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Department of Industry, Science, Energy and Resources

Office of the Chief Economist

Resources and Energy Quarterly

September 2020

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Editor

David Thurtell

Chapter Authors

Resource and energy overview: David Thurtell

Macroeconomic overview, oil: Nathan Pitts

Steel, iron ore, uranium: Mark Gibbons

Metallurgical and thermal coal: Jeremy Coghlan

Gas: Monica Philalay

Gold, aluminium, alumina and bauxite: Thuong Nguyen

Copper and Nickel: Kate Martin

Zinc, lithium: Caroline Lewis

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Contents

Foreword

In the June 2020 *Resources and Energy Quarterly* (REQ) we pointed out that "unlike downturns in previous decades, this downturn was not due to the bursting of excesses built up in the financial system…or in equity markets…. It also differs from the 1970s recessions…which helped contribute to stagflation and forced a wholesale restructure of the world's energy system." An inference was that the current downturn would likely be sharp but short relative to those earlier episodes, particularly if COVID-19 containment measures were successful, and large fiscal and monetary stimulus took effect. And, so far, the downturn in output of the world's industrial sector — the main consumer of energy and resource commodities — has indeed been sharp but relatively short.

Probably the most notable development since the last REQ has been the sharp rebound in the Chinese economy — the world's biggest consumer of resource and energy commodities. The rebound is the result of the almost complete eradication of COVID-19 in China, the subsequent easing of containment measures, and policy efforts to offset the impacts of the global COVID-19 pandemic.

The other notable development of the past several months has been the spread of COVID-19 in the United States. The high prevalence of COVID-19 in the US compared to other major economies has contributed to recent US dollar weakness; this weakness has boosted the US dollar price of commodities but had an adverse impact on the local currency returns of our exporters as the A$/US$ has risen. The US share market appears to have shrugged the effect on the US economy of the COVID-19 outbreak. But the large US 'tech' companies — which dominate the US share market — have benefitted disproportionately from a surge in domestic and offshore investor interest as the pandemic forces people around the world to work, learn, shop and socialise online.

In the outlook period, resource and energy commodity exports are likely to remain a major source of support to the Australian economy as it recovers from the largest global contraction since World War II. In line with IMF forecasts, we assume the world economy contracts by about 5 per cent in 2020, but grows by 5.4 per cent in 2021. Iron ore earnings remain extremely high, after setting an all-time record in 2019–20: strong demand from China has added to the impact of supply problems in Brazil, where COVID-19-related workplace issues have derailed efforts to recover from shutdowns in the wake of the Brumadinho tailings dam collapse. After topping $102 billion in 2019–20, Australian iron ore export earnings are forecast to be $97 billion in 2020–21. Gold has lifted even higher since our last report, and export earnings are on track to set a new record (of about $31 billion) in 2020–21. Base metals have recovered further, and the prices of copper and nickel are now back to pre-COVID-19 levels. Both have relatively constrained long term supply prospects against a backdrop of healthy demand, especially for use in new age technologies.

The prices of energy commodities are steadily recovering, as global demand recovers and supply cuts cause markets to tighten. Data show that China took advantage of low prices to stockpile oil and LNG in the June quarter 2020, helping to put a base under prices. The 'baseline' forecast scenario adopted for the oil price in the June 2020 REQ appears likely to be the most accurate of the four scenarios we constructed. As a result of the direct (but lagged) link between oil prices and LNG contract prices, Australian LNG export revenues are still forecast to fall sharply in 2020–21. Spot LNG prices are recovering strongly as (mainly US) supply is cut back and demand picks up. Coal prices have steadied at low levels, and are likely to edge higher through 2020–21 as supply cuts and rising demand depletes inventories.

Resource and energy exports are forecast to be $256 billion in 2020–21, but fall to $252 billion in 2021–22. Resource and energy exports are therefore expected to continue to make an important contribution to the Australian economy during the outlook period. The forecasts have notable risks on both sides: on the downside, a COVID-19-induced, protracted economic slump in the US would hurt Asia (and thus Australia) as its major supplier of manufactures. An upside risk is potential for a successful COVID-19 vaccine and/or treatment that would boost business and consumer confidence, and lift economic activity once a sufficient number of vulnerable people have been inoculated.

About this edition

The *Resources and Energy Quarterly* (REQ) contains the Office of the Chief Economist's forecasts for the value, volume and price of Australia's major resources and energy commodity exports.

A 'medium term' (five year) outlook is published in the March quarter edition of the *Resources and Energy Quarterly*. Each June, September and December edition of the *Resources and Energy Quarterly* features a 'short term' (two year) outlook for Australia's major resource and energy commodity exports. The December *Resources and Energy Quarterly* also includes the annual Major Projects update.

Underpinning the forecasts/projections contained in the *Resources and Energy Quarterly* is the Office of the Chief Economist's outlook for global resource and energy commodity prices, demand and supply. The forecasts/projections for Australia's resource and energy commodity exporters are reconciled with this global context.

The global environment in which Australia's producers compete can change rapidly. Each edition of the *Resources and Energy Quarterly* attempts to factor in these changes, and makes appropriate alterations to the forecasts/projections by estimating the impact on Australian producers and the value of their exports.

In this report, commodities are grouped into two broad categories, referred to as 'resources' and 'energy'. 'Energy' commodities comprise metallurgical and thermal coal, oil, gas and uranium. 'Resource' commodities in this report are all other mineral commodities.

Unless otherwise stated, all Australian and US dollar figures in this report are in nominal terms. Inflation and exchange rate assumptions are provided in tables 2.1 and 2.2 in the *macroeconomic outlook* chapter.

Data in this edition of the *Resources and Energy Quarterly* is current as of 17 September 2020.

Resources and Energy Quarterly publication schedule

Publication	Expected release date	Outlook period final year
December 2020	21 December 2020	Australian data: 2021–22 World data: 2022
March 2021	29 March 2021	Australian data: 2025–26 World data: 2026
June 2021	28 June 2021	Australian data: 2022–23 World data: 2023
September 2021	30 September 2021	Australian data: 2022–23 World data: 2023

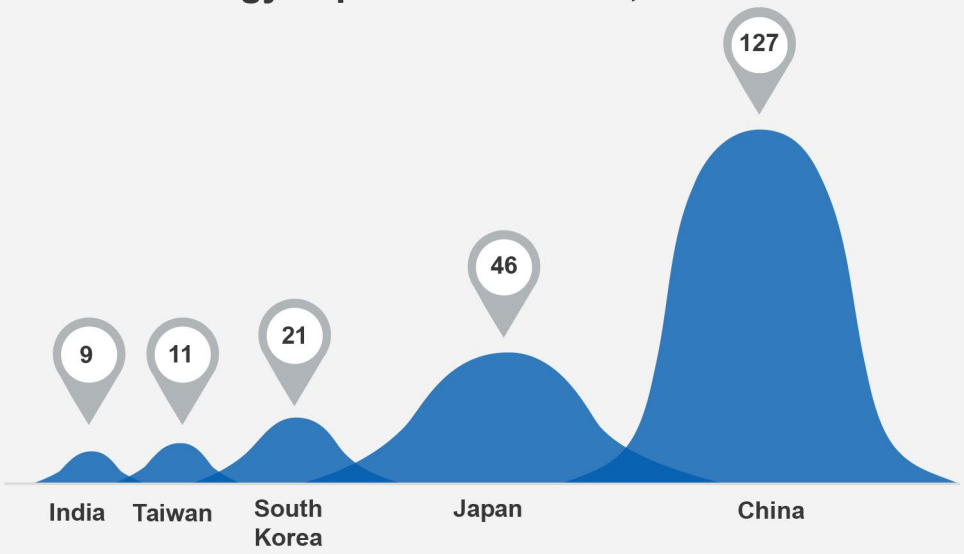
Source: Department of Industry, Science, Energy and Resources (2020)

Overview

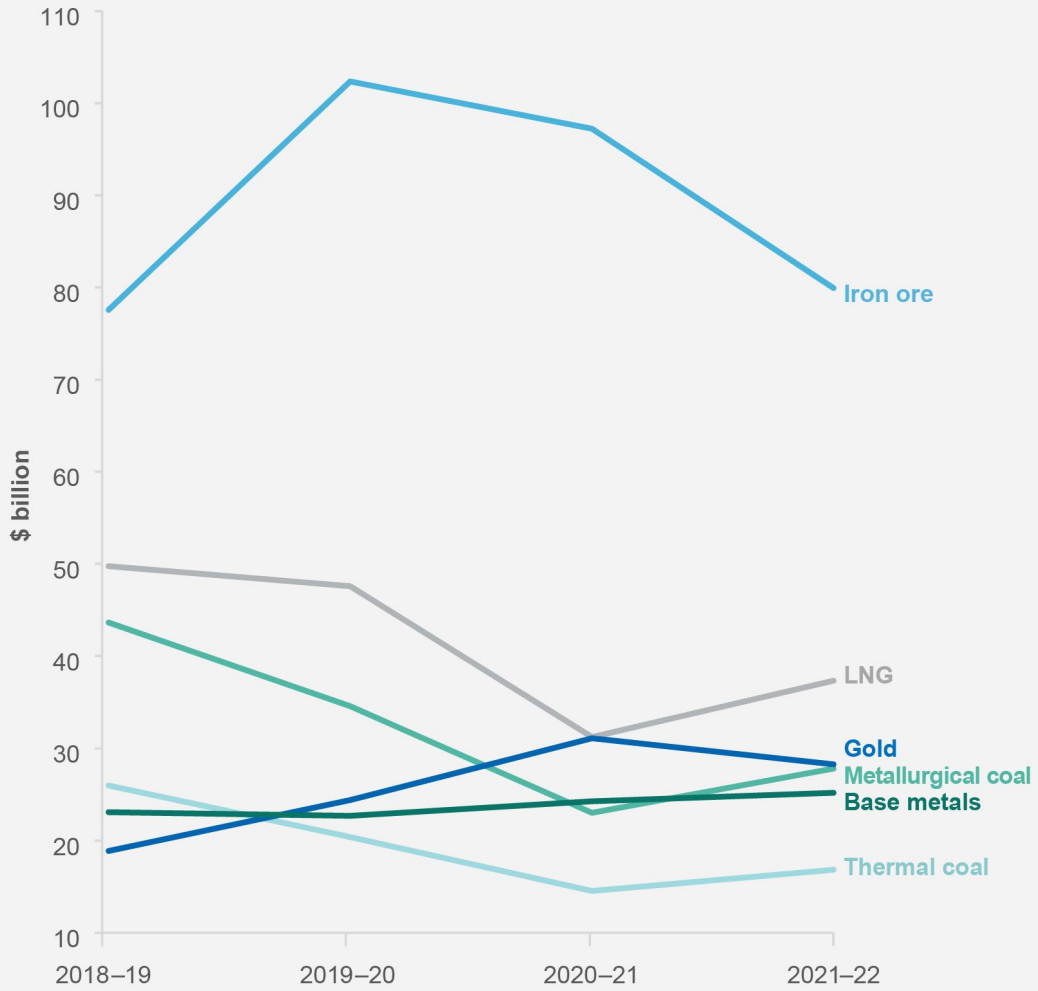
Australia's mining sector

- **9% of GDP**
- Makes up more than **half of Australia's** total exports
- **Directly employs around** a quarter of a million people

Major markets for Australia's resources and energy exports in 2019–20, A$billion



Australia's resources and energy exports



1.1 Summary

- The world economy is showing some recovery from the impacts of the COVID-19 pandemic. However, the recovery is highly regional and vulnerable to renewed containment measures. Supply cutbacks — some voluntary and some due to COVID-19 related workforce problems — have cut inventories and so helped to raise prices.
- Iron ore prices have made a 6-year high and gold is at all-time high. Thermal coal prices remain weak, due to excess supply and to power utilities switching to gas. US dollar weakness has helped base metal prices recover most of their COVID-19 pandemic losses.
- Australia's resource and energy exports in 2020–21 and 2021–22 are forecast to fall noticeably from the record $290 billion registered in 2019–20. Lower iron ore and energy export values and a stronger Australian dollar, are likely to be the main driving forces.

1.2 Export values

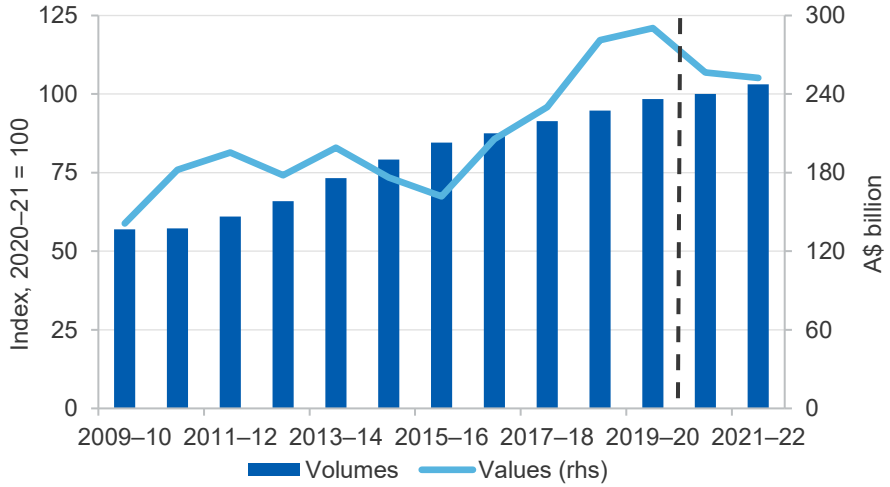
Australia's export values were a record $290 billion in 2019–20

In the September quarter 2020, the Office of the Chief Economist's (OCE) Resources and Energy Export Values Index was down 21 per cent from a year before; an 18.4 per cent fall in prices added to a 4.6 per cent volume decline. In the outlook period, low prices and Australian dollar gains will likely more than offset modest export volumes gains: exports are forecast at $256 billion in 2020–21 and $252 billion in 2021–22, down from a record $290 billion in 2019–20 (Figure 1.1) — when a 3.9 per cent rise in volumes more than offset the impact of a 0.1 per cent fall in prices (Figure 1.2).

Ongoing weakness in the Australian dollar is helping to support earnings

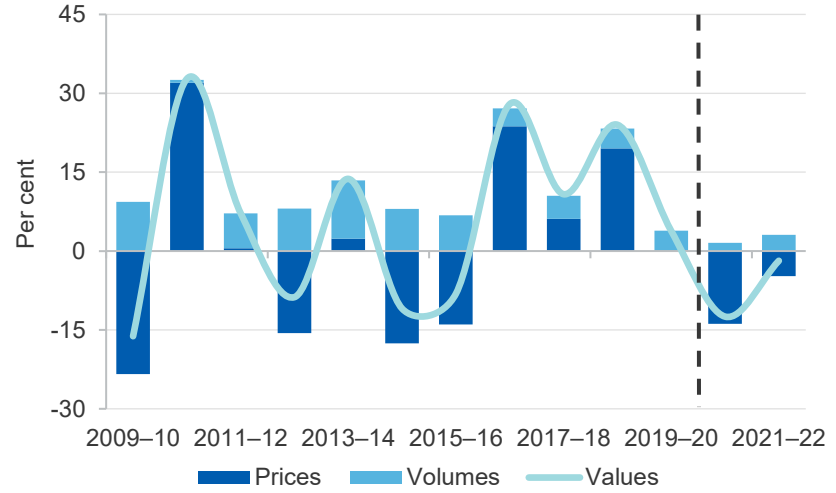
In Australian dollar terms, the OCE's Resources and Energy Commodity Price Index fell by 8.1 per cent (preliminary estimate) in the September quarter to be down 18.4 per cent on a year ago. In US dollar terms, the index fell by 0.1 per cent in the quarter, and was 14.9 per cent lower than a year ago. The index of prices for resource commodity exports (Australian dollar terms) fell by 2.6 per cent in the year to the September quarter 2020, while energy commodity prices fell by 40.5 per cent (Figure 1.3).

Figure 1.1: Australia's resource and energy export values/volumes



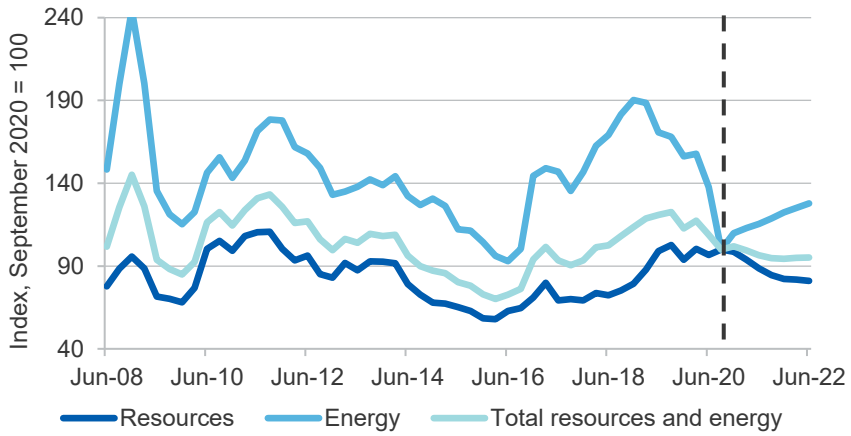
Source: ABS (2020) International Trade in Goods and Services, 5368.0; Department of Industry, Science, Energy and Resources (2020)

Figure 1.2: Annual growth in Australia's resources and energy export values, contributions from prices and volumes



Source: ABS (2020) International Trade in Goods and Services, 5368.0; Department of Industry, Science, Energy and Resources (2020)

Figure 1.3: Resource and energy export prices, AUD terms



Notes: The export price index is based on Australian dollar export unit values (EUVs, export values divided by volumes); the export price index is a Fisher price Index, which weights each commodity's EUV by its share of total export values.

Source: ABS (2020) International Trade in Goods and Services, 5368.0; Department of Industry, Science, Energy and Resources (2020)

1.3 Macroeconomic, policy, trade and other factors

While its impacts are easing, the COVID-19 pandemic now appears likely to result in the largest contraction in the world economy since the 1930s. The easing of containment measures in some nations led to a new surge in infections, postponing a fuller/faster economic recovery. The global economic downturn has been concentrated in the services (mainly travel and hospitality) sector, with the (metal-consuming) manufacturing sector staging a recovery, initially in China but then in other industrial nations.

The most notable development in resource and energy commodity markets in the past few months has been the strength of Chinese demand, as the level of economic activity in China recovers to pre-COVID-19 levels. The Chinese economic recovery has been driven by the easing of COVID-19 containment measures, increased government infrastructure spending, and the property market's response to looser monetary policy. China's property sector accounts for 25-30 per cent of China's steel demand, and is also a large base metal consumer.

Oil and gas demand is likely to recover further, as stockpiling occurs ahead of the Northern Hemisphere winter. The adverse impact of the COVID-19 pandemic on global energy usage has been gradually easing, as travel restrictions are eased slowly and industrial output recovers. International air travel is slowly recovering, as the likes of China and many European countries relax bans on foreign entry from some countries. It may be several more quarters before international travel returns to pre-COVID-19 levels.

Supply cutbacks — some voluntary and a smaller amount due to COVID-19 related workforce problems — have contributed to a decline in inventories of some resource and energy commodities. Lower supply has helped to raise prices or prevent further falls. The decline in energy prices will continue to act as a de facto tax cut to energy users.

Changes in US-China trade could affect both world growth and resource and energy commodity trade over the outlook period. China has increased its imports of US oil and LNG (from a low base), but decade-low oil and LNG prices have made it more difficult to meet purchase targets under the US-China Phase One trade deal.

The European Central Bank and the US Federal Reserve have gone to significant lengths to keep the supply of money and credit flowing, and other central banks have also continued to give significant support to their economies. Fiscal support will be wound back as governments ease COVID-19 containment measures. Some governments will spend more on infrastructure to try to offset likely ongoing weakness in the hospitality and international travel sectors. Increased infrastructure spending over the outlook period will also be resource-commodity intensive, boosting resource commodity demand.

Assuming the worst of the global COVID-19 outbreak has passed by the end of 2020, it is assumed that world GDP will decline by 5 per cent in 2020, before growth of about 5.5 per cent is recorded in 2021. World GDP growth is assumed to moderate to typical levels in 2022. Resource and energy commodity demand should thus recover over the outlook period.

1.4 Prices

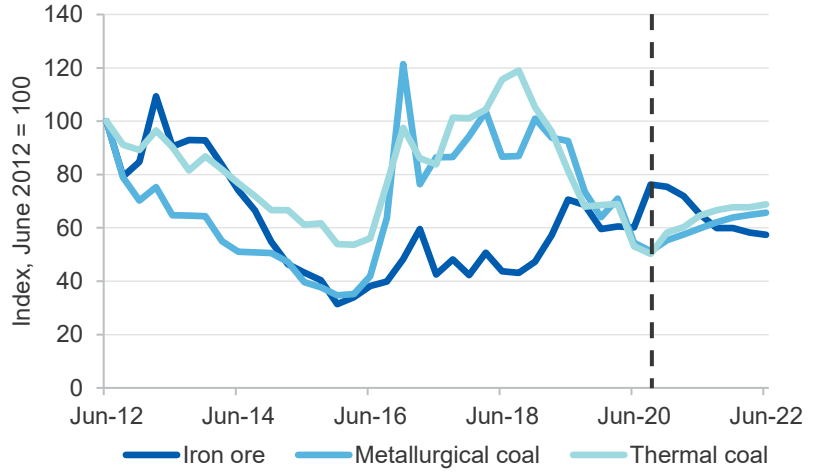
The iron ore price has risen noticeably since the June 2020 *Resources and Energy Quarterly*. Strong Chinese demand has combined with supply disruptions in Brazil to push prices to a six year high. Healthy margins in the Chinese steel industry — partly due to low metallurgical coal prices — have allowed mills to bid up iron ore prices (Figure 1.4).

After dropping sharply in the June quarter 2020, the prices of metallurgical and thermal coal have steadied at relatively low levels. Metallurgical coal prices have been kept low by extremely weak ex-Chinese demand. A modest rise in prices is likely over the outlook period, as high-cost mines are closed and demand recovers. Weak demand from Asian coal-fired power utilities (as many of them switch to using gas) has kept downward pressure on the thermal coal price. Prices are likely to rebound modestly over the outlook period, as demand recovers (Figure 1.4).

Oil prices are steadily regaining some of the sharp declines of the first four months of 2020. Production cuts have combined with a recovery in demand to remove excess inventory from the market. Oil demand is recovering as COVID-19-inspired movement restrictions are eased. The price should recover further, but seems likely to be capped at the US$60 a barrel mark, as US producers re-enter the market. The value of Australian LNG exports is expected to dip sharply in 2020–21, as 75 per cent of our LNG is sold under contract at prices linked to the price of oil.

The gold price pushed above the US$2,000 an ounce mark — an all-time high — in early August, on the back of declining bond yields and rising safe haven demand. Forecast price strength during the last five months of 2020 is likely to attract strong scrap supply and deter jewellery demand in price-sensitive markets such as India and China. Further out, the price is likely to decline as equity markets recover more broadly and as bond yields rise. Base metal prices have recovered significantly on the back of the Chinese economic rebound. Nickel and copper are back to pre-COVID levels. Base metal demand should rebound as industrial activity recovers further from COVID-19 shutdowns (Figure 1.5).

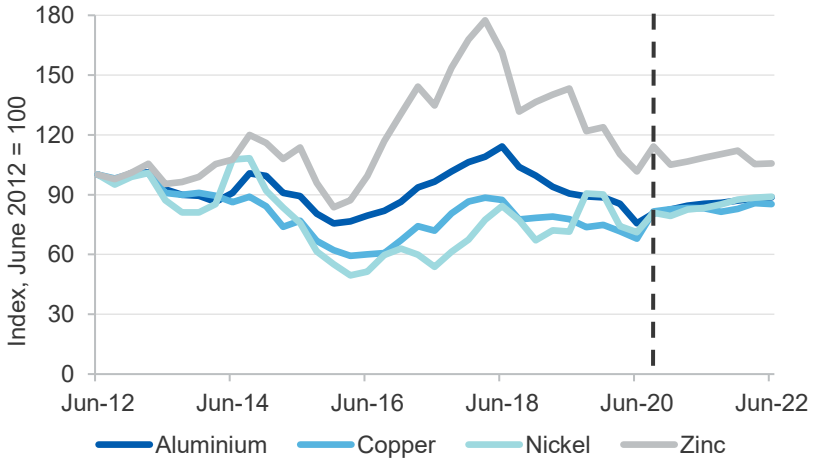
Figure 1.4: Bulk commodity prices



Notes: Prices are in US dollars, and are the international benchmark prices

Source: Bloomberg (2020); Department of Industry, Science, Energy and Resources (2020)

Figure 1.5: Base metal prices



Notes: Prices are in US dollars, and are the international benchmark prices

Source: Bloomberg (2020); Department of Industry, Science, Energy and Resources (2020)

1.5 Export volumes

Export volumes to grow, driven by resource exports

The OCE's Resources and Energy Export Volumes Index (preliminary estimate) fell by 4.0 per cent in the September quarter 2020 from the June quarter 2020, and was 4.6 per cent lower than a year before. Within this, resource commodity volumes fell by 1.7 per cent over the year to the September quarter, while energy commodity volumes fell by 9.6 per cent. In volume terms, resources exports are expected to show modest growth over the outlook period, while energy exports will rise in 2020–21 and then flatten.

1.6 Contribution to growth and investment

Mining industry continues to support economic growth

Australia's real Gross Domestic Product (GDP) fell by 7.0 per cent in the June quarter 2020, and by 6.3 per cent through the year since the June quarter 2019. Mining value-added rose by 0.3 per cent in the June quarter, to be up 1.1 per cent over the previous twelve months, driven by growth in iron ore and 'other' mining.

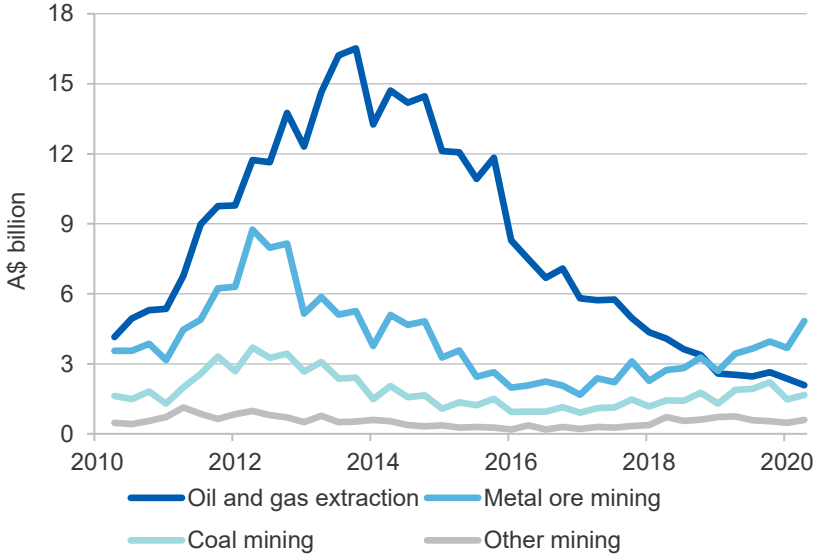
Iron ore mining made a significant contribution to growth. For the second successive quarter, the coal mining sector did not contribute to growth in the June quarter. In the coming year, it is likely that this sector will make little contribution to GDP growth, as low prices and mine closures and cutbacks impact on the sector's output.

Mining investment is picking up

The ABS Private New Capital Expenditure and Expected Expenditure June quarter 2020 survey shows that Australia's mining industry invested $9.2 billion in the quarter, up 6.7 per cent from the June quarter 2019.

Commodity prices have held up relatively well throughout the COVID-19 pandemic. This continues a two year trend of solid commodity prices, which has supported a gradual lift in capital spending. In recent quarters, growth in investment by the metal ore mining sector has been particularly strong, likely reflecting surging iron ore prices (Figure 1.6).

Figure 1.6: Mining industry capital expenditure by commodity



Notes: Other mining includes non-metallic mineral mining and quarrying and exploration and other mining support services; chart data is in nominal terms

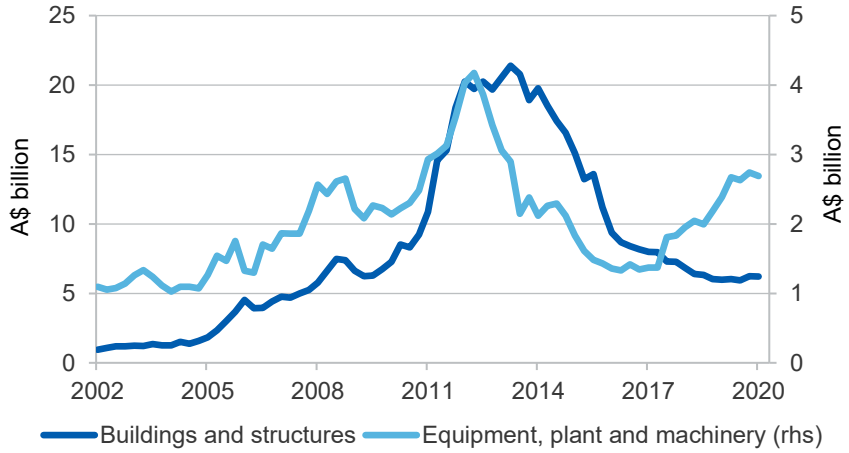
Source: ABS (2020) Private New Capital Expenditure and Expected Expenditure, 5625.0

Expenditure across the mining sector as a whole has been previously supported by rising investment in machinery and equipment, which was up by 13 per cent over the year to the June quarter (Figure 1.7). However, this growth now appears to have stalled, with investment edging down slightly in quarterly terms.

Mining companies invested $35 billion in 2019–20, with forward expectations suggesting that investment in 2020–21 will be little changed (Figure 1.8).

Strong prices for gold, iron ore and other minerals are leading to new investment plans, including the re-opening of mines. However, investment in new greenfield projects remains well below the levels of the previous decade.

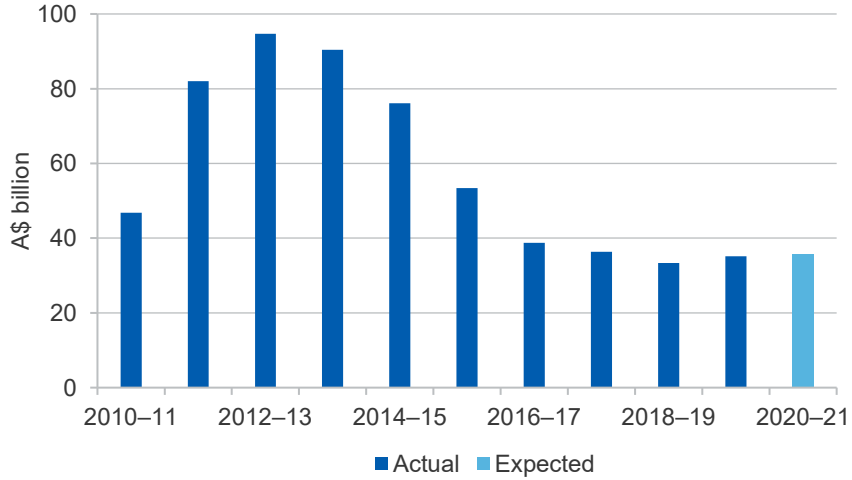
Figure 1.7: Mining industry capital expenditure by type, quarterly



Notes: Chart data is in nominal terms

Source: ABS (2020) Private New Capital Expenditure and Expected Expenditure, 5625.0

Figure 1.8: Mining industry capital expenditure, fiscal year

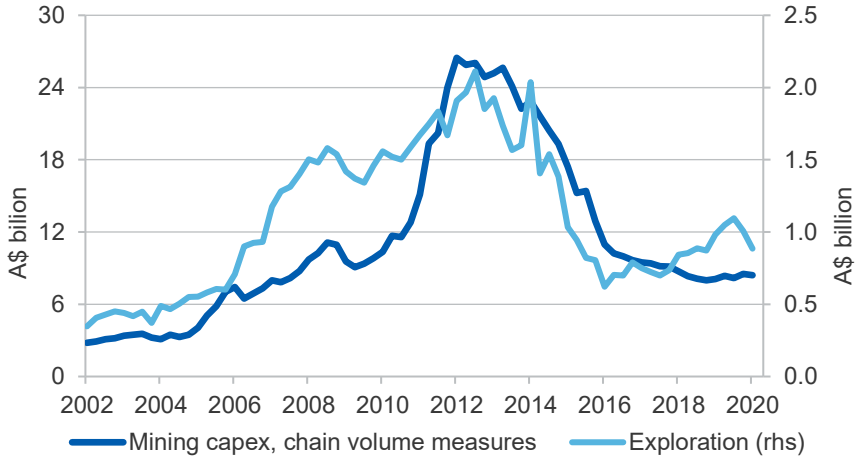


Notes: Chart data is in nominal terms

Source: ABS (2020) Private New Capital Expenditure and Expected Expenditure, 5625.0

Data on exploration spending (adjusted for inflation) suggests that mining capital expenditure is recovering at a marginal pace (Figure 1.9). Exploration spending edged back in the June quarter, with spending for all commodities falling to $884 million. This is 3.6 per cent higher than total spending in the June quarter 2019.

Figure 1.9: Mining capital expenditure vs exploration (real), quarterly



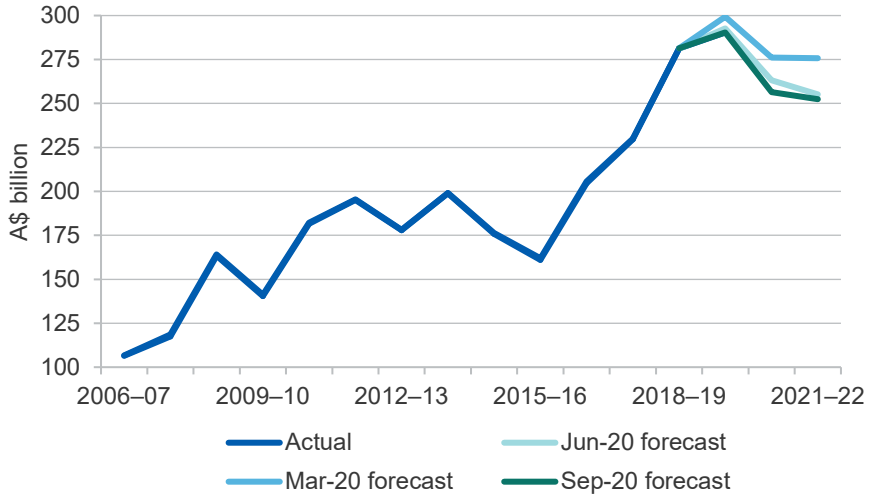
Source: ABS (2020) Private Capital Expenditure Survey, Chain Volume measure, 5625.0

1.7 Revisions to the outlook

In 2020–21, relatively weak resource and energy commodity prices — with the notable exception of gold and iron ore — and lower coal export volumes are expected to drive a sizable fall in export earnings. Gold and iron ore prices are expected to decline in 2021–22, largely offsetting the impact of the ongoing global economic recovery.

Export earnings are now forecast to be $256 billion in 2020–21, and then fall further to $252 billion in 2021–22 (Figure 1.10), down $7 billion and $3 billion, respectively, from the June quarter 2020 *Resources and Energy Quarterly* forecasts. Slightly weaker than expected energy exports and the stronger than expected gains in the Australian dollar have driven the downward revisions.

