Australian Government
Department of Industry, Innovation and Science

Office of the Chief Economist

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Resources and Energy Quarterly

SEPTEMBER QUARTER 2015

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Further Information

For more information on data or government initiatives please access the report from the Department's website at:
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Foreword

The Resources and Energy Quarterly provides data on the performance of Australia's resources and energy sector and analysis of key commodity markets. This release of the Resources and Energy Quarterly contains an update to the Office of the Chief Economist's medium-term commodity forecasts over the period to 2020.

The combination of weak consumption growth and strong supply growth placed considerable downward pressure on commodity prices in the first eight months of 2015. Between January and August 2015, Brent oil prices declined 4 per cent, iron ore prices (FOB) by 23 per cent and Newcastle thermal coal 9 per cent.

Despite the widespread downturn in commodity prices, the prospects for Australia's resources and energy sector remain broadly positive. Australia's resources and energy sector is transitioning from a period of high investment to a period of production growth. The environment of lower commodity prices has curtailed the flow of capital into new projects and also reduced sustaining capital expenditure. In addition, exploration expenditure has declined as companies respond to the need to cut costs and increase productivity by pushing existing operations.

The production phase of the boom, which is yet to peak, is expected to last a lot longer than the price and investment phases of the boom (which were eight and six years, respectively). The production phase is largely underpinned by $400 billion of investment that was channelled into resources and energy projects between 2003 and 2014.

Over the next five years all seven mega-LNG projects that have been developed over the past several years are scheduled to begin operation. When this occurs, Australia will emerge as the world's largest LNG exporter. In 2014-15, Australia exported 25 million tonnes of LNG. By 2019-20, there will be a total of 87 million tonnes of LNG production capacity in place with a projected combined export volume of just over 76 million tonnes.

While current market conditions are challenging, over the medium- to long-term, demand for Australia's resources and energy commodities is projected to increase, due to increasing consumption in developing nations, particularly in Asia. This expectation is based largely on increasing urbanisation and the expansion of manufacturing in emerging, highly populated Asian economies. As a result, Australia's earnings from resources and energy commodities are projected to increase at an average annual rate of 6 per cent a year from 2015-16 to total $235 billion (in 2015-16 dollar terms) in 2019-20.

Mark Cully

Chief Economist

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Macroeconomic outlook

The global economy

The global economy is forecast to grow by 3.4 per cent in 2015, supported by growth in the US, European Union and non-OECD Asia. Emerging economies are forecast to grow by 4.4 per cent and the OECD by 2.3 per cent. Lower energy prices will support growth in most countries but is likely to be offset by weaker growth in key economies, such as China and Japan.

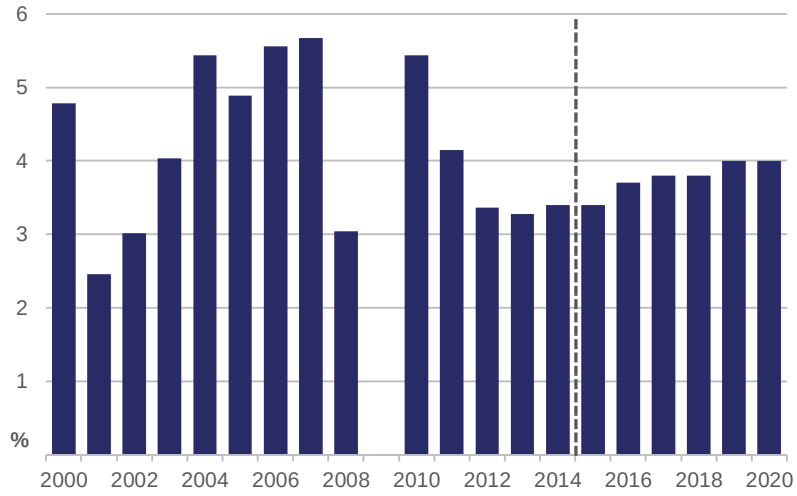
After a decade-long increase in commodity prices, driven by a combination of economic growth in China, a slow global supply response and the depreciation of the US dollar, global commodity prices are now in a downturn and many of the factors that supported the 'supercycle' are in reverse. Prices for most commodities declined through the first eight months of 2015, principally due to strong growth in mining and refining capacity, moderating world consumption growth and a shift in US monetary policies.

In 2016, world GDP growth is forecast to increase marginally to 3.7 per cent, supported by higher growth in advanced economies, particularly the US and European Union. However, stronger world economic growth is unlikely to stimulate a demand-driven recovery in commodity prices. As a result, most commodity prices are forecast to remain below their post-GFC peaks. Any price increases are likely to be the result of a cut in supply, rather than an increase in consumption, as higher cost producers exit the market or curtail production.

Over the medium term world economic growth is projected to increase to 4 per cent in 2020, supported by 5.5 per cent growth in emerging economies and 2.6 per cent growth in OECD economies. China and India are expected to contribute most to the growth in emerging economies while growth in the OECD economies is expected to be driven by the US and European Union.

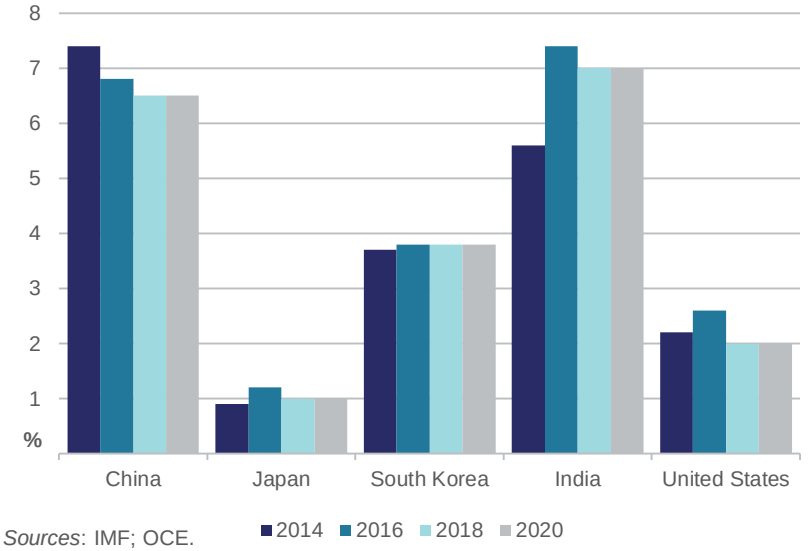
A more detailed discussion on the economic outlook for key economies follows.

Figure 1.1 World economic growth



Sources: IMF; OCE.

Figure 1.2 Economic growth in selected countries



Sources: IMF; OCE.

Table 1.1: Key world macroeconomic assumptions

%	2014	2015 a	2016 a	2017 a	2018 a	2019 a	2020 a
Economic growth b							
OECD	1.8	2.3	2.4	2.6	2.6	2.6	2.6
United States	2.2	2.3	2.6	2.0	2.0	2.0	2.0
Japan	0.9	0.9	1.2	1.5	1.0	1.0	1.0
European Union 28	1.4	1.6	1.8	1.9	1.9	1.9	1.9
Germany	1.6	1.7	1.7	1.6	1.5	1.5	1.5
France	0.4	1.0	1.5	1.5	2.0	2.0	2.0
United Kingdom	2.6	2.7	2.4	2.3	2.2	2.2	2.2
South Korea	3.7	3.5	3.8	3.8	3.8	3.8	3.8
New Zealand	3.6	3.0	2.8	2.5	2.5	2.5	2.5
Emerging economies	4.6	4.4	4.7	5.0	5.3	5.3	5.5
Non-OECD Asia	6.8	6.5	6.4	6.4	6.4	6.4	6.4
South East Asia d	4.6	5.0	5.2	5.5	5.5	5.5	5.5
China e	7.4	6.8	6.8	6.5	6.5	6.5	6.5
Chinese Taipei	3.5	3.5	3.8	4.0	4.0	4.0	4.0
India	5.6	7.4	7.4	7.0	7.0	7.0	7.0
Latin America	1.3	1.0	2.0	2.5	3.0	3.0	3.5
Middle East	2.6	2.8	3.5	4.0	4.0	4.0	4.0
World c	3.4	3.4	3.7	3.8	3.8	4.0	4.0
Inflation rate b							
United States	2.2	2.3	2.3	2.3	2.3	2.3	2.3

a assumption. **b** Change from previous period. **c** Weighted using 2012 purchasing power parity (PPP) valuation of country gross domestic product by IMF. **d** Indonesia, Malaysia, the Philippines, Thailand and Vietnam. **e** Excludes Hong Kong.
Sources: IMF; OECD; OCE.

The outlook for key economies

United States

The US economy grew by 3.7 per cent in the June quarter, a significant improvement on the 0.6 per cent growth recorded in the March quarter. Growth in the June quarter was supported by an increase in household consumption, business fixed investment and the housing sector. However, net exports were weak as a result of volatility in international markets, including China and Europe, that are key destinations for exports.

Labour market indicators show that the utilisation of labour is improving. In August, unemployment fell to 5.1 per cent, 1 per cent lower than the same time last year.

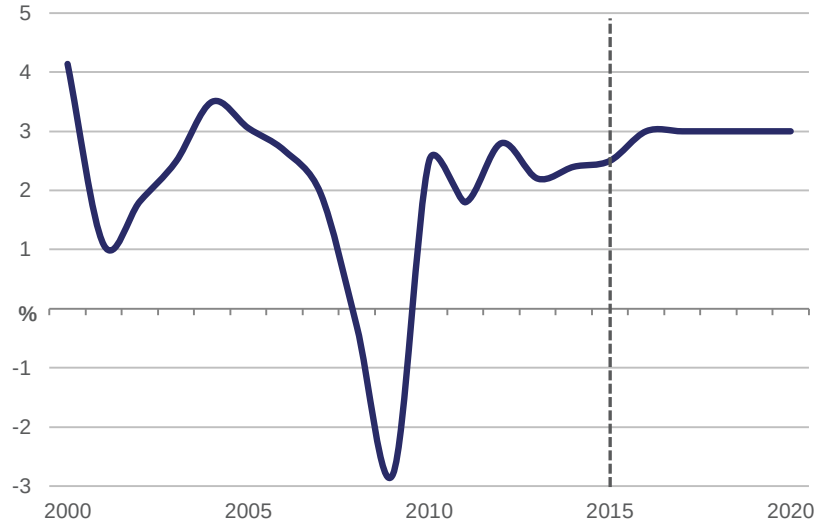
Inflation has stayed persistently low throughout the year at around 0-0.25 per cent, which is well below the 2 per cent Federal Reserve Bank target. Low prices for energy and non-energy imports have contributed to sustained low inflation. As a result, the Federal Reserve decided to maintain discount rates at their September meeting. A decision to increase interest rates will depend on both the inflation rate moving towards the targets of a 2 per cent and the unemployment rate remaining low.

In 2015 US GDP growth is forecast to be 2.3 per cent, driven by consumer spending, low energy prices and an increase in employment. However, developments in key export markets will continue to have a strong influence over economic prospects in the US.

As the economy continues to gain momentum, GDP growth in 2016 is forecast to be 2.6 per cent. Despite lower energy prices, consumer spending is expected grow and drive economic growth.

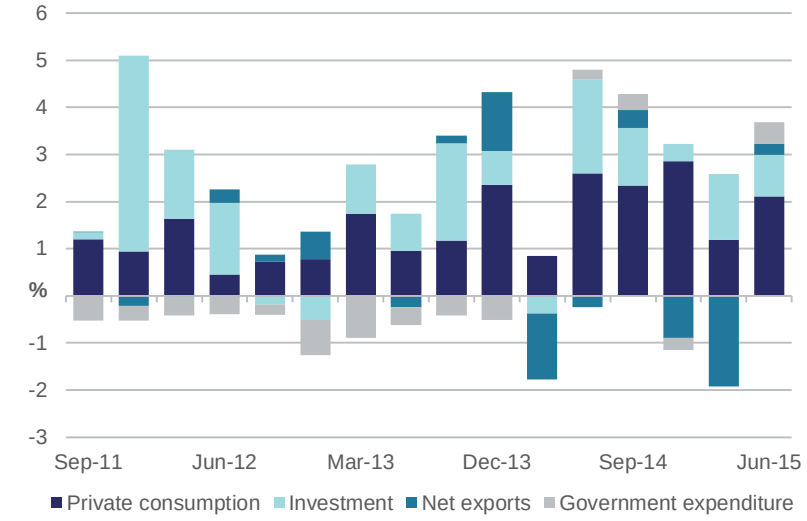
Over the outlook period US GDP is projected grow 2 per cent a year to 2020.

Figure 1.3: US GDP growth



Sources: IMF; OCE

Figure 1.4: US quarterly contribution to GDP



Source: US Bureau of Economic Analysis.

China

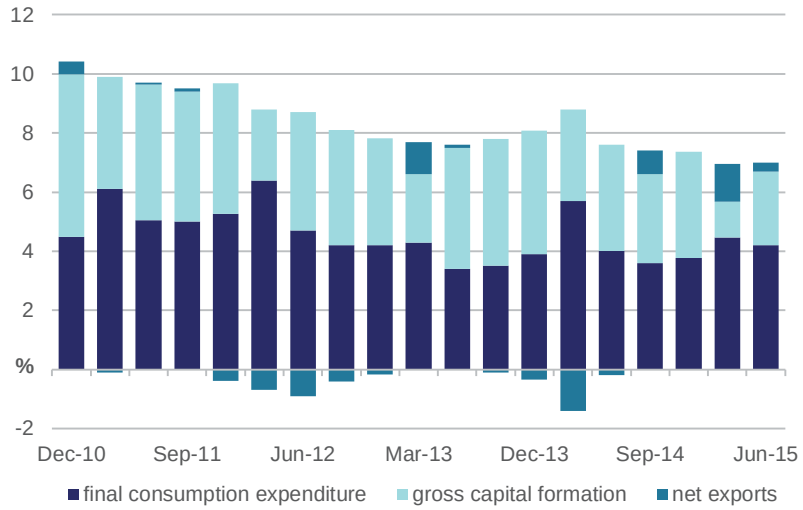
The Chinese economy grew by 7 per cent in the June quarter 2015, down from 7.4 per cent recorded in 2014 and 7.7 per cent in 2013. Growth was supported by consumer spending and infrastructure investment. However, stock market volatility, devaluation of the yuan and continued weakness in residential construction detracted from this growth.

After 12 months of uninterrupted growth in its share market (share prices doubled in the year to 24 June 2015), China's benchmark Shanghai Composite fell 7 per cent on 26 June and by a further 20 per cent through early September. However, the Shanghai Composite benchmark is still 40 per cent higher than at the same time last year. The share market accounts for around 5 per cent of China's corporate financing, and the link between the share price and long-term profitability of companies is weak. As a result, volatility is likely to affect China's share market over the short term, but the impact on the economy should be limited.

In August 2015 the People's Bank of China cut the value of the yuan, which led to a large outflow of China's foreign reserves through the September quarter. In mid-September China's foreign reserves were down 11 per cent, or around US$436 billion, from the June 2014 peak of US$4 trillion. Although the decline in the value of the yuan was large, it had appreciated by around 30 per cent against the US dollar since the currency peg was lifted in June 2005. Despite the outflow, China still has the largest foreign reserves in the world, leaving it well placed to handle further market volatility.

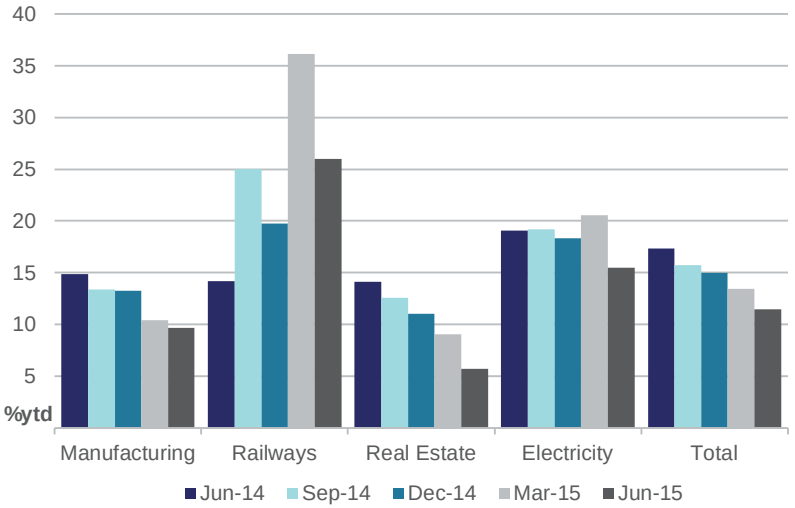
Although residential construction continued to decline in the June quarter, down 16 per cent year-on-year, and vacancy rates increased 22 per cent year-on-year, housing prices have started to recover. The average price of housing in Tier one cities, such as Beijing and Shanghai, increased by 2 per cent between May and July while prices in other cities increased by 1 per cent. The turnaround in prices indicates that the growth in housing supply, which has weighed down residential values and construction growth, is moderating.

Figure 1.5: China's quarterly contribution to GDP



Source: CEIC.

Figure 1.6: Growth in China's fixed asset investment



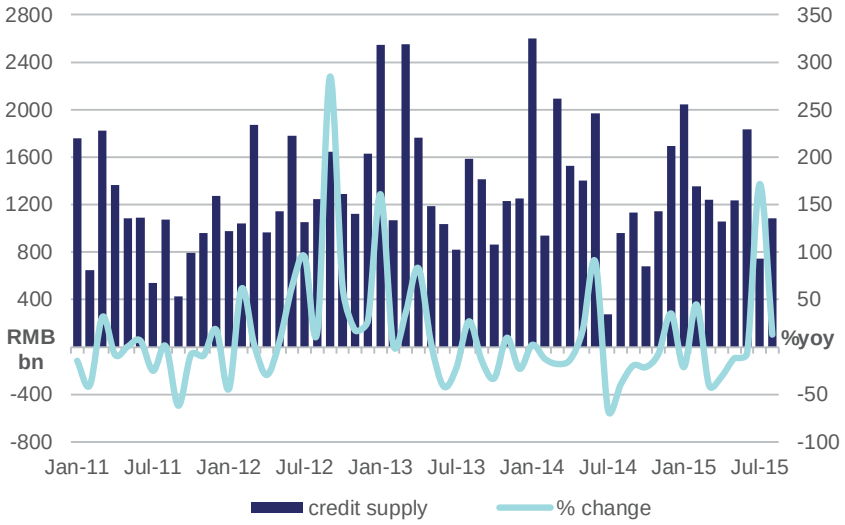
Source: CEIC.

Over the medium term China's GDP growth is assumed to moderate to 6.5 per cent in 2020. While the rate of growth is slowing, it will still support large year-on-year increases in commodity demand.

China's infrastructure investment is expected to grow strongly over the medium term, supported by government expenditure. This includes recently announced public private partnerships worth US$300 billion to develop infrastructure across China. Further, the Chinese government announced plans to invest US$125 billion in rail through 2015. Only US$50 billion of this allocation had been spent in the first half of 2015, indicating a further US$75 billion in rail investment over the remainder of 2015. The government has also committed around US$235 billion to deliver infrastructure associated with the 'one belt, one road' policy which plans to improve transport networks in western China and surrounding countries.

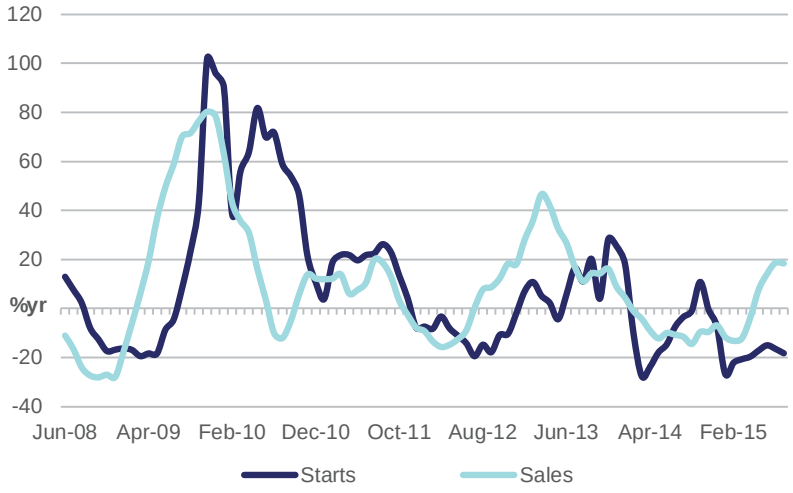
These new initiatives are on top of earlier commitments to redevelop government housing (US$64 billion), water infrastructure (US$14 billion) and the electrical grid (US$315 billion).

Figure 1.7: China's new credit supply



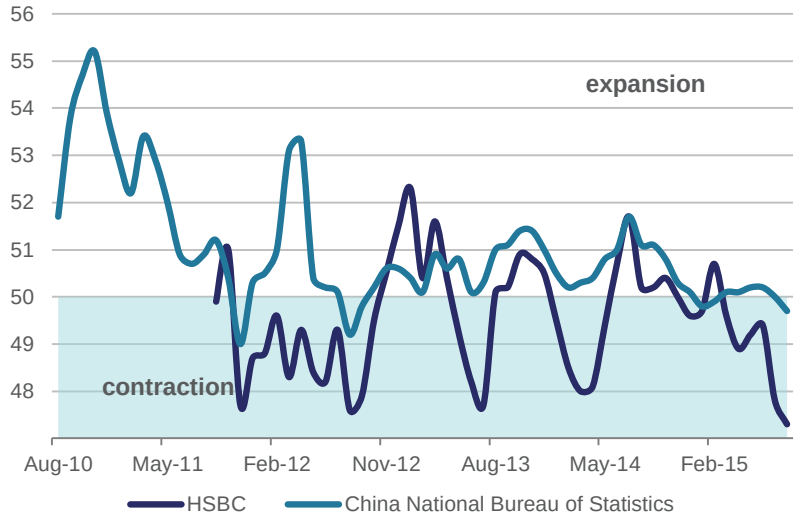
Source: CEIC.

Figure 1.8: China's residential sales and starts



Data is three month moving average of monthly growth rate.
Source: CEIC.

Figure 1.9: China's manufacturing PMI



Sources: CEIC; Bloomberg.

India

India's economy grew by 7 per cent in the June quarter, which was lower than the 7.5 per cent growth rate recorded in the March quarter. Although the growth rate was lower than many analysts' expectations, India's growth was the same as China's during the quarter and stronger than many other emerging economies, including Brazil and Russia.

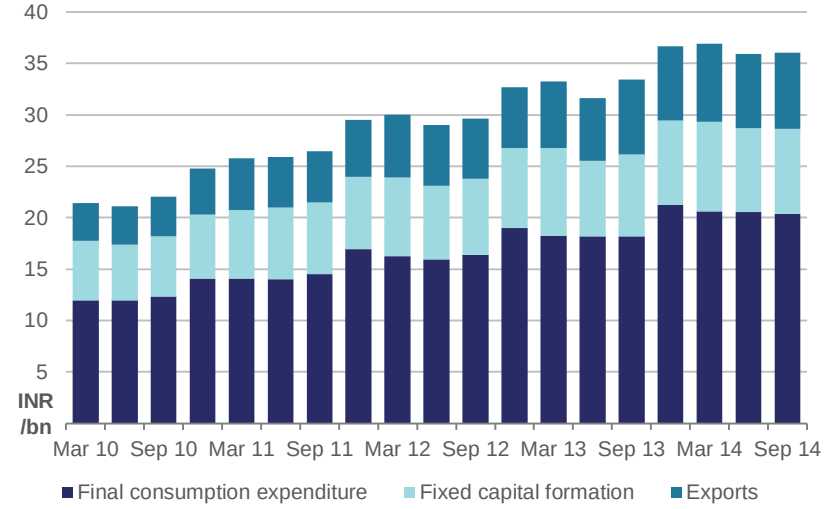
India's economic growth was supported by a fall in the value of the rupee and the lower price of key imports, such as oil. However, a second successive poor monsoon season had a significant impact on the agricultural sector. Agriculture accounts for around 17 per cent of India's economy, and roughly half of India's population makes a living through farming. For the full year 2015 and 2016, India's economy is forecast to grow by 7.4 per cent.

Over the medium term India's GDP growth rate is projected to be 7.0 per cent in 2020, supported by economic reform, infrastructure investment and an expanding manufacturing base. However, there are considerable challenges in achieving this growth, including modernising the tax system.

A key component of India's proposed tax reform is to replace individual state consumption taxes with a nationwide goods and services tax (GST). India has more than 650 interstate checkpoints that local governments use to enforce regional sales taxes. Around 60 per cent of India's freight is transported by road and these checkpoints cause considerable delays, increasing the cost of doing business. The introduction of a nationwide GST would replace the check points and is essential if the government is to meet their target of lifting India's 'Doing Business' ranking from 142 (of 189) into the top 50 by 2017. However, tax reform has stalled in the Parliament and the original April 2016 date for implementation has been delayed.

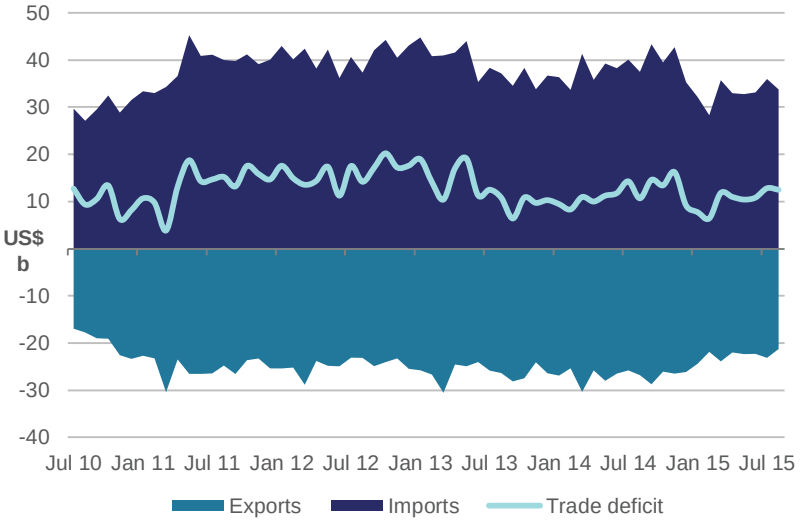
The government's plan for investing in electricity generation and implementing economic reform, particularly to the tax system, should drive growth in manufacturing and the broader economy over the medium term.

Figure 1.10: Quarterly contributions to India's GDP



Source: CEIC.

Figure 1.11: India's current account



Source: CEIC.

Japan

Japan's GDP contracted to an annualised rate of 1.6 per cent in June 2015, underpinned by lower demand for exports and lower private consumption. Private consumption accounts for roughly 60 per cent of economic activity in Japan and fell 0.8 per cent from the March quarter, the first decline since an increase in the sales tax in April 2014. The decline in export demand was largely attributable to slowing economic growth in China, and the rest of the Asian region.

There are growing expectations that the Abe Government could introduce a fiscal stimulus package in response to a continued economic slowdown in China. However, the government is focused on the corporate sector being the key driver of growth, by encouraging them to redirect their profits to increase wages and capital expenditure.

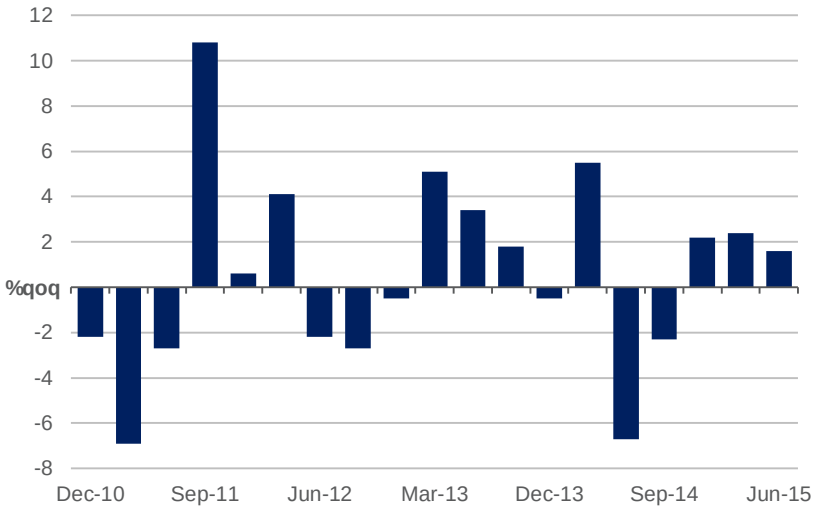
Over the medium term, increased economic growth will rely on large scale investment to stimulate higher productivity and employment. However, growth is likely to remain constrained by an aging population and the need for fiscal consolidation. Over the medium term, Japan's economic growth is forecast to average around 1.0 per cent a year.

South Korea

South Korea's economy grew at an annualised rate of 0.3 per cent in the June quarter, down from 0.8 per cent recorded in March. For the year ending June 2015, South Korea's economy grew 2.2 per cent. In the first half of 2015, the economy was severely affected by the outbreak of Middle East Respiratory Syndrome (MERS), which substantially reduced tourist numbers and reduced consumer and business confidence. The economy is expected to recover in the second half of the year, aided by the government's stimulus package, introduced to mitigate the effects of the outbreak.

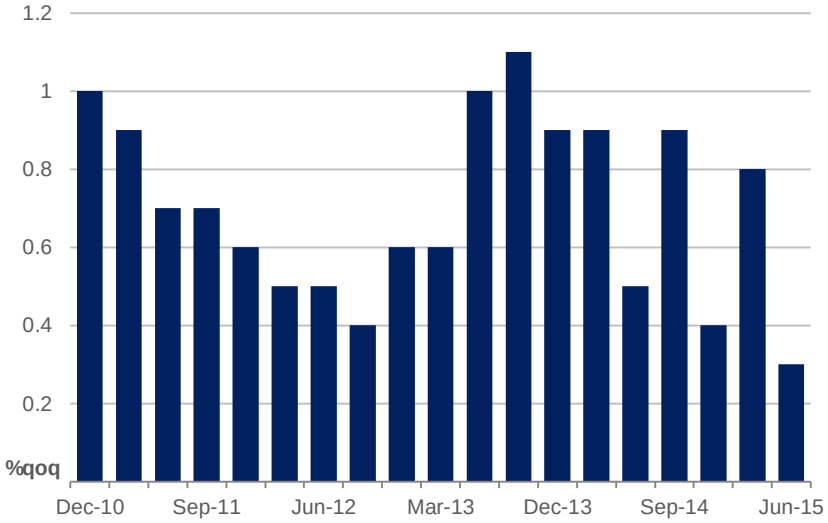
Over the medium term exports are expected to be a key contributor to South Korea's economic growth, as the South Korean won weakens from current levels against the Japanese yen and Euro.

Figure 1.12: Japan's quarterly GDP, annualised



Source: Bloomberg.

Figure 1.13: South Korea's quarterly GDP



Source: Bloomberg.

Europe

Gross domestic product in the EU28 increased by 1.9 per cent year-on-year in the June quarter, led by growth in the United Kingdom, Spain, Poland and Sweden.

Growth across the EU28 was supported by 2.2 per cent year-on-year growth in household consumption and an increase in fixed asset investment, up 2.6 per cent year-on-year.

Output in the United Kingdom increased by 2.3 per cent, year-on-year, supported by strong growth in the distribution, hospitality, transport and business services sectors. Gross domestic product in the United Kingdom is now 5.2 per cent higher than the pre-downturn peak of 2008.

In contrast, the Russian economy slipped into recession in the June quarter, contracting 4.6 per cent year-on-year as the decline in the price of oil and the impact of sanctions continued to affect economic growth. The Russian economy is expected to contract further in the near term, led by falling export revenues, inflation (which reduces real household incomes) and a decrease in consumer spending.

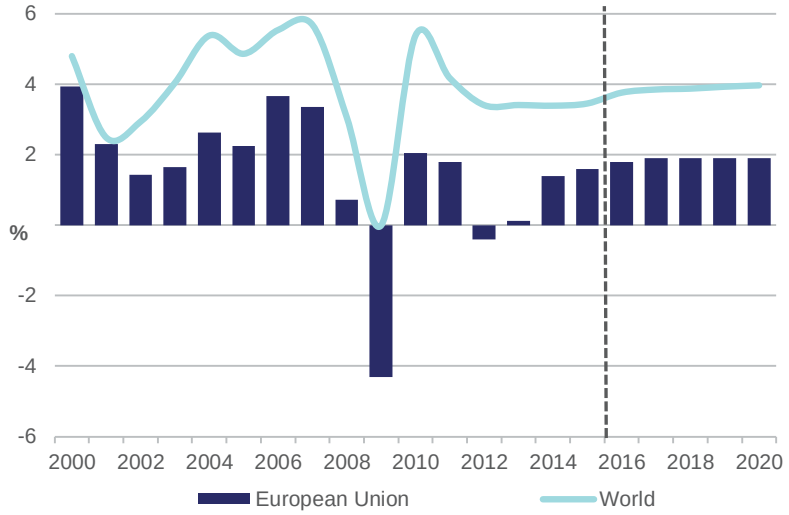
Within the EU28, economic recovery is expected to continue in the near term. However growth is projected to remain below levels recorded prior to the financial crisis in 2008. The EU28 is forecast to grow by 1.6 per cent in 2015, considerably lower than the average annual growth rate of 2.7 per cent for the five years to 2007.

Over the medium term, growth within the EU28 remains subject to a number of significant risks, including the extent of the economic downturn in Russia, its effect on member economies, and the Greek sovereign debt crisis.

Greece narrowly avoided a further default in July after securing its third bail-out package in five years. However, there is widespread uncertainty over its resolve to implement the stringent reforms associated with the deal and the risk of default.

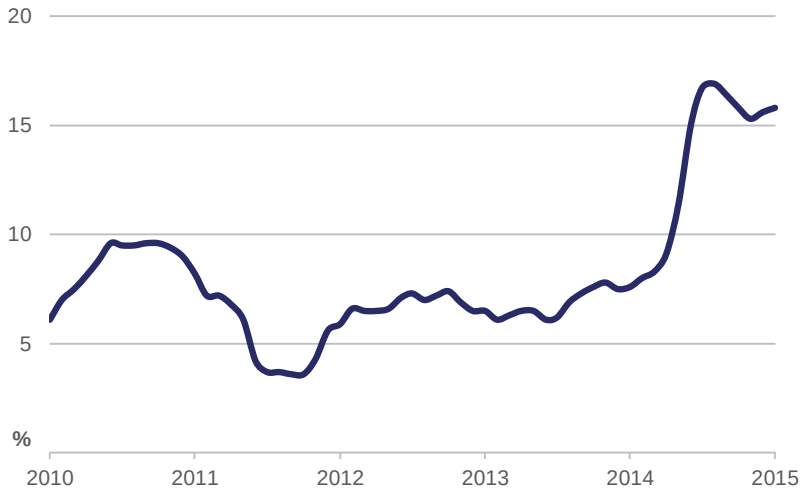
Growth within the EU28 is projected to improve modestly towards the end of the outlook period, with output increasing by 2.0 per cent in 2020.

Figure 1.14: Economic growth in Europe



Sources: IMF; OCE.

Figure 1.15: Year-on-year change in Russian CPI



Source: Bloomberg.

Economic outlook for Australia's resources sector

It is clear that the commodity price cycle is in a downturn as the factors that supported the rapid increase in prices over the last decade subside. Growth in China's commodity demand, once believed to be insatiable, is beginning to slow as the economy transitions away from investment-led growth to consumption-led growth; the substantial investment in new projects over the past several years is beginning to translate into additional supply; and the US dollar is beginning to appreciate against other currencies.

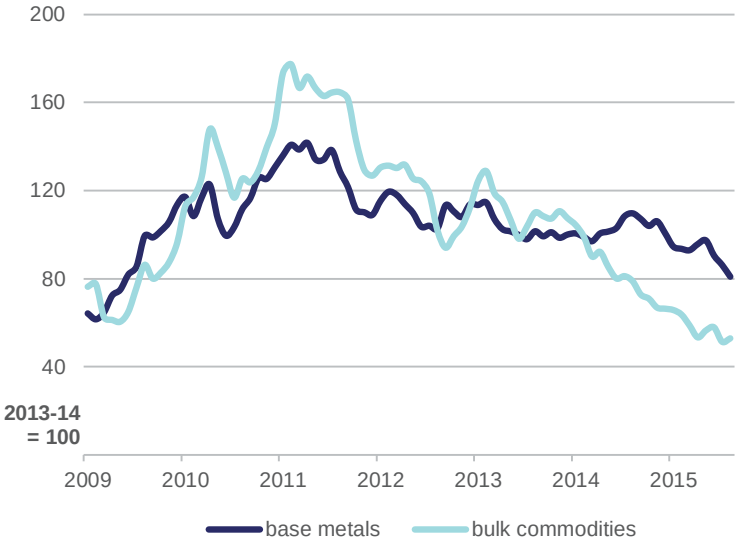
The outlook for Australia's resources and energy sector will be characteristically different to the price and investment phases observed over the past decade, and will depend on developments over the short- and medium-terms.

In the short-term, the resources and energy sectors are transitioning from the investment phase to the production phase. As commodity prices decline and investment in the sector is reduced, Australia's resources and energy sector is turning its focus to improving productivity and reducing costs rather than just increasing output. Current operating conditions are not a new phenomenon for the Australian resources sector which has shown considerable resilience in the face of commodity price cycles and changing economic conditions in the past.

Over the medium term there are still factors to support growth in commodities demand, particularly in emerging economies that are investing in housing, infrastructure and manufacturing to support growing populations and industrial bases. The Australian sector is well placed to meet future commodity demand as production starts to increase following a long period of investment. Increased production volumes have been reflected in growth in exports. In 2014-15, exports of iron ore and coal increased by 15 per cent and 5 per cent, respectively.

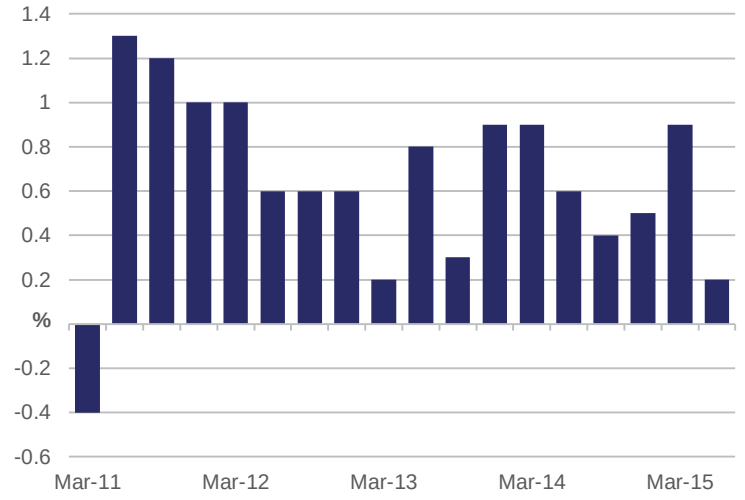
The resources sector has been a key contributor to the Australian economy through large export earnings and capital investments and the slowdown in activity has had an effect on economic growth. Australia's GDP growth slowed from 0.9 per cent in the March quarter 2015 to 0.2 per cent (in seasonally adjusted terms) in the

Figure 1.16: Commodity price index



Source: RBA.

Figure 1.17: Australia's economic growth, seasonally adjusted

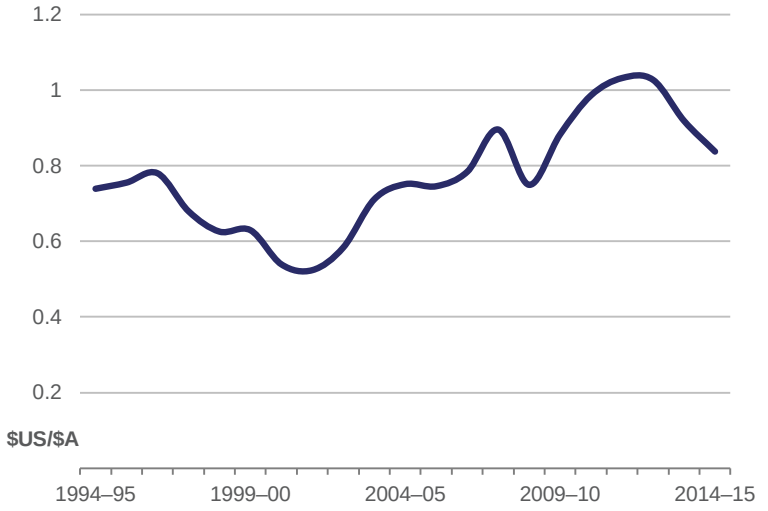


Source: ABS.

June quarter 2015. The slowdown was driven by reduced activity in the resources sector, which declined 3 per cent in the June quarter. However, the sector's production was still 2.1 per cent higher year-on-year for the first half of 2015. Reduced activity in the resources sector also detracted from export earnings and mining-related construction. The slowdown in these sectors was partially offset by increased domestic consumption and stronger performance in the financial, transport and health sectors.

The Australian dollar has depreciated against the US dollar over the past year, but has been historically high since the mid-1990s. Declining commodity prices and the subsequent deterioration in the terms of trade and relatively low interest rates are likely to result in further downward pressure on the exchange rate. The Australian dollar-US dollar exchange rate is forecast to average 0.74 US dollars in 2015-16 but there is a strong risk that the Australian dollar could depreciate further. Over the medium term, the Australian dollar is assumed to return to its long term average of around 0.75 US dollars by 2019-20.

Figure 1.18: Australia's exchange rate



Sources: ABS; Bloomberg.

Table 1.2: Key macroeconomic assumptions for Australia

	unit	2014–15	2015–16 a	2016–17 a	2017–18 a	2018–19 a	2019–20 a
Inflation rate b	%	2.7	2.5	2.2	2.2	2.2	2.2
Interest rate c	%	2.4	2.0	2.5	3.0	4.0	4.0
Exchange rate d	US$/A$	0.84	0.73	0.74	0.75	0.75	0.75

a assumption **b** Change from previous period. **c** Median RBA cash rate. **d** Average of daily rates.
Sources: ABS; RBA; OCE.

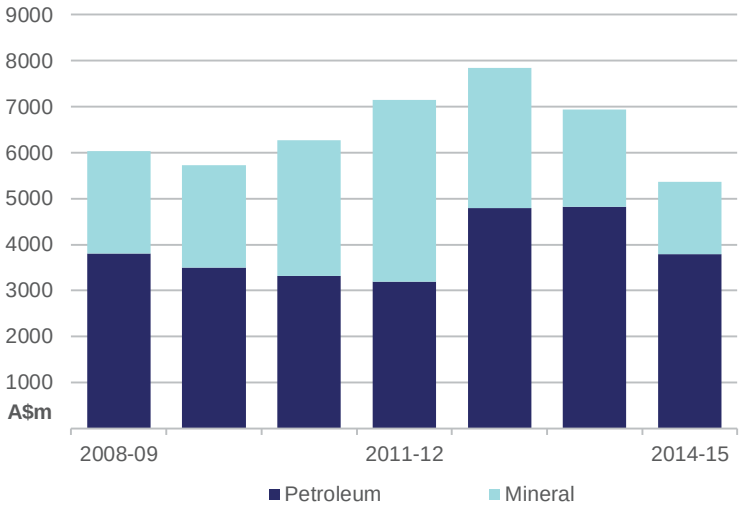
Exploration

In 2014-15, the downturn in commodity prices pushed many companies to implement cost cutting programs to remain profitable. As a result, exploration expenditure decreased 23 per cent to $5.4 billion. Minerals exploration declined 25 per cent to $1.6 billion and petroleum exploration declined 21 per cent to $3.8 billion. With generally lower prices forecast, a pick-up in exploration is unlikely in the short term.

Mineral exploration expenditure declined in all states and territories during 2014-15. Most of the decline occurred in Western Australia and Queensland, which decreased by $303 million and $140 million to $917 million and $311 million, respectively.

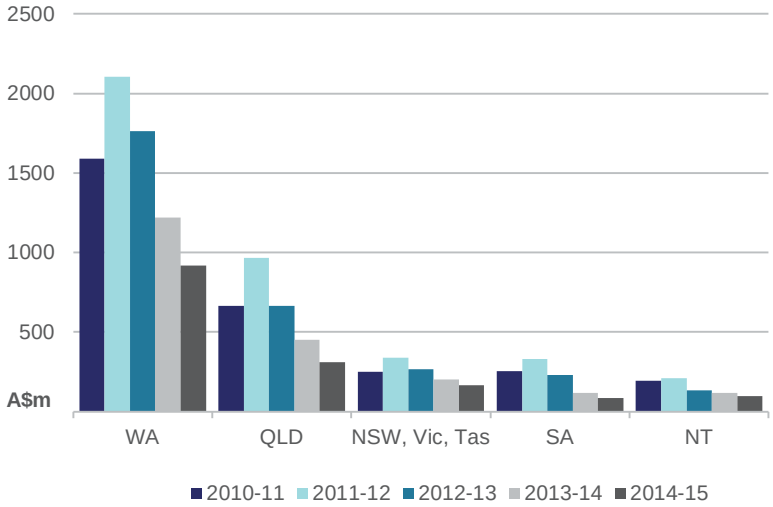
The decline in minerals exploration expenditure was relatively evenly spread between exploration at existing deposits and new deposits, which were down 24 per cent and 29 per cent, respectively in 2014-15.

Figure 1.19: Australia's exploration expenditure



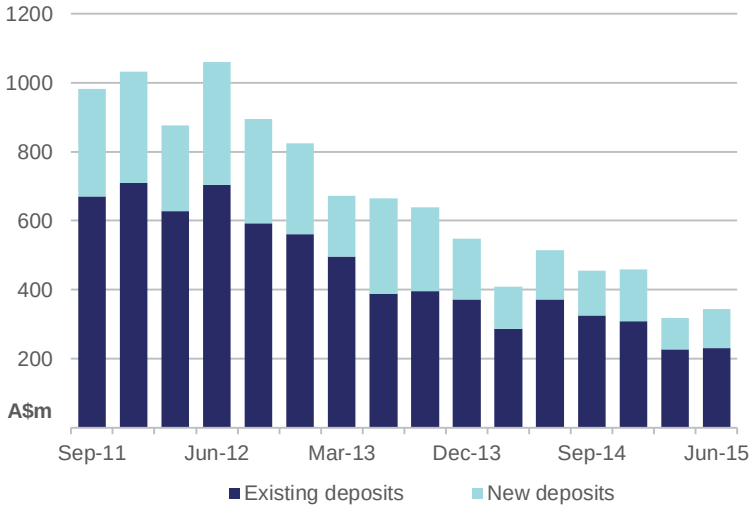
Source: ABS.

Figure 1.20: State exploration expenditure



Source: ABS.

Figure 1.21: Exploration expenditure, by deposit type



Source: ABS.

Capital expenditure

There was an unprecedented escalation in investment in resources and energy projects in Australia over the past decade, underpinned by rapidly increasing consumption and commodity prices. However, the current state of commodity markets is no longer supportive of further investment in new projects. In 2014-15, mining industry capital expenditure was $76.1 billion, down 16 per cent from 2013-14.

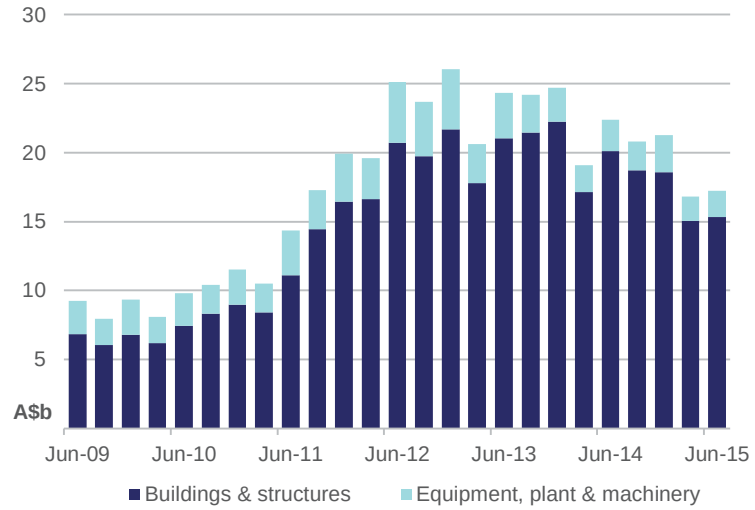
Given the projected softness in commodity prices over the medium term, the outlook for new investment in the Australian resources sector is likely to be subdued. As high-value LNG projects are completed, the stock of investment in the sector will be drawn down. Although investment has slowed, new projects are likely to continue to be developed to maintain output as older projects reach the end of their operating life.

Australia has many high quality mineral and petroleum deposits that can be developed when the economic cycle rebounds. However, Australia will need to compete with other resource-rich countries to secure investment and must ensure it remains a leading destination for attracting capital.

Mining sector employment

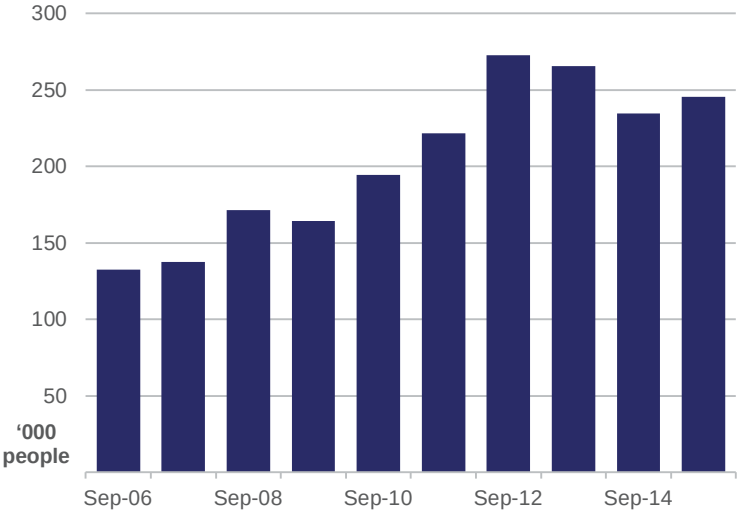
Cost cutting activities in response to lower prices have reduced the number of employees at a number of operations. Despite this, mining sector employment was 245 700 people in the September quarter 2015, 4 per cent higher than the September quarter 2014 and 8 per cent higher than the June quarter. Mining sector employment is not expected to rebound substantially in the medium term as a decline in construction labour associated with the large LNG projects is likely to offset any increases in employment associated with rising production.

Figure 1.22: Mining industry capital expenditure



Source: ABS.

Figure 1.23: Total mining employment



Source: ABS.

Australia's resource and energy commodity production and exports

Commodity prices have declined steadily over the past year in response to strong growth in supply, slowing consumption growth and a stronger US dollar. This has created a challenging operating environment that has encouraged Australian producers to implement cost cutting and productivity enhancing initiatives to remain viable. Although these measures have been successful for many producers, a number of mines have been forced to close. Despite the challenges, the investment in new capacity over the past few years is translating into higher production.

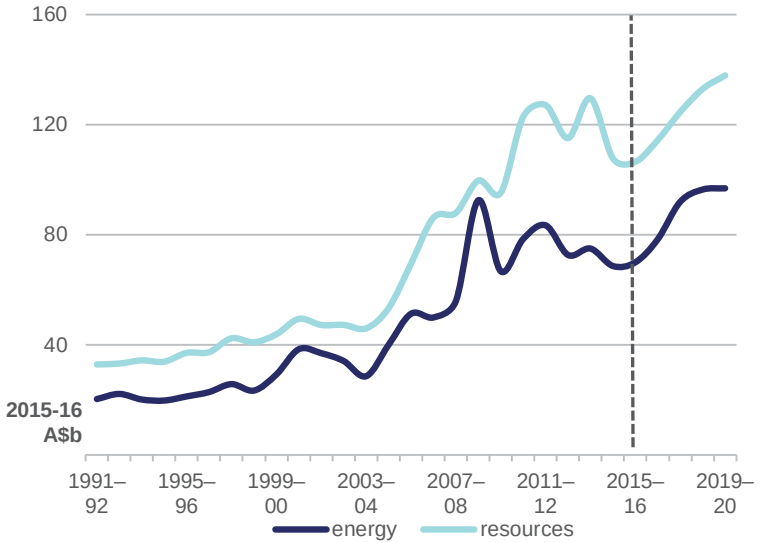
The rapid increase in supply that has emerged over the past few years is forecast to persist in the short term and contribute to continued low commodity prices. As growth in supply begins to slow in response to reduced investment and the closure of unprofitable capacity, the projected growth in consumption will begin to put upward pressure on prices over the medium term.

Australia's earnings from resources and energy commodities decreased by 12 per cent to $172 billion in 2014-15 as growth in export volumes was more than offset by lower prices. Earnings from resource commodities were $105 billion, down 15 per cent from 2013-14, driven primarily by lower earnings from iron ore. Earnings from energy commodities declined 6 per cent to $67 billion because of a decline in earnings from coal exports.

In 2015-16, Australia's earnings from resource and energy commodities are forecast to increase by 3 per cent to $176 billion as higher export volumes for most commodities and the effect of a depreciating Australian dollar more than offset forecast lower prices.

Over the medium term, the outlook for the Australian resources sector is largely positive. The prices of several commodities, in particular iron ore and coal, are projected to increase moderately towards the end of the outlook period. In addition, production and export volumes are projected to increase as the recent investment in the sector contributes to increased output. The strongest growth in export earnings is projected for LNG, where the development of new projects on the east coast of Australia is projected to contribute to a near tripling of LNG exports.

Figure 1.24: Australia's resources and energy export earnings



Source: ABS.

Australia's earnings from resources and energy exports are projected to reach $235 billion (in 2015-16 dollars) by 2019-20. Earnings from resources exports are projected to total $138 billion (in 2015-16 dollar terms), while earnings from energy are projected to total $97 billion in 2019-20.

