery was the increasing price of aluminium, driven by improving economic conditions in the latter part of 2009 and reductions in production caused by the temporary closure of a number of smelters.

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.

While the aluminium price averaged US\$2018 over 2009–10, up from US\$1866 per tonne in 2008–09, it was still significantly lower than the peak of US\$3292 per tonne in July 2008.

Australia is the world's largest bauxite producer and the second-largest producer of alumina. In 2009–10, Western Australia produced 63 per cent of the country's total alumina output, with growth in production remaining close to its long-term growth rate of around three per cent per annum. Reserves of bauxite ore are sufficient to last more than 50 years at current production levels.

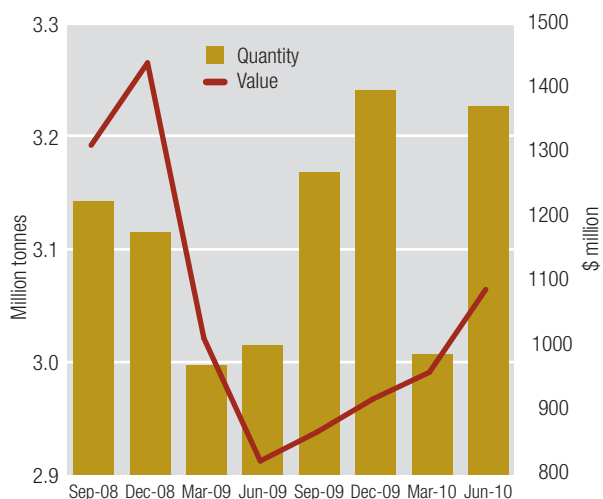


Figure 52 | Alumina Quantity and Value by Quarter  
Source: DMP

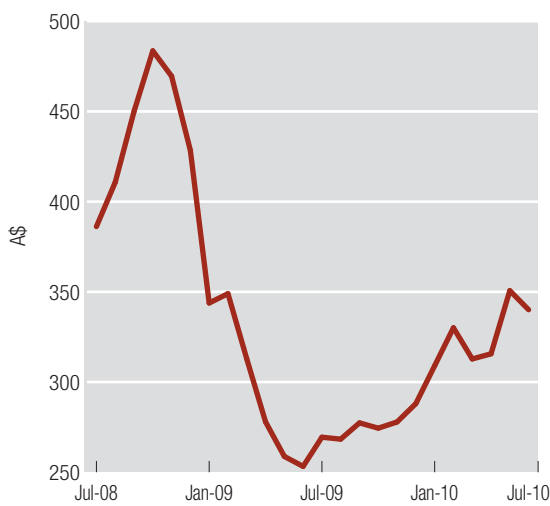


Figure 53 | Alumina Price – A\$/tonne Source: ABS

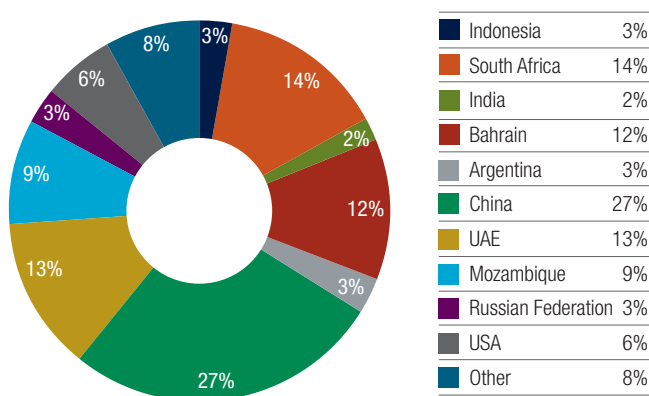


Figure 54 | Alumina Exports – Total Value \$3.66 Billion Source: DMP

Current production of alumina is focused in the South West of the State, with the Darling Scarp containing considerable deposits of bauxite. The 12.6 million tonnes of alumina sold in 2009–10 was accounted for by two producers: Alcoa World Alumina and Worsley Alumina Pty Ltd.

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 received 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. 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 \$2.5 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.

More than 95 per cent, or \$3.66 billion, of the alumina produced in Western Australia was exported in 2009–10, with a relatively small amount shipped by Alcoa to its aluminium smelters in Victoria. The State's main export market is China, the world's largest consumer and major producer of aluminium. China took 27 per cent in 2009–10, significantly up from the amount purchased in 2008–09 (20 per cent). Other major customers include South Africa (14 per cent), the United Arab Emirates (13 per cent) and Bahrain (12 per cent).

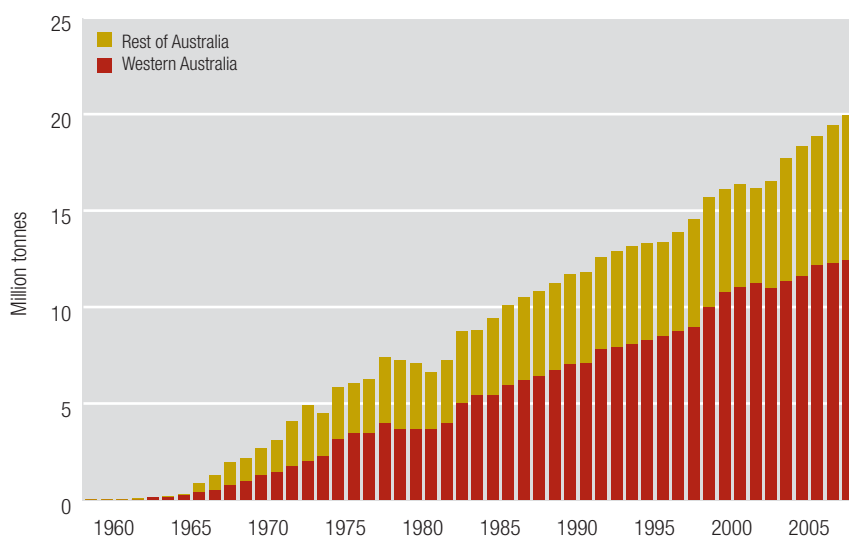


Figure 55 | Alumina Quantity up to 2009  
Source: DMP and ABARE

## 2.7 BASE METALS

The recovery of global economic activity and stronger commodity prices saw the value of base metals produced in Western Australia in 2009–10 increase by 51 per cent on the previous year to \$1.4 billion.

This is largely attributable to a 74 per cent increase in the value of the State's most valuable base metal, copper, which achieved almost \$1.1 billion in sales. While the total amount of copper produced increased by 17 per cent, the value of production was most significantly impacted upon by an average price increase of 18 per cent, in Australian dollar terms, compared to 2008–09.

The average prices received for zinc and lead also increased significantly, with zinc achieving an average price increase of 26 per cent and lead 23 per cent. The total sales value for zinc was down 12 per cent to \$203 million, however, due to a 40 per cent decrease in the quantity produced. The value of lead produced increased by 41 per cent to \$59 million even though production rose by only three per cent.

Prices for all base metals, however, are still significantly lower than the all time highs achieved during 2007 and 2008 and, while this year represents a significant recovery in comparison to the \$928 million received for base metals in 2008–09, it is still lower than the \$1.74 billion achieved in 2007–08.

The impact of the global financial crisis on prices for all three metals was greatest in December 2008, where the price for copper fell to \$4569 per tonne, zinc \$1637 per tonne and lead \$1432 per tonne. Prices began to improve within the next few months as smelter cuts and mine closures ensured that the market was not over-supplied. The copper price maintained this upward momentum throughout 2009–10, finishing the year at \$7621. Prices for zinc and lead reached their highs in January 2010, at \$2670 and \$2597 respectively, ending the 2009–10 year sharply lower at \$2044 and \$1998 per tonne.

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 32 per cent of the total value of base metals, while Golden Grove produced 26 per cent.

The other major producers include Newcrest's Telfer gold–copper operation (16 per cent), Jabiru Metals Limited's Jaguar copper–zinc–silver operation (nine per cent) and Newmont's gold–copper mine at Boddington (eight per cent).

Some production of base metals also emanates as a by-product of nickel mining.

### Copper

Copper is a major industrial metal, ranking third after iron and aluminium in terms of quantity consumed. It is chiefly utilised in electrical circuits, wiring and cables.

Copper prices averaged A\$7568 per tonne, an increase of 18 per cent over the previous year. During 2009–10, the total quantity of copper sold out of Western Australia was 148 553 tonnes, at a total value of \$1.137 billion.

The Nifty copper mine, located 350 kilometres east of Port Hedland, reported producing 59 329 tonnes of copper in concentrate in the current period 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 34 814 tonnes followed by Golden Grove, located 55 kilometres south of Yalgoo in the Mid West, which produced 30 850 thousand tonnes of copper in 2009–10. A feasibility study is currently being undertaken to develop a copper open pit to supplement its underground operations. This has the potential to almost double current copper production from 2011 to 2014.

Boddington was the next major producer at 15 422 tonnes and Jaguar was the smallest copper producer with 9028 tonnes.

Copper was also produced as a by-product (around five per cent of the total) from a number of nickel operations, with eight mines selling 8284 tonnes. The largest of these producers was Panoramic Resources Limited's Savannah nickel mine, producing 4019 tonnes of copper in concentrate.

A small amount of copper, 1275 tonnes, was also produced as copper cathode by Straits Resources from the Mons Cupri mine at Whim Creek in the Pilbara region. In February 2010, Straits sold the Mons Cupri mine to Venturex Resources Ltd.

A notable recent discovery of copper resources is Sandfire Resources NL's DeGrussa copper–gold project near Meekatharra in the State's Mid West. As at 3 September 2010, the project's indicated and inferred resource stood at 10.67 million tonnes at 5.6 per cent copper, rating it as one of the world's highest-grade copper deposits.

## Zinc

Approximately half the zinc produced globally is utilised in the galvanising of iron to prevent corrosion.

Zinc prices averaged A\$2340 per tonne, representing a 26 per cent increase on the previous year. Despite the increased prices, sales decreased by 40 per cent to 85 532 tonnes in 2009–10. This fall reflects a significant cut in zinc production at Golden Grove, where production amounted to 80 195 tonnes of zinc concentrate, down from 104 189 tonnes in 2008–09.

Zinc is also produced by Jabiru Metals Limited's Jaguar mine which also reported a lower annual production of 24 184 tonnes of zinc concentrate, down from 29 265 tonnes in 2008–09.

## Lead

The most important use of lead is in lead–acid batteries, which account for approximately 80 per cent of global lead consumption, providing ancillary electrical power in virtually all road vehicles, including electric vehicles.

Lead sales in Western Australia increased by three per cent to 25 918 tonnes in 2009–10. Production is limited to two producers – Ivernias Magellan lead operation, located 30 kilometres west of Wiluna, and Golden Grove.

The Magellan operation was placed on care and maintenance in April 2007 due to lead contamination issues at the Esperance Port. In August 2009, following extensive community and government consultation, Magellan was granted the final approvals to commence sealed shipments of lead carbonate concentrates through the Port of Fremantle. Shipments of concentrate stockpiles commenced in September 2009 and a staged restart of the processing plant commenced in February 2010. The mine is expected to produce approximately 85 thousand tonnes of lead per annum when full production is achieved, equating to two per cent of the world's lead consumption.

In 2009–10, Magellan sold 21 670 tonnes of lead, most of which was sent to China for smelting by the Yunnan Metallurgical Group.

Golden Grove reported a decrease in annual production, down from 9405 tonnes in 2008–09 to 7145 in 2009–10.



*MMG Golden Grove employees take a concentrate sample from the plant flotation circuit.*

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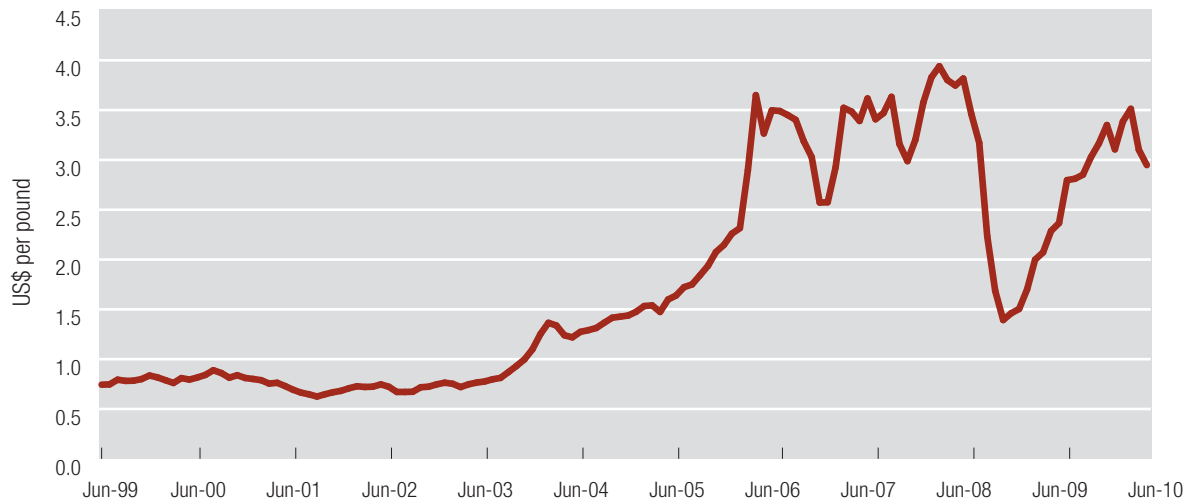


Figure 56 | **Copper Price** Source: Metalprices.com



Figure 57 | **Lead Price** Source: Metalprices.com

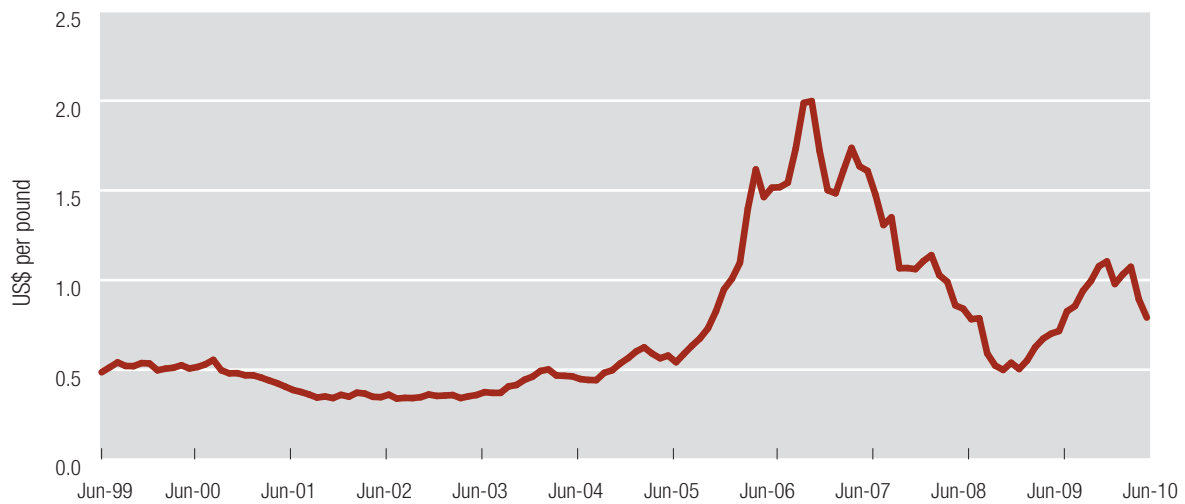


Figure 58 | **Zinc Price** Source: Metalprices.com

## 2.8 MINERAL SANDS

During 2009–10, the value of mineral sands produced in Western Australia stood at \$665 million, nine per cent lower than the \$729 million produced in 2008–09. The value of synthetic rutile, the highest value titanium mineral product, declined by 38 per cent, the result of a 30 per cent drop in production coupled with lower prices. The value of zircon produced, on the other hand, increased by 19 per cent despite softer prices due to a 32 per cent increase in the total amount produced.