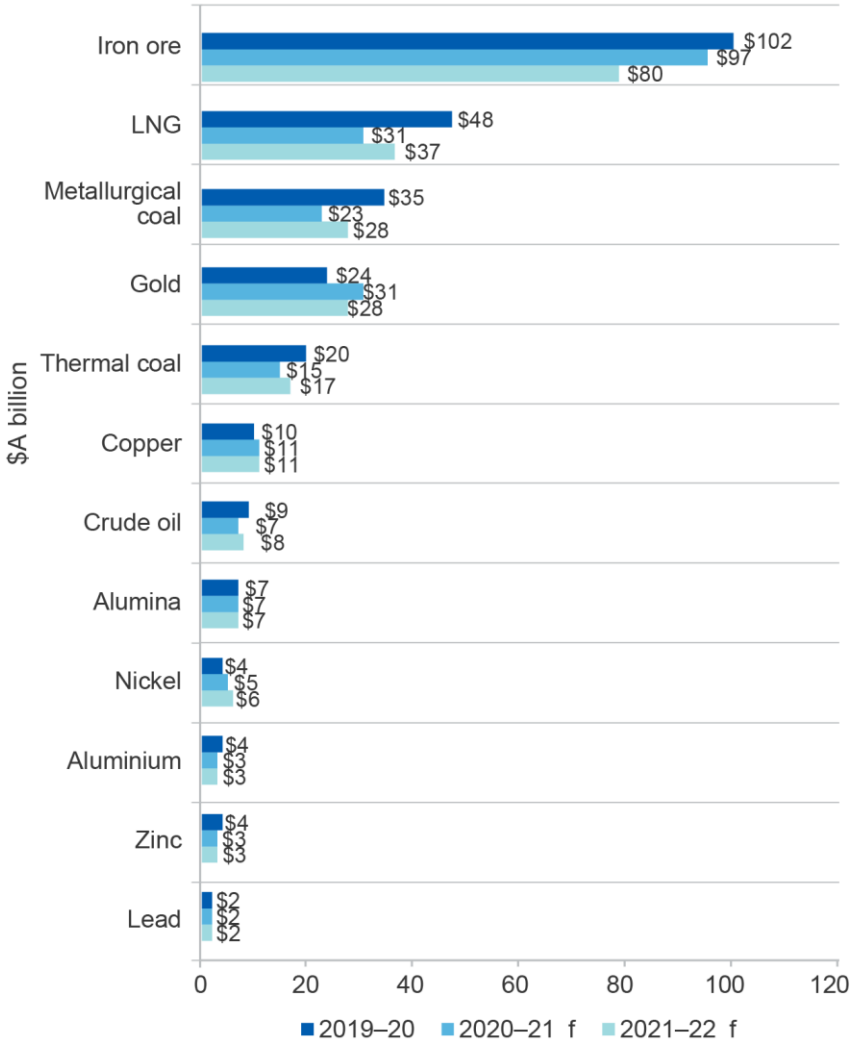
Figure 1.10: Resource and energy exports, by forecast release



Notes: Chart data is in nominal terms

Source: Department of Industry, Science, Energy and Resources (2020)

Figure 1.11: Australia's major resources and energy commodity exports, nominal



Per cent change

	2020–21 f			2021–22 f		
	volume	EUV	value	volume	EUV	value
Iron ore	4	-9	-5	3	-14	-12
LNG	-5	-31	-34	1	-12	-11
Metallurgical coal	-3	-32	-34	2	-12	-10
Gold	9	17	27	6	2	8
Thermal coal	-2	-27	-29	2	-11	-9
Copper	0	7	7	1	3	4
Crude oil	6	-24	-20	3	-7	-4
Alumina	0	-7	-7	0	-3	-3
Nickel	25	10	38	17	7	25
Aluminium	-3	-10	-13	-2	-4	-6
Zinc	3	-16	-14	3	-9	-6
Lead	1	26	28	1	13	14

Notes: f forecast. EUV is export unit value. Per cent change is from 2019–20.

Source: ABS (2020) International Trade in Goods and Services, 5368.0; Department of Industry, Science, Energy and Resources (2020)

Table 1.1: Outlook for Australia's resources and energy exports in nominal and real terms

					Annual percent change		
Exports (A$m)	**2018–19**	**2019–20**	**2020–21[f]**	**2021–22[f]**	**2019–20**	**2020–21[f]**	**2021–22[f]**
Resources and energy	281,297	290,399	256,380	252,420	3.2	–11.7	–1.5
– real[b]	292,217	297,694	256,380	247,391	1.9	–13.9	–3.5
Energy	132,717	116,037	79,689	94,648	–12.6	–31.3	18.8
– real[b]	137,869	118,952	79,689	92,762	–13.7	–33.0	16.4
Resources	148,580	174,362	176,690	157,772	17.4	1.3	–10.7
– real[b]	154,348	178,742	176,690	154,629	15.8	–1.1	–12.5

Notes: **b** In 2020–21 Australian dollars; **f** forecast.
Source: ABS (2019) International Trade in Goods and Services, 5368.0; Department of Industry, Science, Energy and Resources (2020)

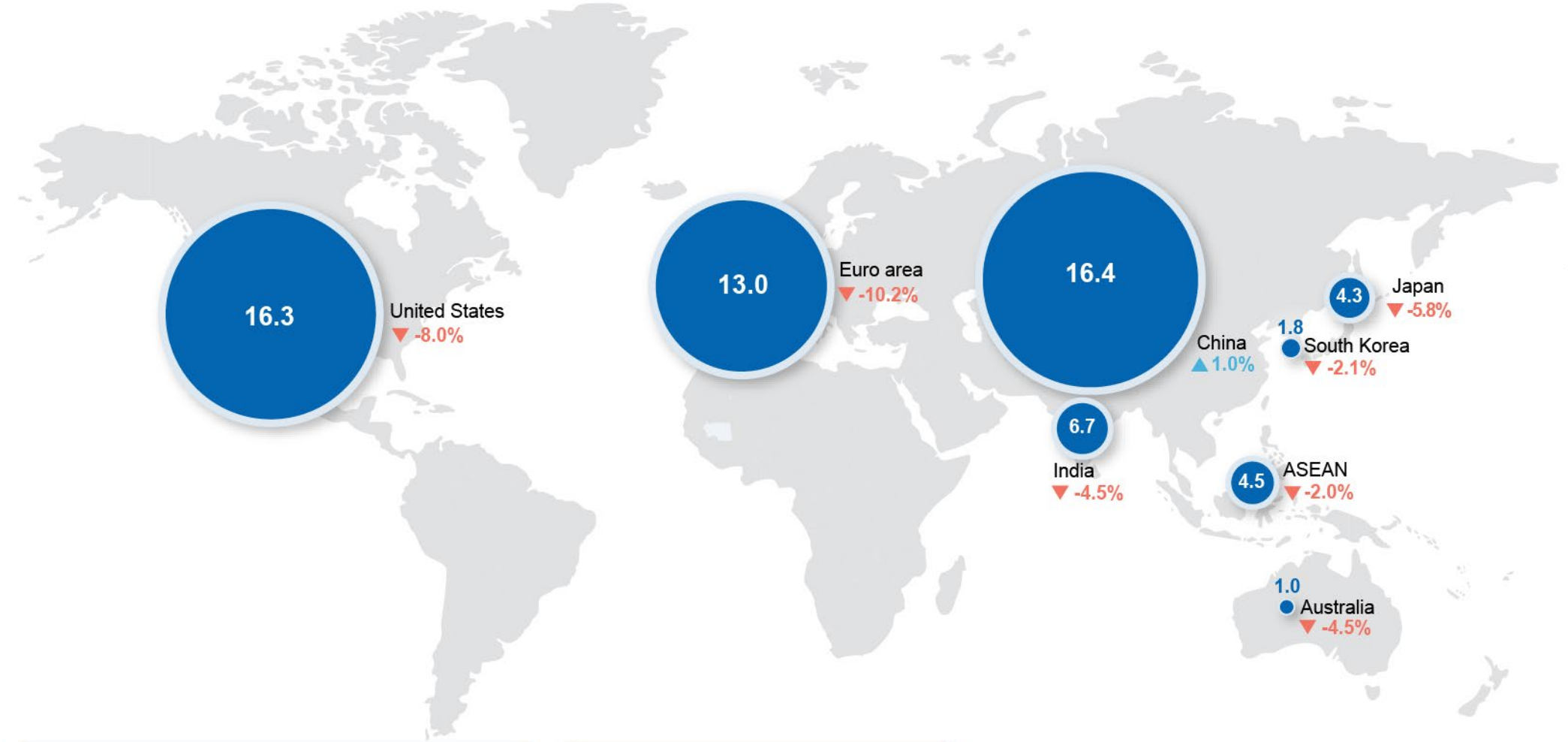
Table 1.2: Australia's resource and energy exports, selected commodities

	Prices				Export volumes				Export values, A$b		
	Unit	2019–2020	2020–21[f]	2021–22[f]	Unit	2019–20	2020–21[f]	2021–22[f]	2019–20	2020–21[f]	2021–22[f]
Iron ore	US$/t	78	77	66	Mt	860	895	905	102	97	80
Metallurgical coal	US$/t	145	124	142	Mt	177	172	185	35	23	28
LNG	A$/GJ	11.4	7.8	8.8	Mt	79	76	80	48	31	37
Thermal coal	US$/t	61	55	64	Mt	213	208	221	20	15	17
Gold	US$/oz	1,562	1,841	1,663	t	350	380	393	24	31	28
Alumina	US$/t	282	264	282	Mt	17,876	17,912	17,948	7.4	6.9	7.0
Copper	US$/t	5,666	6,508	6,595	Kt	928	924	942	9.9	10.6	10.7
Oil[a]	US$/bbl	52	44	52	Kb/d	293	310	310	9.1	7.3	8.4
Aluminium	US$/t	1,675	1,648	1,729	Kt	1,430	1,384	1,384	3.7	3.2	3.3
Zinc	US$/t	2,206	2,093	2,089	Kt	1,530	1,571	1,633	3.6	3.1	3.2
Nickel	US$/t	13,982	13,999	15,017	Kt	246	308	335	3.7	5.2	5.8
Lithium	US$/t	553	447	539	Kt	1,489	1,503	1,677	1.1	1.0	1.3
Uranium	US$/lb	27	34	42	t	7,195	6,500	5,800	0.7	0.6	0.6

Notes: **a** Export data covers both crude oil and condensate; **f** forecast. **Price information:** Iron ore fob (free-on-board) at 62 per cent iron content estimated netback from Western Australia to Qingdao China; Metallurgical coal premium hard coking coal fob East Coast Australia; Thermal coal fob Newcastle 6000 kc (calorific content); LNG fob Australia's export unit values; Gold LBMA PM; Alumina fob Australia; Copper LME cash; Crude oil Brent; Aluminum LME cash; Zinc LME cash; Nickel LME cash; Lithium spodumene ore.

Source: ABS (2020) International Trade in Goods and Services, Australia, Cat. No. 5368.0; LME; London Bullion Market Association; The Ux Consulting Company; US Department of Energy; Metal Bulletin; Japan Ministry of Economy, Trade and Industry; Department of Industry, Science, Energy and Resources (2020)

Macroeconomic Outlook



In 2020, Global economic activity is forecast to fall by 4.9% due to COVID-19. If quarantine measures are gradually relaxed over the outlook period, economic growth in 2021 is forecast to recover to 5.4%.

Risks: Containment measures persisting for longer than assumed, subsequent waves of COVID-19, and resurfacing trade tensions.

● = Share of global GDP

▲ = Economic growth in 2020

▼ = Economic contraction in 2020

Summary

- The COVID-19 pandemic, and subsequent containment measures, have significantly affected world industrial production and economic growth. The IMF assumes that the largest impacts occurred in the June quarter, and the recovery is expected to be unsteady and uneven across nations.
- Governments have imparted fiscal stimulus to support businesses and workers, while central banks around the world have pushed down official interest rates and bought vast amounts of debt.
- The IMF expects that world economic activity will contract by 4.9 per cent in 2020, before growing by 5.4 per cent in 2021.

Global economic outlook

The IMF forecasts that the global economy will contract by 4.9 per cent in 2020, as the full effect of COVID-19 containment measures plays out. This forecast, made in June 2020, is more pessimistic than the 3.0 per cent contraction forecast in April 2020, reflecting greater economic impacts in the first half of 2020 and a more gradual economic recovery. The decline in economic activity is expected to be driven by lower services activity and household consumption. The IMF forecasts GDP will fall by 8.0 per cent in advanced economies, and by 3.0 per cent in developing countries.

Trade has been affected by falling consumer confidence and supply disruptions caused by containment measures. In June 2020, global merchandise export volumes were down 10 per cent year-on-year. Advanced economy exports fell by 15 per cent, while developing economy exports declined by a more moderate 5.3 per cent.

Historically, changes in growth in global trade volumes have been closely linked to growth in industrial production (Figure 2.1). Based on these figures, it is likely that trade and industrial production in 2020 will decline by a similar amount to the global financial crisis, with the largest falls likely to have been in May. However, the downturn appears likely to be much briefer in duration. Global industrial production is expected to recover in the second half of 2020, as production disruptions from COVID-19 abate and consumer confidence gradually recovers.

Government-imposed containment measures have had a significant impact on labour markets, particularly in the service sectors. Employment and business activity have also faced pressures from supply chain disruptions and lower consumer demand.

Figure 2.1: Industrial production and world merchandise trade

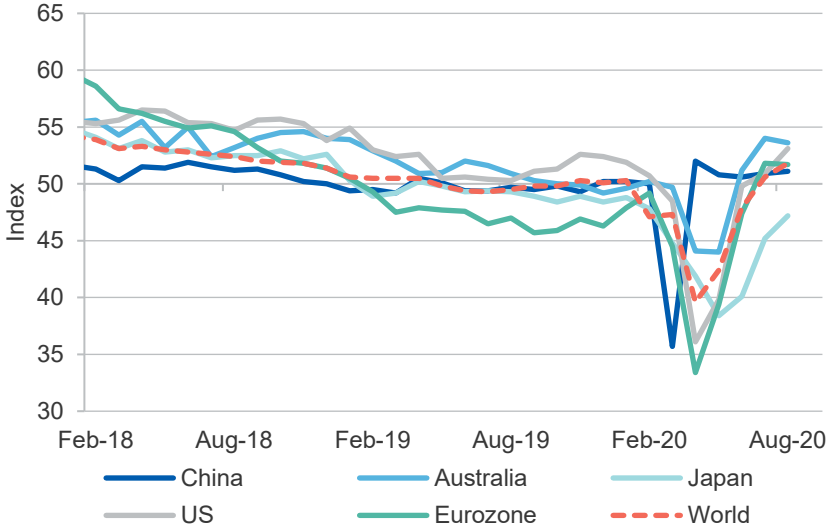
Source: CPB Netherlands Bureau for Economic Policy Analysis (2020)

Governments around the world have introduced fiscal packages to address the widespread job losses and reduced working hours. Other measures have generally been aimed at supporting affected businesses and facilitating the economic recovery. Official interest rates have been reduced around the world, and many central banks have ramped up quantitative easing programs. Despite these stimulatory fiscal and monetary policies, the economic recovery remains more uncertain than usual. Future economic output is likely to be driven by the evolution of the

pandemic, with risks arising from the potential for further containment measures, renewed outbreaks, or potential medical breakthroughs.

The global services Purchasing Managers Index (PMI) increased to 51.9 in August. This was the second consecutive month the index was above 50, indicating month-on-month expansion. For the preceding six months, the services PMI remained below 50, and fell to historic lows in April and May. In August, the employment sub-index recovered to above 50, suggesting that services sector employment is increasing globally.

Figure 2.2: Manufacturing PMI

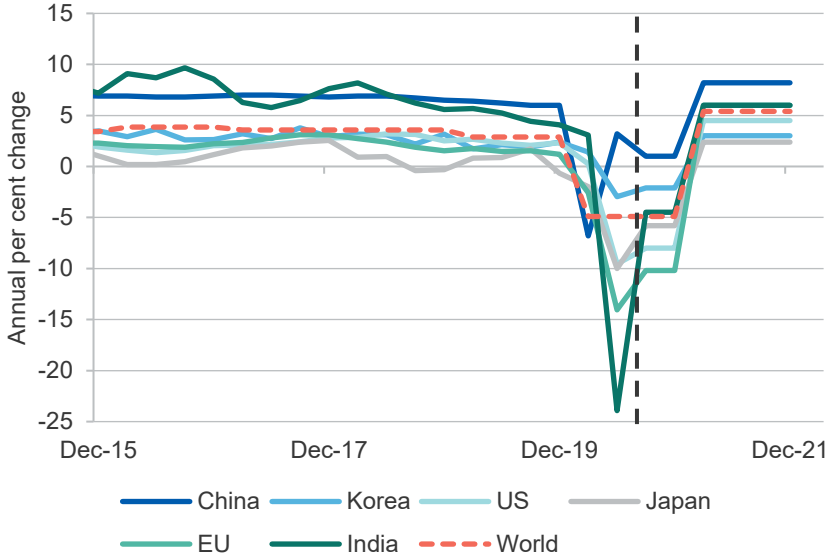


Source: Bloomberg (2020)

Although the largest observed impacts of the COVID-19 pandemic have been in the services sector, the global manufacturing sector has been significantly impacted by supply chain disruptions and falling household demand. The global manufacturing PMI was below 50 for most of the first half of 2020, falling to a historically low 39.6 in April. In August, the index rose to 51.8, a 21-month high (Figure 2.2). For the 31 countries where data was available, 19 had readings indicating month-on-month expansion.

The IMF expects global economic activity in 2021 to increase by 5.4 per cent. Advanced economies are forecast to grow by 4.8 per cent, and developing economies are expected to grow by 5.9 per cent (Figure 2.3). A moderation in growth is then likely in 2022.

Figure 2.3: GDP growth



Source: Bloomberg (2020); IMF (2020)

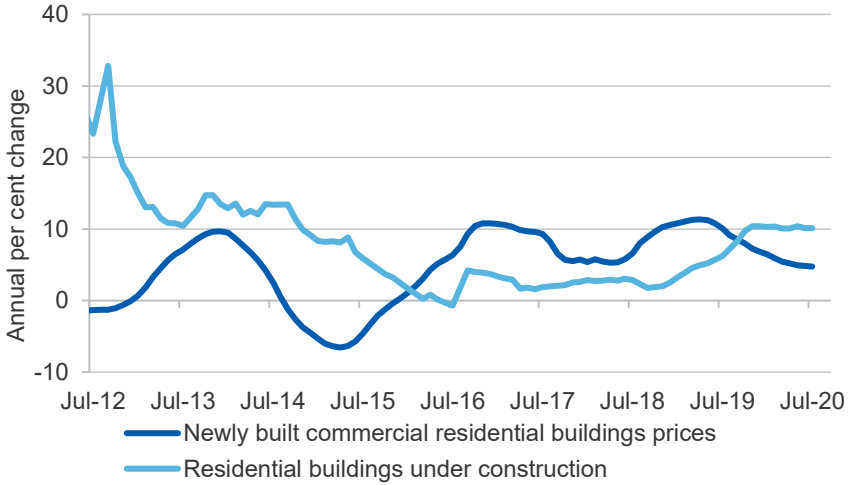
Major trading partner economic outlook

China is Australia's only major export market with projected growth in 2020

In the June quarter of 2020, the Chinese economy grew by 3.2 per cent year-on-year. This represents a return to economic growth following the record 6.8 per cent contraction in the March quarter. The recovery in the Chinese economy has come as COVID-19 containment measures eased. Industrial production increased by 5.6 per cent year-on-year in August 2020. The Chinese government granted tax relief and launched an infrastructure drive, which is helping to boost the construction and manufacturing sectors (Figure 2.4).

Fiscal stimulus has also been accompanied by interest rate cuts by the People's Bank of China (PBOC). The PBOC has also cut the bank reserve requirement ratio, increased the money supply, and provided funds to increase the capacity of commercial banks to lend to small businesses. As a result, Chinese bank lending hit a record high in the first half of 2020.

Figure 2.4: Chinese residential buildings construction and prices



Source: Bloomberg (2020)

Chinese exports are beginning to recover, with August customs data showing that exports grew by 9.5 per cent year-on-year. This increase was driven by demand for medical supplies and work-from home equipment. Exports of electronics, a key manufacturing product, also increased following the declines recorded in the first half of 2020. Chinese imports declined by 2.1 per cent in August, reflecting low Chinese household demand. In contrast, China continues to capitalise on low prices to import key resources and energy products, notably oil and gas.

The Chinese manufacturing PMI fell marginally to 51.0 in August, the sixth consecutive month in expansionary territory. However, the index remains only marginally above 50, as new export orders continued to fall and manufacturing activity was affected by heavy floods in southern China.

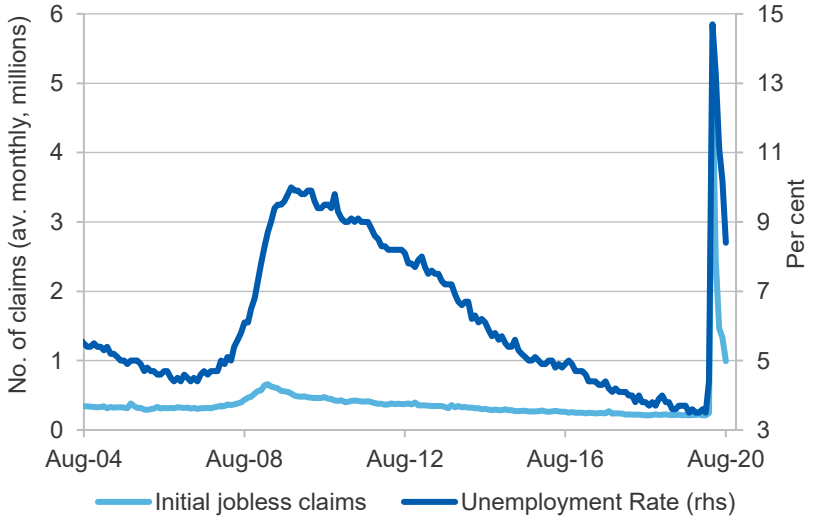
The demand-side recovery appears to be much slower, with August retail sales increasing by just 0.5 per cent year-on-year. The IMF is forecasting the Chinese economy to grow by 1.0 per cent in 2020, making it one of the few economies where economic growth is anticipated. In 2021, the IMF expects Chinese economic growth to recover to 8.2 per cent.

The US economy faces a delayed recovery from COVID-19

The US economy contracted by 9.5 per cent in the June quarter. This was the largest decline since records began in 1947, and was more than three times as large as the previous record. Around 75 per cent of the decline was driven by falling household consumption. The impact of containment measures peaked in April, but the economic harm caused by behavioural responses to the virus is ongoing. The level of restrictions varies significantly by state, as do the number of COVID-19 cases.

Economic impacts of COVID-19 are expected to persist through the rest of 2020.

Figure 2.5: US initial jobless claims and unemployment rate



Source: Bloomberg (2020)

The US unemployment rate declined to 8.4 per cent in August, after peaking in April at a record high 15 per cent (Figure 2.5). Despite the decline, unemployment remains significantly higher than before the COVID-19 pandemic. Employment has fallen starkly in the services sector, particularly in the leisure and hospitality sector and in the retail trade sector. Current low services sector employment is likely to push down US consumer demand for most of 2020 and early 2021, particularly for large consumer durables. A large proportion of the US citizens who were unemployed in August reported being temporarily laid off, suggesting that the unemployment rate will decline once containment measures ease.

In August, US industrial production increased by 0.4 per cent month-on-month, following growth of 3.5 per cent in July. Despite four consecutive months of growth, US industrial production remains 7.3 per cent below February levels. Manufacturing output increased by 1.0 per cent in August, although it remained 6.7 per cent lower than February.

The US government has introduced around US$3 trillion worth of stimulus to address the impacts of COVID-19. The largest package was signed in late March, and committed US$2 trillion for household payments, support for local and state governments, and financial assistance for large businesses, including aircraft producers and airlines. Negotiations for further fiscal stimulus are ongoing as of 17 September, as the number of new COVID-19 cases remains high and fresh containment measures have been introduced in many states.

The persistence of the COVID-19 pandemic in the US relative to other major advanced nations — and consequent concerns for US economic growth — has seen the US dollar depreciate sharply since June 2020. The lower US dollar has supported commodity prices, especially gold (see the *gold* chapter).

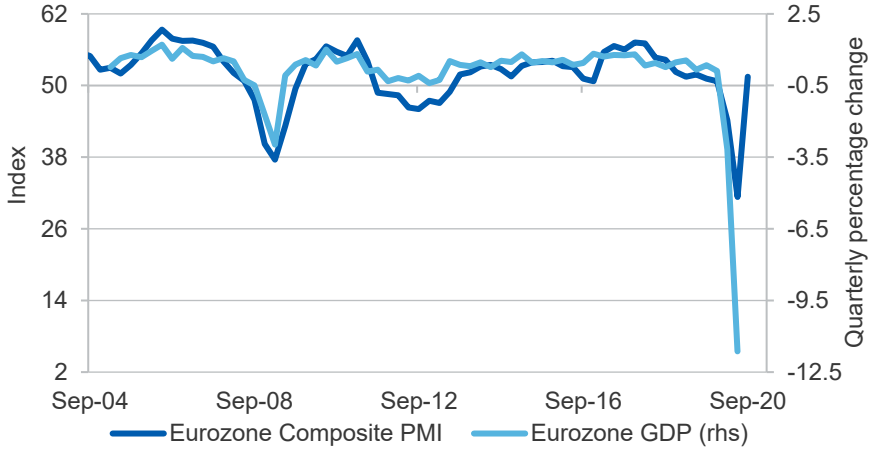
The IMF forecasts the US economy will grow by 4.5 per cent in 2021. US economic growth in 2021 is expected to be influenced by the outcome of the US general elections.

EU government stimulus to drive economic recovery

Eurozone GDP in the June quarter declined by 15 per cent year-on-year. GDP fell by 22 per cent in Spain, 19 per cent in France, 18 per cent in Italy and 11 per cent in Germany. For 2020, the IMF expects the Eurozone economy to contract by 10 per cent.

Eurozone industrial production in July increased by 4.1 per cent on a monthly basis, following the 9.1 per cent increase in June. However, these strong gains have not reversed the declines from earlier in 2020, with industrial production in July still down by 7.7 per cent year-on-year (Figure 2.6). Germany, a key manufacturing country in Europe, registered an annual 12 per cent decline in industrial production in the year to July.

Figure 2.6: Eurozone GDP and PMI



Source: Bloomberg (2020)

Forward looking indicators suggest that manufacturing activity is recovering. The Eurozone manufacturing PMI declined marginally to 51.7 in August, from 51.8 in July. These July and August readings were the first two readings above 50 since February 2019. Although the August PMI reading suggests only a slight month-on-month increase, the increase was broad-based across sectors and member states.

The services PMI was 50.5 in August, following the record lows recorded earlier in 2020.

In July 2020, European Union members agreed to a fiscal stimulus package totalling €750 billion to address the economic impacts from COVID-19. This package consists of €390 billion worth of grants and €360 billion of low-interest loans. Almost a third of this €750 billion is earmarked for climate initiatives, to be consistent with Paris Agreement targets.

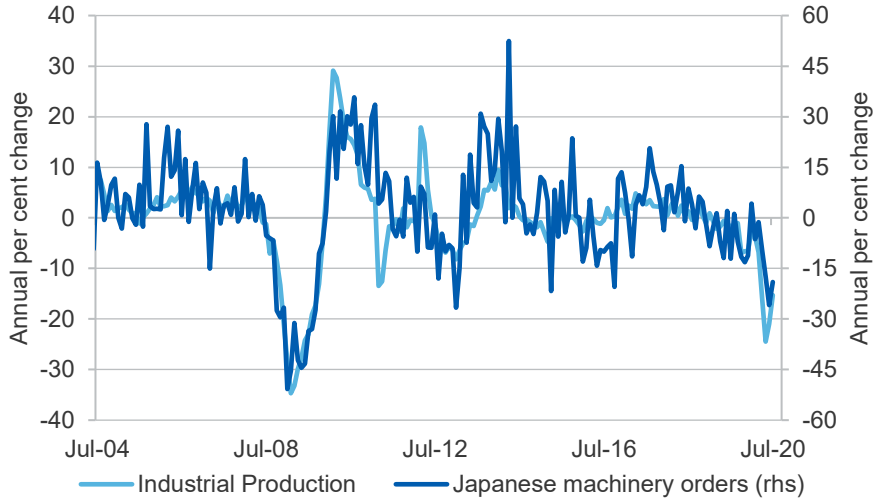
These fiscal policies have been accompanied by expansionary monetary policy, with the European Central bank keeping interest rates at negative levels throughout 2020. Furthermore, in March 2020, the central bank introduced a pandemic emergency purchase programme that targets securities, and ramped up their quantitative easing programme introduced in 2019. These programs were later increased in both size and duration. The outcome of ongoing Brexit negotiations will have implications for EU and UK growth. The IMF expects the Eurozone to grow by 6.0 per cent in 2021.

Japanese GDP is set to fall despite significant fiscal stimulus measures

Japanese GDP in the June quarter declined by a record 10 per cent year-on-year. The economy was strongly affected by household consumption impacts from the state of emergency in effect for April and May, when many citizens stayed home and retail outlets were closed. Like many other trade-oriented nations, exports were affected by supply chain disruptions and weak global import demand (Figure 2.7). The IMF expects the Japanese economy to contract by 5.8 per cent in 2020, as economic activity slowly recovers in the second half of the year.

In response to the downturn, the Japanese government has introduced further fiscal stimulus measures, building on the December 2019 package pre-dating the COVID-19 pandemic. The measures follow the spread of COVID-19 and the subsequent delay of the Tokyo Olympic Games until July 2021. New measures include a universal cash payment and support for medium and small businesses. The focus in these packages is on maintaining household income, and some benefit to economic activity is expected later in the outlook period.

Figure 2.7: Japanese industrial production and machinery orders



Source: Bloomberg (2020)

The Japanese economy is forecast to grow by 2.4 per cent in 2021. However, household consumption and economic growth are likely to be affected by the October 2019 sales tax hike from 8 per cent to 10 per cent. The resignation of Prime Minister Abe in August 2020 is not expected to result in any immediate changes to fiscal policies.

South Korea to be affected by weak export demand

South Korean economic output fell by 2.7 per cent year-on-year in the June quarter. Exports declined by 17 per cent from the prior quarter, significantly reducing GDP for the export-oriented nation. Manufacturing activity was also affected by lower global demand, falling by 9.0 per cent on a quarterly basis. The IMF expects the South Korean economy to contract by 2.1 per cent in 2020.

In 2019, heightened trade tensions between South Korea and Japan disrupted regional supply chains, affecting both economies. These tensions appeared to be easing in late 2019 and early 2020. However, in June 2020, the South Korean government announced that it was

re-opening its WTO complaint against Japan. A renewal of South Korean-Japan trade tensions could pose risks to Japanese and South Korean economic activity. South Korean economic growth in 2021 is forecast by the IMF to be 3.0 per cent.

Stringent lockdown measures have affected Indian growth

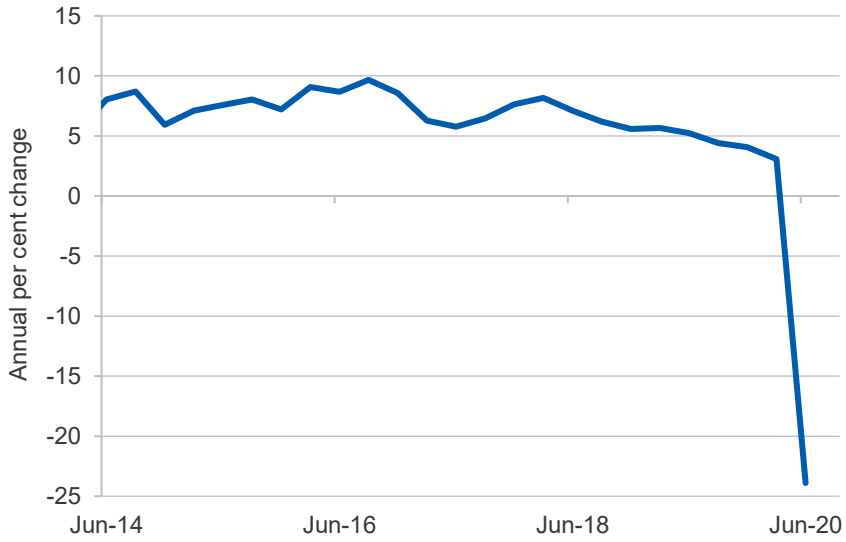
In April 2020, the Indian government introduced containment measures including a three week lockdown, which was extended until 30 June for certain areas in the country. Following 30 June, state governments have introduced their own containment measures, creating disparities across regions.

Indian GDP declined by 24 per cent year-on-year in the June quarter. This contraction was the largest on record, driven by stark declines in consumer spending, private investment and exports. The IMF is forecasting the Indian economy will contract by 4.5 per cent in 2020 as a result of the COVID-19 pandemic.

Although Indian economic growth remains a concern, the scope for interest rate cuts has been reduced. A string of earlier interest rate cuts were made in 2019 to address illiquidity in the financial sector. With food prices soaring, there are concerns that additional interest rate cuts would stoke further inflation. These inflationary concerns are in contrast to most other economies, where inflation remains relatively low despite widespread stimulatory monetary policy.

The IMF expects Indian GDP to grow by 6.0 per cent in 2021.

Figure 2.8: Indian GDP growth



Source: Bloomberg (2020)

Table 2.1: Key IMF GDP assumptions

	2019	2020[a]	2021[a]
Economic growth[b]			
Advanced economies	1.7	-8.0	4.8
– Australia	1.8	-4.5	4.0
– Eurozone	1.7	-10	6.0
– France	1.5	-12	7.3
– Germany	0.6	-7.8	5.4
– Japan	0.7	-5.8	2.4
– South Korea	2.0	-2.1	3.0
– United Kingdom	1.4	-10	6.3
– United States	2.3	-8.0	4.5
Emerging economies	3.7	-3.0	5.9
– ASEAN-5[d]	4.8	-2.0	6.2
– China[e]	6.1	1.0	8.2
– India	4.2	-4.5	6.0
– Latin America	0.1	-9.4	3.7
– Middle East	1.3	-4.7	3.3
World[c]	2.9	-4.9	5.4

Notes: a Assumption; b Year-on-year change; **c** Calculated by the IMF using purchasing power parity (PPP) weights for nominal country gross domestic product; **d** Indonesia, Malaysia, the Philippines, Thailand and Vietnam. **e** Excludes Hong Kong.
Sources: Bloomberg (2020); Department of Industry, Science, Energy and Resources (2020); IMF (2020)

Table 2.2: Exchange rate and inflation assumptions

	2019	2020[a]	2021[a]	2022[a]
AUD/USD exchange rate	0.72	0.69	0.73	0.75
Inflation rate[b]				
United States	1.8	0.9	1.7	2.0
	2018–19	**2019–20**	**2020–21[a]**	**2021–22[a]**
Australia[e]	1.6	1.3	2.5	2.0

Notes: a Assumption; b Change from previous period; **c** Calculated by the IMF using purchasing power parity (PPP) weights for nominal country gross domestic product; **e** Average of daily rates.
Sources: ABS (2020) Consumer Price Index, 6401.0; Bloomberg (2020); Department of Industry, Science, Energy and Resources; RBA (2020) Reserve Bank of Australia Bulletin.