Table 1.3: Outlook for Australia's resources and energy commodities

	unit	2014–15	2015–16 f	2016–17 z	2017–18 z	2018–19 z	2019–20 z
Value of exports							
Resources and energy	A$m	171 953	176 421	196 988	226 150	244 816	256 031
– real a	A$m	176 316	176 421	192 748	216 518	229 344	234 687
Energy	A$m	66 907	69 952	80 080	96 034	102 900	105 647
– real a	A$m	68 604	69 952	78 356	91 944	96 397	96 840
Resources	A$m	105 047	106 469	116 908	130 115	141 916	150 384
– real a	A$m	107 712	106 469	114 392	124 574	132 947	137 848
Mine production							
Gross value	A$m	165 075	169 364	189 109	217 104	235 023	245 790

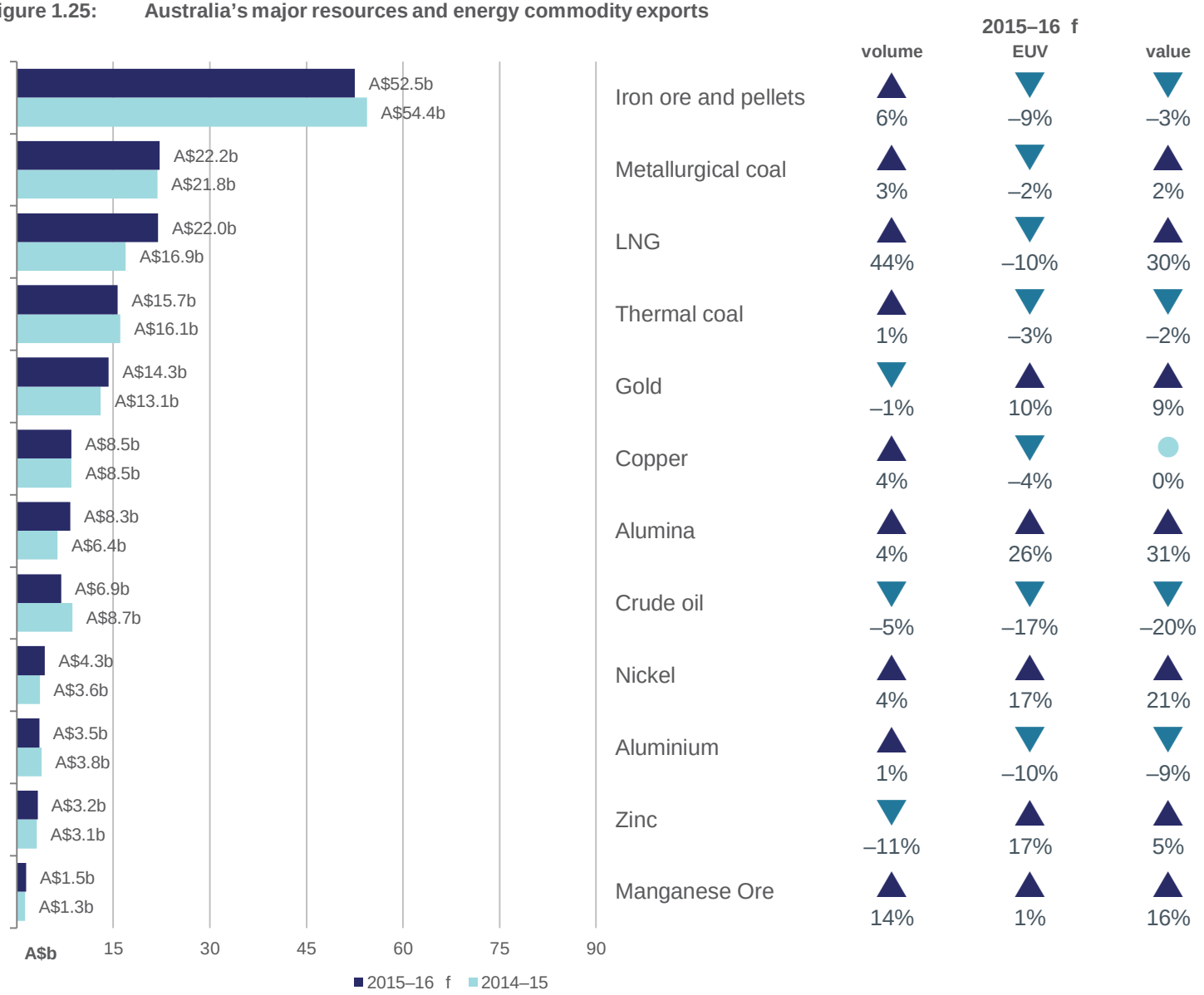
a In current financial year Australian dollars. **f** forecast. **z** projection.
Sources: ABS; OCE.

Table 1.4: Australia's resources and energy commodity exports, by selected commodities

	Volume				Value			
	unit	2014-15	2019-20 z	CAGR	unit	2014-15	2019-20 z	CAGR
Alumina	kt	17 363	17 576	0.2	A$m	6 353	8 345	5.6
Aluminium	kt	1 433	1 307	–1.8	A$m	3 832	3 936	0.5
Copper	kt	1 012	1 265	4.6	A$m	8 514	12 784	8.5
Gold	t	284	303	1.3	A$m	13 052	17 814	6.4
Iron ore	Mt	748	927	4.4	A$m	54 411	83 564	9.0
Nickel	kt	253	299	3.4	A$m	3 584	6 889	14.0
Zinc	kt	1 622	1 620	–0.0	A$m	3 095	4 161	6.1
LNG	Mt	26	76	24.5	A$m	16 924	48 968	23.7
Metallurgical coal	Mt	188	211	2.4	A$m	21 847	26 997	4.3
Thermal coal	Mt	205	222	1.6	A$m	16 062	16 284	0.3
Oil	kbd	261	284	1.7	A$m	8 658	9 409	1.7
Uranium	t	5 515	8 500	9.0	A$m	532	1 048	14.5

z projection. CAGR is compound annual growth rate, in percentage terms.
Sources: ABS; OCE.

Figure 1.25: Australia's major resources and energy commodity exports



f forecast
EUV is export unit value

Steel

Ben Witteveen

World steel consumption in 2015 is forecast to increase slightly as growth in India and other developing economies offsets a small contraction in China and Japan. However, over the medium term fixed asset investment in developing economies is projected to support growth in world steel consumption and production.

World steel overview

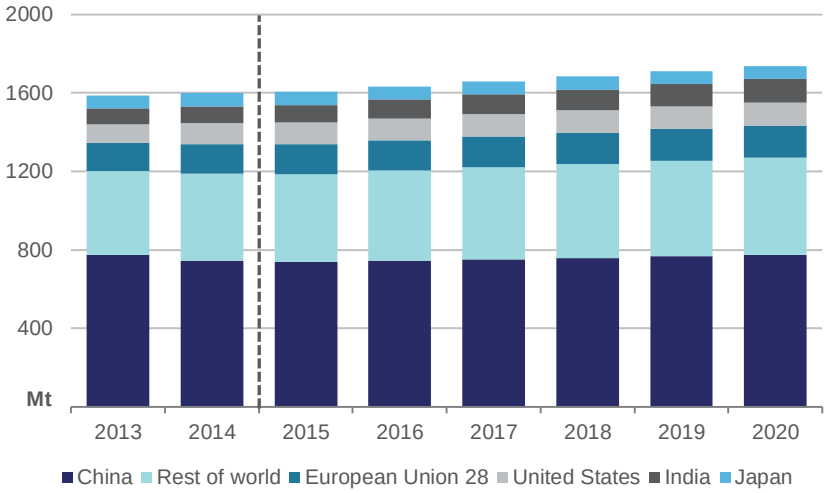
In 2015, world steel consumption is forecast to increase by 0.4 per cent to 1.6 billion tonnes. Increasing consumption in India and other developing economies is expected to drive growth in 2015 and offset a moderate contraction in consumption in China and Japan.

World steel production is forecast to fall by 1 per cent in 2015 to 1.64 billion tonnes, led by declines in China, Japan, South Korea and the US. World steel production in the first half of 2015 was adversely affected by lower output in China, the world's largest producer (in 2014, China accounted for around 50 per cent of the world's steel production). However, growth in India's steel production, which has been supported by ongoing urbanisation and investment in infrastructure, is expect to provide a partial offset to reduced production in China.

Over the outlook period, world steel consumption is projected to grow by around 1.6 per cent a year to 1.74 billion tonnes in 2020, underpinned by ongoing urbanisation and an expanding manufacturing base in many developing countries, particularly China and India. Developing economies have been the growth engine of world steel consumption over the past decade and they are expected remain a key driver over the outlook period.

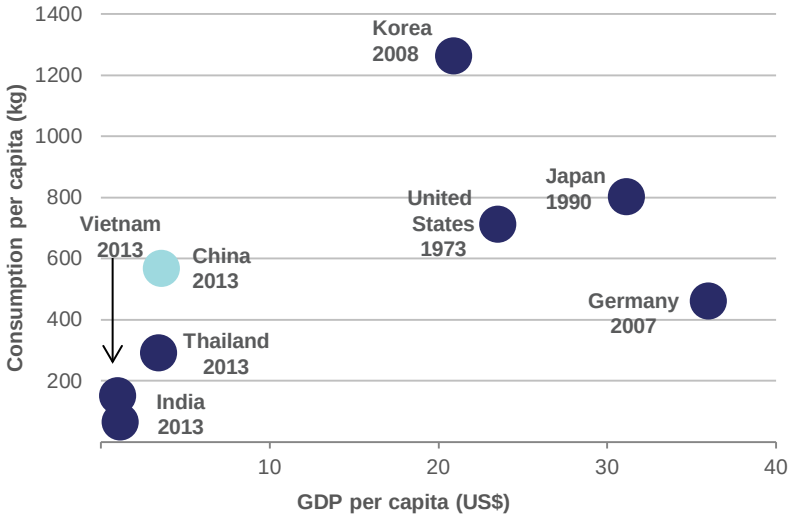
World steel production is projected to grow by around 1 per cent a year to 1.74 billion tonnes in 2020, supported by output growth in emerging and many OECD economies.

Figure 2.1: World steel consumption



Sources: World Steel Association; OCE.

Figure 2.2: Peak steel intensity since 1970



Sources: World Bank; World Steel Association.

However, in the short term, world production growth is expected to be volatile, with the possibility of reduced output, as world consumption growth slows.

China

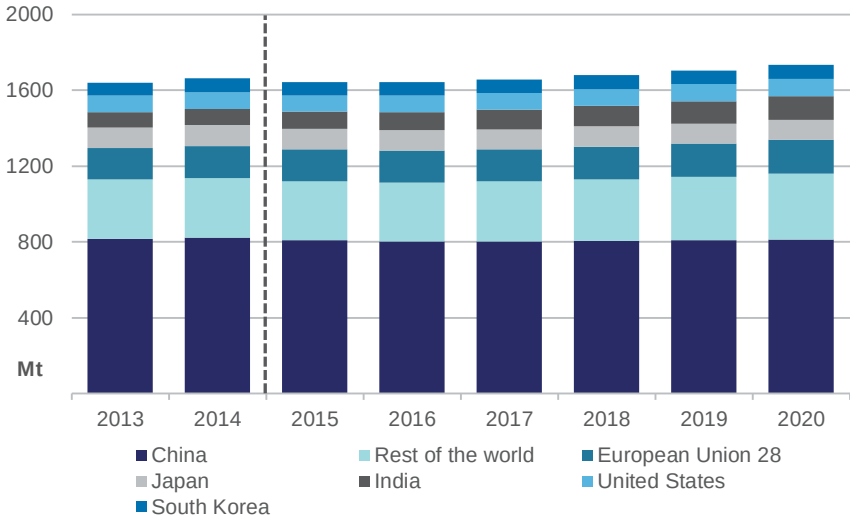
Throughout the first half of 2015 steel prices in China declined steadily, weighed down by overcapacity and weak consumption growth. The price of flat steel products, which are used in manufacturing, led the fall. Prices for hot rolled sheet declined 31 per cent in the first eight months of 2015, cold rolled sheet declined 29 per cent and plate fell 26 per cent. Similarly, the price of rebar, which is primarily used in construction, declined 18 per cent over the same period. The price of steel is forecast to remain subdued through 2015 and 2016 as excess production capacity and low consumption growth continue to affect China's steel market.

China's steel consumption is forecast to contract by 1 per cent in 2015 to 740 million tonnes, following a fall of 4 per cent in 2014. China's steel consumption has been heavily affected by weakness in residential construction, following a rapid increase in housing supply over the past few years. In response to the fall in residential construction, the People's Bank of China cut the benchmark interest rate and reserve requirement ratio multiple times in early 2015 and eased property purchasing rules.

These measures are starting to have an affect on housing prices in Tier One Chinese cities, such as Beijing and Shanghai, which increased by 2 per cent year-on-year between May and July and by less than 1 per cent across the rest of China. However, residential floor space under construction contracted 16 per cent in the June quarter 2015 year-on-year and the vacancy rate in established apartments increased 22 per cent year-on-year over the same period. These factors indicate that there is excess housing capacity and that a recovery is likely to be slow.

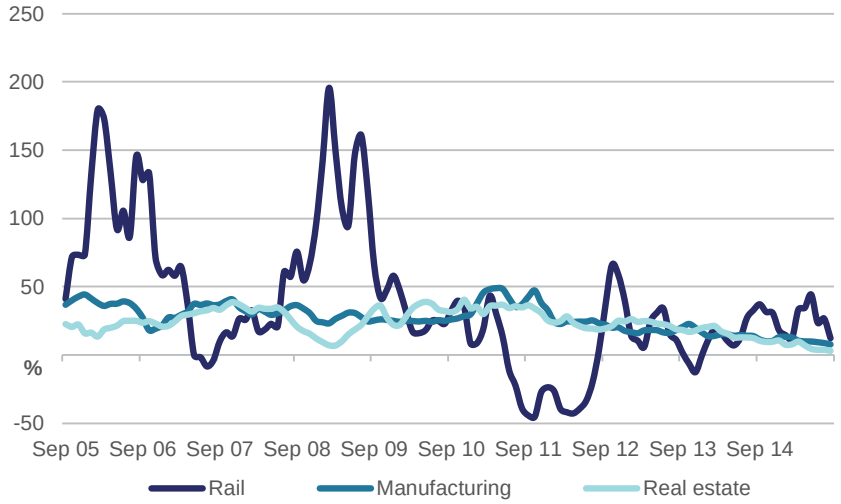
The Chinese government is implementing market reforms designed to rebalance the economy and increase domestic consumption.

Figure 2.3: World steel production



Sources: World Steel Association; OCE.

Figure 2.4: China fixed asset investment



Data is three month moving average of monthly growth rate.
Source: CEIC.

Table 2.1: World steel consumption (Mt)

	2014	2015 f	2016 f	2017 z	2018 z	2019 z	2020 z
European Union 28	151	153	155	157	159	162	164
United States	107	109	111	112	113	114	115
Brazil	25	25	26	26	26	27	27
Russian Federation	43	43	44	44	45	45	46
China	747	740	745	753	760	768	775
Japan	68	67	67	67	67	67	67
South Korea	55	57	58	59	59	60	61
India	85	90	96	101	107	114	121
World steel consumption	**1599**	**1606**	**1633**	**1659**	**1685**	**1711**	**1738**

Table 2.2: Crude steel production (Mt)

	2014	2015 f	2016 f	2017 z	2018 z	2019 z	2020 z
European Union 28	169	169	169	170	173	175	177
United States	88	86	87	88	89	91	93
Russian Federation	72	74	75	76	78	80	83
China	823	810	802	802	806	810	814
Japan	111	107	106	106	106	106	106
South Korea	72	69	70	71	72	73	74
India	87	92	97	103	110	117	124
World steel production	**1662**	**1643**	**1643**	**1657**	**1679**	**1706**	**1735**

f forecast. **z** projection.
Sources: World Steel Association; OCE.

The Government's reforms include increasing competition in the market place, liberalising credit markets and allowing market forces to have a greater role in allocating resources.

The implementation of these reforms is likely to boost production in sectors such as manufacturing and services and lead to cuts in over-producing sectors such as steel. The rebalance is also anticipated to reduce fixed asset investment as a share of GDP, although as GDP continues to grow so will fixed asset investment. However, this shift is likely to occur over the long run and be heavily influenced by the rate of urbanisation and income growth.

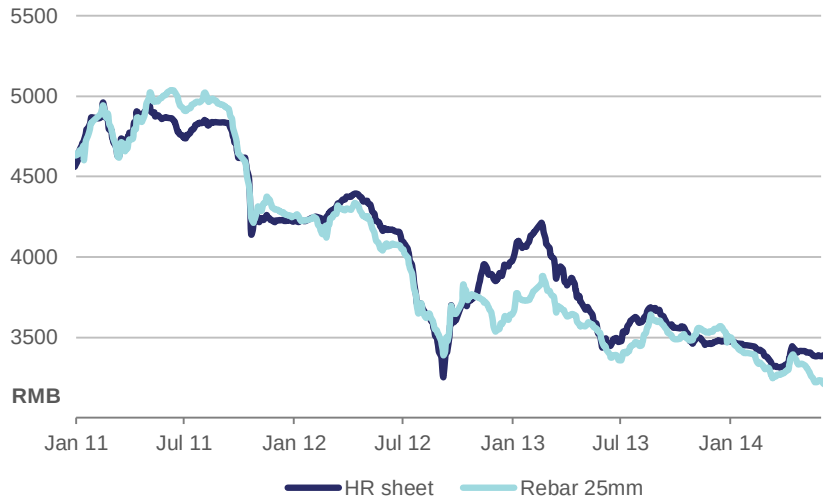
The use of steel is related to urban development as it is used in buildings, transport networks and equipment. As such, the rate of China's urbanisation and the proportion of the population living in urban areas will continue to be a key driver of China's annual steel consumption. Each year around 20 million people relocate to an urban area, although approximately half of this migration occurs through expanding metropolitan boundaries rather than the actual movement of people. In 2014, roughly half of China's population lived in an urban area (around 54 per cent). Crucially for steel consumption, China's urban population is projected to increase by 100 million people over the outlook period and account for 60 per cent of the population in 2020.

To accommodate the rising urban population, investment in residential housing and infrastructure is projected to continue growing strongly. Further, the Chinese Government is expected to increase their focus on urban renewal. A large percentage of China's urban buildings are old, have inadequate access to utilities and are in need of replacement. Various government programs, including a US$162 billion program to redevelop more than 4.8 million residences in lower socioeconomic areas, are targeting urban renewal.

China will also need to invest heavily in transport networks to accommodate the increase in the urban population. China's rail network is still relatively underdeveloped compared with developed nations, with total rail track one-third that of the US and one-sixth of the EU[1].

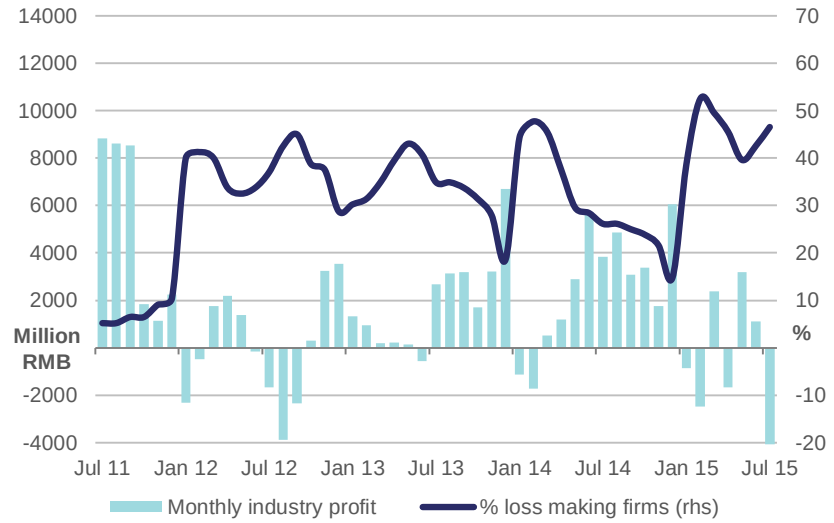
1. Wilkins, K., and Zurawski, A., 2014. *Infrastructure Investment In China*. RBA Bulletin June Quarter 2014.

Figure 2.5: China's benchmark steel prices



Source: Bloomberg.

Figure 2.6: China's steel industry profitability



Source: CEIC.

Further, as China's population urbanises and average incomes rise, the rate of car ownership is likely to increase.

Several cities in China, including Beijing and Shanghai, have reached a density of 250 passenger cars per kilometre of roadway, which equates to an average speed of 12 kilometres an hour. By contrast, Los Angles has 200 cars per kilometre and an average speed of 32 kilometres an hour.

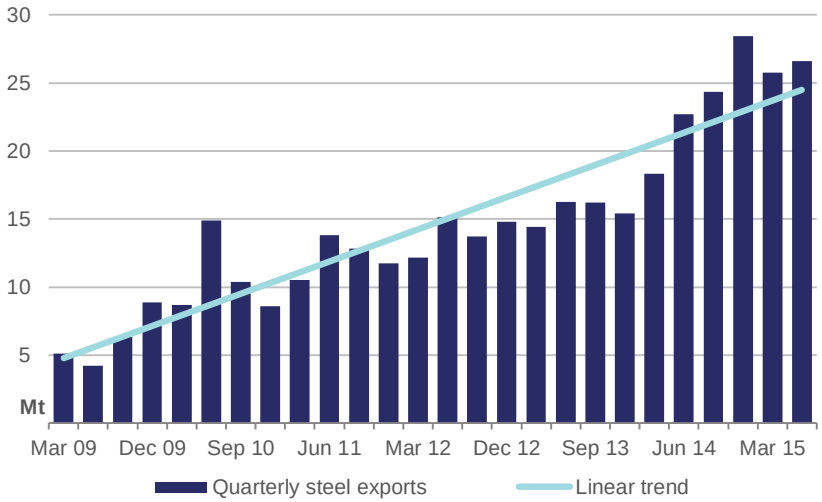
Despite a target for installing an additional 35 000 kilometre of expressways, China's car density is expected to continue rising over the medium term. In addition to developing infrastructure in urban areas, China's government recently announced the 'one-belt one-road' policy which focuses on upgrading transport infrastructure in rural areas and neighbouring countries.

Ongoing urbanisation and addressing relatively underdeveloped transport infrastructure is expected to drive strong investment in transport networks throughout the outlook period and support China's steel consumption growth. While volatility will continue to be a feature of China's economy, steel consumption is projected to grow at an average annual rate of 1 per cent to 775 million tonnes in 2020 as it urbanises and increases consumption as a share of GDP.

In 1984, China produced 43 million tonnes of steel, which was around 6 per cent of the world's total (710 million tonnes). Thirty years later China's annual production has increased by over 1000 per cent to 810 million tonnes and accounts for around 50 per cent of world production. This growth was driven by investment in large scale integrated steel mills (basic oxygen furnaces), built across China but predominantly centred in Hebei, Jiangsu and Shandong. However, in 2014 China's steel production growth was the lowest recorded since 1996, as lower consumption and environmental regulations led to low capital utilisation (70 per cent in 2014) and output.

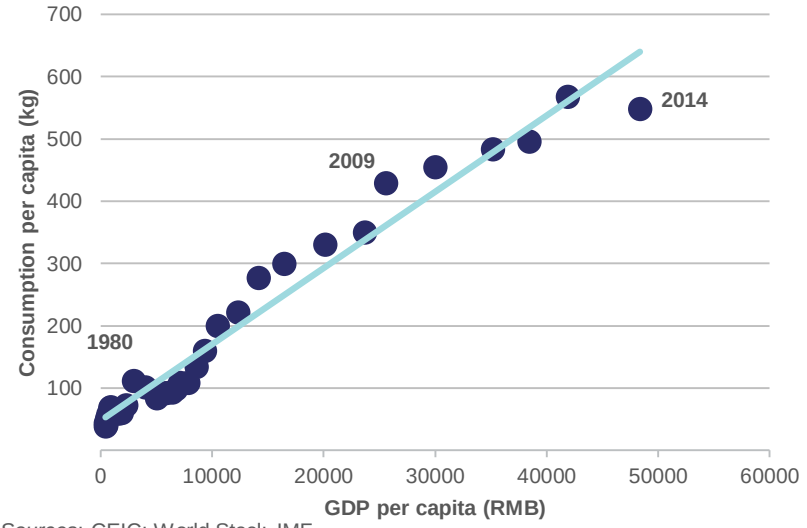
In an effort to reduce pollution and overcapacity in China's steel market the government released three policies that have the potential to affect the steel industry over the medium term. The first was a revision to the *Chinese Environmental Protection Law,* which was passed in April 2014 and took effect in January 2015.

Figure 2.7: China steel exports



Source: CEIC.

Figure 2.8: China steel intensity



Sources: CEIC; World Steel; IMF.

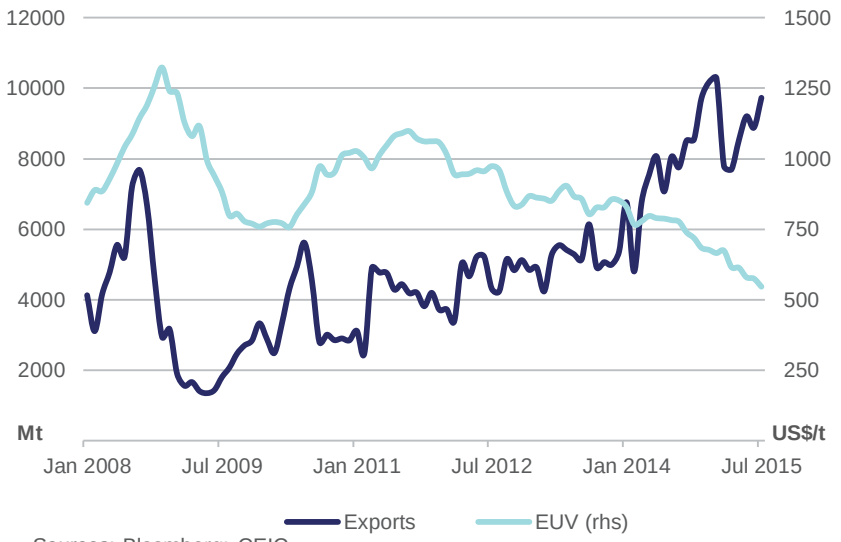
The revision establishes pollution reduction targets for local authorities and toughens penalties for non-compliance. This has prompted steel mills to retrofit facilities to meet the new requirements and should encourage the use of higher quality raw materials that create less pollution.

Second, the government released the *Execution of Capacity Swap for Industries with Overcapacity* in April 2015, which states that any addition to steel mill capacity will have to be offset by a one-for-one reduction in existing capacity. In regions with a high concentration of steel mills, like Hebei, the reduction ratio is 1.25 to 1.

Third, new requirements for the steel mill's size and energy consumption were issued. Failure to meet the new standards could lead to the steel mill being forced to close. These specific changes are designed to drive out smaller, older, less efficient steel mills.

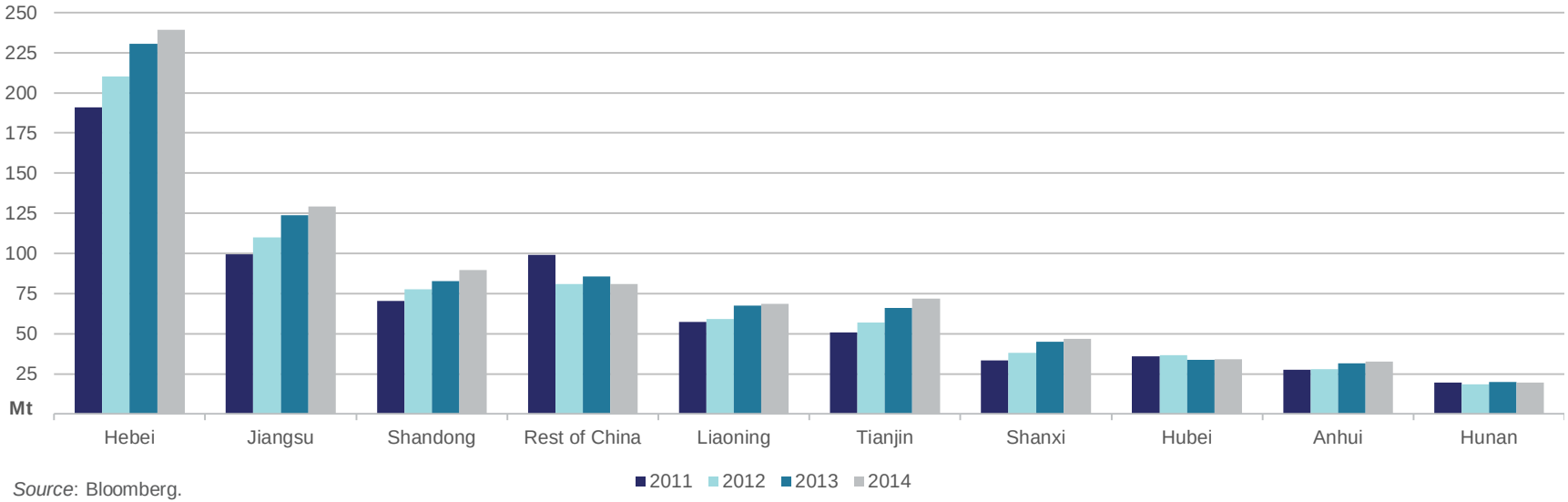
In response to falling domestic prices and reduced profits from domestic steel sales, China's steel mills turned to overseas markets in 2014 and exported around 94 million tonnes of steel. As a result China exported more steel in 2014 than the US produced.

Figure 2.9: China steel exports and export unit value



Sources: Bloomberg; CEIC.

Figure 2.10: China crude steel production by region



Source: Bloomberg.

Defying expectations, China's steel exports grew by 27 per cent year-on-year in the first half of 2015 and are forecast to reach around 110 million tonnes for the year as a whole. This would place China's exports just behind Japan's total steel production (Japan was the world's second largest steel producer in 2014). The main destinations for China's steel exports in 2014 were South Korea (12 million tonnes), Vietnam (6 million tonnes) and India (4 million tonnes). In the first half of 2015, China's steel exports to these countries increased by 1 per cent, 70 per cent and 62 per cent, respectively.

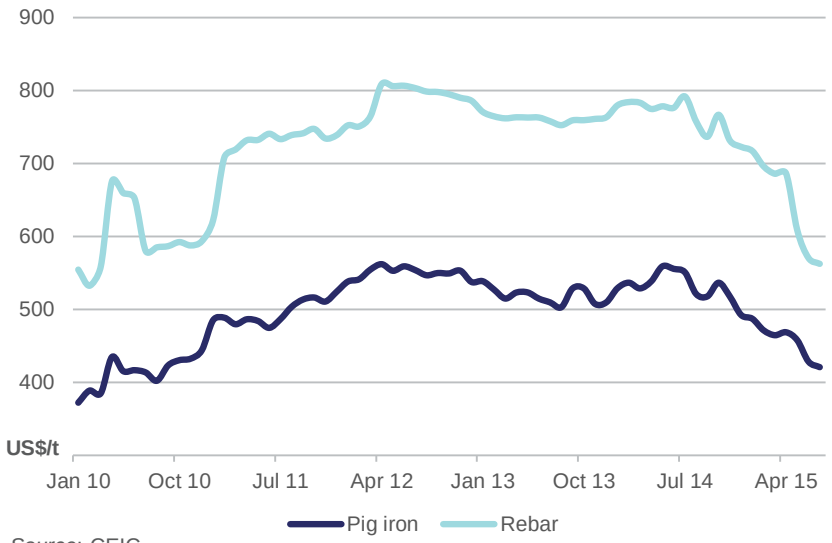
However, over the medium term the volume of China's steel exports are unlikely to be sustained. World steel consumption growth will need to increase sharply to absorb future growth in China's steel output, which appears unlikely. Further, a number of countries have implemented additional duties on steel imports from China, in particular the US, Canada and the EU. India, in an effort to cut steel imports, has tightened quality control measures on imports of steel and implemented a 20 per cent import tax on hot-rolled coil products from China. A significant fall in China's steel exports would affect steel mill profitability. As a result the level of China's steel exports presents a considerable risk to China's steel production growth.

China's steel production is forecast to contract by 1.6 per cent in 2015 and 1 per cent in 2016 as falling consumption growth and increased regulation affect output. However, China's steel production is projected to recover in 2018, albeit at a low rate, to reach 814 million tonnes in 2020 due to an increase in domestic consumption growth.

India

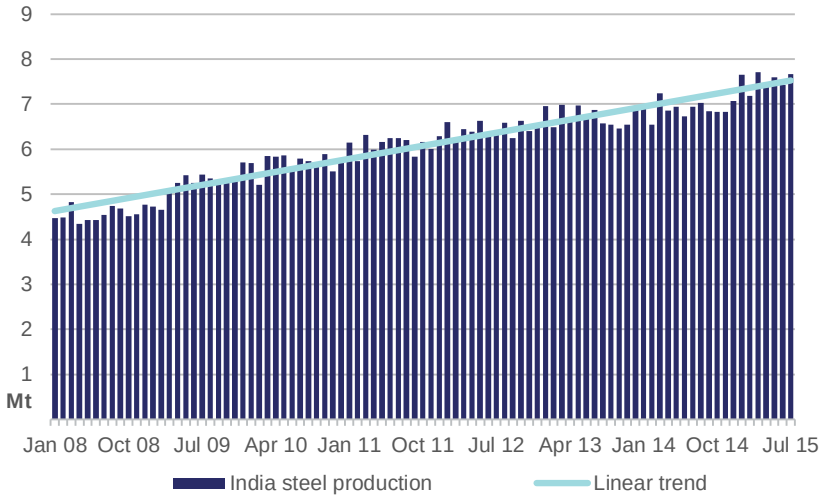
Steel prices in India continued to fall through the first half of 2015, weighed down by a rise in low-cost imports from China. In the first half of 2015 the prices of pig iron and rebar fell 12 per cent to finish June at INR25 818 and 38 037, respectively. While the falls are of a smaller magnitude than those recorded in China, the profitability of local steel mills have been adversely affected and contributed to slower growth in domestic output.

Figure 2.11: India's benchmark steel prices



Source: CEIC.

Figure 2.12: India's steel production



Source: CEIC.

India's steel consumption is forecast to grow by 6 per cent in 2015 to 90 million tonnes, which will place India as the world's third largest consumer of steel behind the US. India's steel consumption growth is expected to be largely underpinned by the ongoing urbanisation of India's population. India is currently at a very early stage in the development cycle. In 2014, only 32 per cent of the population lived in an urban area and per capita steel consumption was around 60 kilograms, which is only 27 per cent of the global average.

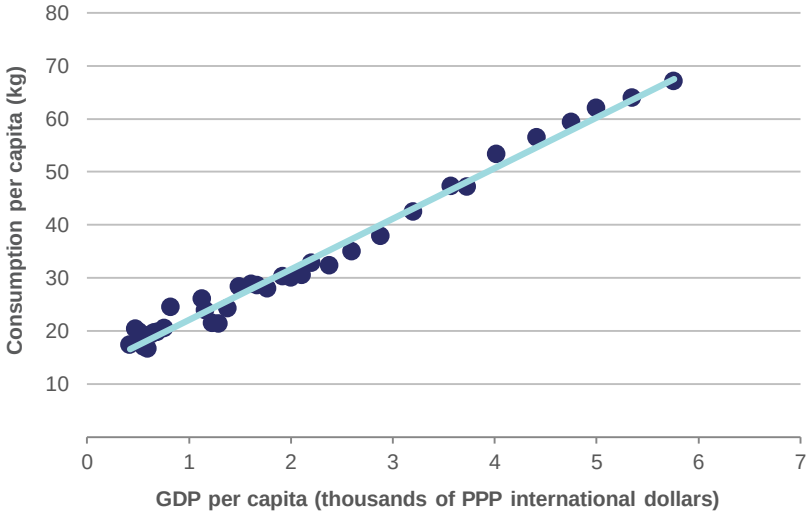
In comparison, 54 per cent of China's population lived in urban areas and steel consumption per person was 530 kilograms in 2014. Around 2.5 per cent of India's population moves from rural to urban areas each year. This movement is expected to drive India's steel consumption as buildings, transport networks and utilities are built and expanded to accommodate the growth.

As India continues to urbanise and industrialise, per person steel intensity is expected to rise and drive steel consumption over the outlook period. As a result, India's steel consumption is projected to grow by around 6 per cent a year to 121 million tonnes in 2020.

In 2015, India's steel production is forecast to grow by 6 per cent to 92 million tonnes, supported by strong consumption growth and expanding production capacity. Over the medium term, steel production in India is projected to grow at an average annual rate of 6 per cent a year to 124 million tonnes in 2020, supported by expanding production capacity and government policies directed at developing the manufacturing sector.

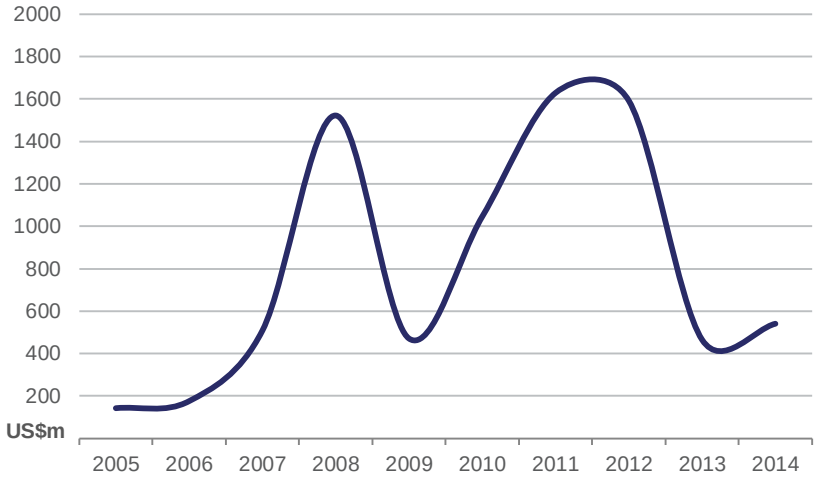
The Indian Government has set an ambitious target to more than triple steel production from 87 million tonnes in 2014 to around 300 million tonnes by 2025. In order to reach this target the government plans to cut regulatory hurdles and speed up approvals. The current lengthy approval process presents a significant risk to production growth. Recently, JSW Steel (one of the India's largest steel producers) placed a project to build a 10 million tonne a year steel plant on hold, largely because of environmental clearance issues. Further, POSCO (the world's sixth largest steel producer) and ArcelorMittal (the world's largest steel producer) have both discarded a number of steel projects in India over the past two years due to difficulties in acquiring approvals.

Figure 2.13: India's steel intensity



Sources: CEIC; World Steel Association; World Bank.

Figure 2.14: Foreign Direct Investment in Indian steel



Source: CEIC.

Access to raw materials may also present a large risk to increasing India's steel production. While the ban on iron ore mining in Karnataka, Goa and Odisha has recently been lifted, the new system that will auction iron ore mines is taking time and causing concern about availability of supply. Steel mills that previously had a captive supply will have to bid for mines through public auction rather than buying them directly from the government.

Further, profitability and financing are proving major barriers to expansion. In June 2015, the Reserve Bank of India stated that five out of the country's top ten private steel companies are under severe financial stress. This financial stress has made capital, critical for funding any production expansion, difficult to obtain.

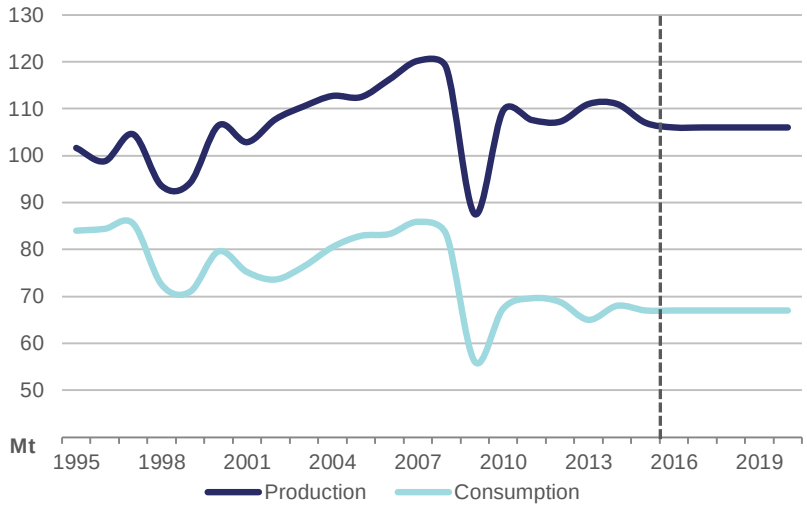
Japan

Japan's steel consumption is forecast to decline by 1 per cent in 2015 to 67 million tonnes, underpinned by weaker manufacturing and construction activity. This weaker activity is expected to be partly offset by an increase in ship building, which has been boosted by the devaluation of the yen. Over the outlook period Japan's annual steel consumption is projected to remain stable at around 67 million tonnes.

In 2015, Japan's steel production is forecast to contract by 4 per cent to 107 million tonnes, as consumption growth slows and domestic output is substituted for lower-cost imports. In 2014, Japan's steel exports fell 6 per cent to 27 million tonnes while imports increased by 20 per cent to 9 million tonnes. These pressures are expected to continue affecting Japan's steel production over the outlook period and contribute to a projected 0.2 per cent annual decrease in output to 106 million tonnes in 2020.

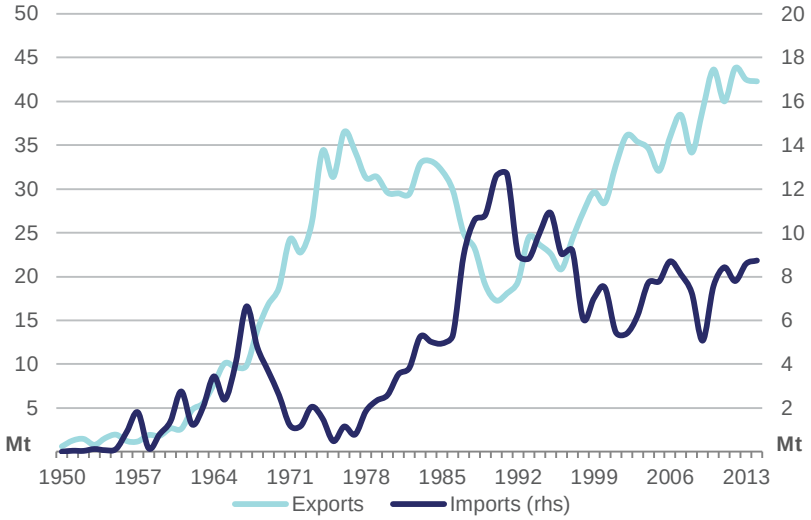
A prolonged period of currency depreciation may encourage an increase in steel production as exports in steel intensive products such as ships and manufacturing become more competitive. A lower yen may also encourage Japanese companies to relocate back to Japan.

Figure 2.14: Japan's steel production and consumption



Source: World Steel Association.

Figure 2.15: Japan's steel exports and imports



Source: Japan Iron and Steel Federation.

South Korea

In 2015 South Korea's steel consumption is forecast to increase by 4 per cent to 57 million tonnes, supported by growth in the construction sector. Growth in South Korea's steel intensive exports, such as ship building, is forecast to remain flat in the short term as competition from China and Japan (following the depreciation of the yen) affects foreign demand.

Over the outlook period South Korea's steel consumption is projected to increase by around 1 per cent a year to 61 million tonnes in 2020.

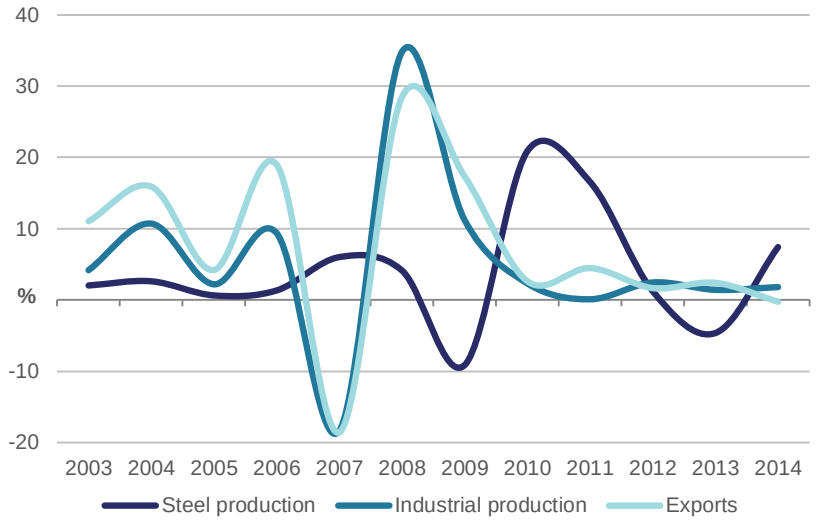
South Korea's steel production is forecast to decrease by 4 per cent in 2015 to 69 million tonnes. Production has been affected by low-cost steel imports from China, which increased 35 per cent in 2014 to 13.4 million tonnes and increased by a further 1 per cent year-on-year in the first six months of 2015. South Korea does not impose any import duties and has few non-tariff barriers on steel imports. As a result, a persistent rise in steel imports from China presents a key risk to South Korea's steel production over the medium term. Over the outlook period South Korea's steel production is projected to average 1 per cent annual growth to 74 million tonnes, supported by growth in domestic construction.

United States

US steel consumption is forecast to grow by 2 per cent in 2015 to 109 million tonnes, supported by growth in manufacturing and construction. Housing construction, which is the major end-user of steel in the US, grew by 11 per cent year-on-year in the first half of 2015. Automobile production, which accounts for around 25 per cent of US steel consumption, expanded by 4 per cent year-on-year in the first half of 2015.

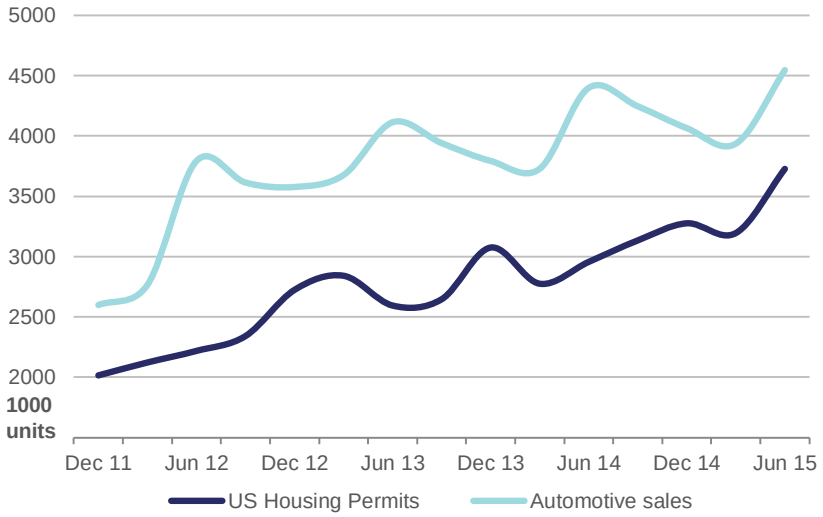
US steel production is forecast to decrease by 2 per cent in 2015 to 86 million tonnes as cheap imports displace domestic production. Steel imports in the US increased by around 10 per cent in the first seven months of 2015 to 25 million tonnes.

Figure 2.16: South Korea's change in steel use



Sources: Bloomberg; World Steel Association.

Figure 2.17: US steel end-use growth



Source: Bloomberg.

As a result, the market share of imports increased from 28 per cent in 2014 to 31 per cent so far in 2015. The growth in steel imports predominantly came from South Korea (up 6 per cent year-on-year), and China (up 1 per cent year-on-year). As a result the US launched an anti-dumping investigation into China's exports of steel in late June. Over the outlook period US steel production is projected to grow by 2 per cent a year to 93 million tonnes, supported by an increase in manufacturing and construction activity.

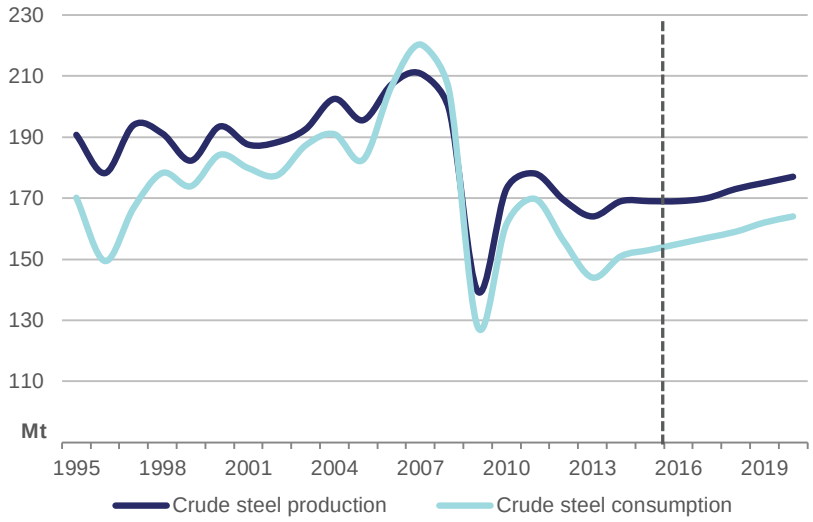
European Union

EU steel consumption is forecast to increase by 1 per cent in 2015 supported by an increase in construction and car manufacturing. Construction accounts for around 35 per cent of steel consumption in the EU. In the first half 2015, construction activity expanded by 1 per cent year-on-year. The automotive sector, which accounts for around 18 per cent of steel consumption, increased by 8 per cent year-on-year in the first half of 2015. Car sales expanded rapidly in all key Eurozone markets in the first half of 2015 including: Germany (13 per cent), UK (13 per cent) and France (15 per cent).

Over the outlook period EU steel consumption is projected to grow by 1.4 per cent a year to 164 million tonnes in 2020 supported by infrastructure investment as key EU economies emerge from the debt crisis.

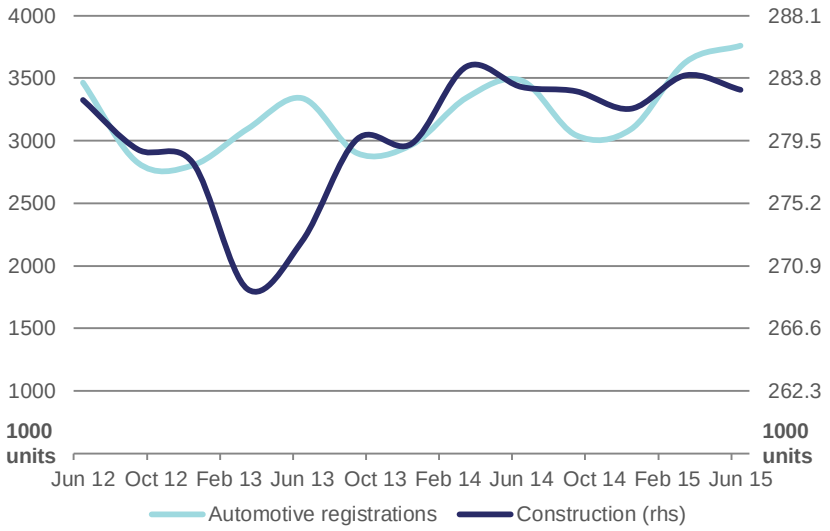
In 2015 EU steel production is forecast to contract by less than 1 per cent to 169 million tonnes as imports displace domestic production. Over the outlook period EU steel production is projected to increase by around 1 per cent a year, although growth over the next two years if forecast to be minimal, to 177 million tonnes in 2020. Growth is projected to be supported by increased consumption in most EU economies.

Figure 2.18: EU 28 steel market



Sources: World Steel Association; OCE.

Figure 2.19: European end-use growth



Source: Bloomberg.

Iron ore

Ben Witteveen

Increasing supply, predominantly from Australia, is forecast to drive prices down in 2015 and 2016 in the seaborne market. Over the medium term prices are projected to rebound as higher cost producers exit the market and world steel production growth rebounds.

Prices

Declining steel production in China and a further increase in iron ore production by major producers in Australia and Brazil contributed to lower iron ore prices during the first half of 2015. In the June quarter 2015, the iron ore spot price fell 43 per cent year-on-year and finished August at US$50 (FOB). The shock to China's stock markets in early July led the price to fall by 11 per cent in one day to US$38.80 (FOB). However, prices quickly recovered through July and have remained stable at around US$50 (FOB) in August and early September. The recent price stability is forecast to be temporary as ongoing increases in supply and the onset of winter in the Northern hemisphere, which affects construction, is expected to weigh down the price in the December quarter 2015. For 2015 as a whole, the price is forecast to average US$53 (FOB), down 40 per cent on the average recorded in 2014.

The price rise through July and August was supported by falling port stocks in China. China's steel mills have adjusted the volume of inventories they hold in response to reduced supply and price risk, stemming from the large increase in supply. In 2013, around 72 million tonnes (or 35 days of inventory) of iron ore was held at China's ports, this rose to 103 million tonnes in the September quarter 2014. However, in the December quarter 2014 China's port stocks began falling and by August 2015 had declined to 76 million tonnes, or 22 days of inventory. This represents a 26 per cent year-on-year decline and 19 per cent fall since the start of the year.

Figure 3.1: Iron ore and steel prices

Source: Bloomberg.

Figure 3.2: Iron ore price cycle

Source: Bloomberg

Importantly, during this time the price of seaborne iron ore also fell, as a large increase in supply reduced the need for China's steel mills to hold large inventories of iron ore.

China's domestic iron ore production has proven to be far more resilient than expected in the wake of lower prices. However, China's mined output fell 9 per cent year-on-year in the first seven months of 2015.

China's domestic iron concentrate, which contains around 66 per cent iron ore, attracts a price premium of around US$36 (average in 2015). The extent of this price premium is likely to encourage China's steel mills, which are struggling with falling prices and sales, to increase their use of cheaper seaborne iron ore. China's domestic iron ore is typically low grade (less than 55 per cent iron content) and must be crushed and concentrated to improve the quality to around 66 per cent. The concentrating process increases the cost of production and therefore is priced higher than its substitute, iron ore fines.

The viability of China's iron ore industry, which produces high cost concentrate, presents one of the key risks to the price of iron ore over the medium term. If the government implements market based reforms, China's domestic production of iron ore is likely to fall, which will increase import requirements and provide support to the seaborne price of iron ore over the medium term.