Production of mineral sands in Western Australia predominantly comprises titanium minerals (ilmenite, leucoxene, synthetic rutile and rutile) and zircon.

Other products produced from the mining of mineral sands include garnet and small quantities of staurolite (a mineral of a similar size, density and hardness to garnet sand and also used as a commercial sandblasting abrasive).

Around 95 per cent of the titanium minerals produced globally are used as feedstock in the production of titanium dioxide pigment, which is manufactured for use in products such as paints, paper and plastics. A small proportion is also used for the production of titanium metal, which is predominantly utilised in the aerospace industry.

Zircon has a number of applications, principally in the manufacture of ceramic tiles and sanitary ware. A small proportion of the zircon produced in Western Australia is also used in the manufacture of locally produced zirconia flours and fused zirconia.

The global economic crisis had a significant impact on titanium minerals and zircon as demand for their end products is closely related to economic development and personal consumption levels.

A significant slowdown in the demand for titanium dioxide pigment in early 2009 resulted in the major pigment producers in the US and Europe reducing output, as did producers in other titanium markets such as titanium metal. This adversely affected the overall demand for titanium minerals. Global demand for zircon also fell significantly, with many customers choosing to run down inventories. Signs of recovery, however, emerged in the latter months of 2009, as strength in the Chinese construction sector gathered pace. By the end of 2009, signs of recovery were also evident in other markets, particularly Europe.



Figure 59 | **Heavy Mineral Sands – Value by Quarter**  
Source: DMP

Mineral sands production in Western Australia is dominated by two producers, Iluka Resources Ltd and the Tiwest Joint Venture (a 50:50 joint venture between Tronox Western Australia Pty Ltd and subsidiaries of Exxaro Resources Limited). These companies accounted for around 79 per cent (by value) of all the State's mineral sands produced in 2009–10.

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

While the company still controls significant resources in Western Australia, its primary focus for future development in Australia is now on the Murray Basin in Victoria and the Eucla Basin in South Australia.

Iluka has significantly reconfigured its Australian mineral sands operations, resulting in the closure of around 50 per cent of its Western Australian operations since June 2009. The company has plans to commence mining operations at Tutunup South in 2010 and this production will supply ilmenite for the Capel synthetic rutile plant.

However, Iluka's past investment in capital-intensive processing facilities in Western Australia will see the processing of mineral sands in this State continue past the life of the mine sites. For example, the economic life of the Narngulu processing facilities has been extended through an expansion program to allow the processing of heavy mineral concentrate from the company's Jacinth–Ambrosia deposit in the Eucla Basin.

During 2009–10, the company commenced exporting commercial quantities of zircon originating from its Jacinth–Ambrosia mine through the Narngulu processing plant.

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 rutile, leucoxene and synthetic rutile produced is processed into titanium dioxide pigment at Kwinana. Zircon and staurolite is also produced for export.

As is the case with Iluka, Tiwest also appears to have passed peak titanium feedstock production in Western Australia, but its processing operations are expected to be supported by local resources for a much longer period. As the Cooljarloo mineral resources are progressively depleted, Tiwest’s other projects at Jurien and Dongara will be systematically developed for mining.

Other companies producing titanium minerals and zircon in the South West include Doral Mineral Sands Pty Ltd, Bemax Resources Limited and GMA Garnet Pty Ltd.

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 located in the Mid West and is the sole Western Australian producer.

## 2.9 DIAMONDS

Diamond sales volumes recovered from the sharp fall in 2008–09, rising by 77 per cent to reach 16.3 million carats in 2009–10.

Demand for diamonds dropped dramatically in the second half of 2008 and a weak market continued through the first half of 2009. However, by around mid-September 2009 there were some positive signs of recovery with regard to price although they are not yet back to their historic highs of early 2008.

The global financial crisis was particularly severe on the diamond market and for the first time in 25 years the Antwerp Diamond Bank (one of the main financiers of Antwerp’s diamond trade) reported a net loss for 2009, its balance sheet shrinking by some 24 per cent.

Rio Tinto’s Argyle mine, 112 kilometres south-southwest of Kununurra, accounts for the bulk of diamond production in Western Australia. In 2009–10, it produced 10.91 million carats, a decrease of some 3.8 million carats (or 26 per cent) from the previous year. The Argyle mine accounts for around 20 per cent of annual global diamond output.

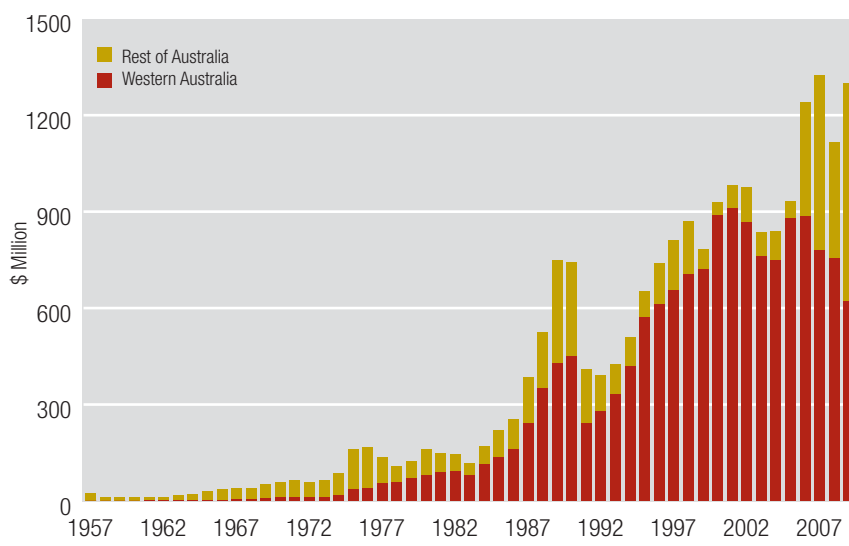


Figure 60 **Heavy Mineral Sands Value of Production up to 2009**  
Includes Ilmenite, Leucoxene, Upgraded Ilmenite, Rutile, Zircon and Monazite  
Source: DMP and ABARE



The Argyle mine processing facilities were shut from March through to May 2009 for planned maintenance and to balance production with market demand. Lower feed grade and wet weather in the March quarter of 2010 also led to a reduction in carat production compared to the first quarter of 2009. Production at Argyle returned to normal levels in the June 2010 quarter.

Argyle commenced mining its main ore body in 1985 and has since produced around 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.

The expansion to underground mining at Argyle commenced in 2005. Progress with the expansion slowed in 2009 in response to global market conditions when construction was around 50 per cent complete. In September 2010 Rio Tinto announced it would ramp-up development of its underground operation with construction to recommence in the first half of 2011.

The Argyle mine is famous for its pink diamonds and accounts for around 90 per cent of the world's production of this type of diamond (though they represent less than one per cent of the mine's output). The colour range also includes white and champagne. 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 95 per cent of the value of Argyle's rough diamond sales.

The Kimberley Diamond Company NL, with its Ellendale mine, 100 kilometres east of the coastal town of Derby, is the State's only other producing diamond mine. Due to the wet season conditions, 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.

With diamond prices sliding dramatically in October 2008, production at Ellendale has been slowed. During 2009–10, the Ellendale mine produced around 194 thousand carats which was down some 207 thousand carats or 52 per cent on the previous year.

Ellendale produces predominantly gem and near-gem quality diamonds, including some rare fancy and vivid yellow stones. Since mining began in mid-2002 the mine has recovered approximately 1.9 million carats of diamonds.

## 2.10 OTHER

### Coal

Western Australia has two coal producers – Wesfarmers Premier Coal Limited and The Griffin Coal Mining Company Pty Ltd (Administrators Appointed) (“Griffin Coal”). Their mines are located at Collie in the South West of the State.

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 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 2010, 38 cargoes had been exported to India and China through the Port of Kwinana.

In 2009–10, the quantity of all coal sold from Collie decreased by four per cent to 6.7 million tonnes whilst the value decreased by almost two per cent to \$326 million.

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.

On 3 January 2010, Griffin Coal was placed into Administration and a transaction process has commenced for the sale of the Griffin Coal assets. These include the Bluewaters I and Bluewaters II coal-fired power stations (each 208 MW) at the Coolangatta Industrial Estate approximately seven kilometres from Collie. Coal supplies for the power stations are sourced from Griffin Coal. Bluewaters I and Bluewaters II have signed a number of long-term supply and off-take contracts.

### Possible Coal Developments

Rey Resources Limited has commenced a definitive feasibility study on their Duchess–Paradise coal project in the Canning Basin. Located 150 kilometres southeast of Derby, the project is well placed to export thermal coal to Asian power generation markets. With the study due for completion in 2011, Rey Resources, subject to approvals, could potentially commence construction in 2012 and may be in production in 2013.

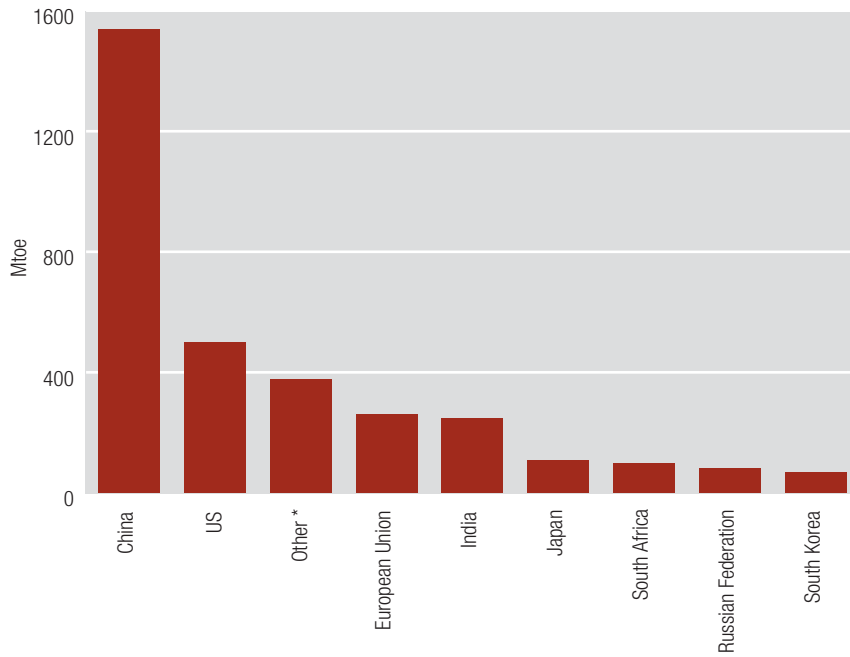


Figure 61 **World Coal Consumption 2009** Source: BP World Energy Statistics 2010  
 \* Other consists of the rest of the world including Australia

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

- The Western Australian State Government's proposed 235-hectare Shotts Industrial Park, located seven kilometres east of Collie, is being developed in support of the growing Collie area. Potential tenants include Perdaman Chemicals and Fertilisers and Wesfarmers Premier Coal.
- Perdaman is proposing a \$3.5-billion coal to urea plant on a 125-hectare site. Subject to the necessary approvals the project could commence construction late 2010 with production commencing in the second half of 2013. The Perdaman Collie Urea project will be Australia's first gasification plant, turning Collie coal into urea. In September 2009 Griffin Coal agreed to supply Perdaman 2.7 million tonnes of coal annually for 25 years.
- Wesfarmers Premier Coal is proposing a potential coal char plant on a 55-hectare site.
- Collie coal is suited for low-emission energy. 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.

There are also developments with coal gasification. Eneabba Gas Limited (operator) and Cougar Energy Limited have plans to build a pilot plant at their Sargon coal resource in the Mid West in 2011. If successful it will also be the first underground coal gasification project proposed to be developed in Western Australia.

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 2010 shows that Australia's domestic coal consumption represents just 1.6 per cent of the total world's coal consumption. Accounting for around 62 per cent of consumption is China with 46.9 per cent, followed by the United States at 15.2 per cent.

## Salt

Western Australia accounts for approximately 80 per cent of the nation's salt production and is the country's dominant exporter. In 2009–10, the volume of Western Australian salt sales rose by four per cent to nearly 11 million tonnes and sale values rose by eight per cent to reach \$417 million. An 18 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).

Expansion options at Lake MacLeod and Port Hedland are being reviewed, and will be progressed as market conditions improve.

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. In the context of growing demand from Asia, demand for salt is likely to continue to increase. Western Australian salt producers are therefore well placed, due to their proximity to the Asian markets.

## 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 2009–10 there were no sales of tantalum due to slow demand for tantalum products by the consumer electronics and other specialist industries. Tantalum operations at Greenbushes and Wodgina have been on care and maintenance since December 2008 and when reactivated could produce up to 50 per cent of the world's tantalite concentrate supply.

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 has been Western Australia's sole producer. In 2009, Talison Lithium Australia Pty Ltd expanded its Greenbushes lithium chemical production to 150 thousand tonnes per annum. A further expansion is planned to be commissioned at the end of 2010 which will see annual production increase to 210 thousand tonnes.

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.

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.

### 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. Commissioning of its value-adding lithium carbonate plant in China will follow shortly after. Mt Cattlin will also produce tantalum as a by-product.

In July 2010, Reed Resources Ltd (in joint venture with Mineral Resources Limited) announced their intentions to proceed with the 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, commencing March 2011 (subject to approvals). The project also has the potential to recover mica, tantalum and potash–feldspars by-products.

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

Talison also produce a small amount of tin as a by-product from Greenbushes and this is all exported. In 2009–10, the total value of tin sold from Western Australia was \$1.3 million.

## Manganese and Chromite

Pilbara Manganese Pty Ltd, a wholly-owned subsidiary of the Ukraine-based Palmary Enterprises Ltd, operates the Woodie Woodie mine and produces around 900 thousand tonnes of manganese ore per annum with an average grade of 48 per cent. The Woodie Woodie mine currently has a mine life of around ten years with potential to extend beyond this time.

Woodie Woodie is recognised worldwide 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.

Auvex Resources Ltd (in joint venture with Mesa Minerals Limited) are looking to start operating their Ant Hill mine, located 45 kilometres southeast of Nullagine, in the second half of 2010. Auvex successfully completed two trial shipments of manganese ore to China during the period under review.

Another producer is Process Minerals International Pty Ltd (PMI) a wholly-owned subsidiary of Mineral Resources Limited. PMI has been retreating tailings from Woodie Woodie as well as sourcing manganese from Peak Hill – Horseshoe by processing previously mined product.

The next manganese project to commence operations will be 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 are expected to commence when the new Utah Point port is completed at Port Hedland.

Palmary was the State's sole producer of chromite ore from the Coobina mine, however, due to deteriorating market conditions, a decision was made in November 2008 to put the Coobina mine on care and maintenance. The Coobina chromite project is located 80 kilometres

southeast of Newman and has an operating capacity of 250 thousand tonnes per annum of high-grade ore.