Steel

26 Fe 55.845

6 C 12.011

Australian steel refineries

Steel facts

- Made in specialised blast furnaces mostly out of **iron and carbon**
- 1,000 kg of steel requires 1,400 kg of iron and 800kg of coal to make
- Pure steel is **1,000 times stronger** than iron
- Steel is the **world's 2nd largest industry**

World consumption

- **50%** Construction
- **16%** Mechanical machinery
- **15%** Other applications
- **13%** Automotive
- **4%** Electrical equipment
- **2%** Domestic appliances

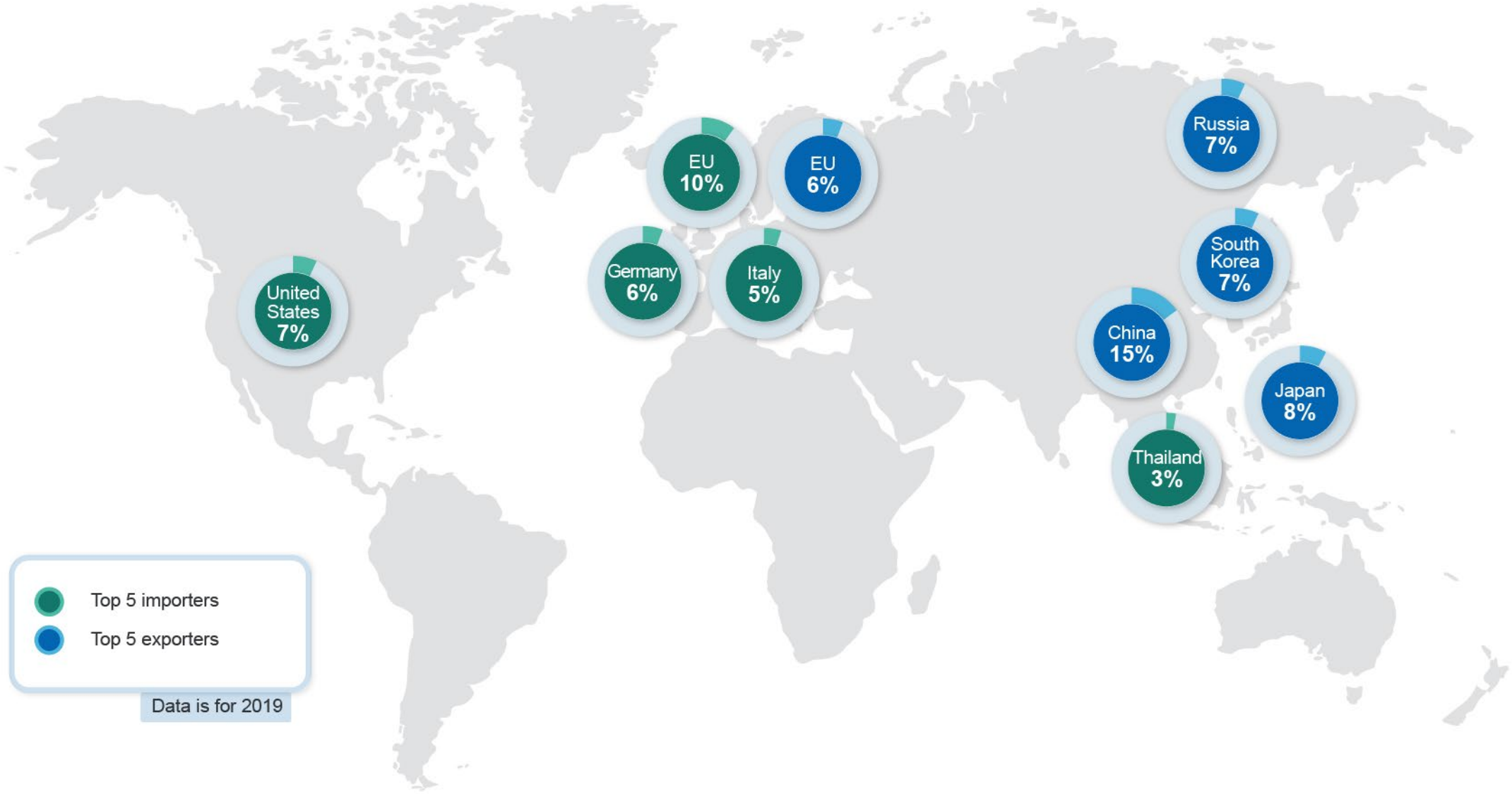
Australia's steel

- **5.3m tonnes** produced each year
- **100,000+** employed in steelmaking
- **Significant export markets**
  - China
  - Japan
  - South Korea
  - Singapore
  - US

26 Fe 55.845 | 6 C 12.011

Steel

Trade map | September 2020



3.1 Summary

- World steel usage is expected to fall by 6.1 per cent in 2020, as a result of the COVID-19 pandemic and resulting economic downturn. Construction, manufacturing and other steel-intensive sectors continue to face challenging conditions, including forced closures in some nations.
- World steel consumption is forecast to rebound in 2021 as the global economy recovers, growing by 4.2 per cent and by 4.0 per cent in 2022.
- Steel output is forecast to follow a similar trend, falling by 4.0 per cent in 2020 before rising by 4.5 per cent in 2021 and 4.0 per cent in 2022.

3.2 World consumption and production

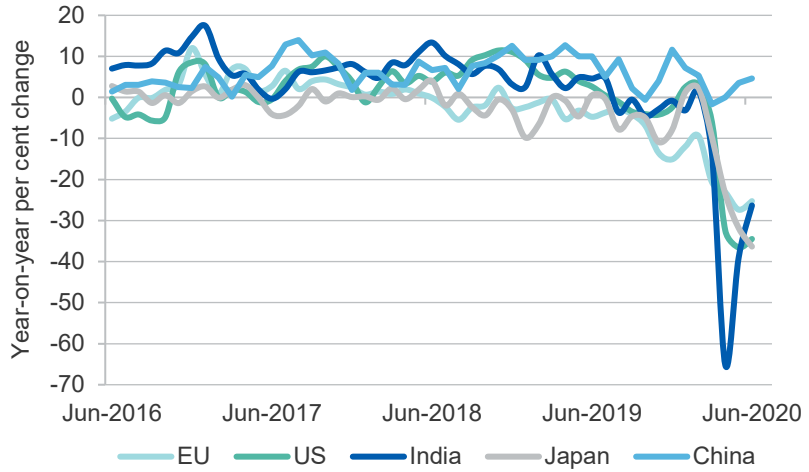
World crude steel production fell by 7 per cent (through the year), to 148 million tonnes in June. Asian production over the first six months of 2020 was down by 3 per cent relative to the equivalent period in 2019. However, impacts elsewhere have been more severe, with production down by 19 per cent in Europe and 18 per cent in North America. European and American output summed to less than one-fifth of output in Asia over the first half of 2020.

Steel production has begun to recover in recent months (see Figures 3.1 and 3.2), though significant capacity remains shuttered, with more than 50 blast furnaces currently idled across Europe, the US, and Japan. At least 20 more furnaces are operating at a reduced capacity.

These closures will likely accelerate a pre-existing shift in steel production, which has long been migrating towards emerging Asia. Some of the idled blast furnaces across Europe will likely not re-open, and European capacity is not expected to recover to its pre-COVID level. Steelmakers in Europe have been increasingly undercut in recent years by cheaper production in Russia and China, and the current high cost of iron ore — in conjunction with difficult economic conditions — has accelerated the closure of a number of mills and furnaces.

Conditions are similar in Japan, where JFC and Nippon Steel are progressing with plans to reduce their capacity in 2020. Steel output in

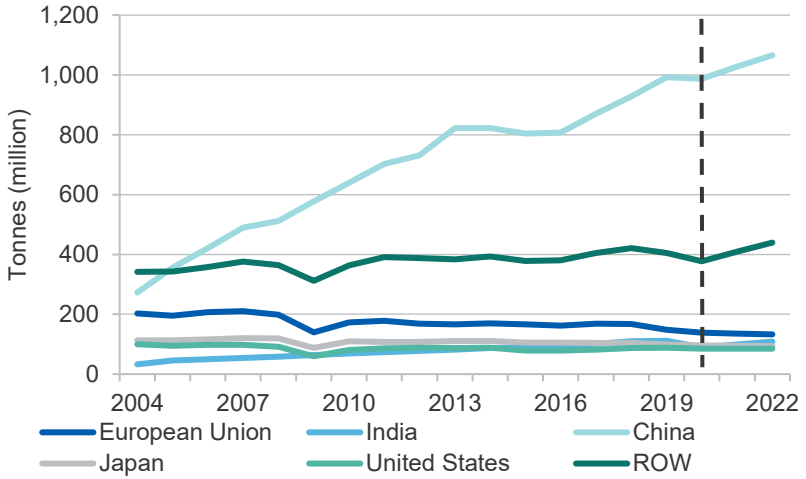
Figure 3.1: Steel production, monthly change



Notes: Monthly average for integrated basic oxygen furnace (BOF) steel mills

Source: Bloomberg (2020) China BOF Steel Profit Index

Figure 3.2: Steel production by region



Source: World Steel Association (2020); Bloomberg (2020)

Japan has been falling for 20 years, but the drop in 2020 will be particularly large, with much of the capacity drop likely to be permanent.

Conditions are marginally better in South Korea, where steel output had previously been expected to increase, especially among smaller steelmakers. These plans have been postponed, but capacity is not expected to fall in South Korea as it has in Europe and Japan.

Indian steel production is highly volatile at present, with the Indian Government's ambitious targets to expand its domestic steel output now severely disrupted. The COVID-19 pandemic has resulted in significant proportions of the Indian workforce being obliged to stay offsite, while transport infrastructure including ports and rail has been subject to steep reductions in capacity and operations. Monthly steel production in India has fallen by 70 per cent since the COVID-19 outbreak began, with non-blast furnace production halted entirely. Blast furnaces, which are difficult to shut down, have mostly shifted to a 'hot idle' status, where equipment remains functional, but output is heavily limited.

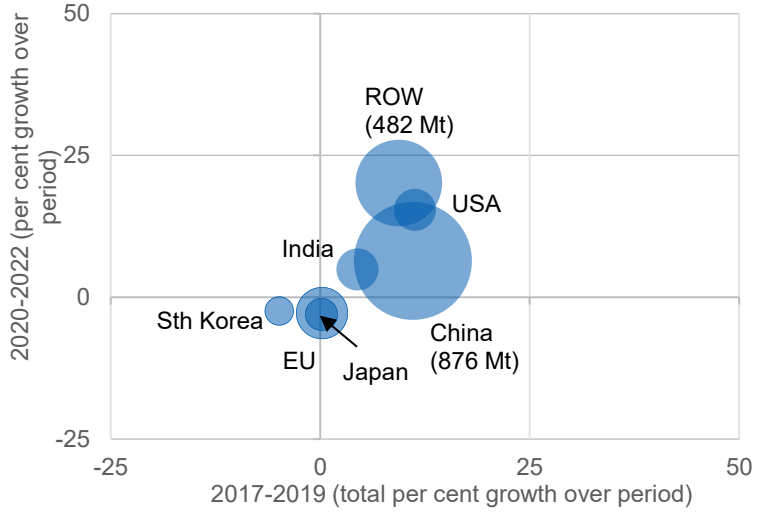
Ultimately, it is likely that Indian steel output will resume growth in the medium term, but progress on this front is likely to be disrupted for the rest of the outlook period.

Conditions have also proven difficult in Vietnam, with the Hoa Sen Group dropping plans to construct a $10bn steel plant in southern Ninh Thuan Province. Steelmaking in Vietnam has been affected by the COVID-19 outbreak, but the Vietnamese steelmaking sector has also faced greater scrutiny and regulation following a severe accident at a Formosa Ha Tinh Steel plant in April 2016, which polluted hundreds of kilometres of coastline and caused significant economic and environmental damage across four provinces.

China's importance to global steel markets is likely to rise even further

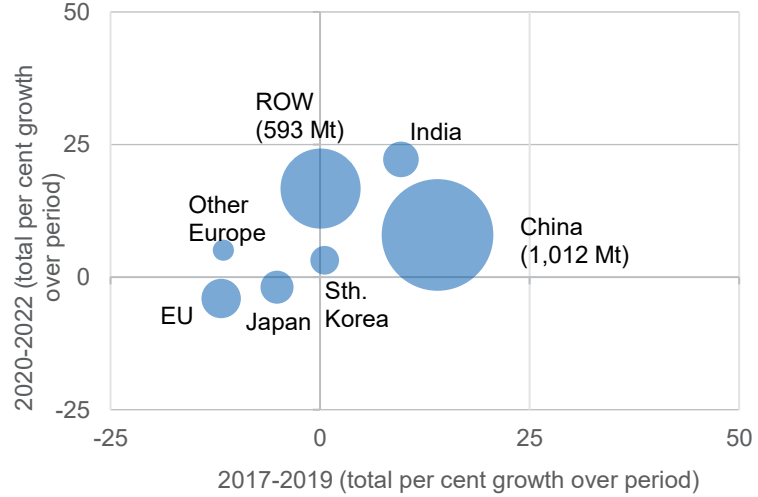
China remains in a uniquely strong position relative to most of the world. It remains the only country where steel output is above its pre- COVID-19 level, having grown by 4 per cent over the year to June 2020.

Figure 3.3: Steel consumption growth by region



Source: Department of Industry, Science, Energy and Resources (2020)

Figure 3.4: Steel production growth by region



Source: Department of Industry, Science, Energy and Resources (2020)

Daily steel output in China hit a monthly record — for the third month in a row — in July, amidst strong construction activity and growing manufacturing output. Sales of heavy machinery, including excavators, have been very strong. China's economic size and the scale of its steel output are such that this growth effectively places a floor under global steel production as a whole.

Steel inventories in China remain tight, albeit with some stabilisation in July after months of declines. Inventory pressure and strong industry demand (with Chinese indexes of manufacturing activity now rising and positive) can be expected to fuel strong iron ore imports over the rest of 2020.

The growing dependency of global steel production on Chinese firms adds to the risks for steelmakers. Global steelmaking could contract sharply should a second outbreak occur in China, or should stimulus by the Chinese government fall short of market expectations. However, barring any setbacks, China is set to become even more pivotal to global steel supply and use over the next two years (Figures 3.3 and 3.4).

China is expected to remain a key source for global steel demand

Steel demand is likely to remain strong in China over the rest of 2020, notwithstanding the adverse impact of widespread flooding on building activity in central and southwestern China. Infrastructure construction is expected to increase over the second half of the year, after investment lifted in May and June. Housing construction is likely to be supported by relatively low interest rates, but income effects from the COVID-19 outbreak may act as a constraint.

Steel-intensive industries have a similarly mixed outlook. Manufacturing, which has been growing in recent months, is expected to remain strong over the remainder of the year. The industry is expected to benefit from expanding state infrastructure projects and from efforts by many firms to make up for lost production earlier in the year. However, automotive manufacturing is expected to remain flat well into 2021.

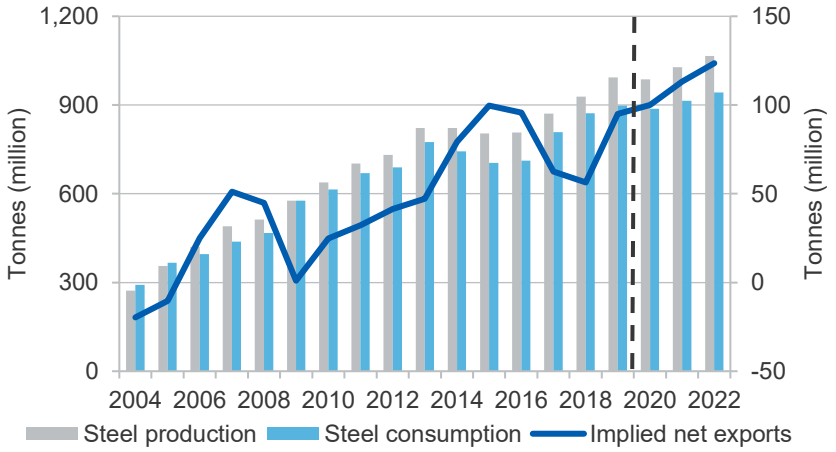
Prospects for a recovery outside of China remain limited

Steel production across most OECD nations has faced increasing challenges in recent years, with the COVID-19 outbreak consequently hitting particularly hard. A number of facilities closed in 2019, due to economic uncertainties and price competition, and an even larger number are set to close in 2020.

Recovery outside of China is not expected to gain much momentum over the remainder of 2020. The EU and Japan are experiencing slow and tentative recoveries in manufacturing activity, but this is yet to flow through to steel production.

It is likely that conditions will improve for OECD steelmakers after 2020. However, the COVID-19 pandemic is expected to continue to affect the global economy over the full outlook period, with global steelmakers facing a range of potential setbacks on the way to recovery.

Figure 3.5: China's steel consumption, production and net exports



Source: Bloomberg (2020) World Steel Association; Department of Industry, Science, Energy and Resources (2020)

Table 3.1: World steel consumption and production

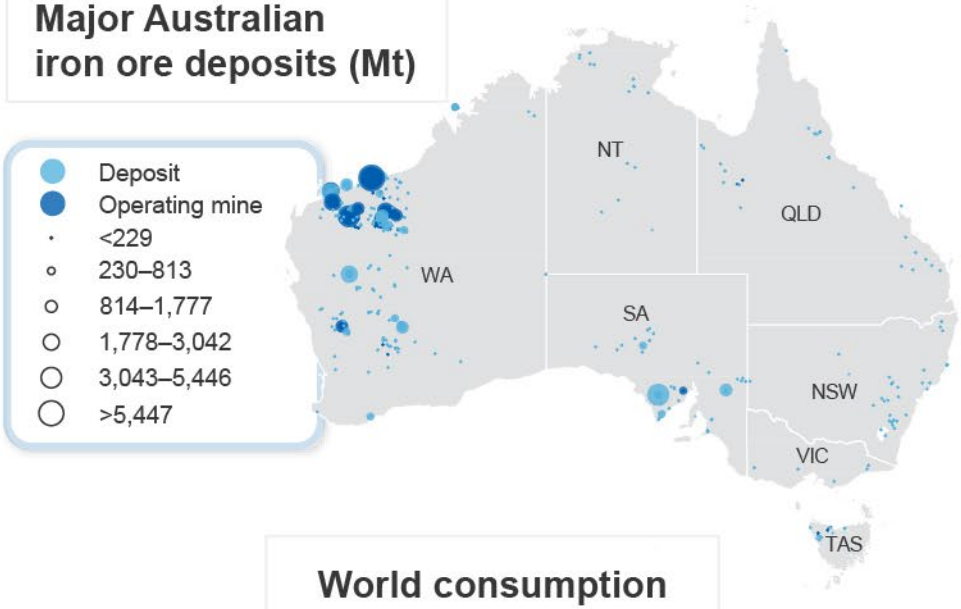
	Million tonnes				Annual percentage change		
Crude steel consumption	**2019**	**2020[f]**	**2021[f]**	**2022[f]**	**2020[f]**	**2021[f]**	**2022[f]**
China	898	887	915	942	-1.2	3.1	3.0
European Union 27 [g]	178	162	160	157	-9.0	-1.6	-1.6
United States	115	110	113	116	-3.7	2.5	2.4
India	112	97	105	113	-13.4	8.0	7.3
Japan	70	66	65	64	-6.1	-1.7	-1.7
Russia	44	43	42	42	-1.7	-1.9	-1.9
South Korea	55	53	53	52	-3.5	-1.3	-1.3
Brazil	25	23	24	25	-8.5	3.2	3.1
World steel consumption	1901	1785	1860	1935	-6.1	4.2	4.0
Crude steel production	**2019**	**2020[f]**	**2021[f]**	**2022[f]**	**2020[f]**	**2021[f]**	**2022[f]**
China	993	987	1 028	1 066	-0.6	4.1	3.7
European Union 28	149	138	135	133	-6.9	-2.1	-2.0
India	111	89	99	108	-20.2	11.5	9.6
Japan	99	95	94	93	-4.2	-1.0	-0.9
United States	88	85	85	85	-2.9	0.1	0.1
Brazil	32	30	30	30	-6.4	0.2	0.2
Russia	72	71	72	72	-1.2	1.3	1.2
South Korea	71	68	70	71	-4.3	1.6	1.5
World steel production	1845	1771	1851	1925	-4.0	4.5	4.0

Notes: **f** Forecast; **g** European Union 27 encompasses the aggregate output and demand for the 27 states which comprise the European Union.

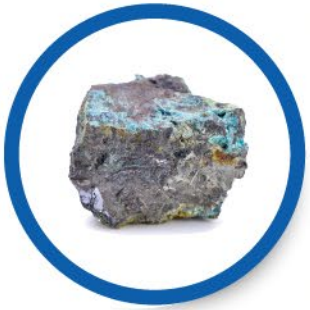
Source: World Steel Association (2020); Department of Industry, Science, Energy and Resources (2020)

26 Fe 55.845 Iron Ore

Major Australian iron ore deposits (Mt)



Iron ore



- Iron is earth's most common element, forming much of the **planet's core**
- Iron ore deposits were originally **formed by algae**
- Humans have been working with iron for at least **5,000 years**
- Iron was central to the **industrial revolution**

World consumption

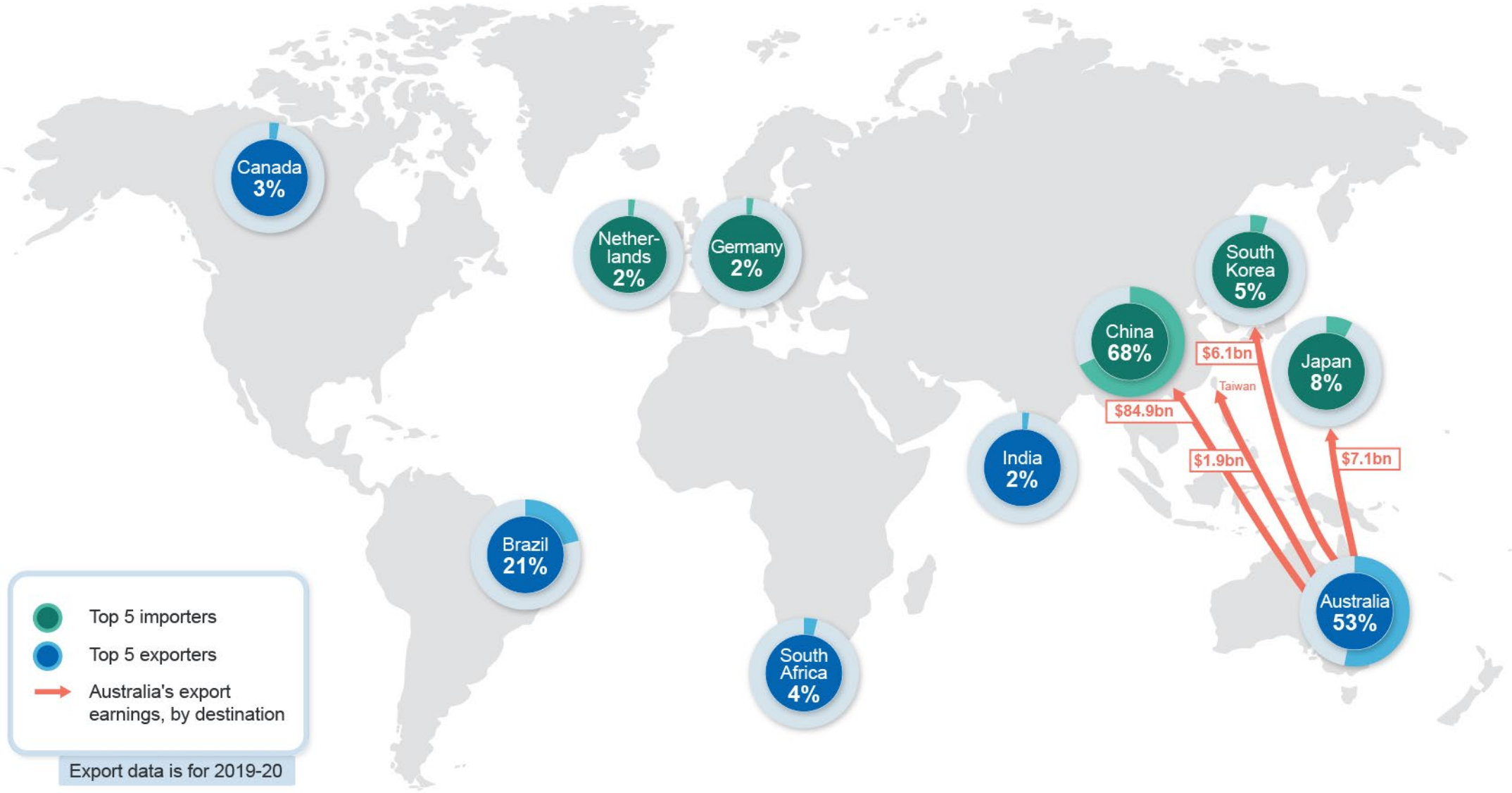
- **57%** China
- **9%** India
- **6%** EU
- **6%** Japan
- **3%** Brazil
- **19%** Rest of the world

Australia's iron ore

- **World's no.1** for iron ore **resources**
- **Largest iron ore producer** in the world
- **2019–20** exports earned **$102 billion**

26 Fe Iron Ore

Trade map | September 2020



4.1 Summary

- The iron ore price has spiked repeatedly in recent months, rising to over US$120 a tonne despite the global economic downturn and a significant fall in steel demand in many countries. This reflects ongoing supply disruptions in Brazil and robust demand in China.
- The iron ore price is forecast to be around US$100 a tonne over the final quarter of 2020, before easing to around US$80 a tonne by the end of 2021 and US$75 a tonne by the end of 2022.
- Australian export volumes are expected to grow from 860 million tonnes in 2019–20 to 905 million tonnes by 2021–22. This reflects the commencement of several new mines in Western Australia.
- Australia's iron ore export values rose from $78 billion in 2018–19 to $102 billion in 2019–20, on the back of growing volumes, strong prices and a low Australian dollar. Falling prices are expected to push export earnings down to $80 billion by 2021–22.

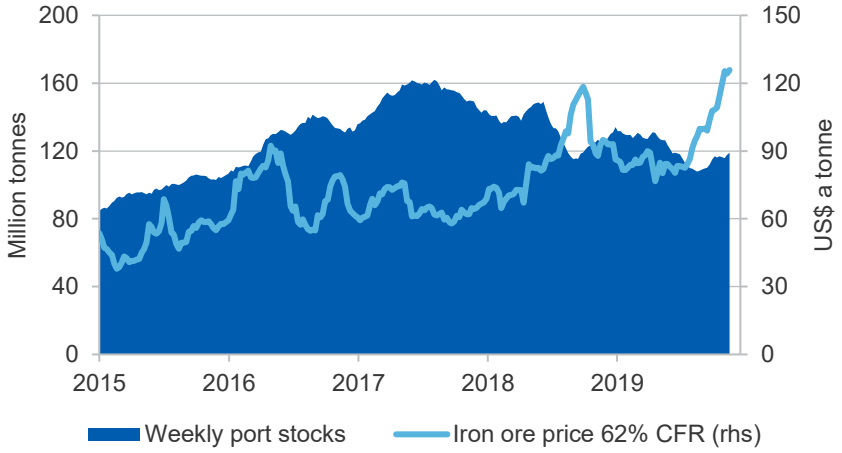
4.2 Prices

Iron ore prices remain strong due to supply disruptions

Unlike most other commodities, iron ore prices have now more than regained pre-COVID-19 levels (see Figure 4.1). The fundamental driver of price growth remains the nexus between volatile and disrupted supply from Brazil, against robust and consistent demand from China. Seaborne supply remains tight as a result, forcing prices to adjust even as broader global economic conditions remain uncertain.

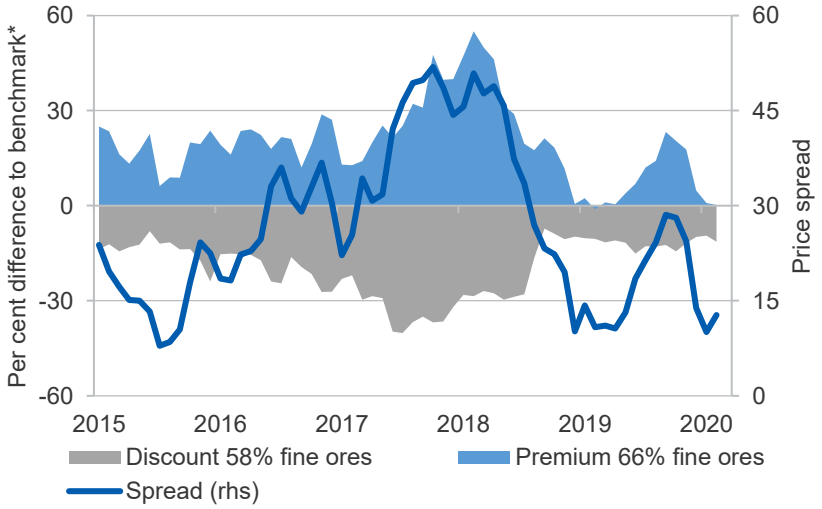
There is little immediate prospect for a major change in these dynamics: Brazil remains subject to extensive COVID-19 containment measures, and lingering after-effects from the collapse of the Brumadinho dam in early 2019. Significant growth in Brazilian short term supply remains unlikely due to the wider problems of COVID-19 across the Brazilian economy. Other supply sources around the world are not expected to rise noticeably over the next two years. The main risk to prices is thus on the demand side, with potential shifts in Chinese steel output now the main factor affecting iron ore prices over the outlook period.

Figure 4.1: China's iron ore port stocks and spot price



Notes: China import Iron ore fines 62% Fe spot (CFR Tianjin port)
Source: Bloomberg (2020) Antaike iron ore port stocks and Metal Bulletin

Figure 4.2: Iron ore price spread between grades



Notes: *Benchmark used is 62 per cent iron fines CFR
Source: Bloomberg (2020) China import prices

The price spread between iron ore grades, which lifted sharply in April amidst a surge in demand for higher-grade ore, has abated somewhat in recent months (Figure 4.2). However, prices for all grades remain elevated (Figure 4.3), with the 62 per cent import fine ores price (FOB) hitting repeated highs over the last few months — US$82.56 a tonne in April, US$94.56 in May, US$98.01 in June and US$109.25 in July.

Iron ore prices are likely to stay strong as Chinese demand recovers

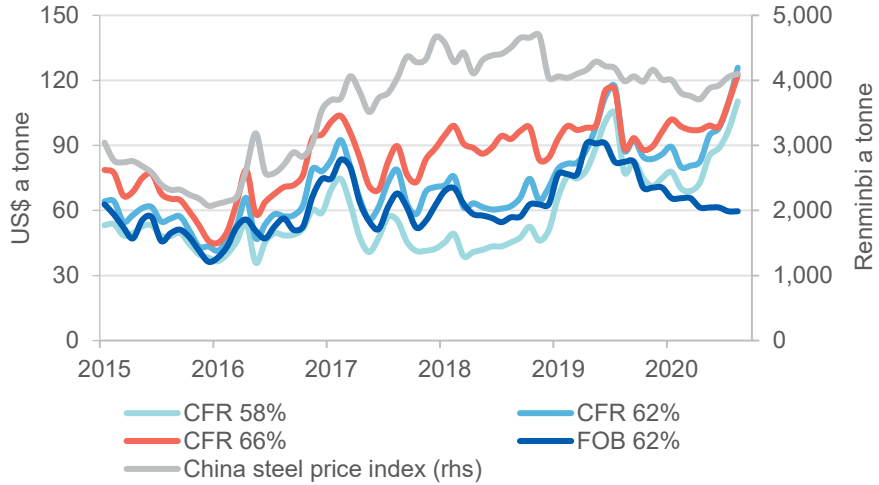
A plateau in prices is expected over the coming months, with risks weighted to the downside given the high dependency of global demand on China (see Figure 4.4), which currently imports more than two-thirds of global seaborne iron ore. Part of the recent price peak was also a result of fears over further significant supply disruptions in Brazil. These fears have not been borne out, though Brazilian output remains constrained overall. Another factor is the relatively low price of metallurgical coal, which provides steelmakers with more flexibility to pay more for iron ore.

China's dominance in iron ore consumption gives it considerable capacity to set global prices, and Chinese importers are unlikely to accept historically high prices for iron ore over an extended period, even with other commodities low/falling in cost. Some cooling in the seaborne market is thus expected towards the end of 2020. However, prices are not expected to yield much of their recent gains, holding near US$100 a tonne over coming months and ending the 2020–21 year at just over US$85 a tonne. Prices are expected to remain high — at over US$75 a tonne — over the rest of the outlook period.

Freight costs, which have been pushed up significantly by Chinese demand in recent months, are expected to remain elevated in the short term, though efforts by Chinese importers to reduce costs may result in some downward pressure towards the end of 2020.

Overall, prices are expected to be supported by a gradual recovery in the global economy (and a linked recovery in steel production outside of China) in 2022. Offsetting this upward pressure, Brazilian supply is expected to partially recover in 2021, as currently idle capacity in the country's south starts to return to operation.

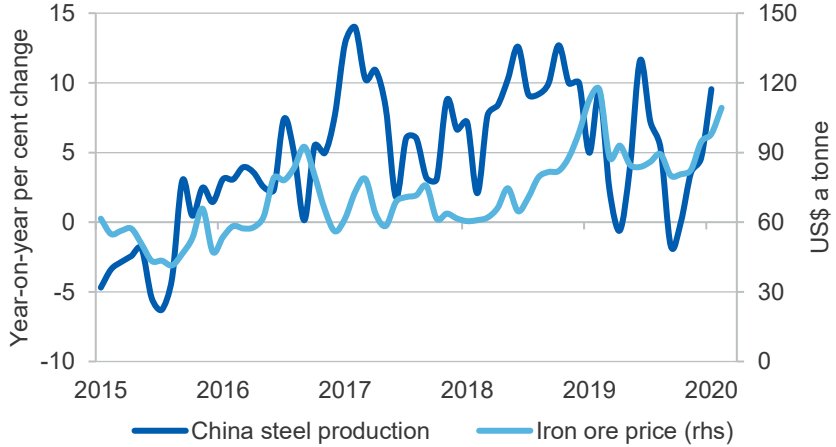
Figure 4.3: Iron ore price by grade and China steel price index



Notes: The OCE forecasts the FOB (free on board) Australia iron ore price, not the benchmark CFR (cost and freight) North China iron ore price.

Source: Bloomberg (2019) Metal Bulletin; Department of Industry, Science, Energy and Resources (2020)

Figure 4.4: Iron ore price vs China steel production growth



Notes: China import Iron ore fines 62% Fe spot (CFR Tianjin port)

Source: Bloomberg (2020) China import prices; World Steel Association (2020)

4.3 World trade

Export growth is recovering despite some recent setbacks

Iron ore exports have continued to rise in 2020 (see Figure 4.5) despite the global economic downturn associated with the COVID-19 outbreak. Iron ore has largely been insulated from the global recession by ongoing robust steel demand in China, and global demand is expected to remain solid over the outlook period.