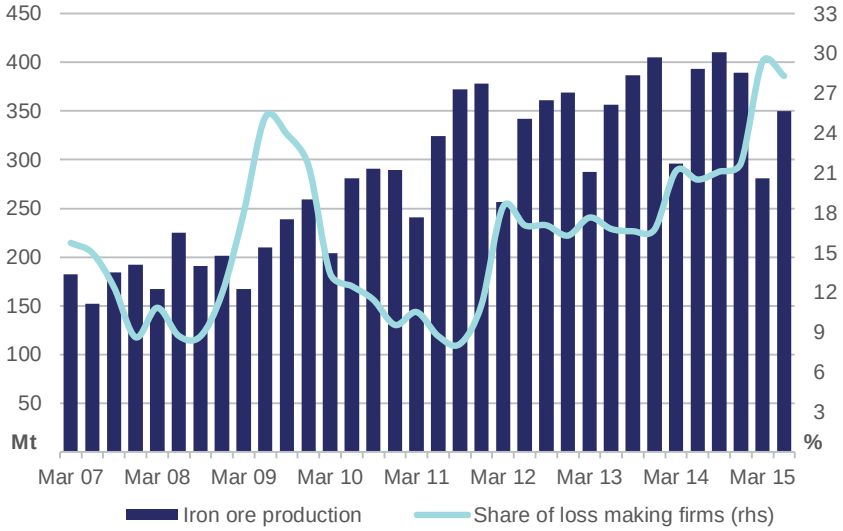
In 2016, the price of iron ore is forecast to fall a further 3 per cent to average US$51 (FOB). China's steel production is forecast to contract further in 2016 while an additional 42 million tonnes of iron ore is forecast to be delivered to the seaborne market. While some high cost iron ore producers are likely to be forced to close; falling steel production in key producing regions (such as China and Japan) and a net increase in the supply of iron ore is expected to keep downward pressure on prices in the seaborne market in the short term.

A key risk to the price is further currency depreciation of the major iron ore producing countries against the US dollar, particularly the Australian dollar and Brazilian real. Further currency depreciation will help maintain cash margins, because the price of iron ore is denominated in US dollars, and may delay cuts to supply.

Figure 3.3: Iron ore prices, FOB Australia

Note: JFY contract prices until April 2010, average spot prices thereafter
Sources: Bloomberg; Platts; OCE.

Figure 3.4: China's domestic iron ore production



Sources: Bloomberg; CEIC.

In 2017, the price of iron ore is projected to increase to US$57.70 (in 2015 dollars, FOB) as demand growth accelerates and supply growth slows. Projected growth in world steel production in 2017 will support consumption of iron ore while industry consolidation is projected to remove some of the excess supply capacity. These factors are expected to support an increase in the price of iron ore to US$67.20 (in 2015 dollars, FOB) in 2020. However, China's residential construction growth rate remains a key area of uncertainty and is a considerable risk to the price of iron ore.

World trade in iron ore

Overview

Global iron ore trade is forecast to increase by 1.5 per cent in 2015 to 1.4 billion tonnes, the lowest rate of growth since 2001. Supply from Australia is forecast to increase by around 6 per cent to 762 million tonnes while China's imports are forecast to increase by 0.3 per cent to 936 million tonnes. Imports from Japan and South Korea are each forecast to contract by 3 per cent.

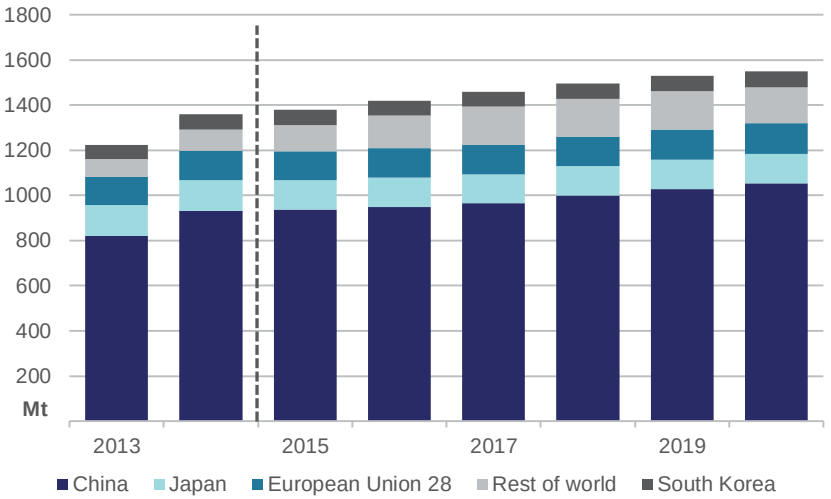
Over the outlook period world trade in iron ore is projected to average 2 per cent annual growth to reach 1.55 billion tonnes in 2020. Increasing supply, particularly from Brazil and Australia, and an increase in consumption of seaborne iron ore from China are projected to support this growth.

Iron ore imports

China's domestic iron ore producers struggled in the first seven months of 2015 with output falling 9 per cent year-on-year and the number of mines reporting a loss increasing from 22 per cent to 29 per cent. As the price of seaborne iron ore fell, China's iron ore miners have found it difficult to match the decline in prices and remain profitable.

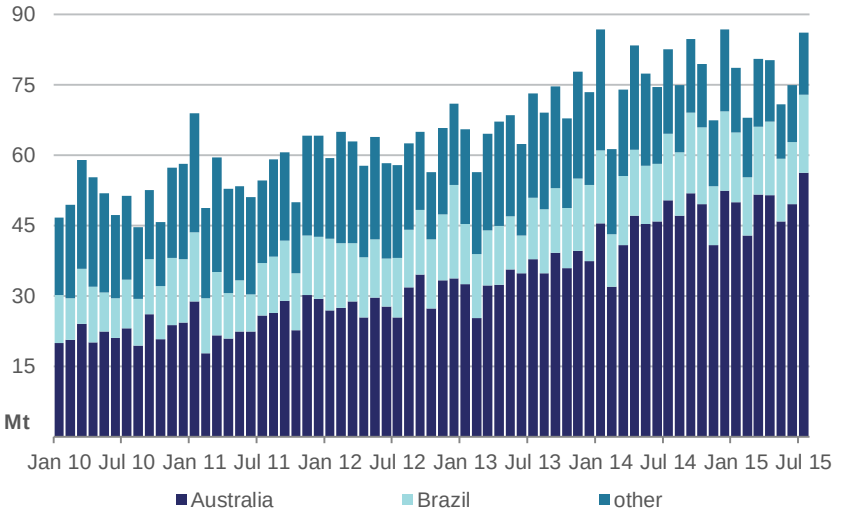
As a result, China's imports of seaborne iron ore remained stable through the first seven months of 2015, despite lower steel production. Australia's exports of iron ore to China increased 13 per cent year-on-year in the first seven months of 2015 to 348 million tonnes.

Figure 3.5: World iron ore import destinations



Sources: UNCTAD; AME; OCE.

Figure 3.6: China's iron ore import volumes



Source: Bloomberg.

Table 3.1: World iron ore imports (Mt)

	2014	2015 f	2016 f	2017 z	2018 z	2019 z	2020 z
European Union 28	130	128	130	130	132	134	136
Japan	135	131	130	129	129	129	129
China	933	936	950	965	1000	1029	1054
Korea, Rep. of	68	66.1	66.2	67	68	69	70

Table 3.2: World iron ore exports (Mt)

	2014	2015 f	2016 f	2017 z	2018 z	2019 z	2020 z
Australia	717	762	824	886	900	927	928
Brazil	363	390	412	425	465	485	509
India (net exports)	2	5	4	7	9	12	15
Canada	34	27	25	24	22	21	20
South Africa	47	43	38	34	31	28	25
World iron ore trade	1 359	1 379	1 420	1 459	1 497	1 530	1 550

f forecast. **z** projection.
Sources: World Steel Association; OCE.

Australia's share of China's total iron ore imports increased from 60 per cent in 2014 to 65 per cent in the first half 2015. The rise in Australia's share of China's imports came at the expense of the smaller, high cost producers such as Iran, Ukraine, Canada and South Africa. The share of China's imports from these smaller producers has fallen from around 30 per cent at the start of 2014 to 15 per cent in mid-2015. Brazil's share of China's imports has remained stable at 20 per cent.

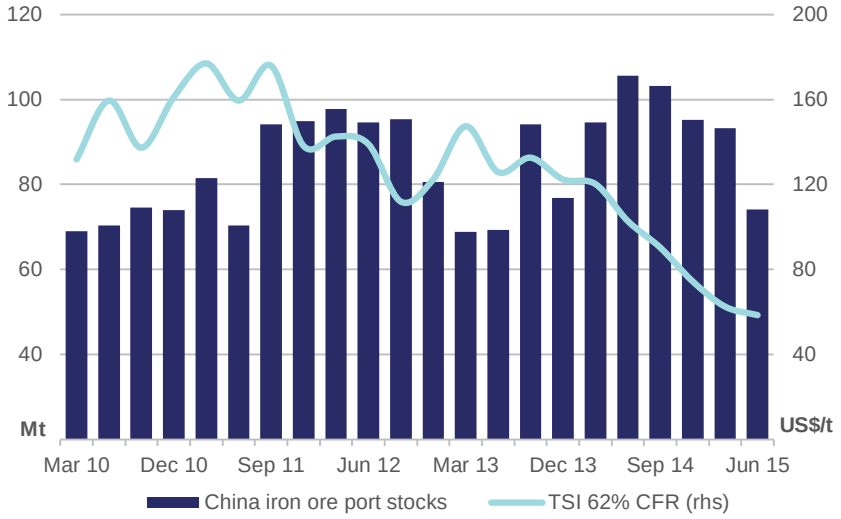
Over the outlook period China's imports of iron ore are projected to grow by 2.4 per cent a year to 1.1 billion tonnes in 2020. Low domestic steel prices, overcapacity and weak consumption growth are expected to be key features of China's steel market over most of the outlook period and encourage steel mills to switch from higher cost domestic concentrate to cheaper seaborne iron ore.

High cost, low quality producers of iron ore (both in China and around the world) are expected to exit the market and remove some seaborne supply over the medium term. As a result, China's imports of iron ore from Australia and Brazil are projected to rise over the outlook period. However, domestic iron ore mines are major employers and tax payers in some districts, and any large scale closures are likely to test the government's commitment to market reform.

Japan's imports of iron ore are forecast to fall by 3 per cent in 2015 to 131 million tonnes, as falling steel production reduces their iron ore requirements. Japan relies entirely on imports for its iron ore needs. Over the outlook period Japan's iron ore imports are projected to fall by less than 1 per cent a year to 129 million tonnes in 2020, as an expected fall in steel production over the medium term reduces Japan's consumption of iron ore.

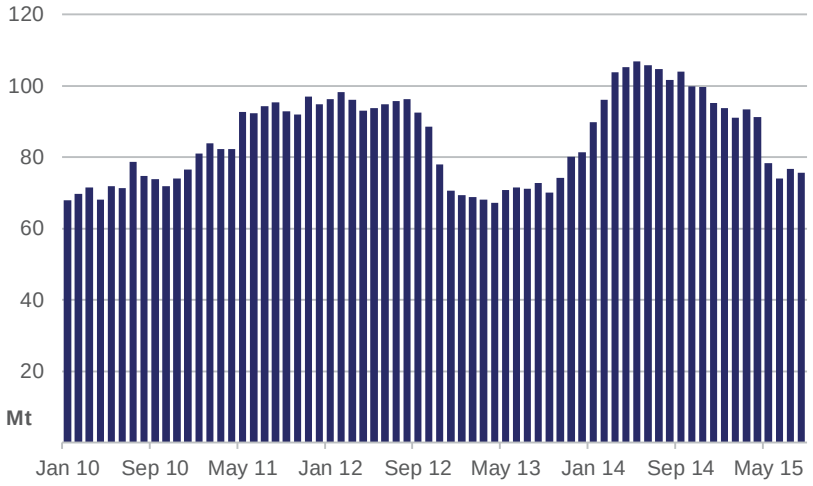
In 2015 South Korea's iron ore imports are forecast to fall by 3 per cent to 66 million tonnes, weighed down by falling steel production. South Korean steel production is projected to grow over the medium term and support an increase in iron ore imports to 70 million tonnes a year in 2020, an increase of around 1.2 per cent a year.

Figure 3.7: Iron ore price and China's port stocks



Source: Bloomberg.

Figure 3.8: China's port inventories



Source: Bloomberg.

Iron ore exports

In 2015, Australia's iron ore exports are forecast to increase by around 6 per cent to 762 million tonnes supported by increased supply capacity.

The major Pilbara producers have rapidly increased output and have indicated that they will continue to do so over the short to medium term. The quarterly reports of most major producers indicate that the current environment of low prices is unlikely to impact production, as the Pilbara iron ore miners are some of the world's cheapest producers.

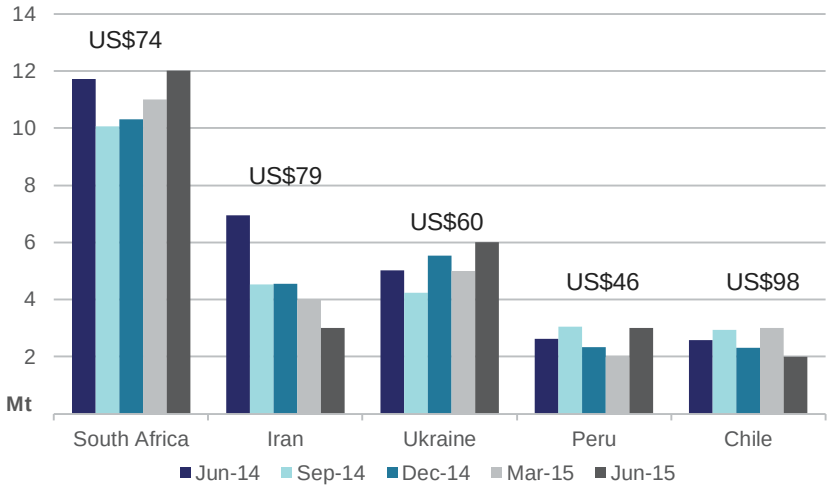
However, the low prices will continue to encourage Australian iron ore miners to cut costs and improve productivity. Infrastructure improvements, particularly to rail and ports, and the start of production at Roy Hill, which at capacity is expected to produce 55 million tonnes of high grade, low impurity iron ore are expected to support this growth.

An increase in the use of technology such as driverless trucks and information technology is expected to reduce operating costs and support increased production. Australian producers are also expected to benefit from the lower Australian dollar (relative to the US) and low energy prices. The value of the Australian dollar will cushion some of the price falls, and low energy prices will reduce operating costs.

Over the outlook period the growth in Australia's iron ore exports is projected to slow, from 15 per cent annual growth recorded from 2010 to 2014 to around 4 per cent a year over the medium term. Roy Hill is the last major iron ore mine under construction in Australia and is scheduled to open in the December quarter 2015. As production at Roy Hill ramps up and the major Pilbara producers reach maximum capacity over the next couple of years, growth in Australia's output and exports is projected to slow considerably.

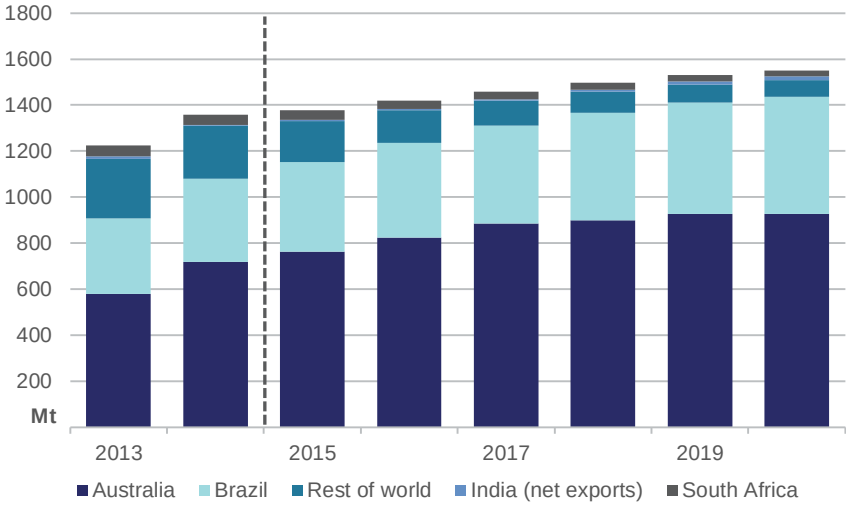
In 2015, Brazil's iron ore exports are forecast to increase by 7 per cent to 390 million tonnes, supported by increased production in the Carajas region.

Figure 3.9: China's minor import sources and CFR costs



Sources: Bloomberg; AME.

Figure 3.10: World iron ore export sources



Sources: AME; OCE.

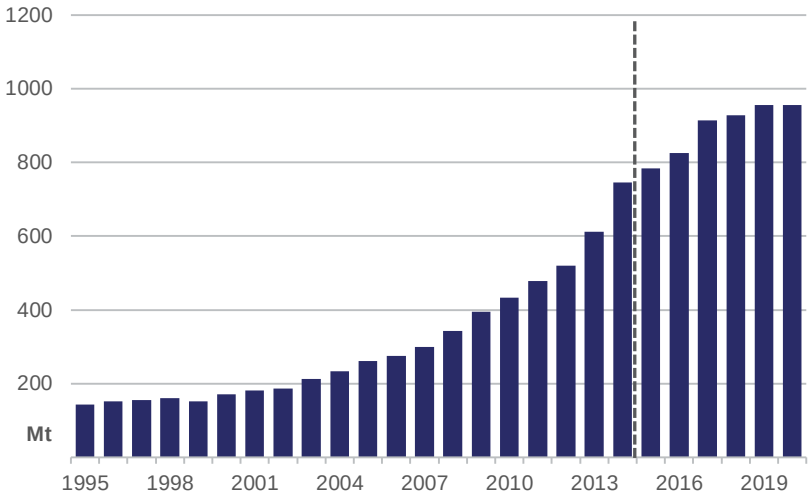
Brazil's exports of iron ore received a boost in June 2015 when China's Transport Ministry announced that Vale's 400 000 dead weight tonne Valemax vessel can dock at several ports, including: Qingdao, Dalian, Tangshan and Ningbo. Vale estimates that the use of the Valemax will reduce shipping costs by around US$4–6 a tonne. The use of the Valemax also presents a considerable risk to the cost advantage enjoyed by the major Pilbara producers. In 2014, the cost of shipping iron ore from Australia to China was around US$8 a tonne cheaper than from Brazil to China. Vale also announced plans to cut between 20 and 30 million tonnes of production from some higher cost iron ore mines in Brazil, should the price fall further in the short term.

Over the outlook period, Brazil's iron ore exports are projected to increase by around 5 per cent a year to 509 million tonnes in 2020. Growth is projected to be supported by improved infrastructure (primarily in the northern Carajus region) and the start of production at the Serra Sul (S11D) mine, which is scheduled to begin production in late 2016. The Serra Sul mine, once fully operational, is expected to be one of the lowest cost producers of iron ore in the world and given the quality of the iron ore is likely to be profitable in an environment of low prices.

Despite the current low price of iron ore, India's output is forecast to increase through 2015 and over the outlook period as several mines restart operations. India's iron ore mines have been slow to restart, following the lifting of the ban on operations in April 2014, and as a result local steel mills have been increasing their imports of iron ore. In 2014-15, India's imports of iron ore reached 15 million tonnes, a remarkable outcome given that India was the fourth largest exporter of iron ore in 2010 (prior to court imposed closure of domestic iron ore mines).

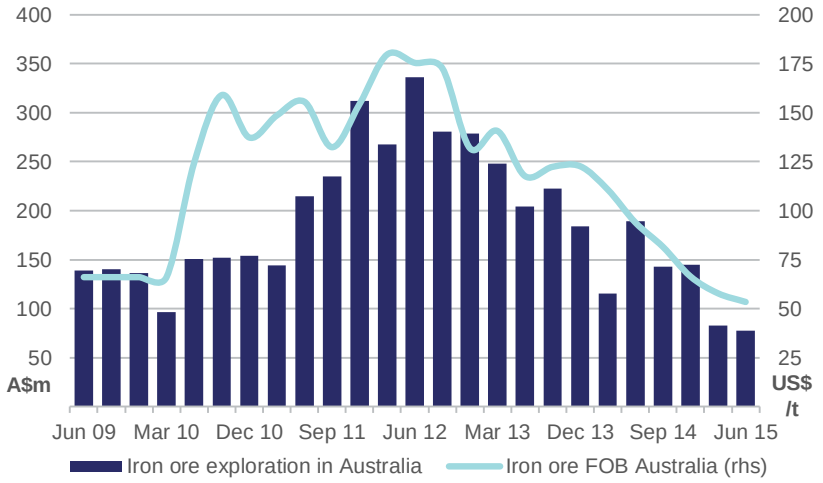
Over the outlook period India is expected to return to be a net exporter of iron ore as mines in Karnataka, Goa and Odisha gradually ramp-up to full capacity. Small export volumes to Japan and South Korea are already occurring; however, the ability to export large quantities of iron ore profitably, given the current and forecast price, is a key risk to this assessment.

Figure 3.11: Australia annual iron ore production



Sources: Company Reports; OCE.

Figure 3.12: Australia iron ore exploration



Sources: ABS; Bloomberg.

Iron ore exports from South Africa, Canada, the Ukraine and other minor producers are expected to contract over the outlook period. Output from the smaller producers is expected to be displaced by the lower cost, higher quality iron ore produced by Australia and Brazil. The smaller producers tend to face infrastructure constraints and lower grades of iron ore which make it difficult to export profitably in an environment of falling prices.

Australia

Exploration

Iron ore exploration fell 59 per cent year-on-year in the June quarter 2015 to $77 million, down from $189 million in the June quarter 2014. The trend of lower iron ore prices has removed much of the incentive to undertake exploration as producers have been cutting costs to remain profitable. Exploration expenditure is projected to improve in the medium term as the major Australian producers look for iron ore deposits to replace existing capacity.

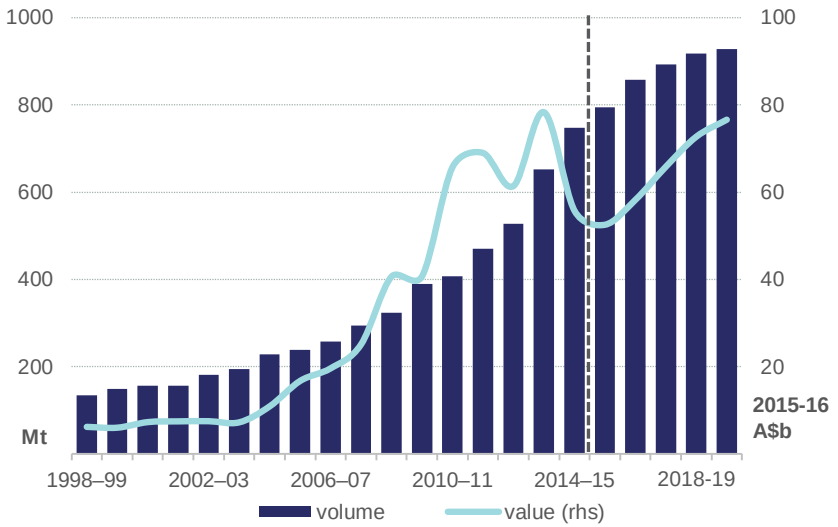
Exports

In 2014-15 Australia's iron ore exports increased by 15 per cent to 748 million tonnes. Growth was supported by an expansion in output from Australia's major producers and improved rail and port infrastructure. The falling price of iron ore did not affect output from the major producers as they are some of the lowest cost producers in the world and are still profitable and earning healthy margins amidst the falling price.

Australia's export values decreased 27 per cent year-on-year in 2014-15 to $54 billion, as the falling price offset the increase in export volumes.

Over the outlook period Australia's iron ore exports are projected to increase by 24 per cent to 928 million tonnes in 2019-20. Growth is expected to be supported by further increases in output from Australia's major producers and the start of production at Roy Hill. Export values are projected to increase by 7 per cent a year to $77 billion (in 2015-16 prices) in 2019-20, supported by an increase in export volumes and growth in prices from 2017.

Figure 3.13: Australia's iron ore exports



Sources: ABS; OCE.

Table 2.5: Iron ore outlook

	unit	2014	2015 f	2016 f	2017 z	2018 z	2019 z	2020 z
World								
Prices b								
Iron ore c								
– nominal	US$/t	88.1	52.9	51.2	60.4	65.8	70.8	75.3
– real d	US$/t	90.1	52.9	50.0	57.7	61.5	64.6	67.2
		2013–14	**2014–15f**	**2015–16 f**	**2016–17 z**	**2017–18 z**	**2018–19 z**	**2019–20 z**
Australia								
Production								
Iron and steel gs	Mt	4.43	4.33	4.29	4.25	4.21	4.17	4.13
Iron ore	Mt	677.4	773.6	823.5	885.5	920.4	945.9	955.6
Exports								
Iron and steel gs	Mt	0.87	0.85	0.82	0.81	0.80	0.79	0.79
– nominal value	A$m	724	692	677	665	658	652	646
– real value h	A$m	759	710	677	651	630	610	592
Iron ore	Mt	651.4	747.7	794.9	857.0	892.1	917.8	927.5
– nominal value	A$m	74 671	54 411	52 534	59 516	68 751	77 609	83 564
– real value h	A$m	78 314	55 791	52 534	58 235	65 823	72 704	76 597

b fob Australian basis **c** Spot price, 62% iron content basis. **d** In current calendar year US dollars. **e** Contract price assessment for high-quality hard coking coal. **g** Includes all steel items in ABS, *Australian Harmonized Export Commodity Classification,* chapter 72, 'Iron and steel', excluding ferrous waste and scrap and ferroalloys. **h** In current financial year Australian dollars.
f forecast. **s** estimate. **z** projection.
Sources: ABS; World Steel Association; UNCTAD; OCE.

Metallurgical coal

Kate Penney

Metallurgical coal prices declined substantially in the first eight months of 2015 reflecting an increase in supply and lower import demand from China. A tightening of market conditions is not expected until 2017 as more high-cost capacity is closed and import demand begins to recover.

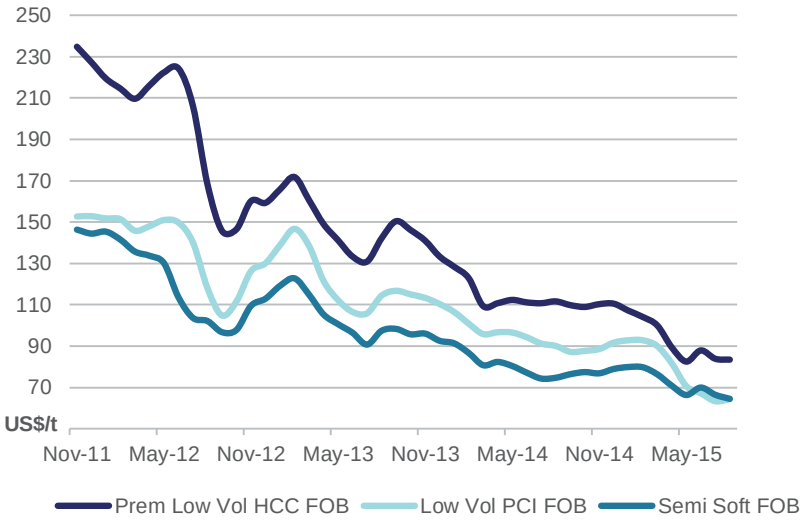
Prices

Metallurgical coal prices declined substantially in the first eight months of 2015 because of weaker import demand from China and a large increase in supply. Steel making raw material prices have been adversely affected by continued weakness in China's housing sector and general weakness in the Chinese economy. Prices for low volatility hard coking coal FOB Australia averaged US$92 a tonne in the first eight months of 2015, 20 per cent lower than the same period in 2014.

Australian benchmark prices for high-quality metallurgical coal delivered in the December quarter 2015 settled at US$89 a tonne, down from US$93 a tonne in the September quarter. Although this represented a 4.3 per cent decline in US dollar terms, in Australian dollar denominated terms the settled price represented an approximate 5 per cent increase over the September quarter. For 2015 as a whole, contract prices are forecast to average US$102 a tonne, 19 per cent lower than 2014.

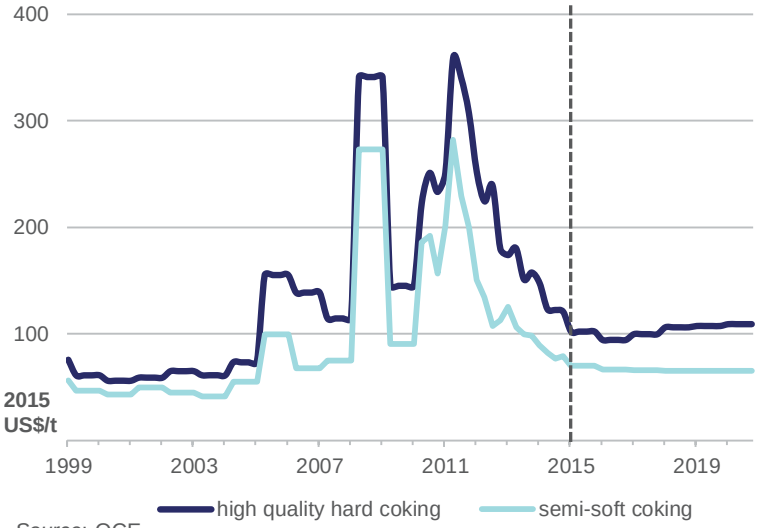
Sustained low prices have encouraged some companies to close capacity or reduce output, particularly in North America and Australia. Despite these announcements the market is forecast to remain well supplied until demand growth recovers and announced production cuts materialise. In 2016, high-quality metallurgical coal prices are forecast to decline by 6 per cent to average US$97 a tonne.

Figure 4.1: Metallurgical coal spot prices



Source: Platts.

Figure 4.2: Metallurgical coal benchmark prices, FOB Australia



Source: OCE.

Most of the new production scheduled to be commissioned over the next five years, particularly in Mozambique, is expected to be high-cost.

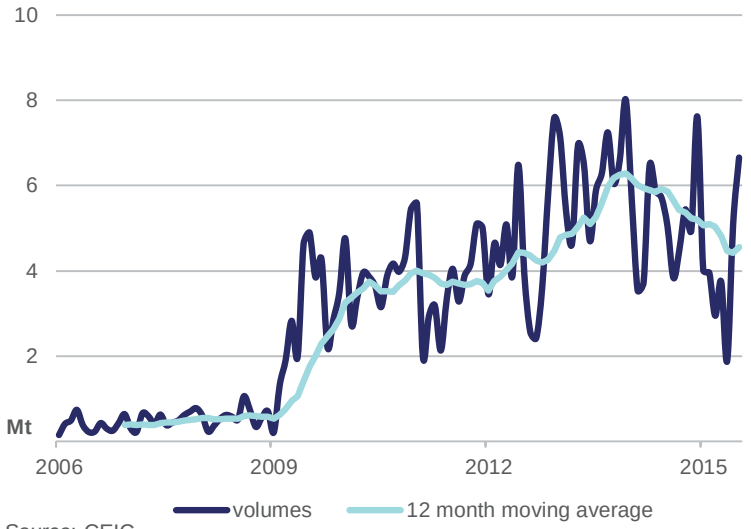
At current prices (around US$80 a tonne) a large proportion of this seaborne production would be making significant cash losses, which is likely to force higher cost production to close and contribute to a tighter market and higher prices over the medium term. However, the extra supply capacity being planned will moderate the increase in prices. India's steel production targets are ambitious and although their metallurgical coal imports are projected to increase, it is unlikely to be sufficient to meet all of the planned output. Chinese steel mills are price sensitive and imports are volatile. Given the projected slowing in China's steel output, it is unlikely that China will consume much more metallurgical coal than it currently does, let alone increase its imports significantly. From 2017, metallurgical coal contract prices are projected to increase at an average annual rate of 3 per cent to US$109 a tonne (in 2015 dollars) in 2020.

Consumption and trade

World metallurgical coal trade is determined by developments in world steel consumption and production. Growth in metallurgical coal consumption has been driven by China over the past decade as its steel production capacity expanded rapidly. Conversely, consumption growth in developed economies was relatively subdued. Developing economies are projected to remain the key driver of growth in metallurgical coal use over the medium term as new steelmaking capacity expands to support growing infrastructure needs.

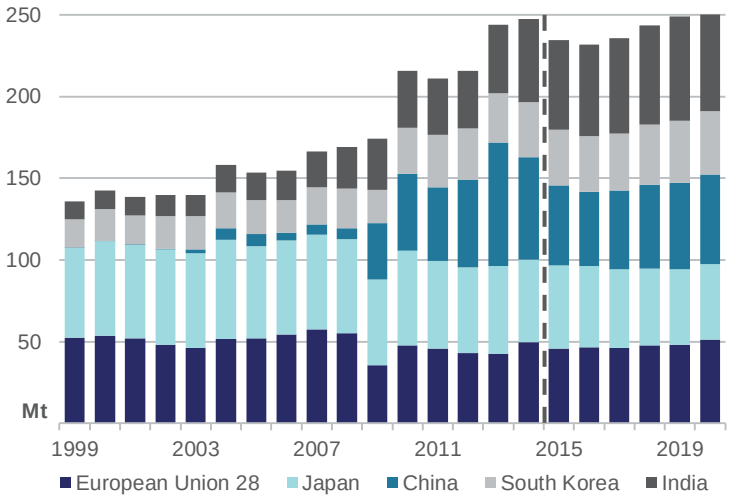
World trade in metallurgical coal is forecast to decline by 1.2 per cent to 306 million tonnes in 2015, driven by lower import demand from China. In 2016, world trade is forecast to increase by 0.6 per cent to 308 million tonnes. Reflecting projected growth in world steel production, world trade in metallurgical coal is projected to increase at an average annual rate of 1.5 per cent to 330 million tonnes in 2020.

Figure 4.3: China's metallurgical coal imports, monthly



Source: CEIC.

Figure 4.4: Major metallurgical coal importers



Sources: IEA; OCE.

World imports

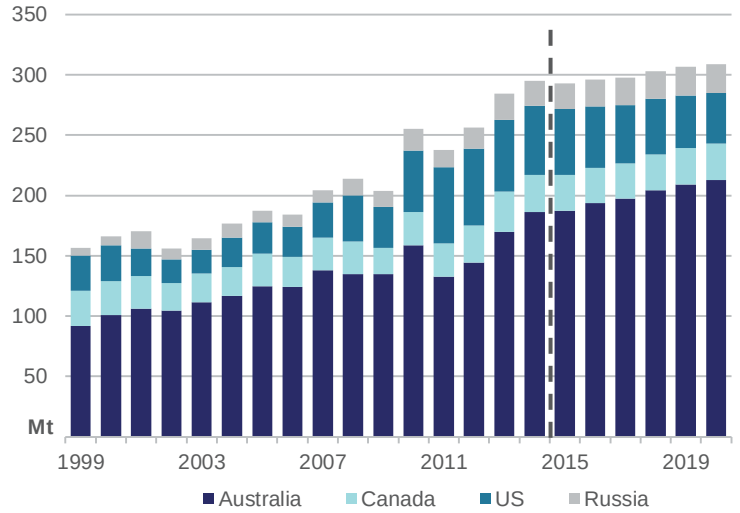
China's imports of metallurgical coal declined 22 per cent year-on-year in the first seven months of 2015 to around 28 million tonnes because of reduced steel production and increased use of domestically-sourced coal.

It is reported that some large steel mills intend to stop importing metallurgical coal in the short term because they have ample stocks and expect further price declines.

The rapid decline in metallurgical coal prices in early 2015 has affected the viability of China's domestic coal producers. Heilongjiang Longmay Mining Holding Group, one of the top four metallurgical coal producers in China, announced that it would be closing eight of its mines because of low margins, low prices and the exhaustion of economic reserves.

China's metallurgical coal use is expected to be subdued in the short term, reflecting a forecast contraction in steel production, but increase moderately over the medium term as steel production

Figure 4.5: Major metallurgical coal exporters



Sources: IEA; OCE.

Table 4.1: Metallurgical coal trade

	2014	2015 f	2016 f	2017 z	2018 z	2019 z	2020 z
Metallurgical coal imports (Mt)							
European Union 28	50	46	47	46	48	48	51
Japan	51	51	50	48	47	46	46
China	62	49	46	48	51	53	55
South Korea	34	34	34	35	37	38	39
India	51	54	56	58	61	64	67
Metallurgical coal exports (Mt)							
Australia	186	188	194	198	205	209	213
Canada	31	29	29	29	30	30	31
United States	57	55	51	48	46	44	41
Russia	21	22	22	23	23	24	24
World trade	**310**	**306**	**308**	**311**	**318**	**323**	**330**

f forecast. **z** projection.
Sources: IEA; OCE.

recovers in response to a projected increase in steel use in China's housing sector. Although China is likely to remain a relatively large participant in seaborne trade in the medium term, a greater focus on domestic supply and controlling costs suggests that China's demand for imports will moderate. China's imports of metallurgical coal are projected to increase at an average annual rate of 2.3 per cent from 2016 to 55 million tonnes in 2020.

India's imports of metallurgical coal increased by 21 per cent to 51 million tonnes in 2014, underpinned by increased steel production. The Indian Government has announced ambitious plans to rapidly expand its steel production capacity to meet an anticipated increase in steel requirements over the medium term as it invests heavily in infrastructure. Although the target of increasing production more than three-fold will be challenging, the expansion in steel capacity that does occur will require large volumes of raw materials.

The doubling in metallurgical coke tariffs announced in the February budget may encourage increased use of metallurgical coal to produce coke instead of importing coke from China. Given that India's metallurgical coal deposits are relatively small and low quality, they will rely on imports to support increased steel production. India's imports of metallurgical coal are projected to increase at an average annual rate of 4.4 per cent to 67 million tonnes in 2020.

Imports into the European Union and South Korea are projected to increase to 51 million tonnes and 39 million tonnes by 2020, respectively. Conversely, Japan's imports are projected to decline to 46 million tonnes in 2020, commensurate with a projected decline in steel production.

World exports

Lower prices have forced the closure of mine capacity and reduced the incentive to invest in new supply, particularly greenfield projects. As a result, growth in exports is likely to come from existing producers. Most of the growth in world metallurgical coal exports is expected to come from Australia. Australia's exports are projected to increase at an average annual rate of 2.5 per cent to 213 million tonnes in 2020.

Mozambique could emerge as a large metallurgical coal exporter over the projection period. Vale and Mitsui are progressing plans to expand production at the Moatize mine in the Tete Basin from 4 million tonnes a year to 22 million tonnes a year. A number of private Indian companies are also planning to expand capacity at projects in Mozambique to feed into steel mills in India. Jindal Steel and Power Limited is expanding the Songa project (10 million tonnes a year) and Tata Steel the Benga project (8.5 million tonnes a year). However, these projects are all relatively high cost operations and would be making substantial cash losses if metallurgical coal prices are less than US$100 a tonne. Higher production from Mozambique will require strong import demand growth to absorb the extra capacity.

Exports from Canada are projected to remain steady at 31 million tonnes and exports from Russia to increase to 24 million tonnes by 2020. By contrast, exports from the United States are projected to decline to 41 million tonnes in 2020 as lower prices force the closure of capacity.

Australia's production and export

Australia's metallurgical coal production increased by 6 per cent to 193 million tonnes in 2014-15 as increased production from recently completed projects such as BHP Billiton Mitsubishi Alliance's (BMA) Caval Ridge and existing operations more than offset announced capacity reductions. A number of operations were closed in 2014 or are scheduled to close in 2015. These include Vale's Integra (3.5 million tonnes a year), Sumitomo's Isaac Plains (2.8 million tonnes a year) and Glencore's Ravensworth underground mine (5.6 million tonnes a year).

In 2015-16, Australia's metallurgical coal production is forecast to increase by 1.3 per cent to 196 million tonnes as announced production curtailments are more than offset by increased production at existing operations and new production from Whitehaven Coal's Maules Creek. Australian producers have been focusing on cost cutting activities or reducing output to remain viable in an environment of lower prices. Those that intend to reduce output include: Glencore who announced that it will reduce output at its

Collinsville mine by 2 million tonnes in 2015 to improve efficiency and reduce losses; and Peabody Energy announced it would reduce output at North Goonyella by 1.5 million tonnes, Coppabella by 1.2 million tonnes and Metropolitan by 600 000 tonnes to improve cash flow and preserve their higher grade resources for when market conditions improve.

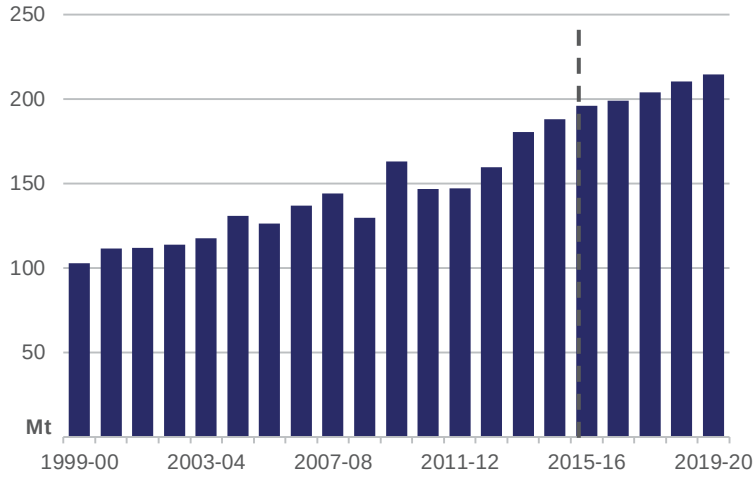
Over the medium term, Australia's production of metallurgical coal production is projected to increase at an average annual rate of 2.1 per cent to 215 million tonnes in 2019-20. This will be supported by a number of projects that are scheduled to be completed over the outlook period including Yancoal's South East Ashton opencut expansion, BHP Billiton's Appin Area 9 and Anglo American's Grosvenor.

Despite price pressures, Australia managed to increase its share of world metallurgical coal exports from 52 per cent in 2013 to 56 per cent in 2014 as higher cost production, particularly in North America, was closed. In 2014-15, Australia's exports of metallurgical coal increased by 3.9 per cent to 188 million tonnes. Although the volumes increased, export earnings declined by 6 per cent to $21.8 billion because of lower prices.

Australia's exports of metallurgical coal are forecast to increase by a further 3.4 per cent to 194 million tonnes in 2015-16, supported by higher production. The value of exports is forecast to increase by 1.7 per cent to $22.2 billion as increased volumes and the effect of a depreciating Australian dollar more than offset forecast lower prices.

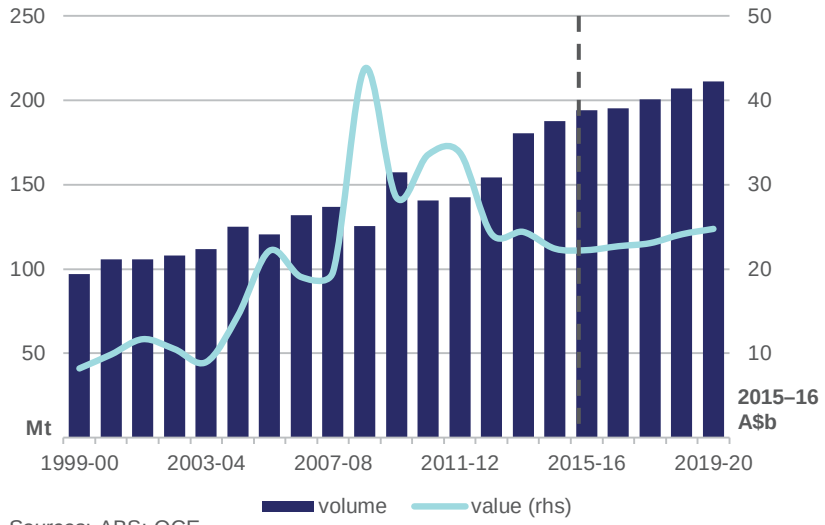
From 2016-17, Australia's exports of metallurgical coal are projected to increase at an average annual rate of 2.6 per cent to 211 million tonnes in 2019-20. Over the same period, export earnings from metallurgical coal are projected to increase at an average annual rate of 2.9 per cent to $24.7 billion (in 2015-16 dollar terms), underpinned by higher export volumes, projected higher contract prices and an assumed weaker Australian dollar.

Figure 4.6: Australia's metallurgical coal production



Source: OCE.

Figure 4.7: Australia's metallurgical coal exports



Sources: ABS; OCE.

Table 4.2: Metallurgical coal outlook

	unit	2014	2015 f	2016 f	2017 z	2018 z	2019 z	2020 z
World								
Contract prices bc								
– nominal	US$/t	125.5	102.1	96.5	104.3	113.6	117.6	122.2
– real d	US$/t	128.4	102.1	94.3	99.7	106.1	107.4	109.1
		2013–14	**2014–15 f**	**2015–16 f**	**2016–17 z**	**2017–18 z**	**2018–19 z**	**2019–20 z**
Australia								
Production	Mt	183.1	193.3	195.8	198.8	203.9	210.5	214.5
Export volume	Mt	180.5	187.5	193.8	195.3	200.4	207.0	211.0
– nominal value	A$m	23 254	21 847	22 229	23 193	24 082	25 733	26 997
– real value e	A$m	24 389	22 402	22 229	22 693	23 056	24 107	24 747

b fob Australian basis **c** Contract price assessment for high-quality hard coking coal. **d** In current calendar year US dollars. **e** In current financial year Australian dollars. **f** forecast. **s** estimate. **z** projection.
Sources: ABS; OCE.

Thermal coal

Kate Penney

Coal is likely to remain an important source of energy over the medium term because of continued investment in coal-fired electricity generation capacity, particularly in non-OECD countries. In the short term, supply competition in the thermal coal market is forecast to contribute to lower prices. However, the market is projected to tighten from 2017 as demand increases and uncompetitive capacity has closed, supporting a moderate increase in prices.

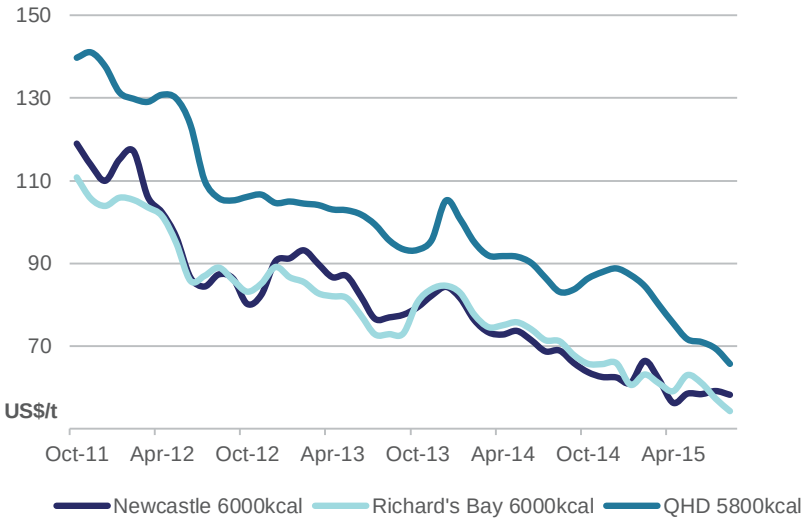
Prices

Thermal coal prices continued to decline steadily throughout early 2015 in response to increased supply and weaker import demand from China. Newcastle free on board prices averaged US$60 a tonne in the first eight months of 2015, down 18 per cent year-on-year. In August, large Chinese producers reduced their offer prices to domestic utilities and the Chinese Government devalued the yuan, reducing the competitiveness of coal imported into China. This reduced spot demand for Newcastle coal and put further downward pressure on prices.

Many producers have struggled to remain viable because of persistent low prices. Although some companies have closed capacity, the supply response has been slow because of limitations to altering infrastructure supply services, the appreciation of the US dollar relative to currencies of major producers and lower energy prices. As a result, the strong supply competition is forecast to persist and contribute to lower prices over the short term. Benchmark prices for the Japanese Fiscal Year 2016 (JFY, March 2016 to April 2017) are forecast to settle 9 per cent lower at US$62 a tonne.

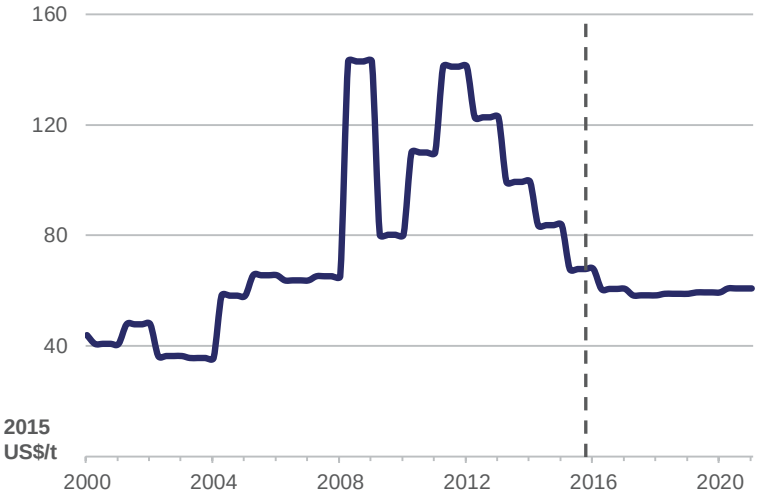
Lower prices are expected to reduce the incentive to invest in new capacity and continue to force the closure of unprofitable capacity. Beyond 2017, thermal coal prices are projected to increase moderately as demand increases, supply growth slows

Figure 5.1:Thermal coal spot prices



Source: IHS.

Figure 5.2: JFY thermal coal prices



Source: OCE.

and the market tightens. However, benchmark contract prices are unlikely to return to levels observed between 2008 and 2012 because cost cutting activities have reduced the price required for production to be viable. Further, continued weakness in the Australian dollar (against the US dollar) will provide some offset to lower US denominated prices for Australian producers. The JFY contract price is projected to decline to US$58 a tonne in 2017 (in 2015 dollar terms), before increasing to around US$61 a tonne (in 2015 dollar terms) by 2020.

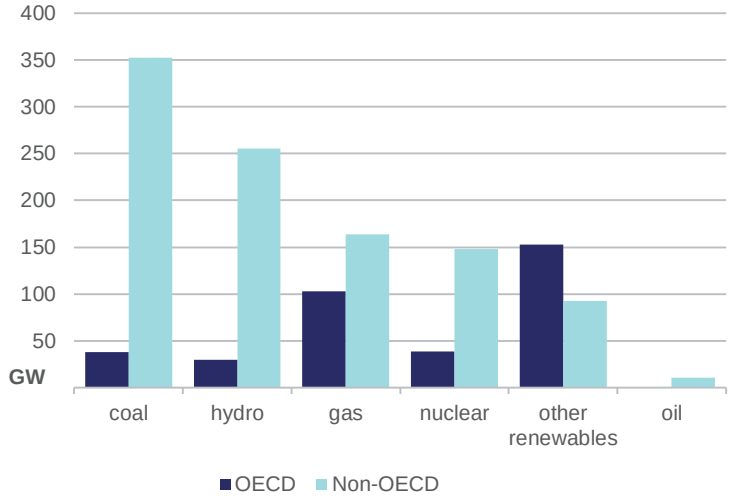
Consumption and trade

Many countries have enacted measures to reduce the role of coal in their energy mix in response to concerns about the effect of its use on the environment. In particular, the United States and several European countries have announced their intentions to phase out the use of coal over the medium term. Although these measures will undoubtedly reduce coal use in these countries, this will be more than offset by increased use in emerging economies. This shift in the geography of coal use is important to Australia as the majority of its exports are destined for countries in the Asia-Pacific where coal use is projected to increase.

The development of electricity generation capacity in emerging economies is essential to facilitate economic development and improve the living standards of their citizens. The demand for electricity will be met by many sources, including coal, which is relatively abundant, low-cost and reliable. New electricity capacity under construction or approved indicates that coal-fired generation is likely to remain a key source of generation over the medium term. There is around 350 gigawatts of new coal-fired generation capacity either under construction or approved in non-OECD countries, which is almost equal to the investment across all technologies in the OECD.

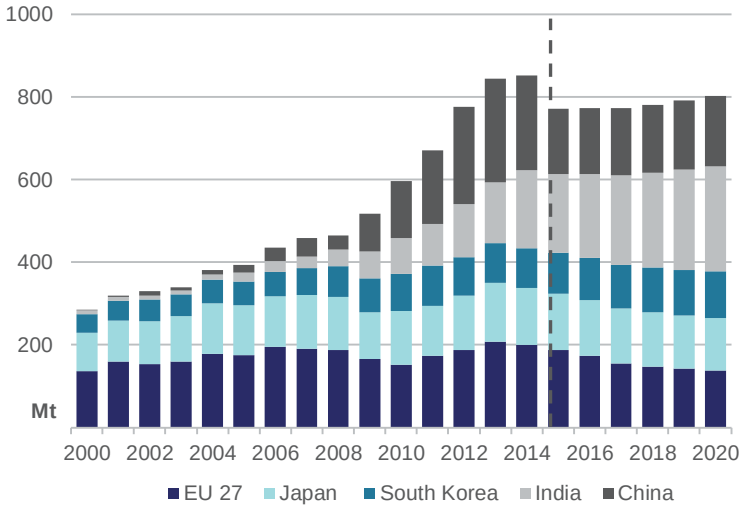
While coal-fired generation is projected to increase over the medium term, an increasing proportion of new projects are being based on high efficiency, low emissions technologies. These plants use less coal and therefore emit less CO_2 and other pollutants than older technologies. World trade is projected to increase at an average

Figure 5.3: World electricity capacity under construction or approved



Source: Enerdata, www.enerdata.net.

Figure 5.4: Major thermal coal importers



Sources: IEA; OCE.

annual rate of 5 per cent to 1180 million tonnes in 2020.