Globally, chromite production is dominated by South Africa, Kazakhstan, Turkey, India and Pakistan, which together account for around 80 per cent of world mine production.

## Rare Earths

June 2007 saw the commencement of mining operations at Lynas Corporation Ltd'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.

The Mt Weld deposit comprises world-class REO and niobium–tantalum deposits. Rare earths ore are mined, crushed and blended at Mt Weld, trucked to Leonora, then railed to the Port of Esperance for export to the Gebeng Industrial Estate on the east coast of Malaysia where Lynas is establishing a processing operation. This advanced materials plant is scheduled to be completed in the second half of 2010.

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.

Mt Weld will be well placed to take advantage of a recovering market as it works toward being in production toward the end of 2011.

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.

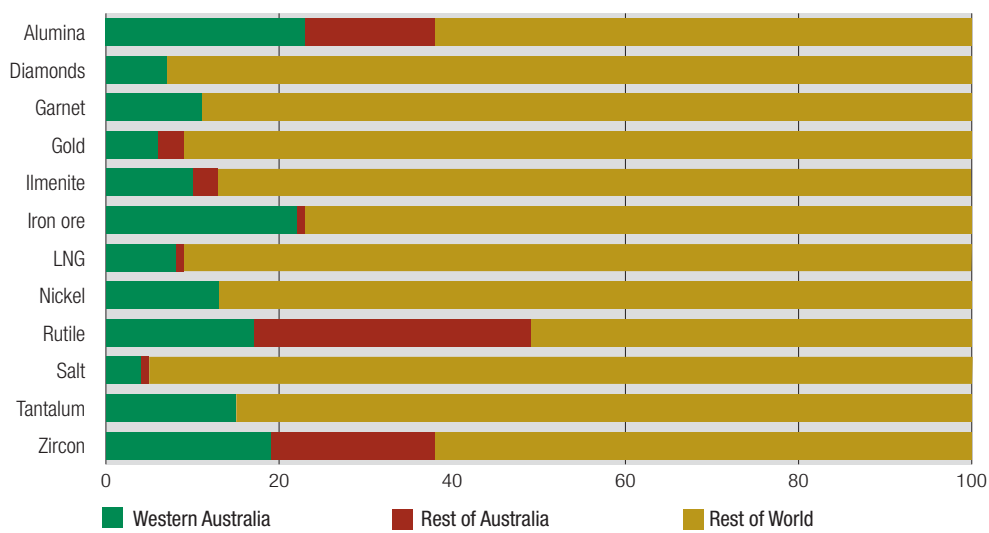


Figure 62 **Selected WA Commodities Relative to World Production Ending 2009 by Quantity** Source: DMP, ABARE, USGS

The latest comparable data show that the Western Australian share (by quantity) of the world's output of the following products was: alumina 23%, garnet 11%, gold 6%, ilmenite 10%, iron ore 22%, LNG (sea-borne trade) 8%, nickel 13%, rutile 17%, salt 4%, tantalum 15%, zircon 19% and 7% of diamonds (mainly industrial grade)

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.

China currently supplies approximately 95 per cent of the global rare earths market 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 36 per cent of rare earth reserves, Commonwealth of Independent States (Russia) 19 per cent followed by the United States at 13 per cent and Australia with five 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 has been cut by 40 per cent below last year's figure of 50 145 tonnes to 30 259 tonnes setting the stage for significant price increases for product sourced from China.

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 a major Japanese rare earth consumer has recently 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.

### Molybdenum–Copper Development

Moly Mines Limited (57 per cent owned by Hanlong Mining Investment Pty Ltd) 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. With prices showing signs of recovery and confirmation that completion of the Utah Point export facility at Port Hedland is on schedule to receive ore from October 2010, site construction works have commenced with ore processing scheduled to start later in 2010. Spinifex Ridge is expected to have a 24-year mine-life.

Spinifex Ridge is 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.

## 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.

Continual efforts are made by the Department to improve data and evidence-driven safety regulation. This has involved introducing a web-based database to replace the previous incident and accident system commonly known as AXTAT. The new Safety Regulation System (SRS) AXTAT+ will improve data collection and reporting of safety and occupational health information. The SRS is also designed to enhance data quality and analysis.

SRS AXTAT+ will enable better communication between resources safety and industry, encompassing not only mining and exploration safety, but also onshore petroleum, geothermal energy and dangerous goods. At the time of this Digest's publication, latest employment data for 2009–10 was not available as the SRS AXTAT+ system was being implemented. This edition of the Digest contains employment data for the calendar year 2009. Mining employment data for 2009–10 is expected to be available for release in early 2011 when implementation of the new SRS system is completed. This data will be available in MS Excel spreadsheet format via the Department's website at [www.dmp.wa.gov.au](http://www.dmp.wa.gov.au).

It is important to note that mining employment statistics published by the Department are not directly comparable with those sourced from the Australian Bureau of Statistics (ABS). ABS mining industry employment statistics are classified using reference to 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.

Statistics generated from the existing AXTAT database for 2009 show that there were on average 70 063 persons employed in Western Australia's mining industry (including 2254 people employed in mineral exploration). This is a decrease of almost two per cent compared with 2008 which peaked at 71 225 employees, however the size of the workforce remains higher than in previous years.

Since 2003, when Western Australia's economy began to expand strongly, mining employment has grown on average by around eight and a half per cent a year. Employment 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. This has seen contractors account for 51 per cent of total mining employment in 2009.

In 2009, iron ore was the largest employing sector in the State's mining industry with 26 051 employees. Gold and bauxite–alumina followed with 16 686 and 8212 persons respectively. Together the iron ore, gold and bauxite–alumina sectors accounted for 73 per cent of total employment in the State's mining industry in 2009.

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.

#### 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 requesting an average number of employees and contractors working on site for the period under review. Petroleum employment data for 2009–10 will be available in early 2011 alongside mining employment data for the same period.

Average petroleum employment for 2009 totalled 5552, an increase of 12 per cent compared with 2008.

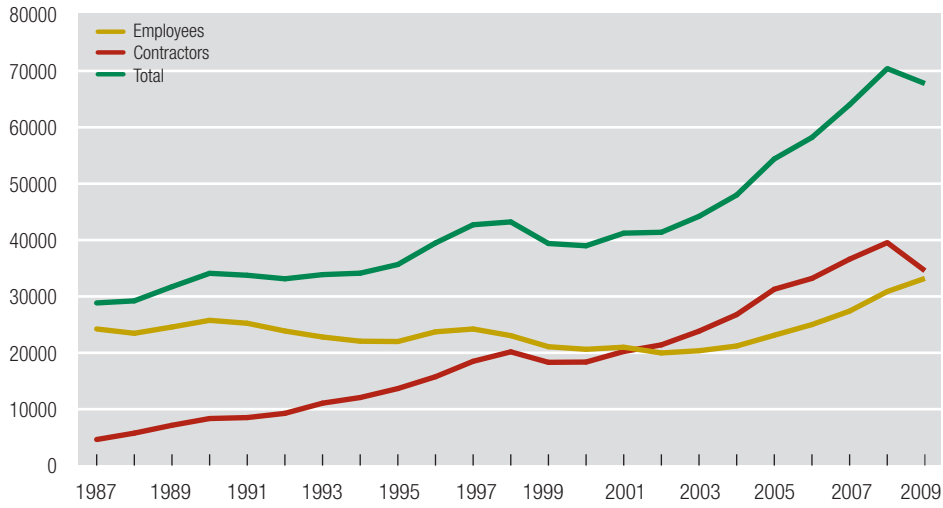


Figure 63 | Mining Employment 1987–2009 Source: DMP

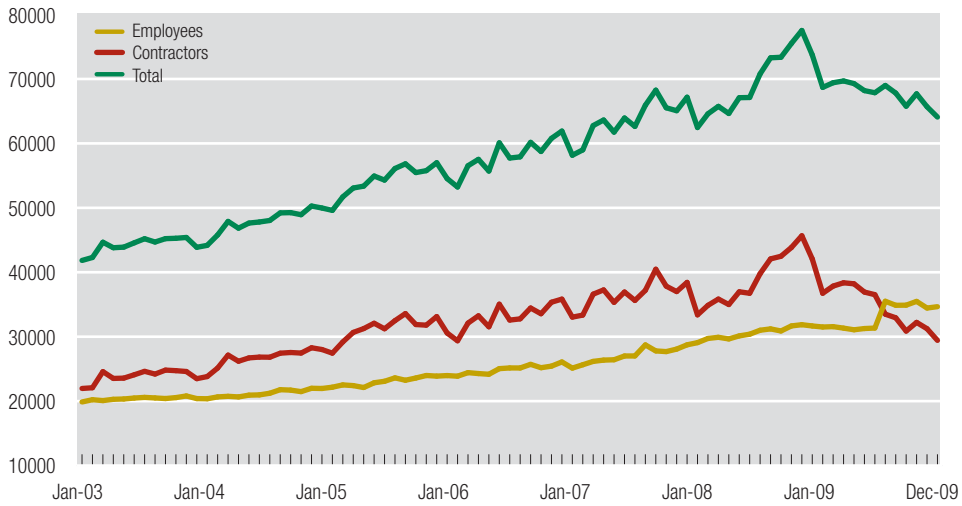


Figure 64 | Mining Employment January 2003 to December 2009 Source: DMP

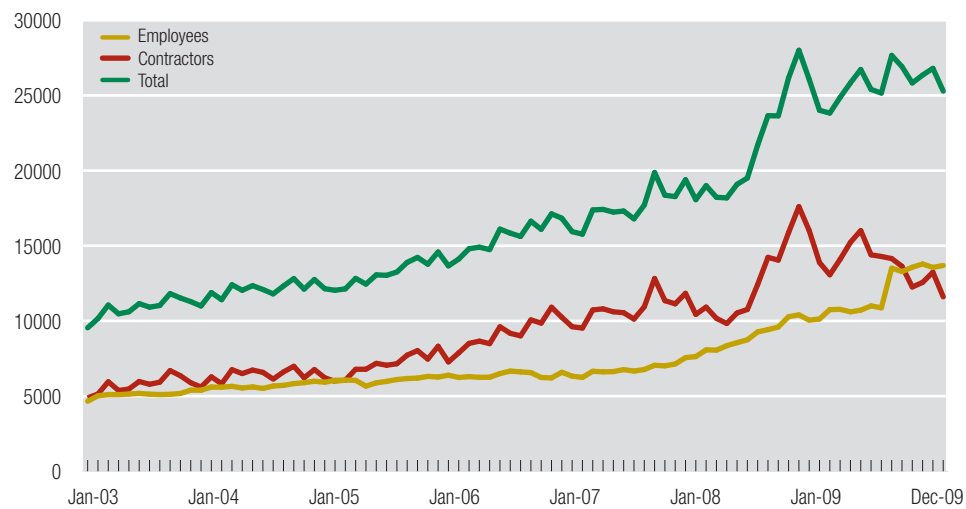


Figure 65 | Mining Employment Iron Ore January 2003 to December 2009 Source: DMP

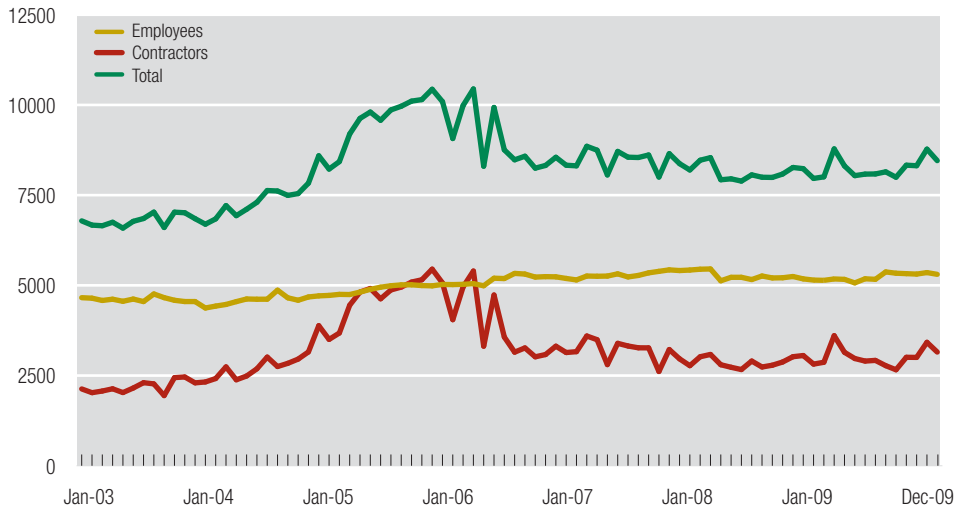


Figure 66 | **Mining Employment Alumina** January 2003 to December 2009 Source: DMP

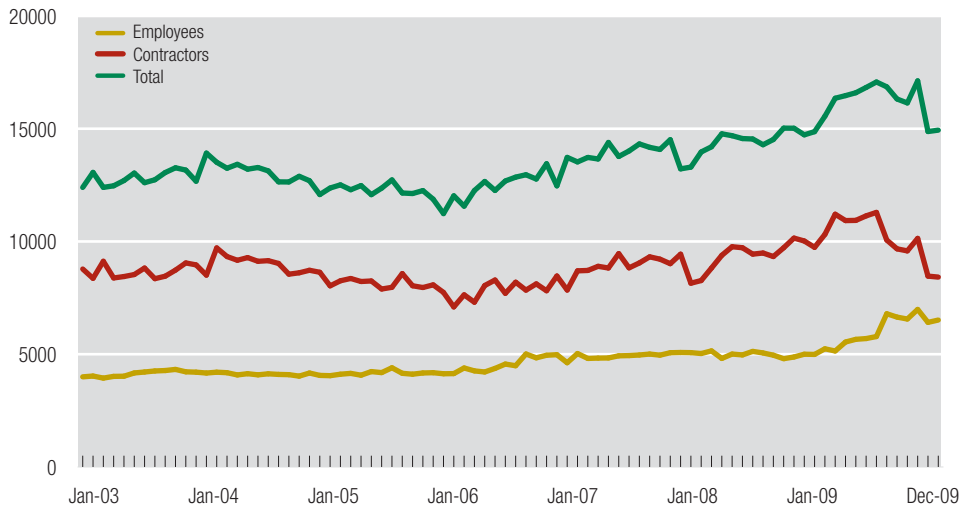


Figure 67 | **Mining Employment Gold** January 2003 to December 2009 Source: DMP

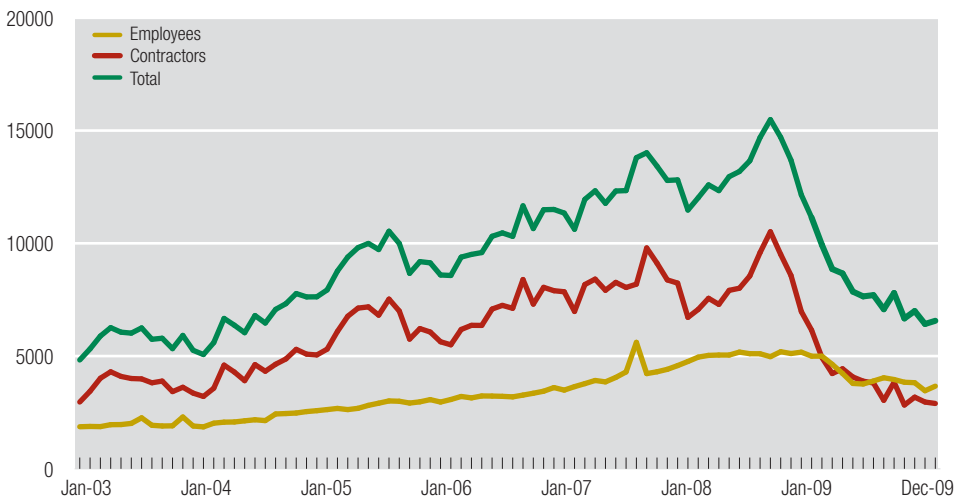


Figure 68 | **Mining Employment Nickel** January 2003 to December 2009 Source: DMP



Petroleum employment growth is set to continue given the development of a number of large-scale natural gas projects. These projects typically require significant numbers of workers especially during the construction phase. Projects underpinning growth in petroleum employment and job creation for the broader economy include:

- The \$43-billion Gorgon Project which is one of the world's largest natural gas projects and the largest single resource natural gas project in Australia's history. It is estimated that the Gorgon Project will provide up to 10 thousand direct and indirect employment opportunities at peak construction. These jobs will be spread across the metropolitan area, the Pilbara region including Dampier and on Barrow Island and to other parts of Australia.
- Construction of Woodside's \$12-billion Pluto LNG project which has an estimated construction workforce of 4000 and expected to permanently employ 300 workers during operation. The first shipments of LNG are expected in early 2011. The project is expected to expand with plans to build an additional two LNG trains under consideration.
- The \$5-billion gas redevelopment and \$1.8-billion oil redevelopment of North Rankin, approved by the North West Shelf Venture participants, will employ around 840 people in total during the construction and commissioning period. Redevelopment is scheduled for completion in 2013.
- Apache's Devil Creek gas processing and transportation facility will employ over 200 people during the construction phase which commenced in September 2009. The facility is expected to be in production by late 2011.
- The planned development of the Macedon gas field which will be operated by BHP Billiton. The project is estimated to cost \$1.5 billion and employ around 300 people during construction.
- The proposed development of Australia's third LNG hub in the Kimberley will also generate thousands more employment opportunities both directly and indirectly.