Production in Brazil continues to rise slowly, with Vale ramping up some latent capacity in recent months. The company has significant mines and facilities in the north of Brazil, where operations are relatively remote and somewhat protected from the COVID-19 outbreak — which has severely affected towns and cities in the south of the country. Vale remains confident of expanding exports over the rest of 2020, citing a monthly lift in production in June, as well as recent falls in absentee rates (which had spiked due to COVID-19).

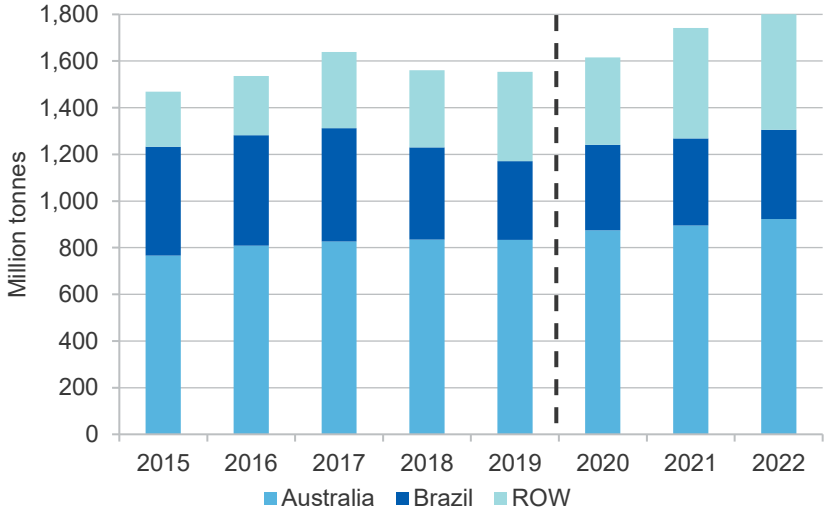
However, Vale's production showed signs of lagging again in July, and the company has repeatedly fallen short of its announced targets. Vale is facing tougher regulatory requirements following the collapse of its Brumadinho dam construction in early 2019. Production plans have also been derailed by the impact of the COVID-19 outbreak, which has led to more than 100,000 deaths across Brazil and severely disrupted transport and labour across the country.

Brazilian production is not expected to return to normal levels until late 2022, and even this schedule faces risks should efforts to contain the COVID-19 pandemic continue to fall short. South African and Canadian production have also been affected by labour and transport problems linked to the COVID-19 outbreak. While the effects on these countries have been less severe, it is unlikely that their production could rise sufficiently to fill the gap created by the downturn in output from Brazil.

Production in Africa is expected to grow over the longer term, with recent rapid progress being made on development of the US$20 billion Simandou deposit in Guinea. China has long sought to diversity its iron ore sources, and Baowu — a large Chinese steelmaker — is now expected to lead the acquisition of Chinalco's stake in the mine, which amounts to one half of the overall deposit. The other half is held by Rio Tinto. Full production at the site is not expected until after 2025.

Australia is expected to account for a rising share of steel output over the next two years as new mines open in the Pilbara region.

Figure 4.5: Outlook for global iron ore exports



Source: World Steel Association (2020); Department of Industry, Science, Energy and Resources (2020)

4.4 Australia

Australia's export earnings are set to rise despite short-term setbacks

Australian iron ore exports grew by 8 per cent (through the year) to $9.9 billion in June. Volumes reached 82 million tonnes in the month. This was a record monthly result both for volumes and values, and reflects a surge in shipments from Port Hedland.

The June result brought 2019–20 earnings to $102 billion, easily above the previous annual record for iron ore earnings (of $78 billion in 2018–19). It

also makes iron ore the first commodity to earn Australia more than $100 billion in a single year.

As a low-cost producer, Australia is unlikely to see any major decline in export volumes in the outlook period; on the contrary, it appears Australia is set to raise export volumes given production shortfalls elsewhere. On the negative side, the loss of European steelmaking capacity will force Australian suppliers to adjust to falls in a modest but reliable iron ore export market.

Australian iron ore miners continue to invest in new supply sources. New output is expected from significant projects in the Pilbara region of Western Australia, including BHP's South Flank project (from 2021), Fortescue's Eliwana project (from 2021), and Brockman's Marillana mine (after 2021). This will expand on existing capacity and substitute for falling output from some existing mines in the region, which are approaching depletion.

Export capacity is also being expanded, with Fortescue proceeding with plans to expand its capacity at Port Hedland by 20 million tonnes, to 210 million tonnes per year. BHP has announced plans to increase its own capacity at the same site from 290 million tonnes a year to 330 million tonnes. This signals a degree of confidence that Chinese demand for steelmaking will remain strong for several more years.

Australia's iron ore export volumes are forecast to grow

Export volumes are expected to follow the trajectory of production, increasing from an estimated 860 million tonnes in 2019–20 to 905 million tonnes by 2021–22 (see Figure 4.6).

This volume growth should largely reduce the impact of likely price declines, leading to still relatively strong export earnings over the next few years.

Australia's iron ore export values are expected to ease as prices retreat

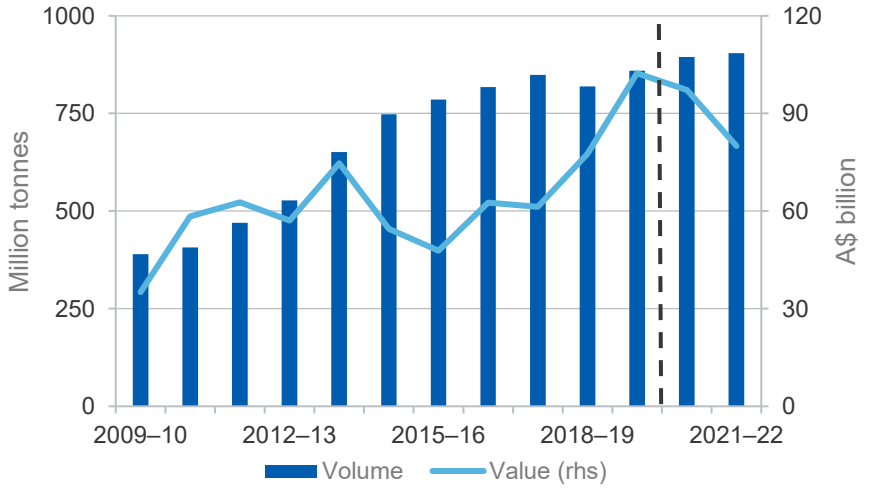
Historically high iron ore prices have resulted in an export earnings boon, with values peaking above $100 billion this year. While volumes are expected to hold up, an expected correction in prices will lead to some retreat in export value, with earnings forecast to shift down from $102 billion in 2019–20 to $80 billion by 2021–22.

Iron ore exploration expenditure is growing as prices lift

Iron ore exploration has picked up in recent quarters as prices have lifted. A total of $98.7 million was invested in exploration in the June quarter: this was up by 31 per cent in the quarter and 4 per cent through the year. The overwhelming majority of exploration occurred in Western Australia, where the most substantial deposits exist.

Iron ore exploration for the full 2019–20 year was $361.3 million. This was the highest annual total since 2014–15.

Figure 4.6: Australia's iron ore export volumes and values



Source: ABS (2020) International Trade, Australia, 5368.0; Department of Industry, Science, Energy and Resources (2020)

Revisions

Forecast export earnings for 2021–22 and 2021–22 are largely unchanged from the June quarter 2020 *Resources and Energy Quarterly*.

Table 4.1: World trade in iron ore

	Million tonnes				Annual percentage change		
	2019	2020[f]	2021[f]	2022[f]	2020[f]	2021[f]	2022[f]
Total world trade	1,554	1,616	1,741	1,824	4.0	7.8	4.8
Iron ore imports							
China	1,071	1,157	1,288	1,371	8.1	11.4	6.4
European Union 27	137	128	125	125	-7.0	-2.2	0.0
Japan	120	117	116	115	-2.0	-1.0	-0.9
South Korea	74	71	72	73	-4.2	1.6	1.5
India	5	5	5	5	-6.5	-2.1	0.0
Iron ore exports							
Australia	836	874	896	922	4.6	2.5	3.0
Brazil	336	366	372	382	8.9	1.6	2.7
Ukraine	45	45	57	60	0.9	25.7	6.2
India	41	38	48	52	-6.2	27.1	7.6

Notes: **f** forecast

Source: World Steel Association (2020); International Trade Centre (2020); Department of Industry, Science, Energy and Resources (2020)

Table 4.2: Iron ore outlook

						Annual percentage change		
World	**Unit**	**2019**	**2020[f]**	**2021[f]**	**2022[f]**	**2020[f]**	**2021[f]**	**2022[f]**
Prices [bc]								
– nominal	US$/t	83.0	90.7	85.5	76.1	9.3	-5.7	-11.0
– real [d]	US$/t	84.3	90.7	83.6	73.0	7.6	-7.9	-12.7
Australia	**Unit**	**2018–19**	**2019–20[s]**	**2020–21[f]**	**2021–22[f]**	**2019–20[s]**	**2020–21[f]**	**2021–22[f]**
Production								
– Steel [hs]	Mt	6.05	5.78	5.79	5.78	-4.5	0.2	-0.1
– Iron ore	Mt	924.2	924.0	928.0	928.7	0.0	0.4	0.1
Exports		189	187	185	193	-0.9	-1.0	4.0
Steel	Mt	1.21	0.88	1.00	0.99	-27.6	13.5	-0.1
– nominal value	A$m	1 287	1 008	752	751	-21.7	-25.4	-0.1
– real value [hi]	A$m	1 337	1 034	752	736	-22.7	-27.2	-2.1
Iron ore	Mt	818.0	859.6	895.0	904.7	5.1	4.1	1.1
– nominal value	A$m	77,553	102,345	97,219	79,963	32.0	-5.0	-17.8
– real value [i]	A$m	80,564	104,916	97,219	78,370	30.2	-7.3	-19.4

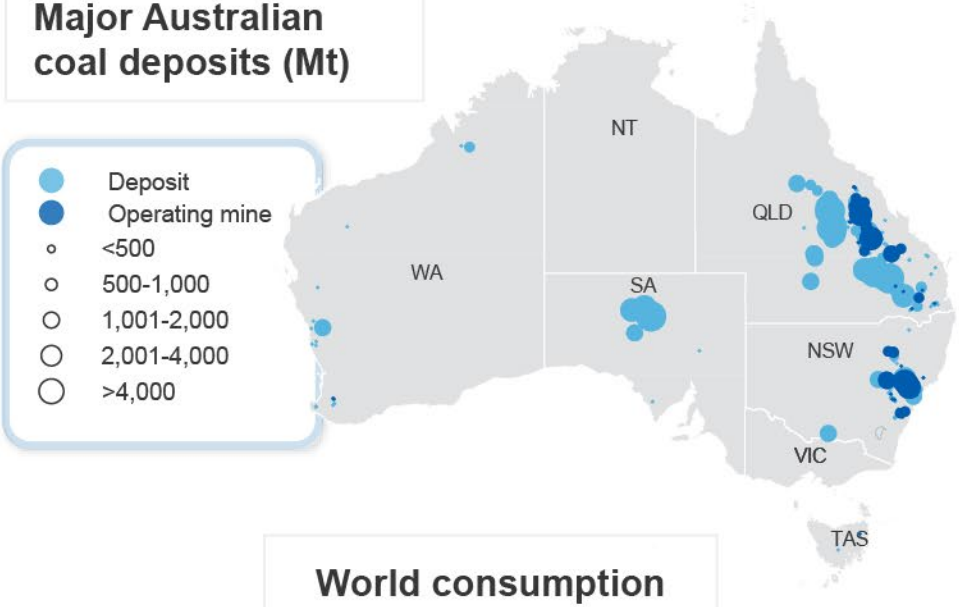
Notes: **b** fob Australian basis; **c** Spot price, 62 per cent iron content basis; **d** In 2020 US dollars; **f** forecast; **h** Crude steel equivalent; Crude steel is defined as the first solid state of production after melting. In ABS Australian Harmonized Export Commodity Classification, crude steel equivalent includes most items from 7206 to 7307, excluding ferrous waste and scrap and ferroalloys; **i** In 2020–21 Australian dollars.

Source: ABS (2020) International Trade in Goods and Services, Australia, 5368.0; Bloomberg (2019) Metal Bulletin; World Steel Association (2020); AME Group (2020); Company Reports; Department of Industry, Science, Energy and Resources (2020)

6 C Carbon 12.011

Metallurgical coal

Major Australian coal deposits (Mt)



Metallurgical coal

- Metallurgical coal is primarily used **to make steel**
- Contains **more carbon and less ash & moisture** than thermal coal
- 1x tonne of steel made in a blast furnace **uses 780kg of met coal**
- Electric arc furnaces don't use met coal as a **raw material**

World consumption

59% China

10% India

7% Russia

5% EU28

5% Japan

4% South Korea

Australia's metallurgical coal

World's no.1 **metallurgical coal** exporter

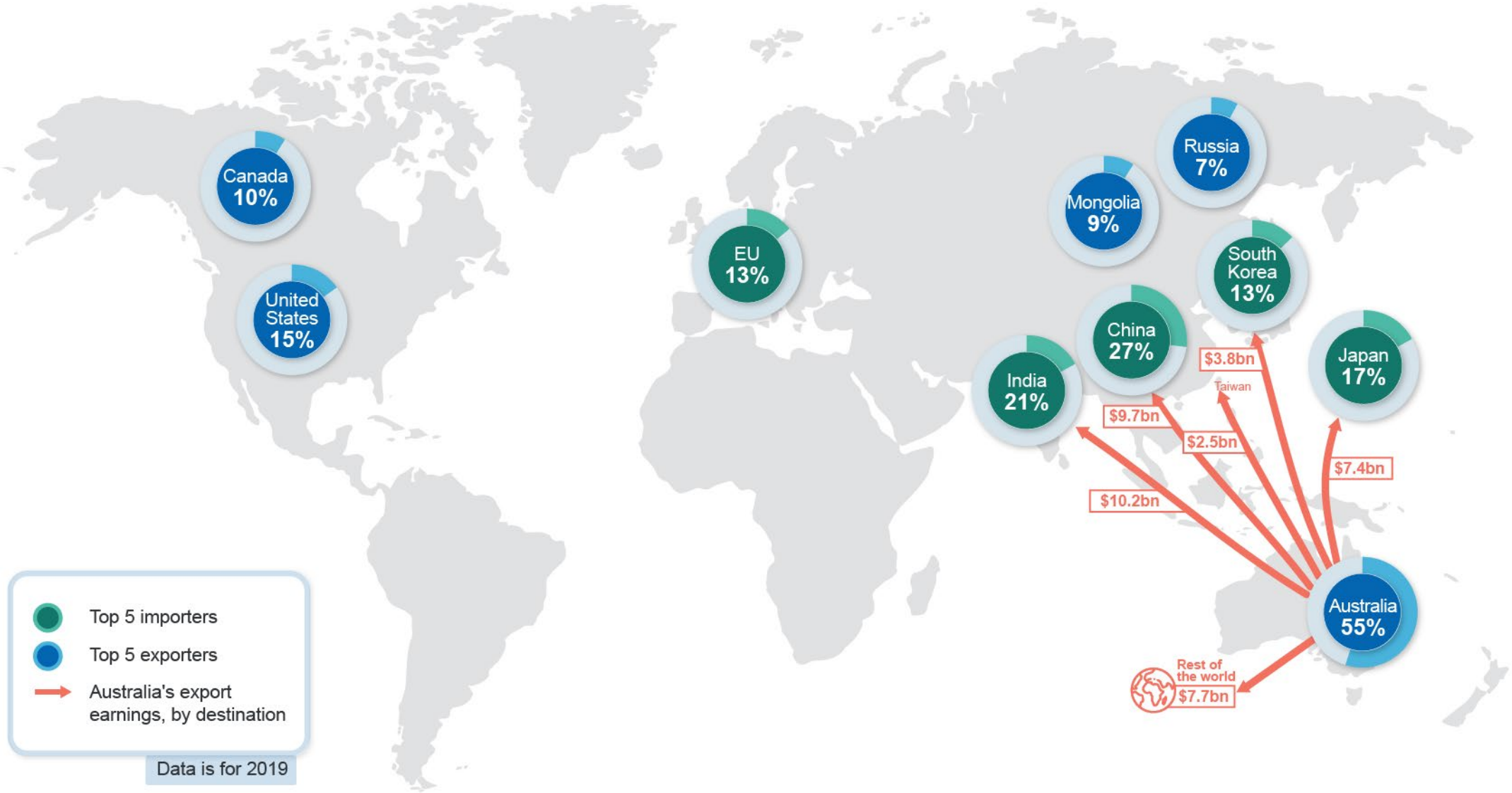
176m tonnes of **metallurgical coal** exported in 2019-20

Almost all of Australia's met coal is **exported**

6 C Carbon 12.011

Metallurgical coal

Trade map | September 2020



5.1 Summary

- Metallurgical coal prices have fallen sharply in recent months, reaching four year lows as a result of the demand-side impacts of COVID-19. The Australian premium hard coking coal (HCC) price is forecast to average US$128 a tonne in 2020, down from US$179 a tonne in 2019.
- Australia's export volumes are forecast to edge down by around 5 million tonnes in 2020–21 to 172 million tonnes, due to lower global demand, before lifting in 2021–22, as world steel production recovers.
- Australia's metallurgical coal exports are forecast to fall sharply in 2020–21, to $23 billion from $35 billion in 2019–20. They are forecast to recover partially to $28 billion in 2021–22, as prices and volumes lift.

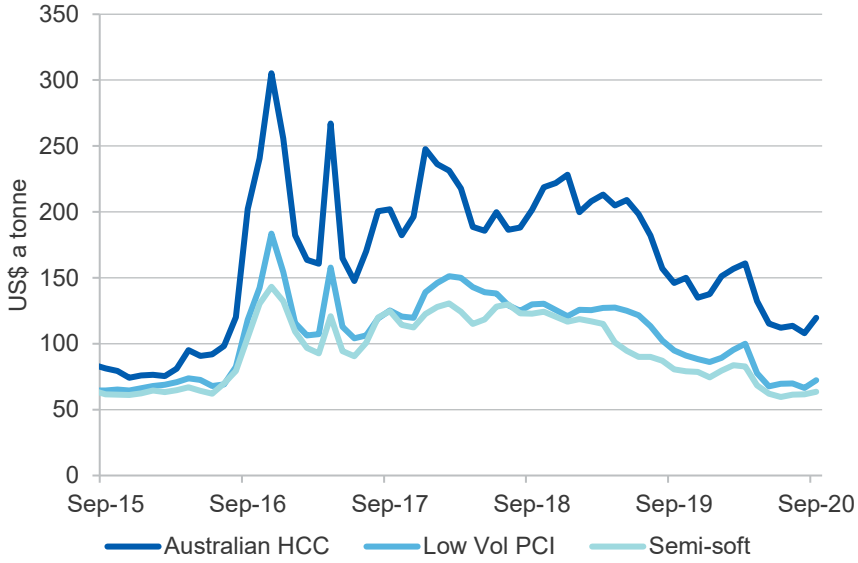
5.2 Prices

Metallurgical coal prices may have bottomed

After sustained declines through the first half of 2020, metallurgical coal prices may have reached a bottom, settling in the low US$100's in the September quarter — at their lowest level in four years. The global COVID-19 pandemic has slowed the steel industry, driving the price decline (see the *steel* chapter). The Australian premium hard coking coal (HCC) spot price averaged US$120 in the June quarter (down US$36 a tonne from the March quarter), and then fell further to about $114 in the September quarter (Figure 5.1). For a period, the HCC price was below the iron ore price for the first time in the history of the benchmarks.

Slowing global economic activity saw steel production curtailed dramatically across a number of nations in the first half of 2020, which in turn reduced demand for metallurgical coal. Indian steel mills reportedly cut output by 60–70 per cent during the initial national containment measures, causing some Indian ports to stop accepting coal deliveries to prevent further accumulation. Other major metallurgical coal buyers in North East Asia and Europe also cut steel production. The impact of demand reductions immediately affected high-cost US mines, who reduced output and exports from March. As prices fell further, miners in other major metallurgical coal exporting countries — including Australia from around May (see *Section 5.6 Australia*) — started to cut output.

Figure 5.1: Metallurgical coal prices, monthly



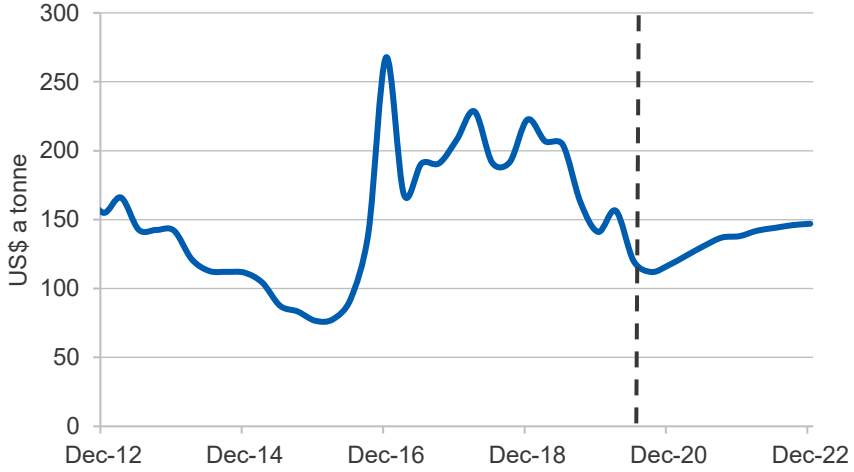
Notes: HCC stands for hard coking coal. PCI stands for pulverized coal for injection.
Source: Platts (2020)

The recovery of global metallurgical coal demand is expected to be slow, and patchy, which is likely to keep prices low for longer, even with planned supply cuts. The Australian premium HCC spot price is forecast to remain at current levels of around US$120 a tonne over the remainder of 2020, averaging US$128 a tonne for the year as a whole.

Chinese demand for metallurgical coal from the seaborne market will be the key driver of the metallurgical coal price outlook. This will depend on the Chinese coal industry's output of metallurgical coal, the impact of changes to China's import practices (including import licensing) as well as the rate of growth of China's massive steel industry. The other key demand-side uncertainty is the pace of the economic recovery in India, the world's 2nd largest metallurgical coal importer.

From 2021, metallurgical coal prices are expected to begin to recover in line with increasing steel production.

Figure 5.2: Australian premium HCC spot price, quarterly



Source: Platts (2020); Department of Industry, Science, Energy and Resources (2020)

The premium Australian HCC price is forecast to average US$134 a tonne in 2021 and US$145 a tonne in 2022, both well below the 2019 average (Figure 5.2).

5.3 World trade

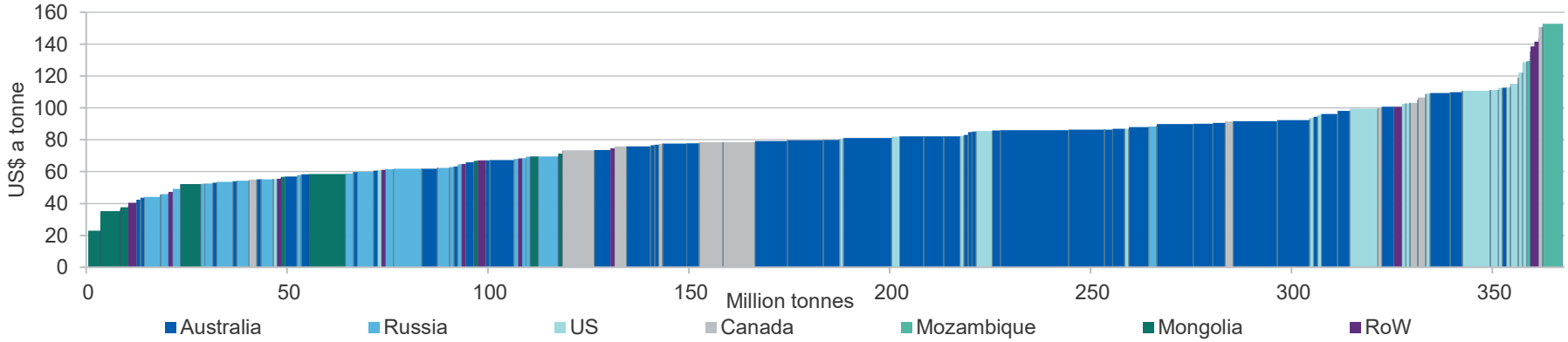
In 2019, world trade in metallurgical coal fell by 7 million tonnes (around 2 per cent) to 337 million tonnes. China's and India's imports increased strongly during the year, on the back of robust growth in steel production, but imports by other steel producing countries fell overall.

World metallurgical coal trade is forecast to fall by 41 million tonnes (or 12 per cent) to 296 million tonnes in 2020. India alone is expected to account for around half of the fall, with the rest of the decline spread across some other major steel producers, such as Europe and Japan.

Coal production cutbacks — as a percentage of 2019 levels — are expected to be most severe in the US, but other major exporters are also likely to be affected, including global leader Australia. The US is the second largest supplier, but many US producers have high costs, as shown in the global cost curve (Figure 5.3).

In 2021 and 2022, world trade in metallurgical coal is expected to grow strongly with the industrial production recovery; rising by 32 million tonnes in 2021 and a further 24 million tonnes in 2022. This stands in contrast to the forecasts for thermal coal, which is not expected to regain 2019 world trade levels during the outlook period (see *thermal coal* chapter).

Figure 5.3: Metallurgical coal (including hard coking, PCI and semi-soft) global cost curve, FOB, 2020



Notes: FOB is Free on Board. RoW is rest of world.

Source: AME Group (2020); Department of Industry, Science, Energy and Resources (2020)

5.4 World imports

China's steelmakers recover, but import restrictions expected

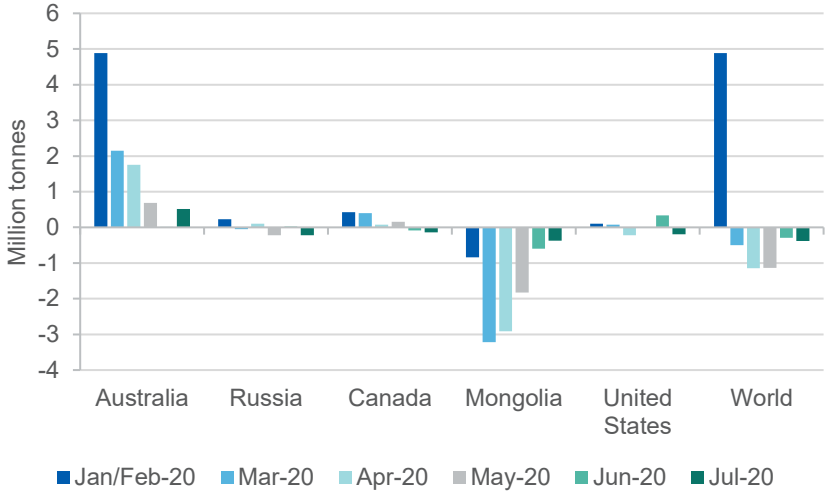
China is the world's largest steel maker, and imported 75 million tonnes of metallurgical coal in 2019 — making it the world's largest metallurgical coal buyer. Due to a sharp rise in China's seaborne metallurgical coal imports in the first quarter, the first half of 2020 saw imports increase by 5 per cent year-on-year (Figure 5.4). The early surge was driven by reduced domestic coal production (due to travel restrictions associated with the COVID-19 pandemic) and the halt to overland imports as Mongolia's border with China closed for many weeks.

After more than a decade of strong growth associated with the rise of the steel sector, China's metallurgical coal imports are expected to be around 70 million tonnes in 2020, as monthly import volumes decline over the rest of 2020. As the economic impacts of COVID-19 recede, metallurgical coal imports by China are expected to rise to 78 million tonnes in 2021, as steel production grows (see steel chapter). Chinese metallurgical coal output is also expected to lift, but is not expected to keep pace with demand growth given that China has limited reserves — particularly of high quality grades.

Reforms to Chinese coal mining regulation could adversely affect domestic metallurgical coal production, which would raise the need for imports to supply China's steelmakers. The safety, environmental and productivity goals of the reforms are making it more difficult for many small-scale coal mines to secure approvals to operate, and China's metallurgical coal output is more reliant on smaller mines than is thermal coal production. Shanxi's provincial government is planning to shut all coal mines that produce less than 0.6 million tonnes per annum by the end of 2020 — equivalent to around 15 million tonnes or 1.5 per cent of China's 2019 production.

Chinese coal imports (of all types from all countries) in the first six months were already 20 million tonnes ahead of where they were in the first 6 months of 2019. Consequently, China's metallurgical coal import volumes in the second half of 2020 could be constrained by slower customs clearance processes. In mid-September, around 100 vessels were queued

Figure 5.4: China's metallurgical coal imports, year-on-year change



Notes: China customs released combined January/February data for 2020.
Source: Bloomberg (2020) China customs

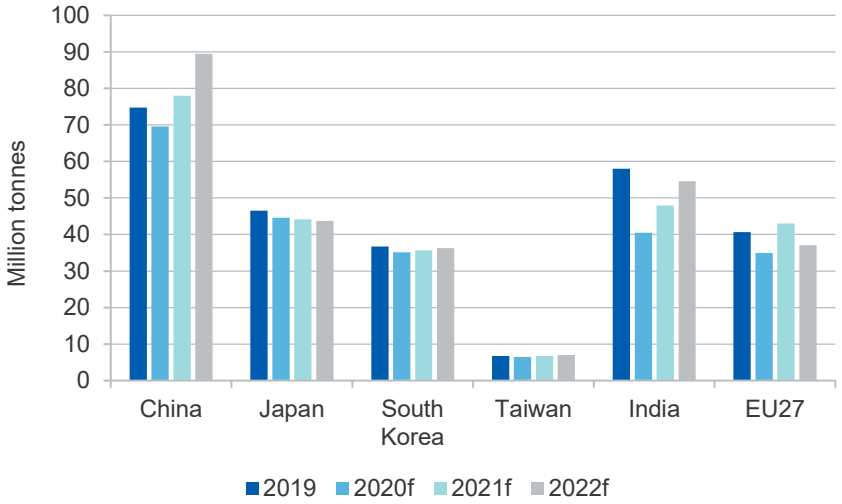
waiting to unload at major coal import terminals in northern China. This suggests China's policy of limiting coal imports to support domestic producer prices is slowing down cargos.

Australia's premium metallurgical coals have become China's metallurgical coal of choice in 2020. The volume of Australian cargos imported by China in the first 6 months of 2020 is estimated to be 24 million tonnes, up 65 per cent compared with the same period in 2019. Coincidentially, Australian cargos constituted almost two-thirds of all metallurgical coal imports to China in the first half of 2020.

India's metallurgical coal imports to fall sharply

India is the world's second largest steel producer and metallurgical coal buyer, importing 58 million tonnes in 2019. India's metallurgical coal imports fell by 23 per cent in the first six months of 2020 compared with a year earlier. The impact of the COVID-19 pandemic in India has seen its steel mills cut output by 70 per cent on a monthly basis, and much of India's steel sector remains 'hot idled' — whereby mills continued to

Figure 5.5: Metallurgical coal imports, annual



Notes: **f** Forecast

Source: IHS (2020); Department of Industry, Science, Energy and Resources (2020)

produce but at minimum levels in order to avoid the costs of later restarting furnaces. As India's steel production fell, so too did India's metallurgical coal demand. Steel mills and ports were unable to take more metallurgical coal cargos, and some had to be on-sold. India's metallurgical coal imports are forecast to fall by 18 million tonnes in 2020 to 40 million tonnes, a decline of 30 per cent.

After 2020, India's metallurgical coal imports are expected to begin to recover, increasing to 55 million tonnes in 2022 (Figure 5.5). India has ambitious plans to increase crude steel production capacity from 142 million tonnes to 300 million tonnes per year over the next decade. However, India has limited domestic reserves of metallurgical coal, and will need to increase imports to support rapid growth of its steel sector. The continuing impacts of the COVID-19 pandemic on India has further slowed the pace at which India's steel sector is able to expand, and this remains a key risk to the outlook for metallurgical coal.

Japan's imports to fall, while South Korea's to rise slightly after 2020

Japan is the world's third largest metallurgical coal importer, importing 47 million tonnes in 2019. Japan's imports were stable year-on-year in the first 6 months of 2020 despite the Japanese government announcing COVID-19 containment measures in early April. However, July saw a dramatic 29 per cent year-on-year fall in imports. With two major producers planning to retire some steel making capacity over the outlook period, Japan's metallurgical coal imports are forecast to fall to 45 million tonnes in 2020, and then to 44 million tonnes in 2022.

South Korea is the world's fourth largest metallurgical coal importer, bringing in 37 million tonnes in 2019. South Korea's imports fell 7 per cent year-on-year in the six months to end of June, and are forecast to be 35 million tonnes in 2020. South Korea's imports are expected to recover slowly, reaching 36 million tonnes in 2022.

5.5 World exports

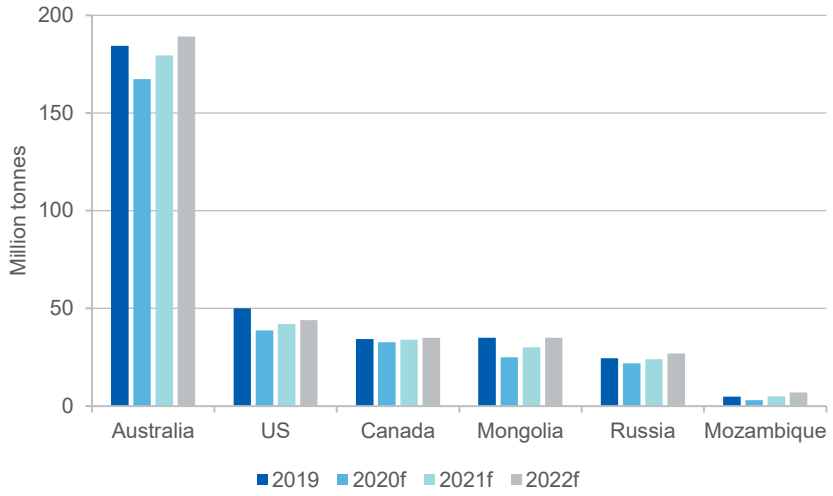
US exports volumes plunge and likely to stay down

The US is the world's second largest exporter of metallurgical coal after Australia, exporting 50 million tonnes in 2019. The US is a swing producer in metallurgical coal markets — due to higher production costs (Figure 5.3) and higher freight costs to key consumer markets — and exports fell 29 per cent year-on-year in the first half of 2020. Export volumes rose significantly in July such that US metallurgical coal exports are forecast to fall to 39 million tonnes in 2020, before rebounding in line with expected higher prices and lifting to 44 million tonnes in 2022 (Figure 5.6).

Russia's exports fall for now

Russia exported 25 million tonnes of metallurgical coal in 2019. Exports in the first quarter of 2020 were 13 per cent lower year-on-year, in response to declining prices. With the low prices of 2020, exports are forecast to be 22 million tonnes in 2020. After 2020, Russia's metallurgical coal exports are expected to gradually recover, reaching 27 million tonnes in 2022. Russia has been investing in new mining capacity, and rail and port expansions in recent years.