Imports

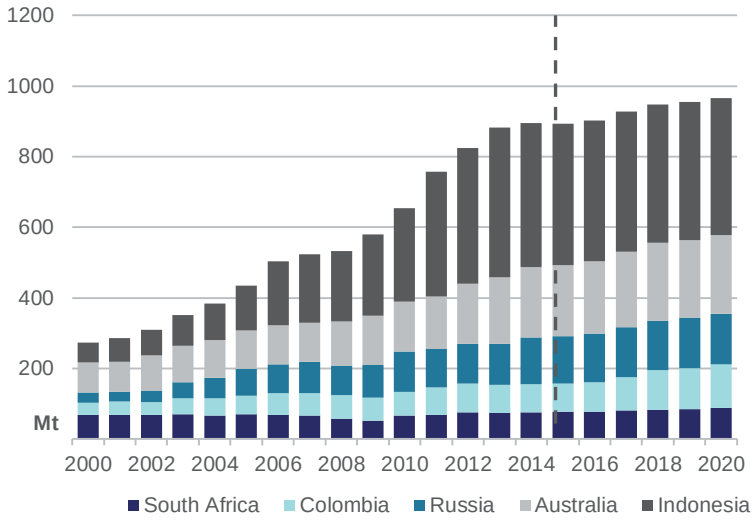
China

During 2014 and early 2015, China's coal consumption was affected by reduced economic activity and continued strength in hydroelectric output. In the first eight months of 2015, hydroelectric generation increased by 6 per cent year-on-year, while thermal generation was unchanged. China's electricity use is expected to continue to grow over the medium term, albeit at a slower pace, as the economy expands and household income and consumption increases. To meet its growing energy needs, China is investing in new energy infrastructure including 123 gigawatts of coal-fired capacity under construction or approved (more than twice Australia's total installed capacity). China already has substantial installed coal-fired capacity. These assets typically have an operating life of 40–60 years and China's coal fleet is relatively new so it is unlikely that there will be any large-scale closure of capacity over the medium term. However, the capacity utilisation of some plants may be reduced.

The Chinese government has announced multiple measures to curb growth in coal use, driven by a desire to reduce pollution and diversify the fuel mix. The Energy Strategy Action Plan (2014–2020) released by the State Council outlines the government's plans to modernise China's energy structure including a cap on energy consumption that would limit its energy growth over the next six years to around 3.5 per cent a year. Further, China has announced its intention to target peak CO_2 emissions by 2030. Although these policies will slow the growth in coal use, they are unlikely to result in a rapid shift away from coal.

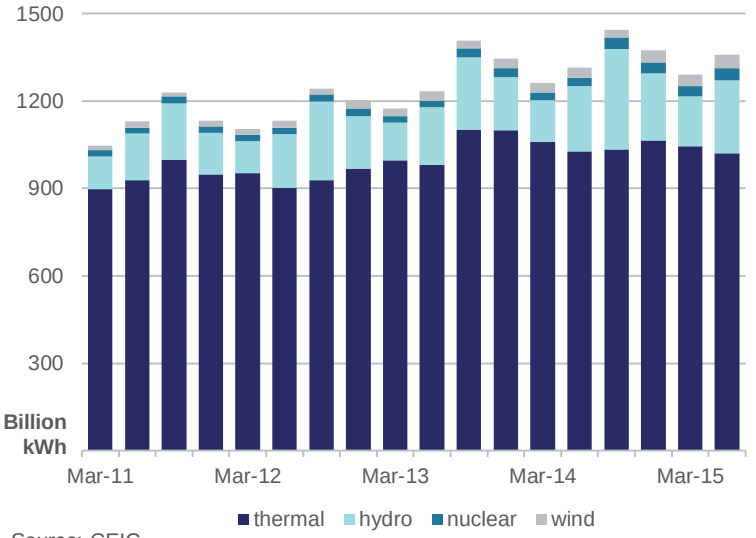
China's Intended Nationally Determined Contribution for COP21 in Paris indicates that coal will remain a key part of its energy mix, but there will be a greater focus on high efficiency, low emissions technologies and carbon capture and storage. This will be supported by the Clean Coal Action Plan 2015–2020 released in May 2015. Under the plan, the government will focus on the clean and efficient use of coal through increasing coal quality, retrofitting coal-fired

Figure 5.5: Major thermal coal exporters



Sources: IEA; OCE.

Figure 5.6: China's quarterly electricity generation



Source: CEIC.

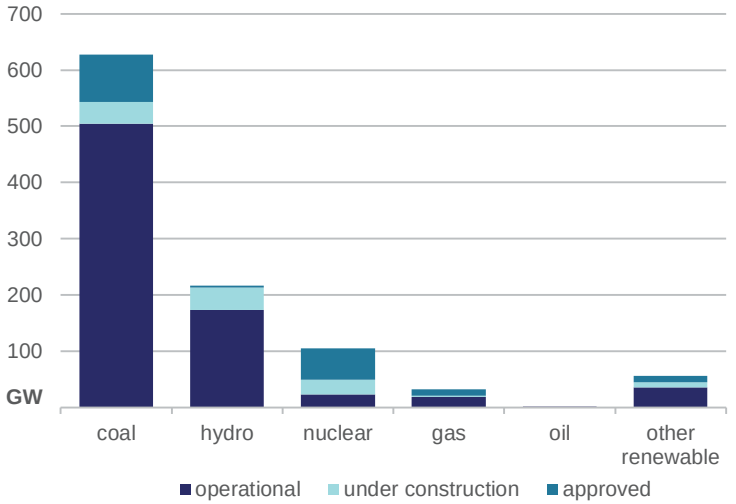
power plants, industrial boilers and coal chemical operations, and controlling residential use.

To improve coal quality, China will invest in large-scale washing capacity to ensure that 70 per cent of raw coal is washed by 2017 and more than 80 per cent by 2020, up from around 40 per cent currently. In addition, coal distribution centres will be developed in mining regions, ports and end-user regions. By 2020, it is intended that China will have eleven coal storage and blending bases and 30 coal logistics parks.

China's coal production declined by 6 per cent in the first half of 2015 to 1.8 billion tonnes in response to weaker demand, lower prices and government directives. It is estimated that around 70 per cent of Chinese producers were losing money in the first half of 2015. In an effort to stabilise prices, Chinese state-owned producers have been encouraged to reduce output. In response, Shenhua and China Coal, two of China's largest coal producers, reported lower production in the first half of 2015. Shenhua's output declined by 10 per cent to 139 million tonnes while China Coal's output fell 22 per cent to 46 million tonnes. The consolidation of the coal industry undertaken over the past decade is expected to continue over the medium term, with smaller, inefficient and unsafe mines being closed.

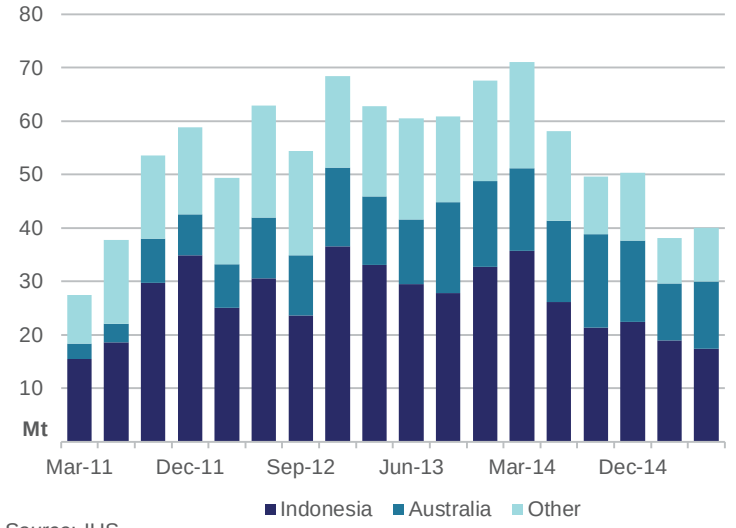
Although coal use is projected to increase moderately over the medium term, the proportion of demand that will be met with imported coal is uncertain. China's imports will be determined by relative import prices, the location of new generation capacity and government policy. If new power plants are increasingly developed closer to domestic coal deposits or government policies favour domestic coal, the demand for imported coal may be lower. However, if imported coal prices are relatively cheaper than domestic coal, then China's imports may increase. After declining in the short term, China's thermal coal imports are projected to increase to 170 million tonnes in 2020.

Figure 5.7: China's electricity generating capacity >50MW



Source: Enerdata, www.enerdata.net.

Figure 5.8: China's quarterly coal imports by source



Source: IHS.

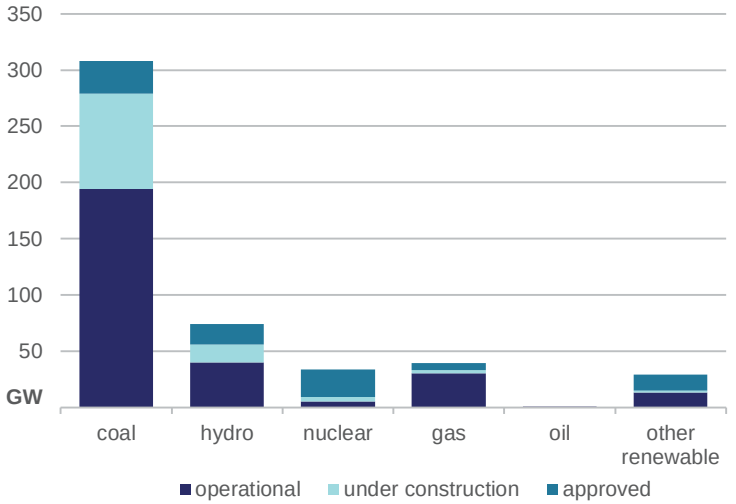
India

India's imports of thermal coal increased by 29 per cent to 189 million tonnes in 2014, supported by a rapid increase in the development of new coal-fired capacity and relatively slow growth in domestic production. India's coal consumption is projected to grow rapidly over the medium term as the economy develops, manufacturing activity expands, household income increases and the government improves electrification. Around 300 million people have inadequate access to electricity in India. Prime Minister Modi has announced plans to improve access to electricity across all Indian villages over the next five years. Although the government has announced ambitious targets to increase the installed capacity of renewable technologies, there is also considerable investment in coal-fired electricity capacity. Around 114 gigawatts of new coal-fired capacity is already under construction or approved.

Coal India Limited (CIL) accounts for around 80 per cent of India's domestic production, the remainder is produced by Singareni Collieries Company Limited (10 per cent) and captive (own-use) producers (10 per cent). Over the past few years, the development of new projects has been stalled by difficulties in obtaining land access, environmental approvals and inadequate transport infrastructure, which has contributed to a rapid increase in imports.

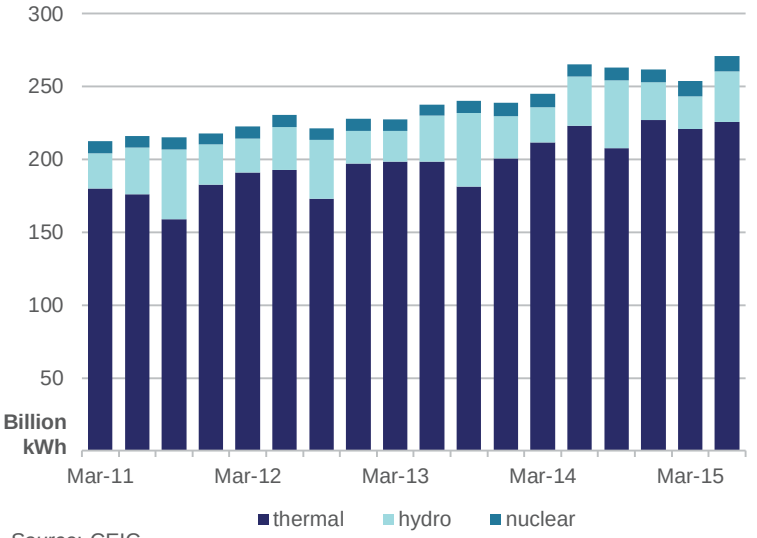
To stem the growth in import requirements, Coal and Power Minister Goyal set a target to roughly double CIL's production to 1 billion tonnes by 2020. In order to promote a rapid increase in domestic production, proposals are underway to speed up environmental clearances, and land acquisition procedures. CIL's production has increased 9 per cent to 192 million tonnes in the first five months of India's fiscal year (April–March), but is running just below target. Although CIL has been successful in increasing production, achieving the 2020 target will remain challenging because of declining coal quality, and the need to speedily open new production areas and build new transport links. The government has recognised that a key part of any moves to raise coal output will require increased private sector participation in the mining and sale of coal. By 2020, it is envisaged that more than one third of Indian coal output will come from the private sector, or state governments.

Figure 5.9: India's electricity generating capacity >50MW



Source: Enerdata, www.enerdata.net.

Figure 5.10: India's quarterly electricity generation



Source: CEIC.

In early 2015, India's coal imports were mostly of high energy coal that could be blended with lower quality domestic coal to meet power plant specifications. This affected the volume of imports from Indonesia, India's primary source of coal. By mid-2015, growth in coal imports began to slow because of weaker demand, rising port stocks and difficulties obtaining credit at domestic power plants. Weak electricity demand from power distribution companies encouraged many plants to operate below capacity, with some plants reported to be operating at 40–50 per cent of capacity. Further, some utilities are struggling to obtain credit because they have high debt and are unprofitable, which has reduced their ability to purchase imported coal.

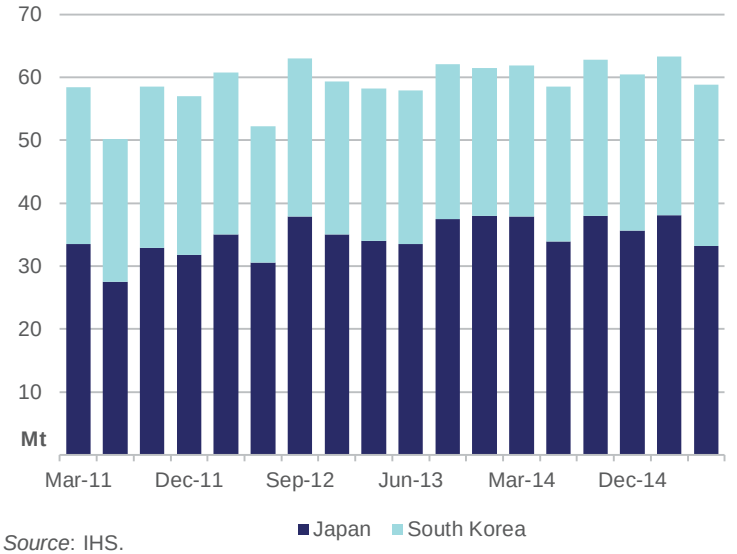
Despite some short term fluctuations in India's import requirements, it is not expected that the pace of growth in India's production will be fast enough to meet coal demand over the medium term. In addition, the development of capacity using supercritical technologies will require higher quality coal than can be sourced domestically. As a result, it is unlikely that India will be able to cease thermal coal imports within the next three years as widely claimed. India's coal imports are projected to increase at an average annual rate of 6 per cent to 255 million tonnes. Some of this will be secured through the development of foreign coal assets.

Japan

Japan has relied on thermal power (coal, oil and gas) following the closure of its nuclear power capacity at the end of 2013. In mid-August, unit one at Kyushu Electric Power Company's Sendai nuclear power plant (890 megawatt capacity) was restarted after obtaining approval from the Nuclear Regulatory Authority and passing safety checks. This represents the first of up to 43 operable reactors that could be restarted over the coming years. As nuclear capacity is restarted, some of the pressure on coal-fired power plants operating at capacity will be relieved. However, there still remains uncertainty over the timing of restarts, which is likely to support coal imports over the short term.

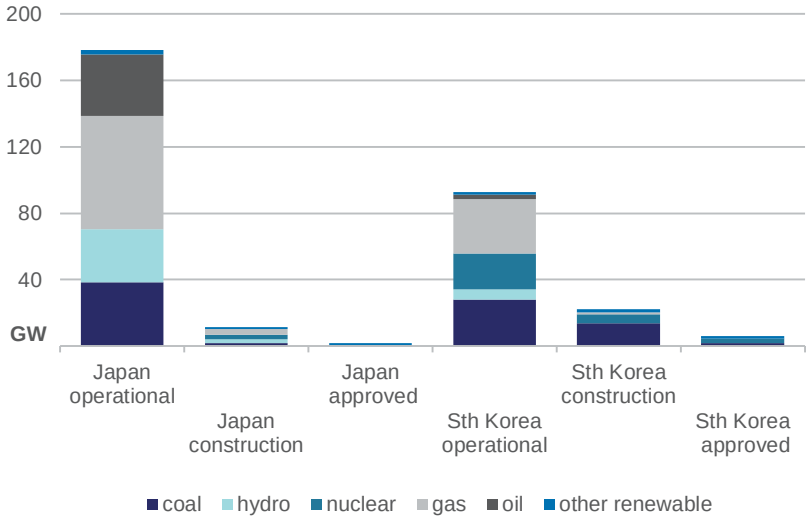
The Ministry of Economy, Trade and Industry has announced plans to replace Japan's existing coal-fired power generating capacity with newer technology as part of its efforts to reduce CO_2 emissions by

Figure 5.11: Japan and South Korea's quarterly imports



Source: IHS.

Figure 5.12: Japan and South Korea electricity capacity >50MW



Source: Enerdata, www.enerdata.net.

20–30 per cent. Under the initiative, newer plants based on ultra-supercritical and Integrated Gasification Combined Cycle technologies will be built over the medium term. These plants operate at higher efficiencies and use less coal than existing plants.

Over the medium term, Japan's imports of thermal coal are projected to decline gradually to 127 million tonnes in 2020, reflecting declining electricity use, the restart of nuclear capacity and the deployment of more efficient coal-fired technologies.

South Korea

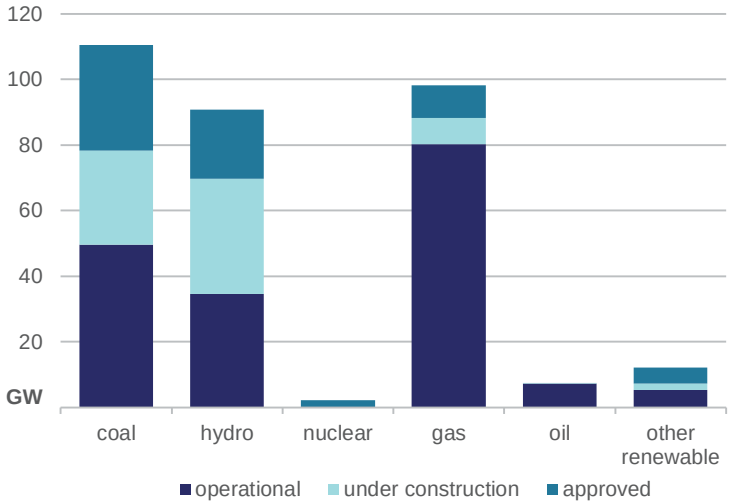
Over the medium term, South Korea's coal imports will be supported by the development of fourteen coal-fired power plants with a combined capacity of 13.8 gigawatts that are scheduled to be completed by 2019. South Korea's imports are projected to increase at an average annual rate of 2.5 per cent to 113 million tonnes in 2020. The South Korean government has introduced tax policies that favour the use of higher quality coal. From July 2015, the import tax on coal was increased by around US$4.40, which is likely to reduce the competitiveness of low energy content coal such as that from Indonesia.

ASEAN

The Association of Southeast Asian Nations (ASEAN) is expected to emerge as a source of import growth over the medium term as they invest in new coal-fired generation capacity. There are currently 55 gigawatts of coal-fired generation capacity under construction or approved in ASEAN, with most of the developments in Indonesia, Vietnam, Malaysia, the Philippines and Myanmar. Although some of the new capacity will use more efficient ultra-supercritical technology, the capacity under development is dominated by subcritical technology that uses lower quality coal.

Vietnam is projected to transition from a net exporter to a net importer over the medium term as it builds coal-fired power plants to meet its growing energy requirements. Vietnam has 28.3 gigawatts of coal-fired capacity under construction or approved. Although the Ministry of Industry and Trade is considering the introduction of regulations to prioritise domestic coal supply for electricity generation, Vietnam's production is not expected to keep pace with the growth in consumption.

Figure 5.13: ASEAN electricity generating capacity >50MW



Source: Enerdata, www.enerdata.net.

Malaysia has 5.2 gigawatts of coal-fired electricity capacity under construction or approved as part of a strategy to meet increasing electricity demand and diversify fuel sources. Similarly, the Philippines and Myanmar have 4.9 gigawatts and 4.2 gigawatts of coal-fired generation capacity under construction or approved, respectively.

Exports

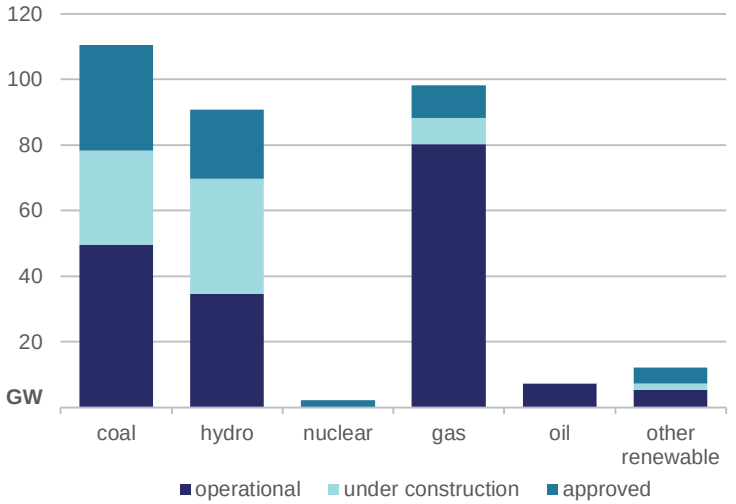
Indonesia

Indonesia's coal production declined substantially in the first half of 2015 in response to reduced demand for Indonesian coal in key export markets—China and India—and the associated decline in prices. In addition, the cost of production for many Indonesian producers is denominated in US dollars. As the US dollar has appreciated, the cost of production has increased and contributed to deteriorating profitability. Smaller producers were particularly affected by lower profits and around 5–8 million tonnes of small scale capacity is estimated to have closed in response to lower prices in early 2015. Some larger producers have opted to reduce production and conserve resources until prices are higher. Indonesian producers have been able to close capacity faster than that observed in other major producing countries because their exposure to infrastructure and labour-force related constraints is limited.

Over the medium term, production is unlikely to increase substantially as the government continues to implement measures aimed at preserving resources and the quality of coal declines. Further, the Indonesian Government has announced its intention to begin to consolidate the industry by reviewing mines that do not comply with government rules, including the payment of royalties and administration fees. Some industry consolidation may occur through merger and acquisition activity over the short term as larger companies buy smaller assets in preparation for an expected increase in domestic use as coal-fired generation capacity is developed (discussed below).

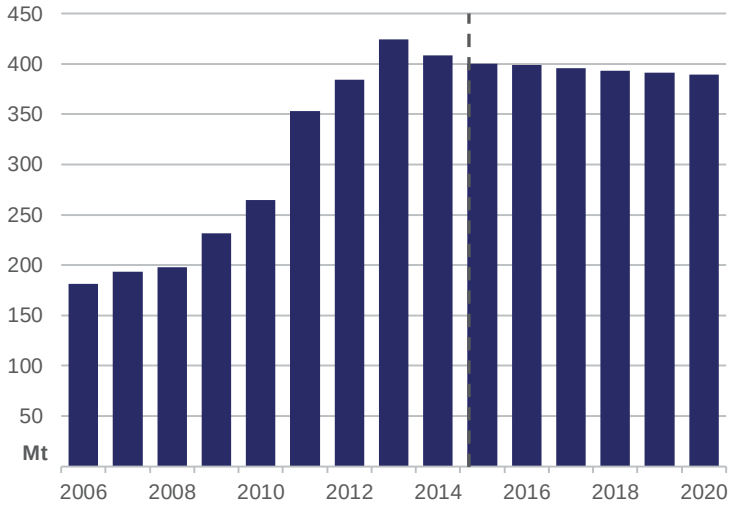
Indonesia's exports have been adversely affected by tighter regulation of exports and lower demand from China and India as they favour higher energy coal from other sources. Over the past year, the government has introduced requirements for exporters to provide evidence clearing them to produce before they make any shipments and introduced a tax on the value of exports. The tax on exports took effect in early August. Under the new arrangements, all small business exporters will be required to pay 1.5 per cent of the

Figure 5.14: Indonesian electricity generating capacity >50MW



Source: Enerdata, www.enerdata.net.

Figure 5.15: Indonesia's thermal coal exports



Sources: IEA; OCE.

value of exports to the government, bringing their taxation in line with major producers.

Indonesia's coal consumption is projected to increase over the medium term, underpinned by the development of 35 gigawatts of new coal-fired capacity by 2019 to meet growing electricity requirements. The increased use of coal will be supported by the Domestic Market Obligation that requires a proportion of output to be reserved for the domestic market.

Lower coal production, combined with an expected increase in domestic requirements is projected to result in Indonesia's thermal coal exports declining at an average annual rate of 0.6 per cent to 389 million tonnes in 2020.

Colombia

In the first half of 2015, Colombia's coal production declined by 6 per cent to 44 million tonnes because of labour disputes and transport limitations. The introduction of a night time rail restriction on the Feneco coal railway has affected production at three major mines: Drummond, Prodeco and Colombia Natural Resources. However, the government is considering temporarily lifting the ban because of geopolitical tensions preventing coal from being railed to Venezuelan export terminals. This mainly affects smaller producers that cannot economically export through Colombian ports. Despite lower production, exports from Colombia do not appear to have been affected.

Over the medium term, exports from Colombia are projected to increase at an average annual rate of 9 per cent to 122 million tonnes. This growth will be underpinned by the development of new projects and infrastructure. Colombian coal is high quality and the cost of production is low, so even at lower prices the development of new capacity is still profitable. Traditionally the majority of Colombia's exports have been directed to the US and European markets. However, the expansion of the Panama Canal is estimated to substantially reduce the cost and shipping time to Asian markets, which may increase Colombia's presence in the Asia-Pacific.

South Africa

South African producers were affected by reduced profitability and power constraints in early 2015. Lower prices have forced a number of producers to close capacity. In July, Glencore announced that its Optimum opencast operations would be placed on care and maintenance. While most of the output from this mine was destined for export markets, a small portion is used at Eskom's Hendrina Power Plant. Glencore intends to retain enough capacity at the Optimum mine to continue supplying coal to the Hendrina facility.

Over the medium term, South Africa's coal production will be affected by deteriorating coal quality and availability and electricity supply. Eskom, the publicly owned electricity utility, has warned that power cuts are likely over the next few years as it struggles to maintain its aging fleet. Most of South Africa's coal mines are reliant on grid connection for electricity supply.

The majority of South Africa's electricity supply is sourced from coal-fired generation. In late August, the Medupi power station was commissioned. The plant has an initial capacity of 749 megawatts and is expected to reach its capacity of 4800 megawatts by 2019. The opening of the plant is likely to alleviate some of the pressure on the electricity grid.

Despite disruptions to production, South Africa's exports increased in the first half of 2015, driven by increased demand from India. India has become South Africa's largest export market and will be a critical source of export growth over the medium term. Exports from South Africa are projected to increase at an average annual rate of 2.9 per cent a year to 89 million tonnes in 2020.

Australia

Exploration

Lower coal prices have reduced the incentive to invest in exploration, and many companies are reducing their exploration activity as part of cost cutting activities. Australia's coal exploration expenditure in 2014-15 was around $252 million, 37 per cent lower than 2013-14. In the June quarter, expenditure was $50 million, down 38 per cent

compared with the June quarter 2014, but up 15 per cent from the March quarter following increased expenditure in Queensland.

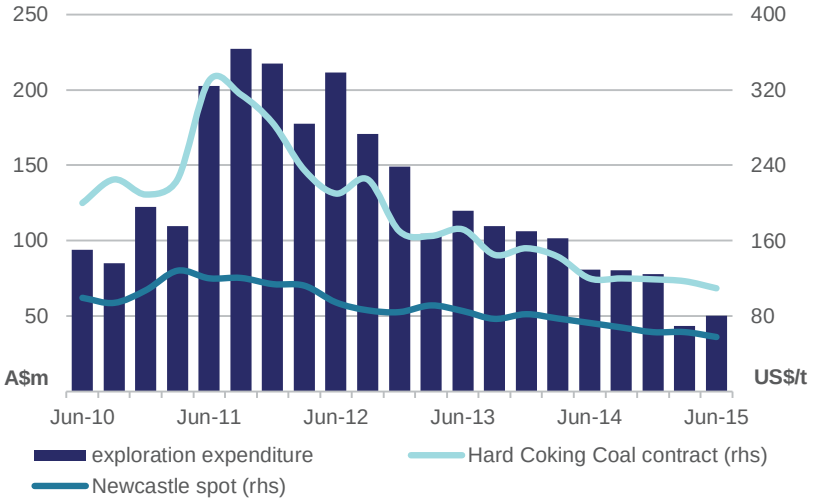
Production

Australia's thermal coal production increased marginally to 249 million tonnes in 2014-15 as increased output at existing operations and recently completed projects more than offset announced closures and Glencore's decision to reduce production at its Australian operations by 15 million tonnes in 2015. In 2015-16, Australia's thermal coal production is forecast to increase by a further 2 per cent to 254 million tonnes, underpinned by increased output from new projects.

Whitehaven Coal's Maules Creek was declared commercial in July 2015. More production equipment will be introduced to the mine towards the end of 2015 as part of the expansion to 8.5 million tonnes. At full capacity the mine will produce 13 million tonnes a year. Idemitsu Kosan's Boggabri expansion was completed in late August, which will allow the mine to produce up to 7 million tonnes a year and support continued mining at the site until 2033. Partly offsetting this increased production will be the expected closure of Anglo American's Drayton South after they failed to get approval to extend the life of the project; BHP Billiton's Crinum; and Glencore's West Wallsend and Newlands mines.

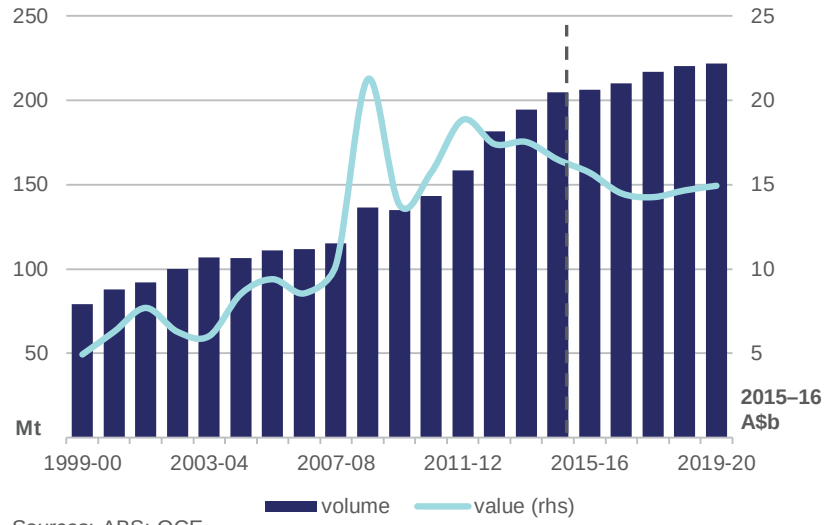
From 2016-17, Australia's thermal coal production is projected to increase at an average annual rate of 1.1 per cent to 265 million tonnes in 2019-20 as projects completed during 2015 and 2016 approach full capacity. The development of Adani's Carmichael mine (capacity of 60 million tonnes a year) in the Galilee Basin in Queensland has been delayed following a High Court decision to overturn its environmental approval. Adani have indicated it still intends to develop the mine. Should it secure all of its approvals, the mine could begin production from late 2019/early 2020. In an environment of sustained lower prices, it is possible that further mine closures could be announced over the projection period.

Figure 5.16: Australia's coal exploration expenditure



Sources: ABS; IHS; OCS.

Figure 5.17: Australia's thermal coal exports



Sources: ABS; OCE.

Exports

Despite the challenging operating environment, Australia's exports of thermal coal remained resilient in 2014-15, supported by increased demand for Australian coal in key export markets including Japan, South Korea and Chinese Taipei. As a result, Australia's exports increased by 5 per cent to 205 million tonnes in 2014-15. Despite higher volumes, the value of these exports declined by 3.8 per cent to $16.1 billion because of lower prices.

In 2015-16, Australia's thermal coal exports are forecast to increase by 0.8 per cent to 206 million tonnes. Earnings from thermal coal exports are forecast to decline by 2.3 per cent to $15.7 billion as forecast lower prices more than offset higher volumes to customers in Asia including South Korea, Chinese Taipei and India.

Over the remainder of the outlook period, Australia's thermal coal exports are projected to increase at an average annual rate of 1.8 per cent to 222 million tonnes in 2019-20. Export earnings are projected to increase by 1.0 per cent a year to around $14.9 billion (in 2015-16 dollar terms).

Table 5.1: Thermal coal outlook

	unit	2014	2015 f	2016 f	2017 z	2018 z	2019 z	2020 z
World								
Contract prices b								
– nominal	US$/t	82	68	62	61	63	65	68
– real c	US$/t	84	68	61	58	59	59	61
Coal trade	Mt	1 125	1 030	1 055	1 081	1 118	1 156	1 180
Imports								
Asia	Mt	789	726	749	786	816	849	871
China	Mt	229	157	160	162	165	167	170
Chinese Taipei	Mt	60	61	62	68	75	78	78
India	Mt	189	191	204	217	229	242	255
Japan	Mt	137	136	135	133	131	128	127
South Korea	Mt	97	100	102	106	109	111	113
Europe	Mt	249	222	224	214	223	225	224
European Union 27	Mt	200	187	173	155	147	143	138
other Europe	Mt	49	54	55	57	60	60	60
Exports								
Australia	Mt	201	200	206	215	220	220	223
Colombia	Mt	79	80	83	95	112	116	122
Indonesia	Mt	408	400	399	396	393	391	389
Russia	Mt	132	135	137	140	141	142	143
South Africa	Mt	76	77	78	81	83	85	89
United States	Mt	31	25	23	20	18	17	16
		2013–14	**2014–15 f**	**2015–16 f**	**2016–17 z**	**2017–18 z**	**2018–19 z**	**2019–20 z**
Australia								
Production	Mt	247.8	248.8	253.9	256.5	261.4	264.5	265.3
Export volume	Mt	194.6	204.5	206.1	209.8	216.8	220.4	221.6
– nominal value	A$m	16 705	16 062	15 701	14 798	14 888	15 642	16 284
– real value d	A$m	17 520	16 470	15 701	14 480	14 253	14 654	14 927

b Japanese Fiscal Year (JFY), starting April 1, fob Australia basis. Australia–Japan average contract price assessment for steaming coal with a calorific value of 6700 kcal/kg gross air dried. **c** In current JFY US dollars. **d** In current financial year Australian dollars. **f** forecast. **z** projection.
Sources: ABS; IEA; Coal Services Pty Ltd; Queensland Department of Natural Resources and Mines; OCE.

Gas

Inja Ahn, Kieran Bernie and David Whitelaw

Global LNG trade will grow rapidly to 2020 as Australia emerges as the world's largest LNG exporter. Relatively low prices and excess supply capacity over the next five years will lead to increased competition and price volatility, and put downward pressure on LNG production costs.

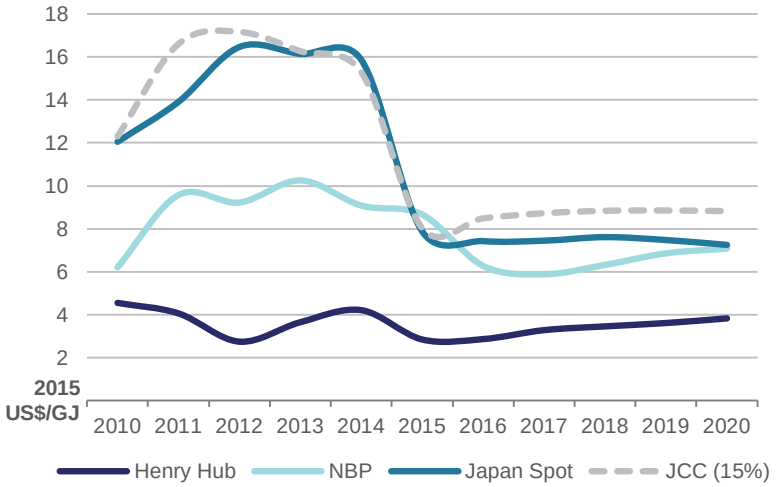
Prices

Prices for LNG delivered into North East Asia have fallen significantly over the past six months. LNG contract prices in Asia are largely tied to the Japan Customs-cleared Crude (JCC) oil price, and LNG contract prices have tracked the recent falls in this index with a three to six month lag. Prices in June reached as low as US$8.20 a gigajoule for LNG delivered into Japan compared with $14.80 a gigajoule a year earlier.

Spot prices have also fallen significantly over the last year. The US Henry Hub price fell to around US$2.60 a gigajoule in September, and is expected to rise only marginally by 2020. Japanese spot prices are also unlikely to rise significantly from the June low of around US$7.20 a gigajoule, given the forecast excess liquefaction capacity and low oil prices. European prices (such as the British National Balancing Point) are expected to rise marginally, and converge with Asian prices.

Australian LNG into Asia faces stiff competition from global LNG producers, particularly the US plants under construction. Before the oil price fall, buyers were seeking US contracts based on Henry Hub prices, as a competitive alternative to oil-linked contracts. With the fall in oil prices, this dynamic is changing. Assuming a typical US contract with a mark-up of US$6.25 a gigajoule over Henry Hub price for liquefaction and shipping costs, US LNG exports delivered into Japan will be about US$10.10 a gigajoule (in 2015 dollars) by 2020.

Figure 6.1: Global price indices



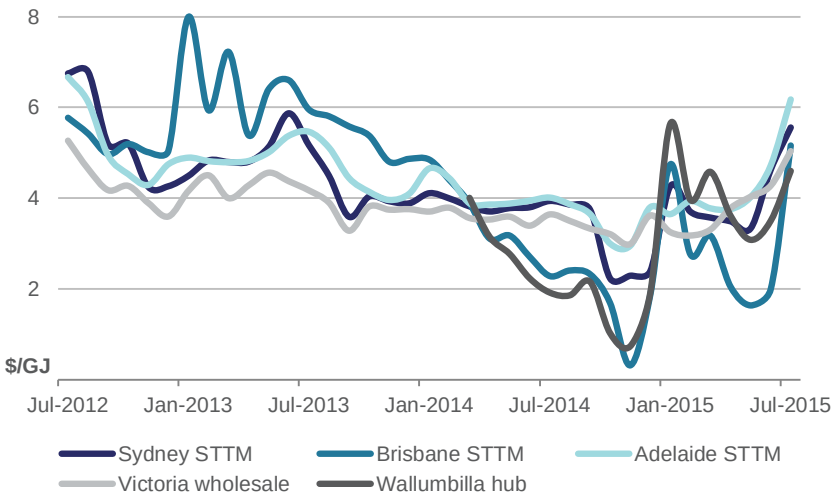
Sources: Nexant; OCE.

This is marginally higher than the projected Australian oil-linked contract price of about US$9.30 a gigajoule.

Domestic gas prices across the Eastern seaboard have all been rising over the last three months. The Wallumbilla hub price has exhibited considerable volatility since late 2014. From a low of $0.70 a gigajoule in November 2014, the hub price escalated sharply to $5.70 a gigajoule in January 2015, and has fluctuated widely since then. The key driver for this volatility has been the varying degrees of uncontracted gas available to the market during this time, as ramp gas from Queensland's coal seam gas fields has been taken up by the commencement of operations at Queensland Curtis LNG (QCLNG).

Given increasing pressure on domestic gas supply as a result of operations at the three LNG projects in Queensland, domestic prices are expected to be volatile over the outlook period. The collapse in oil prices in the second half of 2014 will result in lower netback prices in Queensland, which may constrain price rises in the domestic gas markets

Figure 6.2: Indicative monthly Eastern Australian gas prices



Notes: STTM prices are ex ante, and tend to cover less than 10 per cent of the gas consumed in those markets. The Victoria wholesale price is ex post, and typically 10 to 20 per cent of the gas consumed in Victoria is exposed to that price.
Source: AEMO.

Global LNG supply

The global LNG market was extremely tight over the last five years, with little new construction and a number of outages at African plants. This contributed to the high spot prices that prevailed until last year, and the tepid growth in imports after the surge in demand post-Fukushima.

However, LNG liquefaction capacity is expected to expand significantly over the next five years, as new capacity in Australia and the US enters the market. Installed capacity is expected to grow by 65 per cent between 2014 and 2020 with approximately 170 million tonnes of nameplate capacity coming online. This includes 62 million tonnes in Australia between 2014 and 2020, and at least 67.5 million tonnes in the US.

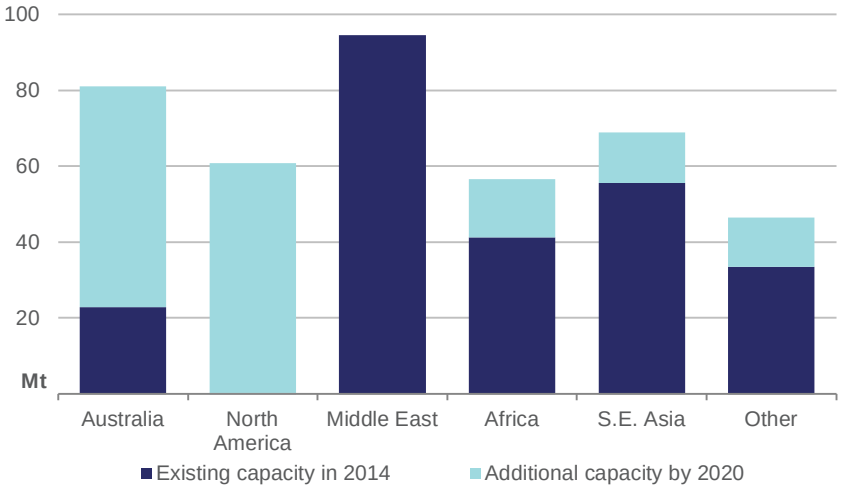
Despite the recent fall in LNG prices, there are no signs of a slowdown in the US LNG capacity expansion. There are five liquefaction plants under construction in the US which will be completed before 2020, with a total capacity of 62 million tonnes:

- Sabine Pass - 18 million tonnes,
- Cove Point - 4.6 million tonnes
- Cameron - 12 million tonnes
- Freeport - 13.9 million tonnes, and
- Corpus Christi - 13.5 million tonnes.

This is expected to increase to 67.5 million tonnes with the addition of a fifth train at Sabine Pass, Louisiana.

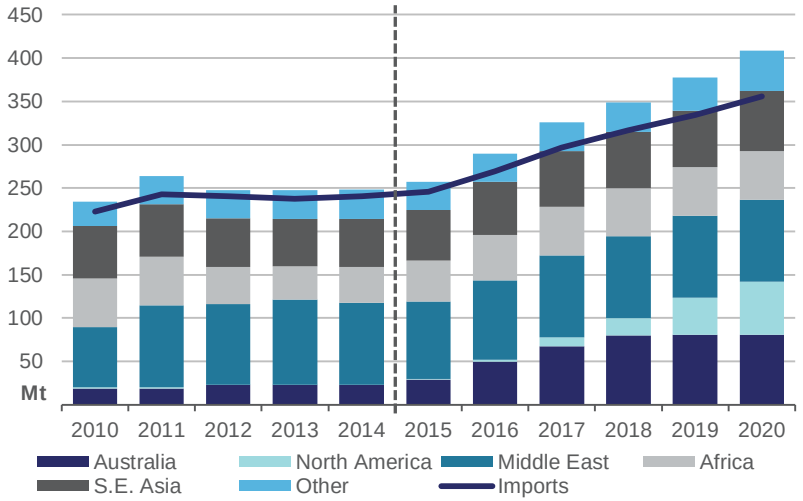
The US plants have introduced an innovative tolling arrangement, whereby the buyers take the risk on the price out of the Henry Hub in Louisiana, but are not exposed to oil prices.

Figure 6.3: Global existing and new liquefaction capacity



Note: Includes allowances for plant downtime and maintenance.
Sources: Nexant; OCE.

Figure 6.4: Global LNG supply capacity



Note: Nameplate reduced by 6 per cent for plant maintenance.
Sources: Nexant; OCE.

Global LNG imports

Global gas demand is expected to grow at an annual rate of 2.0 per cent, from 3495 billion cubic metres in 2014 to 3926 billion cubic metres by 2020, according to the IEA Medium Term Gas Report. LNG imports contributed an estimated 328 billion cubic metres (241 million tonnes) in 2014, around 9 per cent of global demand, and are projected to grow to 473 billion cubic metres (348 million tonnes) by 2020, 12 per cent of global demand.

LNG imports have traditionally been the preserve of countries with no access to alternative gas supplies, such as Japan and South Korea. However, in recent decades LNG imports have been growing in areas such as China and Europe, which have access to competitive alternative supplies of gas. This trend is expected to continue, as almost all the growth in LNG trade over the next five years is in countries where gas must compete with either indigenous production, pipeline imports, or both.

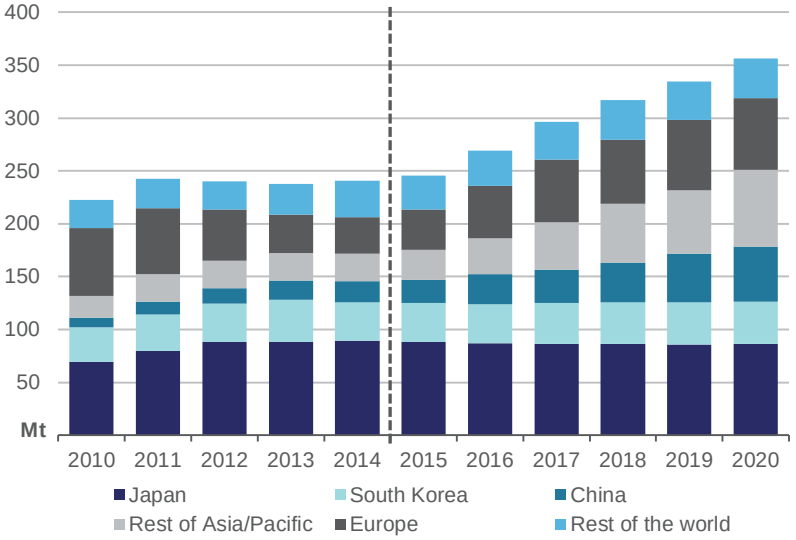
The trends in European LNG imports demonstrate the increasing volatility in the market. Imports have declined sharply in recent years due to slow economic growth and fuel switching to coal.

The largest importers Japan and South Korea took 52 per cent of global LNG trade in 2014, but this is projected to decline to 36 per cent by 2020. The Asia Pacific as a whole took 71 per cent of global trade in 2014 and this is expected to be maintained as LNG demand in other Asian countries expands.

Key features of the global demand outlook are:

- no growth in the largest markets of Japan and South Korea
- strong growth in China, although less than previous forecasts
- a recovery in European imports, which are expected to double over the next five years
- strong growth in the rest of Asia (India, Chinese Taipei and South East Asia).

Figure 6.5: Global LNG imports



Sources: Nexant; OCE.

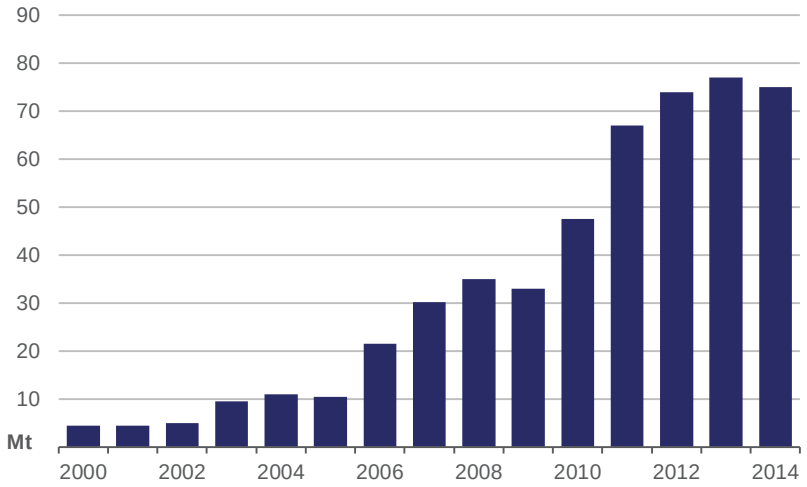
LNG spot market

LNG production has traditionally been traded under long-term contracts of around 20 years duration, which has served to under-write the very large capital investments in liquefaction, shipping and regasification assets. Ten years ago contracts with terms of five years or less made up less than 5 per cent of the total LNG market. However, this share increased dramatically from 2011 to reach 75 million tonnes in 2014, approximately 30 per cent of the global market.

The bulk of these trades (65 million tonnes) was contracted for periods of two years or less. This is referred to as the spot and short-term market.

The growth in the spot and short term market represents a growing desire for more flexible supply arrangements, and is associated with the growth of portfolio players, reloads and more flexible destination clauses. For example, reloads amounted to 5 million tonnes in 2013.

Figure 6.6: Spot, short and medium term LNG trades



Sources: International Gas Union.

The main drivers of the growth in spot trades over the last five years have been:

- the uncertainty in demand due to the growth in competition between gas and its energy substitutes (nuclear, coal and renewables)
- significant and unexpected swings in demand, such as the post-Fukushima surge in Japan from 2011, and the rapid fall in LNG imports into Europe
- a reluctance to commit to long-term contracts during a period of high prices
- the opportunity to arbitrage between prices in the Atlantic and Pacific basins, which until recently showed a wide divergence.

Other factors favouring the growth of the spot market include the large increase in the number of trading countries and in overall demand, the expiration of older long-term contracts as the existing LNG liquefaction plants age, and the growth of the LNG shipping fleet.

It is not clear how the spot market will develop over the next five years. On the one hand, there will be a rapid growth in supply from Australia and the US which will be under-written by long-term contracts. Conversely, older long-term contracts will continue to roll off, which will increase the bargaining power of the buyers.

Demand uncertainty will persist going forward, particularly given the strong competition in China and Europe from pipeline supplies and gas substitutes, and the uncertainty surrounding nuclear restarts in Japan.

In these circumstances, a spot market adds greater flexibility to manage demand uncertainty, but also to efficiently manage production during a period of excess supply capacity. For these reasons the spot market is likely to at least maintain its share of total trades and grow in absolute volumes.

Regional LNG markets

Japan

Japan is the world's largest consumer of LNG and relies on imports to meet almost all demand for gas. Approximately two-thirds of demand is for power generation, with the remainder consumed in the residential, commercial and industrial markets.

LNG imports rose dramatically in 2011 as a result of the Fukushima disaster, but recently has plateaued at about 88 million tonnes. This plateau is thought to be the result of the very high prices for LNG into Japan that prevailed at the time.

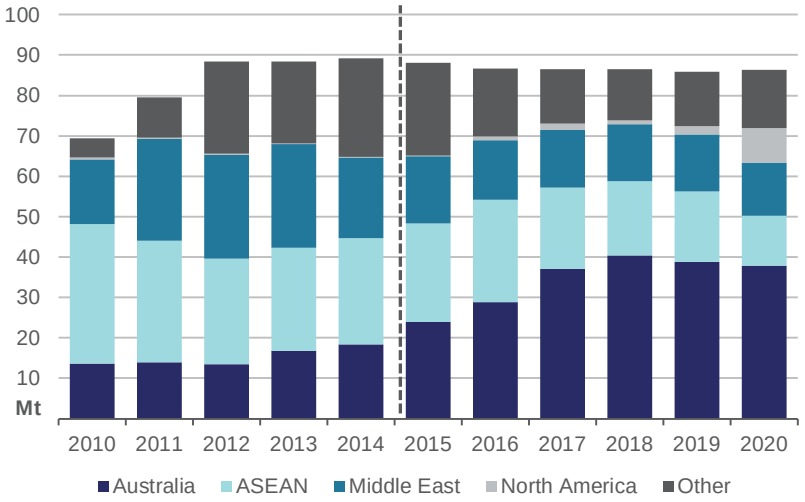
LNG prices have fallen substantially in line with the fall in oil prices. Despite these positive influences, the outlook for LNG imports is dominated by the prospect of restarts in the nuclear reactor fleet. One 890 megawatt reactor at Sendai has recently re-commenced operations, and a second is scheduled to be restarted in October.

Japanese energy policy has set a target of 20-22 per cent nuclear generation by 2030, and the share of gas generation is targeted to fall substantially from 43 per cent in 2013 to 27 per cent by 2030. This objective, when combined with the observation that total primary energy consumption in Japan has declined at 1 per cent a year since 2000, suggests that gas consumption could fall significantly in the longer term.

It is difficult to say how these events will play out over the next five years. Even if a significant number of reactors are restarted, the initial impact will be to displace oil-fired generation. Therefore LNG imports are projected to fall marginally by 2 per cent over the next five years. This compares to a small increase of 3 per cent in the previous forecast.

There is a downside risk to this forecast of 10 to 15 million tonnes if most of the nuclear fleet commences operations.

Figure 6.7: Japan LNG import outlook



Sources: Nexant; OCE.

China

Overall gas demand in China is growing strongly, albeit from a relatively low base of 5 per cent of total primary energy consumption in 2013. Gas demand is projected to grow from 178 billion cubic metres in 2014 to 297 billion cubic metres by 2020.

Gas is consumed mainly in the residential, commercial and industrial sectors, with about 20 per cent used in power generation and another 8 per cent used in transport in 2014. Growth to 2020 will be across the board, but gas for power generation is expected to increase to about 23 per cent of total gas demand.

Despite some concerns around the economic growth outlook, the prospects for Chinese gas demand remain strong. Gas is attractive as a means of reducing air pollution in major cities, and rapid urbanisation is driving strong residential sector consumption and uptake of gas in power generation.

The key determinant of LNG demand is the extent of competition with indigenous production and pipeline gas imports. The Chinese Government has set ambitious targets for domestic gas production as well as promoting pipeline connections with Central Asia and Russia. Three major lines from Central Asia are ramping up deliveries, and a fourth pipeline (Line D) will be completed by 2020. These pipelines have a combined capacity of around 85 billion cubic metres. The Power of Siberia pipeline from Russia, with a capacity of 38 billion cubic metres, is not expected to make a significant contribution until after 2020.