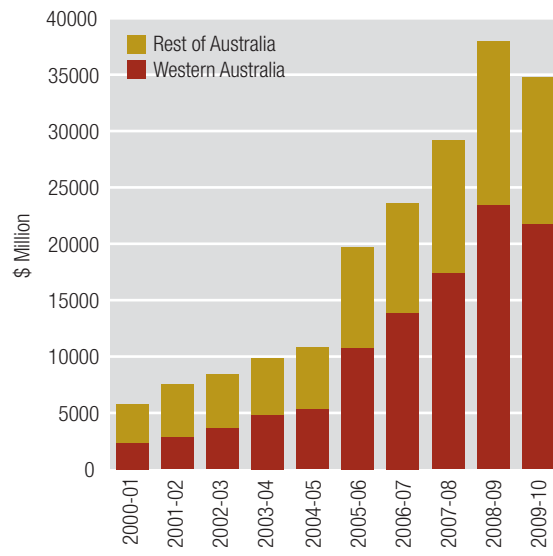


Figure 69 | Mining Investment Source: ABS

### 3.2 INVESTMENT

Total national private new capital mining expenditure in 2009–10 amounted to \$34.8 billion, a fall of eight per cent compared to the previous financial year. Western Australia accounted for 63 per cent of investment in the nation's mining sector.

The ABS private new capital expenditure statistics for Western Australia show a very significant rise in the value of new capital expenditure during the past ten years increasing on average by 24 per cent per annum. In 2009–10 the amount of capital expenditure on mining in Western Australia amounted to \$21.7 billion, which was seven per cent less compared to the previous financial year. This also represented 71 per cent of Western Australia's total (\$30.4 billion) new capital expenditure in 2008–09.

On a national scale, Western Australia has attracted 29 per cent of total new capital investment more than doubling its share over the past ten years.

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.

The Department of Mines and Petroleum now maintains two databases (minerals and petroleum) to track actual and possible investment in major resource projects. The databases collate information relating to the expected capital expenditure, employment numbers during construction and during operation and start-up commencement date of a project.

The databases use information from various sources including, ABARE's Major Development Projects List, Access Economics' Investment Monitor, REPS' Major WA Projects List, on-line company research consultancy systems, media announcements and company websites. The combined databases currently contain approximately 120 major projects.

Projects are ranked according to understood project potential and level of advancement toward production. Mineral and petroleum projects are ranked 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 on approvals to proceed with construction.
- Planned Projects include those undergoing advanced feasibility studies including definitive and bankable feasibility studies.
- 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, a summary of total capital expenditure by commodity is provided below. It should be noted that investment in a number of the projects is publicly reported in US dollar terms and as such the data below may therefore vary over time in line with movements in the US/AU\$ exchange rate.

Investment projects in the under-construction category are dominated by LNG and iron ore projects. These include Chevron's Gorgon Joint Venture which began construction in December 2009 (\$43 billion), Woodside's Pluto Train 1 LNG Project (\$12 billion), BHP Billiton's Rapid Growth Project 5 iron ore project (\$6.4 billion), and the Sino Iron Pellet Project (\$5.2 billion). In addition, the gold and alumina sectors are represented by Integra Mining's Randalls (\$64 million) and Worsley Alumina's Alumina Refinery expansion (\$2.5 billion).

The committed investment projects category is dominated by investment in the Oakajee Port and Rail development which is anticipated to top \$4 billion. It is also anticipated that Perdamen Chemicals will invest in the vicinity of \$2.5 billion in its coal to urea plant.

The table below covers information available from various sources up to 1 September 2010. Information on Western Australian projects changes frequently and the database is reviewed and updated twice yearly, with cut-off dates for new data being 1 September and 1 March.

### Investment in Major Projects (as at 1 September 2010)

MAJOR PROJECTS Commodity	CAPEX \$Million	
	Committed/ Under Construction	Planned/ Possible
Alumina	2,500	1,500
Gold	139	806
Iron Ore	18,760	38,089
Nickel	170	6,139
Other Minerals and Commodities and Infrastructure	12,681	2,798
	<b>34,250</b>	<b>49,332</b>
Crude Oil and Condensate	1,800	
LNG	56,000	108,350
Gas	6,010	6,645
Pipelines and Infrastructure	65	800
	<b>63,875</b>	<b>115,795</b>
<b>Total forecast investment</b>	<b>98,125</b>	<b>165,127</b>

### 3.3 ROYALTIES

Over the past ten years, royalties received by the Western Australian Government from Western Australian mineral and petroleum producers have increased 150 per cent from \$1.1 billion in 2000–01 to \$2.8 billion in 2009–10. 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.

The bulk of collections for 2009–10 (attributed directly to the State) came from iron ore (53 per cent) and petroleum (32 per cent).

The result for 2009–10 was 12 per cent lower than 2008–09, when a record \$3.2 billion was recorded. Iron ore was responsible for the major part of this shortfall in royalty collections. Market uncertainty, created by the global financial crisis, saw record benchmark iron ore prices reduce by some 40 per cent in April 2009 by Japan and South Korea with a considerable amount of product being sold on the spot market. The period also saw a shift away from the 50-year-old annual benchmark system price negotiations for iron ore to a quarterly system.

While not collected by Western Australia, it is estimated that \$1.48 billion was also received by the Commonwealth in 2009–10 from petroleum resource rent tax (PRRT). Approximately 60 per cent of this resource rent tax (\$888 million) could be attributed to operating fields within designated Commonwealth waters off the Western Australian coast.

In June 2010, the Western Australian State Government reached an 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 will change from 3.75 per cent to 5.625 per cent on fines production to bring them into line with other iron ore producers. This new rate will apply to all production by the companies and is expected to generate an additional \$340 million in State royalties for the 2010–11 financial year.

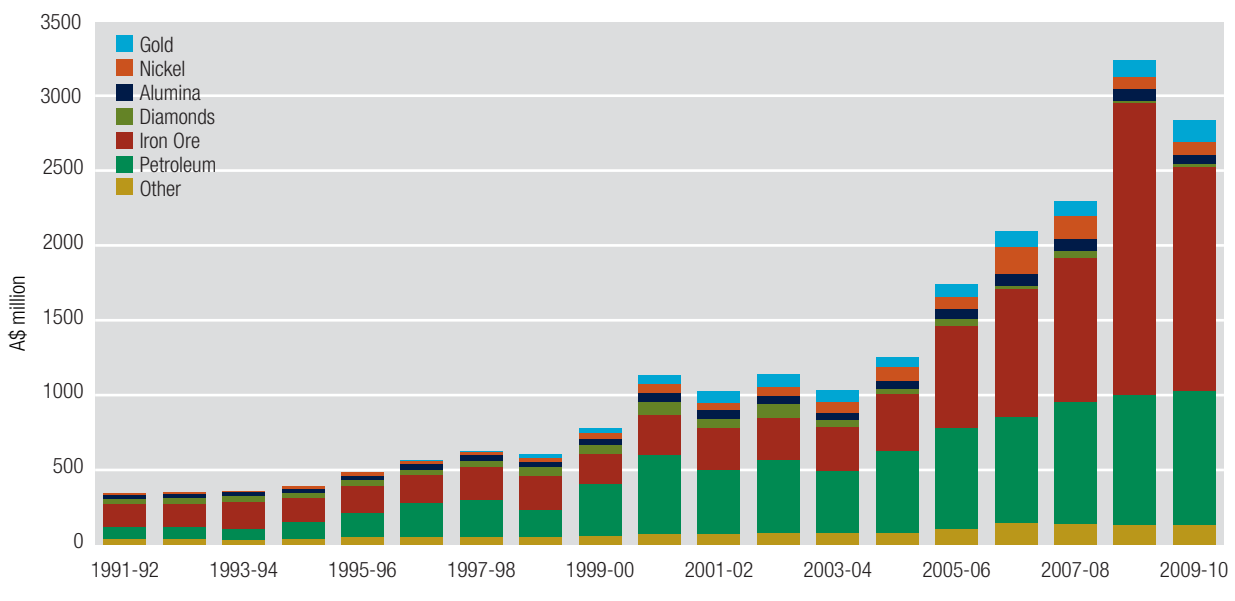


Figure 70 | Royalty Receipts by Commodity Source: DMP

**TABLE 3. ROYALTY RECEIPTS**

COMMODITY	2008–09	2009–10	2009–10 Growth	
	Total A\$	Total A\$	A\$	%
ALUMINA	75,982,728	61,860,134	-14,122,594	(19)
DIAMONDS	18,838,566	19,192,682	354,116	2
GOLD	116,420,727	152,528,649	36,107,922	31
HEAVY MINERAL SANDS	26,681,513	22,008,559	-4,672,954	(18)
IRON ORE	1,946,717,875	1,495,438,193	-451,279,682	(23)
NICKEL	81,829,169	83,359,668	1,530,499	2
PETROLEUM	868,761,581	897,025,331	28,263,750	3
OTHER	104,423,890	107,688,425	3,264,535	3
<b>TOTAL REVENUE</b>	<b>3,239,656,049</b>	<b>2,839,101,641</b>	<b>-400,554,408</b>	<b>(12)</b>

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

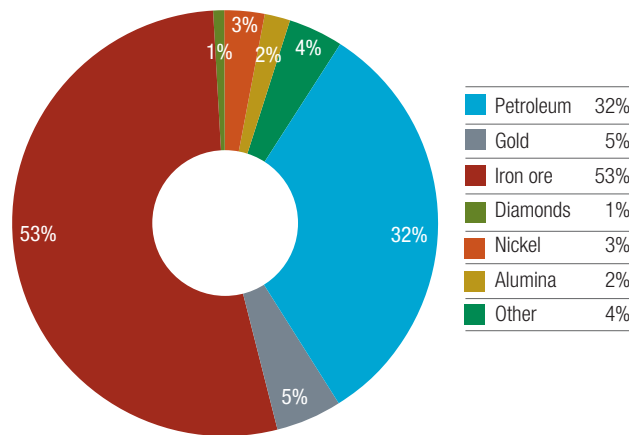


Figure 71 | **Royalty Receipts 2009–10 – \$2.8 Billion** Source: DMP

**TABLE 4. QUANTITY AND VALUE OF MINERALS AND PETROLEUM**

COMMODITY	UNIT	FINANCIAL YEAR 2008-09		FINANCIAL YEAR 2009-10	
		QUANTITY	VALUE	QUANTITY	VALUE
<b>ALUMINA</b>	t	12,271,553	4,563,992,022	12,643,178	3,810,171,814
<b>BASE METALS</b>					
Copper Metal	t	127,328 (r)	654,337,722 (r)	148,553	1,136,876,284
Lead Metal	t	25,203 (r)	42,115,329 (r)	25,918	59,231,761
Zinc Metal	t	142,062 (r)	231,271,582 (r)	85,532	202,502,698
<b>TOTAL BASE METALS</b>			927,724,633 (r)		1,398,610,743
<b>CHROMITE</b>	t	74,898 (r)	n/a	59,373	n/a
<b>CLAYS</b>		57,949 (r)	1,066,460 (r)	262,677	1,187,324
<b>COAL</b>	t	6,979,209 (r)	332,572,499 (r)	6,713,291	326,236,315
<b>CONSTRUCTION MATERIALS</b>					
Aggregate	t	3,941,262	91,104,572	3,165,512	85,249,799
Gravel	t	165,263 (r)	1,694,272 (r)	173,195	1,163,963
Rock	t	194,471	1,703,510	530,868	9,141,980
Sand	t	3,836,059 (r)	29,591,019 (r)	3,201,007	24,691,038
<b>TOTAL CONSTRUCTION MATERIALS</b>			124,093,373 (r)		120,246,779
<b>DIAMONDS</b>	ct	9,187,548	261,533,447	16,278,939	304,005,758
<b>DIMENSION STONE</b>		3,143 (r)	329,863 (r)	5,371	301,508
<b>GEM &amp; SEMI-PRECIOUS STONES</b>	kg	316,529	211,317	588,070	463,866
<b>GOLD</b>	kg	136,614 (r)	5,226,839,405 (r)	164,061	6,559,584,664
<b>GYPSUM</b>	t	846,712 (r)	16,897,102 (r)	877,685	17,650,877
<b>HEAVY MINERAL SANDS</b>					
Garnet	t	290,884	n/a	237,978	n/a
Ilmenite	t	452,044 (r)	64,189,407 (r)	444,500	59,927,753
Leucoxene	t	49,675 (r)	19,235,776 (r)	66,006	20,334,457
Zircon	t	255,642 (r)	231,440,440 (r)	336,539	276,067,557
Other	t		414,008,532 (r)		308,986,359
<b>TOTAL HEAVY MINERAL SANDS</b>			728,874,155 (r)		665,316,126
<b>IRON ORE</b>	t	316,543,641 (r)	33,633,370,436 (r)	396,070,457	33,656,633,045
<b>LIMESAND-LIMESTONE-DOLOMITE</b>		3,803,348 (r)	18,295,829 (r)	3,975,842	28,580,812
<b>MANGANESE ORE</b>	t	417,703 (r)	n/a	693,392	350,693,640
<b>NICKEL INDUSTRY</b>					
Cobalt	t	4,709 (r)	220,200,065 (r)	4,341	189,172,911
Nickel	t	178,386 (r)	2,996,716,946 (r)	177,033	4,083,144,447
Palladium and Platinum By-Product	kg	642 (r)	5,452,602 (r)	781	8,644,469
<b>TOTAL NICKEL INDUSTRY</b>			3,222,369,613 (r)		4,280,961,827

COMMODITY	UNIT	FINANCIAL YEAR 2008-09		FINANCIAL YEAR 2009-10	
		QUANTITY	VALUE	QUANTITY	VALUE
<b>PETROLEUM</b>					
Condensate	kl	6,657,101	3,108,787,292	7,418,012	3,501,186,255
Crude Oil	kl	12,939,868	7,659,581,530	11,842,075	6,385,071,844
LNG	t	13,963,724	8,524,445,702	15,717,041	6,922,556,548
LPG - Butane and Propane	t	866,534	750,825,346	975,752	647,351,337
Natural Gas	'000m <sup>3</sup>	8,598,035	1,232,178,988	9,357,026	1,320,801,777
<b>TOTAL PETROLEUM</b>			21,275,818,858		18,776,967,761
<b>SALT</b>	t	10,519,491 (r)	386,254,378 (r)	10,967,879	417,460,428
<b>SILICA-SILICA SAND</b>		446,025 (r)	7,615,823 (r)	442,340	12,402,030
<b>SILVER</b>	kg	134,344 (r)	76,272,010 (r)	97,763	60,461,153
<b>TIN-TANTALUM-LITHIUM</b>	t	224,374	162,591,597	247,542	74,737,442
<b>OTHER (Includes Feldspar, Red Oxide, Spongolite and Talc)</b>	t		285,308,001 (r)		43,662,012
<b>TOTAL VALUE</b>			<b>71,252,030,821 (r)</b>		<b>70,906,335,923</b>

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, manganese, red oxide, talc, spodumene and tantalite not available.