Figure 5.6: Metallurgical coal exports, annual



Notes: **f** Forecast
Source: IHS (2020); Department of Industry, Science, Energy and Resources (2020)

Mongolia's coal exports coming back after China border reopens

Mongolia surpassed both Russia and Canada to become the world's third largest metallurgical coal exporter in 2019, exporting 30 million tonnes. The closure of Mongolia's border with China from late January to April 2020 disrupted the crossing of coal trucks. Mongolia's metallurgical coal exports are now recovering from that hiatus, with reports of high numbers of trucks crossing into China in the September quarter. Nevertheless, due to the halt, Mongolia's exports are forecast to be lower at 25 million tonnes in 2020. Mongolia's exports are forecast to be 35 million tonnes in 2022.

Exports from Canada strong

Canada exported 34 million tonnes of metallurgical coal in 2019 (Figure 5.6). Canada's exports were strong in in the first half of 2020 — despite the fall in prices — with exports up 9 per cent year-on-year. However, this strength was mainly in the March quarter and started to slow in the June quarter, as prices declined further. Given the expected persistence of weak prices, Canada's metallurgical coal exports are expected to decline modestly to 33 million tonnes in 2020, and to bounce back to 35 million tonnes in 2022.

Mozambique's exports collapse

Mozambique currently has two exporting metallurgical coal mines: Vale's Moatize and Jindal Steel's Songa mines. Once touted as the next major supplier of metallurgical coal, Mozambique has faced a number of challenges in growing its exports, which were 5 million tonnes in 2019. Mozambique's metallurgical coal exports plummeted 41 per cent year-on-year in the first half of 2020, due to weak demand and low prices.

Mozambique's metallurgical coal exports are forecast to decline to 3 million tonnes in 2020, as low prices impact Mozambique's relatively high cost producers (Figure 5.3). After 2020, Mozambique's exports are forecast to begin to recover, reaching 7 million tonnes in 2022. The rise will be driven by the ramp up of Vale's Moatize mine, and facilitated by the 912 kilometre Nacala logistics corridor rail line and Nacala port expansion.

5.6 Australia

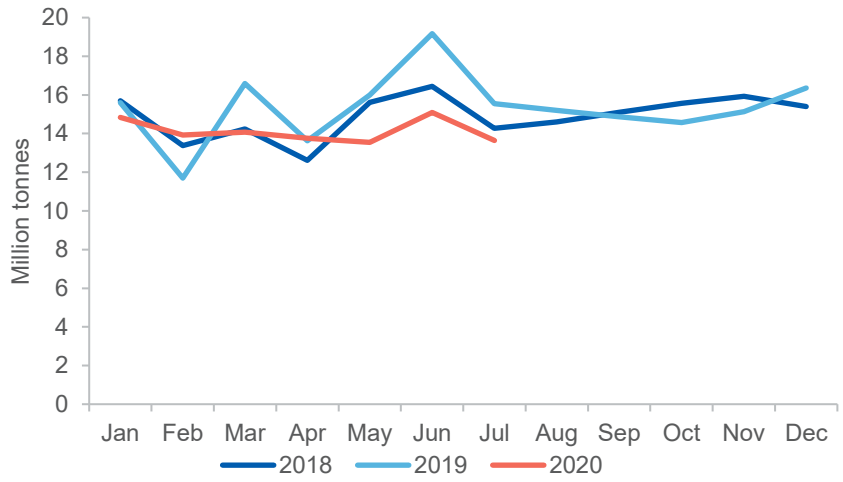
Metallurgical coal export earnings declined sharply in 2019–20

The value of Australia's metallurgical coal exports declined from $44 billion in 2018–19 to $35 billion in 2019–20, driven by both lower prices and lower export volumes. Metallurgical coal export volumes fell 8 per cent year-on-year in the June quarter, due to weak global demand — despite production recovering from the impacts of wet weather and bushfires in the March quarter.

Metallurgical coal export earnings to fall further in 2020–21

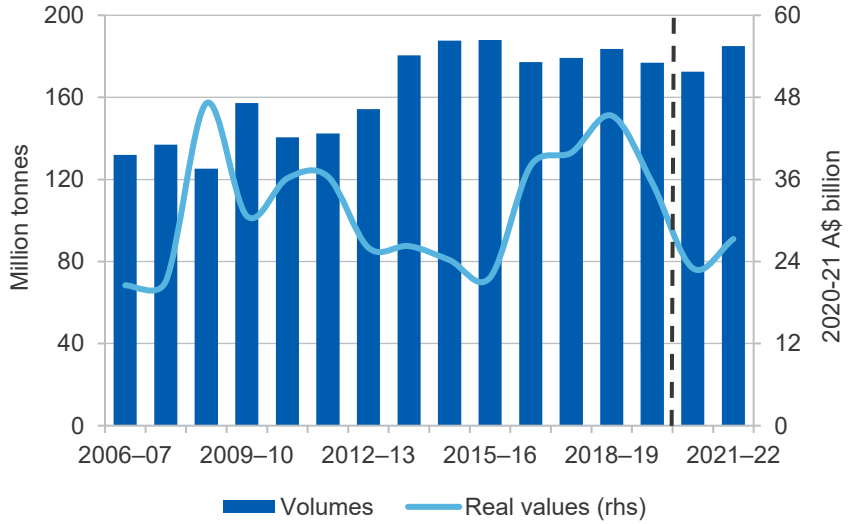
Metallurgical coal export earnings are forecast to decline further to $23 billion in 2020–21, due to a combination of lower prices and reduced mine production (Figure 5.8). Export volumes are expected to decline due to lower global demand for metallurgical coal, with some Australian miners announcing production cutbacks or temporary closures (discussed below) and the potential for further announcements to follow. Export earnings are then expected to mount a partial recovery to $28 billion in 2021–22.

Figure 5.7: Australia's metallurgical coal exports



Source: ABS (2020)

Figure 5.8: Australia's metallurgical coal exports



Source: ABS (2020) International Trade, Australia 5454.0; Department of Industry, Science, Energy and Resources (2020)

A key risk to the outlook is coal mines being placed on care and maintenance. However, there are a number of factors that reduce the risk of widespread mine closures in Australia; these include 'take-or-pay' contracts with rail and port operators, contracted export sales, and the costs associated with moving to care and maintenance (see the *thermal coal* chapter for discussion). About two-thirds of Australian metallurgical coal exports are HCC, while the remaining third is composed of pulverized coal for injection (PCI) and semi-soft coking coal. Most Australian HCC producers appear to be relatively well-positioned, even at current spot prices (Figure 5.9). However, producers of semi-soft coking coal and PCI appear to be more exposed to a prolonged period of low prices.

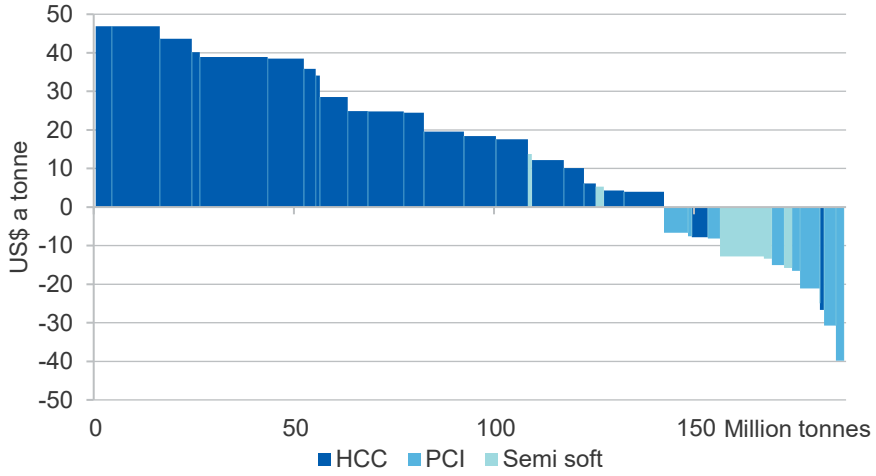
To date, several Australian mines have announced production cuts in response to low prices. In July, Glencore — Australia's largest coal miner in 2019–20 — announced that it would reduce global output over the rest of 2020. While the strategy aims mainly to reduce thermal coal output, it will target lower grade metallurgical coals too. This will be achieved with targeted shutdowns of two or three weeks at certain mines. Glencore reports that metallurgical coal was the only profitable part of its coal mining business in the 2019–20 financial year.

BHP, another major player in Australian coal, announced in August that it would reduce the output of its portfolio of metallurgical coal mines by about 4–6 per cent over the medium term, cutting annual output to 46–52 million tonnes. BHP too will focus its production efforts on higher quality coals.

Also in August, Peabody announced that it would halve the workforce at its 2.5 million tonne per annum Wambo underground thermal and semi-soft coking coal mine in New South Wales. This decision followed a two-month temporary closure since June. Production will also be slowed at Peabody and Yancoal's 2.7 million tonne Middlemount mine (which produces mostly PCI) in Queensland's Bowen Basin.

Anglo American's Grosvenor mine in Queensland — which closed due to an accident that injured 5 workers in early May — will remain suspended until at least the second half of 2021. This alone removes up to 4 million tonnes of prime hard mid volatile metallurgical coal from global supply.

Figure 5.9: Export margins of Australian metallurgical coal mines



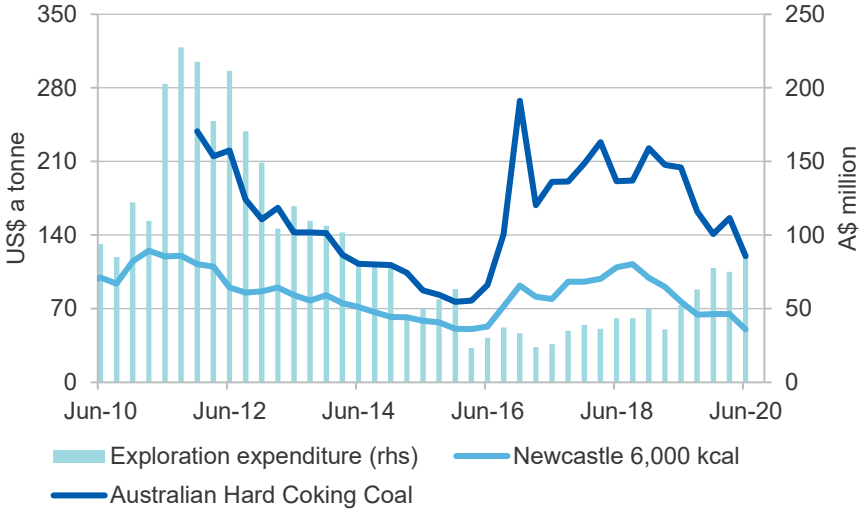
Notes: Semi soft is semi-soft coking coal; PCI is pulverized coal for injection; HCC is hard coking coal. Price assumptions are HCC = US$120 a tonne; PCI = US$70 a tonne; semi soft = US$65 a tonne. Mines are categorized into HCC, PCI and semi soft based on which product they most produce of. Some mines produce a mixture of these products.

Source: AME (2020); Department of Industry, Innovation and Science (2020)

Another near term risk to mine production — not factored in to the forecast — is the higher likelihood of heavy rainfall in coal producing regions of NSW and Queensland. The Australian Bureau of Meteorology (BOM) has forecast the likelihood of La Niña this year is 70 per cent, roughly three times the normal likelihood. The last significant La Niña was in 2010–11 and resulted in around 85 per cent of Queensland coal mines either restricting output or closing because of record rainfall.

Longer term, deferred investment decisions — as a result of the demand-side impacts of COVID-19 — are likely to weigh on Australian metallurgical coal production. Coronado Coal has deferred an expansion of its Curragh mine in Queensland's Bowen Basin, noting it would reduce capital expenditure by around 40 per cent in response to COVID-19. Similarly, South32 may push back the timetable for development and project expansion for its Appin and Dendrobium underground coal mines in New South Wales because of capital constraints adopted by the company.

Figure 5.10: Australian coal exploration expenditure and prices



Source: ABS (2020), IHS (2020), Platts (2020)

As the result of announced production cuts, Australian export volumes are forecast to fall by 3 per cent to 172 million tonnes in 2020–21. A full recovery is anticipated by 2021–22, with exports in that year rebounding up 7 per cent to 185 million tonnes.

Coal exploration expenditure increases

Australia's coal exploration expenditure increased by 66 per cent year-on-year to $87 million in the June quarter 2020, continuing to recover from the lows recorded over 2016 and 2017 (Figure 5.10). For the full year 2019−20 expenditure was $303 million, 66 per cent higher than the previous year.

The outlook for Australia's metallurgical coal exports has deteriorated

Australia's forecast metallurgical coal export earnings have been revised down by $2.3 billion in 2020–21 and by $1.4 billion in 2021–22, due to a stronger $A/$US exchange rate and reduced export volumes. Forecast export volumes in 2020–21 have been revised down by 8 million tonnes, and volumes in 2021–22 down by 2 million tonnes.

Table 5.1: World trade in metallurgical coal

	Unit	2019	2020[f]	2021[f]	2022[f]	Annual percentage change 2020[f]	2021[f]	2022[f]
World trade	Mt	337	296	329	352	-12.1	10.8	7.2
Metallurgical coal imports								
China	Mt	75	70	78	89	-7.0	12.1	14.7
India	Mt	58	40	48	55	-30.2	18.4	14.0
Japan	Mt	47	45	44	44	-4.2	-1.0	-0.9
European Union 28	Mt	41	35	39	37	-14.0	11.5	-5.1
South Korea	Mt	37	35	36	36	-4.3	1.6	1.5
Metallurgical coal exports								
Australia	Mt	184	168	179	189	-8.6	6.4	5.3
United States	Mt	50	39	42	44	-22.5	8.4	4.8
Canada	Mt	34	33	34	35	-5.0	4.2	2.9
Russia	Mt	25	22	24	27	-11.1	9.8	12.5
Mongolia	Mt	30	25	30	35	-16.9	20.3	16.7
Mozambique	Mt	5	3	5	7	-39.3	68.3	40.0

Notes: **f** Forecast; **s** Estimate.

Source: IEA (2019) Coal Information; IHS (2020); Department of Industry, Innovation and Science (2020)

Table 5.2: Metallurgical coal outlook

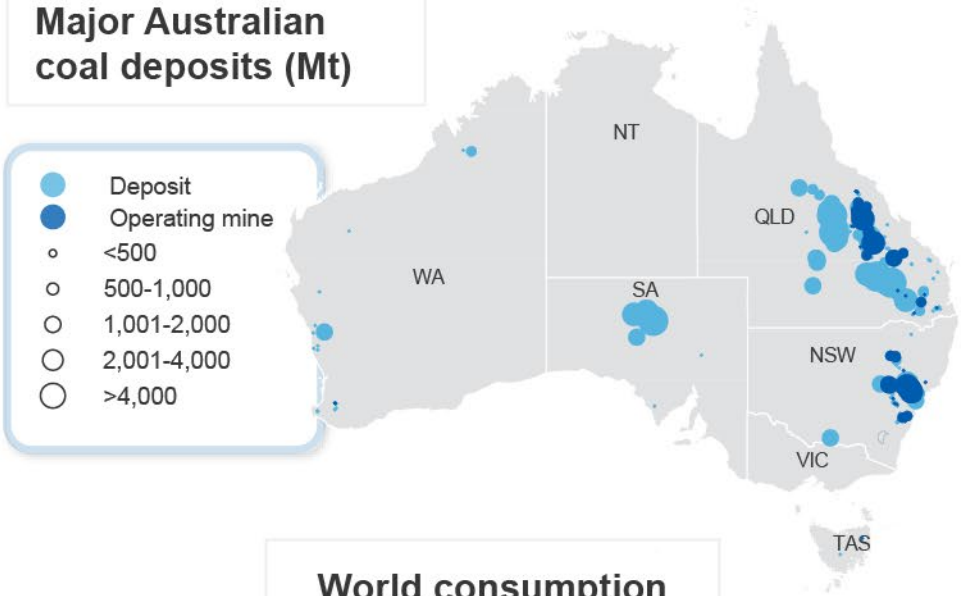
World	Unit	2019	2020[f]	2021[f]	2022[f]	Annual percentage change 2020[f]	2021[f]	2022[f]
Contract prices[e]								
– nominal	US$/t	184	129	133	145	-30.1	3.1	9.1
– real[d]	US$/t	187	129	130	139	-31.3	0.7	7.0
Spot prices[g]								
– nominal	US$/t	179	128	134	145	-28.4	5.0	8.2
– real[d]	US$/t	182	128	131	139	-29.6	2.5	6.1
Australia	**Unit**	**2018–19**	**2019–20**	**2020–21[f]**	**2021–22[f]**	**2019–20**	**2020–21[f]**	**2021–22[f]**
Production	Mt	189	184	178	191	-2.8	-2.9	7.2
Export volume	Mt	184	177	172	185	-3.6	-2.6	7.2
– nominal value	A$m	43,637	34,603	22,993	27,817	-20.7	-33.6	21.0
– real value[i]	A$m	45,331	35,472	22,993	27,263	-21.7	-35.2	18.6

Notes: **d** In 2020 US dollars. **e** Contract price assessment for high-quality hard coking coal. **i** In 2020–21 Australian dollars. **f** Forecast. **g** Hard coking coal fob Australia east coast ports.
Source: ABS (2020) International Trade in Goods and Services, Australia, 5368.0; Department of Industry, Innovation and Science (2020); Platts (2020)

Thermal coal

6 C Carbon 12.011

Major Australian coal deposits (Mt)



Thermal coal

- Thermal coal is primarily used in **electricity generation**
- Coal accounted for **38%** of power generation globally in 2018
- Mines are open cut or underground depending on the **geology of the deposit**
- **Coal formation** began 290-360 million years ago

World consumption

55% China

14% India

8% United States

3% South Africa

3% Indonesia

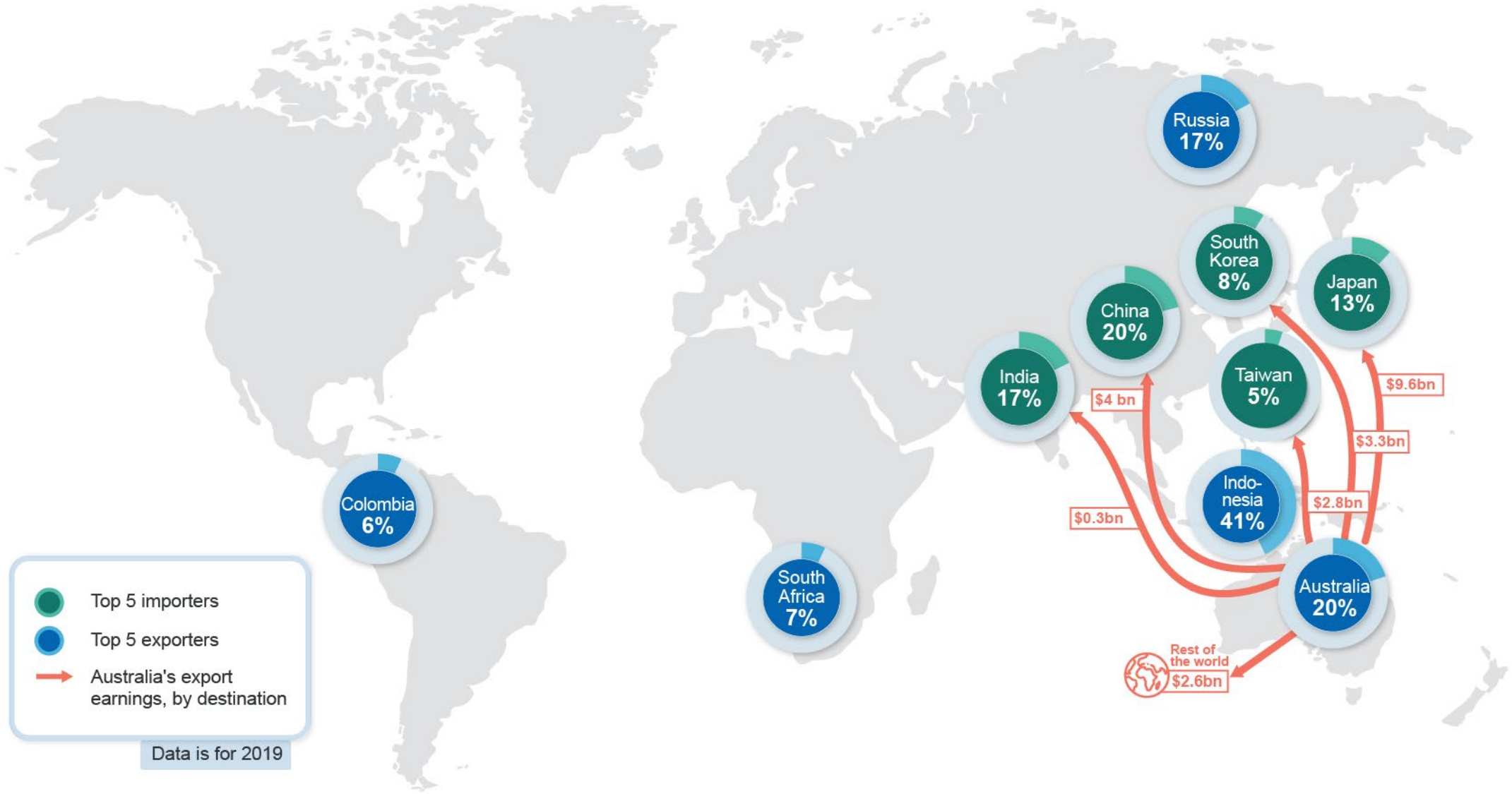
2% Japan

Australia's thermal coal

- **World's 2nd** largest **thermal coal** exporter
- **World's 4th** **largest black coal** resources
- **75-80%** of thermal coal **is exported**

Thermal coal

Trade map | September 2020



6.1 Summary

- Thermal coal spot prices have continued to fall, as the impact of COVID-19 drives a contraction in seaborne trade. The Newcastle benchmark price is forecast to average US$54 a tonne in 2020, before slowly rising to US$65 a tonne in 2022.
- The bulk of production cuts in 2020 are expected to come from Indonesia, Columbia and the US. Australia's exports are forecast to decline from 213 million tonnes in 2019–20 to 208 million tonnes in 2020–21, as Australian producers cut output in response to low prices. As prices gradually rise again, Australian exports are expected to grow to 221 million tonnes in 2021–22.
- Australia's thermal coal exports are forecast to fall from $20 billion in 2019–20 to $15 billion in 2020–21, before a partial recovery to $17 billion in 2021–22, driven by slow price gains and a strong recovery in volumes.

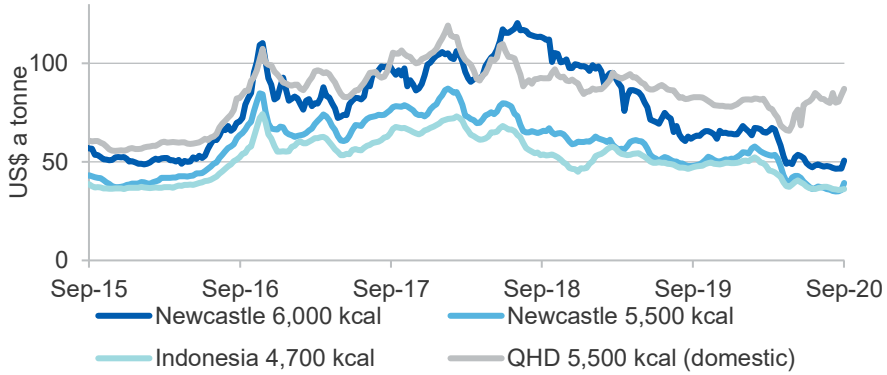
6.2 Prices

Thermal coal prices stabilise at lowest level in 14 years

A combination of developments drove the fall in thermal coal prices earlier in the year: in India, COVID-19 containment measures coupled with government directives that favoured domestic coal over imports; and in North East Asia, weak demand due to lower power consumption and an ongoing shift away from coal in electricity generation. Demand from smaller importers in South East Asia was also affected as the spread of COVID-19 widened. Competition from gas also lowered thermal coal demand, with oil-linked LNG contract prices in Asia near record lows, and LNG spot prices weighed down by oversupply (see the *gas* chapter).

In the September quarter 2020, seaborne thermal coal daily spot prices have stabilised at levels (in nominal terms) last seen in 2006. While global demand remains weak, strong Chinese imports and the withdrawal of higher cost producers and supply cutbacks from other miners appear to have slowed the decline in prices. The benchmark Australian thermal coal spot price — Newcastle 6,000 kcal/kg — remained mostly within the range US$45–50 a tonne during the quarter (Figure 6.1).

Figure 6.1: Thermal coal prices, weekly



Notes: Qinhuangdao (QHD) is the largest coal port in China and QHD prices are a key benchmark for coal prices in northeastern China.

Source: IHS (2020)

World demand for thermal coal has slumped, with imports 5 per cent lower year-on-year in the second half of 2020. China is the only major importer to demonstrate resilient import demand, and domestic prices for Chinese-produced thermal coal remain relatively high. While COVID-19 restrictions in the first quarter of 2020 lowered Chinese power consumption, domestic coal production was curtailed by China's efforts to control the spread of the virus and Chinese buyers turned to imports to make up the shortfall.

On the supply side, all major exporters are expected to ship lower volumes in 2020 and 2021, as persistently weak prices prompt miners to pause or reduce production for the time being.

Against the backdrop of persistent weak spot prices, the 2020–21 Japanese Fiscal Year contract price (April to March) outcome appears generous at US$68.75 a tonne, though this still represented a substantial drop from US$95 a tonne for the contract in 2019–20.

Thermal coal prices to remain subdued due to weak demand

The Newcastle 6,000 kcal spot price is forecast to remain low for the rest of 2020, averaging around US$54 a tonne for the year as a whole (Figure

6.2). Lower power demand — as a result of a sharp fall in economic activity — is expected to weigh on seaborne thermal coal demand.

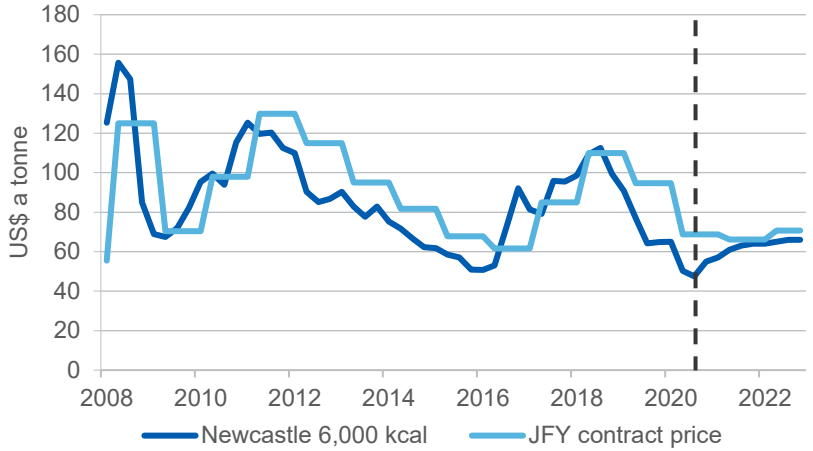
On the demand side, the rapid build-up in coal stocks in key importing countries will take some time to run down, and moves by the Indian government to encourage the use of domestic coal over imports should prevent any sharp rebound in prices in the short term. There also remains the risk of Chinese government intervention to restrict coal imports: the Chinese coal mining industry is encouraging the government to tighten import controls, with seaborne coal prices growing increasingly attractive relative to domestic prices, and local demand continuing to outpace supply (see comparison with QHD prices in Figure 6.1).

On the supply side, further cuts to production are likely to be required to balance the market in 2020. At current prices, around one-third of mine production supplying the seaborne thermal coal market (and for which data is available) is uneconomic (for Australian mine costs, see Figure 6.12).

Thermal coal prices are expected to rise in 2021, driven by an increase in seaborne thermal coal demand as the global economy recovers. However, longer-term trends will constrain the extent of the rise: Europe and South Korea are looking to reduce thermal coal consumption, while the world's two largest consumers (China and India) have signalled their intention to reduce thermal coal imports by increasing domestic production. Growing demand from South and Southeast Asia should help to offset declining thermal coal imports elsewhere. Competition from LNG is also expected to weigh on thermal coal demand, especially while LNG prices remain near record lows in spot and short-term contract markets (see the *gas* chapter).

The Japanese Fiscal Year contract price, which serves as a benchmark for the Asian market is, as usual, expected to settle at a premium relative to the spot price over the outlook period (Figure 6.2).

Figure 6.2: Thermal coal price outlook, annual



Notes: JFY is Japanese Fiscal Year (April to March).

Source: IHS (2020); Department of Industry, Science, Energy and Resources (2020)

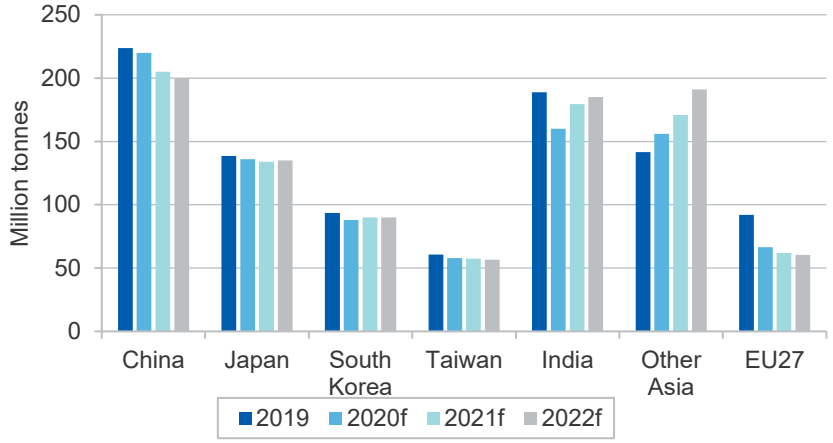
6.3 World trade

World thermal coal trade is expected to decline in 2020 for only the second time this century (the first being 2015). World thermal coal imports are forecast to fall by 63 million tonnes — or 6 per cent to 1,043 million tonnes.

The fall in seaborne thermal coal demand is expected to be led by India and Europe (Figure 6.3). Europe's coal imports are expected to continue to decline as a part of its longer-term shift away from coal in energy generation, while demand in Southeast and South Asia is also being affected by COVID-19's impact on power demand and economic activity. The largest cuts to production are expected to come from Indonesia, Colombia and the US, although all suppliers will be affected.

In 2021 and 2022, global thermal coal import demand is expected to grow weakly, as the world economies rebound from the impacts of COVID-19. But the shift away from coal in power generation in some countries, combined with the drive for self-sufficiency in others, is expected to keep world trade in thermal coal below 2019 levels during the outlook period.

Figure 6.3: Thermal coal imports



Notes: **f** Forecast

Source: IHS (2020); IEA (2019) Coal Market Report; Department of Industry, Science, Energy and Resources (2020)

In 2021 and 2022, global thermal coal import demand is expected to grow weakly, as the world economies rebound from the impacts of COVID-19. But the shift away from coal in power generation in some countries, combined with the drive for self-sufficiency in others, is expected to keep world trade in thermal coal below 2019 levels during the outlook period.

6.4 World imports

China's imports buck the trend so far in 2020

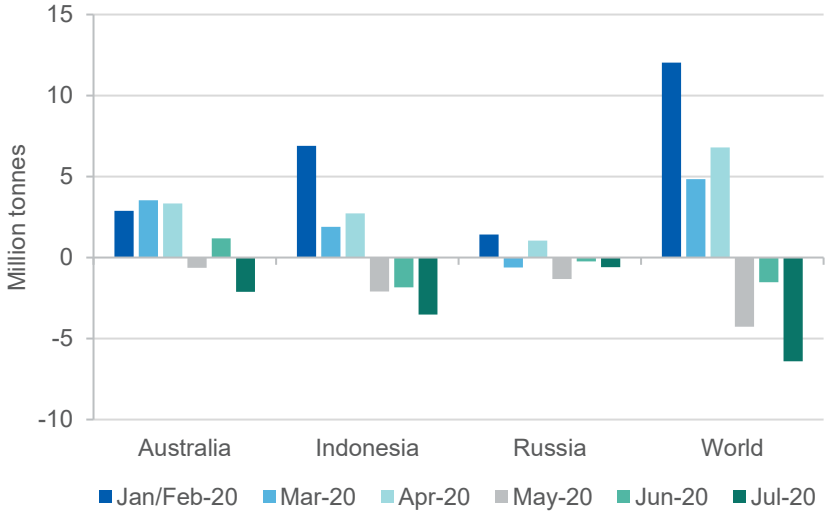
As the world's largest thermal coal consumer and importer, China exerts a profound influence on seaborne markets. Propelled by a rebounding economy — after its intense early 2020 measures to contain COVID-19 — China's total thermal coal imports surged in the first half of the year.

Previous forecasts (in the June *Resources and Energy Quarterly*) that Chinese thermal coal imports would fall by 11 million tonnes in 2020 now appear less likely. China's thermal coal imports in the first six months of 2020 were its highest on record for the period, up 15 per cent to 136 million tonnes, compared with 118 million tonnes in the same period a year ago (Figure 6.4).

During the first half of 2020, China's thermal coal trade relationship with Australia grew strongly. In that period, China's imports from Australia were up 48 per cent on the same period in 2019, from 21 to 32 million tonnes.

The implementation of measures in China from late January to control the spread of COVID-19 restricted domestic coal production, forcing Chinese buyers to turn to the seaborne market. However, these policies were short lived and a turn back to domestic supply is underway. Consequently, Chinese monthly imports started returning to normal levels in May and are expected to trend down over the remainder of 2020. With import restrictions expected to continue to curtail volumes for the remainder of the year, annual imports are forecast to be 220 million tonnes in 2020, slightly down from 224 million tonnes in 2019.

Figure 6.4: China's thermal coal imports, year-on-year change



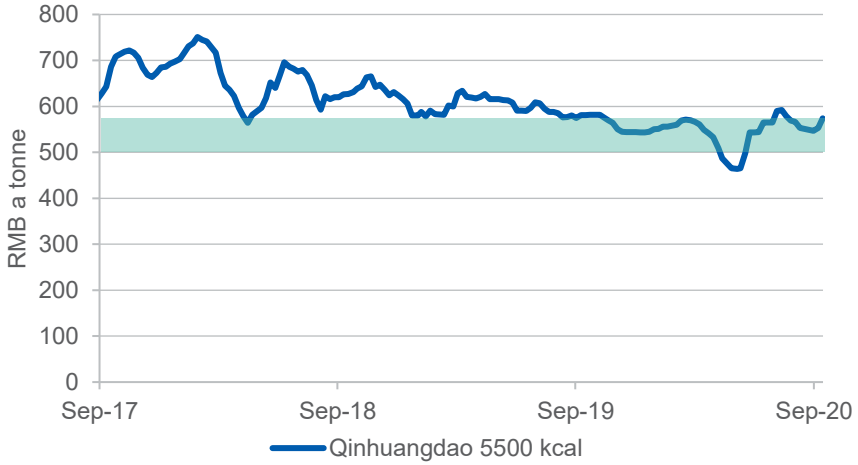
Notes: Estimates based on Chinese customs data. China customs released combined January/February data for 2020.