Both pipeline and LNG supply into China are expected to grow significantly over the next five years. The precise split between pipeline and LNG supplies is difficult to predict, but given the overall level of gas demand and the level of indigenous gas production, it is expected there will be downward pressure on both pipeline and LNG supply contracts, and possible reloading or redirecting of LNG cargoes by over-contracted Chinese buyers.

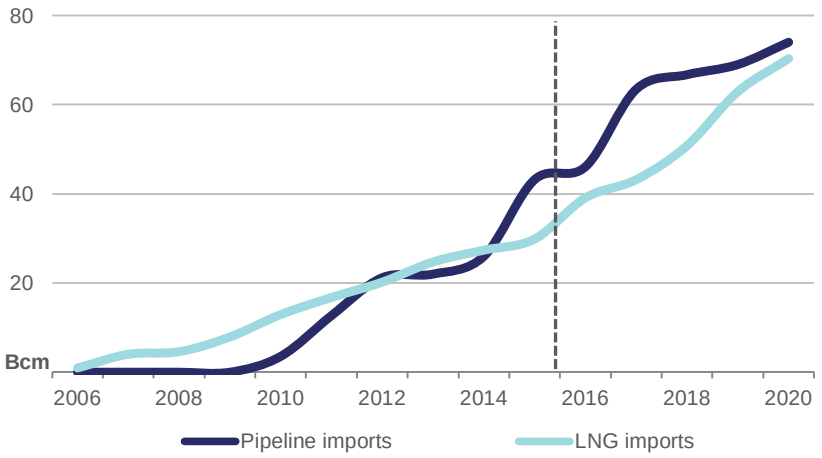
LNG imports should reach about 50 million tonnes by 2020, up from 20 million tonnes in 2014. This forecast is lower than previous forecasts due to the increasing competition from alternative supplies in China.

The supply mix into China is dominated by the growth of Australian and ASEAN imports. Middle East supply declines as it is diverted to India and Pakistan.

The Chinese government is making significant investments in pipeline inter-connections between the producing regions of the North and West, and the main consuming regions on the coast. This will also facilitate gas flows from Central Asia and Russia. Pipelines are expected to more than double from 2013 to 2020.

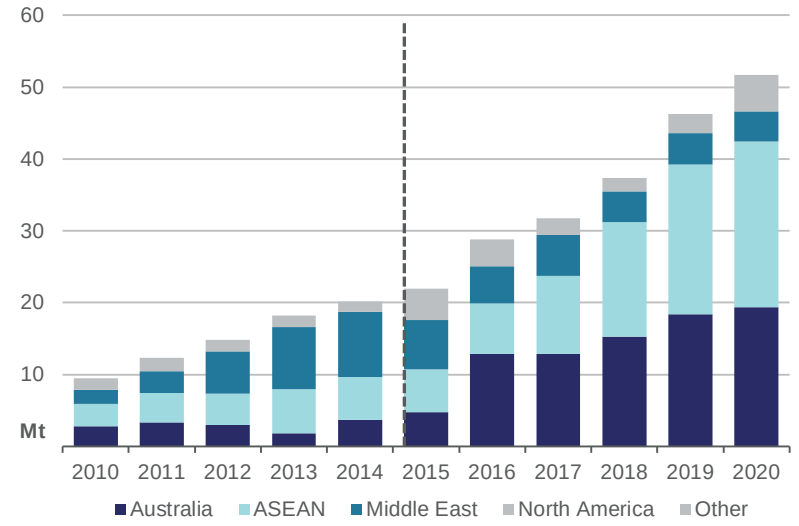
However given the transcontinental distances between source of supply and the centres of demand, there will be a continuing competitive advantage for LNG deliveries, particularly into the south coast.

Figure 6.8: Chinese pipeline and LNG imports



Sources: Nexant; OCE.

Figure 6.9: China's LNG import outlook



Sources: Nexant; OCE.

South Korea

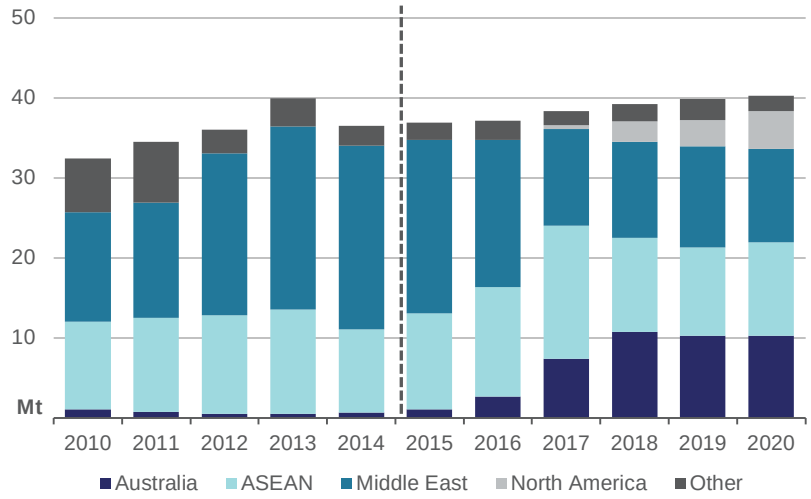
Gas demand in South Korea makes up approximately 18 per cent of total primary energy consumption, significantly higher than China and marginally below Japan at 23 per cent. About 50 per cent of this demand is for power generation and in this sector gas must compete vigorously with nuclear power, coal and renewables.

South Korea has negligible domestic gas resources and geopolitical impediments to pipeline imports. Currently South Korea is the world's second largest LNG importer after Japan.

South Korea's gas consumption grew steadily over the decade to 2012. A brief surge in LNG imports in 2013 was related to safety concerns at some nuclear power plants, but this has proven to be a temporary setback, and LNG imports in 2014 declined by 7 per cent.

LNG demand is expected to show only modest growth to 2020, as competition intensifies from nuclear, coal and renewables. Total demand by 2020 is expected to be only marginally higher than the peak reached in 2013.

Figure 6.10: South Korea's LNG import outlook



Sources: Nexant; OCE.

While growth will be modest, the supply mix is expected to change in a similar fashion to Japan. New contracts with Australia and the United States will commence from 2016, which will displace some supply from the Middle East and to some extent from ASEAN.

Australia

Production

Australian gas production was up 3 per cent to 16.6 billion cubic metres in the June quarter. This was due to increased gas demand in both domestic and export markets, with increased gas production from the Bass and Gippsland basins related to winter demand highs, as well as increased CSG production to support LNG export by QCLNG.

Growth in gas production for the June quarter was primarily supplied by increased unconventional gas production, up 22 per cent to 3.7 billion cubic metres. Conventional gas production was relatively stable at 12.9 billion cubic metres. Gas production for 2014–15 increased by 5.5 per cent to 66.4 billion cubic metres compared to 62.9 billion cubic metres in 2013–14.

Australia is forecast to produce 82.4 billion cubic metres of gas in 2015–16, 24 per cent higher than in 2014–15. The ramp–up of train 1 at Australia Pacific LNG (APLNG) and Gladstone LNG (GLNG), as well as expansion of LNG production to train 2 at QCLNG will drive this substantial increase of additional production in 2015–16.

It is projected that Australian gas production will grow substantially to 146.8 billion cubic metres by 2019–20, at an average annual rate of 17.2 per cent. This substantial growth is due to the completion of new LNG export projects, which are expected to reach full capacity between 2015 and 2018.

In Eastern Australia, gas production is projected to increase from 38.6 billion cubic metres in 2015–16 to 53.5 billion cubic metres in 2019–20. Almost all of the production increase will be from CSG fields in the Bowen-Surat basins in Queensland associated with the three LNG projects in Gladstone.

QCLNG has expanded its LNG production and has been shipping LNG from train 2 since July 2015. Both GLNG and APLNG are expected to produce and ship LNG from train 1 in late 2015. Furthermore, APLNG and GLNG are expected to reach full capacity by late 2016 and 2018–19 respectively. When they are fully operational, the three LNG plants will have a total annual nameplate capacity of 25.3 million tonnes.

In the Western market, Australia's largest gas producing area, production is projected to be 81 million cubic metres in 2019–20, from 43 billion cubic metres in 2015–16. Given recent delays due to industrial relations issues at the Gorgon project, the commencement of first LNG shipments is now expected in early 2016. When fully operational in 2018, Gorgon will have an annual capacity of 15.6 million tonnes of LNG. Wheatstone, currently over 65 per cent complete, and Prelude LNG are both expected to begin operations in 2017. These projects will add additional LNG export capacity of 8.9 and 3.6 million tonnes a year, respectively, when at full capacity in 2018–19.

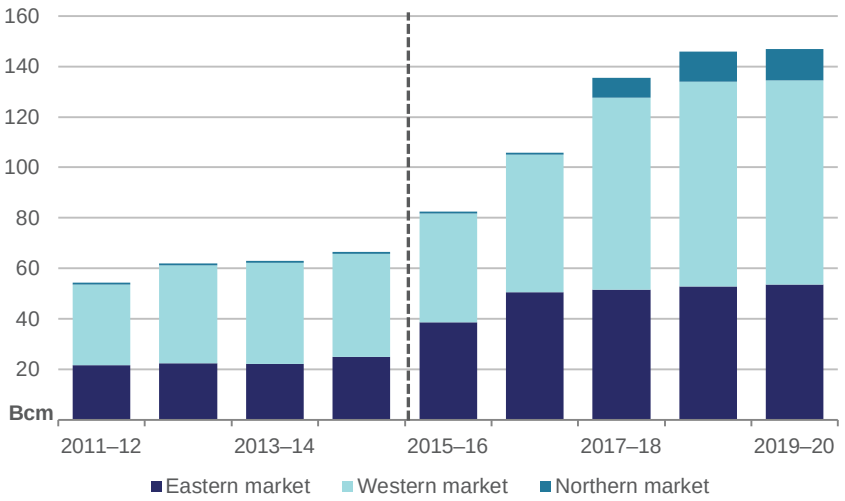
Gas production in the Northern market (excluding imports from the Bayu–Undan fields) is also expected to grow substantially, from just 0.7 billion cubic metres in 2015–16 to 12.2 billion cubic metres in 2019–20. The Ichthys project, recently upgraded to 8.9 million tonnes of annual LNG liquefaction capacity, will be the major driver for the substantial growth in Northern Territory gas production. This project, around 74 per cent complete, is now expected to commence in late 2017, given recent delays.

Exports

Australia exported 6.2 million tonnes of LNG in the June quarter 2015, down by 5.2 per cent compared to the March quarter. Decline in production at both at both North West Shelf and Pluto outweighed increases in LNG production at QCLNG.

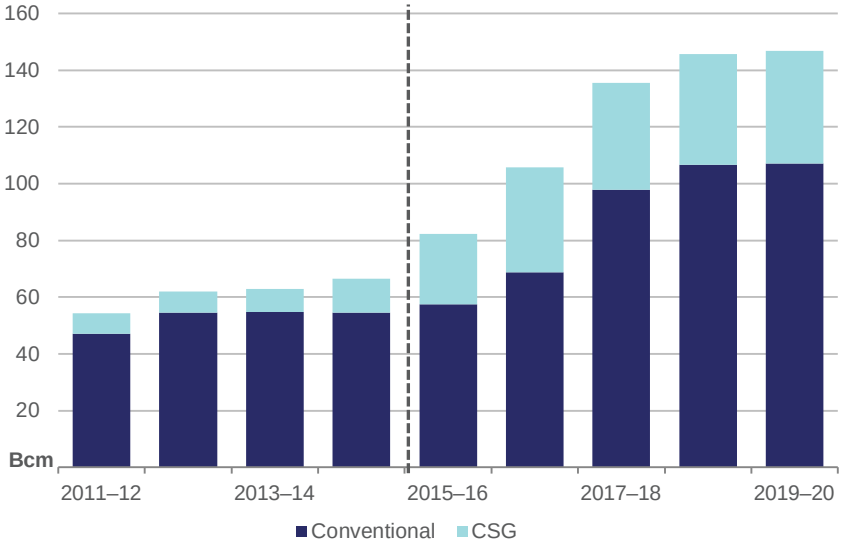
Total export volume for 2015–16 is forecast to grow very strongly to 36 million tonnes, a 44 per cent increase compared to 25 million tonnes in 2014–15, as a result of substantial increases in LNG production by APLNG, GLNG and QCLNG.

Figure 6.11: Australian gas production outlook by market



Notes: Gas production included ethane. Gas production associated with Darwin LNG is not included in the Northern market as it comes from the Bayu-Undan Joint Petroleum Development Area.

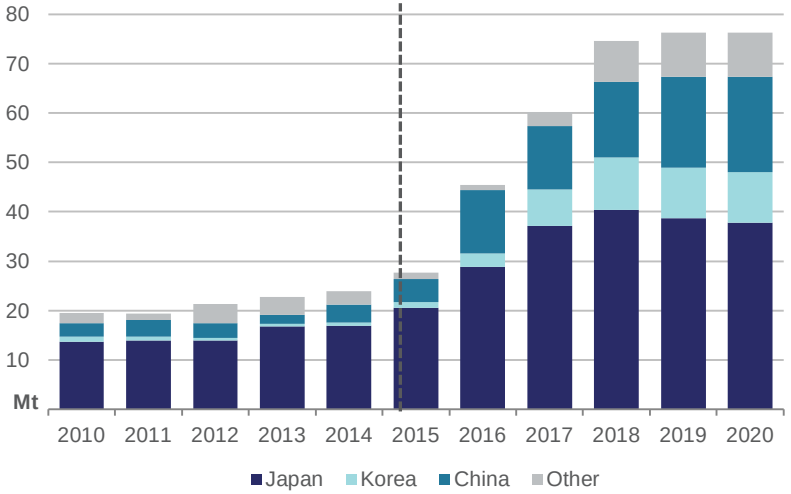
Figure 6.12: Australian gas production outlook by type



Total export value for 2015–16 is forecast to be $21.9 billion, up from $17.4 billion in 2014–15. The strong growth in LNG export volumes, together with depreciation of the Australian currency, is expected to prevail over negative effects of falling oil prices.

It is expected that Australia will be the largest LNG exporter in the world by 2020, reflected in strong increases in LNG export volumes over the next five years. QCLNG commenced operation in late 2014, with APLNG and GLNG commencing operation in 2015. These projects will be followed by Gorgon, Ichthys, Wheatstone and Prelude LNG in 2016 and 2017. Combined with the existing North West Shelf, Darwin and Pluto LNG projects, Australia will reach 86.6 million tonnes of liquefaction capacity in 2020. Exports are projected to be 76.3 million tonnes in 2019–20, slightly below effective capacity due to the growth in global competition.

Figure 6.14: Australian LNG export outlook by destination



Source: Nexant; OCE.

Figure 6.13 Australian liquefaction capacity and LNG exports

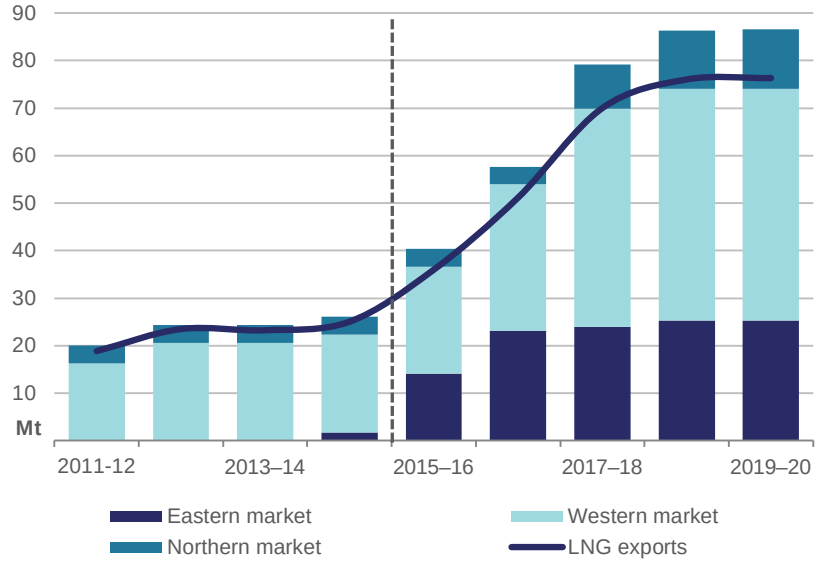
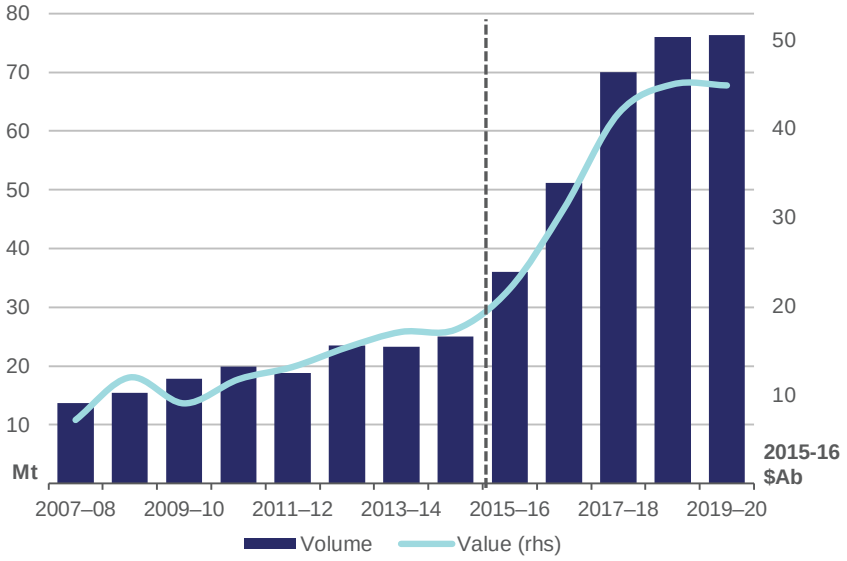


Figure 6.15: Australian LNG exports by value



Japan will remain the largest recipient of Australia's LNG export over the outlook period, albeit with a decreasing share, from around 74 per cent in 2015 to 50 per cent in 2020. By 2020, Australia will export around a quarter of its LNG to China, as well as around 13 per cent to South Korea.

Export values are projected to increase to $44.9 billion in 2019–20, at an annual average rate of 20.9 per cent (in 2015–16 dollars). Strong growth in export volumes over the outlook period, together with a low Australian dollar, will buffer against the significant fall in export values arising from the recent collapse of oil prices.

Table 6.1: Gas outlook

	unit	2013–14	2014–15	2015–16f	2016–17z	2017–18z	2018–19z	2019–20z
Australia								
Production **b**	Bcm	62.9	66.4	82.4	105.8	135.6	145.8	146.8
– Eastern market	Bcm	22.2	24.9	38.6	50.9	51.6	53.0	53.5
– Western market	Bcm	40.1	40.8	43.1	54.4	76.2	81.9	81.0
– Northern market **c**	Bcm	0.7	0.7	0.7	0.7	8.0	11.8	12.2
LNG export volume	Mt **d**	23.2	25.0	36.0	51.2	70.0	76.0	76.3
– nominal value	A$m	16 305	16 924	21 971	31 714	43 568	48 040	48 968
– real value **e**	A$m	17 100	17 354	21 971	31 031	41 712	45 004	44 885

b Production includes both sales gas and gas used in the production process (i.e. plant use), as well as ethane. **c** Gas production from Bayu-Undan Joint Production Development Area is not included as Australian gas production. Browse basin production associated with the Ichthys project is classified as Northern market. **d** 1 million tonnes of LNG is equivalent to approximately 1.36 billion cubic metres of gas. **e** In current financial year Australian dollars. **f** Forecast. **z** Projection.
Sources: ABS; Company reports and World Bank.

Oil

Kieran Bernie

The value of Australia's exports of crude oil and condensate are forecast to decline in the near term as lower prices compound lower volumes. Export earnings will then increase in line with production growth from new projects, before falling again in the medium term as natural decline weighs on production.

Prices

Oil prices increased in the June quarter as unconventional production in the United States slowed in line with the continued decline in the number of rigs in operation. The price of West-Texas Intermediate (WTI) increased by 19 per cent to average US$58 a barrel for the quarter, while the price of Brent increased by 16 per cent, to reach US$62 a barrel.

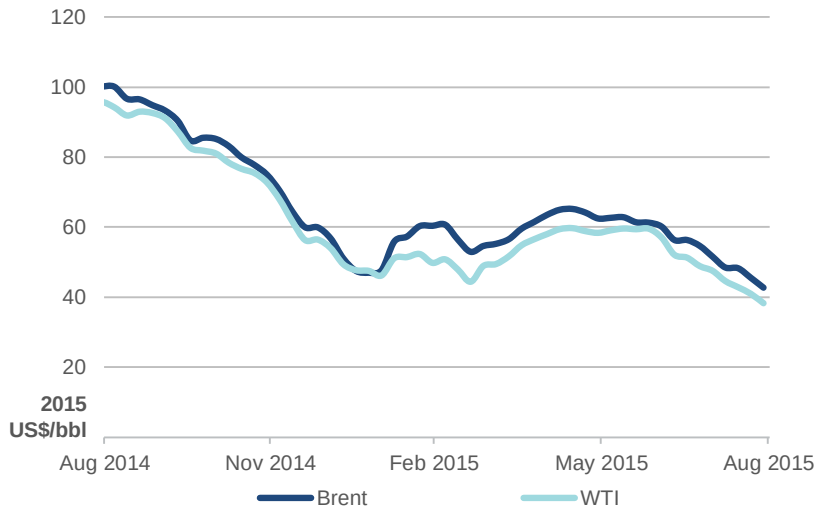
Since June, prices have fallen considerably in response to weakening economic conditions in China and the prospect of increased supply from Iran following the nuclear accord reached in July. By late August, the price of WTI had fallen to as low as US$38 a barrel, and Brent to as low as US$41 a barrel.

Prices are forecast to recover in the near term as declines in non-OPEC output weigh on world supply and global consumption continues to grow. The price of WTI is forecast to increase to US$57 dollars a barrel in 2016, and the price of Brent to US$62 a barrel.

Oil prices are projected to increase modestly over the medium term, with consumption growth just outweighing returning supply from Iran and slower production growth in Iraq and the United States. In real terms, the price of WTI is projected to increase to US$60 by 2020, while the price of Brent is projected to reach US$63 a barrel.

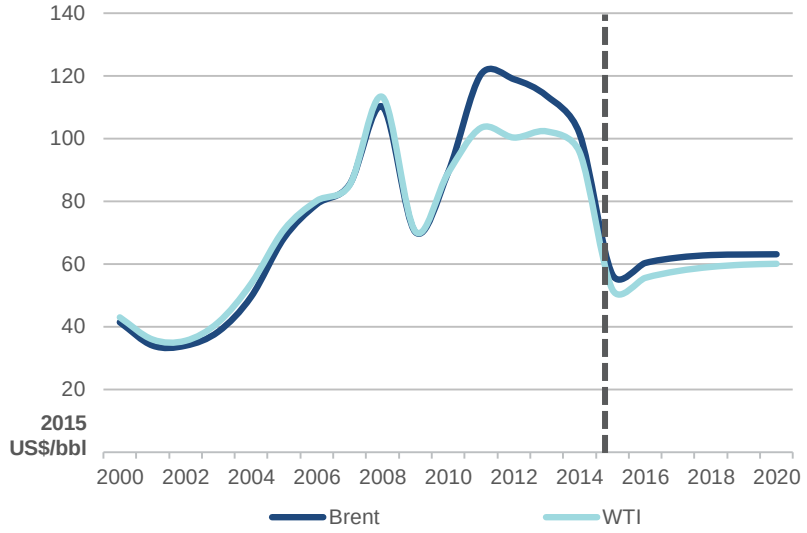
The price uncertainties in the medium term include the extent of the economic slow-down in China, its effect on the global economy, and the timing and pace of recovery in Iranian supply.

Figure 7.1: Weekly oil prices



Source: Bloomberg

Figure 7.2: Annual oil prices



Sources: Bloomberg; OCE

World oil consumption

World oil consumption is forecast to grow by 1.7 per cent in 2015, to reach 94.2 million barrels a day in line with improving economic conditions in the United States, colder weather conditions in Europe, and continued growth in Asia.

Growth is projected to continue in the medium term but will moderate towards the end of the decade. World oil consumption is projected to increase by 1.1 per cent a year over the outlook period, to average 99.6 million barrels a day by 2020. Growth will continue to be driven by increased consumption in non-OECD economies, particularly those in Asia and the Middle-East.

OECD economies

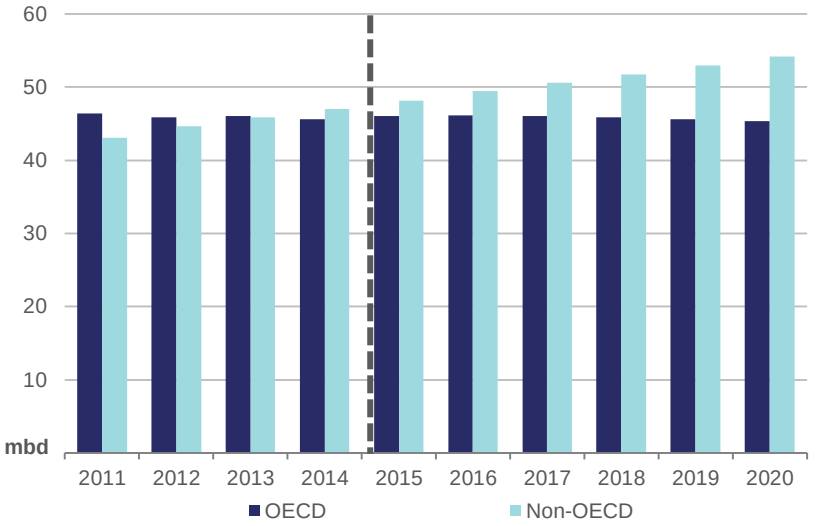
Oil consumption in OECD economies is forecast to increase by 1.0 per cent in 2015, to reach 46.1 million barrels a day, largely as a result of stronger growth in the United States, and increased consumption by European economies.

Growth in OECD consumption is expected to slow in the near term, before decline sets in over the remainder of the outlook period, with consumption falling to 45.4 million barrels a day in 2020.

In North America, ongoing economic recovery is expected to support increasing consumption over the first half of the outlook period. Oil consumption is forecast to increase by 0.2 per cent a year to 2018, before falling to 24.5 million barrels a day in 2020 as a result of improving efficiency in the transport sector.

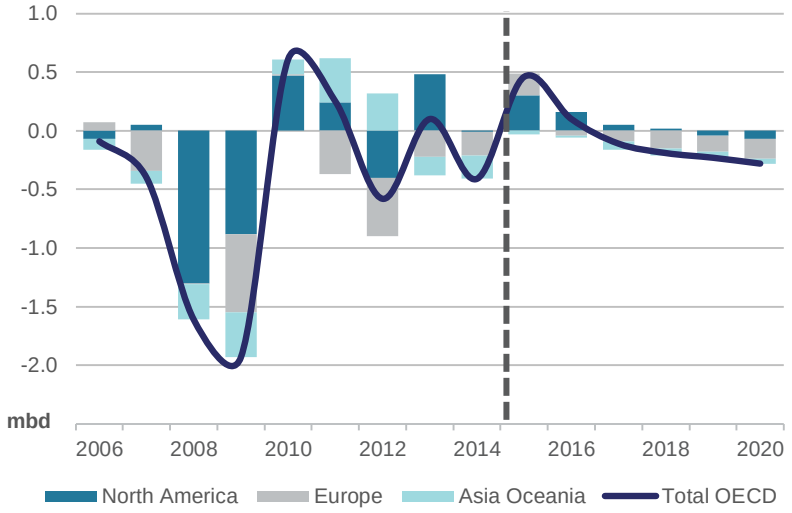
After increasing for the first time in nine years due to colder weather conditions in the first quarter of 2015, consumption by European economies is expected to decline over the medium term. From 2016, consumption by OECD economies in Europe is projected to decline by 0.8 per cent a year, falling to 13.0 million barrels a day by 2020 as demographic and consumer trends dampen oil consumption.

Figure 7.3: World oil consumption



Sources: IEA; OCE.

Figure 7.4: Change in OECD consumption



Sources: IEA; OCE

In the Asia Oceania region, weaker economic growth and the restart of nuclear power generation in Japan are also expected to contribute to falling oil consumption over the medium term. For the region as a whole, oil consumption is forecast to decline by 0.6 per cent a year, falling to 7.9 million barrels a day by 2020.

Non-OECD economies

Oil consumption in non-OECD economies is forecast to increase by 2.4 per cent in 2015, to average 48.2 million barrels a day in line with continued growth in Asia and the Middle-East.

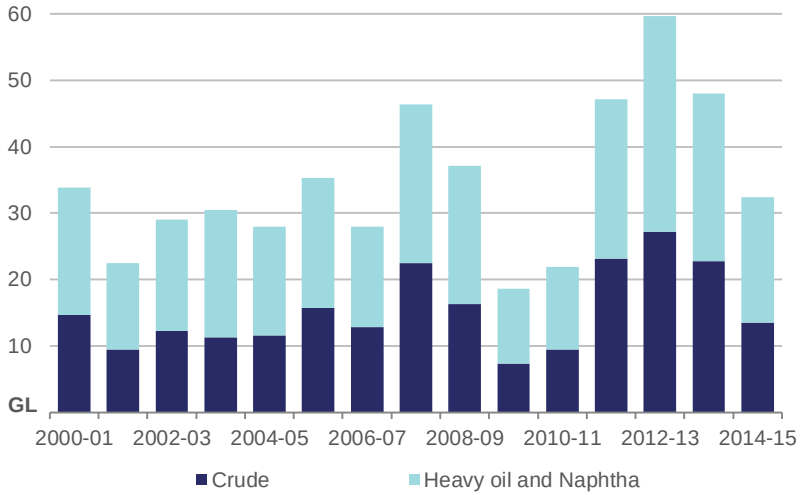
The strong growth in non-OECD consumption is projected to continue in the medium term, but the distribution of incremental consumption within the group is expected to differ from earlier patterns. Over the outlook period, consumption by non-OECD economies is projected to increase by 2.4 per cent a year, to reach 54.2 million barrels a day by the end of the decade.

In China, consumption growth is forecast to slow as the economy transitions from a focus on manufacturing and exports towards domestic demand and environmental improvements. Oil demand in China is projected to increase by 2.3 per cent a year over the outlook period, to reach 12.3 million barrels a day by 2020.

To some extent, slowing growth in China will be offset by stronger increases in consumption by other non-OECD economies in Asia – particularly India, where growth in the transport sector is expected to drive further increases. Consumption by other non-OECD economies in Asia is forecast to grow by 3.1 per cent a year over the outlook period, to reach 14.5 million barrels a day by the end of the decade.

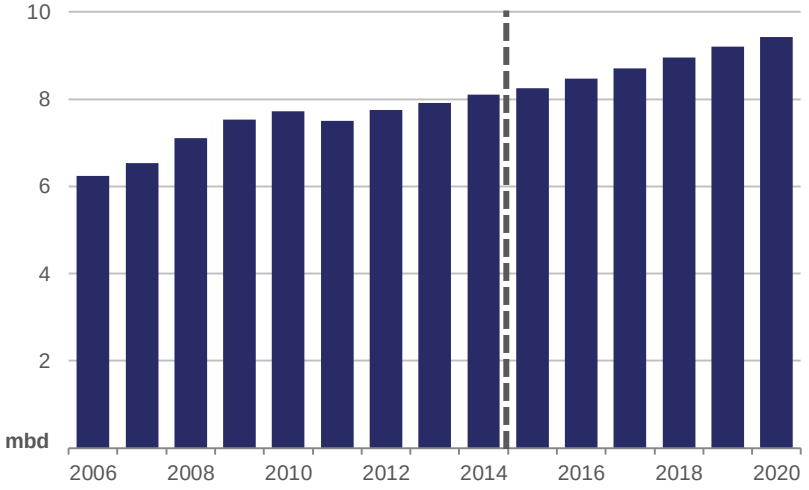
In the Middle-East, oil consumption is expected to continue to increase, despite ongoing geopolitical tensions and improved efficiency in the transport sector. Over the medium term, oil consumption by non-OECD economies in the Middle-East is projected to increase by 2.7 per cent a year, reaching 9.4 million barrels a day by the end of the decade.

Figure 7.5: Petroleum used in power generation in Japan



Notes: Data refers to Japanese Fiscal Year commencing 1 April.
Source: Federation of Electric Power companies of Japan.

Figure 7.6: Oil consumption in the Middle-East



Sources: IEA; OCE.

World oil production

World oil production is forecast to grow by 2.7 per cent in 2015 to reach 96.1 million barrels a day, driven by strong increases in OPEC and US output.

Production is expected to continue to increase over the medium term, but growth will slow considerably in line with the decline in exploration and development caused by lower oil prices. World oil production is projected to increase by 0.6 per cent a year over the outlook period, to reach 99.1 million barrels a day by the end of the decade.

OPEC oil production

OPEC production is forecast to increase considerably in 2015, growing by 3.6 per cent to reach 38.0 million barrels a day, largely as a result of increased output from Saudi Arabia and Iraq.

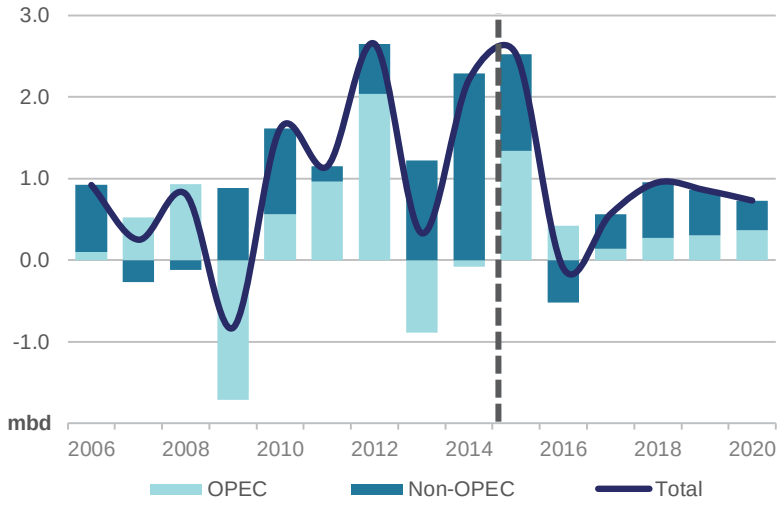
Output by OPEC economies will continue to increase in the medium term, but growth is expected to slow. Production is projected to increase by 0.8 per cent a year over the outlook period, rising to 39.5 million barrels a day by the end of the decade.

Production in Iran is forecast to recover in the medium term as sanctions are lifted in response to the recent agreement over its nuclear program. Output is projected to increase by 4.8 per cent a year over the outlook period, to reach 3.6 million barrels a day by 2020.

Iraq is also expected to continue to increase production in the medium term, supported by strong growth in output from its southern oil fields, which are not threatened by ISIL forces. While the ongoing conflict presents a downside risk to future supply, production in Iraq is forecast to increase by 3.2 per cent a year over the outlook period, to reach 4.5 million barrels a day by the end of the decade.

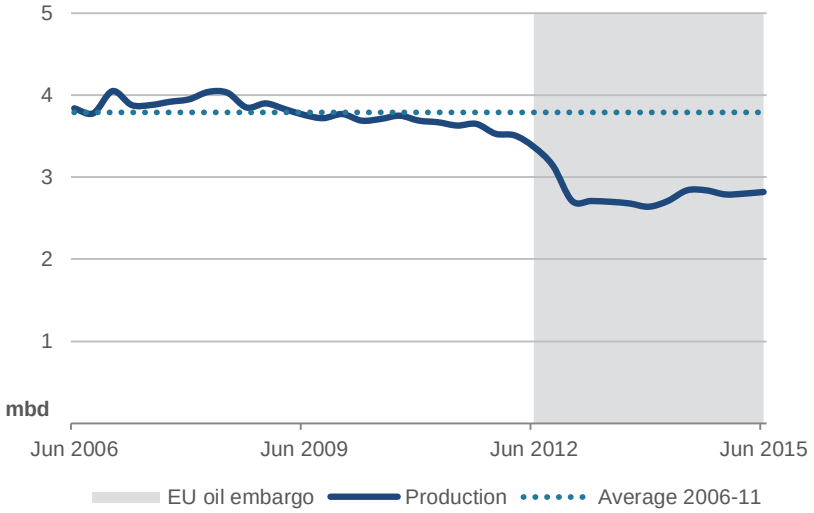
Increased output from Saudi Arabia is expected to continue in the near term, but production is forecast to fall somewhat over the remainder of the outlook period. From 2016, production is projected to decline by 0.8 per cent a year, falling to 9.8 million barrels a day by 2020.

Figure 7.7: Growth in world oil production



Sources: IEA; OCE.

Figure 7.8: Oil production in Iran



Source: IEA

In the UAE, production is projected to increase over the medium term, in line with the development of the large offshore Upper Zakum field, which has the potential to lift production by as much as 750 thousand barrels a day. Over the outlook period the UAE is projected to increase production by 1.3 per cent a year, to average 3.1 million barrels a day by the end of the decade.

Non-OPEC oil production

Output from non-OPEC producers is forecast to grow by 2.1 per cent in 2015, rising to 58.1 million barrels a day in line with continued increases in US production.

The sharp fall in the price of oil is expected to contribute to a decline in non-OPEC production in 2016, before output recovers towards the end of the decade. From 2016 onwards, non-OPEC production is projected to increase by 0.7 per cent a year, growing to 59.6 million barrels a day by 2020.

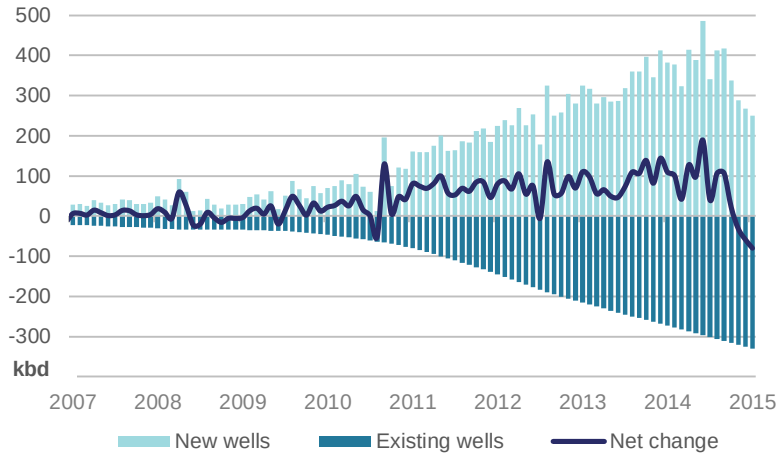
In the US, growth is expected to slow considerably in the medium term as declines in the unconventional sector weigh on total output. Production is projected to grow by 1.4 per cent a year over the outlook period, to reach 13.7 million barrels a day by the end of the decade. This compares with a annual growth rate of 10.5 per cent for the five years to 2015.

Production growth in Brazil is also projected to slow in the medium term, as lower oil prices and high levels of debt constrain output from technically challenging pre-salt water oil fields. Brazilian production is forecast to increase by 4.2 per cent a year over the outlook period, growing to 3.1 million barrels a day by the end of the decade.

Growth in Canadian output is expected to lift from recent lows caused by planned maintenance and bushfires affecting oil sands projects, increasing by 3.4 per cent over the outlook period to reach 5.1 million barrels a day by 2020.

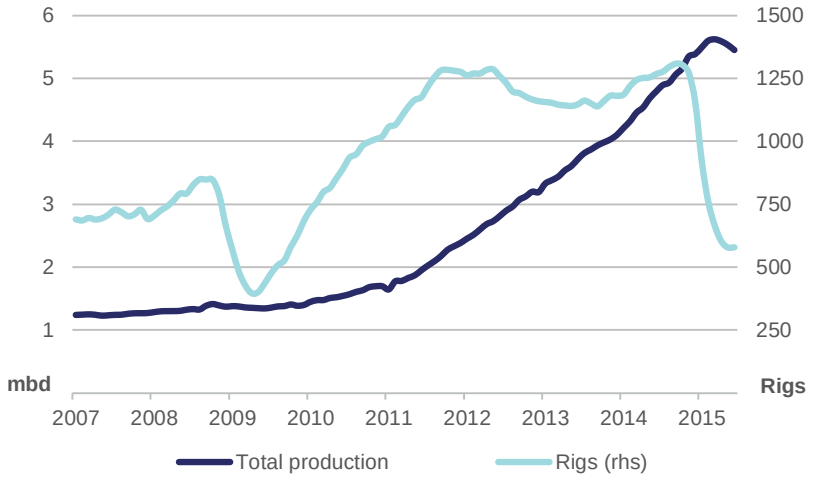
In Russia, sanctions-related restrictions on technology and financing are expected to cause production to contract over the medium term. Output is projected to decline by 1.0 per cent a year over the outlook period, falling to 10.5 million barrels a day by the end of the decade.

Figure 7.9: Change in production in US shale oil regions



Notes: Covers Bakken, Eagle Ford, Haynesville, Marcellus, Niobrara, Permian and Utica regions
Source: EIA.

Figure 7.10: Production from US shale oil regions



Notes: Covers Bakken, Eagle Ford, Haynesville, Marcellus, Niobrara, Permian and Utica regions
Source: EIA.

Australian production and exports

Australia produced 295 thousand barrels of crude oil and condensate a day in the June quarter; down 14 per cent on a year-on-year basis due to lower output from the Gippsland, Bonaparte and Cooper basins.

Lower output in the June quarter contributed to a fall in annual production, which declined by 6.8 per cent in 2014-15 to average 328 thousand barrels a day, as declining production from mature fields outweighed additional output from new projects.

Expenditure on petroleum exploration also declined in the June quarter, falling by 27 per cent on a quarter-on-quarter basis to $698 million as the industry adjusted to the new price environment.

Output is projected to increase to 413 thousand barrels a day in 2017-18, supported by additional condensate production associated with the Prelude and Icthys projects. Production is expected to decline thereafter, falling to 368 thousand barrels a day by the end of the decade.

The volume of Australian exports of crude oil and condensate averaged 204 thousand barrels a day in the June quarter; down 23 per cent on a year-on-year basis in line with seasonally lower production. Despite this, the annual volume of exports increased by 2.3 per cent in 2014-15 to reach 261 million barrels a day, largely as a result of stronger exports in the December quarter.

Export volumes are projected to increase to 314 thousand barrels a day in 2017-18, bolstered by additional production from new projects close to regional trading hubs in Asia. The volume of exports is projected to decline thereafter, falling to 284 thousand barrels a day in 2019-20 in line with declining production.

Despite the increase in volumes, the value of Australian exports of crude oil and condensate declined in 2014-15; falling by 22 per cent to $8.7 billion as a result of the sharp decline in the price of oil.

The value of Australian exports will continue to decline in 2015-16, as falling volumes combine with significantly lower prices.

Figure 7.11: Australian petroleum production

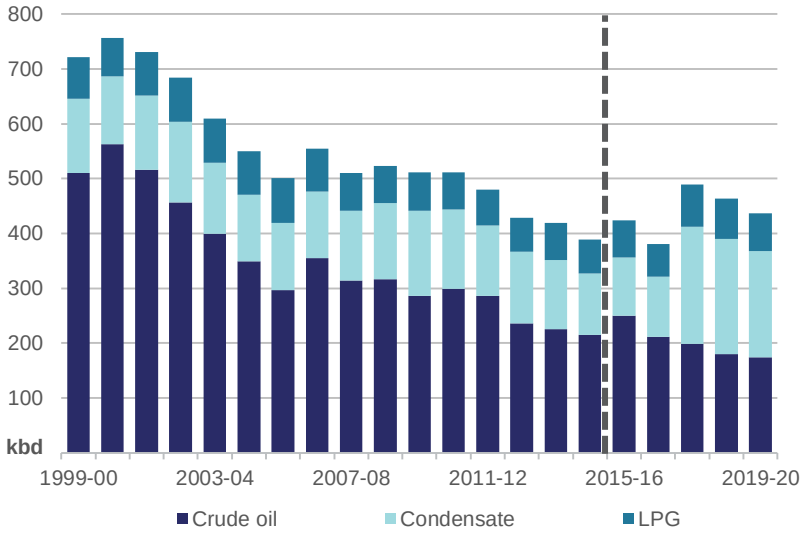
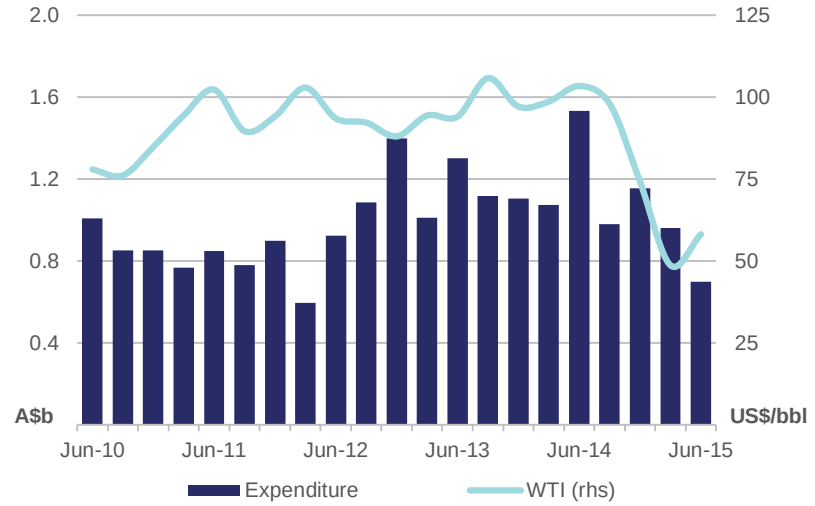


Figure 7.12: Australian petroleum exploration expenditure



Sources: ABS; Bloomberg.

Export earnings are then projected to grow as volumes increase; rising to $9.4 billion in 2017-18, before falling to $8.6 billion (in 2015-16 dollar terms) by the end of the decade.

Production of refined products declined in 2014-15, falling by 11 per cent to 527 thousand barrels a day due to the conclusion of refining activities at Kurnell and Bulwer Island. Production is projected to decline further over the outlook period, falling to 367 thousand barrels a day by 2020 in line with reduced refining capacity.

As a result, the volume of imported refined products is projected to increase over outlook period, reaching 763 thousand barrels a day by the end of the decade.

Figure 7.13: Australian crude oil and condensate exports

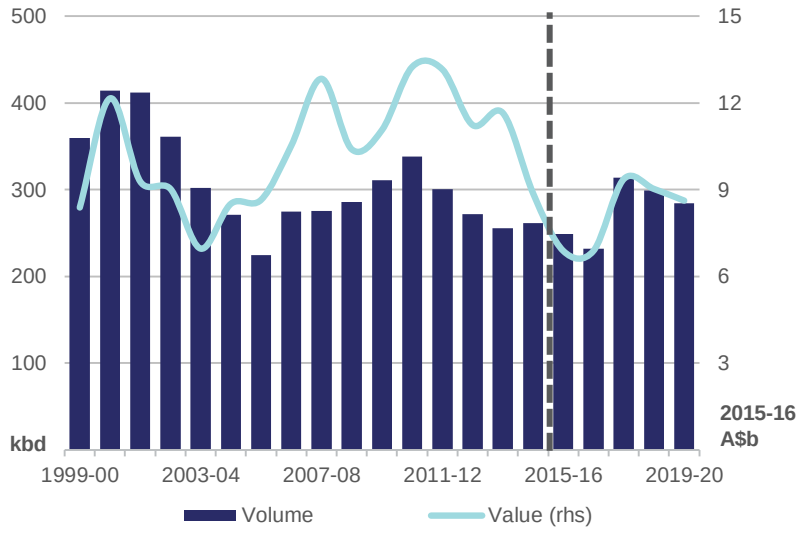


Figure 7.14: Australian refinery feedstocks

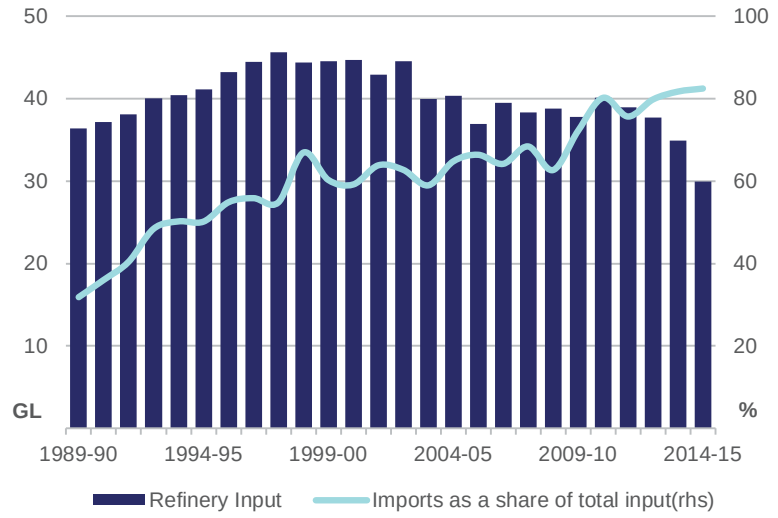


Table 7.1: Oil outlook

	unit	2014	2015 f	2016 f	2017 z	2018 z	2019 z	2020 z
World								
Production b	Mbd	93.6	96.1	96.0	96.6	97.5	98.4	99.1
Consumption b	Mbd	92.6	94.2	95.6	96.6	97.6	98.6	99.6
WTI crude oil price								
– nominal	US$/bbl	93.5	51.8	56.8	60.4	63.2	65.4	67.3
– real c	US$/bbl	95.7	51.8	55.5	57.7	59.0	59.8	60.0
Brent crude oil price								
– nominal	US$/bbl	99.3	56.6	61.7	64.9	67.3	69.0	70.7
– real c	US$/bbl	101.6	56.6	60.3	62.0	62.8	63.0	63.1
		2013–14	**2014–15 f**	**2015–16 f**	**2016–17 z**	**2017–18 z**	**2018–19 z**	**2019–20 z**
Australia								
Crude oil and condensate								
Production b	kbd	352	328	357	321	413	390	368
Export volume b	kbd	255	261	249	232	314	299	284
– nominal value	A$m	11 115	8 658	6 884	7 041	9 787	9 638	9 409
– real value d	A$m	11 657	8 878	6 884	6 890	9 370	9 029	8 625
Imports b	kbd	488	426	291	300	284	285	289
LPG								
Production be	kbd	67	61	67	60	77	73	69
Export volume b	kbd	42	36	41	36	47	44	42
– nominal value	A$m	1 265	811	824	802	1 066	1 038	1 006
– real value d	A$m	1 327	832	824	784	1 021	972	922
Petroleum products								
Refinery production b	kbd	589	527	389	384	378	372	367
Exports bg	kbd	11	12	10	10	10	10	10
Imports b	kbd	423	480	667	684	718	740	763
Consumption bh	kbd	944	977	1 007	1 023	1 041	1 060	1 081

b Number of days in a year is assumed to be exactly 365. A barrel of oil equals 158.987 litres. c In current calendar year US dollars. d In current financial year Australian dollars.
e Primary products sold as LPG. g Excludes LPG. h Domestic sales of marketable products.
f Forecast.
z Projection.
Sources: OCE; ABS; IEA; Energy Information Administration (US Department of Energy); Geoscience Australia.

Uranium

John Barber

The re-start of the Sendai reactor in August has ended Japan's nuclear power hiatus but had limited impact on uranium prices. Instead, the substantial growth in nuclear power in emerging economies remains the defining feature of uranium markets.

Prices

Uranium prices have fared better than most commodities in 2015 and bucked the bearish trends that have gripped markets. Uranium spot prices averaged US$36 a pound in the June quarter 2015, up 25 per cent relative to the same period in 2014. Unlike most commodities, particularly those relating to industrial production, uranium has not been affected by the recent slowing of economic growth in key Asian economies. Instead, the surge in nuclear power investment over the past few years is now supporting increasing growth in uranium consumption. China's nuclear power output alone increased 48 per cent, year-on-year, in the June quarter.

In the short term the prospect of higher uranium prices are expected to be limited by high inventory levels that have accumulated recently. For the full year 2015 the uranium spot price is forecast to average US$37 a pound, 11 per cent higher than 2014. With around 66 nuclear reactors under construction around the world, higher consumption and limited supply growth is expected to underpin higher uranium prices in the medium term. In 2020 the uranium spot price is projected to increase to around US$57.50 a pound (in 2015 dollars).

Figure 8.1: Uranium prices, monthly

Source: Cameco.

Figure 8.2: Quarterly uranium prices

Sources: Cameco; OCE.

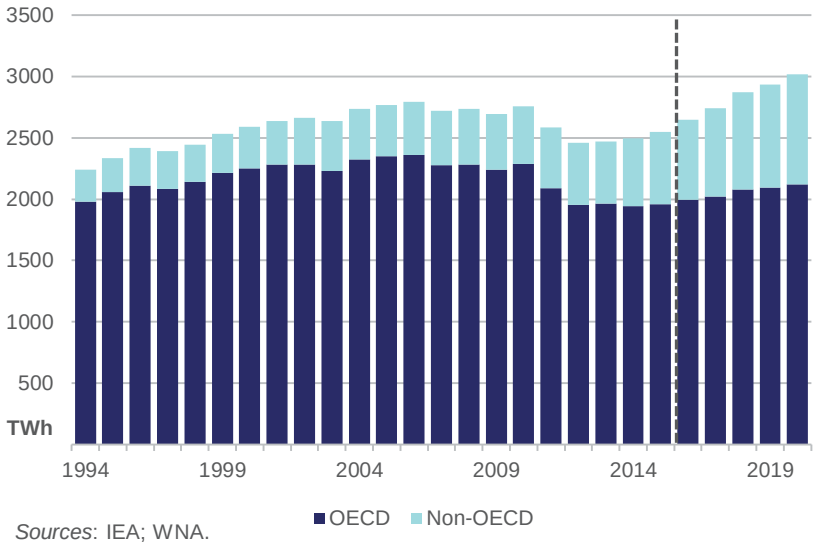
Consumption

In 2015 world uranium consumption is forecast to increase 0.7 per cent and total 77 400 tonnes. Forecast growth will continue to be supported by the initial start-up of new reactors in China as well as moderate output increases across existing reactors in developed economies. The Sendai power plant became the first of Japan's nuclear reactors to re-start in August following the post-Fukushima review of the country's energy policies. Additional reactors are expected to come back online in the medium term but Japan's nuclear power output is projected to remain well below pre-Fukushima levels.