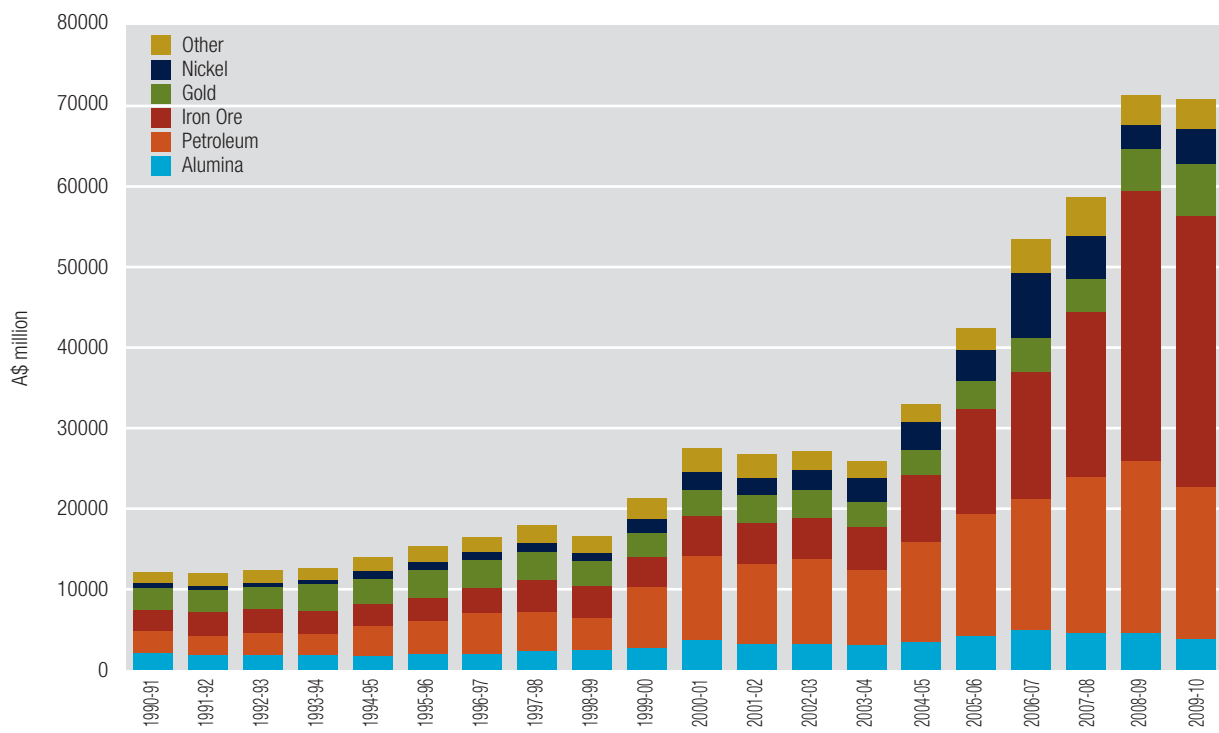


Figure 72 | Value of Minerals and Petroleum by Commodity Source: DMP

**TABLE 5. QUANTITY AND VALUE OF SELECTED MAJOR COMMODITIES**

		2000-01		2001-02		2002-03		2003-04	
	Unit	Quantity	Value \$M	Quantity	Value \$M	Quantity	Value \$M	Quantity	Value \$M
<b>ALUMINA</b>	Mt	10.48	3,600.67	10.86	3,584.38	11.13	3,204.65	11.17	3,085.11
<b>BASE METALS</b>									
Copper Metal	kt	42.62	111.12	53.50	122.57	59.45	138.78	53.29	155.82
Lead Metal	kt	82.33	37.31	75.08	36.72	70.02	31.85	29.45	10.57
Zinc Metal	kt	236.01	280.24	223.67	173.82	206.45	173.19	108.04	79.55
<b>TOTAL BASE METALS</b>			428.67		333.11		343.82		245.95
<b>COAL</b>	Mt	6.10	252.28	6.16	258.13	6.32	272.89	5.98	274.28
<b>COBALT</b>	kt	4.19	174.38	4.43	127.36	4.92	124.18	4.55	213.14
<b>DIAMONDS</b>	M ct	25.42	614.45	25.69	489.34	38.89	773.32	32.50	519.72
<b>GOLD</b>	t	201.21	3,245.06	185.00	3,279.50	187.47	3,445.34	177.01	3,109.56
<b>HEAVY MINERAL SANDS</b>									
Ilmenite	Mt	1.10	168.75	0.80	128.75	0.96	136.51	0.76	91.03
Rutile	kt	127.21	110.04	122.61	106.74	113.57	82.53	138.77	84.57
Upgraded Ilmenite (Synthetic Rutile)	kt	643.27	409.19	585.91	380.21	597.27	353.10	592.18	307.00
Zircon	kt	343.08	198.84	317.77	218.84	411.15	255.81	433.14	251.97
Other HMS			18.08		19.78		16.86		20.53
<b>TOTAL HEAVY MINERAL SANDS</b>			904.90		854.32		844.81		755.10
<b>IRON ORE</b>	Mt	161.77	4,912.70	164.63	5,207.61	188.52	5,205.27	202.04	5,331.53
<b>MANGANESE ORE</b>	kt	401.36	58.50	474.27	68.62	619.65	75.38	584.97	81.78
<b>NICKEL</b>	kt	167.45	2,238.74	179.46	2,002.07	191.89	2,482.47	182.21	3,031.04
<b>PETROLEUM</b>									
Condensate	Gl	5.81	1,984.53	6.33	1,680.03	6.93	2,046.37	6.18	1,747.51
Crude oil	Gl	13.96	4,792.05	15.09	4,198.78	14.00	4,258.12	13.22	3,773.64
LNG *	Btu 10 <sup>12</sup> & t	429.54	2,695.53	386.08	2,970.61	403.83	3,130.83	404.94	2,775.88
LPG - Butane **	kt	428.90	221.97	482.20	193.71	460.47	221.47	383.92	154.13
LPG - Propane	kt	333.47	187.54	374.32	167.87	346.60	172.39	311.35	128.02
Natural Gas	Gm <sup>3</sup>	7.63	630.36	7.53	643.28	8.12	661.92	8.06	694.07
<b>TOTAL PETROLEUM</b>			10,511.98		9,854.28		10,491.10		9,273.25
<b>SALT</b>	Mt	8.30	233.08	8.60	227.95	9.61	227.95	9.88	179.85
<b>OTHER</b>			371.67		409.47		366.48		316.87
<b>TOTAL</b>			<b>27,547.08</b>		<b>26,696.14</b>		<b>27,857.66</b>		<b>26,417.17</b>

\* Expressed in million tonnes from 2004-05 onwards

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

2004-05		2005-06		2006-07		2007-08		2008-09		2009-10	
Quantity	Value \$M	Quantity	Value \$M	Quantity	Value \$M	Quantity	Value \$M	Quantity	Value \$M	Quantity	Value \$M
11.16	3,461.63	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
61.93	243.73	81.20	559.85	115.98	1,052.48	124.53	1,080.56	127.33	654.34	148.55	1,136.88
2.32	0.31	58.74	86.55	70.47	146.07	25.71	81.39	25.20	42.12	25.92	59.23
48.40	42.42	110.52	336.65	142.18	675.75	197.13	578.31	142.06	231.27	85.53	202.50
	286.46		983.05		1,874.31		1,740.27		927.72		1,398.61
6.28	271.72	6.71	297.37	6.02	271.52	6.23	270.42	6.98	332.57	6.71	326.24
4.50	202.38	5.02	183.98	4.70	275.28	5.09	448.53	4.71	220.20	4.34	189.17
22.80	467.81	29.26	693.80	18.22	435.32	27.97	610.67	9.19	261.53	16.28	304.00
167.35	3,016.38	166.17	3,715.05	161.77	4,222.91	141.48	4,136.28	136.61	5,226.84	164.06	6,559.58
0.71	79.55	590.24	65.92	0.82	90.90	0.73	83.74	0.45	64.19	0.44	59.93
101.71	63.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
652.94	336.37	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
420.04	298.37	402.42	357.34	323.56	282.18	262.63	204.76	255.64	231.44	336.54	276.07
	23.58		442.71		414.98		381.90		414.01		308.99
	800.89		865.97		788.06		692.48		728.87		665.32
233.15	8,302.34	242.63	12,699.09	257.64	15,732.60	291.00	21,949.80	316.54	33,633.37	396.07	33,656.63
606.94	116.32	888.43	117.97	902.05	153.32	373.47	382.75	417.70	n/a	693.39	350.69
180.42	3,503.20	183.56	3,815.11	173.66	8,059.38	172.36	5,141.53	178.39	2,996.72	177.03	4,083.14
5.63	2,203.11	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
12.80	5,146.61	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
11.04	3,953.10	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
77.17	421.74	871.98	654.42	898.61	605.08	818.39	683.35	866.53	750.83	975.75	647.35
7.64	678.72	7.71	703.28	8.71	919.49	9.16	1,025.20	8.60	1,232.18	9.36	1,320.80
	12,403.29		14,709.77		16,375.49		19,484.22		21,275.82		18,776.97
11.58	221.25	10.83	229.85	10.42	236.15	10.59	232.93	10.52	386.25	10.97	417.46
	820.06		1,113.02		866.73		460.86		698.13		719.03
<b>33,405.91</b>		<b>42,841.48</b>		<b>53,702.78</b>		<b>60,072.89</b>		<b>71,252.03</b>		<b>70,906.34</b>	



**TABLE 6. VALUE OF MINERALS AND PETROLEUM BY REGION BY COMMODITY 2009–10**

REGION	2009–10 VALUE
<b>Pilbara Region</b>	
Iron Ore	32,212,038,832
Gold and Silver	894,031,870
Copper	682,352,188
Manganese and Salt	628,564,079
Other	100,085,230
<b>Total</b>	<b>34,517,072,199</b>

<b>Offshore Petroleum</b>	
Crude Oil and Condensate	9,850,793,031
Liquefied Natural Gas	6,922,556,548
Natural Gas	1,301,216,810
LPG Butane and Propane	647,351,337
<b>Total</b>	<b>18,721,917,726</b>

<b>Goldfields–Esperance Region</b>	
Nickel, Platinum and Palladium	3,249,708,119
Gold	4,139,085,754
Cobalt	165,968,368
Copper and Zinc	138,173,796
Silver	21,934,258
Construction Materials	3,948,157
Gypsum and Limesand	2,620,504
Other	630,132
<b>Total</b>	<b>7,722,069,088</b>

<b>Peel Region</b>	
Alumina, gold and copper	4,424,363,331

<b>Mid West Region</b>	
Gold	816,576,756
Cobalt, Nickel and Talc	449,931,675
Copper, Lead and Zinc	431,828,097
Iron ore	415,711,202
Heavy Mineral Sands, Chromite	337,799,087
Crude Oil and Condensate	32,908,273
Silver	21,519,620
Natural Gas	19,584,967
Other	5,976,226
<b>Total</b>	<b>2,531,835,903</b>

REGION	2009–10 VALUE
<b>Wheatbelt Region</b>	
Iron Ore, Gold and Silver	937,384,657
Nickel, Copper and Salt	260,206,424
Gypsum and Heavy Mineral Sands	238,299,111
Other	5,081,631
<b>Total</b>	<b>1,440,971,823</b>

<b>Kimberley Region</b>	
Iron Ore, Nickel and Cobalt	438,956,862
Diamonds and Crude Oil	306,562,553
Copper, Silver and Gold	86,755,312
Other	5,764,854
<b>Total</b>	<b>838,039,581</b>

<b>South West Region</b>	
Coal	326,236,315
Heavy Mineral Sands	124,851,276
Tin, Tantalum and Spodumene	74,737,442
Other	187,189
<b>Total</b>	<b>526,012,222</b>

<b>Gascoyne Region</b>	
Salt and Gems	130,211,350
Gypsum and Limesand–Limestone	12,092,470
Other	15,670
<b>Total</b>	<b>142,319,490</b>

<b>Perth Metropolitan Region</b>	
Construction Materials, Silica Sand, Limesand–Limestone	36,679,122

<b>Great Southern Region</b>	
Spongolite, Silica Sand and Limesand	5,055,439

**TABLE 7. VALUE OF MINERALS AND PETROLEUM BY REGION BY LOCAL GOVERNMENT AUTHORITY 2009–10**

REGION	2009–10 VALUE
<b>Pilbara Region</b>	
East Pilbara	22,084,094,097
Ashburton	12,058,243,809
Roebourne and Karratha	234,932,091
Port Hedland and Marble Bar	139,802,202
<b>Total</b>	<b>34,517,072,199</b>

<b>Offshore Petroleum</b>	<b>18,721,917,726</b>
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<b>Goldfields–Esperance Region</b>	
Leonora	2,414,778,934
Coolgardie	2,308,076,411
Kalgoorlie–Boulder	1,720,237,911
Laverton	1,149,578,695
Dundas	77,215,901
Menzies	51,577,259
Esperance	603,977
<b>Total</b>	<b>7,722,069,088</b>

<b>Peel Region</b>	
Waroona	3,810,171,814
Boddington	614,191,517
<b>Total</b>	<b>4,424,363,331</b>

<b>Mid West Region</b>	
Wiluna and Three Springs	1,082,975,990
Yalgoo and Cue	431,693,114
Carnamah and Coorow	261,571,067
Mullewa and Mt Magnet	235,090,025
Meekatharra and Morawa	224,741,948
Irwin and Murchison	210,798,319
Northampton, Perenjori and Sandstone	84,965,441
<b>Total</b>	<b>2,531,835,903</b>