Source: Bloomberg (2020); Department of Industry, Science, Energy and Resources (2020)

The Chinese government's coal import policies will be critical in determining China's thermal coal imports in 2020 and beyond, with ramifications for the seaborne market. China's government has actively sought to manage coal import levels over the past few years; in part to provide support for China's coal industry — which is undergoing restructuring — and to pursue energy security goals. The Chinese government is set to pass changes to their domestic Coal Law, including new language focused on regulating coal imports.

Thermal coal import policy has been a key tool for stabilising domestic prices within a price band of 500 to 570 Renminbi (RMB) equivalent to US$72–82 a tonne at the current exchange rate. Prices in this range are understood to be broadly acceptable to China's power generators and industrial consumers, while also providing sufficient margins for domestic coal miners. China's government has tended to ease import restrictions when domestic prices exceed RMB570 a tonne, and tighten restrictions when the price goes below RMB500. The price range is shown as a green zone in Figure 6.5.

Figure 6.5: China's domestic thermal coal price



Notes: The 'green zone' is a price band from 500-570RMB. Qinhuangdao (QHD) prices are a key benchmark for coal prices in northeastern China.

Source: Bloomberg (2020)

China's quantitative limits on coal imports may help to explain the current popularity of Australian coal in China. Since Australian thermal coal generally has high calorific content, a buyer facing a quantitative limit is likely to choose higher grade coal to maximise the amount of energy available from a given quota expressed in tonnes.

In 2021 and 2022, with domestic mine output in China lifting more quickly than consumption, China's imports should decline. China has been restructuring its coal mining sector over the past few years, and the replacement of smaller, less efficient mines with larger, more efficient mine capacity, should allow production to grow. Domestic output will also be boosted by infrastructure improvements and expansions — including the 60 million tonne per annum Haoji railway, commissioned in October 2019 — which is connecting domestic supplies to demand centres more effectively.

Chinese coal demand is expected to lift in 2021 and 2022, as economic activity strengthens. While the bulk of newly installed power generation capacity is likely to come from hydro and renewable generators, China has a substantial pipeline of coal-fired power stations to build. The government has recently accelerated the approval and construction of over 100 GW of coal generation capacity, as part of its COVID-19 economic recovery plan. Given the pipeline of coal generation projects in China, it is possible that the central government will raise the coal power cap in the country's 14th Five Year Plan (2021–2025). China currently has over 1,000 gigawatts (GW) of operational coal-fired power generation capacity, and state planning bodies have recommended lifting the cap from 1,100 GW to somewhere between 1,200 GW and 1,400 GW.

Increases in coal consumption in utility-scale power generation are likely to be partly offset by falls in coal consumption in the residential, commercial and small-scale industry sectors, as a result of China's efforts to reduce city air pollution.

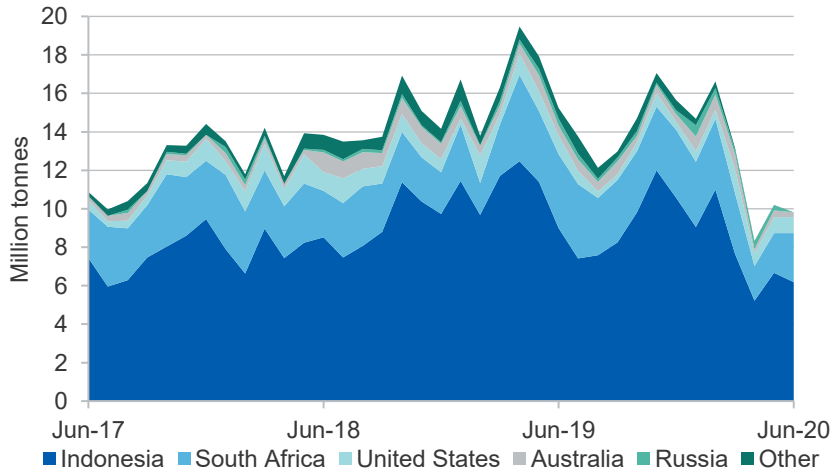
India's imports fall as lockdowns impact the power and industrial sectors

India is the world's second largest thermal coal consumer and importer, importing 189 million tonnes of thermal coal in 2019. The Indian government ordered nationwide COVID-19 containment measures from 24 March until 20 April, after which restrictions were progressively relaxed (except for localised 'hotspot' containment measures). This approach slowed the initial spread of COVID-19, but by September reported infections were growing rapidly, and economic activity in the country remained severely impacted.

As a result of COVID-19, India's thermal coal imports saw the world's steepest declines in the first half of 2020, with imports falling by 22 per cent year-on-year — 22 million tonnes lower compared with the same period in 2019. Almost all of this impact was absorbed by Indonesia — India's major supplier. Australia's thermal coal exports to India are very small (Figure 6.6).

The fall in India's imports was the result of a sharp contraction in demand coupled with resilient domestic mine output. As India went into COVID-19 containment measures in March, power demand plunged — lowering demand for thermal coal in electricity generation. Power consumption for the first half of 2020 was 10 per cent lower year-on-year. The COVID-19 containment measures also affected industrial thermal coal demand, especially in the sponge iron and cement production sectors. India's sponge iron sector uses about 25–30 million tonnes of imported thermal coal each year, largely from South Africa.

Figure 6.6: India's thermal coal imports, monthly



Source: IHS (2020)

India's domestic coal production started the year very strongly and has been resilient to the disruptive effects of COVID-19. Production from state-owned Coal India — which accounts for about 80 per cent of India's coal output — reached a monthly record in March, as the miner sought to reach its production target for the Indian fiscal year ending in March 2020. From April onward, Indian mine production fell to about 15 per cent below normal monthly levels. Nevertheless, coal stocks at mines, industrial facilities, ports and power plants climbed to record highs, and remain elevated at around twice ordinary levels. With excess supply mounting, the Indian government urged state-owned generation companies to use domestic coal ahead of imports. India's Power Ministry issued a directive for power plants to cut their use of imported coal.

The Indian government made a significant policy decision in May: suspending air quality environmental regulations which had previously obliged power plants in urban and polluted areas to use higher-quality coal. The removal of this regulation will further reduce incentives to import higher grade coals to blend with Indian coals. India's thermal coal imports are forecast to decline sharply — by almost 30 million tonnes to 160 million tonnes in 2020 — due to the likelihood that the demand-side impacts of COVID-19 on India's economy are prolonged. Record high inventories will take some time to run down, and will weigh on India's thermal coal imports in the short term.

There is a high degree of uncertainty about this forecast. To date, India's mining operations have continued throughout the COVID-19 containment measures. State-owned Coal India has a production target of 710 million tonnes in Indian fiscal year (April to March) 2020–21. However, the

continued spread of COVID-19 through the rest of the year would threaten output targets, as mines adjust operational procedures to prevent spread among the workforce, minimise work days lost to illness, as well as to cease work when infections occur. Such increased and prolonged COVID-19 impacts would depress economic activity, reducing coal demand. With India's coal consumption and production both dwarfing import requirements, small swings in either will likely exert a huge influence over the trajectory of India's thermal coal imports.

India's thermal coal imports are expected to recover gradually over the next two years to reach 185 million tonnes in 2022, as the country recovers from COVID-19, electricity demand picks up and industrial activity resumes. However, the bounce back is expected to be constrained by government targets and policy. In February 2020, India's Minister for Coal and Mines announced India would aim to stop importing thermal coal from Indian fiscal year 2023–24 (instead relying on domestic mine production for all its needs). While this has been a long-running goal for India and there are considerable barriers to its achievement, the announcement signals a renewed policy drive for energy self-sufficiency.

The Indian government's strategy to increase domestic production has several elements. The first is to boost production by state-owned companies, particularly Coal India which has an annual production target of 1 billion tonnes by Indian fiscal year 2023–24. The second strategy is to increase production by the private sector. The Indian government has introduced a number of reforms to encourage private investment, including opening up the country's coal sector to foreign direct investment and changing the rules governing coal mine auctions. While India will likely fall short of its production targets, government policy is nevertheless expected to propel Indian coal production higher over the next few years.

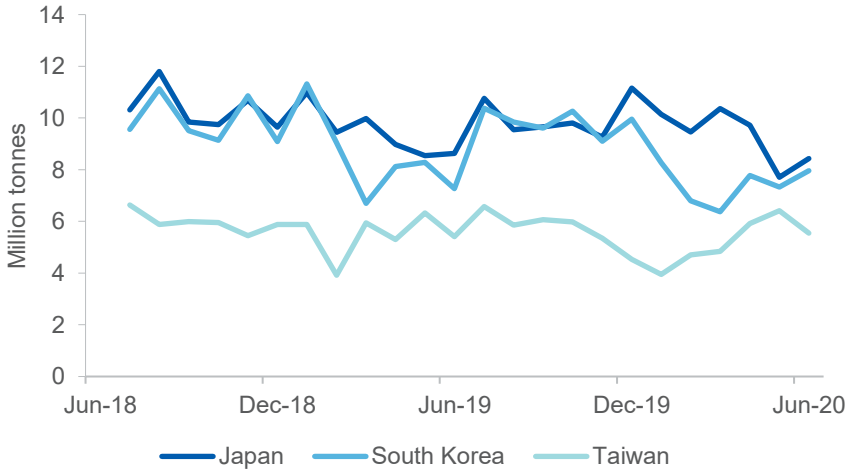
Japan's imports are being affected by competing influences

Japan is the world's third largest thermal coal importer, importing 138 million tonnes of thermal coal in 2019. In 2020, so far, the country's thermal coal imports in the seven months to July were slightly lower than the same period in 2019 (Figure 6.7). This gentle decline is likely to continue, with Japan's imports forecast to decline by around 2 million tonnes to 136 million tonnes in 2020. Low LNG prices and subdued energy demand — due to COVID-19 — should weigh on thermal coal imports. However, imports should also receive support from the shutdown of a number of nuclear power plants (which compete with thermal coal in electricity generation) that need to finish upgrades to comply with counter-terrorism measures.

Beyond 2020, there are competing trends at work. Japan has new coal-fired power generation capacity under construction but coal consumption will be offset by retiring older plants. Also, Japanese energy demand is on a downward trend, and Japan is planning to increase the role of nuclear and renewables in its energy mix, while reducing the role of gas and coal.

The 2011 Fukushima nuclear reactor disaster resulted in the closure of Japan's nuclear power plants. At the time of writing, only nine of Japan's 42 nuclear reactors had gained approval to restart, and only 4 of these are currently in operation. More reactors are likely to come back online by 2022, with 18 reactors having submitted applications to restart to Japan's

Figure 6.7: Japan, South Korea and Taiwan's thermal coal imports



Source: IHS (2020)

Nuclear Regulation Authority. The pace of nuclear restarts is the main uncertainty affecting the outlook for Japan's thermal coal imports. Nuclear energy in Japan continues to face public opposition and legal challenges. There remain significant risks of delays or slippages in nuclear reactor restarts.

South Korea's imports to decline as energy transition accelerates

South Korea is the world's fourth largest thermal coal importer, purchasing 93 million tonnes of thermal coal in 2019. South Korea's thermal coal imports fell steeply in the six months to June 2020 (Figure 6.7), down 12 per cent year-on-year, as COVID-19 affected power demand and the country temporarily closed some coal-fired power stations to reduce air pollution. South Korea's import and consumption of thermal coal has been declining since 2018, as government policies have been implemented to manage air pollution problems. South Korea's government has also introduced new tax arrangements aimed at encouraging the use of gas over coal.

South Korea's thermal coal imports are forecast to fall to 88 million tonnes in 2020, as a result of these existing trends and reduced power demand caused by COVID-19.

In 2021 and 2022, South Korea's imports are forecast to remain broadly stable at around 90 million tonnes, with increasing power demand offset by the impact of policies to reduce coal usage. South Korea's long-term plan is to shift its energy mix towards renewables and gas, and away from nuclear and coal. Under South Korea's current energy plan, no new coal-fired power or nuclear capacity will be added, aside from that already under construction. Under South Korea's draft 2020–2034 energy plan, the target for coal's share of the power mix in 2034 would fall to 15 per cent. Currently, coal accounts for around 27 per cent of South Korea's power generation.

Taiwan's imports to decline under its national energy plan

Taiwan's thermal coal imports were 61 million tonnes in 2019, and are expected to decline to 58 million tonnes in 2020. While power demand in Taiwan was reasonably resilient to the impacts of COVID-19 in the first half of 2020, thermal coal imports declined by 4 per cent year-on-year.

In 2021 and 2022, Taiwan's thermal coal imports are expected to decline slightly further as a result of the government's energy transition policies. Taiwan is aiming to shift its power generation mix towards gas and renewables, and away from nuclear and coal. Under Taiwan's current energy plan, coal's share of power generation would fall from 46 per cent at present to 27 per cent in 2025.

While government policy is expected to reduce Taiwan's thermal coal imports, Taiwan faces challenges in achieving a rapid energy transition. Taiwan will need to quickly bring on LNG regasification capacity in order to ramp up LNG imports, and project slippage remains a risk.

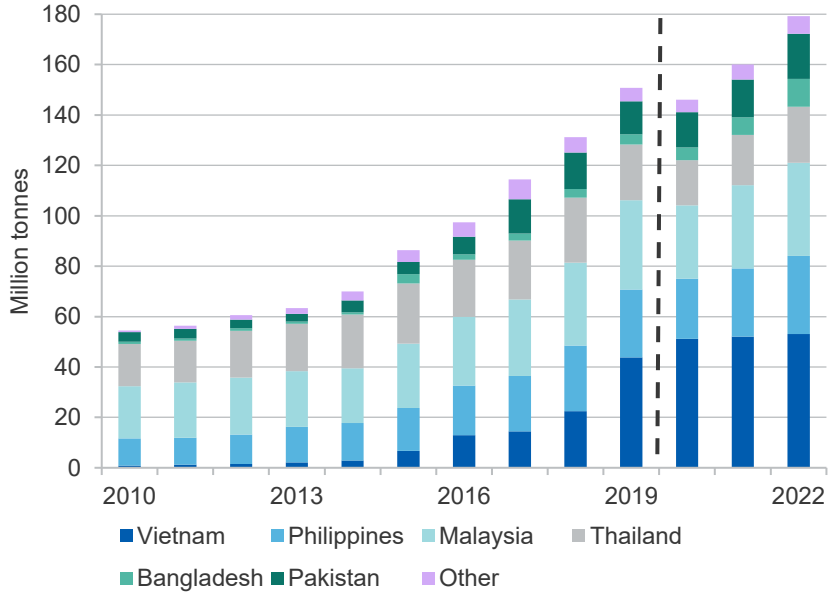
Southeast and South Asia to be a key source of import growth

In 2019, the nations in Southeast and South Asia (excluding India) collectively imported 151 million tonnes of thermal coal. The largest importers of thermal coal in Southeast Asia were Vietnam, Malaysia, the Philippines and Thailand. In South Asia, Pakistan was the largest thermal coal buyer, followed by Bangladesh. While nations in Southeast and South Asia are relatively small importers individually, collectively the region is expected to play a substantial role in thermal coal markets going forward.

Vietnam's thermal coal imports appear to have grown strongly in the first six months of 2020, as power demand climbed thanks to Vietnam's early success in containing the spread of COVID-19. The composition of electrical power supply also tilted towards coal as hydroelectric power generation was crippled by a prolonged dry season, and declining domestic gas supplies impacted gas-fired power generation.

Power generators in the Philippines are reportedly expecting to cut coal imports this year, as measures aimed to contain the COVID-19 pandemic reduce power demand. In 2020, Southeast and South Asia's imports are forecast to decline slightly to 146 million tonnes, as Vietnam's forecast import growth partly offsets declines in all other importers in the region.

Figure 6.8: South and South East Asia thermal coal imports



Source: IEA (2020) Coal Information; Department of Industry, Science, Energy and Resources (2020); IHS (2020)

After 2020, the thermal coal imports of Southeast and South Asia are expected to increase, reaching 179 million tonnes in 2022 (Figure 6.8).

Economic and population growth is driving the demand for electricity, and coal-fired power generation is expected to play a key role in meeting growing usage. While project cancellations appear to have been rising in recent years, the completion of coal-fired power stations currently under construction is expected to drive up the region's demand for thermal coal imports over the next few years.

Vietnam is expected to be a key driver of import demand growth. Under Vietnam's Power Development Plan, coal-fired power will account for 49 per cent of the nation's electricity generation capacity by 2025. However, commentators suggest that this target may be scaled back to as low as 37 per cent under a future update to the Power Development Plan.

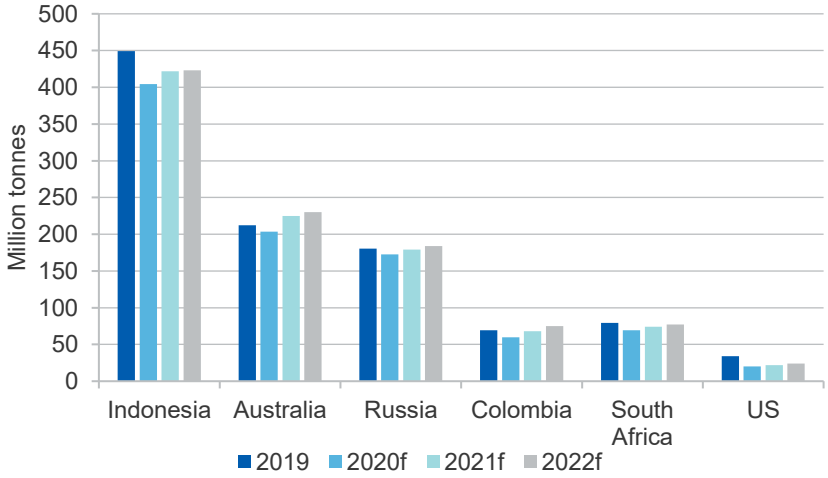
6.5 World exports

Indonesia's exports to decline sharply from record highs

Indonesia is the world's largest thermal coal exporter, exporting 449 million tonnes in 2019 — a record high — from production of 610 million tonnes. Indonesian thermal coal exports have come under pressure as thermal coal prices weaken, with prices below the cost of production for some miners. The COVID-19 containment measures in India — the main destination for Indonesia's exports — have reduced demand for Indonesia's lower calorific coals. Indonesia's exports are expected to fall sharply in 2020 by 10 per cent to 404 million tonnes.

In the first half of 2020, Indonesia's exports fell by 22 million tonnes (9 per cent) compared with the same period a year earlier. These losses were concentrated in the June quarter and were the result both of heavy rains in South Kalimantan and miners' strategic decisions to lower output, due to low price levels.

Figure 6.9: Thermal coal exports



Notes: **f** Forecast

Source: IHS (2020); IEA (2019) Coal Information; ABS (2019); Department of Industry, Science, Energy and Resources (2020)

Indonesia's exports are expected to rise slightly in 2021 and 2022, as prices recover. However, output will not return to 2019 levels during the outlook period, as forecast low prices discourage production. Moreover, the Indonesian government has previously flagged plans to limit annual output, in order to preserve coal reserves for future domestic use. The government is targeting an output cap of 550 million tonnes for 2020.

Russia's exports have been affected by COVID-19

Russia was the third largest thermal coal exporter in 2019, shipping 181 million tonnes. Russia's exports fell 14 per cent year-on-year in the first half of 2020. Russia's largest coal exporter, SUEK, reported lower exports due to low seaborne prices and logistics issues on the eastern rail network. Russian exports are forecast to fall to 173 million tonnes in 2020, but rebound to 184 million tonnes in 2022 as seaborne demand recovers.

Export growth will be supported by ongoing government plans to invest in the coal industry and in associated rail and port infrastructure. Russia has been investing heavily in transportation infrastructure to the country's eastern ports — targeting the Asian premium market, where Japan's utilities are diversifying their supply sources, and South Korea's new regulations are lifting demand for Russia's low sulphur coal. A sustained fall through 2020 in the value of the Russian Ruble has also helped Russian coal miners.

Colombia's exports affected by COVID-19

Colombia exported 69 million tonnes of thermal coal in 2019. Exports increased solidly year-on-year in January and February, but declined in March and April as COVID-19 disrupted producers. Colombia's exports are forecast to fall to 55 million tonnes in 2020, its lowest export volume in 15 years, before recovering over the next two years. The low level of investment in Colombia's coal sector in recent years, and falling coal consumption in Europe — where Colombian miners have historically sold their coal — are expected to limit the prospects for growth in Colombia's exports. Most of Colombia's coal mines are on the Caribbean coast — providing a direct route to Europe — so the costs of shipping to growing demand centres in Asia is much higher.

On 31 August, a mine workers' union at the massive Cerrejón coal mine went on strike over a pay dispute with the company. The closure of Cerrejón leaves just one of Colombia's big four coal exporters in full operation. The outlook for prices has prompted Glencore to seek regulatory approval to keep its Prodeco mine in care and maintenance for several years. At time of writing, approval has been denied, which limits the period it can stay shut to six months, but the company is likely to seek a review of the decision.

South Africa's exports fall on weak Indian orders

South Africa produced 250 million tonnes of thermal coal in 2019, and exported 79 million tonnes — making it the world's 4th largest exporter. South Africa began COVID-19 containment measures in late March, which was subsequently extended to end April. The measures briefly reduced output and exports from the country's largest port, Richard's Bay. South Africa's exports in the first half of 2020 were 10 per cent lower than the same period in 2019. South Africa's thermal coal 2020 exports are forecast at 69 million tonnes.

By 2022, South Africa's exports are expected to recover to 77 million tonnes (Figure 6.9). Developments in India — a major destination for South African exports — will be key to the recovery of the nation's coal sector. South African exports to India are expected to rise, and miners will increasingly target other Asian markets — such as Pakistan — as European coal usage falls. A modest decline in domestic consumption should also help free up thermal coal for export. This was outlined the South African government's October 2019 plan, to reduce coal-fired power generation capacity from 37 GW at present to 33 GW by 2030.

US exports to decline due to cost and infrastructure challenges

The US exported 34 million tonnes of thermal coal in 2019. The US is considered a price-sensitive swing supplier in the seaborne thermal coal market, with most US producers operating at higher costs. US exports fell by 34 per cent year-on-year in the first half of 2020, and a number of producers have idled mines, which will affect exports later in 2020. Lower exports are partly related to the impacts of COVID-19 on the seaborne

thermal coal market, but the US coal sector was already under pressure due to low natural gas prices, falling demand in Europe (the typical destination for US coal), and a lack of infrastructure on the US west coast (near Asian markets). These challenges are expected to result in US thermal coal exports falling to 20 million tonnes in 2020, before partially recovering to 24 million tonnes in 2022.

6.6 Australia

A tumultuous time for thermal coal exports

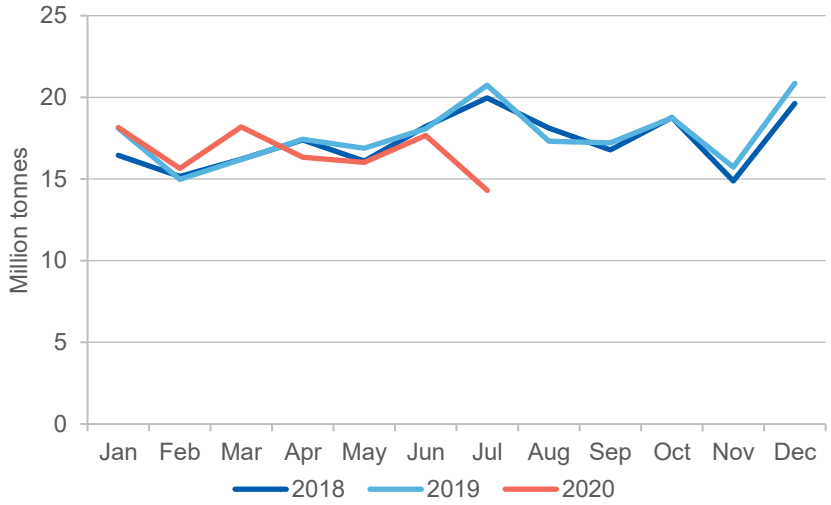
Despite a number of miners being challenged by bad weather and bushfires in the first half of 2020, Australia's thermal coal export volume was a record 102 million tonnes — similar to the volume exported in the same period in 2019. This strength faltered in July, with exports for that month at their lowest level since 2011, reflecting concerns over delays unloading cargos in China (Figure 6.10). Export volumes are expected to recover to more typical levels in August and September — based on preliminary port data — but to gradually decline through to the end of 2020, as mines execute their plans to reduce output.

Thermal coal export earnings are forecast to decline by around $6 billion to $15 billion in 2020–21, due to lower prices and slightly lower export volumes (Figure 6.11). The benchmark Newcastle 6,000 kcal spot price fell to below US$50 a tonne in the September quarter, and is expected to recover slowly, reaching around US$65 at the end of the outlook period.

Australia's thermal coal export volumes are forecast to edge down from 213 million tonnes in 2019–20 to 208 million tonnes in 2020–21. Forecast low prices over 2020, currently being exacerbated by the relative weakness of the US dollar, are expected to result in lower production at higher-cost mines during the first half of 2020–21.

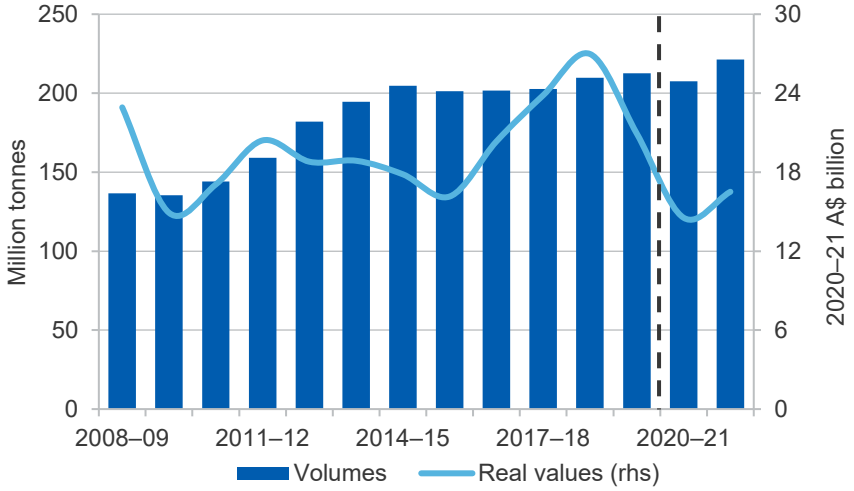
Australian thermal coal export earnings are forecast to edge up by around $2.3 billion to $17 billion in 2021–22, driven by a surge in export volumes and slow but steady growth in prices.

Figure 6.10: Australia's thermal coal exports, monthly



Source: ABS (2020)

Figure 6.11: Australia's thermal coal exports



Source: ABS (2020); Department of Industry, Science, Energy and Resources (2020)

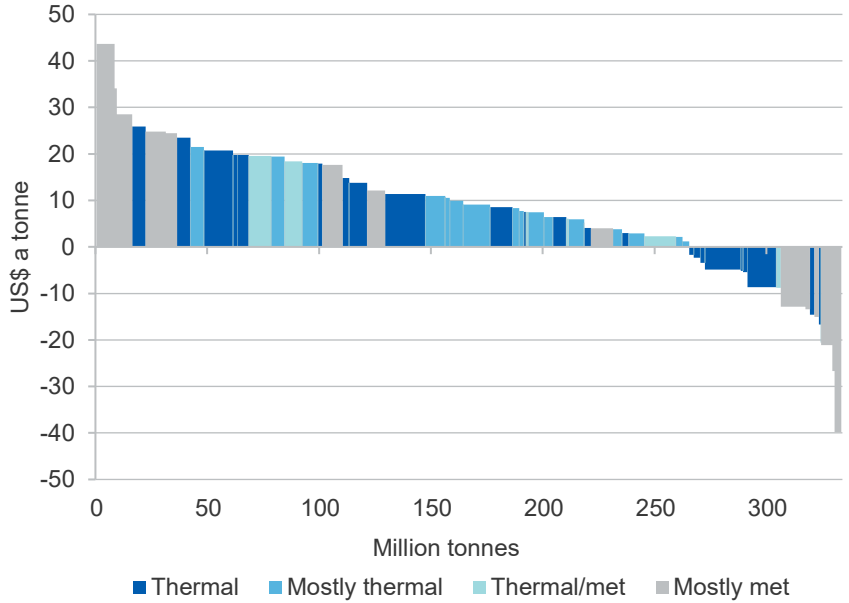
In mid-August, Peabody announced a 50 per cent reduction in the workforce at its 2.5 million tonne per annum Wambo mine. This follows a production halt at the mine since 19 June. Also in August, Glencore — Australia's largest supplier of thermal coal — announced plans to reduce its overall Australian output by about 12 per cent relative to 2019 output. The cuts will focus on lower quality coals that face the largest oversupply, and follow temporary operational stops at some Glencore mines.

At current prices, a significant proportion of Australian thermal coal production is loss-making. On a calorific-value-adjusted basis, an estimated one-third of Australian thermal coal exports are cash negative at prices of US$50 a tonne for Newcastle 6,000 kcal NAR coal (Figure 6.12). However, a number of factors should see Australian supply remain relatively resilient — and thus minimise the risk of widespread mine closures if prices do not persist at current lows beyond 2020:

- Some Australian thermal coal is exported on contracts that provide Australian miners with an annual fixed price. The 2020–21 Japanese fiscal year (April to March) benchmark contract price settled at US$68.75 a tonne, well above both the prevailing spot price at the time and the forecast for average spot prices of US$52 a tonne for the same period (see *Section 6.2 Prices*).
- Mines may run at loss for a time — given the costs associated with shutting down production — until prices recover. The costs associated with placing a mine on care and maintenance are relatively high in Australia, compared with nations like Indonesia, South Africa and Colombia.
- Mines may have 'take-or-pay' clauses in contracts with rail and port facilities, under which they incur costs whether or not they produce. Mines may continue to produce even if their costs are above prices, if take-or-pay costs are greater than those losses from producing.

Some of the mines that are uneconomic at current thermal coal prices do not rely on their thermal coal sales for the bulk of their revenue, since they mainly produce metallurgical coal (Figure 6.12). However, low prices for metallurgical coal could threaten the viability of some of these mines.

Figure 6.12: Export margins of Australian thermal coal mines



Notes: The margin curve incorporates the following assumptions: a price of US$50 a tonne for Newcastle 6,000 kcal NAR coal; an adjustment to mine costs based on this calorific content; an exchange rate of 1 AUD = US$0.65; 'Thermal' refers to mines that produce 100 per cent thermal coal; 'Mostly thermal' more than 70 per cent; 'Thermal/met 30-70 per cent; 'Mostly met' 1-30 per cent.

Source: AME Group (2020); Department of Industry, Science, Energy and Resources (2020)

Revisions to the outlook for Australian thermal coal exports

Since the June 2020 *Resources and Energy Quarterly,* Australia's forecast thermal coal export earnings have been revised down by $1.4 billion in 2020–21, due to weaker prices in the September quarter, a 2 million tonne reduction in expected export volumes and an 3 cent increase in the relative value of the Australian dollar. Forecast export volumes have been revised up by 5 million tonnes in 2021–22, on lower expected Australian coal consumption, but export earnings are expected to be $0.4 billion lower, due to the stronger dollar.

Table 6.1: World trade in thermal coal

	Unit	2019	2020[f]	2021[f]	2022[f]	Annual percentage change 2020[f]	2021[f]	2022[f]
World trade	Mt	1,106	1,043	1,058	1,078	-5.7	1.5	1.9
Thermal coal imports								
Asia	Mt	847	808	837	858	-4.6	3.6	2.5
China	Mt	224	220	205	200	-1.7	-6.8	-2.4
India	Mt	189	160	180	185	-15.2	12.2	3.0
Japan	Mt	138	136	134	135	-1.8	-1.5	0.7
South Korea	Mt	93	88	90	90	-5.9	2.4	0.0
Taiwan	Mt	61	58	57	57	-4.6	-1.2	-1.2
Thermal coal exports								
Indonesia	Mt	449	404	422	423	-10.0	4.4	0.2
Australia	Mt	212	203	225	230	-4.3	10.8	2.3
Russia	Mt	181	173	179	184	-4.4	3.7	2.8
Colombia	Mt	69	55	68	75	-13.8	13.6	10.3
South Africa	Mt	79	69	74	77	-12.6	6.5	4.1
United States	Mt	34	20	22	24	-41.6	10.1	9.1

Notes: **f** Forecast

Source: IEA (2019) Coal 2019, accessed through the IEA 20/20 Professional Browser; IHS (2020); Department of Industry, Science, Energy and Resources (2020)

Table 6.2: Thermal coal outlook

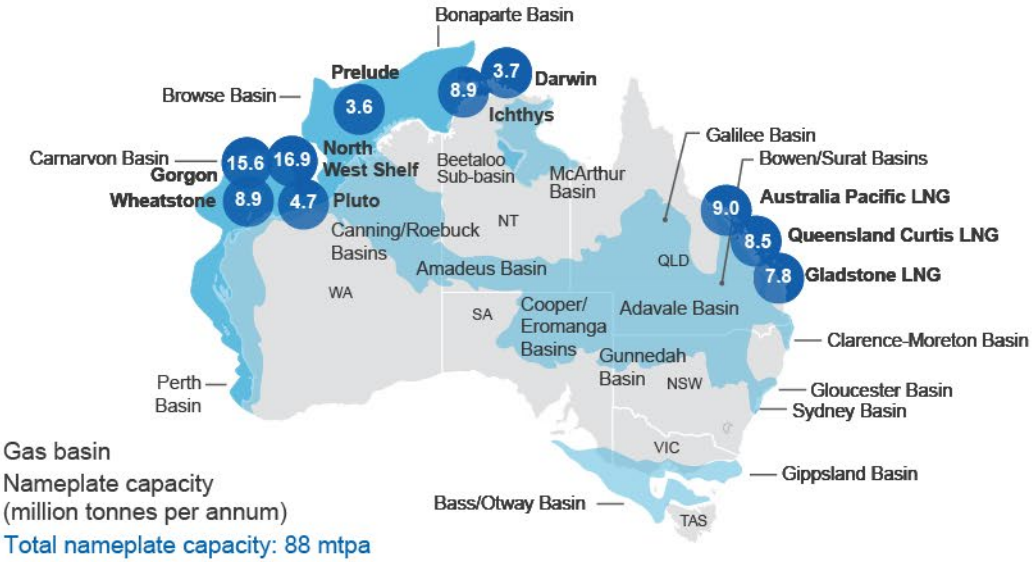
World	Unit	2019	2020[f]	2021[f]	2022[f]	Annual percentage change 2020[f]	2021[f]	2022[f]
Contract prices[b]								
– nominal	US$/t	95	69	66	71	-27.4	-3.7	6.6
– real[c]	US$/t	95	68	64	67	-28.7	-5.6	4.5
Spot prices[d]								
– nominal	US$/t	74	54	61	65	-26.5	12.2	6.5
– real[e]	US$/t	75	54	60	62	-27.7	9.6	4.4
Australia	**Unit**	**2018–19**	**2019–20**	**2020–21[f]**	**2021–22[f]**	**2019–20**	**2020–21[f]**	**2021–22[f]**
Production	Mt	272	268	263	276	-1.5	-1.9	5.2
Export volume	Mt	210	213	208	221	1.4	-2.4	6.6
– nominal value	A$m	25,958	20,382	14,547	16,849	-21.5	-28.6	15.8
– real value[h]	A$m	26,966	20,894	14,547	16,513	-22.5	-30.4	13.5

Notes: **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** fob Newcastle 6000 kcal net as received; **e** In 2020 US dollars; **f** Forecast; **h** In 2020–21 Australian dollars.