Over the outlook period rapid growth in the number of operating nuclear power reactors is expected to underpin substantial increases in demand for uranium. As a result, world uranium consumption is projected to grow at an average annual rate of 4.8 per cent from 2015 and to total 97 900 tonnes of U_3O_8 in 2020. This growth will come primarily from emerging, highly populated economies whose energy policies are embracing nuclear power to provide low carbon emitting supplies of baseload electricity that can support their growing industrial base. Older reactors in a number of advanced economies are still scheduled to close, but this should only partially offset some of the substantial growth in nuclear power.

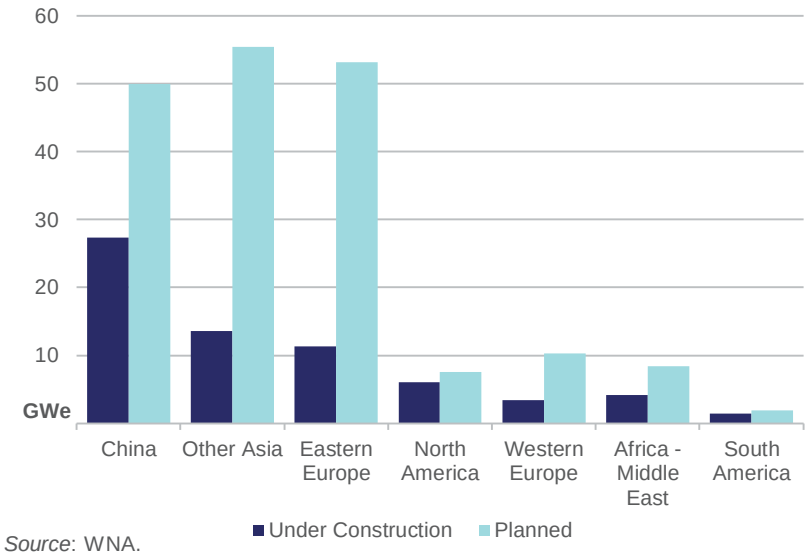
The US is expected retain its crown as the largest producer of nuclear power in the medium term. Despite some recent reactor closures and the increased focus on gas and renewables in its energy mix, there are currently five new reactors under construction in the US with a combined capacity of around 6000 megawatts. These new reactors combined with higher output at existing power plants are projected to support US uranium consumption increasing at an average annual rate of 1.2 per cent to total around 24 200 tonnes of U_3O_8 in 2020.

Figure 8.3: World nuclear power generation



Sources: IEA; WNA.

Figure 8.4: New nuclear capacity



Source: WNA.

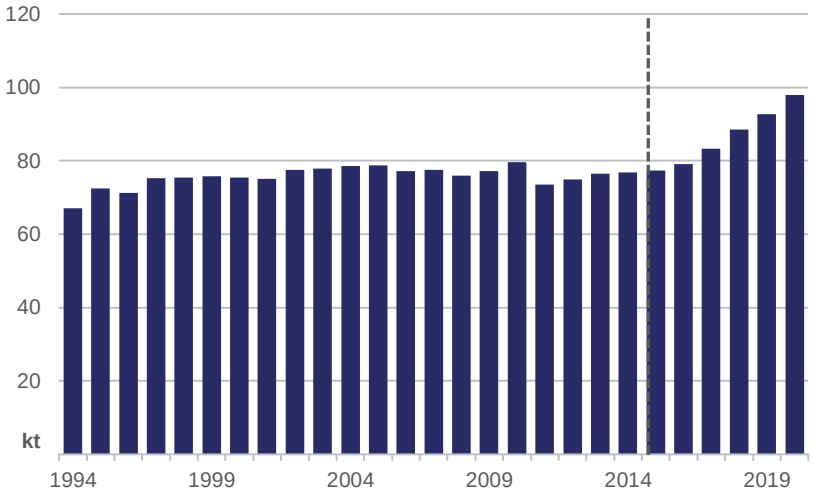
China is expected to be the principal source of uranium demand growth over the next five years. With 25 nuclear reactors already under construction, China's nuclear power industry is expected to more than double its capacity over the next five years to more than 52 gigawatts. To fuel this increase in nuclear power output, China's uranium consumption is projected to increase at an average annual rate of 16 per cent to around 20 400 tonnes of U_3O_8 in 2020. After this period, China's nuclear power industry is likely to continue to expand with plans for a further 43 reactors already under development.

Production

Uranium producers have remained under pressure throughout 2015 despite the moderate uptick in uranium prices. Like many mining companies, the industry focus remains on cutting costs during the downturn in the price cycle rather than expanding production. There are still a number of new projects being developed around the world, but most of these require further price increases to become commercially viable. In 2015, world primary uranium production is forecast to increase 4.3 per cent to 68 100 tonnes of U_3O_8 mainly due to incremental production gains at existing mines and the continued ramp up of production at Cameco's recently commissioned Cigar Lake mine in Canada.

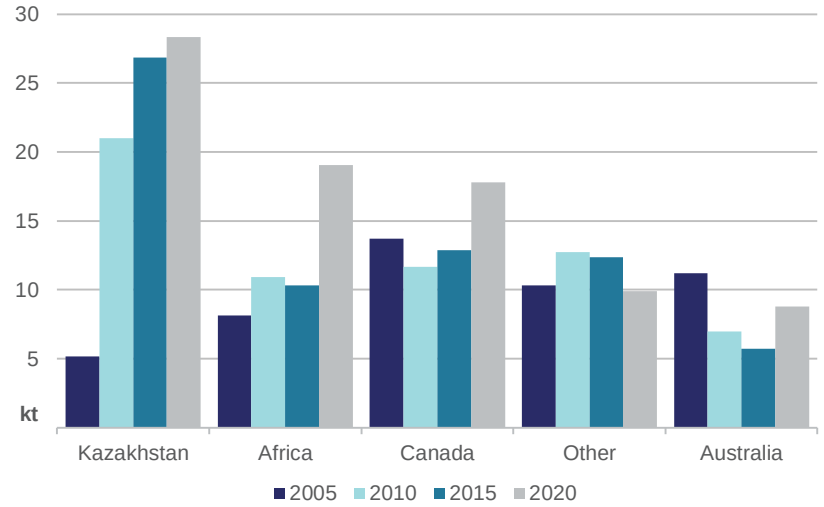
In the medium term, increased uranium demand stemming from a rise in the number of operating reactors around the world is expected to eventually result in new mines being commissioned. A number of large mines are at various stages of development and are well positioned to supply the market in coming years when uranium prices recover sufficiently. World uranium production is projected to increase to 87 900 tonnes of U_3O_8, 29 per cent higher than 2015. Most of this growth in production is expected to be sourced from brownfield expansions of lower cost mines and mines already under construction ramping up to full production. New mines are likely to be commissioned towards 2020 in response to demand-driven uranium price increases, but these are not expected to produce substantial quantities in the next five years.

Figure 8.5: World uranium consumption (U_3O_8)



Sources: IEA; WNA.

Figure 8.6: World uranium production (U_3O_8)



Sources: WNA; NEA; UXC.

Australia

Exploration and Production

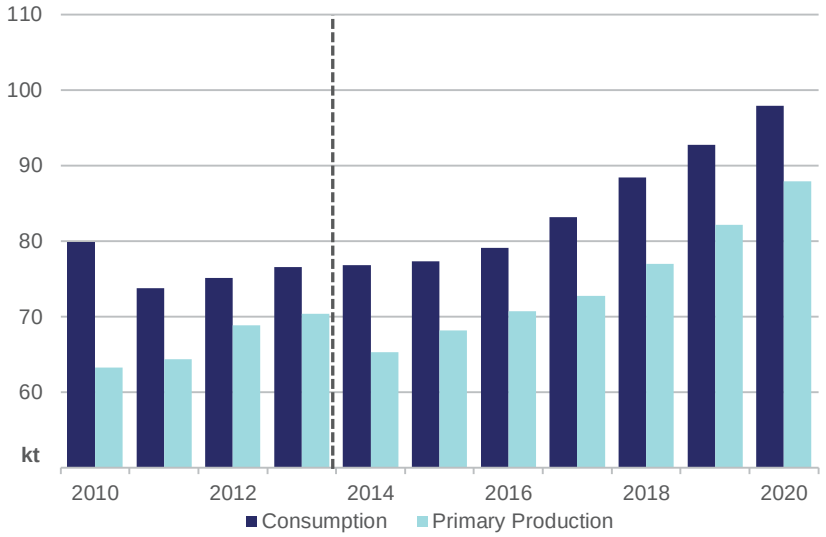
Despite the upswing in uranium prices over the past twelve months, Australia's uranium exploration expenditure decreased 7.5 per cent in 2014-15 and totalled $40.6 million. This decrease was principally due to a 56 per cent drop in exploration expenditure in Queensland following changes in state government policies and regulations on uranium mining. This more than offset a 17 per cent increase in exploration expenditure in Western Australia.

In 2014-15 Australia is estimated to have produced 6196 tonnes of U_3O_8, up 12 per cent from 2013-14. This increase in production is the result of the Four Mile mine in South Australia ramping up after commencing production in 2014 and the Ranger facility returning to capacity after production was disrupted in the first six months of 2014. Production is forecast to remain around the same level in 2015-16. In the short term, Australia's uranium production is forecast to decline as the stockpile of ore at ERA's Ranger site is run down. ERA's decision not to proceed with the Ranger 3 Deeps project will also not result in the mine re-commencing production in the medium term. Nevertheless, there are still several prospective uranium mines under development in Australia, including Toro Energy's Wiluna and Vimy Resources' Mulga Rock projects in Western Australia, that are expected to support growth in uranium production. Australia's uranium production is projected to increase to around 8500 tonnes of U_3O_8 in 2019-20, around 38 per cent higher than 2015-16.

Exports

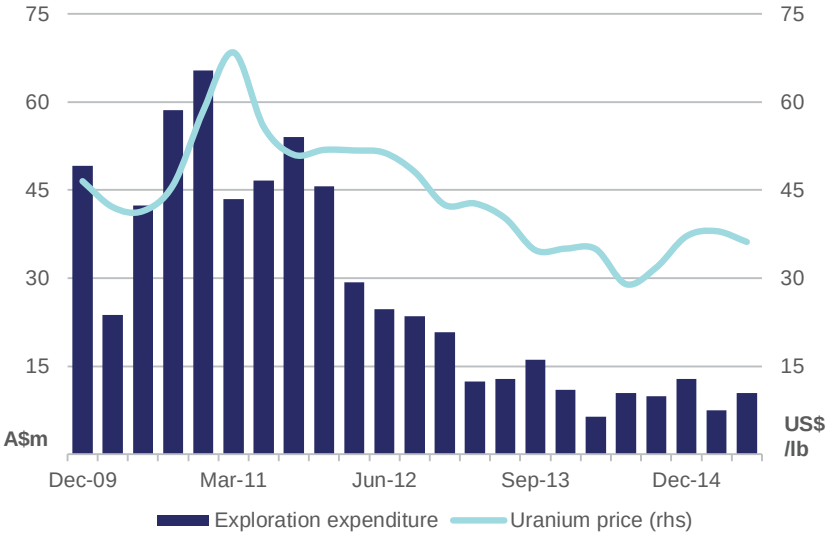
Australia exported around 5515 tonnes of U_3O_8 in 2014-15, 18 per cent lower than 2013-14 when previously accumulated uranium inventories were shipped. Export values decreased 14 per cent to $532 million as lower volumes offset the effects of higher prices and a more favourable exchange rate. In 2015-16, export volumes are forecast to increase 9 per cent to 6024 tonnes. Export values are forecast to rise 37 per cent to $728 million, due principally to forecast higher volumes, prices and a lower Australian dollar exchange rate.

Figure 8.7: Uranium demand-supply balance (U_3O_8)



Sources: WNA; IAEA; UXC; OCE.

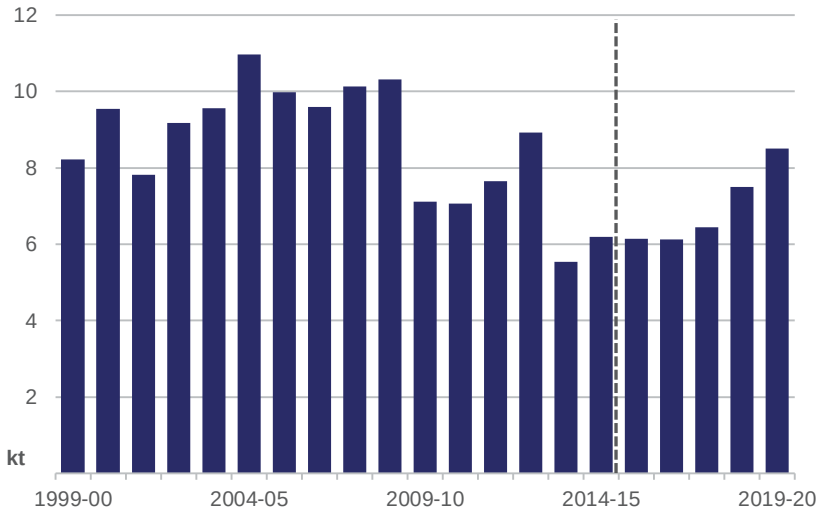
Figure 8.8: Australia's uranium exploration



Sources: Cameco; ABS.

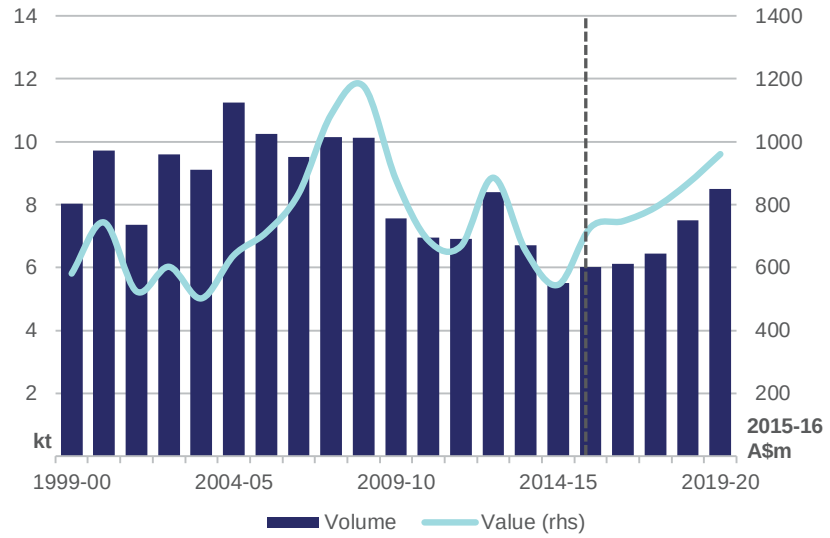
In 2019-20, export volumes are project to increase in line with rising production and total around 8500 tonnes. Export revenue is projected to increase to $960 million (in 2015-16 dollars), underpinned by projected higher prices.

Figure 8.9: Australia's uranium production



Source: company reports; OCE.

Figure 8.10: Australia's uranium exports



Sources: ABS; ASNO; OCE.

Table 8.1: Uranium outlook

	unit	2014	2015 f	2016 f	2017 z	2018 z	2019 z	2020 z
World								
Production	kt	65.3	68.1	70.7	72.8	77.0	82.2	87.9
Africa b	kt	9.9	10.3	10.9	11.9	13.6	16.0	19.1
Canada	kt	10.7	12.9	14.1	14.2	15.5	16.4	17.8
Kazakhstan	kt	26.4	26.9	26.9	26.9	27.3	27.8	28.3
Russia	kt	3.5	3.5	3.5	4.0	4.0	4.0	4.1
Consumption	kt	76.9	77.4	79.1	83.2	88.4	92.8	97.9
China	kt	9.1	9.8	12.5	14.8	17.1	18.3	20.4
European Union 27	kt	23.1	23.0	22.5	24.0	24.0	22.9	23.6
Japan	kt	0.0	0.1	0.5	1.3	2.3	2.6	2.9
Russia	kt	6.4	6.0	6.2	6.5	7.0	7.6	7.6
United States	kt	22.2	22.8	23.1	23.1	23.1	23.6	24.2
Spot price	US$/lb	33.2	36.9	40.3	46.0	52.0	58.0	64.4
real c	US$/lb	34.0	36.9	39.3	44.0	48.6	53.0	57.5
		2013–14	**2014–15**	**2015–16 f**	**2016–17 z**	**2017–18 z**	**2018–19 z**	**2019–20 z**
Australia								
Production	t	5 548	6 196	6 150	6 125	6 450	7 500	8 500
Export volume	t	6 701	5 515	6 024	6 125	6 450	7 500	8 500
– nominal value	A$m	622	532	728	764	827	926	1 048
– real value d	A$m	652	545	728	747	791	867	960
Average price	A$/kg	92.8	96.4	120.8	124.7	128.1	123.4	123.3
– real d	A$/kg	97.4	98.9	120.8	122.0	122.7	115.6	113.0

b Includes Niger, Namibia, South Africa and Malawi. **c** In current calendar year US dollars. **d** In current financial year Australian dollars. **f** forecast. **z** projection.
Sources: ANSO; Cameco, WNA, IEA, UxC.

Gold

Gayathiri Bragatheswaran

Despite anxiety over a potential Greek exit, or 'Grexit', from the Eurozone, gold prices have continued to decline in the first half of 2015. An expected increase in US interest rates is likely to place downward pressure on gold prices as investors seek higher returns from US dollar denominated financial assets. Over the medium term gold prices are projected to increase, reflecting increasing physical gold demand, predominantly in the form of jewellery purchases in emerging markets including China and India.

Prices

Gold prices are forecast to decrease 7 per cent in 2015 and average US$1172 per ounce. Prices declined 12 per cent between August 2014 and August 2015 due to lower jewellery and investor purchases to US$1135 per ounce. This decline and forecast decrease in overall prices is mostly underpinned by an expected increase in US interest rates in late 2015, which is anticipated to divert the interest of investors with gold investments to other investment assets with expected higher returns. Despite geopolitical instability including volatility in the stock market, the removal of the Swiss Franc peg to the Euro and the potential for a Greek exit from the Euro zone, gold prices have remained low for the year to date. Continued expectations of a higher US interest rate and forecast higher supply and lower consumption over the remainder of 2015 are expected to provide further downward pressure on prices.

Prices are forecast to decline further in 2016 to US$1167 per ounce, reflecting flow on effects from an expected increase in US interest rates at the end of 2015. However, a forecast increase in physical demand in large and emerging markets such as India and China is expected to partially offset the impact of higher US interest rates, limiting the decline in prices.

Figure 9.1: Daily gold prices

Sources: LBMA; US Federal Reserve.

Figure 9.2: Quarterly gold prices

Sources: LBMA; OCE.

Over the outlook period gold prices are projected to increase at an annual average rate of 1.3 per cent to US$1250 per ounce (in 2015 dollar terms) in 2020 as relatively lower gold prices compared with historical highs (average of US$1669 a tonne in 2012) contribute to greater global gold jewellery purchases. Jewellery consumption has accounted for a significant proportion of gold consumption over the last few years (58 per cent in 2013 and 2014) and is expected to continue to do so over the outlook period, supported by rising incomes in large consumers such as China and India.

Consumption

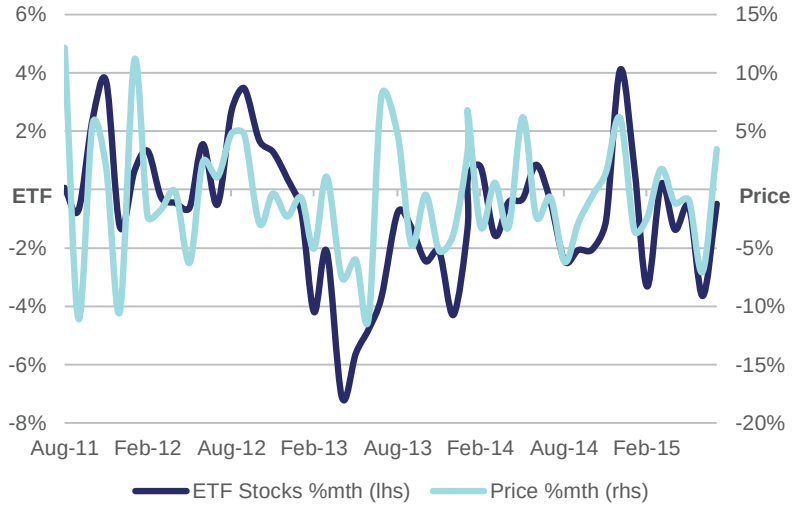
Due to the declining appeal of gold as an investment asset, world gold consumption is forecast to decrease 12 per cent to 2460 tonnes in 2015. This reflects the 14 per cent year-on-year decline in global purchases to 1117 tonnes in the first half of 2015 as reported by the World Gold Council. Overall total purchases (investment and jewellery) over the second half of the year are expected to remain low as total jewellery purchases in 2015 decline from record levels in 2013.

Purchases of gold for investment purposes declined 16 per cent between 2010 and 2014 as the expected return on other investment assets increased. Conversely, from 2012 to 2014, jewellery purchases in China, India and the Middle East grew, 88 per cent, 47 per cent and 104 per cent respectively. Jewellery purchases are forecast to decline in 2015, as economic growth in large consuming countries such as China begins to slow.

In 2016 gold consumption is forecast to remain similar to 2015 levels at 2465 tonnes underpinned by the expected continued slowing of China's economic growth. However forecast lower prices are likely to support jewellery purchases particularly in emerging markets such as India and China who make up the majority of the gold jewellery market (collectively around 57 per cent in 2014).

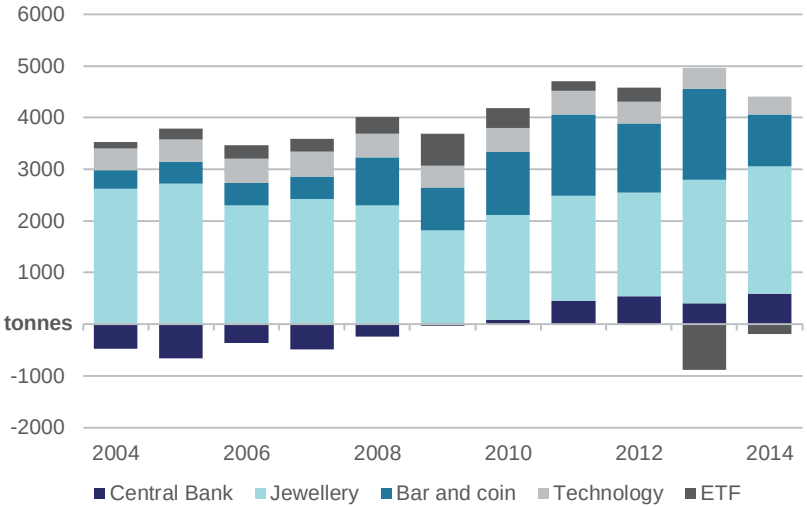
Over the medium term world gold consumption is projected to increase 2.0 per cent a year to 2720 tonnes in 2020, supported by increased jewellery consumption and holdings by central banks.

Figure 9.3: ETF stocks and gold prices (% change)



Source: Bloomberg.

Figure 9.4: World gold demand



Source: World Gold Council.

Jewellery consumption in emerging markets is projected to continue to increase, albeit at much lower rates in response to rising incomes and projected relatively low prices.

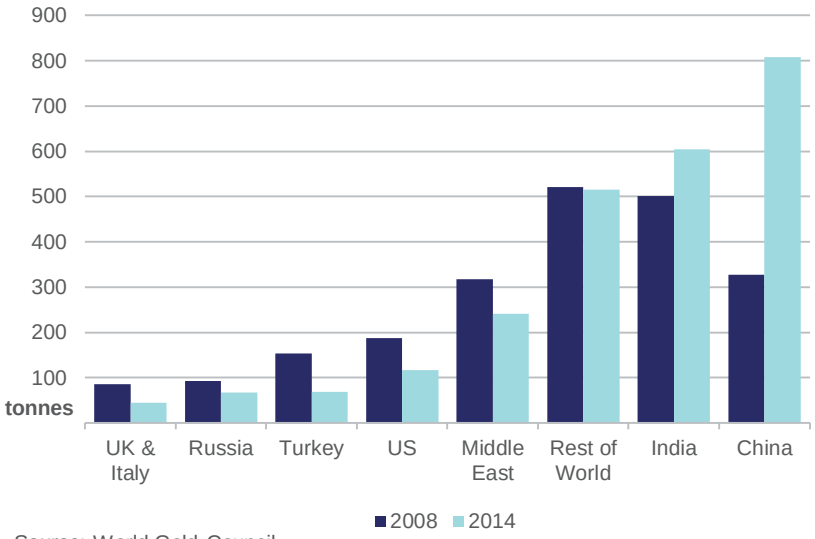
Over the past five years there has been a trend for central banks in developed economies to increase their reserve holdings (total global central bank gold reserves increased 173 per cent between 2009-2014). Over the medium term, the attractiveness of gold as an investment asset will depend strongly on global economic uncertainty over the outlook period.

Production

World gold mine production is forecast to increase 3.1 per cent relative to 2014, to 3057 tonnes in 2015 as existing producers increase output. As a result, production is forecast to increase despite lower consumption and prices. Production is expected to increase at the Penasquito mine in Mexico, which is expected to expand production by 28 per cent in 2015 compared to 2014. Other new production capacity expected to be completed over the remainder of the year includes the Cerro Negro mine in Argentina (an additional 11 tonnes a year) and the Bozymchak mine in the Kyrgyz Republic (adding 0.4 tonnes of gold).

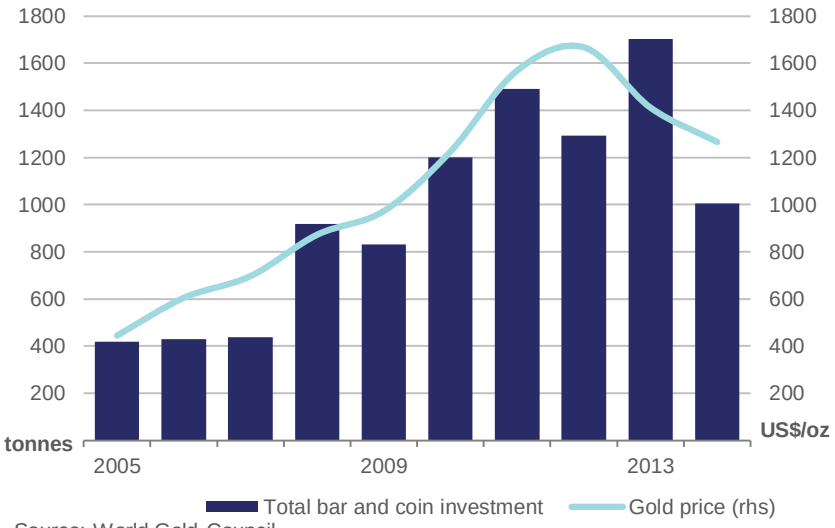
In 2016, gold production is forecast to increase 2.6 per cent to 3135 tonnes. Despite forecast lower gold prices, planned projects scheduled to commence production in 2016 include small mines in Canada such as Cochenour and Heva and Hosco.

Figure 9.5: Gold jewellery consumption



Source: World Gold Council.

Figure 9.6: Total bar and coin investment



Source: World Gold Council.

Production from larger mines such as Metates in Mexico (one of the world's largest undeveloped gold and silver projects) was originally planned for 2016 but is now likely to start production in 2018.

Over the medium term gold production is projected to increase at an annual average rate of 2.3 per cent to 3425 tonnes in 2020, supported by increasing production at existing mines. From 2011 to 2014 recycled gold supply has declined on average 10 per cent, this decline coincided with lower gold prices indicating private gold holders' decreasing willingness to exchange holdings for cash.

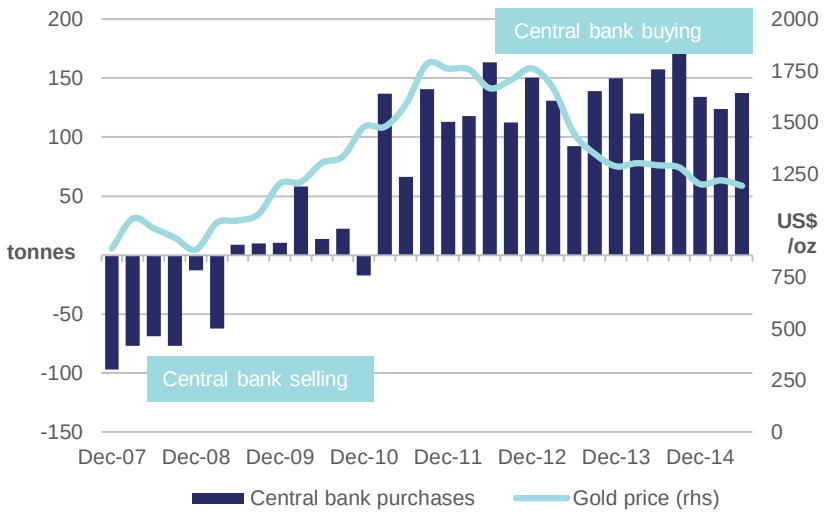
Prices are projected to increase over the medium term, thus the assumed appreciation of the US dollar (gold price received) relative to local currencies (cost of production) is expected to contribute to higher margins and encourage increased output. While Yanacocha, one of Peru's largest producing gold mines (annual production of 34.5 tonnes between 2010 and 2014), is expected to reduce production over the outlook period (as it approaches closure in 2025), production from new mines in large producing countries such as the Natalka mine in Russia (scheduled to add an annual average of 18 tonnes from 2018-2020) are expected to offset this. In South Africa (which dominated production in the twentieth century), the gold mining industry is seeking to ensure it remains economically viable by improving labour productivity measures to counter ongoing labour disputes and challenges surrounding old and very deep mines.

Australia's production and exports

Exploration

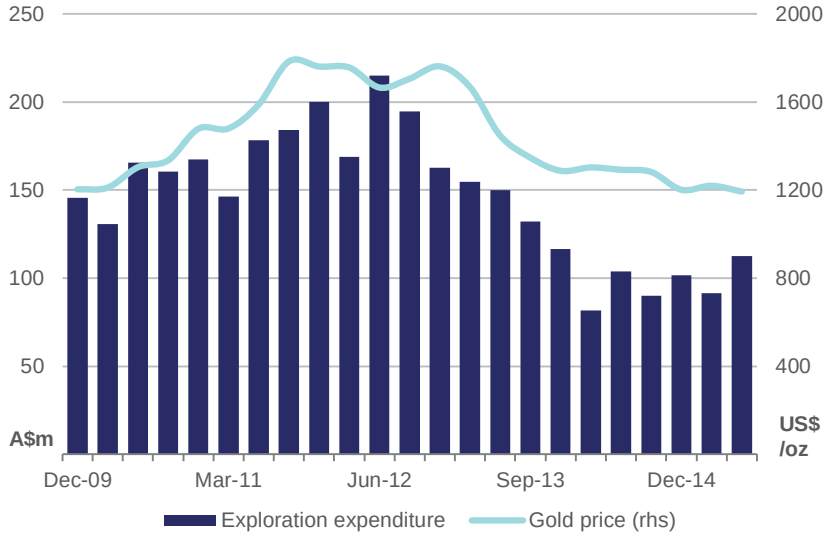
Underpinned by lower gold prices, expenditure on gold exploration declined 9 per cent in 2014-15 to $395.7 million. Expenditure on gold exploration in the June quarter 2015 was $112.4 million, 23 per cent higher than the March quarter and 8 per cent higher than the June quarter 2014.

Figure 9.7: Central bank purchases



Source: World Gold Council.

Figure 9.8: Australia's gold exploration



Sources: Bloomberg; ABS.

The increase compared with the March quarter is likely to be underpinned by the effect of the depreciating Australian dollar against the declining gold price and exploration projects including Golden Road Resources' Yarmana Belt development (JORC mineral resource 1.3 million ounces) in Western Australia.

Production

Australia's gold production in 2014-15 remained relatively steady compared with 2013-14 at 275 tonnes, supported by cost efficiency measures implemented by Australian producers to remain viable at lower prices. The closure of the Tasmania based Henty mine was offset by production from large producing mines (all in Western Australia) over this period including, Newmont's Boddington mine and the KCGM Superpit mine. In addition, smaller producers such as the Western Australian based Saracen Minerals posted record production over 2014-15 (4.7 tonnes). The growth of domestic producers such as Evolution Mining is evident through the finalisation in May of Evolution's $550 million acquisition of Barrick Gold's New South Wales Cowal mine, making Evolution Mining the second largest gold producer listed on the ASX.

In 2015-16, Australia's production of gold is forecast to remain unchanged, at 275 tonnes. Production across Australia's gold mines is forecast to remain steady into the next financial year supported by relatively stable Australian denominated prices.

Over the outlook period, Australia's gold production is projected to increase by 0.9 per cent a year to 287 tonnes in 2019-20. While some Western Australian mines such as Higginsville and St Ives are scheduled to close over the outlook period, a number of new relatively large projects are scheduled to be commissioned. These include Doray Minerals' Deflector project (nearly 2 tonnes a year over six years) and phase 1 of Saracen Minerals' Thunderbox project (4 tonnes a year over four and a half years).

Exports

Australia's gold exports increased 1.8 per cent in 2014-15 to 284 tonnes. However, gold export values remained similar to 2013-14 at $13 billion.

Figure 9.9: Australia's gold production

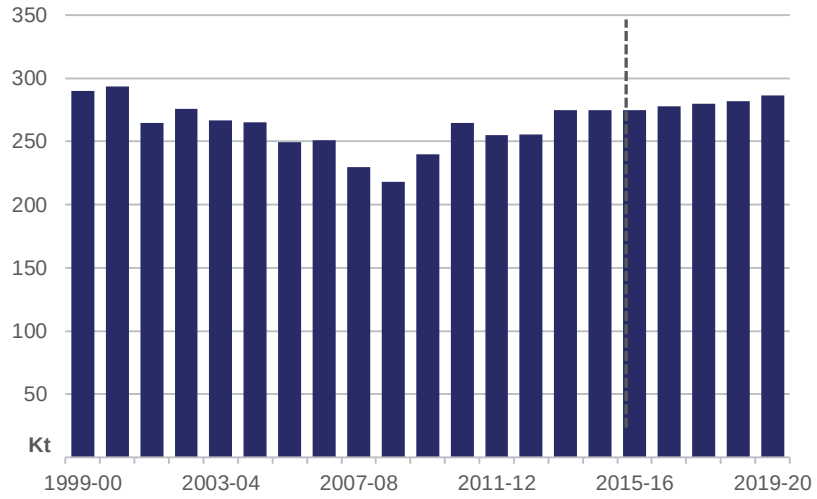
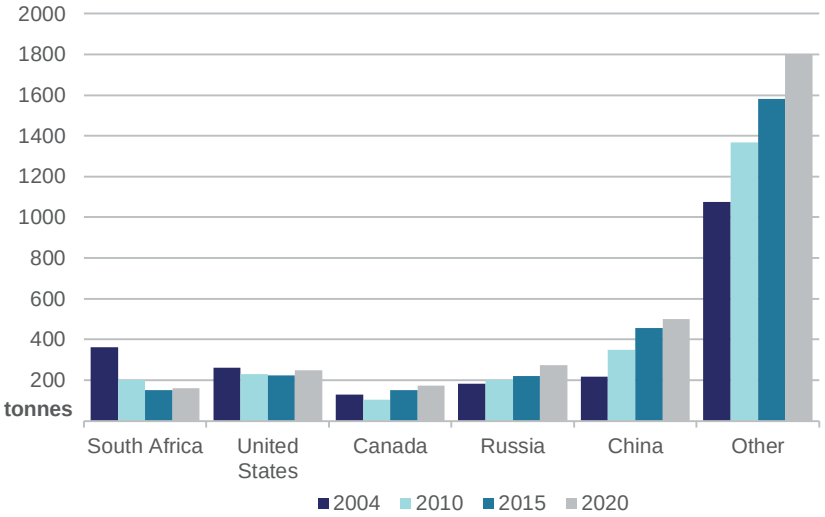


Figure 9.10: World gold mine production



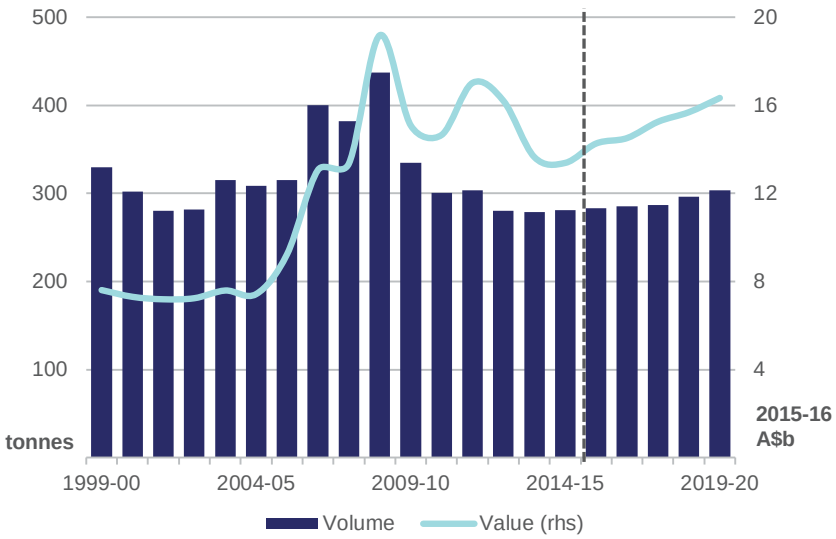
Source: GFMS; Thomson Reuters.

This reflects lower gold prices, especially in the June quarter when prices averaged US$1194 per ounce, the lowest quarterly average since the March quarter 2010.

In 2015-16, Australia's gold exports are forecast to decline marginally to 281 tonnes, reflecting lower demand from large gold consumers such as China and India in the latter half of 2015. Gold export values are forecast to increase 9 per cent to $14.3 billion, supported by an assumed depreciation of the Australian dollar.

Over the outlook period to 2019-20 Australia's gold exports are projected to increase at an annual average rate of 1.3 per cent to 303 tonnes in 2019-20. Export values are projected to increase at an annual average of 4 per cent to $16.3 million (in 2015-16 dollar terms) in 2019-20, driven by projected higher export volumes, prices and an assumed weaker Australian dollar. China and India, as well as emerging markets in South East Asia are likely to be major consumers of Australia's gold exports over the medium term.

Figure 9.11: Australia's gold exports



Sources: ABS; OCE.

Table 9.1: Gold outlook

	unit	2014	2015 f	2016 f	2017 z	2018 z	2019 z	2020 z
World								
Fabrication consumption b	t	2 809	2 460	2 465	2 489	2 535	2 604	2 720
Mine production	t	2 966	3 057	3 135	3 257	3 365	3 400	3 425
Price c								
– nominal	US$/oz	1 266	1 172	1 167	1 256	1 311	1 341	1 400
– real d	US$/oz	1 295	1 172	1 141	1 200	1 225	1 225	1 250
		2013–14	**2014–15 f**	**2015–16 f**	**2016–17 z**	**2017–18 z**	**2018–19 z**	**2019–20 z**
Australia								
Mine production	t	274	275	275	278	280	282	287
Export volume	t	279	284	281	283	286	296	303
– nominal value	A$m	13 010	13 052	14 263	14 829	15 928	16 742	17 814
– real value e	A$m	13 645	13 383	14 263	14 510	15 250	15 684	16 329
Price								
– nominal	A$/oz	1 410	1 468	1 595	1 685	1 722	1 760	1 834
– real e	A$/oz	1 479	1 506	1 595	1 649	1 649	1 649	1 681

b Includes jewellery consumption and industrial applications. **c** London Bullion Market Association AM price. **d** In current calendar year US dollars. **e** In current financial year Australian dollars. **f** forecast. **z** projection.
Sources: ABS; London Bullion Market Association; World Gold Council; OCE.

Aluminium

Kate Martin

Abundant world supply and capacity expansions have placed downward pressure on aluminium prices in 2015. The falling price has moved the market into a critical position, putting pressure on current operations in an environment of expanding global supply.

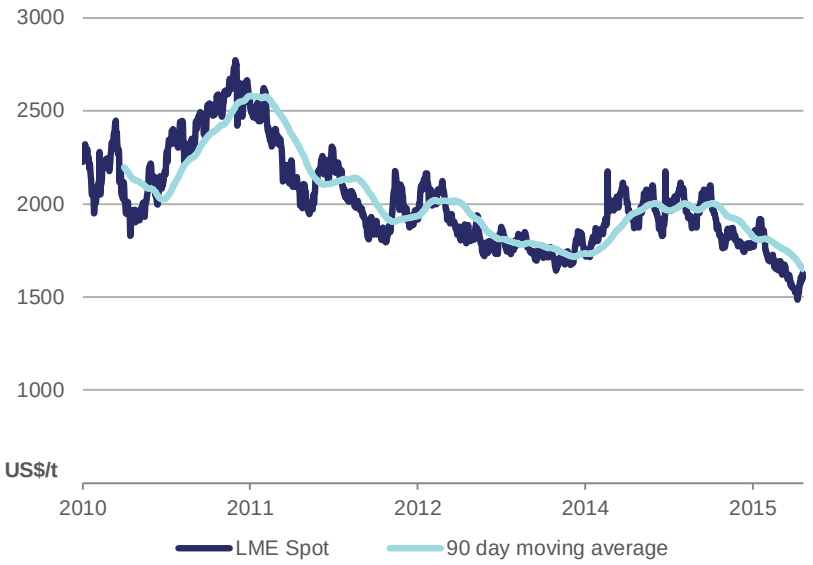
Prices

Aluminium prices have trended downwards since the high-prices of May, due to continued strong growth in global supply, mainly from China. The average LME spot price in the second quarter was 1.8 per cent lower than the first quarter, and averaged US$1767 a tonne. Prices fell sharply in August to reach a low of US$1486 a tonne and premiums fell substantially across regional markets, as supply increased and demand was subdued.

Aluminium stocks in LME warehouses have steadily depleted in 2015, falling 15 per cent in the first two quarters of the year, to 3.6 million tonnes. These outflows have contributed to lower prices, as LME rules have encouraged higher load-out rates and a shift in global storage patterns.

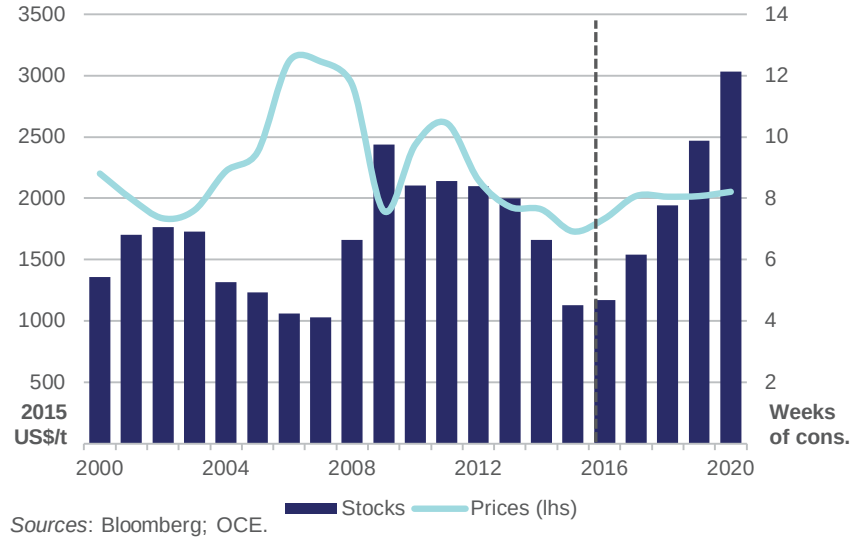
At current low prices, a number of smelters are operating at a loss, as unit production costs are higher than prices. Low margins may facilitate some closures or short-term production curtailments; however this will likely be exceeded by planned capacity increases. As a result, prices are unlikely to recover in the short term. For the year as a whole, prices are forecast to decrease by 7 per cent in 2015 to average US$1728 a tonne.

Figure 10.1: Aluminium daily price



Source: Bloomberg.

Figure 10.2: Annual aluminium prices and stocks



Sources: Bloomberg; OCE.

Prices are forecast to return to more financially sustainable levels in 2016, averaging US$1874 per tonne, 8 per cent higher than 2015. This price increase is dependent on reducing growth in supply availability, which will require significant capacity curtailments, and strong world consumption growth, which is particularly reliant on growth in China's market.

Over the medium term price are projected to increase as industry consolidation, particularly in the small-scale operations in China, removes supply from the market. However, smelter margins will be compressed as input costs increase, including electricity, labour and potentially alumina feedstock, which will also support higher prices in the long-term. In 2020, average prices are projected to be US$2053 (in 2015 dollars), growing at an average annual rate of 3.5 per cent.

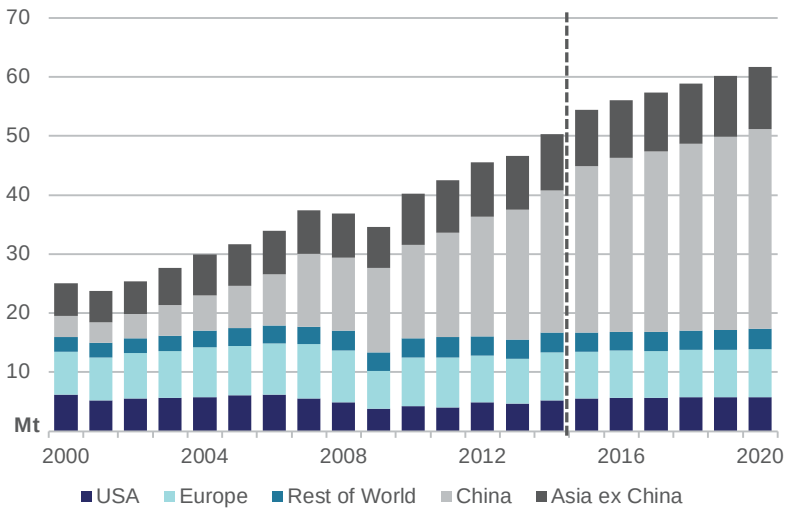
World consumption

Global aluminium consumption increased at a gradual pace in the first half of 2015, with higher apparent consumption in the US and European markets supported by positive growth in automotive and manufacturing activity. For the full year 2015 world aluminium consumption is forecast to grow by 8 per cent to 54.5 million tonnes.

In 2016, world aluminium consumption is forecast to increase at a much lower rate, by around 3 per cent to 56 million tonnes. Lower consumption growth in China is the main contributor to this. This will be partially offset by stronger aluminium consumption in India, with higher investment in infrastructure, particularly in railways and electricity networks.

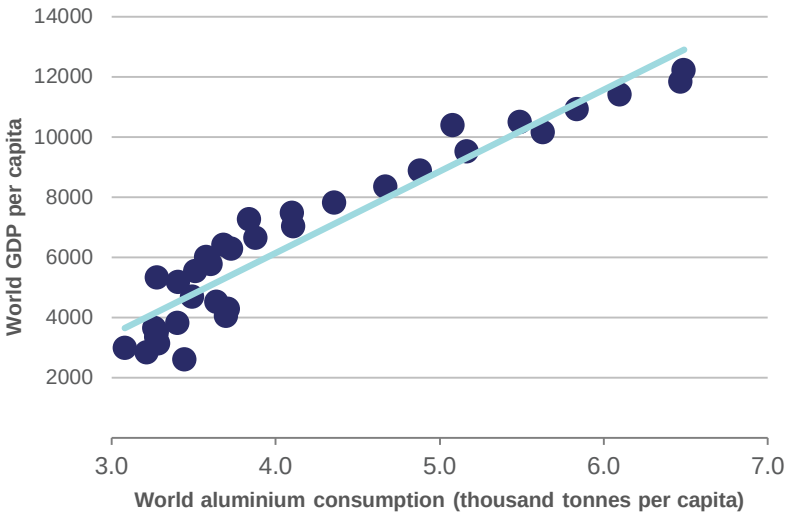
Over the medium term world aluminium consumption is projected to be driven by an increase in infrastructure investment and manufacturing activity. Consumption growth is also expected to be supported by an increase in the intensity of use, as aluminium is increasingly used instead of other heavier, more expensive metals.

Figure 10.3: World aluminium consumption



Source: WBMS; OCE.

Figure 10.4: World aluminium intensity



Sources: IMF; WBMS; World Bank.

In applications such as in auto manufacturing and electrical infrastructure, aluminium offers a lightweight or more affordable substitute for steel or copper. Continued innovation and application of new technology will drive world aluminium consumption over the outlook period. As a result world consumption is projected to increase by almost 3 per cent a year, to 63 million tonnes in 2020. At this time China's consumption is forecast to account for 54 per cent of world consumption, at around 34 million tonnes.

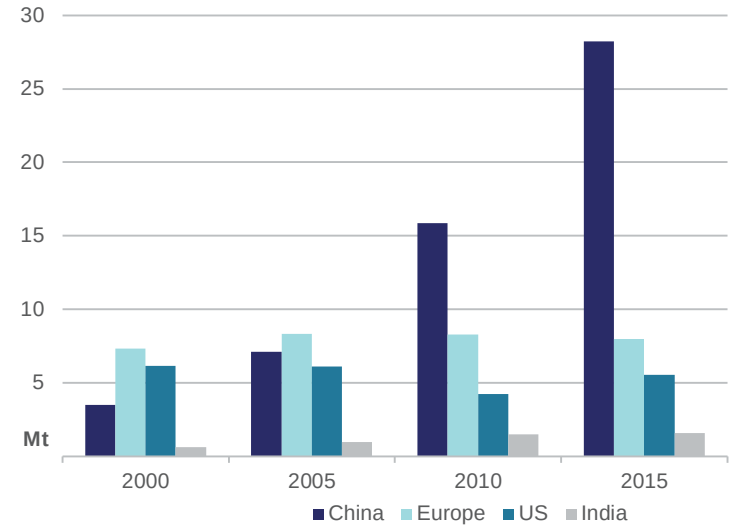
World production

The combination of a rapid increase in supply, following large investments in new capacity worldwide over the past few years, and the development of low-cost, efficient smelters have contributed to growing pressure on aluminium producers. The tough operating conditions have prompted the closure of some higher-cost capacity during 2015, although further capacity consolidation is necessary to stem the growth in supply. In 2015, world aluminium production is forecast to increase by 8 per cent, to 54.3 million tonnes.

Over the medium term, world output growth will depend on developments in China. China's production growth will be heavily affected by the interaction between the construction of new, more efficient plants and the extent of capacity closures of the smaller, less efficient plants. Low domestic aluminium prices in China and reduced opportunities for exports have affected China's high cost producers. An estimated 1.1 million tonnes of capacity has been shut-down this year to date, and more potential closures are planned.

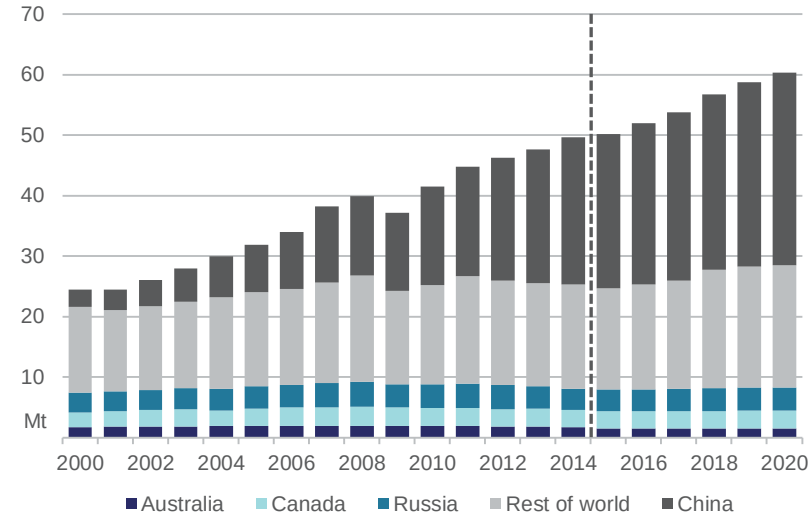
China's aluminium production is forecast to grow by 20 per cent year-on-year to 29.3 million tonnes in 2015, which is around 54 per cent of world production. Growth is expected to come from the start of efficient and cost-competitive projects coming online and despite the closure of several smaller operations that have already occurred. Aluminium production growth in China is expected to be driven by new projects in Xinjiang (adding 1.8 million tonnes), Shandong (adding 2 million tonnes), Gansu (adding 1 million tonnes) and Inner Mongolia (adding 1 million tonnes). Investment in these areas is supported by access to affordable energy inputs including coal.

Figure 10.5: Key aluminium consumers



Source: WBMS.

Figure 10.6: World aluminium production



Sources: WBMS; OCE.

In 2015, production in the rest of the world is forecast to decrease. Several established operations that have not been able to operate profitably, facing high costs (including power and labour inputs) have ceased production. Closures have been particularly large in Brazil (including Sao Luis 74 thousand tonnes and Pocos 96 thousand tonnes) and the United States (Hawesville 250 thousand tonnes and Ravenswood 170 thousand tonnes).

Over the outlook period world aluminium production is projected to grow at an average annual rate of 4 per cent, to around 64.6 million tonnes in 2020. A growing proportion of world production is expected to come from China, the United Arab Emirates and India. The Middle East is projectedto produce 12 per cent of the world's aluminium in 2020, with new capacity growth anticipated in Oman and Bahrain, where affordable gas keeps operating costs low.