<b>Wheatbelt Region</b>	
Yilgarn	934,809,948
Dalwallinu and Kondinin	254,977,900
Dandaragan	235,624,358
Lake Grace and Westonia	10,562,641
Corrigin and Moora	2,516,426
Gingin and Wyalkatchem	2,026,064
Mukinbudin, Northam and Nungarin	454,486
<b>Total</b>	<b>1,440,971,823</b>

REGION	2009–10 VALUE
<b>Kimberley Region</b>	
Derby – West Kimberley	347,870,610
Halls Creek	266,021,491
Wyndham – East Kimberley	220,478,174
Broome	3,669,306
<b>Total</b>	<b>838,039,581</b>

<b>South West Region</b>	
Bunbury, Dardanup and Manjimup	91,408,498
Bridgetown–Greenbushes, Capel and Collie	434,603,724
<b>Total</b>	<b>526,012,222</b>

<b>Gascoyne Region</b>	
Carnarvon	98,959,358
Exmouth, Shark Bay and Upper Gascoyne	43,360,132
<b>Total</b>	<b>142,319,490</b>

<b>Perth Metropolitan Region</b>	
Kalamunda, Swan and Wanneroo	18,799,890
Cockburn, Kwinana and Rockingham	17,879,232
<b>Total</b>	<b>36,679,122</b>

<b>Great Southern Region</b>	
Albany, Denmark and Plantagenet	5,055,439

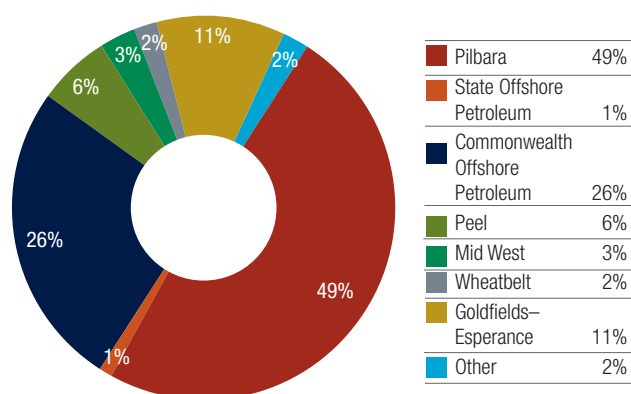


Figure 73 | **Value of Minerals and Petroleum by Region 2009–10**  
Total \$71 Billion Source: DMP

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

MINERAL/Company	Operating Site	2008	2009
<b>BAUXITE–ALUMINA</b>			
Australian Fused Materials Pty Ltd	Rockingham Fused Alumina Plant	85	69
Alcoa World Alumina Australia	Huntly	830	688
	Kwinana Alumina Refinery	1,583	1,410
	Pinjarra Refinery	1,868	1,633
	Wagerup Alumina Refinery	1,215	1,015
	Wagerup Co-Generation Plant	5	0
Bauxite Resources Limited	Willowdale	403	313
Worsley Alumina Pty Ltd	Bindoon Bauxite Quarry	0	9
	Boddington Bauxite	296	370
	Worsley Refinery	1,916	2,705
<b>TOTAL BAUXITE–ALUMINA</b>		<b>8,201</b>	<b>8,212</b>
<b>BASE METALS</b>			
Birla (Nifty) Pty Ltd	Nifty	694	541
CBH Sulphur Springs Pty Ltd	Panorama	9	0
Jabiru Metals Ltd	Jaguar	101	163
Lennard Shelf Pty Ltd	Pillara	99	8
Magellan Metals Pty Ltd	Magellan	64	24
Minerals and Metals Group	Golden Grove	1,118	655
Straits (Whim Creek) Pty Ltd	Whim Creek	157	65
<b>TOTAL BASE METALS</b>		<b>2,242</b>	<b>1,456</b>
<b>COAL</b>			
Griffin Coal Mining Co. Pty Ltd	Muja Open Cut	425	436
Wesfarmers Premier Coal Ltd	Premier	472	289
<b>TOTAL COAL</b>		<b>897</b>	<b>725</b>
<b>DIAMONDS</b>			
Argyle Diamond Mines Pty Ltd	Argyle Diamond Mine	1,687	1,247
Kimberley Diamond Company Ltd	Ellendale/Kimberley Diamonds	528	353
North Australian Diamonds Limited	Wangarra Laboratory	3	2
<b>TOTAL DIAMONDS</b>		<b>2,218</b>	<b>1,602</b>
<b>GOLD</b>			
A1 Minerals Ltd	Brightstar Beta–Midado	0	15
Agnew Gold Mining Company Pty Limited	Agnew–Emu	328	454
AngloGold Ashanti Australia Ltd	Sunrise Dam	883	837
Apex Gold Pty Ltd	Wiluna Group	326	409
ATW Gold Corp Australia Pty Ltd	Burnakura	19	91
	Gullewa	0	9
Avoka Resources Ltd	Higginsville Gold Project	272	463
Barra Resources Ltd	Burbanks Group	5	1
Barrick Gold of Australia Limited	Darlot	257	299
	Granny Smith	379	423
	Kalgoorlie West Group	646	836

MINERAL/Company	Operating Site	2008	2009
<b>GOLD Continued</b>			
Barrick Gold of Australia Limited Continued	Lawlers	382	324
	Plutonic	262	529
Catalpa Resources Limited	Edna May Gold Project	0	94
Central Norseman Gold Corporation	Central Norseman Group	245	262
Crescent Gold Limited	Laverton Gold Project	79	116
Davyhurst Gold Pty Ltd	Davyhurst	86	3
Diora – HBJ Minerals Pty Ltd	South Kal Operations	238	159
Equigold NL	Kirkalocka	40	0
Focus Minerals Ltd	Coolgardie Group	62	169
	The Mount	0	3
Golden Stallion Resources Pty Ltd	Minjar Gold Project	4	29
Haoma Pty Ltd	Bamboo Creek	9	11
Higginsville Mining Pty Ltd	Greenfield–Higginsville Plant	51	54
Intrepid Mines Limited	Paulsens	154	182
Jervois Mining Limited	Bullabulling	11	6
Kalgoorlie Consolidated Gold Mines Pty Ltd	Golden Mile - Super Pit	1,565	1,408
Kingroze Mining Pty Ltd	Sand Queen	25	23
La Mancha Resources Australia Pty Ltd	Frogs Legs Group	162	193
Mercator Gold Australia Pty Ltd	Meekatharra Gold Operations	74	10
Mount Magnet Gold NL	Mt Magnet	38	18
Mt Ida Gold Operations Pty Ltd	Mt Ida Group	24	6
Navigator (Bronzewing) Pty Ltd	Bronzewing	65	2
Newcrest Mining Ltd	Telfer	1,832	1,605
Newmont Boddington Gold Pty Ltd	Boddington	2,348	3,815
Newmont Mining Corporation	Jundee	553	745
Norilsk Nickel Australia Pty Ltd	Bannockburn Gold Mine	0	5
Paddington Gold Mine Pty Ltd	Paddington Gold	288	325
	Binduli	14	26
Ramelius Milling Services Pty Ltd	Burbanks Treatment Plant	14	22
Ramelius Resources Ltd	Wattle Dam	26	65
Range River Gold Ltd	Indee Group	28	5
Silver Lake Resources Limited	Christmas Flat	0	8
	Daisy–Milano	64	95
	Lakewood – Fimtails Plant	40	32
Saracen Gold Mines Pty Limited	Carosue Dam	17	66
St Barbara Mines Ltd	Southern Cross – Marvel Loch and Hercules mines	499	443
	Leonora Operations – Sons of Gwalia	447	380
St Ives Gold Mining Company Pty Limited	Kambalda/St Ives	1,306	1,242
Tanami Gold NL	Coyote Group	118	157
The Perth Mint	Perth Mint	119	103
Troy Resources Ltd	Sandstone Group	37	98
Other	Various	18	11
<b>TOTAL GOLD</b>		<b>14,459</b>	<b>16,686</b>

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

MINERAL/Company	Operating Site	2008	2009
<b>HEAVY MINERAL SANDS</b>			
BHP Titanium Minerals Pty Ltd	Beenup	7	2
Bemax Resources Limited	Bunbury	205	224
Doral Mineral Sands Pty Ltd	Dardanup	296	132
Mintech Chemical Industries Pty Ltd	Rockingham Fused Materials	10	11
GMA Garnet Pty Ltd	Narngulu Garnet Plant	38	34
	Port Gregory	33	30
Iluka Resources Limited	Capel	604	294
	Eneabba	501	326
	Narngulu Synthetic Rutile Plants	346	201
	Gingjin/Iluka	84	54
Tiwest Pty Ltd	Chandala–Muehea	302	226
	Cooljarloo	223	398
	Bunbury Port	21	2
<b>TOTAL HEAVY MINERAL SANDS</b>		<b>2,670</b>	<b>1,934</b>
<b>IRON ORE</b>			
Atlas Iron Ltd	Pardoo RSD Group	19	147
	Wodgina	0	10
Australian Premium Iron JV	Upper Cane	3	0
Ngarda Civil and Mining Pty Ltd.	Yarrie Nimingarra	160	262
BHP Iron Ore (Jimblebar) Ltd	Jimblebar	84	0
	RGP4 Jimblebar Construction	72	8
BHP Iron Ore Ltd	Boodarie HBI Plant	47	29
	Mining Area C	1,110	1,363
	Mt Newman Railway	1,039	1,050
	Mt Whaleback	2,103	2,018
	Nelson Point	761	1,244
	Newman Joint Venture Hub	0	1,370
	PACE-RGP Group	189	1,020
Calibre Engenium Joint Venture Pty Ltd	Mesa A Rail Construction	0	418
Citic Pacific Mining Management Pty Ltd	Cape Preston Group	428	631
Cliffs Natural Resources Pty Ltd	Koolyanobbing	584	792
Crosslands Resources Ltd	Cuddingwarra	0	103
	Jack Hills	92	245
Fast (Fluor & SKM Team)	Yandi	0	213
Ferro Metals Australia Pty Ltd	Balla Balla Group	11	4
Fortescue Metals Group Ltd	Anderson Point Port Facility	0	158
	Christmas Creek	0	281
	Cloud Break	1,599	2,326
	Cloud Break Team 45	0	27
Hamersley HMS Pty Ltd	Hope Downs	453	787
	Hope Downs Village	14	0

MINERAL/Company	Operating Site	2008	2009
<b>IRON ORE Continued</b>			
Hammersley Iron Pty Ltd	Brockman	445	539
	Dampier Port Operations and Power Plant	1,619	1,290
	Hismelt Kwinana	612	86
	Marandoo	250	355
	Paraburdoo–Channar–Eastern Range	1,324	1,081
	Paraburdoo Power Plant	35	1
	Tom Price	1,701	1,515
	Yandicoogina	957	953
Henry Walker Eltin Cockatoo Pty Ltd	Cockatoo Island	169	127
Henry Walker Eltin Contracting Pty Ltd	Orebody 23/25	420	308
	Yandi	775	1,049
Henry Walker Eltin Mining Pty Ltd	Mesa A	0	45
Kellog Brown & Root Pty Ltd	Hope Downs Construction Group	665	80
MacMahon Holdings Pty Ltd	Orebody 18–Wheelarra	300	473
Mount Gibson Iron Limited	Geraldton Port Storage Facility	18	18
	Koolan Island	503	518
	Ruvidini Rail Terminal	70	56
	Tallering Peak	305	278
Process Minerals International	Boodarie RSI	0	6
Robe River Mining Co. Pty Ltd	Cape Lambert Port Operations and Power Plant	1,601	1,151
	Pannawonica	1,012	627
	West Angelas	867	989
<b>TOTAL IRON ORE</b>		<b>22,416</b>	<b>26,051</b>
<b>NICKEL</b>			
Australian Mines Limited	Blair	52	0
BHP Billiton Minerals Pty Ltd	Ravensthorpe	1,075	221
BHP Billiton (Nickel West)	Cliffs	316	207
	Kalgoorlie Nickel Smelter	1,526	638
	Kambalda	514	136
	Kwinana Refinery	463	436
	Leinster	1,836	1,163
	Mt Keith	1,599	968
Consolidated Nickel Pty Ltd	Beta–Hunt Nickel Group	220	10
Consolidated Minerals Limited	Armstrong–Kambalda	21	0
Copernicus Nickel Mines Pty Ltd	Copernicus	25	0
Focus Minerals Ltd	Nepean	9	1
Fox Resources Pty Ltd	Radio Hill	74	26
Heron Resources Limited	Jump Up Dam	6	0
Lightning Nickel Pty Ltd	Long Nickel	162	169
Mincor Resources NL	Miitel, Wannaway, Redross, Mariners	371	176
	Carnilya Hill	76	57

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

MINERAL/Company	Operating Site	2008	2009
<b>NICKEL Continued</b>			
	Mincor Operations	139	176
	Otter Juan	0	162
Norilsk Nickel Avalon Pty Ltd	Avalon-Bulong Plant	16	6
	Black Swan	524	64
	Cawse	376	11
	Emily Ann	400	55
	Waterloo	177	10
Murrin Murrin Operations Pty Ltd	Murrin Murrin	1,893	1,292
Panoramic Resources Limited	Lanfranchi	287	242
	Savannah Group	294	246
Poseidon Nickel Ltd	Windarra Group	24	2
Xstrata Nickel Australasia Operations Pty Ltd	Cosmos	286	630
	Sinclair	147	166
Southern Cross Energy	Southern Cross Energy Power Group	100	0
Western Areas Limited	Forrestania	299	291
<b>TOTAL NICKEL</b>		<b>13,307</b>	<b>7,561</b>
<b>PETROLEUM PRODUCTS</b>			
Apache Energy Ltd	Harriet, John Brookes, Stag, Legendre	155	463
AWE Energy Ltd	Dongara, Hovea–Eremia, Mt Horner, Woodada, Xyris	40	44
BHP Billiton Petroleum (North West Shelf) Pty Ltd	Stybarrow, Pyrennes	110	140
Buru Energy Limited	Blina	3	3
Chevron (Australia) Pty Ltd	Barrow Island, Crest, Roller–Skate, Saladin, Yammaderry Wheatstone, Gorgon	1,400	1,630**
ENI Australia	Woollybutt	36	200
Origin Energy Resources Ltd	Beharra Springs, Tarantula, Jingemia	21	33
Roc Oil (WA) Pty Ltd	Cliff Head	18	31
Santos Limited	Mutineer–Exeter	73	78
Vermillion Oil and Gas Australia Pty Ltd	Wandoo	22	26
Woodside Energy Ltd	Athena, Cossack, Echo–Yodel, Goodwyn, Hermes, Laminaria East, North Rankin, Wanaea, Angel, Vincent, Enfield	3,099	2,904*
<b>TOTAL PETROLEUM PRODUCTS</b>		<b>4,977</b>	<b>5,552</b>
<b>SALT</b>			
Dampier Salt Ltd	Dampier	199	162
	Lake MacLeod	170	163
	Port Hedland	240	154
WA Salt Supply Koolyanobbing Pty Ltd	Lake Deborah	11	7
Onslow Solar Salt Pty Ltd	Onslow	161	143
Shark Bay Salt JV	Useless Loop	79	145
Western Salt Refinery Pty Ltd	Pink Lake	7	4
<b>TOTAL SALT</b>		<b>867</b>	<b>778</b>
<b>TIN, TANTALUM AND LITHIUM</b>			
Galaxy Resources Ltd	Mt Cattlin (Spodumene)	0	5
Haddington Resources Limited	Bald Hill West	2	1

MINERAL/Company	Operating Site	2008	2009
<b>TIN, TANTALUM AND LITHIUM Continued</b>			
Nagrom and Co.	Kelmscott	31	28
Talison Minerals Pty Ltd	Greenbushes	213	188
	Wodgina	219	54
<b>TOTAL TIN, TANTALUM AND LITHIUM</b>		<b>465</b>	<b>276</b>
<b>OTHER COMMODITIES</b>			
<b>TOTAL CHROMITE</b>		<b>115</b>	<b>40</b>
<b>TOTAL CLAYS</b>		<b>139</b>	<b>86</b>
<b>TOTAL CONSTRUCTION MATERIALS</b>		<b>600</b>	<b>580</b>
<b>TOTAL DIMENSION STONE</b>		<b>138</b>	<b>107</b>
<b>TOTAL INDUSTRIAL PEGMATITE MINERALS</b>		<b>20</b>	<b>13</b>
<b>TOTAL LIMESTONE – LIMESAND</b>		<b>108</b>	<b>121</b>
<b>TOTAL MINERAL EXPLORATION</b>		<b>n/a</b>	<b>2,254</b>
<b>TOTAL PHOSPHATE</b>		<b>151</b>	<b>125</b>
<b>TOTAL RARE EARTHS</b>		<b>37</b>	<b>12</b>
<b>TOTAL SILICA – SILICA SAND</b>		<b>198</b>	<b>186</b>
<b>TOTAL SILVER</b>		<b>6</b>	<b>2</b>
<b>TOTAL TALC</b>		<b>81</b>	<b>32</b>
<b>TOTAL TUNGSTEN AND MOLYBDENUM</b>		<b>50</b>	<b>9</b>
<b>TOTAL VANADIUM</b>		<b>67</b>	<b>128</b>
<b>TOTAL VARIOUS PORTS</b>		<b>443</b>	<b>416</b>
<b>ALL OTHER MATERIALS</b>		<b>48</b>	<b>13</b>
<b>TOTAL</b>		<b>75,433</b>	<b>75,615</b>

SOURCE: AXTAT 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 2010)**

**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](http://www.bhpbilliton.com)

**China Minmetals Corporation**

Level 8,  
564 St Kilda Road,  
Melbourne Vic 3004,  
(03) 9520 6800,  
Golden Grove.