Source: ABS (2020) International Trade in Goods and Services, Australia, Cat. No. 5368.0; IHS (2020); NSW Coal Services (2020); Queensland Department of Natural Resources and Mines (2020); Company Reports; Department of Industry, Science, Energy and Resources (2020)

Gas

Australia's LNG projects and gas basins



Gas facts

- LNG is produced by **cooling natural gas to -161°C**
- **LNG shrinks** to 1/600th the volume of natural gas
- **LNG accounted for 12%** of global gas demand in 2019
- Natural gas accounted for **23% of the world's primary energy mix** in 2019

Global gas use by sector

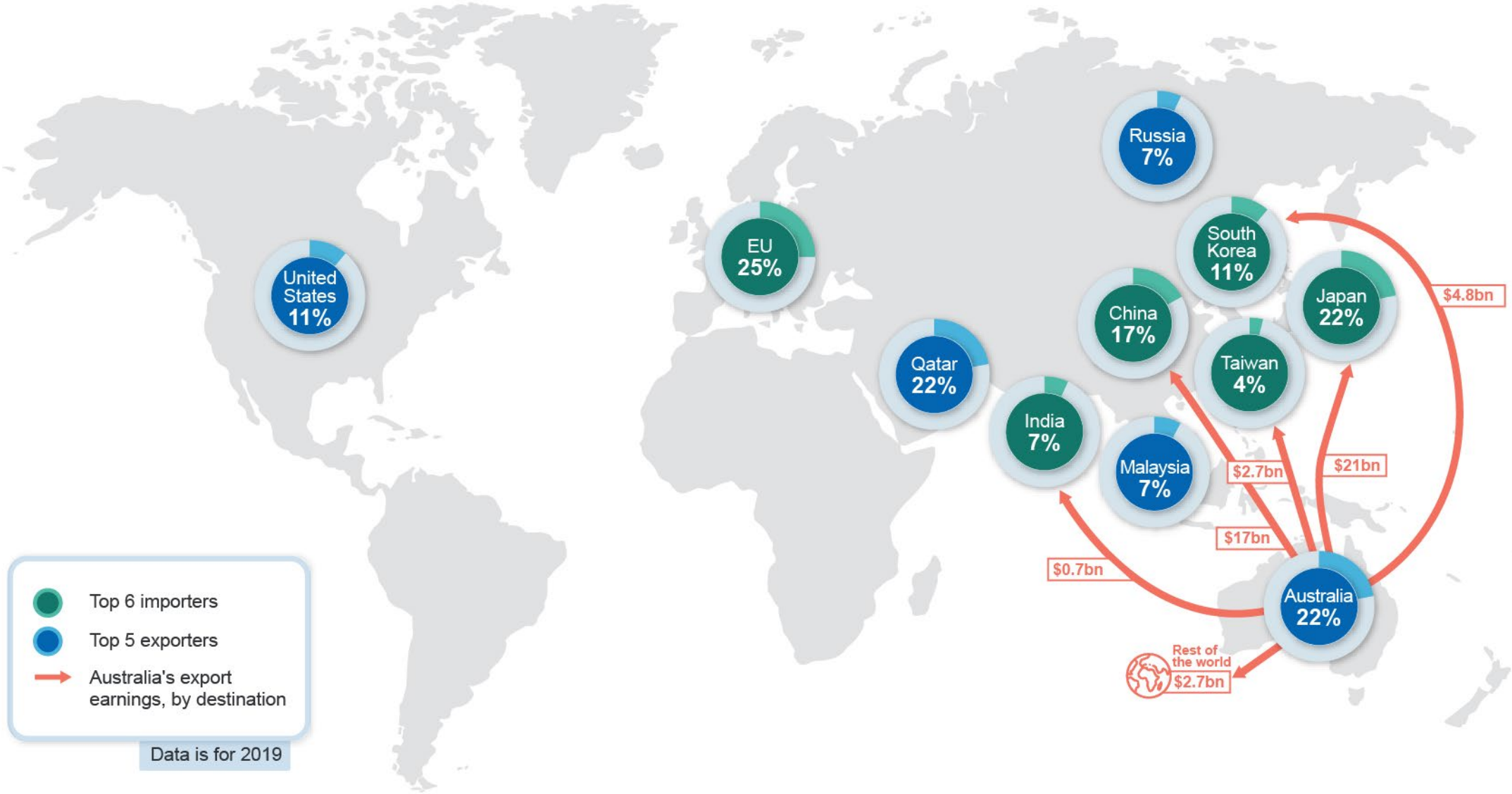
- **20%** Industry
- **19%** Transport
- **22%** Residential
- **40%** Electricity

Australia's LNG

- **79m tonnes** exported in 2019-20
- **$48bn** in export earnings in 2019-20
- Around **3/4** sold on **long-term contracts**

LNG

Trade map | September 2020



7.1 Summary

- Asian LNG spot prices and oil-linked contract prices are expected to gradually recover over the next two years, as the impacts of COVID-19 ease and demand catches up to global LNG supply capacity.
- Australia's LNG exports reached 79 million tonnes in 2019–20, but are forecast to decline to 76 million tonnes in 2020–21, reflecting the impacts of COVID-19 as well as technical issues at the Prelude and Gorgon LNG plants. Australian LNG export volumes are forecast to recover to 80 million tonnes in 2021–22.
- Australia's LNG exports earnings are forecast to decline sharply, from $48 billion in 2019–20 to $31 billion in 2020–21, due to weak prices and export volumes, before a partial recovery to $37 billion in 2021–22.

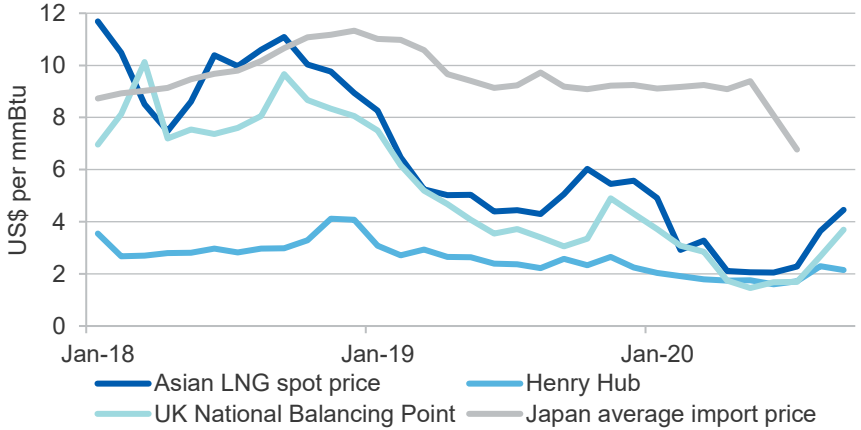
7.2 Prices

Asian LNG spot prices recovering, but risks remain

Global gas prices converged at very low levels in the June quarter, as a result of several concurrent trends: weak oil prices, an ongoing global LNG supply glut — which was already placing downward pressure on LNG spot prices prior to 2020 — and widespread demand destruction due to the impacts of COVID-19 containment measures. This convergence was relatively short-lived, with the Asian LNG spot price regaining a premium over US and European benchmark prices (Figure 7.1).

The Asian LNG spot price has more than doubled from the record lows earlier in 2020, driven by weaker exports from most major LNG producing countries, including the US and Australia. Global LNG imports have shown tentative signs of recovery, as the impacts of COVID-19 ease and with the northern hemisphere summer boosting demand for gas-fired power for cooling. The spot price averaged an estimated US$3.50 per mmBtu (A$4.55 per GJ) in the September quarter, 66 per cent higher than the June quarter, but 25 per cent lower year-on-year. Asian LNG imports are expected to recover over the rest of 2020, ahead of the northern hemisphere winter, providing ongoing price support. However, recovering supply from the US and Australia over the same period will likely contain price rises.

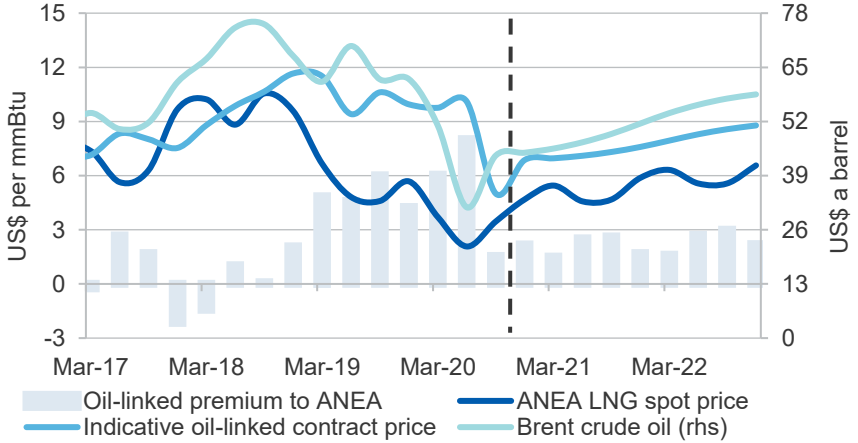
Figure 7.1: Global gas and LNG prices, monthly



Notes: ANEA is the Argus Northeast Asia spot price. LNG prices are DES (Delivered Ex Ship), which include shipping and insurance.

Source: Argus (2020); Bloomberg (2020); Department of Industry, Science, Energy and Resources (2020)

Figure 7.2: LNG spot and contract prices, quarterly



Notes: ANEA is the Argus Northeast Asia spot price. LNG prices are DES (Delivered Ex Ship), which include shipping and insurance. The long-term oil-linked contract price is indicative, and is estimated at 14 per cent of the 3-month lagged JCC oil price plus shipping. The oil-linked premium to ANEA represents the differential between these two prices.

Source: Argus (2020); Bloomberg (2020); Department of Industry, Science, Energy and Resources (2020)

The Asian LNG spot price is forecast to increase modestly in 2021 and 2022, averaging over US$5 per mmBtu (A$6.70 per GJ) and over US$6 per mmBtu (A$7.70 per GJ), respectively (Figure 7.2). Stronger demand is expected to be supported by both a global economic recovery — as the impacts of COVID-19 ease — and a longer term trend for growing demand from China and emerging Asian economies. However, ongoing overcapacity in the global LNG market is expected to constrain the extent of any price recovery over the next two years.

Weak oil prices expected to continue to weigh on LNG contract prices

Almost three-quarters of the LNG traded in Asia is sold on long-term contracts which link the price of that LNG to the price of oil (commonly the Japanese customs-cleared crude, JCC) with a lag of several months. While oil prices have partly recovered from the multi-decade lows seen in April, they remain well below the five-year average. Due to the several month lag, the mid-year recovery in oil prices is not expected to be reflected in contract prices until around the December quarter, depending on contractual arrangements.

In the second half of 2020, the difference between oil-linked contract prices and the Asian LNG spot price is expected to fall to its lowest level in almost two years, and stay relatively narrow compared to 2019 (Figure 7.2). While oil prices are expected to continue to recover, global oil consumption is expected to continue to be constrained by the impacts of the COVID-19 pandemic (see the *oil* chapter). Consequently, while LNG contract prices are expected to gradually recover over 2021 and 2022, they are expected to remain relatively weak in historical terms.

7.3 World trade

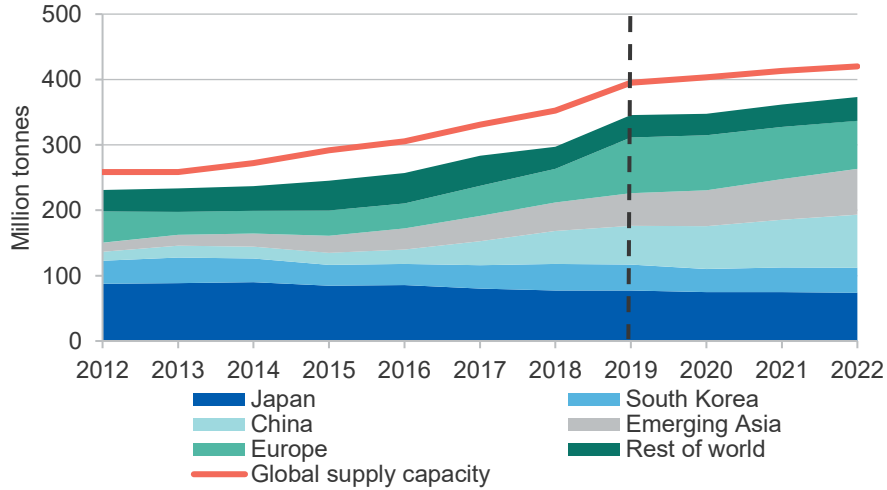
In 2019, global LNG trade totalled 345 million tonnes (470 billion cubic metres), an increase of 48 million tonnes (or 16 per cent) from 2018. Global LNG trade has continued to grow faster than overall global gas demand (which grew by 1.5 per cent in 2019) and pipeline trade (which decreased by 1.3 per cent in 2019). LNG's share of global gas demand was 12 per cent in 2019, up 2 percentage points from 2018.

Growth in LNG imports was driven by Europe, China and emerging Asia, while LNG export growth was primarily from the US, Russia and Australia. Global LNG supply capacity additions have rapidly outpaced demand growth in recent years. This has resulted in a supply glut, which has been exacerbated in 2020 by the impacts of COVID-19 on demand.

Global LNG trade is expected to grow by 1 per cent in 2020 — a sharp deceleration from recent years of growth due to the impacts of COVID-19. Global LNG demand is expected to fare better than overall global gas demand, which is forecast to decline by 4 per cent in 2020. Demand from Europe, China and emerging Asia has been supported by competitively-priced LNG, offsetting weaker demand from north Asia.

Growth in global LNG trade is expected to recover in 2021 and 2022, growing by 3-4 per cent a year. The global LNG market is expected to tighten, as demand recovers and absorbs the available capacity. Nevertheless, given the rapid and large scale expansion of global LNG capacity in recent years, demand is expected to continue to fall short of total supply capacity (Figure 7.3).

Figure 7.3: LNG demand and world supply capacity



Source: Nexant (2020) World Gas Model, Department of Industry, Science, Energy and Resources (2020)

7.4 World imports

Japan's LNG imports forecast to stagnate in 2020

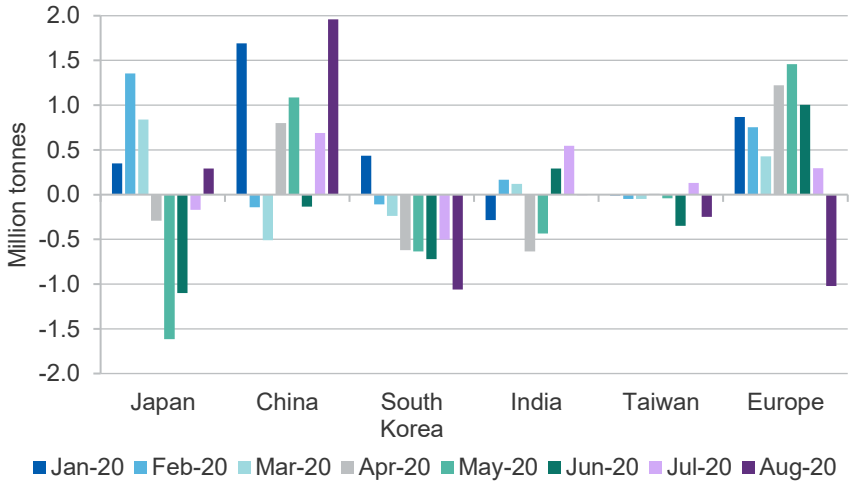
Japan is the world's largest LNG buyer, importing 77 million tonnes of LNG in 2019. The impact of COVID-19 on LNG imports appear to have been largely concentrated in the June quarter, with LNG imports falling sharply by 16 per cent year-on-year (Figure 7.4).

Japan's total LNG imports in 2020 are expected to decline by 3.1 per cent to 75 million tonnes (Figure 7.5). The impact of weaker power demand (due to the COVID-19 pandemic) on LNG imports is expected to be partially offset by nuclear reactor shutdowns, which is boosting demand for gas-fired power generation. Four reactors are currently offline to finish anti-terrorism upgrades, with a fifth to be offline from October. A sixth reactor is expected to remain offline until the end of 2020 due to a court injunction imposed in January — as a result of safety concerns in the event of a natural disaster. In the final few months of 2020, relatively cheap LNG is also expected to encourage temporary coal-to-gas switching.

Beyond 2020, Japan's LNG imports are forecast to decline slightly (Figure 7.5). The return of nuclear power generation is expected to weigh on Japan's future LNG demand, offsetting an expected post-pandemic rebound in gas demand. However, there are significant risks of delays and slippages in nuclear restarts, which remains the key uncertainty affecting the outlook for Japan's LNG imports.

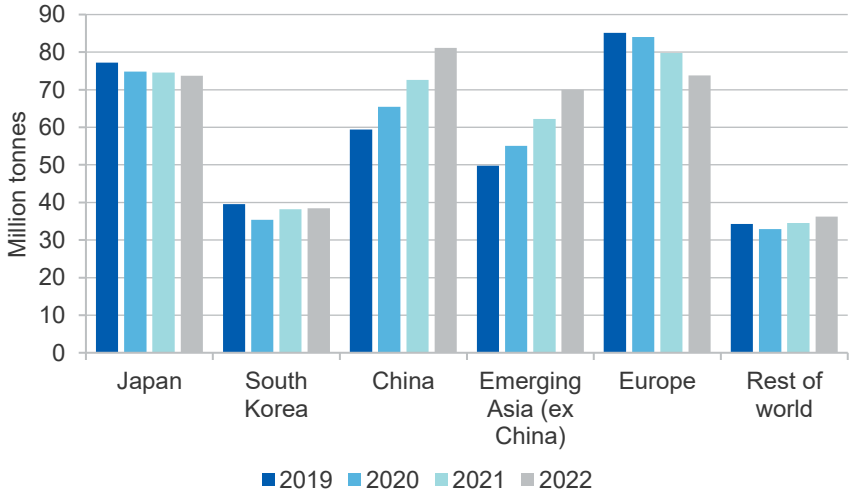
On 3 July 2020, the Japanese government announced its intention to phase out Japan's most inefficient coal-fired power plants (around 100 out of a total of 140) by 2030, which may buoy gas demand beyond the outlook period. However, questions remain over the extent to which gas will benefit; this will depend on the extent to which the inefficient coal capacity is replaced by high-efficiency coal plants, renewables or gas. The plan has also faced opposition from electricity utilities. The development of the regulatory framework and policy is being led by the Japanese Ministry of Economy, Trade and Industry, and will form part of the planned 2021 update to Japan's Basic Energy Plan.

Figure 7.4: Monthly LNG imports, year-on-year change



Source: Bloomberg (2020)

Figure 7.5: World LNG import forecasts



Notes: Emerging Asia includes India.
Source: Nexant (2020) World Gas Model; Department of Industry, Science, Energy and Resources (2020)

China to remain a key driver of LNG demand growth

China was the world's second largest LNG importer in 2019, importing 59 million tonnes of LNG (81 billion cubic metres). Despite the impacts of COVID-19, China's LNG imports have continued to grow in 2020, increasing by 16 per cent year-on-year in the year to August (Figure 7.4). LNG has accounted for a growing share of China's gas supply, driven by low LNG spot prices relative to pipeline gas imports (Figure 7.6).

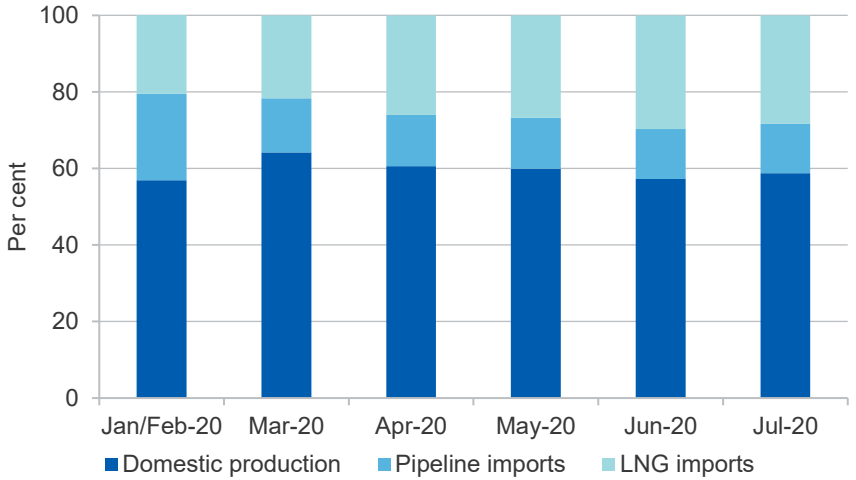
China's LNG imports are forecast to grow by 10 per cent to 65 million tonnes in 2020. However, the impact of weak global economic growth on China's export-oriented sectors and the possibility of new COVID-19 outbreaks present risks to the outlook.

Beyond 2020, China is expected to continue to be a key driver of global LNG demand growth, with LNG imports forecast to reach 81 million tonnes by 2022 — making China the world's largest LNG importer (Figure 7.5). Chinese gas demand is expected to be supported by a policy-driven expansion of gas-fired power generation, aimed at reducing air pollution. However, China's future energy and environmental policies are subject to considerable uncertainty, particularly as the impacts of COVID-19 change government priorities.

While LNG imports are expected to continue to play a role in meeting China's growing demand for gas, LNG is expected to face competition from both domestic gas and pipeline imports. Domestic gas, pipeline imports and LNG imports each accounted for 57, 16 and 27 per cent of total gas supply in China in 2019, respectively.

Domestic gas output is expected to continue to be the major source of gas supply in China for the foreseeable future, supported by government policies to boost domestic production. In 2019, upstream investment was at a five year high, and newly-discovered shale gas reserves reached 764 billion cubic metres, up 513 per cent compared to 2018. The Power of Siberia pipeline opened in December 2019, and is expected to ramp up over the next five years. The pipeline has nameplate capacity of 38 billion cubic metres of gas per year — equivalent to around 28 million tonnes of LNG.

Figure 7.6: Share of China's gas supply by source



Source: Bloomberg (2020) National Bureau of Statistics of China, Bloomberg (2020) General Administration of Customs

South Korea's LNG imports forecast to recover after 2020

South Korea was the world's third largest LNG buyer in 2019, importing 40 million tonnes (54 billion cubic metres) of LNG, the second highest level on record due to the temporary closure of nuclear power plants for maintenance. In the first eight months of the year, South Korea's LNG imports declined by 18 per cent year-on-year as a result of the impacts of COVID-19 on gas demand (Figure 7.4). The restart of nuclear power plants that were closed for extended maintenance are expected to further dampen South Korea's gas demand from the second half of 2020.

South Korea's LNG imports are forecast to decline to 35 million tonnes in 2020, before staging a modest recovery in 2021 and 2022 (Figure 7.5). An expected economic recovery and government policies favouring gas usage are expected to partially offset the impacts of nuclear restarts. These policies include lower consumption taxes on gas relative to coal, a fine dust policy — to reduce coal-fired power generation in winter, resulting in higher gas-fired power generation — and a long-term goal to boost the share of gas in its energy mix.

Emerging Asia to shape future developments in global LNG markets

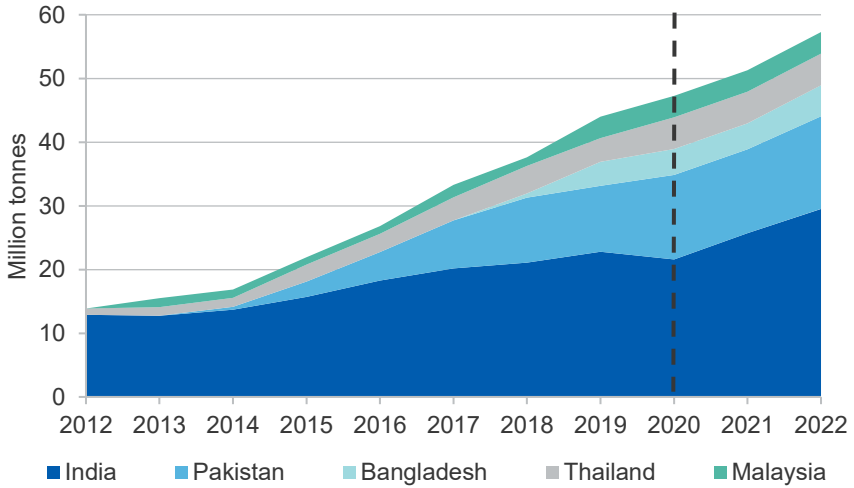
Emerging Asian economies have become a key driver of growth in global LNG markets. In 2019, the region's total LNG imports grew by 10 per cent to 55 million tonnes. After declining sharply in April and May — due to COVID-19 containment measures — India's LNG imports bounced back in June and July, increasing by 26 per cent year-on-year (Figure 7.4). India's price sensitive buyers returned to opportunistically purchasing LNG at record low spot prices, after industrial and economic activity picked up as most containment measures ended in May. However, imports in August were largely flat on a year-on-year basis, highlighting that the recovery in India's LNG imports could waver, and largely depends on gas prices and the speed and shape of India's economic recovery.

Bangladesh's LNG imports grew by 8 per cent year-on-year in the first eight months of 2020 to meet growing gas demand, despite the impacts of COVID-19. The completion of pipelines in March now allows for full utilisation of two floating storage regasification units (FSRUs). Combined with an expected increase in spot purchases to take advantage of low prices, Bangladesh's imports are expected to show strong growth in 2020.

India and other emerging Asian economies are expected to be a major source of LNG demand growth over the outlook period (Figures 7.5 and 7.7). The Indian government is aiming to lift the share of gas in its energy mix from around 6 per cent currently to 15 per cent in 2030, although the target is considered to be ambitious. The pace of growth in India's LNG imports will depend on a range of factors, including the pace of infrastructure development, domestic gas market reforms and domestic gas output.

In contrast to India — where the industrial sector is expected to be the key driver of LNG demand growth — LNG demand from other emerging Asian economies is expected to be primarily driven by the power sector and the expansion of gas-fired power generation. There are a range of risks surrounding the growth prospects of this region, with the impact of COVID-19 potentially having lingering effects on policy priorities, project development and access to financing.

Figure 7.7: LNG imports from emerging Asian countries



Source: Nexant (2020) World Gas Model

Europe's LNG imports projected to decline from record highs

Europe imported a record 85 million tonnes of LNG in 2019, up by two-thirds. As a collective region, Europe was the world's largest LNG buyer in 2019. Europe has been playing an important role in balancing the global LNG market, by absorbing a large share of the increase in global LNG supply. Europe's LNG imports grew by 36 per cent year-on-year in the year to July. However, imports declined sharply in August, as the levels of gas in storage reached close to full capacity, with most of the decline in imports being from the US (Figure 7.4).

Europe's LNG imports are expected to decline over the next two years (Figure 7.5). Stagnating gas consumption and growing competition from pipeline gas — offsetting the impacts of declining northern European gas production — are expected to see imports fall over the outlook period. The TurkStream pipeline began supplying gas in January 2020, while the NordStream 2 and Trans Adriatic pipeline projects are expected to begin supplying pipeline gas to Europe by late 2020 or early 2021.

7.5 World exports

Global LNG capacity utilisation is set to decline

At the end of 2019, global LNG capacity reached close to an estimated 400 million tonnes tonnes per annum (mtpa), with another 125 mtpa of capacity under construction or sanctioned for development. These new projects will contribute to growth in global LNG capacity over the next few years, although at a slower pace than in recent years.

The strong growth in LNG capacity combined with weaker growth in LNG demand is expected to drive a decline in the global average capacity utilisation rate in 2020 (Figure 7.8). Overcapacity in global LNG markets is expected to persist for the next two years, although the market is expected to tighten as demand gradually catches up to supply capacity.

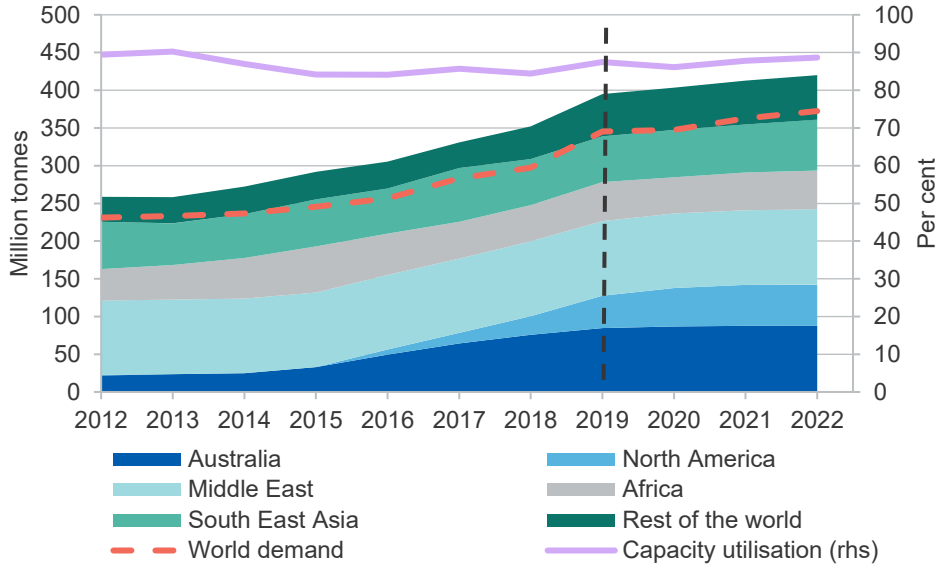
There is an abudance of potential LNG projects in the global investment pipeline, with an estimated 907 mtpa of proposed LNG capacity in the pre-final investment decision (FID) stage. However, weak spot LNG and oil prices are resulting in the deferral of FIDs that were initially expected in 2020. Further complicating the outlook for new LNG projects, buyers are also increasingly reluctant to sign new long-term contracts against a backdrop of rapidly changing market conditions. The impacts of COVID-19 could accelerate the trend towards shorter, more flexible contracts, and gas-based pricing over oil-linked pricing.

Global LNG exports have been weaker

Global LNG exports have weakened substantially in recent months. LNG producers around the world have been responding to weak demand and low prices with production cuts, extended maintenance schedules, and slowdowns in the construction or commissioning of new projects. The bulk of the supply cuts and cancelled cargoes have been from the US, but exports have also been weaker from other countries, including Australia (Figure 7.9).

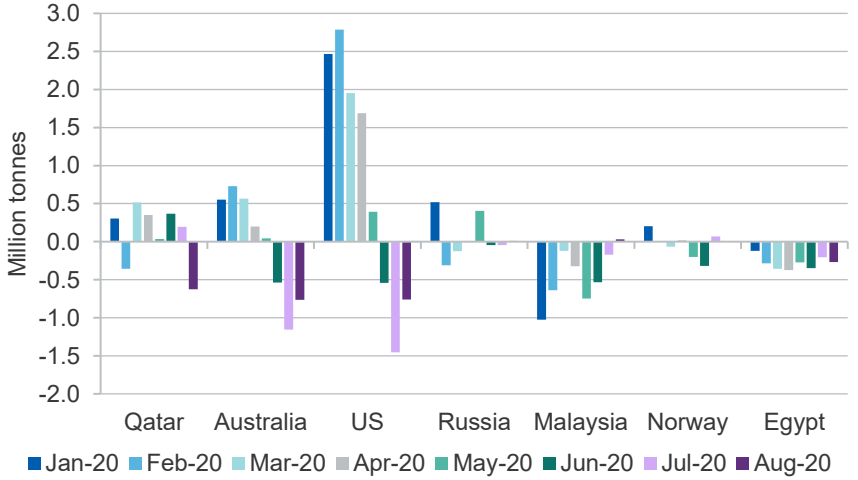
Global LNG exports are expected to recover over the next two years, as the impacts of COVID-19 ease, and new capacity, particularly in the US, continues to ramp up (Figure 7.10).

Figure 7.8: Annual LNG capacity, capacity utilisation and demand



Source: Nexant (2020) World Gas Model; Department of Industry, Science, Energy and Resources (2020)

Figure 7.9: Monthly LNG shipments, year-on-year change



Source: Bloomberg (2020)

Qatar's LNG exports been resilient until recent months

Qatar exported 76 million tonnes of LNG in 2019, making it the world's second largest exporter after Australia (by a very small margin). Qatar's LNG exports had been largely resilient in 2020, until August when they fell 9.1 per cent year-on-year (Figure 7.9). Shipping data for the year-to-date suggests that Qatar could reclaim the title of the world's largest exporter in 2020. However, this is far from certain, given the marginal difference between Qatar and Australia's LNG exports, and some uncertainty around the precise level of Qatar's LNG exports. Qatar's LNG exports are forecast to hold broadly steady over the outlook period, at around 76 million tonnes.

US LNG exports have declined sharply, but a strong rebound is expected

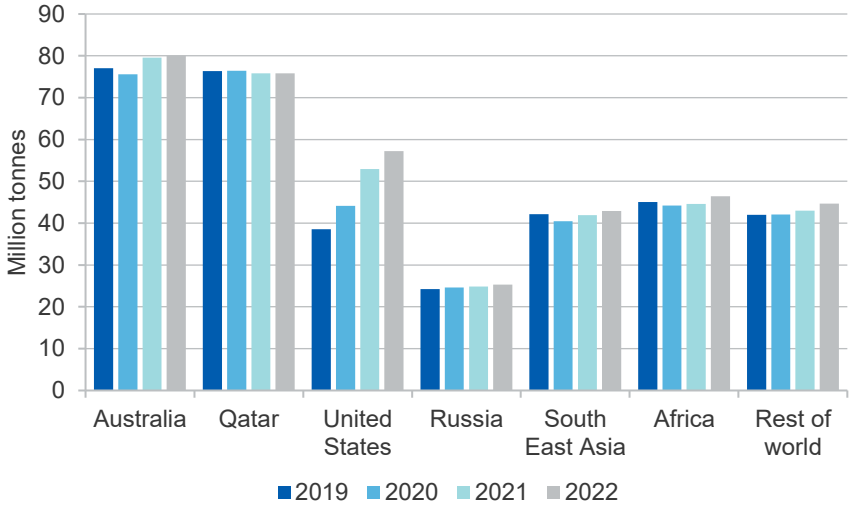
The US became the world's third largest LNG exporter in 2019, driven by the ongoing ramp up of new LNG projects (Figure 7.11). This strong growth continued at the start of 2020, with exports growing by 96 per cent year-on-year from January to May.

US LNG exports have since fallen dramatically. From June to August, US LNG shipments were 35 per cent lower year-on-year. Low global gas prices relative to the Henry Hub price has reduced the competitiveness of US LNG exports to Asia and Europe, leading to cargo cancellations. A modest recovery in US exports is expected in the December quarter, supported by the northern hemisphere winter boosting gas demand. Overall, US LNG exports are forecast to grow by 14 per cent in 2020 to 44 million tonnes, mostly driven by the strong growth at the start of the year.

US LNG exports are forecast to grow at a faster pace in 2021 and 2022, as the impacts of COVID-19 ease and new LNG projects continue to ramp up. There is 15 mtpa of US LNG capacity expected to commence operations by the end of 2021, and another 30 mtpa of LNG capacity expected to commence operations between 2023 and 2025.