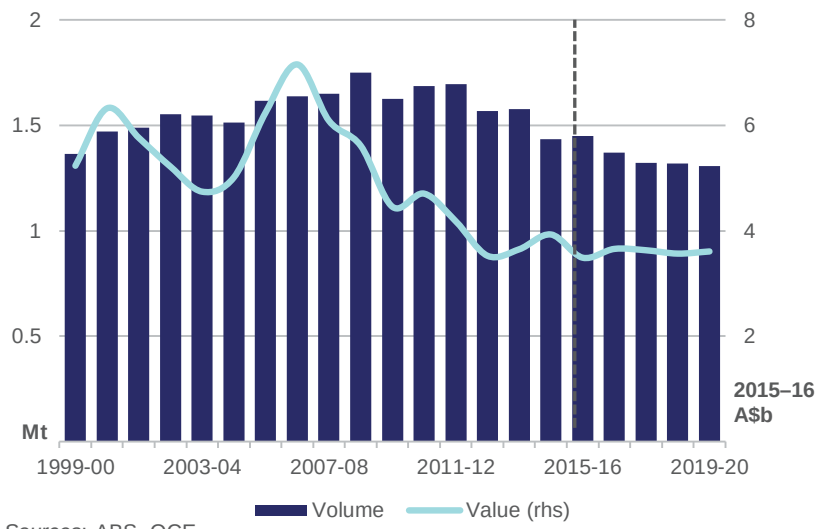
Australia's production and exports

Australia's 2014-15 aluminium production was 7 per cent lower than the year before, totalling 1.6 million tonnes, due to the closure of the Point Henry smelter. As a result, Australia's aluminium exports decreased to 1.4 million tonnes, 9 per cent lower than 2013-14. However, export earnings increased 10 per cent to $3.8 billion as higher prices and the effect of a weaker Australian dollar more than offset the lower volumes.

In 2015-16, Australia's aluminium production is forecast to remain steady at around 1.6 million tonnes. Similarly, export volumes are forecast to be broadly unchanged at around 1.5 million tonnes. Export earnings are forecast to decrease around 9 per cent due to lower prices, to $3.5 million.

Over the outlook period Australian producers will continue to operate in an increasingly cost competitive environment. Australia's production is projected to decline at an average annual rate of 2 per cent to 1.5 million tonnes in 2019-20, as domestic supply is displaced by low cost imports. Export volumes are projected to decrease to 1.3 million tonnes in 2019-20. Export values are projected to increase at an average annual rate of 2 per cent to reach $3.6 million (in 2015-16 dollar terms) supported by higher prices.

Figure 10.7: Australia's aluminium exports



Sources: ABS, OCE.

Alumina

Prices

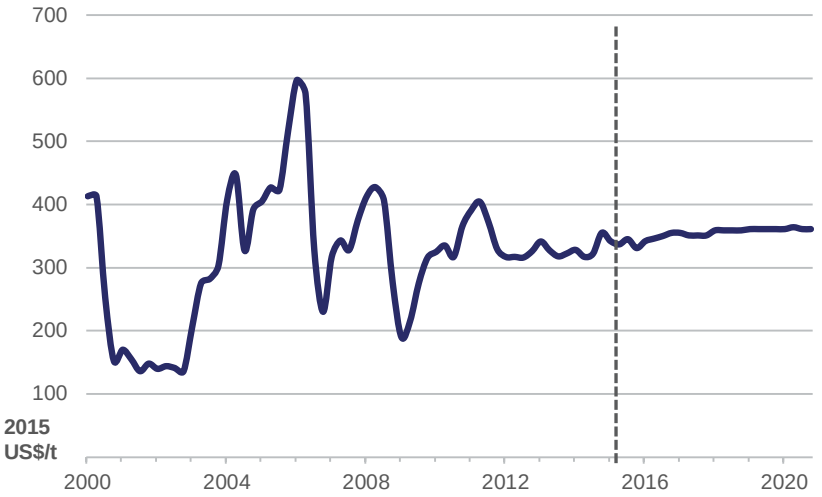
Spot alumina prices decreased steadily during the first half of 2015, underpinned by reduced demand from China, weak aluminium prices and supply growth. The average FOB Australia price was US$337 per tonne for the June quarter, down 1.5 per cent from the previous quarter. Uncertainty around China's economic prospects and the devaluation of the yuan contributed to historically low prices in early September, of US$274 a tonne.

World alumina production is forecast to continue to grow in 2015 supported by new additions to capacity including the ramp-up of the Ma'aden refinery in Saudi Arabia, which is expected to produce 1.1 million tonnes in 2015. Alumina spot prices are forecast to remain subdued over the remainder of 2015 as aluminium smelter closures adversely affect demand. The 2015 average Australia FOB price is forecast to be US$339 a tonne, 2.5 per cent higher than 2014.

Despite low prices, refining margins are likely to remain stable as input costs, including energy and bauxite, have also declined in many major producing countries. In 2016 alumina prices are forecast to increase moderately, in line with aluminium prices, growing 3 per cent over the year to average $348 in 2016.

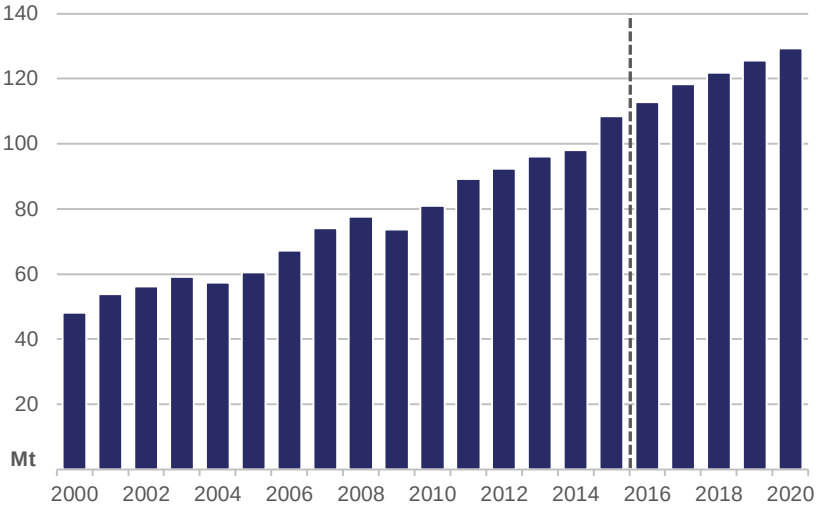
Over the medium-term prices are projected to decrease at an average annual rate of 1 per cent to $323 in 2020 (in 2015 dollar terms). Growing aluminium consumption and production will support this price growth, even as alumina refining capacity expands.

Figure 10.8: World alumina price



Sources: Bloomberg; OCE.

Figure 10.9: World alumina production



Sources: WBMS; OCE.

Australia's alumina production and exports

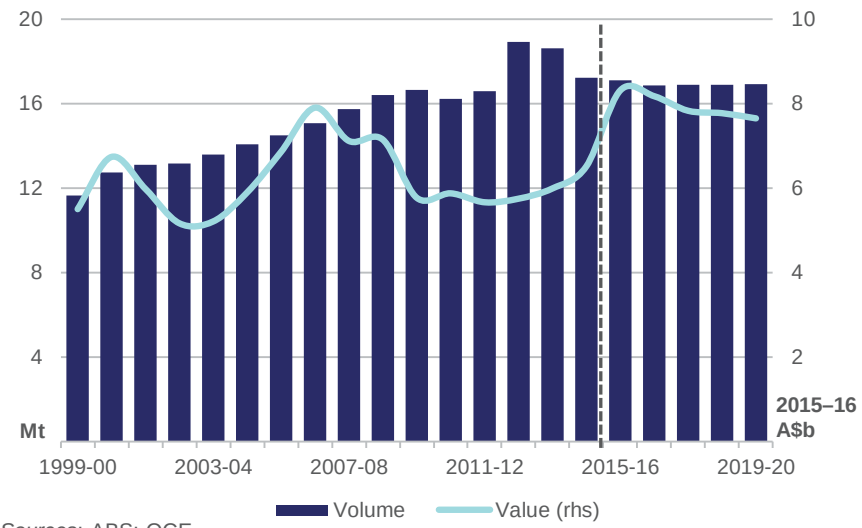
Australia's alumina production was 19.9 million tonnes in 2014-15, 8 per cent lower than 2013-14. Higher production at Rio Tinto's Queensland Alumina and Yarwun refineries partially offset the full-year effect of the Gove refinery closure. Refinery efficiency improvements are expected to support higher production in 2015-16, particularly at Rio Tinto's refineries, facilitating forecast production growth of 2.7 per cent to 20.4 million tonnes.

While Australia's alumina refineries face an increasingly competitive export market and lower domestic requirements, alumina production is projected to remain stable over the outlook period, producing 19.8 million tonnes in 2019-20.

Australia's exports of alumina decreased 7 per cent in 2014-15, to 17.4 million tonnes, driven by lower domestic production and subdued demand in China. Export earnings increased 11 per cent to $6.3 million, supported by higher alumina prices at the end of 2014 and a weaker Australian dollar.

Over the medium term alumina export volumes are projected to remain stagnant, at 17.6 million tonnes in 2019-20. Australia's earnings from alumina exports are projected to increase at an average annual rate of 3 per cent $7.6 million (in 2015-16 dollars), driven by projected higher prices.

Figure 10.10: Australia's alumina exports



Sources: ABS; OCE.

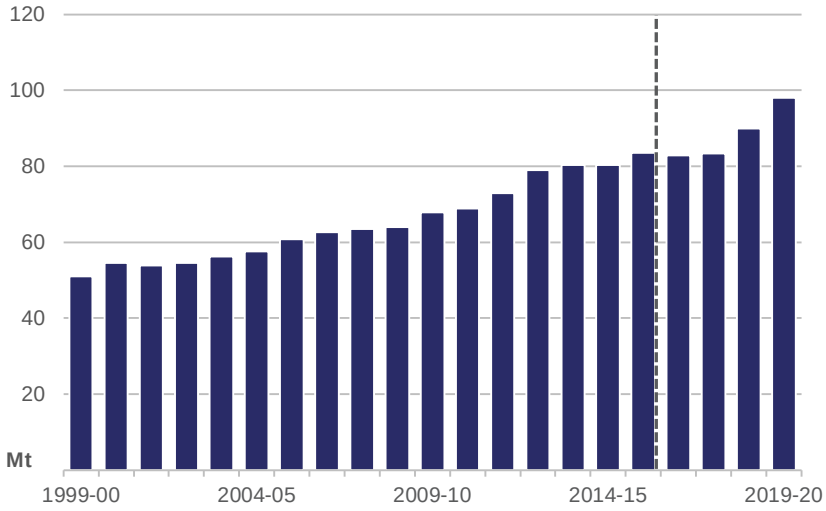
Bauxite

Australia's bauxite production was steady at 80.3 million tonnes in 2014-15, as temporary decreases at BHP Billiton's Worsley mine were balanced by higher output at Rio Tinto's Weipa and Gove mines. As bauxite previously used for domestic alumina refining was redirected to international markets, bauxite exports increased. In 2014-15, bauxite exports increased by 33 per cent to 20.2 million tonnes. Export earnings increased 71 per cent to $934 million.

China remains the primary export destination for Australia's bauxite exports, although the supply gap left by Indonesia's exports following the raw material export ban has been filled by exports from Malaysia and higher domestic production in China. Despite this, Australia's exports are forecast to increase to 21.3 million tonnes in 2015-16, 5 per cent higher than 2014-15. Earnings from these exports are forecast to grow 9 per cent to just over $1 billion.

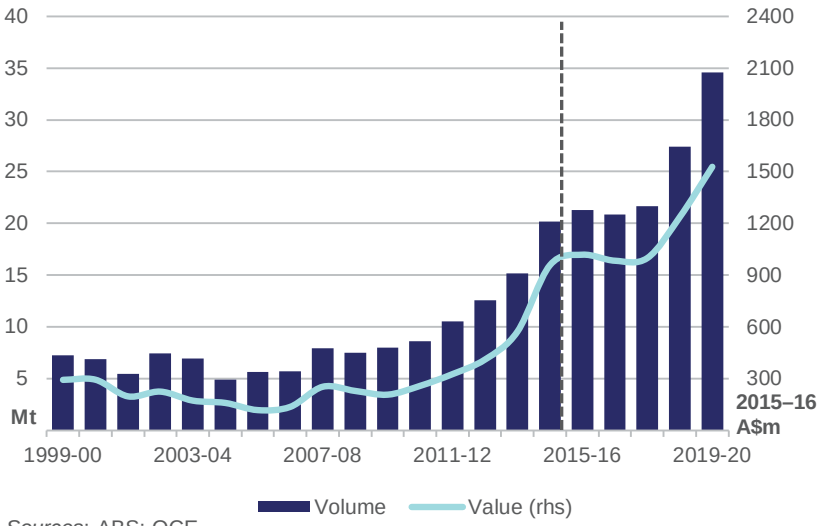
Medium-term growth in bauxite production will be supported by the development of the Bauxite Hills and South of Embley projects. As domestic and international demand for bauxite grows, Australia's exports are projected to increase at an average annual rate of 11 per cent to 34.6 million tonnes in 2019-20, with earnings of $1.5 million (in 2015-16 dollars), increasing by 10 per cent a year.

Figure 10.11: Australia's bauxite production



Source: OCE.

Figure 10.12: Australia's bauxite exports



Sources: ABS; OCE.

Table 10.1: Aluminium outlook

	unit	2014	2015 f	2016 f	2017 z	2018 z	2019 z	2020 z
World								
Primary aluminium								
Production	kt	50 060	54 274	56 362	59 161	60 897	62 799	64 645
Consumption	kt	50 277	54 515	56 253	57 708	59 263	60 805	62 599
Closing stocks b	kt	6 428	6 187	6 296	7 748	9 382	11 376	13 422
– weeks of consumption		6.6	5.9	5.8	7.0	8.2	9.7	11.1
Prices								
World aluminium c								
– nominal	US$/t	1 866	1 728	1 874	2 113	2 155	2 210	2 300
– real d	US$/t	1 909	1 728	1 832	2 019	2 013	2 018	2 053
Alumina spot								
– nominal	US$/t	331	339	348	352	359	361	362
– real d	US$/t	338	339	340	336	335	330	323

		2013–14	2014–15 f	2015–16 f	2016–17 z	2017–18 z	2018–19 z	2019–20 z
Australia								
Production								
Primary aluminium	kt	1 773	1 647	1 616	1 539	1 486	1 480	1 469
Alumina	kt	21 532	19 896	20 428	19 985	19 780	19 780	19 780
Bauxite	Mt	80	80	83	83	83	90	98
Consumption								
Primary aluminium	kt	197	213	166	169	163	163	162
Exports								
Primary aluminium	kt	1 576	1 433	1 450	1 370	1 323	1 317	1 307
– nominal value	A$m	3 479	3 832	3 489	3 736	3 792	3 807	3 936
– real value e	A$m	3 649	3 929	3 489	3 656	3 630	3 567	3 607
Alumina	kt	18 614	17 363	18 004	17 676	17 551	17 560	17 576
– nominal value	A$m	5 711	6 353	8 312	8 354	8 177	8 297	8 345
– real value e	A$m	5 990	6 514	8 312	8 174	7 829	7 772	7 649
Bauxite	kt	15 146	20 204	21 279	20 873	21 648	27 389	34 576
– nominal value	A$m	546	934	1 018	1 005	1 043	1 320	1 667
– real value e	A$m	573	958	1 018	983	999	1 237	1 528
Total value								
– nominal	A$m	9 737	11 118	12 820	13 096	13 012	13 424	13 947
– real e	A$m	10 212	11 401	12 820	12 814	12 458	12 576	12 784

b Producer and LME stocks. c LME cash prices for primary aluminium. d In current calendar year US dollars. e In current financial year Australian dollars. f forecast. z projection.
Sources: ABS; LME; World Bureau of Metal Statistics; OCE.

Copper

Gayathiri Bragatheswaran

Over the short term slowing consumption growth is expected to place downward pressure on prices. However, over the medium term relatively slow supply growth is expected to contribute place upward pressure on prices.

Prices

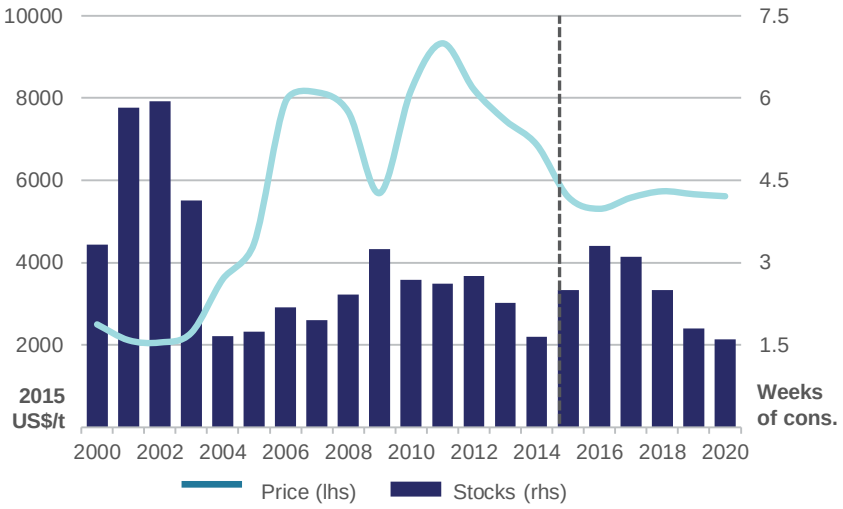
In 2015 the average LME copper price is forecast to decline 18 per cent compared to 2014 to US$5620 a tonne, as production outpaces growth in consumption and contributes to a build-up in stocks. As a result of lower economic growth in China, consumption growth in the world's largest copper consumer, is forecast to be significantly lower than the 15 per cent annual average growth recorded over the past five years (2009–2014). LME stocks increased 130 per cent between July 2014 and July 2015 to 336.5 tonnes. Total commercial stocks (metal exchange and country stocks) increased 31 per cent between June 2014 and June 2015. The LME copper price declined to US$5001 a tonne in mid-August, the lowest recorded over the past five years. This substantial price decline reflected expectations of slowing copper demand from China, influenced by concerns over growth prospects for the Chinese economy.

Average LME copper prices are forecast to decline by a further 3 per cent in 2016 to average US$5429 a tonne. Continued slowing demand growth combined with forecast strong global copper production is expected to result in a further increase in stocks and put downward pressure on prices. However, there remains an ongoing risk of supply disruptions, including labour disputes and natural disasters, at some of the world's largest mines, such as Escondida in Chile and the Grasberg mine in Indonesia, which could present an upside risk to prices.

Figure 11.1: Monthly LME copper price

Sources: LME; Bloomberg.

Figure 11.2: Annual copper prices and stocks



Sources: Bloomberg; OCE.

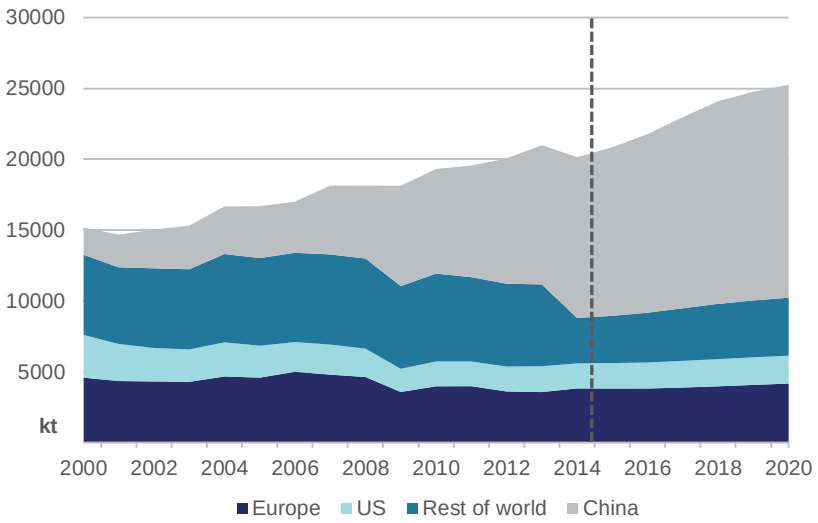
Over the medium term, prices are projected to increase at an annual average rate of 0.2 per cent to US$5612 (in 2015 dollar terms) a tonne in 2020. Increasing prices will be underpinned by a projected increase in consumption growth as large consumers such as China and India increase investment in their power distribution networks in which copper is a major component. Delays in project investment due to lower copper prices and declining ore grades in key producing regions are likely to result in slowing copper production growth over the medium term. Consumption growth is projected to remain higher than production growth over the medium term, placing upward pressure on prices.

Consumption

World copper consumption in 2015 is forecast to increase 3 per cent to 23.5 million tonnes. Despite slowing economic growth in China and an associated slowing in copper use, China's copper consumption is forecast to increase 4.8 per cent to 11.9 million tonnes supported by higher investment in electricity distribution networks. However, copper demand may be affected by the Government's new industry standard for low-voltage aluminium alloy power cables, usually used in buildings. This industry standard may cause substitution effects as the construction industry switches to lower cost aluminium instead of traditional copper cables. Demand for copper in more developed markets across Europe is forecast to be flat over 2015, consistent with subdued economic conditions and limited investment in housing and electricity infrastructure.

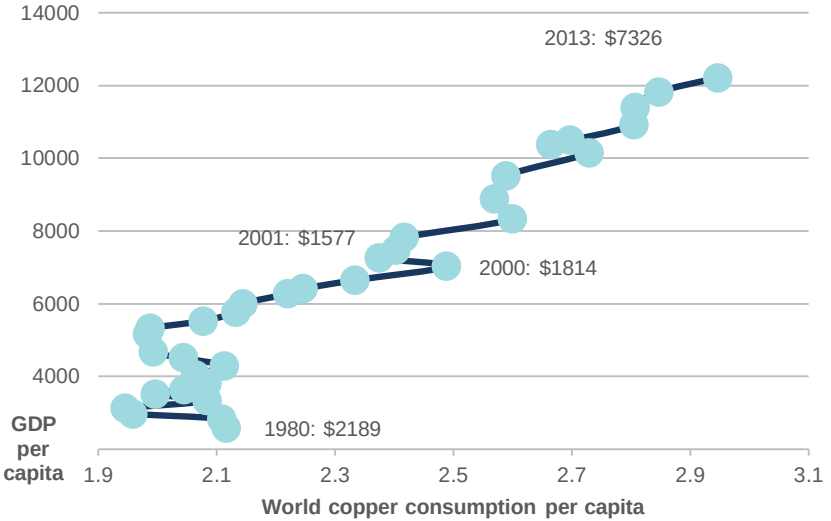
In 2016, world copper consumption is forecast to increase 4.4 per cent to 24.5 million tonnes, underpinned by growth in emerging consumers such as India, and increases in consumption in China, despite slowing economic growth. Given the importance of copper in the development of electricity distribution networks, India's copper consumption is forecast to increase substantially from 2016, underpinned by the Modi Government's commitment to address electricity access and reliability.

Figure 11.3: World copper consumption



Sources: WBMS; OCE.

Figure 11.4: World copper intensity



Sources: World Bank; IMF; WBMS.

Over the outlook period, world copper consumption is projected to grow at an annual average rate of 3.7 per cent to 28.1 million tonnes in 2020 driven by continued investment in China's electricity networks. The Chinese Government has committed to a US$315 billion plan to upgrade its cross country power transmission capacity to enable better connection between cities in the East and West. As can be seen in Figure 11.4 there has been a trend of increasing global copper consumption per capita over the past 14 years. This trend has been driven by highly populated emerging economies in Asia (China and India). Given the large population size and development needs still required in these countries there is still significant growth potential as their per capita consumption is still quite low. Their electricity grids are under developed and their industrial use of copper (electronics & electrical goods) is still increasing.

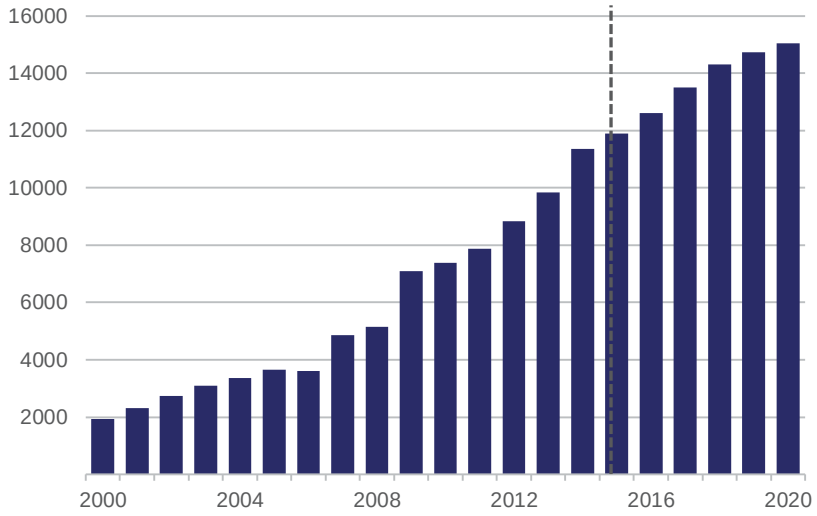
Copper consumption in South East Asian, Latin American and African countries is also projected to increase over the medium term. Given the amount of electricity generation and general infrastructure development remaining in these economies the potential for growth in copper consumption in these regions is substantial. Expectations of increasing economic growth in the US may lead to increasing copper consumption through stronger demand from the commercial and residential sectors.

Production

Mined

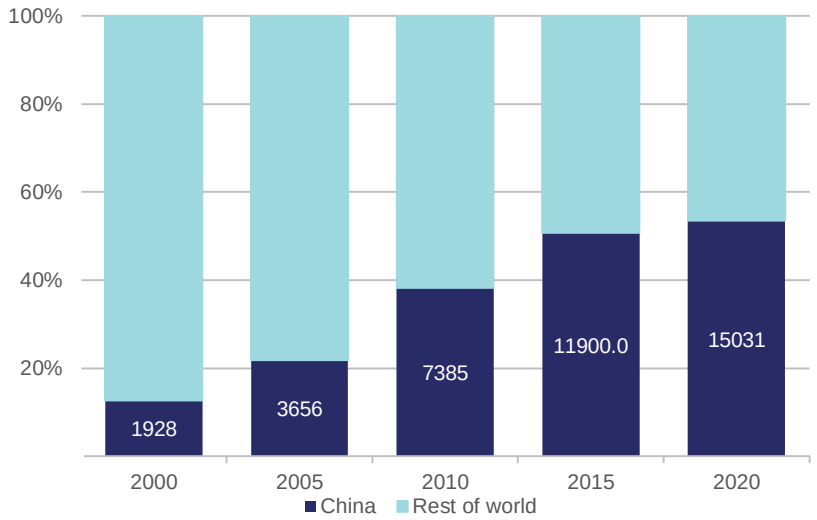
World mine production is estimated by the World Bureau of Metal Statistics to have increased 3.6 per cent year-on-year to 9.4 million tonnes in the first half of 2015, with the largest increase in production in Africa (new production from the Sentinel mine in Zambia), with an 11 per cent increase to 1.1 million tonnes. For 2015 as a whole, world mine production is forecast to increase 5 per cent to 19.4 million tonnes compared to 2014, underpinned by higher production from large mines such as BHP and Rio Tinto's Escondida mine.

Figure 11.5: China's copper consumption



Sources: WBMS; OCE.

Figure 11.6: China's share of world copper consumption



Sources: WBMS; OCE.

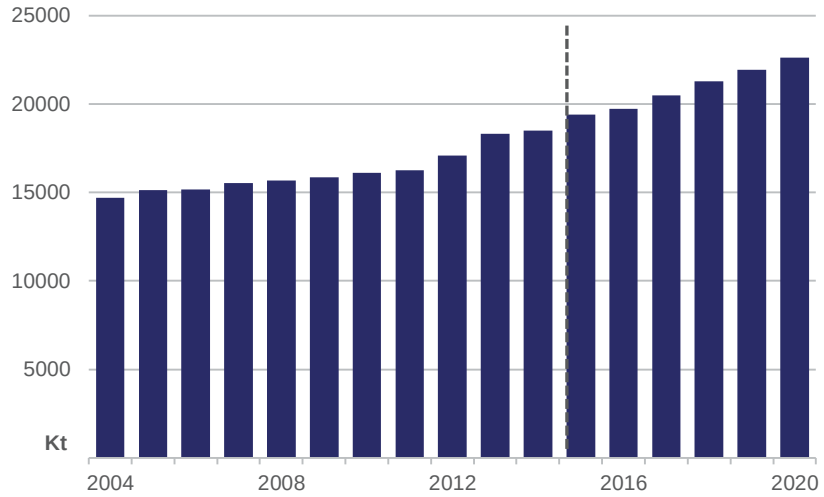
In 2016 world copper mine production is forecast to increase 1.8 per cent to 19.7 million tonnes, supported by the scheduled start of production at MMG Limited's Las Bambas mine in Peru, which has an expected average annual production of around 250 thousand tonnes a year for more than twenty years. Other mines scheduled to come online in 2016 include the Bozshakol mine in Kazakhstan, (additional 115 thousand tonnes of production) and the Sierra Gorda mine in Chile (119 thousand tonnes).

Over the outlook period, production is projected to increase at an average annual rate of 3.1 per cent to 22.7 million tonnes by 2020. Production will be supported by new projects coming online over the outlook period as projected higher copper prices and depreciating currencies in major producing regions (which increases the local-currency denominated price) improve margins and stimulate higher output. New projects expected to be completed over the outlook period include the Agua Rica and El Pachon mines in Argentina, which are expected to add 206 000 tonnes and 150 000 tonnes of production, respectively.

Increased production from newly commissioned capacity will be partly offset by Glencore's announcement to cease mining for eighteen months at two of Africa's largest copper mines (the Katanga mine in the Democratic Republic of Congo and the Mopani mine in Zambia), and declining ore grades in the world's largest copper producer Chile (accounted for 31 per cent of global production in 2014). To overcome the effect of declining ore grades on production, several mining companies in Chile intend to expand output at existing mines (such as Codelco's Chuquicamata underground mine project) and investigate the feasibility of new projects.

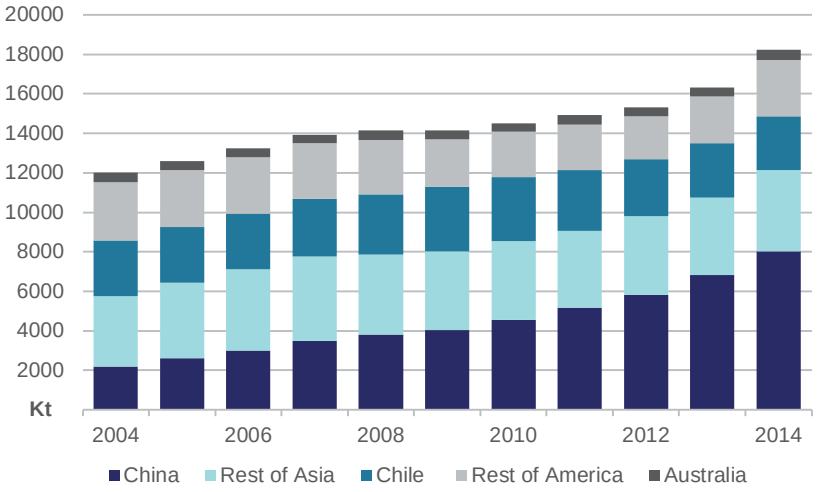
Chilean producers will also need to address the effect of high energy costs, low energy availability and inadequate water supply due to the geographical location of most of the copper mines (the Andes mountain range). BHP Billiton is building the 540 megawatt Kelar power station in northern Chile to ensure improved energy availability. Lower copper prices are also expected to delay investment in copper developments that have not yet received investment approval.

Figure 11.7: World copper mine production



Sources: WBMS; OCE.

Figure 11.8: World refined copper production



Source: WBMS.

Refined

According to the World Bureau of Metal Statistics, global refined copper production increased 2.4 per cent year-on-year in the first half of 2015 to 11.2 million tonnes. A decrease in production at the Katanga refinery in the Democratic Republic of Congo (Glencore's decision to cease production for eighteen months) as well as a 4.5 per cent decline in refined production in China over 2014-15 is expected to be offset by increases in production across most refineries in North America. Declines in production at refineries in China are due to lower ore availability from domestic mines and higher import costs for copper concentrates (the yuan was devalued in early August) combined with lower copper prices. For the year as a whole, refined production is expected to increase 3.9 per cent to 23.9 million tonnes in 2015 compared to 2014.

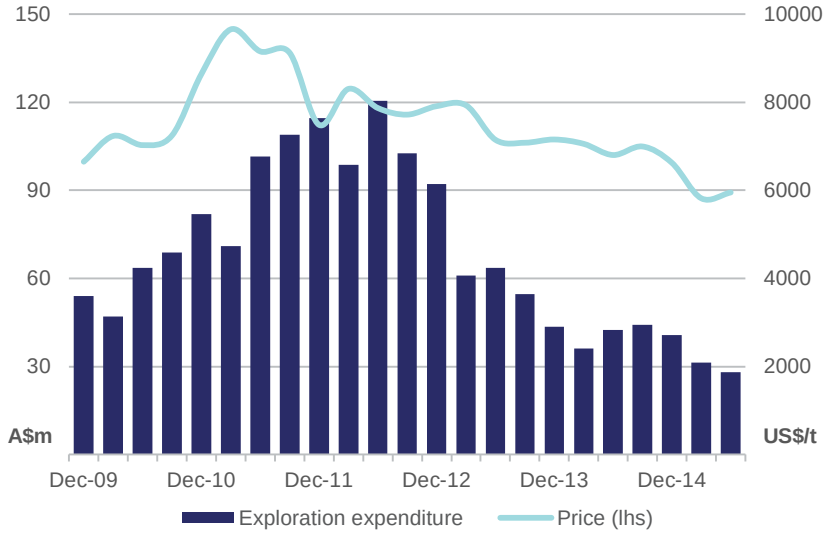
Global refined production in 2016 is forecast to increase 4.2 per cent relative to 2015, to 24.9 million tonnes. This increase in production is expected to be supported by continued growth in refined production from large producers including the Canadian copper refinery (320 000 tonnes) in Canada and the Chuquicamata (500 000 tonnes a year) and Escondida (320 000 tonnes a year) refineries in Chile.

Australia's production and exports

Exploration

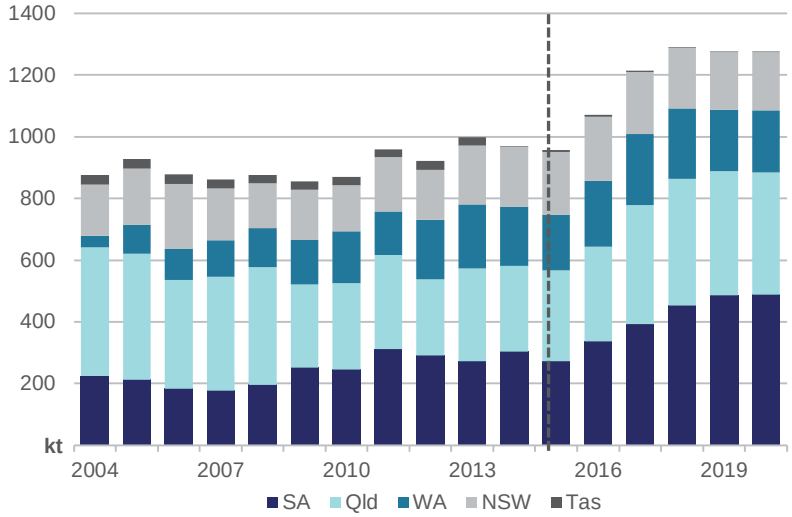
Australia's expenditure on copper exploration in the June quarter 2015 declined 10 per cent to $28.1 million relative to the March quarter 2015 and coincided with a decline in copper prices. Exploration expenditure in the June quarter fell 34 per cent year-on-year, underpinned by the large price decline over the year.

Figure 11.9: Australia's copper exploration



Sources: ABS; LME.

Figure 11.10: Australia's copper mine production



Sources: Company reports; OCE.

Mined production

Australia's copper mine production declined 3.2 per cent in 2014-15, relative to 2013-14, and totalled 956 000 tonnes. Supply disruptions at BHP Billiton's Olympic dam mine associated with an outage at its crushing mill were the principal cause of this decrease in production. The mill was offline for around six months following an electrical failure. In addition, an accident as well as operational issues affected production at Newcrest's Telfer mine in Western Australia over the June quarter. However, efficiency gains at existing mines materialised into higher production including record production from the Tritton mine in New South Wales (30 245 tonnes). These production increases slightly offset the declines at Olympic Dam.

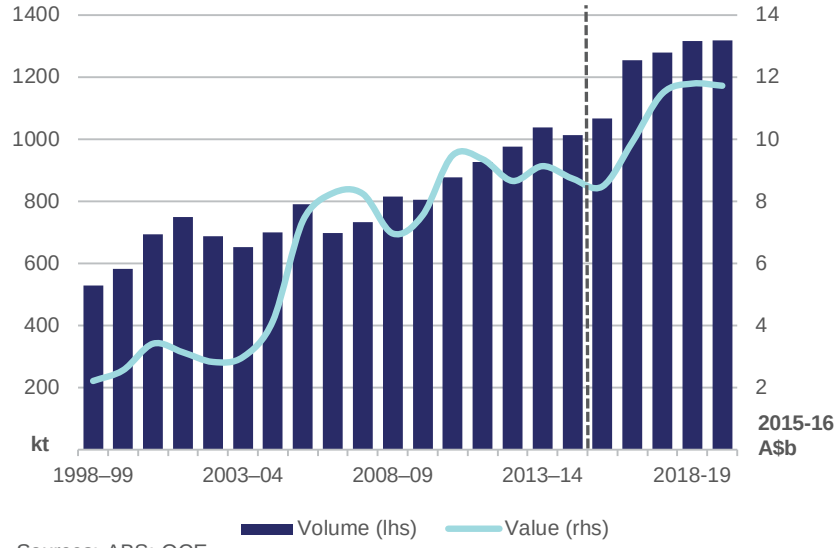
Copper mine production in 2015-16 is forecast to increase 5 per cent to 1 million tonnes, supported by a return to normal production at Olympic Dam and productivity gains at other mines.

Over the outlook period production is projected to increase at an average rate of 7 per cent a year to 1.3 million tonnes in 2020, underpinned by the development of new projects and higher production at existing mines. The scheduled closure of the Golden Grove (average production of nearly 30 thousand tonnes a year over the past five years) mine in Western Australia and the Leichardt mine (copper resources of around 70 thousand tonnes) in Queensland are expected to be offset by increased production at existing mines such as Cadia and Prominent Hill.

Refined production

In 2014-15, Australia's refined copper production fell 10 per cent to 452 thousand tonnes as the mill outage at Olympic Dam reduced feedstock availability. The outage reduced total refined production at the operation by 32 per cent between 2013-14 and 2014-15 to 124 500 tonnes.

Figure 11.11: Australia's copper exports



Sources: ABS; OCE.

In 2016-17 refined production is forecast to increase 6 per cent to 479 thousand tonnes, underpinned by the return to normal of operations at Olympic Dam and increases at other (Solvent Extraction – Electrowinning) operations. Over the outlook period refined copper production is forecast to decline on average by 12 per cent a year to around 239 thousand tonnes in 2019-20 because of the scheduled closure of Glencore's Townsville refinery (production of around 300 thousand tonnes a year) in 2016.

Exports

Australia's total metal content copper exports fell 2.2 per cent in 2014-15 relative to 2013-14 to around 1 million tonnes, reflecting lower overall output. Export values also declined 2.2 per cent to $8.5 billion as a result of lower copper prices and export volumes.

In 2015-16 Australia's copper exports (total metal content) are forecast to increase 4.3 per cent to 1.1 million tonnes, as forecast higher consumption in China and India stimulates more production. Although export volumes are forecast to increase, earnings from these exports are forecast to decline because of forecast lower copper prices.

Over the outlook period, Australia's copper exports (total metal content) are projected to grow at an annual average rate of 5 per cent to 1.3 million tonnes in 2019-20, supported by higher production and expected increasing demand from large global copper consumers and emerging copper consumers. Export values over the outlook period are projected to increase at an annual average rate of 6 per cent to $11.7 billion (in 2015-16 dollar terms) in line with projected increases in average copper prices and an assumed weak Australian dollar.

Table 11.1: Copper outlook

	unit	2014	2015 f	2016 f	2017 z	2018 z	2019 z	2020 z
World								
Production								
– mine	kt	18 489	19 405	19 747	20 516	21 311	21 960	22 657
– refined	kt	22 981	23 887	24 899	25 636	26 494	27 189	28 026
Consumption	kt	22 774	23 466	24 499	25 646	26 748	27 511	28 119
Closing stocks	kt	725	1 146	1 546	1 537	1 283	961	868
– weeks of consumption		1.7	2.5	3.3	3.1	2.5	1.8	1.6
Price LME								
– nominal	US$/t	6 860	5 620	5 429	5 838	6 138	6 200	6 288
	USc/lb	311	255	246	265	278	281	285
– real b	US$/t	7 018	5 620	5 307	5 578	5 733	5 661	5 612
	USc/lb	318	255	241	253	260	257	255
		2013–14	**2014–15**	**2015–16 f**	**2016–17 z**	**2017–18 z**	**2018–19 z**	**2019–20 z**
Australia								
Mine output	kt	988	956	1 008	1 167	1 277	1 314	1 317
Refined output	kt	500	452	479	328	230	232	239
Exports								
– ores and conc. c	kt	2 122	2 069	2 159	3 202	3 996	4 127	4 117
– refined	kt	456	423	438	299	210	211	217
Export value								
– nominal	A$m	8 707	8 514	8 478	10 127	11 981	12 584	12 784
– real d	A$m	9 131	8 730	8 478	9 909	11 470	11 789	11 719

b In current calendar year US dollars. **c** Quantities refer to gross weight of all ores and concentrates. **d** In current financial year Australian dollars. **f** forecast. **z** projection.
Sources: ABS; International Copper Study Group; LME; World Bureau of Metal Statistics; OCE.

Nickel

Ben Witteveen

Growth in LME stocks, which were already historically high at the start of the year, and slowing consumption growth in China contributed to prices falling in the first eight months of 2015. In the short term prices are forecast to remain subdued as LME inventory is absorbed. Over the medium term prices are projected to increase gradually to reflect the rising cost of raw materials.

Nickel prices and stocks

Persistently high stockpiles, bearish sentiment in the nickel market and low consumption growth led to the average price of nickel falling 34 per cent in the first eight months of 2015 to US$9835. The price of nickel declined to a six year low of US$9305 in late August in response to market volatility in China. As of the end of August the price of nickel was 56 per cent lower than its peak of $20 955 in May 2014.

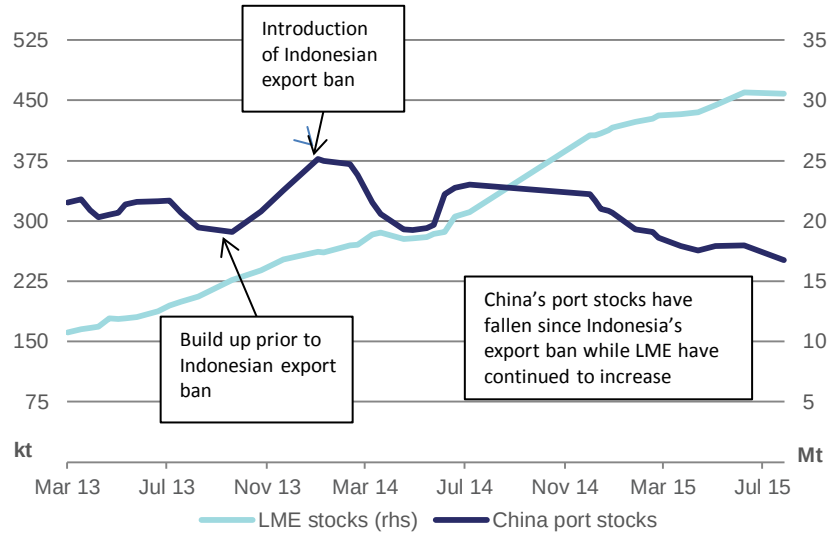
The price of nickel has been weighed down by the ongoing build-up of LME nickel stocks which, contrary to expectation, increased 11 per cent in the first seven months of 2015 to 473 000 tonnes in July (around 13 weeks consumption). LME nickel holdings in July were 78 per cent higher than at the start of 2014. It was widely expected that nickel stocks would fall rapidly following the introduction of Indonesia's ban on the export of unprocessed raw materials in January 2014. LME stocks have been boosted, at least in part, by the Qingdao port scandal, which broke in mid-2014. The scandal led to a loss of confidence in China's warehouse system and the transfer of metal stocks (including nickel) into LME warehouses.

In contrast to LME stocks, China's port stocks have steadily declined through 2014 and early 2015, down 18 per cent since the start of 2015 and 32 per cent since January 2014.

Figure 12.1: Nickel daily price

Source: Bloomberg.

Figure 12.2: China's port and LME stocks of nickel



Sources: AME; LME.

China's port stocks averaged 17 million tonnes of unrefined ore in August, which is below the pre-January 2014 average stock holdings of 20 million. Nickel prices are forecast to remain subdued in the short term as the large stockpile residing in LME warehouses, is absorbed by the market. In 2015, world nickel prices are forecast to average US$12 621, which is 25 per cent below the average recorded in 2014.

From 2016, nickel prices are projected to increase as the cost of mining laterite deposits, which require more processing, lifts the overall cost of producing nickel. The supply of lower cost sulphide deposits, primarily located in Russia and Canada, is starting to deplete and the replacement supply is likely to be from higher cost laterite deposits found in places like Brazil. Laterite deposits are typically lower quality than sulphide deposits and as a result require more complex processing. The complexity involved with processing laterite deposits increases the cost of production. As the proportion of laterite ore increases, expected to be around 70 per cent of supply in 2020, the overall cost of production will increase and place upward pressure on prices.

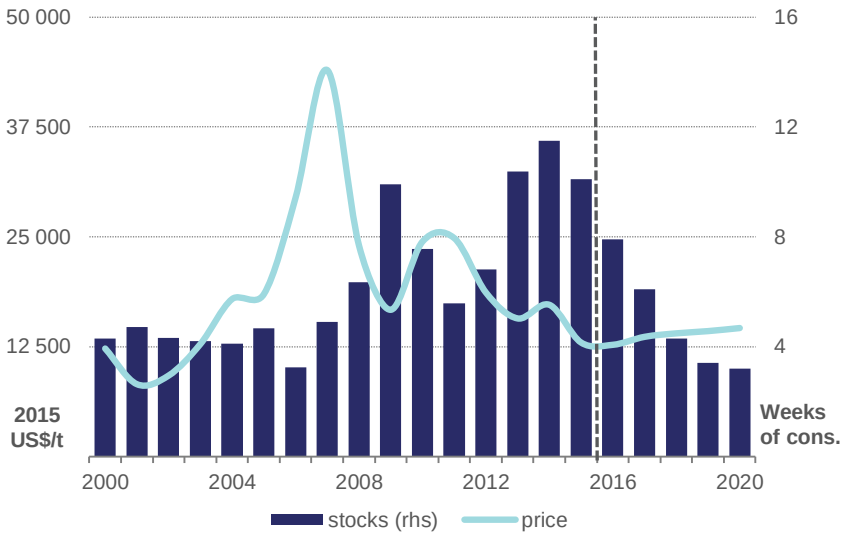
However, refined capacity is expected to increase over the same period as production in Indonesia and other developing countries increases and moderates the upward pressure on price. LME nickel prices are projected to increase to around US$14 615 a tonne (in 2015 dollar terms) by 2020.

Consumption

World nickel consumption is forecast to grow by 4 per cent in 2015 to 1.94 million tonnes. The rate of growth is substantially below the 6 per cent rate of growth recorded in 2014 and the lowest since 2009, because of moderating consumption growth in China.

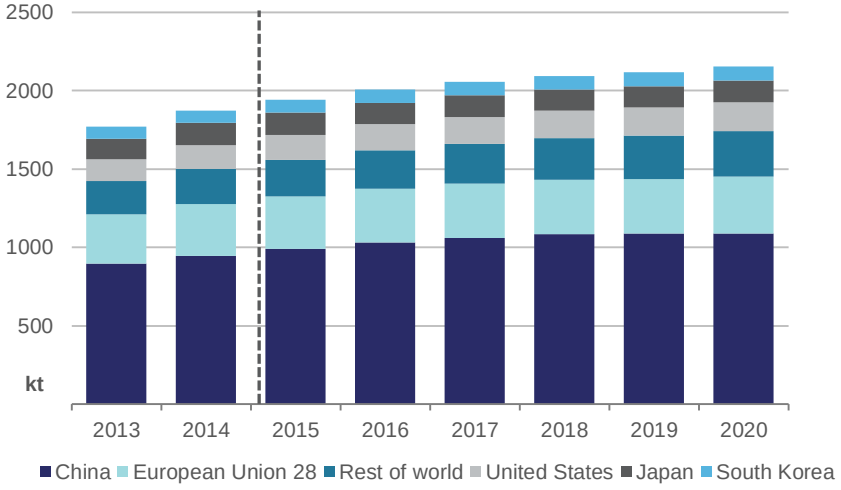
Nickel consumption is driven largely by stainless steel production, which is used in appliances, automotive components and infrastructure. Emerging economies, particularly China and India, are projected to drive the growth in stainless steel and nickel consumption over the medium term.

Figure 12.3: Nickel prices and LME stocks



Sources: LME, OCE.

Figure 12.4: World nickel consumption



Sources: International Nickel Study Group; OCE.

Between 2016 and 2020 world nickel consumption is projected to grow by around 1.8 per cent a year to 2.2 million tonnes in 2020. China's nickel consumption growth is projected to fall from around 13 per cent a year, recorded from 2010 to 2014, to around 3 per cent a year between 2016 and 2020. China is transitioning to a consumption led economy, which should result in moderating infrastructure investment and a fall in the stainless steel consumption growth rate. However, China's production of automobile components and appliances is expected to grow strongly over the medium term. China is projected to remain the world's largest consumer of nickel over the medium term and consume around 1.14 million tonnes of nickel in 2020, just over 50 per cent of the global total.

Over the medium term India is projected to drive growth in world nickel consumption, supported by a strong increase in infrastructure investment and consumption of manufactured goods, such as cars and appliances. India's nickel consumption is projected to average 8 per cent annual growth to reach 85 000 tonnes of nickel in 2020.

Japan's nickel consumption is projected to decline by an average 1 per cent a year to 138 000 tonnes in 2020, as stainless steel exports are displaced by cheaper output from China.

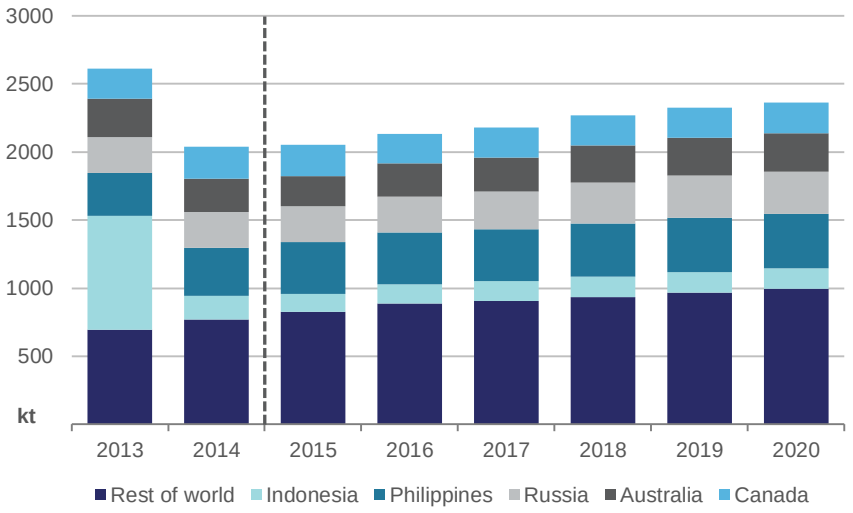
Mine production

In 2015, world mine production is forecast to increase by 0.6 per cent to 2.1 million tonnes, supported by growth in mine output in the Philippines, Russia and New Caledonia. Indonesia's mine output in the first six months of 2015 was almost 50 per cent lower than the first six months of 2014. The fall has occurred due to an export ban on unprocessed raw materials that was introduced in January 2014. Following the ban, Indonesian mine output fell as mines were placed on care and maintenance. For the full year 2015, Indonesia's mine output is forecast to be around 130 000 tonnes, which would place Indonesian production behind the Philippines, Australia, Canada and Russia. Prior to the export ban Indonesia produced 834 000 tonnes in 2013 and was the world's largest producer of nickel, accounting for 32 per cent of world production.

Over the medium term mine output is projected to increase at an average annual rate of 2.8 per cent to 2.4 million tonnes in 2020. Output from existing mines, particularly in New Caledonia, the start of new mines in Canada, Australia and Brazil and the resumption of mining in Indonesia is expected to support this growth. Indonesian mines that were placed on care and maintenance are expected to resume operations over the medium term to provide feedstock ore to the domestic refineries currently under construction.

The price of nickel presents a key risk to the growth in mine output as an ongoing period of low prices may encourage companies to delay or reduce production. The start of production at the Nova-Bollinger mine in Australia has already been delayed and others planned for re-opening, such as the Avebury mine also in Australia, have been kept on care and maintenance.

Figure 12.5: World nickel mine production



Sources: International Nickel Study Group; OCE.

Refined production

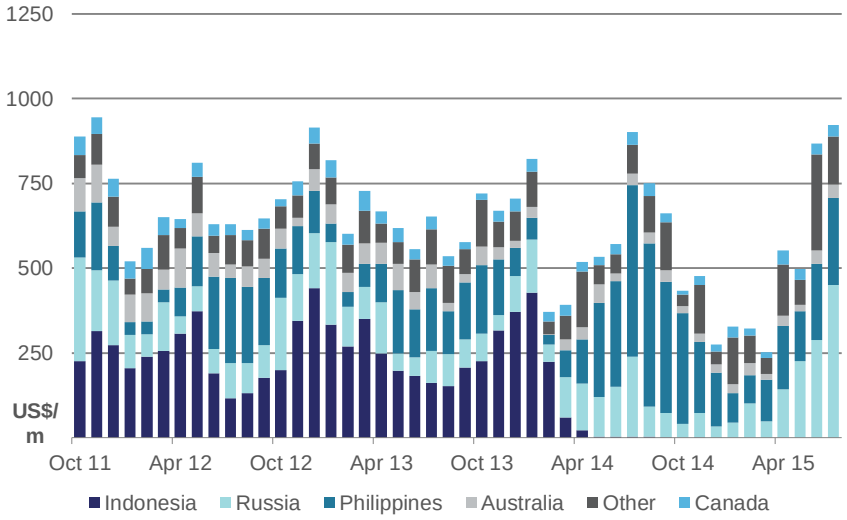
In 2015, world refined nickel production is forecast to grow by 1 per cent to 1.9 million tonnes, supported by an increase in Russian refined output. Russian refined nickel output has surged following the 46 per cent depreciation of the rouble against the US dollar, in the first half of 2015. As the cost of Russian produced refined nickel fell, China's imports increased substantially, resulting in Russia overtaking the Philippines as the largest provider of nickel to China in the June quarter 2015.