[www.minmetals.com/index.jsp](http://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](http://www.jabirumetals.com.au)

**Magellan Metals Pty Ltd**

96 Welshpool Road,  
Welshpool WA 6106,  
(08) 9267 7000,  
Magellan.

[www.magellanmetals.com.au](http://www.magellanmetals.com.au)

**Newcrest Mining Ltd**

193 Great Eastern Highway,  
Belmont WA 6104,  
(08) 9270 7070,  
Telfer.

[www.newcrest.com.au](http://www.newcrest.com.au)

**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](http://www.alcoa.com.au)

**Worsley Alumina Pty Ltd**

PO Box 344,  
Collie WA 6225,  
(08) 9734 8311,  
Boddington.

[www.wapl.com.au](http://www.wapl.com.au)

**CLAY**

Attapulgitte

**Hudson Resources Ltd**

2 Kemp Street, Narngulu,  
Geraldton WA 6530,  
(08) 9923 3604,  
Lake Nerramyne.

[www.hudsonresources.com](http://www.hudsonresources.com)

Clay Shale

**The Griffin Coal Mining Company Pty Limited**

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

[www.griffincoal.com.au](http://www.griffincoal.com.au)

Saponite

**Watheroo Minerals Pty Ltd**

PO Box 353,  
Dunsborough WA 6281,  
(08) 9756 6121,  
Watheroo Clays.

[www.bentoniteproductswa.com.au](http://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](http://www.griffincoal.com.au)

**Wesfarmers Premier Coal Ltd**

Premier Road,  
Collie WA 6225,  
(08) 9780 2222,  
Collie.

[www.wesfarmers.com.au](http://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](http://www.holcim.com.au)

Gravel

**WA Limestone Co.**

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

[www.walimestone.com](http://www.walimestone.com)

Sand

**Boral Resources (WA) Ltd**

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

[www.boral.com.au](http://www.boral.com.au)

**Rocla Quarry Products**

130 Fauntleroy Avenue,  
Redcliffe WA 6104,  
(08) 9475 2500,  
Gnangara, Banjup, Gingin, Lexia,  
Baldivis.

[www.rocla.com.au](http://www.rocla.com.au)

**Holcim (Australia) Pty Ltd**

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

**Kimberley Diamond Company**

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

**DIMENSION STONE****Granite****Fraser Range Granite NL**

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

**FELDSPAR****Unimin Australia Ltd**

26–28 Tomlinson Road,  
Welshpool WA 6106,  
(08) 9362 1655,  
Mukinbudin.  
[www.unimin.com.au](http://www.unimin.com.au)

**GOLD****Agnew Gold Mining Co Pty Ltd**

PMB 10,  
Leinster WA 6437,  
(08) 9088 3822,  
Agnew.  
[www.goldfields.co.za](http://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](http://www.anglogoldashanti.com)

**Apex Minerals NL**

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

**Avoca Resources Limited**

Level 1, 31 Ventnor Avenue,  
West Perth WA 6005,  
(08) 9226 0625,  
Higginsville.  
[www.avocaresources.com.au](http://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](http://www.barrick.com)

**Dioro Exploration NL**

Level 2, 45 Stirling Highway,  
Nedlands WA 6009,  
(08) 9389 8799,  
South Kal Mines, Frogs Leg.  
[www.dioro.com.au](http://www.dioro.com.au)

**Focus Minerals Limited**

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

**Intrepid Mines Limited**

Level 1, WBM Building,  
490 Upper Edward Street,  
Spring Hill Qld 4004,  
(07) 3007 8000,  
Paulsens.  
[www.intrepidmines.com](http://www.intrepidmines.com)

**La Mancha Resources Inc.**

Level 1, 12 St Georges Terrace,  
Perth WA 6000,  
(08) 9268 4000,  
Mungari East.  
[www.lamancha.ca](http://www.lamancha.ca)

**Newcrest Mining Ltd**

193 Great Eastern Highway,  
Belmont WA 6104,  
(08) 9270 7070,  
Telfer.  
[www.newcrest.com.au](http://www.newcrest.com.au)

**Newmont Mining Corporation**

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

**TABLE 9. PRINCIPAL MINERAL AND PETROLEUM PRODUCERS (EFFECTIVE 1 JULY 2010) Continued**

**Norseman Gold Plc**

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

**Paddington Gold Pty Ltd**

Menzies Highway,  
PO Box 1653,  
Kalgoorlie WA 6430,  
(08) 9080 6800,  
Paddington.  
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

**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,  
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,  
Coyote.  
www.tanami.com.au

**Troy Resources NL**

44 Ord Street,  
West Perth WA 6005,  
(08) 9481 1277,  
Sandstone.  
www.try.com.au

**GYPSUM**

**Cockburn Cement Ltd**

Lot 242 Russell Road,  
Munster WA 6163,  
(08) 9411 1000,  
Lake Hillman.  
www.cockburncement.com.au

**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.

**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**

**Cable Sands (WA) Pty Ltd**

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

**Doral Mineral Sands Pty Ltd**

Lot 7 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

**IRON ORE**

**Atlas Iron Ltd**

Ground Floor, 10 Richardson Street,  
West Perth WA 6005,  
(08) 9476 7900,  
Pardoo.  
www.atlasiron.com.au

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

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

**BHP Billiton Iron Ore Ltd**

225 St Georges Terrace,  
Perth WA 6000,  
(08) 6224 4444,  
Jimblebar, Newman, Yandicoogina.  
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](http://www.cliffsnaturalresources.com)

**Fortescue Metals Limited**

Level 2, 87 Adelaide Terrace,  
East Perth WA 6004,  
(08) 6218 8888,  
Cloud Break.  
[www.fmg.com.au](http://www.fmg.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](http://www.hamersleyiron.com)

**Hope Downs Management Services Pty Ltd**

152 St Georges Terrace,  
Perth WA 6000,  
(08) 9327 7000,  
Hope Downs.  
[www.hancockprospecting.com.au](http://www.hancockprospecting.com.au)

**Sinosteel Midwest Corporation Limited**

7 Rheola Street,  
West Perth WA 6005,  
(08) 9429 4888,  
Koolanooka.  
[www.midwestcorp.com.au](http://www.midwestcorp.com.au)

**Mt Gibson Iron Limited**

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

**LIMESAND–LIMESTONE****Cockburn Cement Ltd**

Lot 242, Russell Road,  
Munster WA 6163,  
(08) 9411 1000,  
Cockburn, Denison, Wanneroo.  
[www.cockburncement.com.au](http://www.cockburncement.com.au)

**Gypsum Industries of Australia**

Suite 1, 110 Robinson Avenue,  
Belmont WA 6104,  
1800 644 951,  
Cervantes, Lancelin, Jurien.  
[www.aglime.com.au/](http://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](http://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/](http://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](http://www.consminerals.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](http://www.bhpbilliton.com)

**Glenmurrin Pty Ltd**

Level 4,  
30 The Esplanade,  
Perth WA 6805,  
(08) 9226 1099,  
Murrin Murrin.  
[www.glencore.com](http://www.glencore.com)

**Independence Group NL**

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

**Minara Resources Ltd**

Level 4, 30 The Esplanade,  
Perth WA 6000,  
(08) 9212 8400,  
Murrin Murrin.  
[www.minara.com.au](http://www.minara.com.au)

**TABLE 9. PRINCIPAL MINERAL AND PETROLEUM PRODUCERS (EFFECTIVE 1 JULY 2010) Continued**

**Mincor Resources NL**

Level 1, 56 Ord Street,  
West Perth WA 6005,  
(08) 9476 7200,  
Carnilya Hill, Mariners, Miitel,  
Redross, Wannaway.  
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,  
Flying Fox.  
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,  
Agincourt, Albert, Artreus, Bambra,  
Double Island, East Spar, Endymion,  
Gipsy, Gudrun, Harriet, Hoover,  
Legendre, John Brookes,  
Linda, Little Sandy, Mohave,  
Monet, North Alkimos,  
North Pedirka, Pedirka,  
Rose, Simpson, Sinbad,  
South Plato, Stag, Tanami,  
Van Gogh, Victoria, Wonnich.  
www.apachecorp.com

**AWE Ltd**

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

**Buru Energy Limited**

Level 1, 418 Murray Street,  
Perth WA 6000,  
Freecall: 1800 337 330,  
Blina.  
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, Griffin, Pyranees,  
Stybarrow.  
www.bhpbilliton.com

**Chevron Australia Pty Ltd**

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

**ENI Australia Limited**

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

**Origin Energy Resources Ltd**

34 Colin Street,  
West Perth WA 6005,  
(08) 9324 6111,  
Beharra Springs, Jingemina.  
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

**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](http://www.woodside.com.au)

**PLATINUM****BHP Billiton (Nickel West)**

191 Great Eastern Highway,  
Belmont WA 6104,  
(08) 6272 3000,  
Kambalda.  
[www.bhpbilliton.com](http://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](http://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, Pink Lake.  
[www.wasalt.com.au](http://www.wasalt.com.au)

**SILICA – SILICA SAND****Silica****Simcoa Operations Pty Ltd**

973 Marriott Road,  
Wellesley WA 6233  
(08) 9780 6744,  
Dalaroo, Kemerton.  
[www.simcoa.com.au](http://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](http://www.ksspl.com.au)

**Rocla Quarry Products**

3 Casella Place,  
Kewdale WA 6105,  
(08) 9353 9800,  
Gnangara.  
[www.rocla.com.au](http://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](http://www.luzenac.com)

**Unimin Australia Ltd**

26 Tomlinson Road,  
Welshpool WA 6106,  
(08) 9362 1411,  
Mt Seabrook.  
[www.unimin.com.au](http://www.unimin.com.au)

**TIN–TANTALUM–LITHIUM****Spodumene****Talison Minerals Ltd**

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

**Tantalite–Tin****Talison Minerals Ltd**

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

## ABBREVIATIONS

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

## WEIGHTS AND MEASURES

Kilo	1000 <sup>1</sup>	10 <sup>3</sup>	1,000
Mega	1000 <sup>2</sup>	10 <sup>6</sup>	1,000,000
Giga	1000 <sup>3</sup>	10 <sup>9</sup>	1,000,000,000
Tera	1000 <sup>4</sup>	10 <sup>12</sup>	1,000,000,000,000
Peta	1000 <sup>5</sup>	10 <sup>15</sup>	1,000,000,000,000,000
Exa	1000 <sup>6</sup>	10 <sup>18</sup>	1,000,000,000,000,000,000
Zetta	1000 <sup>7</sup>	10 <sup>21</sup>	1,000,000,000,000,000,000,000
Yotta	1000 <sup>8</sup>	10 <sup>24</sup>	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 <sup>3</sup>	= 35.3147 cubic feet (ft <sup>3</sup> ) [1 kilolitre (kl) = 1 cubic metre (m <sup>3</sup> )]
Energy	1 kilojoule	kj	= 0.94781 British Thermal Units (Btu)
Energy Content		Prefix	
Coal	19.7 GJ/t	kilo (k)	10 <sup>3</sup>
Condensate	32.0 MJ/L	mega (M)	10 <sup>6</sup>
Crude oil	37.0 MJ/L	giga (G)	10 <sup>9</sup>
LNG	25.0 MJ/L	tera (T)	10 <sup>12</sup>
Natural gas	38.2 MJ/m <sup>3</sup>	peta (P)	10 <sup>15</sup>
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