While lower prices are expected to force the closure of some high-cost capacity, world refined nickel production is projected to increase by 2 per cent a year to 2.2 million tonnes in 2020. China's refined nickel production is forecast to fall in the short term in response to strict environmental regulations that were enacted in January 2015, overcapacity and weak consumption growth. These conditions have already led to the closure of several smaller ferronickel producers in the first half of 2015 and more are expected to close through the remainder of 2015 and 2016.

Pressure on China's refineries is likely to increase over the medium term because of an expected increase in Indonesia's refined nickel output. In the first half of 2015, Indonesia exported the first shipment of refined nickel from a refinery constructed following the export ban. The new refinery is the first of several due to begin operation over the medium term.

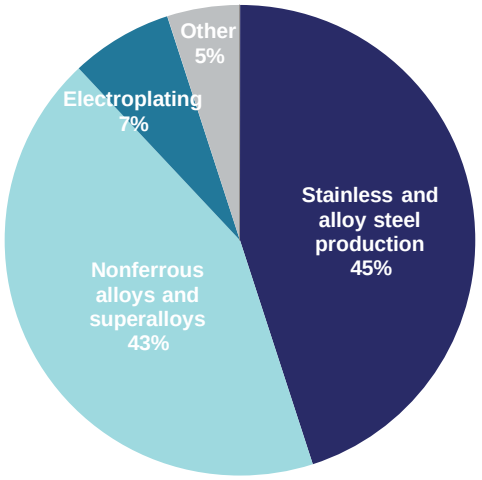
The opening of these refineries signals a potential shift in refined production from China to Indonesia. However, any shift is likely to take time and is unlikely to be smooth. While Indonesian refineries have access to cheap, high quality nickel deposits they do not have access to transport infrastructure, which will have to be built in remote areas. This is a challenge China's refineries do not face and as a result, any transfer of refined nickel production to Indonesia is likely to occur beyond the outlook period.

Figure 12.6: China's nickel import values



Source: Bloomberg.

Figure 12.7: Nickel end use by sector



Source: United States Geological Survey.

Australia

Exploration

Australia's expenditure on nickel and cobalt exploration in the June quarter decreased 35 per cent year-on-year to $17 million. This is the result of low nickel prices and the subsequent drive by many nickel producers to cut costs.

Mine production

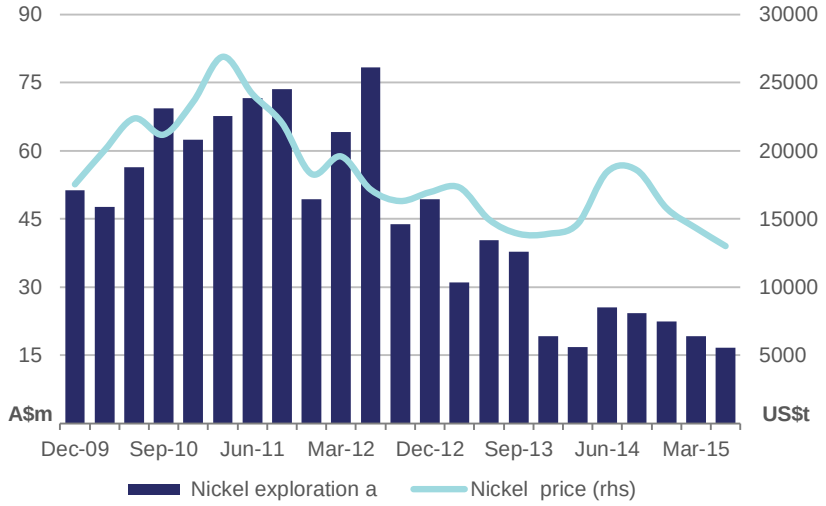
In 2015-16 Australia's mined nickel production is forecast to increase by 6 per cent to 242 000 tonnes supported by the start of production at Mount Windara and Lake Johnston and the ramp-up of production at Ravensthorpe towards capacity. Production at Ravensthorpe was cut from around 36 000 tonnes following a chemical spill in late 2014.

Over the medium term Australia's mined nickel production is forecast to increase by 4 per cent a year to 275 000 tonnes in 2019-20. Higher output from new mines or the resumption of mining activities from closed mines, including Lake Johnston, Nova Bolinger and Mount Windara, is expected to more than offset the decrease in production associated with falling output at several existing mines, including Nickel West.

Refined production

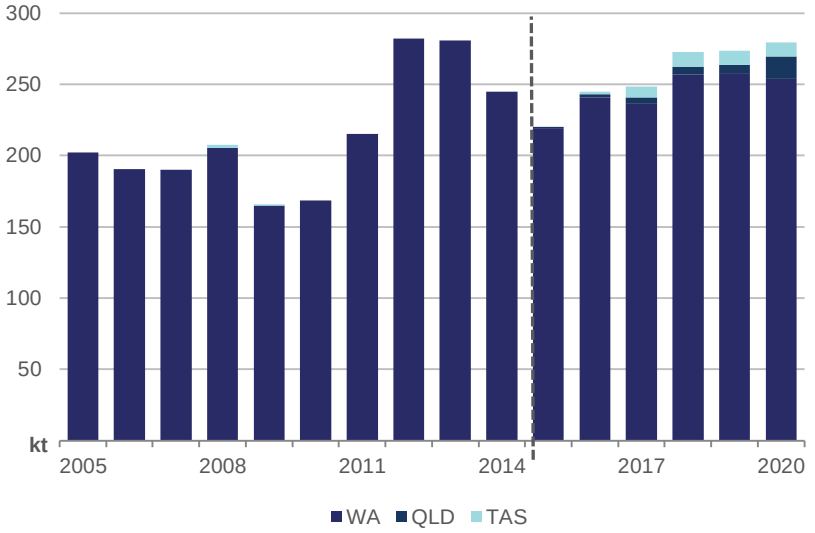
Australia's refined production is forecast to decrease by 5 per cent in 2015-16 to 104 000 tonnes driven by falling year-on-year production at Nickel West. Over the medium term Australia's refined nickel production is projected to remain relatively stable at around 104 000 tonnes a year to 2019-20. No new refined nickel capacity is expected to be developed over the outlook period as domestic energy costs are relatively high in comparison to competitors developing new capacity in Asia.

Figure 12.8: Australia's nickel exploration expenditure



a. Includes cobalt.
Sources: ABS; LME.

Figure 12.9: Australia mine production



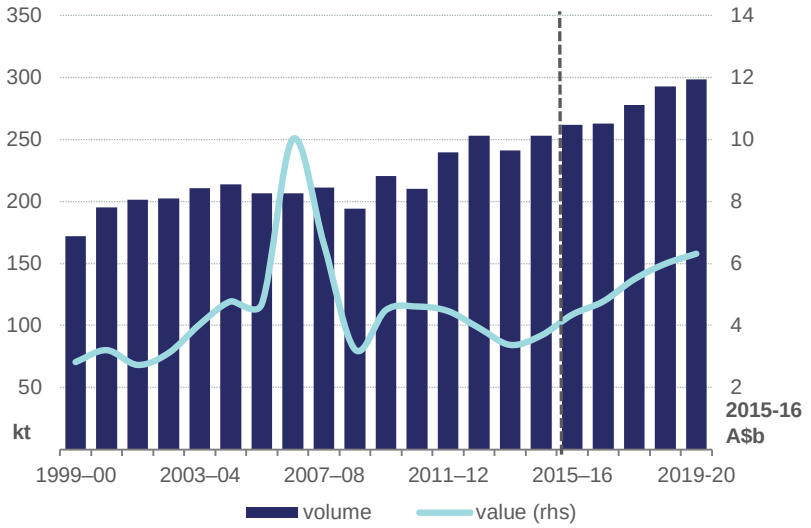
Sources: Company quarterly reports;

Exports

In 2015-16 Australia's nickel exports (metal content) are forecast to increase by 14 per cent year-on-year to 262 000 tonnes supported by increased mine output. Over the remaining outlook period, Australia's nickel exports are projected to grow by around 3 per cent a year to 299 000 tonnes in 2019-20 supported by increased mine output.

In 2015-16 Australia's export values are forecast to increase by 21 per cent to $4.3 billion supported by a rise in prices, a relatively weak Australian dollar against the US dollar and increased export volumes. Over the medium term Australia's export values are projected to increase by around 11 per cent a year to $6.3 billion (2015-16 dollars) in 2019-20 underpinned by a sustained increase in prices and an increase in export volumes.

Figure 12.10: Volume and value of Australia's nickel exports



Sources: ABS; OCE.

Table 12.1: Nickel outlook

	unit	2014	2015 f	2016 f	2017 z	2018 z	2019 z	2020 z
World								
Production								
– mine	kt	2 040	2 053	2 135	2 180	2 269	2 326	2 361
– refined	kt	1 910	1 930	1 934	1 998	2 026	2 084	2 150
Consumption	kt	1 873	1 943	2 007	2 058	2 095	2 118	2 156
Stocks	kt	390	376	303	242	173	139	133
– weeks of consumption		10.8	10.1	7.8	6.1	4.3	3.4	3.2
Price LME								
– nominal	US$/t	16 872	12 621	13 000	14 250	15 000	15 625	16 375
	Usc/lb	765	572	590	646	680	709	743
– real b	US$/t	17 260	12 621	12 708	13 616	14 011	14 267	14 615
	Usc/lb	783	572	576	618	636	647	663

Australia		**2013–14**	**2014–15**	**2015–16 f**	**2016–17 z**	**2017–18 z**	**2018–19 z**	**2019–20 z**
Production								
– mine cs	kt	261	220	242	246	261	274	275
– refined	kt	130	110	104	104	104	104	104
– intermediate	kt	72	86	87	81	75	75	75
Export volume ds	kt	241	253	262	263	278	293	299
– nominal value s	A$m	3 216	3 584	4 348	4 880	5 736	6 394	6 889
– real value es	A$m	3 373	3 675	4 348	4 775	5 492	5 989	6 315

b In current calendar year US dollars. **c** Nickel content of domestic mine production. **d** Includes metal content of ores and concentrates, intermediate products and nickel metal. **e** In current financial year Australian dollars. **f** forecast. **s** estimate. **z** projection.
Sources: ABS; International Nickel Study Group; LME; World Bureau of Metal Statistics; OCE.

Zinc

Kate Martin

Over the medium term consumption growth is projected to outpace supply growth as several large operations reach the end of their operating life, contributing to higher prices. However, the price increase will be moderated by the development of new capacity over the outlook period.

Prices

LME zinc prices averaged US$1810 in the first eight months of 2015, 3 per cent lower than the same period in 2014. Average prices were US$2194 a tonne in the June quarter, 5 per cent higher than the previous quarter. However, prices subsequently declined to a low of US$1688 a tonne in late August.

LME stocks have steadily depleted over 2015 despite lower prices, falling 10 per cent over the June quarter to 465 thousand tonnes. At the end of August this trend reversed and LME stocks increased to 523 thousand tonnes.

The zinc price is forecast to average US$2126 a tonne in 2015, 2 per cent lower than 2014. The price is forecast to recover in the December quarter, supported by growing consumption that is forecast to outpace increases in supply. These factors are forecast to continue in 2016, average prices are forecast to be 8 per cent higher than 2015, at US$2303 a tonne.

Over the outlook period new capacity will be developed, moderating price increases in the long-term. In 2020 zinc prices are projected to be US$2340 a tonne (in 2015 dollars), growing at an average annual rate of 2 per cent.

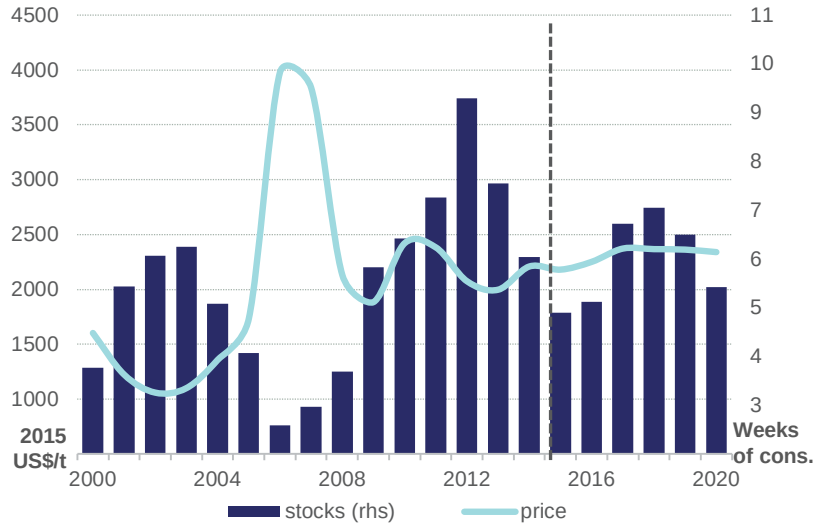
World consumption

In 2015, world zinc consumption is forecast to be almost 14 million tonnes, 3.5 per cent higher than 2014.

Figure 13.1: Zinc daily price

Source: Bloomberg.

Figure 13.2: Annual zinc prices and stocks



Source: LME; OCE.

Economic conditions are likely to support consumption growth in European and US automotive and appliance markets, with forecast annual growth of 3 and 2.4 per cent respectively.

Growth in China's consumption, which accounts for around half of world consumption, is expected to be lower than in previous years, as weaker economic conditions affect housing expenditure and car sales. Consumption in China is forecast to grow 4 per cent in 2015, to 6.5 million tonnes.

Zinc consumption is projected to expand by an average 3 per cent a year, to 16 million tonnes in 2020. Expanding middle classes will increase consumption growth in Asian markets, particularly in galvanised steel, used in automotive manufacturing. China's share of global zinc consumption is projected to grow from 46 per cent in 2015 to 50 per cent in 2020.

World production

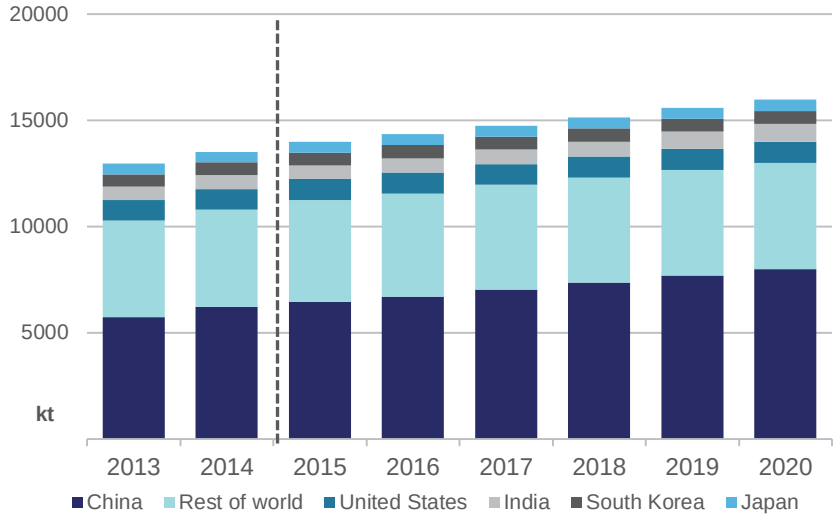
World mine production in 2015 is forecast to grow 4 per cent to 13.9 million tonnes, driven by higher production in China, India and Peru. China's production growth is forecast to slow in 2015 compared to 2014, as capacity closures have occurred with tightened environmental regulations.

Other closures occurring around the world include MMG's Century mine in Australia (500 thousand tonnes) and Vedanta's Lisheen mine in Ireland (180 thousand tonnes). This will be offset by higher production from Glencore's Macarthur River mine and Vendanta's underground operations in India.

Over the outlook period world mine production is projected to increase at an average annual rate of 3 per cent to 16.4 million tonnes in 2020. Capacity expansions and new projects are expected to come online over the outlook period to offset planned closures.

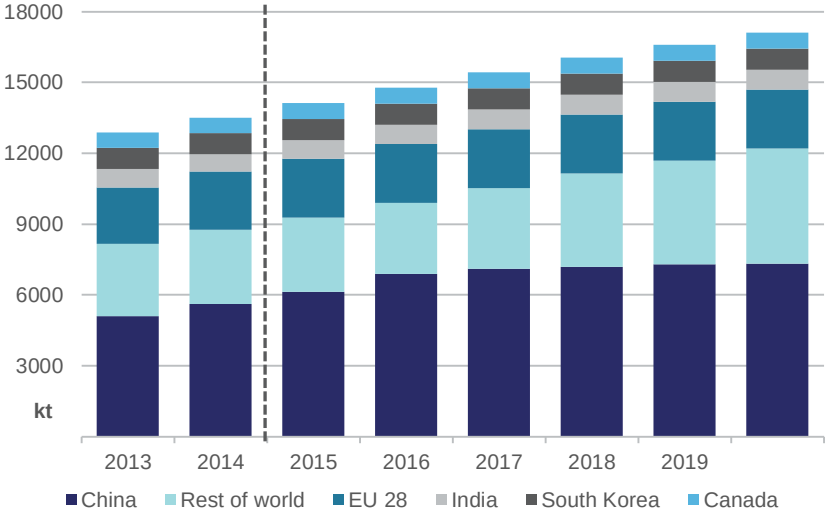
In 2015, world refined production is estimated to grow 3 per cent to 13.7 million tonnes. New capacity in China is estimated to bring 100 thousand tonnes of new production to the market in 2015 and 2016.

Figure 13.3: World zinc consumption



Sources: World Metal Statistics; International Lead and Zinc study Group; OCE.

Figure 13.4: World refined zinc production



Sources: World Metal Statistics; International Lead and Zinc Study Group; OCE.

China is forecast to produce approximately 6 million tonnes of refined zinc in 2015, around 44 per cent of world supply. Higher production from Vendanta's operations in India is forecast to support production growth outside of China.

In the medium term world production is projected to reach almost 16 million tonnes in 2020, growing at an average annual rate of 3 per cent. Output from new projects will continue to increase global supply despite closures of older refineries. Over the outlook period projects that are economically viable are expected to come online. However increasing environmental costs may affect output volumes.

Australia

Exploration

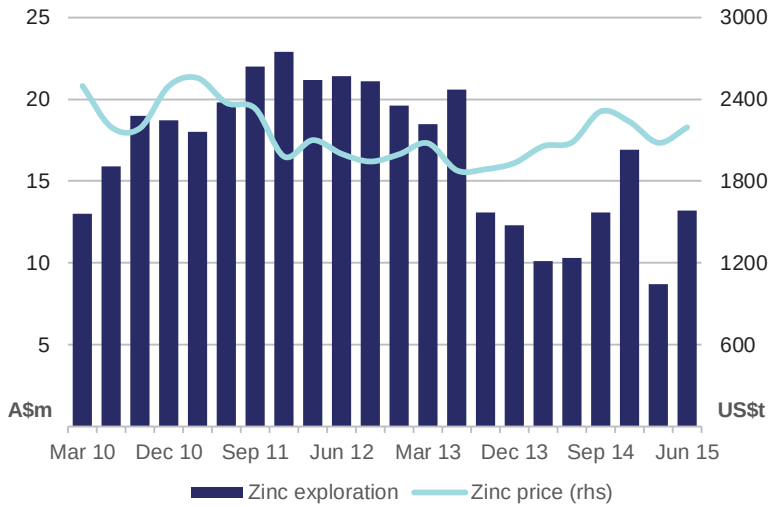
Zinc exploration activity in Australia has been increasing, driven by expectations of higher prices over the short to medium term. In 2014-15 Australia's zinc exploration expenditure was $51.9 million, 13 per cent higher than 2013-14. June quarter expenditure increased after a low March quarter, to $13.2 million, 28 per cent higher than same time last year.

Production

Australia's zinc mine production in 2014-15 was 1.7 million tonnes (in metallic content), up 13 per cent on the previous year; the first time in seven years production has increased. This is primarily related to Glencore's Mt Isa and Macarthur River expansion projects. Higher output was also recorded at MMG's Rosebury mine.

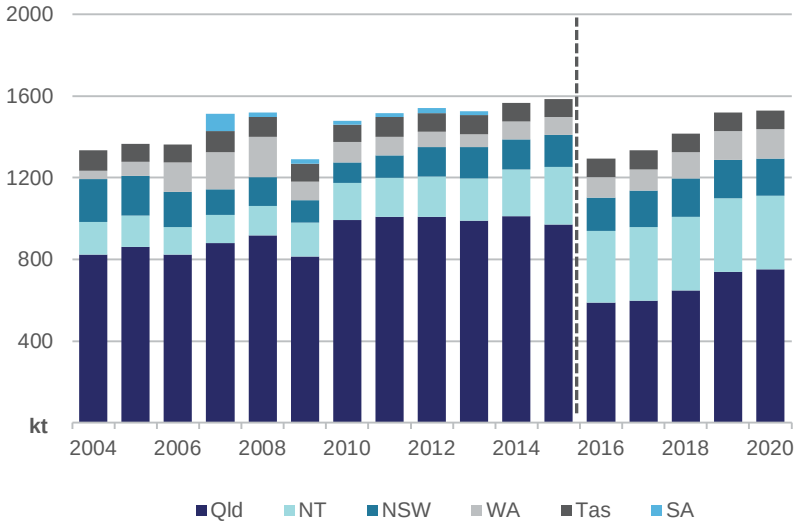
Significant changes to Australia's mine capacity are anticipated over the outlook period, as processing at Century mine concludes towards the end of 2015 and production expands at Dugald River. Over the medium term mine production is expected to decrease at an average annual rate of 1.7 per cent, to 1.6 million tonnes in 2019-20.

Figure 13.5: Australia's zinc exploration expenditure



Sources: ABS; LME.

Figure 13.6: Australian mine production



Sources: ABS; OCE.

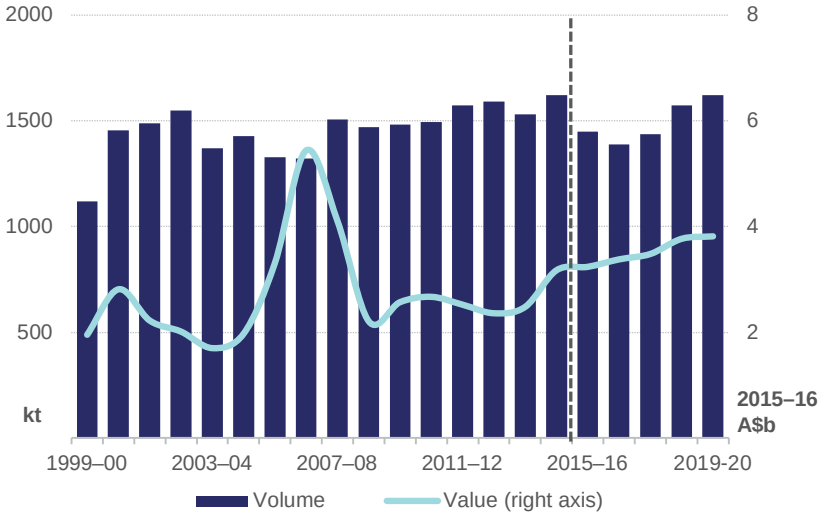
In 2014-15, Australia's refined zinc production decreased by around 1 per cent, to produce 485 thousand tonnes. Redevelopment at Nystar's Port Pirie smelter and processing changes at the Hobart smelter is expected to support annual average growth of 1 per cent to 504 thousand tonnes in 2019-20.

Exports

In 2014-15 Australia's exports of zinc were 1.6 million tonnes of zinc (total metal content), 6 per cent higher than previous year, reflecting higher production from Century and Macarthur River operations. Related export earnings were 27 per cent higher at $3 billion, related to higher prices at the end of 2014 and a lower Australian dollar.

At the end of the outlook period zinc exports are projected to remain steady at 1.6 million tonnes. In 2019-20 export values are projected to be $3.8 billion (in 2015-16 dollars), increasing at an average annual rate of 4 per cent.

Figure 13.7: Australia's zinc exports



Source: ABS; OCE.

Table 13.1: Zinc outlook

	unit	2014	2015 f	2016 f	2017 z	2018 z	2019 z	2020 z
World								
Production								
– mine	kt	13 319	13 879	14 113	14 794	15 431	15 968	16 377
– refined	kt	13 303	13 732	14 428	14 982	15 338	15 560	15 749
Consumption	kt	13 519	13 986	14 334	14 749	15 125	15 594	15 961
Closing stocks	kt	1 570	1 317	1 411	1 643	1 856	1 822	1 610
– weeks of consumption		6.0	4.9	5.1	5.8	6.4	6.1	5.2
Price								
– nominal	US$/t	2 159	2 126	2 303	2 482	2 534	2 587	2 621
	USc/lb	98	96	104	113	115	117	119
– real b	US$/t	2 209	2 126	2 251	2 372	2 367	2 362	2 340
	USc/lb	100	96	102	108	107	107	106

		2013–14	2014–15	2015–16 z	2016–17 z	2017–18 z	2018–19 z	2019-20z
Australia								
Mine output	kt	1 499	1 694	1 382	1 320	1 371	1 507	1 553
Refined output	kt	492	485	477	514	519	519	504
Export volume								
– ore and conc. c	kt	2 329	2 961	2 178	1 966	2 064	2 356	2 487
– refined	kt	438	329	431	469	474	474	459
– total metallic content	kt	1 532	1 622	1 448	1 387	1 438	1 574	1 620
Export value								
– nominal	A$m	2 366	3 095	3 238	3 454	3 637	4 023	4 161
– real d	A$m	2 482	3 174	3 238	3 379	3 482	3 769	3 815

b In current calendar year US dollars. **c** Quantities refer to gross weight of all ores and concentrates. **d** In current financial year Australian dollars.
f forecast.
Sources: ABS; International Lead and Zinc Study group; OCE.

Trade Summary Charts and Tables

Figure 14.1: Contribution to GDP, 2014-15 dollars

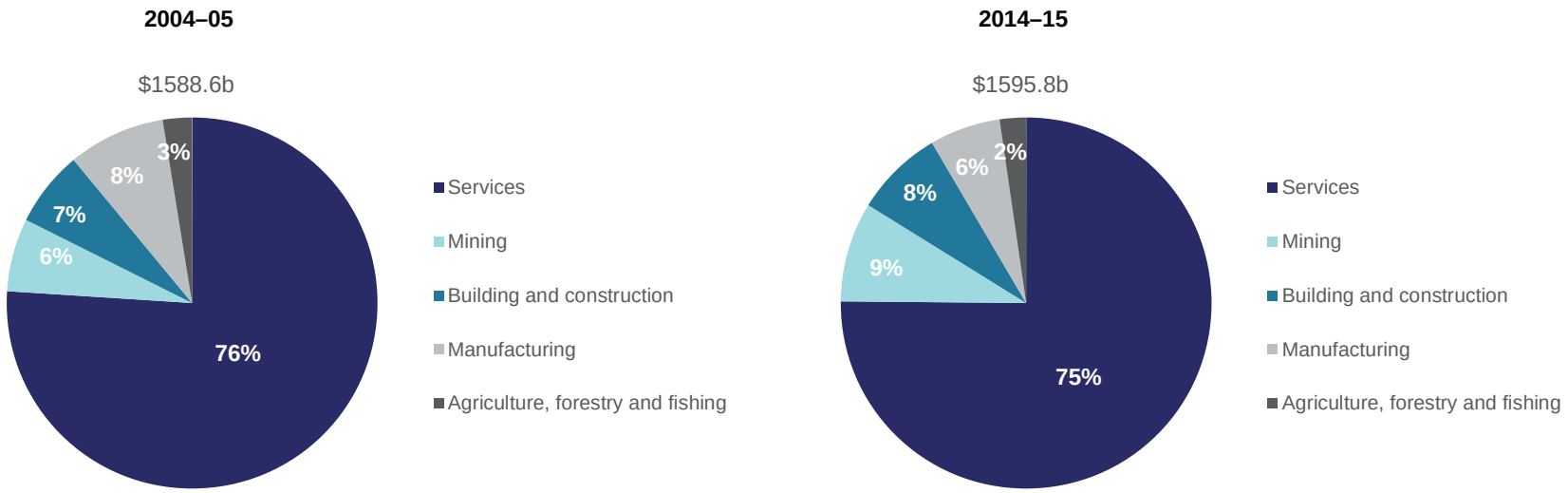


Figure 14.2: Principal markets for Australia's total imports
2014-15 dollars

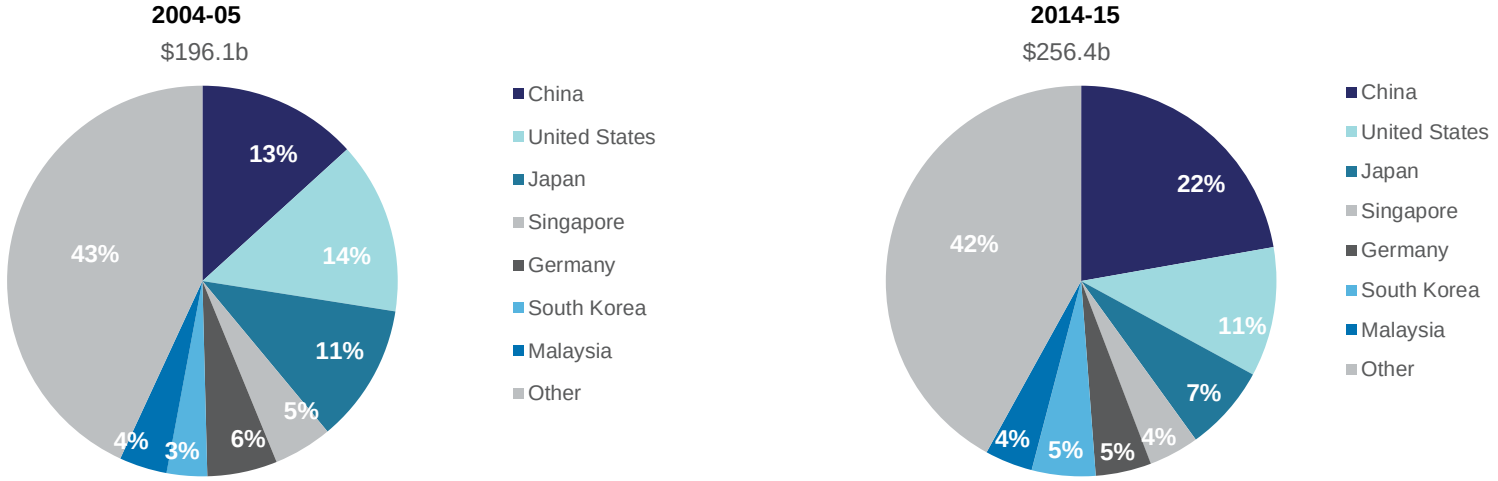


Figure 14.3: Principal markets for Australia's resources and energy imports, 2014-15 dollars

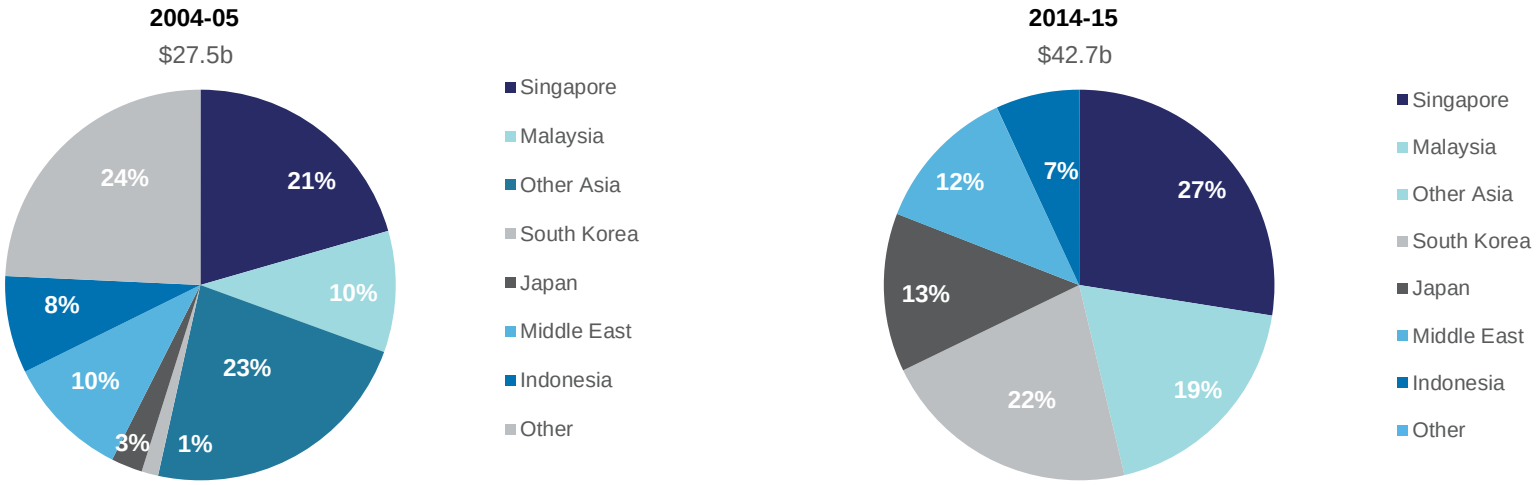


Figure 14.4: Principal markets for Australia's total exports 2014-15 dollars

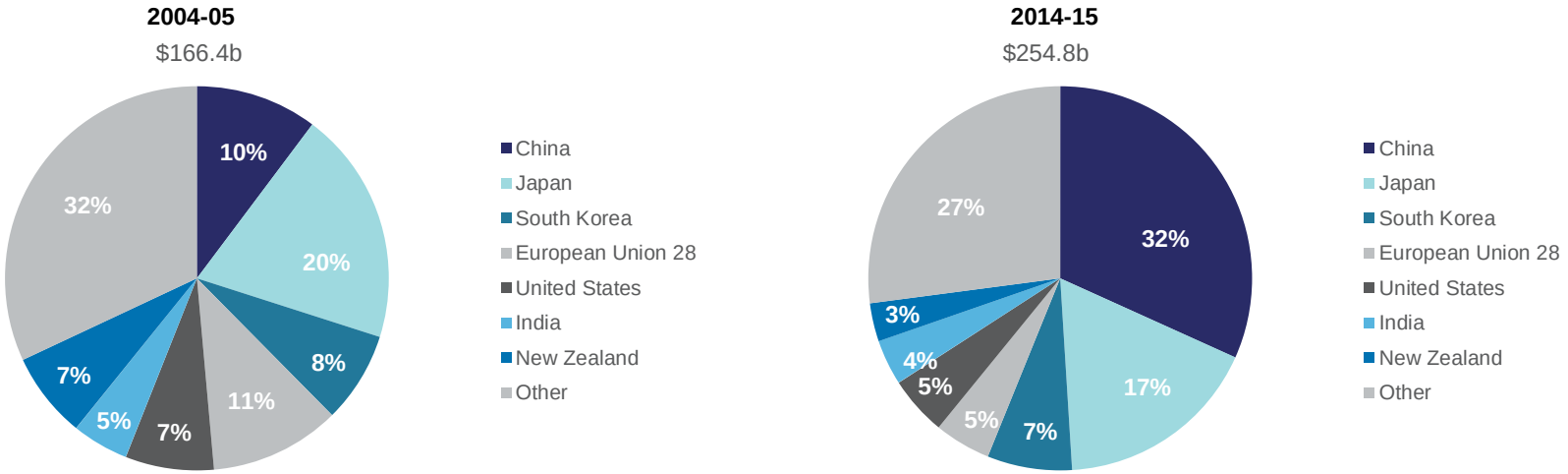


Figure 14.5: Principal markets for Australia's resources exports, 2014-15 dollars

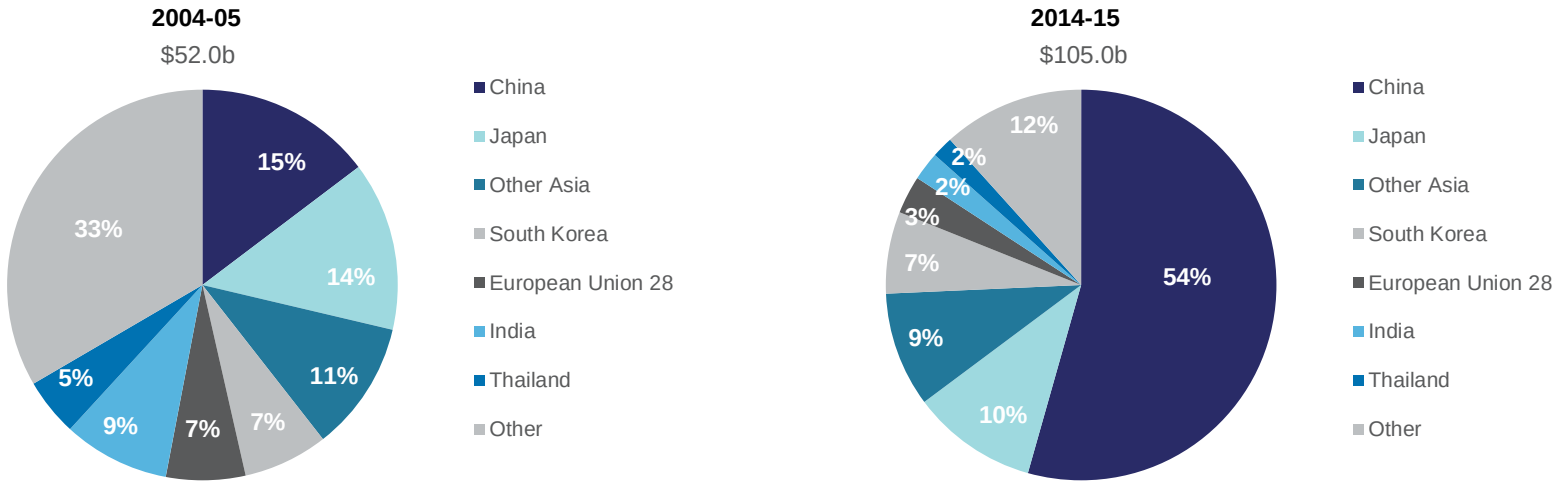


Figure 14.6: Principal markets for Australia's energy exports, 2014-15 dollars

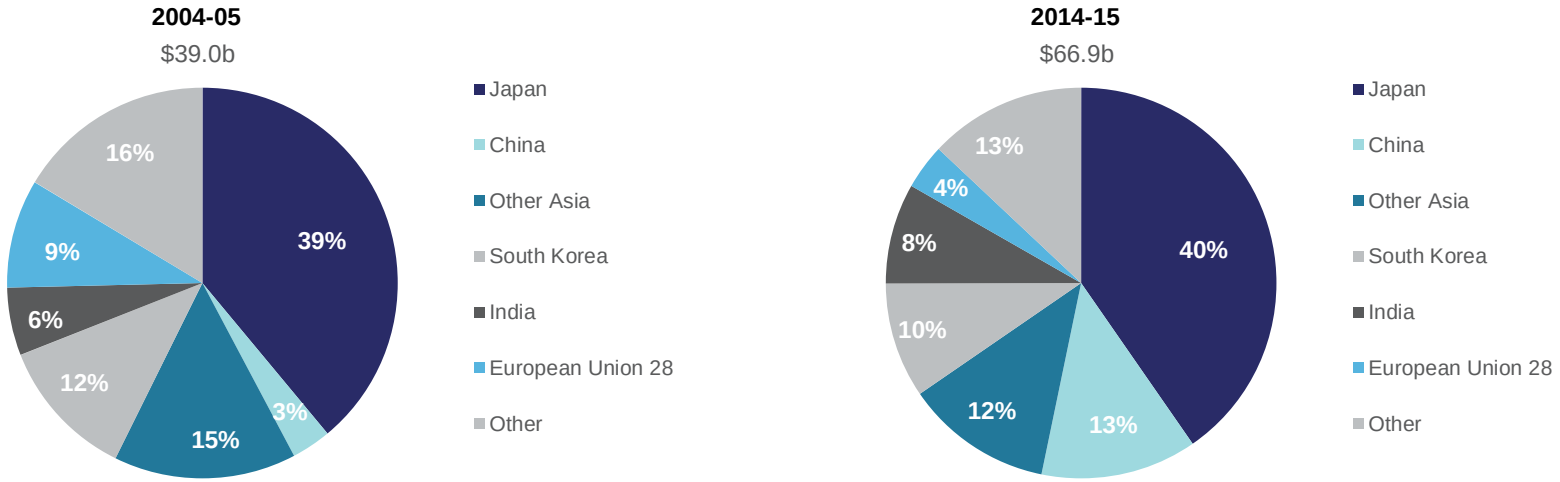


Figure 14.7: Contribution to exports by sector, 2011-12

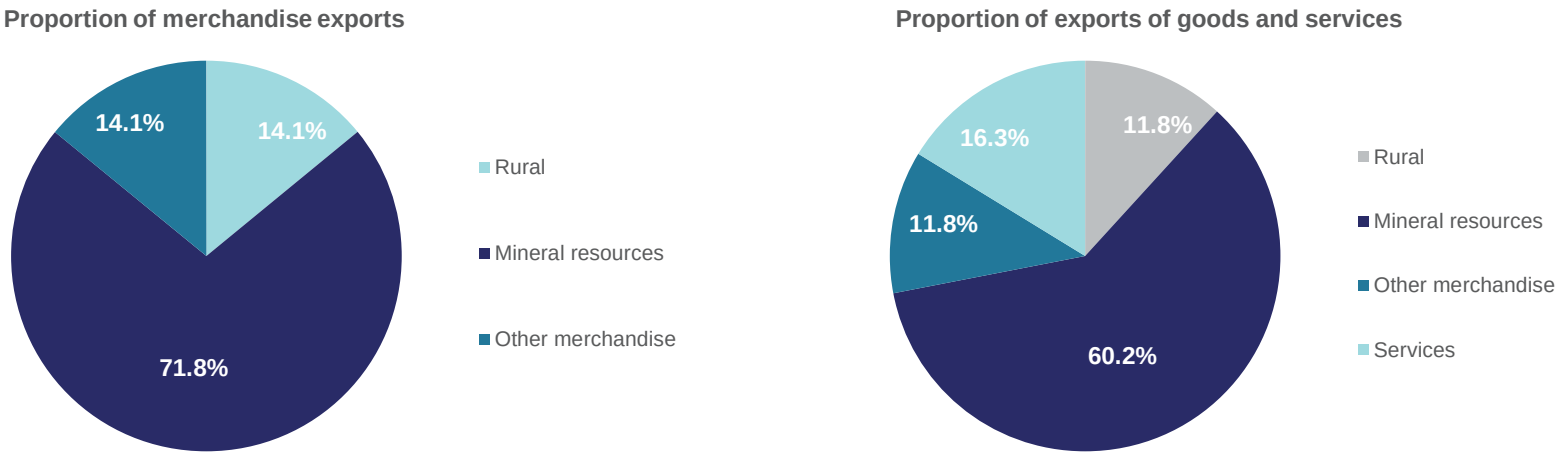


Figure 14.8: Contribution to exports by sector, 2012-13

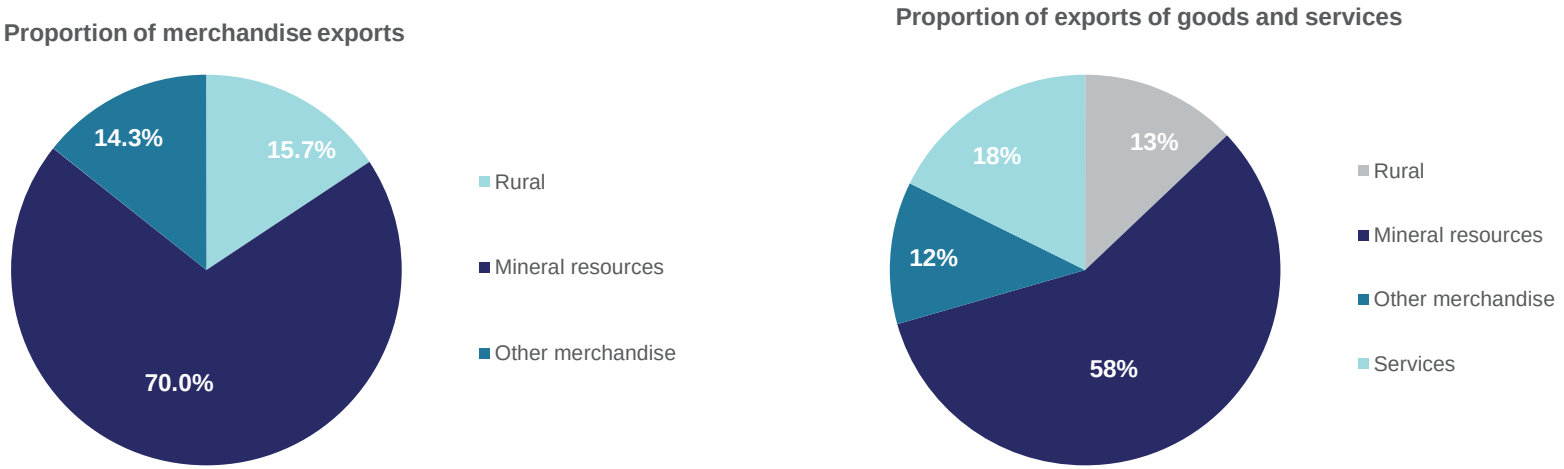
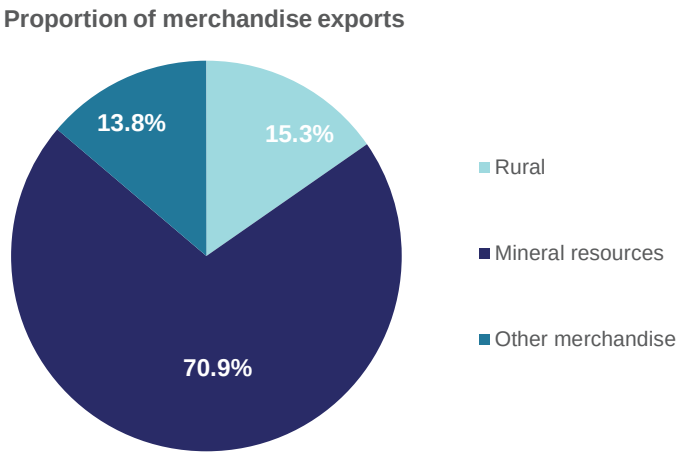


Figure 14.9: Contribution to exports by sector, 2013-14



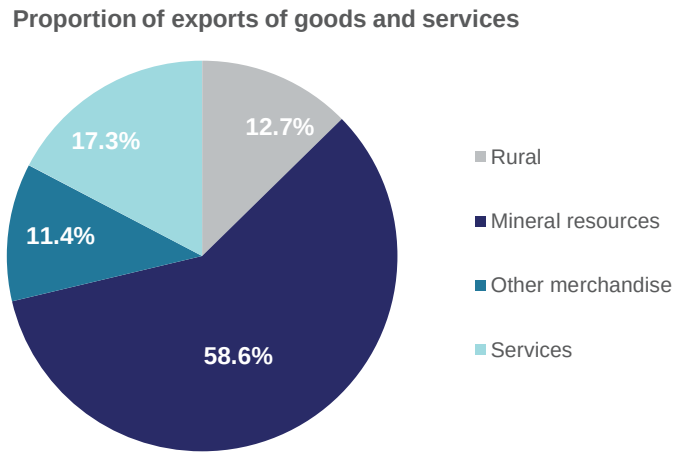
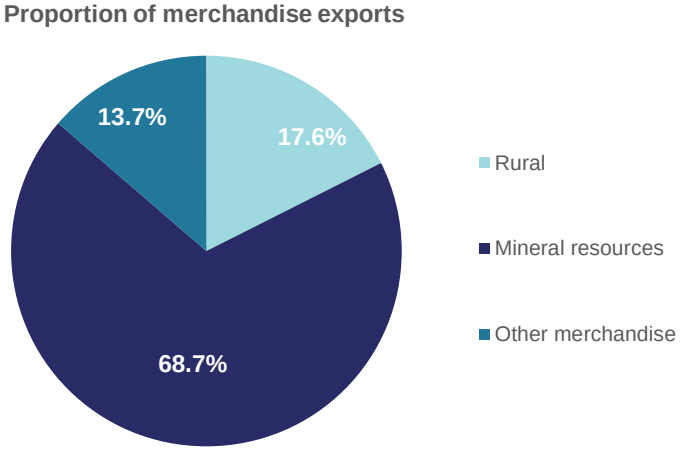
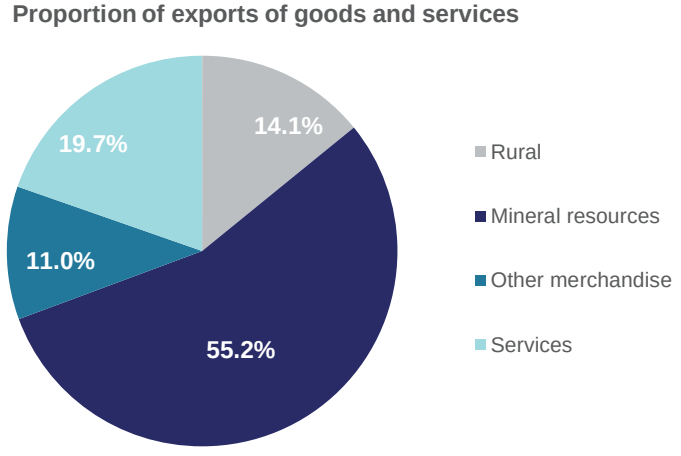


Figure 14.10: Contribution to exports by sector, 2014-15





Principal markets for Australia's thermal coal exports, 2014-15 dollars

		2010-11	2011-12	2012-13	2013-14	2014-15
Japan	A$m	7 574	8 816	8 115	7 845	7 097
China	A$m	1 741	2 916	2 999	3 533	2 737
South Korea	A$m	2 809	3 134	2 838	2 822	2 663
Chinese Taipei	A$m	2 008	1 950	1 746	1 689	1 768
Malaysia	A$m	346	382	285	352	584
Thailand	A$m	207	183	248	295	273
Total	A$m	15 321	18 370	16 966	17 087	16 062

Principal markets for Australia's metallurgical coal exports, 2014-15 dollars

		2010-11	2011-12	2012-13	2013-14	2014-15
China	A$m	3 090	3 845	4 832	5 990	4 790
Japan	A$m	9 384	9 466	6 249	5 625	4 614
India	A$m	7 771	6 934	4 813	4 921	5 022
South Korea	A$m	4 101	4 111	2 549	2 514	2 381
Chinese Taipei	A$m	1 853	1 972	1 211	1 191	1 142
Netherlands	A$m	1 045	1 360	1 020	1 027	832
Total	A$m	32 707	32 945	23 539	23 785	21 847

Principal markets for Australia's oil and gas exports, 2014-15 dollars

		2010-11	2011-12	2012-13	2013-14	2014-15
Japan	A$m	11 569	13 840	15 141	16 271	15 463
China	A$m	3 275	3 896	2 844	1 853	1 953
South Korea	A$m	2 880	1 870	2 276	1 422	1 947
Singapore	A$m	2 063	2 928	2 823	2 350	2 153
Thailand	A$m	1 926	1 048	863	1 679	1 267
India	A$m	1 010	317	185	256	214
Total	A$m	25 966	27 635	27 764	29 895	26 925

Principal markets for Australia's gold exports, 2014-15 dollars

		2010-11	2011-12	2012-13	2013-14	2014-15
China	A$m	694	4 574	6 280	8 269	6 954
Singapore	A$m	1 224	1 204	991	2 325	3 114
United Kingdom	A$m	3 843	4 853	2 745	655	583
Turkey	A$m	0	69	490	550	157
Thailand	A$m	2 598	1 725	1 334	455	897
Switzerland	A$m	9	36	300	352	15
Total	A$m	14 289	16 593	15 798	13 307	13 052

Principal markets for Australia's iron ore exports, 2014-15 dollars

		2010-11	2011-12	2012-13	2013-14	2014-15
China	A$m	43 867	46 643	44 003	58 331	42 010
Japan	A$m	11 351	11 671	9 040	9 885	6 694
South Korea	A$m	6 643	6 940	5 170	6 237	4 047
Chinese Taipei	A$m	2 126	1 926	1 570	1 749	1 297
Indonesia	A$m	0	0	0	113	213
India	A$m	0	0	50	42	109
Total	A$m	64 099	67 280	59 885	76 376	54 411

Principal markets for Australia's aluminium exports, 2014-15 dollars

		2010-11	2011-12	2012-13	2013-14	2014-15
Japan	A$m	1 541	1 419	1 053	1 140	1 455
South Korea	A$m	954	628	711	697	767
Chinese Taipei	A$m	571	399	478	454	497
Thailand	A$m	356	351	382	310	286
China	A$m	151	203	157	238	50
Indonesia	A$m	286	324	261	200	137
Total	A$m	4 587	4 074	3 438	3 558	3 832

Principal markets for Australia's copper exports, 2014-15 dollars

		2010-11	2011-12	2012-13	2013-14	2014-15
China	A$m	2 698	2 679	3 186	4 028	3 669
Japan	A$m	1 500	1 594	1 694	1 661	1 985
India	A$m	1 479	1 557	1 164	967	816
Malaysia	A$m	712	753	710	625	527
South Korea	A$m	1 108	924	460	598	367
Philippines	A$m	201	21	148	291	257
Total	A$m	9 245	9 123	8 440	8 905	8 514

Principal markets for Australia's iron and steel exports, 2014-15 dollars

		2010-11	2011-12	2012-13	2013-14	2014-15
United States	A$m	294	176	135	107	223
New Zealand	A$m	97	91	83	97	106
Thailand	A$m	156	119	105	37	60
Indonesia	A$m	57	53	46	37	19
Philippines	A$m	2	2	3	20	3
Brazil	A$m	40	89	17	18	0
Total	A$m	1 430	1 055	861	740	692