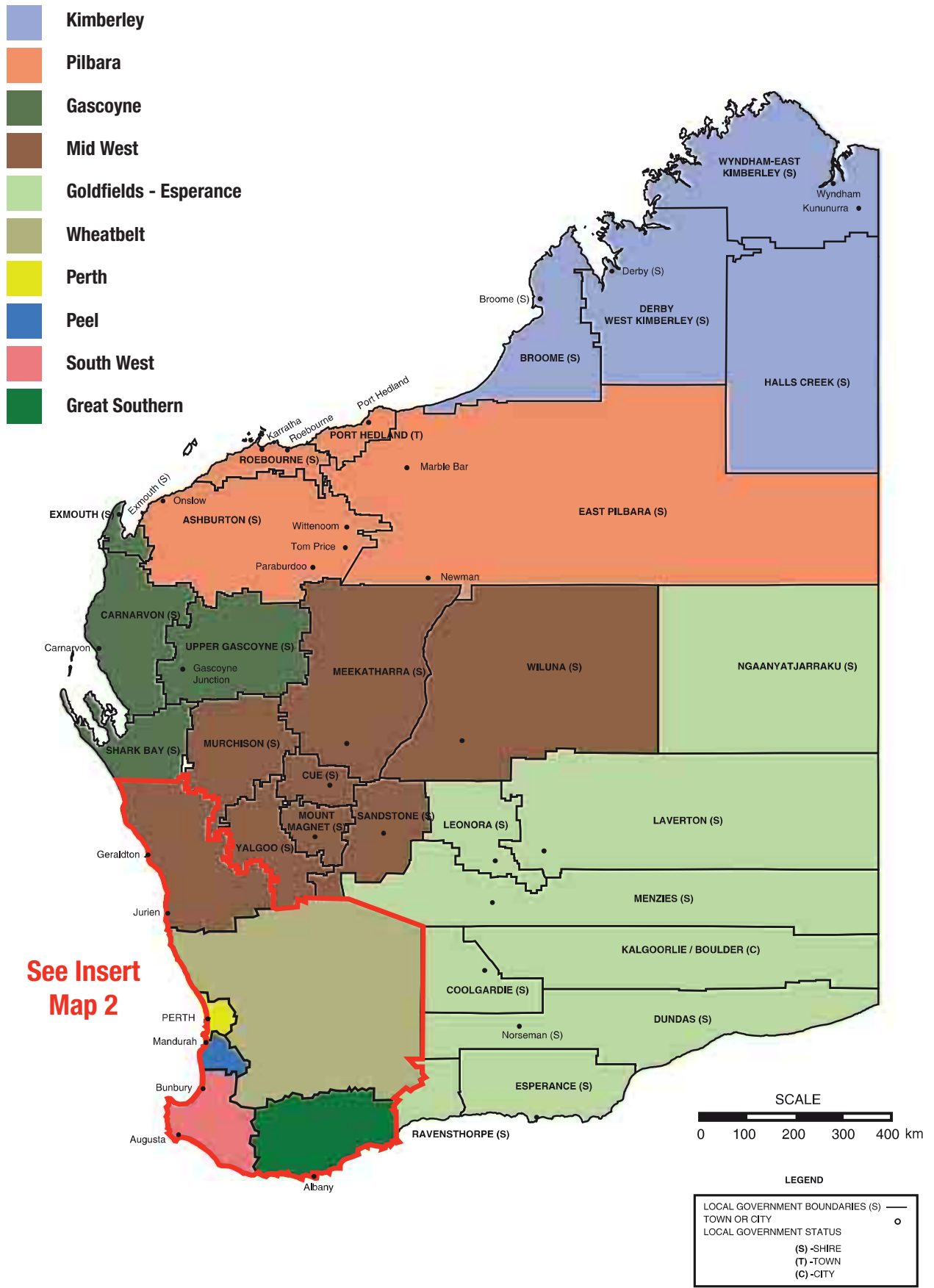
Quantities and values for minerals and petroleum in this publication are collected from a variety of sources including:

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

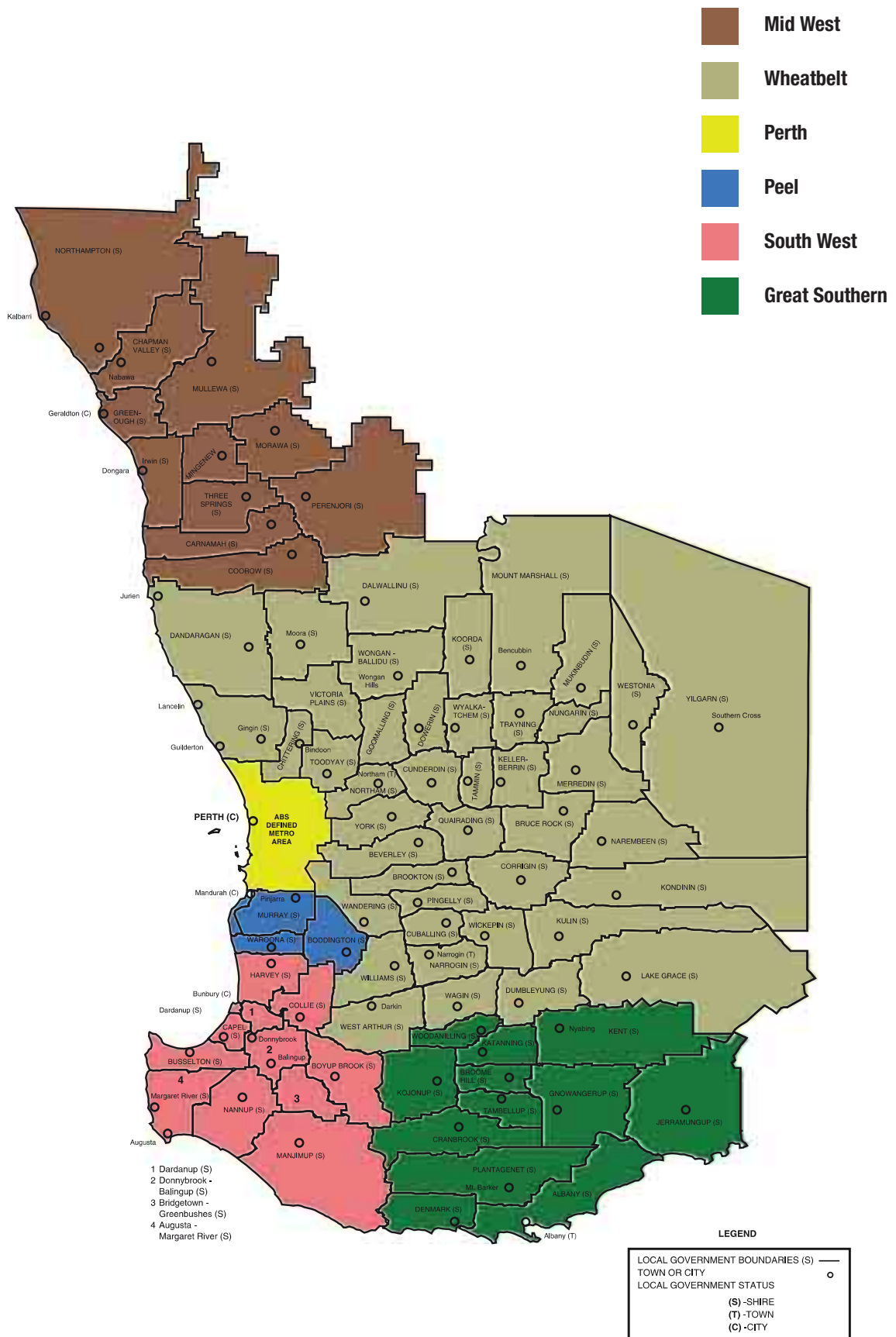
Quantities specified relate to either mine production or sales as listed below for each commodity.

<b>Mine Production</b>
Clays
Coal
Construction Materials
Dimension Stone
Gold
Gypsum
Limesand–Limestone–Dolomite
Silica – Silica Sand
Talc
<b>Sales</b>
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



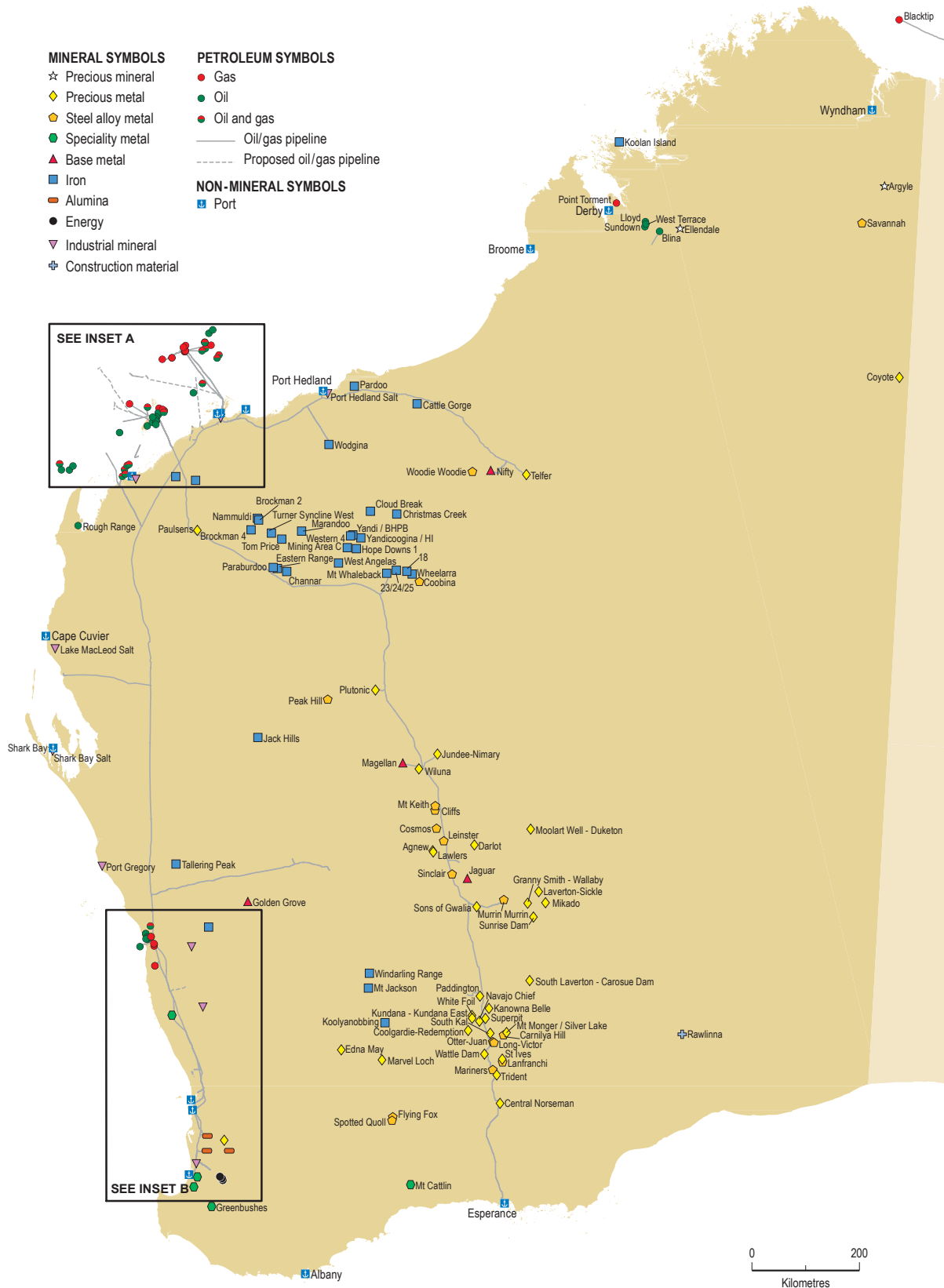


Map 4. Local Government and Regional Boundaries



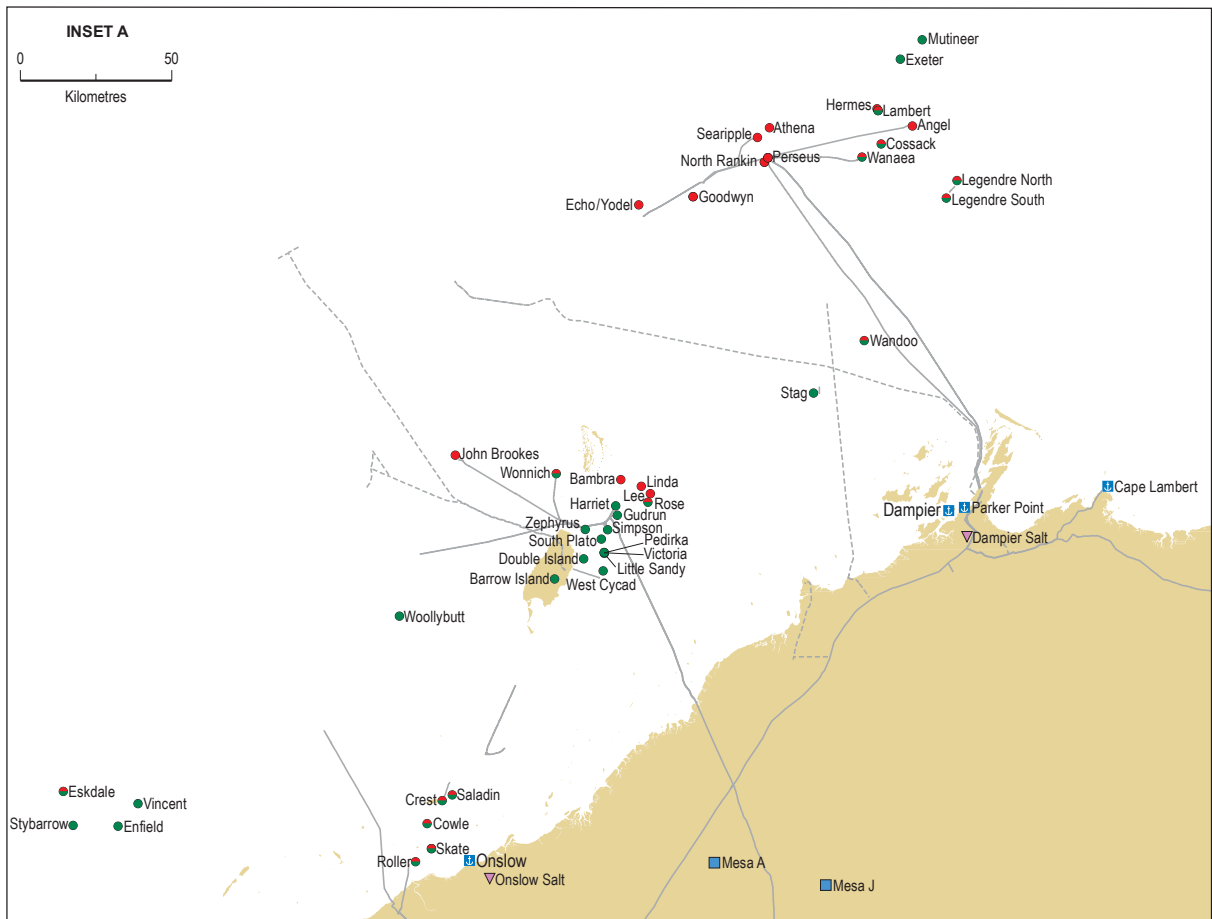
Map 5. Local Government and Regional Boundaries Insert

# 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

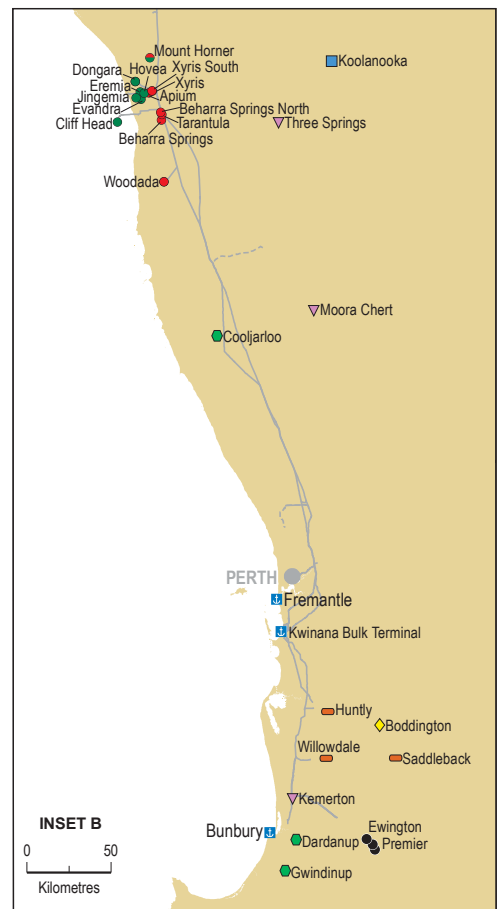
- ◆ Precious metal
- Speciality metal
- Iron
- Alumina
- Energy
- ▽ Industrial mineral

### 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





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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](mailto:dmp@dmp.wa.gov.au)  
Web: [www.dmp.wa.gov.au](http://www.dmp.wa.gov.au)

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