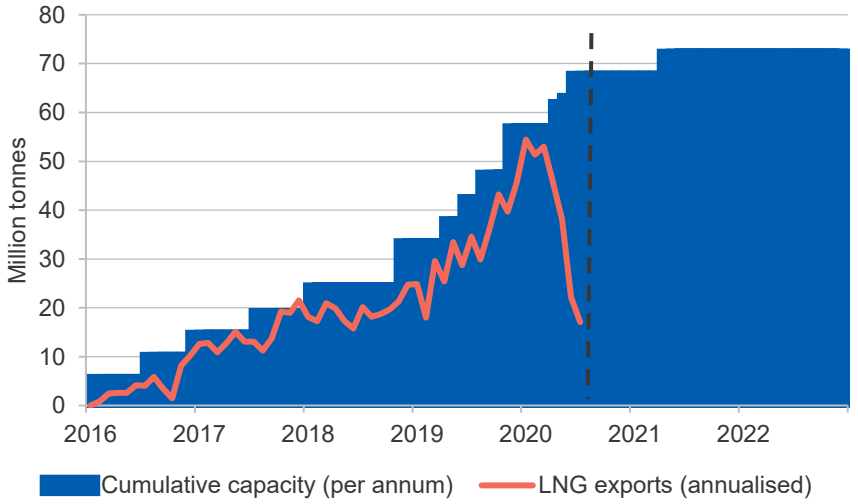
In the longer term, weak market conditions have resulted in several FID deferrals, which could impact on the timing of the next wave of US LNG capacity additions.

Figure 7.10: World LNG export forecasts



Source: Department of Industry, Science, Energy and Resources (2020)

Figure 7.11: US LNG capacity and annualised monthly exports



Source: Bloomberg (2020), US Energy Information Administration (2020)

7.6 Australia

Australia's LNG export volumes have come under pressure

The wave of LNG investment in Australia saw over US$200 billion invested in seven new LNG projects, which all began operating between 2014 and 2019 (Figure 7.12). The ramp up of these projects saw Australia's annual LNG nameplate capacity reach 88 million tonnes.

However, Australia's LNG export volumes have come under pressure in recent months. Australia's LNG shipments between June and August were 12 per cent lower year-on-year (Figure 7.13). Australia's average capacity utilisation rate is thus expected to fall slightly in 2020. Some buyers have reportedly exercised their rights to reduce contracted purchases by around 10 per cent in 2020, with some of these replaced by cheaper spot cargoes. Cargoes have also been delayed, several plants have undergone extended maintenance, and two LNG plants have faced technical issues.

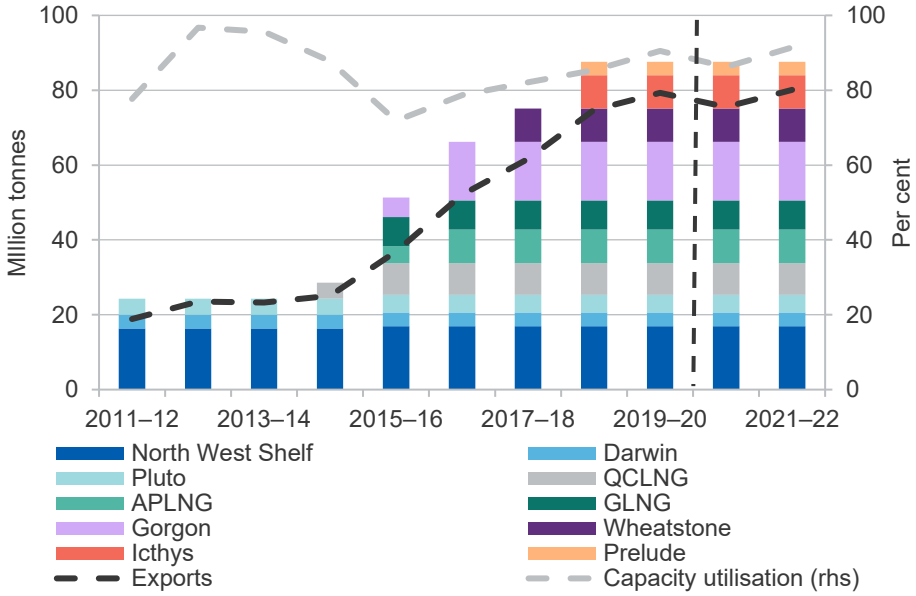
The Prelude FLNG project — which shipped its first cargo in June 2019, but had not yet reached its full nameplate capacity of 3.6 mtpa — has been temporarily shut since February 2020, due to technical issues. At the time of writing, Shell has indicated that the process to restart operations has begun, but has not yet announced an official production restart date.

Gorgon's production has also been disrupted, with the shutdown of Train 2 extended to October, after cracks were discovered in its heat exchangers. After a period of uncertainty, a shutdown of the whole plant was avoided, with phased shutdowns instead: Train 1 and 3 are expected to be taken offline for inspections in October 2020 and January 2021, respectively. There is a risk of extended shutdowns if further cracks are discovered in these trains.

Australian LNG export volumes are forecast to dip before recovering

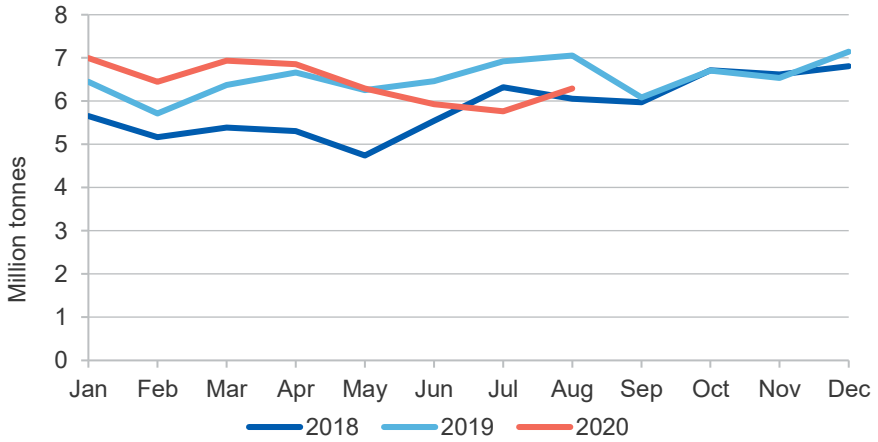
Australia's LNG exports are forecast to decline from 79 million tonnes in 2019–20 to 76 million tonnes in 2020–21, reflecting the impacts of COVID-19 on demand as well as technical issues at the Prelude and Gorgon LNG plants.

Figure 7.12: Australia's LNG capacity by project and LNG exports



Source: ABS (2020); Department of Industry, Science, Energy and Resources (2020)

Figure 7.13: Australia's monthly LNG shipments



Source: Bloomberg (2020)

LNG exports are forecast to recover to around 80 million tonnes in 2021–22, as the impacts of COVID-19 and technical issues ease, and Prelude ramps up towards its nameplate capacity.

A production halt at the Darwin LNG plant is expected to weigh on export volumes in 2022, as gas from the Bayu-Undan field is exhausted. However, Santos is advancing plans for an infill drilling program, which could extend the life of the field and narrow the time between its depletion and start-up of the Barossa backfill project. An FID for the Barossa project has been delayed from 2020 to an unspecified date.

The outlook for the next wave of investment in Australian LNG projects is shrouded by considerable uncertainty, with weak market conditions resulting in capital expenditure reductions, write-downs, and FID deferrals. The Darwin and North West Shelf projects will require new gas field developments as backfill from as early as 2021. Backfill is the supply of gas from a new source that will support the ongoing operation of an existing LNG facility.

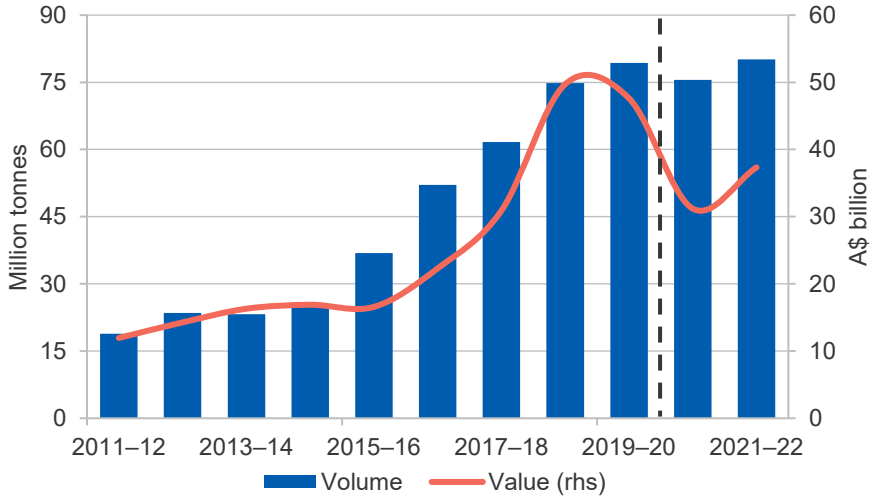
Australia's LNG export earnings forecast to decline from record highs

Australia's LNG export earnings are forecast to fall sharply, from $48 billion in 2019–20 to $31 billion in 2020–21. The decline in export earnings is expected to be driven primarily by weak contract and spot prices and, to a lesser extent, lower export volumes (Figure 7.15). The impact of the slide in oil prices is expected to be concentrated in the second half of 2020, due to the several month lag of the flow-on effects for oil-linked contract prices (at which almost three-quarters of Australian LNG is sold). Export earnings are forecast to partially recover to $37 billion in 2021–22, tracking an expected rise in contract and spot prices.

Australia's LNG export earnings have been revised down marginally

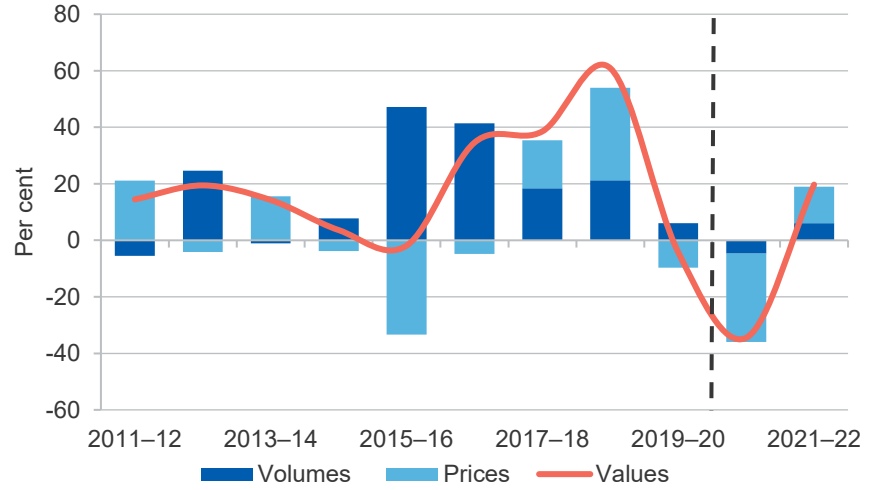
The forecast for Australian LNG export earnings in 2020–21 has been revised down by $3.7 billion from the June 2020 *Resources and Energy Quarterly*. The downward revision primarily reflects lower export volumes and exchange rate revisions.

Figure 7.14: Australia's LNG exports



Source: ABS (2020); Department of Industry, Science, Energy and Resources (2020)

Figure 7.15: Growth in Australia's LNG export earnings, contributions from volumes and prices



Source: ABS (2020); Department of Industry, Science, Energy and Resources (2020)

Table 7.1: World gas outlook

	Unit	2019	2020[f]	2021[f]	2022[f]	Annual percentage change 2020[f]	2021[f]	2022[f]
JCC oil price[a]								
– nominal	US$/bbl	66.4	45.7	47.3	55.1	-31.2	3.3	16.7
– real[h]	US$/bbl	67.6	45.7	46.1	52.8	-32.3	0.9	14.4
Asian LNG spot price[bg]								
– nominal	US$/MMbtu	5.4	3.5	5.2	6.1	-35.8	49.0	17.5
– real[h]	US$/MMbtu	5.5	3.5	5.1	5.9	-36.9	45.5	15.2
LNG trade	Mt[c]	345	348	362	373	0.6	4.1	3.1
Gas production	Bcm	4,047	3,917	4,023	4,139	-3.2	2.7	2.9
Gas consumption	Bcm	4,048	3,893	4,036	4,141	-3.8	3.7	2.6

Notes: **a** JCC stands for Japan Customs-cleared Crude; **b** Historical data is the Argus North East Asia spot price; **c** 1 million tonnes of LNG is equivalent to approximately 1.36 billion cubic metres (bcm) of gas; **f** Forecast; **g** 1 MMBtu is equivalent to 1.055 GJ; **h** In 2020 US dollars.

Source: ABS (2020) International Trade in Goods and Services, Australia, 5368.0; Department of Industry, Science, Energy and Resources (2020); Company reports; Nexant World Gas Model (2020)

Table 7.2: Australian gas outlook

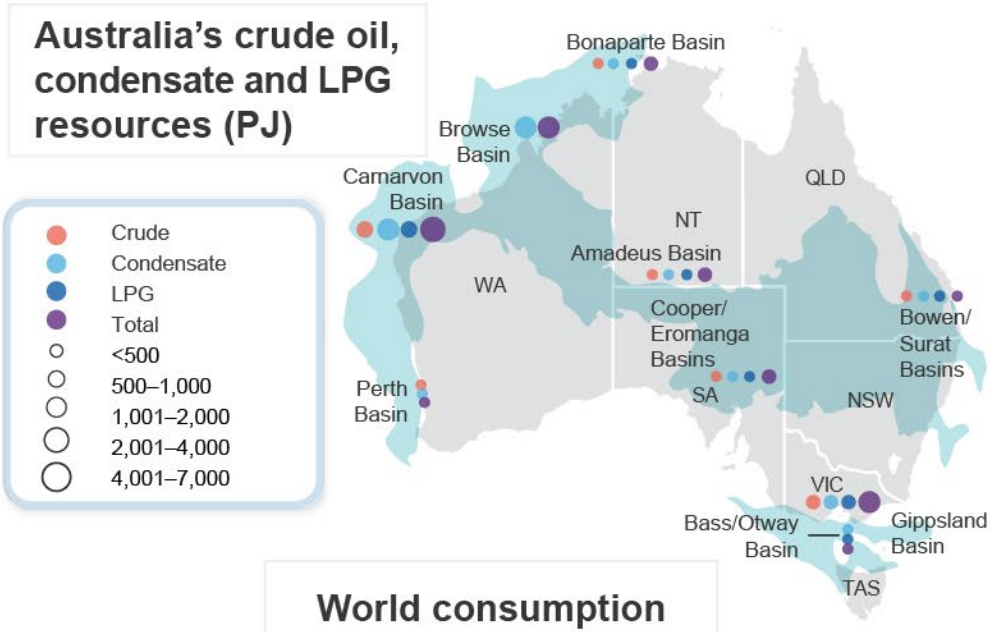
	Unit	2018–19	2019–20	2020–21[f]	2021–22[f]	Annual percentage change 2019–20[f]	2020–21[f]	2021–22[f]
Production[d]	Bcm	145.2	157.6	150.3	160.2	8.5	-4.7	6.6
– Eastern market	Bcm	55.3	57.5	53.7	55.0	3.9	-6.6	2.5
– Western market	Bcm	82.3	85.7	82.4	90.6	4.2	-3.9	10.0
– Northern market[k]	Bcm	7.6	14.4	14.2	14.5	89.9	-1.7	2.5
LNG export volume	Mt[c]	74.8	79.3	75.6	80.1	6.0	-4.7	6.0
– nominal value	A$m	49,727	47,617	31,193	37,339	-4.2	-34.5	19.7
– real value[e]	A$m	51,658	48,813	31,193	36,595	-5.5	-36.1	17.3
LNG export unit value[g]								
– nominal value	A$/GJ	12.6	11.4	7.8	8.8	-9.7	-31.3	12.9
– real value[e]	A$/GJ	13.1	11.7	7.8	8.7	-10.9	-32.9	10.7
– nominal value	US$/MMBtu	9.5	8.1	6.0	6.9	-15.2	-26.0	16.1
– real value[e]	US$/MMBtu	9.9	8.3	6.0	6.8	-16.4	-27.8	13.7

Notes: **c** 1 million tonnes of LNG is equivalent to approximately 1.36 billion cubic metres (bcm) of gas; **d** Production includes both sales gas and gas used in the production process (i.e. plant use) and ethane. Historical gas production data was revised in the June quarter 2017 to align with Australian Petroleum Statistics; **e** In 2020–21 Australian dollars; **f** Forecast; **g** 1 MMBtu is equivalent to 1.055 GJ; **h** In 2020 US dollars; **k** Gas production from Bayu-Undan Joint Production Development Area is not included in Australian production. Browse basin production associated with the Ichthys project is classified as Northern market.

Source: ABS (2020) International Trade in Goods and Services, Australia, 5368.0; Department of Industry, Science, Energy and Resources (2020); Company reports; Nexant World Gas Model (2020)

Oil

Australia's crude oil, condensate and LPG resources (PJ)



Oil facts

- Carnavon basin produces around **2/3 of Australia's crude & condensate**
- Brent spot price ranged from **US$17–86 a barrel,** in the last 5 years
- Around 27% of refinery feedstock is **domestically produced**

World consumption

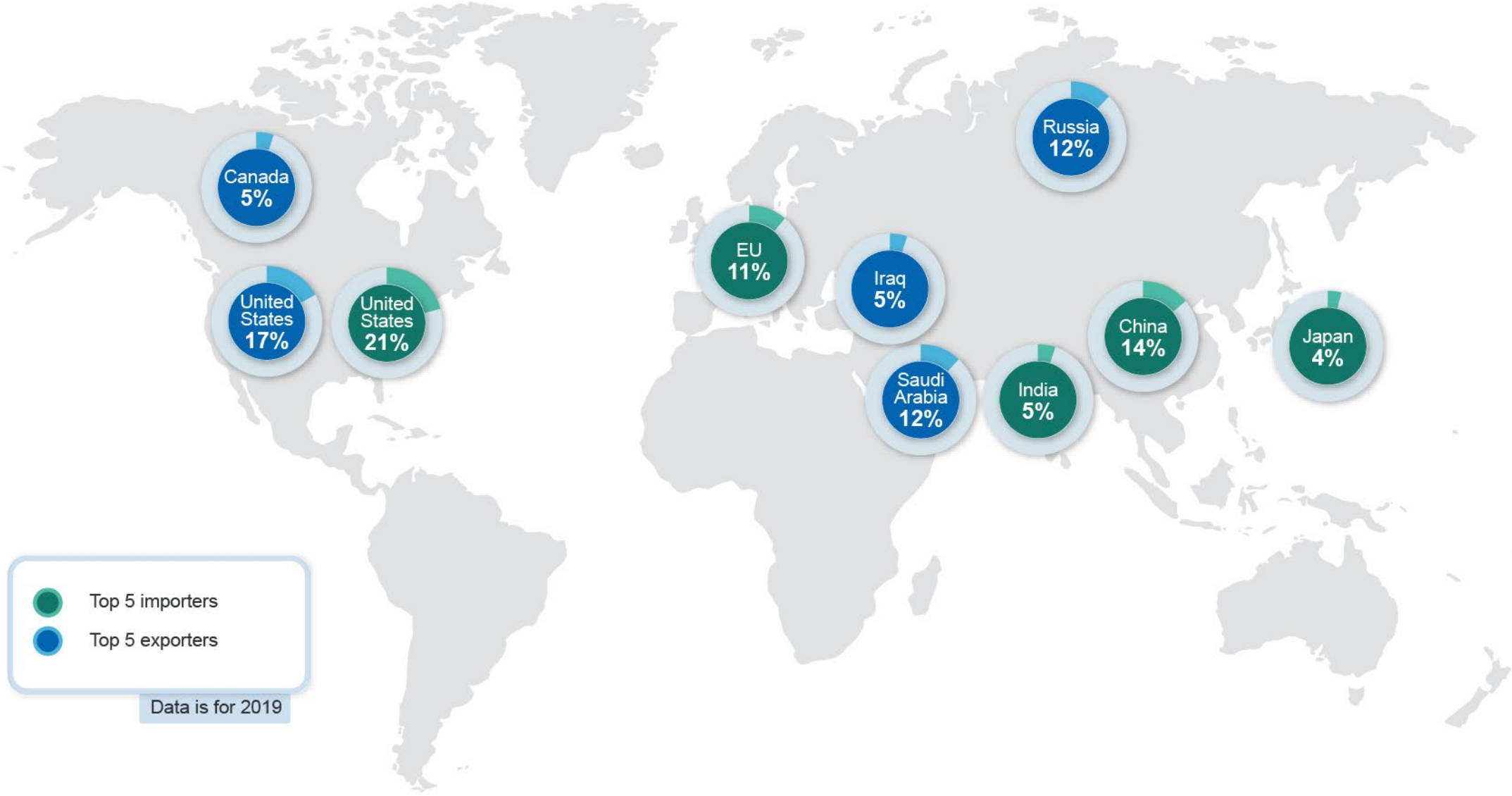
- **29%** Diesel
- **26%** Gasoline
- **12%** LPG and Ethane
- **12%** Other
- **8%** Aviation turbine fuel
- **7%** Fuel oil

Australia's oil

- Holds **0.3%** of the world's **oil resources**
- **Oil exports** worth **$9.1b** in 2019-20
- Accounts for **0.3%** of **oil production**

Oil

Trade map | September 2020



8.1 Summary

- Oil prices were extremely volatile in early 2020, due to the impacts of COVID-19, but are forecast to be less volatile for the rest of 2020. A gradual recovery in consumption is expected to lift Brent crude prices from US$44 a barrel in the December 2020 quarter to US$57 a barrel by the December 2022 quarter.
- Australian crude oil and condensate exports increased to 293,000 barrels a day in 2019–20. Exports are expected to increase further to 310,000 barrels a day in 2020–21, and remain at this level in 2021–22.
- Low prices are expected to lead to Australian export earnings falling by 20 per cent to $7.3 billion in 2020–21. An uptick in prices is expected to lift earnings to $8.4 billion in 2021–22.

8.2 Prices

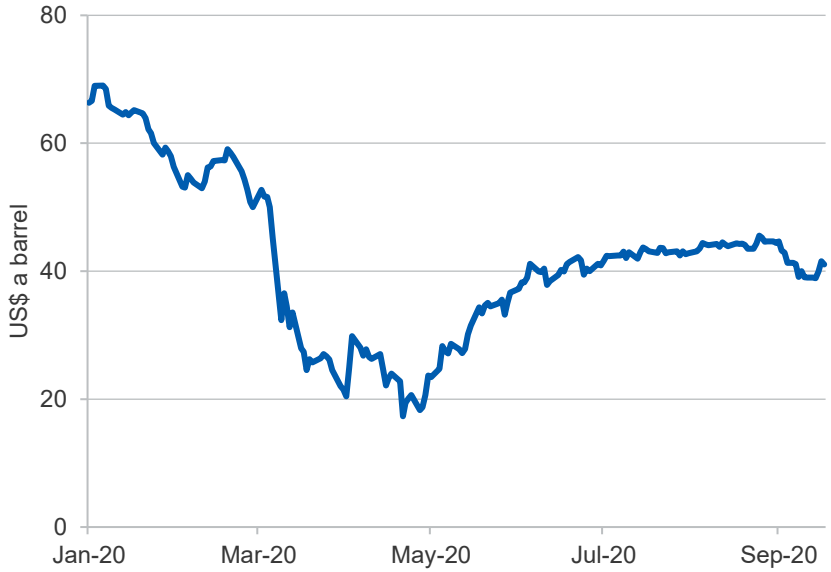
Oil prices stabilising late in 2020

Global oil prices have been highly volatile in 2020, although these variations have eased in recent months. Prices started falling in January 2020 due to the impact of COVID-19 containment measures on transport demand. Prices fell further following the March 2020 OPEC+ meeting, when members did not agree to extending the production cuts already in place, or lower production targets to address the impacts of COVID-19.

Prices went below US$20 a barrel in April 2020, as global production exceeded global consumption by around 25 million barrels a day — equivalent to around 25 per cent of average production in 2019. Prices began to recover late in April, propped up by the 12 April OPEC+ announcement that member countries agreed to reduce production in May and June 2020 by a record 9.7 million barrels a day.

Prices reached US$41 a barrel on 30 June 2020, and have remained around these levels when this report was finalised (Figure 8.1). The 17 September price of US$41 a barrel is well below the 2015-2019 average of US$59 a barrel, as global oil consumption remains affected by COVID-19 related containment measures.

Figure 8.1: Brent oil prices



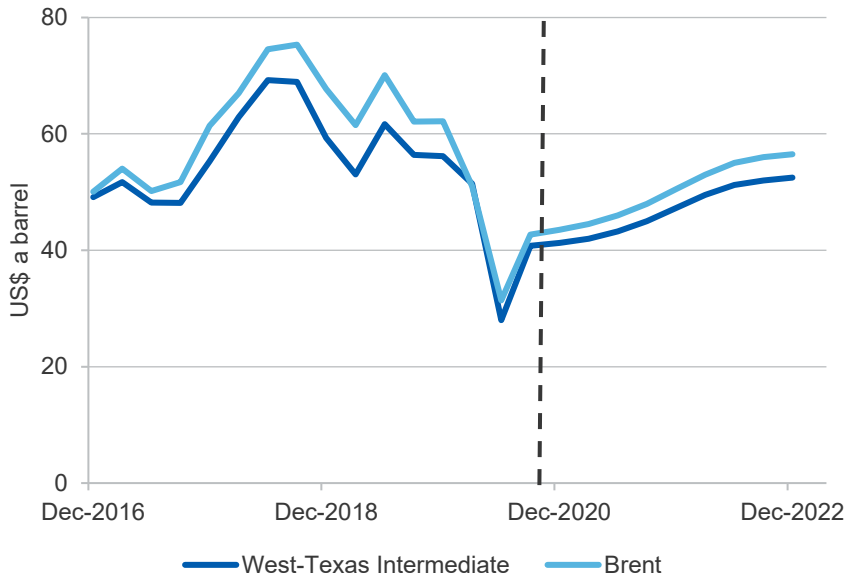
Source: Bloomberg (2020)

Prices to increase slowly over the outlook period

Oil prices are expected to stabilise at US$43 a barrel in the September quarter of 2020, before increasing marginally to US$44 a barrel in the December quarter. Prices are expected to increase throughout 2021, as containment measures ease and consumption recovers. Established OPEC+ targets, and current low exploration expenditure in Canada and the US are expected to limit any production response, further supporting prices.

Prices are expected to increase from US$45 a barrel in the March quarter of 2021, reaching US$51 a barrel in the December quarter of 2021. However, prices in 2021 are expected to remain below the 2015-2019 average, as aviation demand is limited and road activity remains somewhat affected. In 2022, prices are forecast to increase further, reaching US$57 a barrel by the December quarter (Figure 8.2).

Figure 8.2: Oil prices



Source: Bloomberg (2020); Department of Industry, Science, Energy and Resources (2020)

While oil prices are forecast to increase moderately over the outlook period, the timing and rate of these increases remains highly uncertain. Oil consumption may be significantly affected by unforeseen changes in COVID-19 containment measures, as governments and households react to the evolving COVID-19 pandemic; the possibility of an effective COVID-19 vaccine(s) at some time in the outlook period would also influence global oil consumption.

If compliance with OPEC+ production limits falls as oil prices start to recover, global oil inventories will begin to grow. Increased inventories will tend to limit further price growth.

Higher prices will lead to some non-OPEC+ oilfields becoming economically viable once again; as these fields resume production, inventories will pick up, also limiting further price rises.

8.3 World Consumption

Low aviation travel to constrain consumption

Global crude oil and natural gas liquids consumption in 2020 is forecast to fall by 8.7 per cent to 91 million barrels a day. If realised, this would be the first decline since 2009, and the largest historical decline in volume terms. Consumption is forecast to fall in all major consuming countries, as travel demand and industrial production both fall because of COVID-19 restrictions. Although the largest impacts are expected in the first half of 2020, consumption for each month is expected to be below 2019 levels.

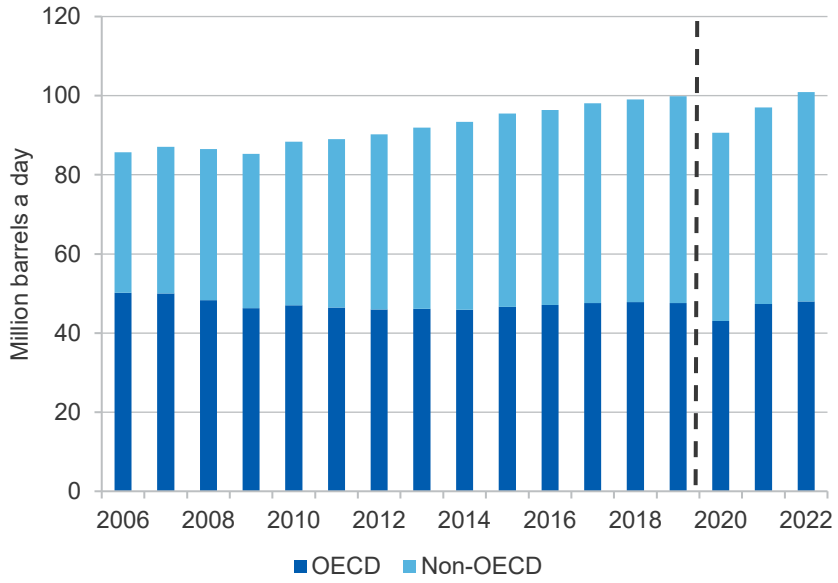
Indicators suggest that road activity fell by around 50 per cent in some major cities in April. The recovery in global road activity later in 2020 has been limited, as COVID-19 has spread to other developing nations and for some countries, containment measures have lingered. Even in the countries where containment measures have reduced rapidly, road activity has been affected by fewer non-essential trips and more people working from home. Travel demand is projected to increase slowly for the rest of 2020, before recovering in 2021 to close to pre-pandemic levels.

Although transportation demand is expected to rise as containment measures ease, aviation demand is expected to remain weak over the outlook period. About two thirds of global passenger traffic is international travel — which is unlikely to recover fully until a vaccine is rolled out. The International Air Transport Association expects that global passenger traffic will not return to 2019 levels until 2024. Domestic air travel is expected to rise gradually over the outlook period, as countries ease restrictions on internal travel. However, domestic air travel is expected to remain below 2019 levels over the outlook period.

Oil consumption for the manufacturing of plastic and other petrochemicals declined sharply in the first half of 2020, but was more resilient than travel-based oil consumption. Similar to other manufactured products, demand for manufactured oil products has been affected by low household consumption and supply chain disruptions. These impacts are expected to linger throughout the remainder of 2020 and the first half of 2021.

Global consumption in 2020 has also been constrained by poor refining margins, as end-use demand is affected by containment measures and low consumer confidence. In addition to low refining throughput, some countries have increased their strategic reserves, pushing global crude stocks starkly higher. Geographically, a high proportion of the stock build-up is occurring in China and the US, two major oil consuming nations. High stocks in these countries will weigh on oil prices once the impacts of the COVID-19 pandemic ease. Stock accumulation is expected to have ended in the June quarter of 2020, although the price limiting impacts are expected to persist throughout 2021.

Figure 8.3: OECD and non-OECD Oil consumption



Source: Department of Industry, Science, Energy and Resources (2020); International Energy Agency (2020)

There are likely to be some behavioural shifts once the COVID-19 pandemic recedes that will have material impacts on the oil market. This may occur through a shift towards working from home, evolving commuting patterns, and lingering impacts on long haul air travel. This raises the level of uncertainty for oil consumption late in the outlook period. In 2021, demand is forecast to recover to 97 million barrels a day; still 3.5 per cent below 2019 levels, as aviation demand remains limited. Demand is forecast to rise further to 99 million barrels a day in 2022 (Figure 8.3).

OECD consumption is expected to drop

The COVID-19 pandemic and the associated containment measures have significantly disrupted OECD consumption. Between 2012 and 2019, OECD oil consumption was steady at around 48 million barrels a day, as ongoing energy efficiency improvements offset higher transport needs. This period of stability is expected to end in 2020, as containment measures affect travel and aviation demand in OECD economies. Consumption is forecast to fall by 10 per cent to 43 million barrels a day in 2020. OECD consumption is expected to be lowest in the June quarter of 2020, before recovering later in the year.

US consumption is forecast to fall by 10 per cent to 18 million barrels a day in 2020, as persistently high COVID-19 cases are expected to weigh on road activity and travel demand. Although containment measures generally declined in the June quarter, the recovery in consumption has been more muted. Further growth in US oil consumption is likely to depend on falling COVID-19 cases, complicated by variability across states. In 2021, US consumption is forecast to increase to 20 million barrels a day.

EU consumption is forecast to decline by 11 per cent to 13 million barrels a day. The majority of this decline is expected to have occurred in the June quarter, as stringent containment measures severely restricted consumption. Consumption is forecast to recover in 2021, reaching 14 million barrels a day, and remaining around these levels in 2022.

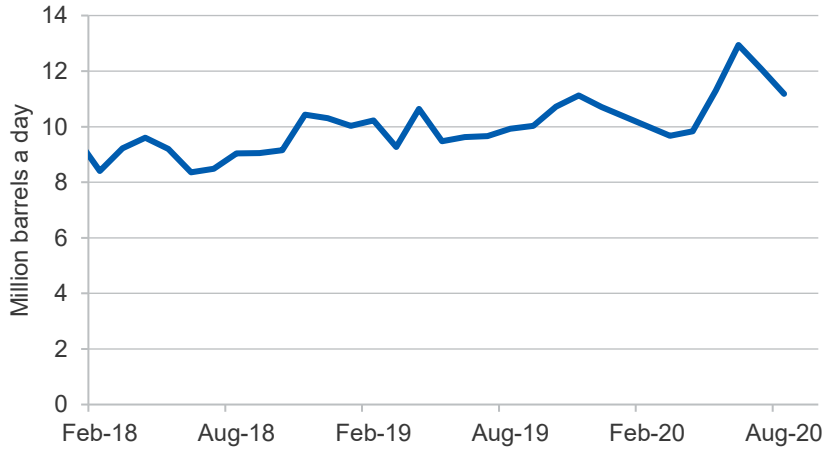
Consumption in other OECD nations has also fallen, as Australia, Japan and South Korea all introduced containment measures early in 2020. Although measures in these countries eased over the June quarter of 2020, localised outbreaks in Australia and Japan have led to containment measures being reintroduced, negatively affecting oil demand.

Non-OECD consumption to plummet, driven by China and India

Non-OECD consumption is forecast to fall by 4.1 million barrels a day to 48 million barrels a day in 2020, compared to the 2019 increase of 1.1 million barrels a day.

In the March quarter of 2020, Chinese oil consumption fell by 16 per cent on a quarterly basis, although consumption has since recovered strongly. Chinese consumption in 2020 is forecast to fall by 1.2 per cent to 14 million barrels a day. Over the outlook period, price growth is likely to be limited by record Chinese oil in storage, accumulated from imports made when prices reached multi decade lows during the June quarter of 2020 (Figure 8.4). In 2021, Chinese consumption is forecast to increase marginally to 14 million barrels a day, before reaching 15 million barrels a day in 2022.

Figure 8.4: Chinese crude oil imports



Source: Bloomberg (2020)

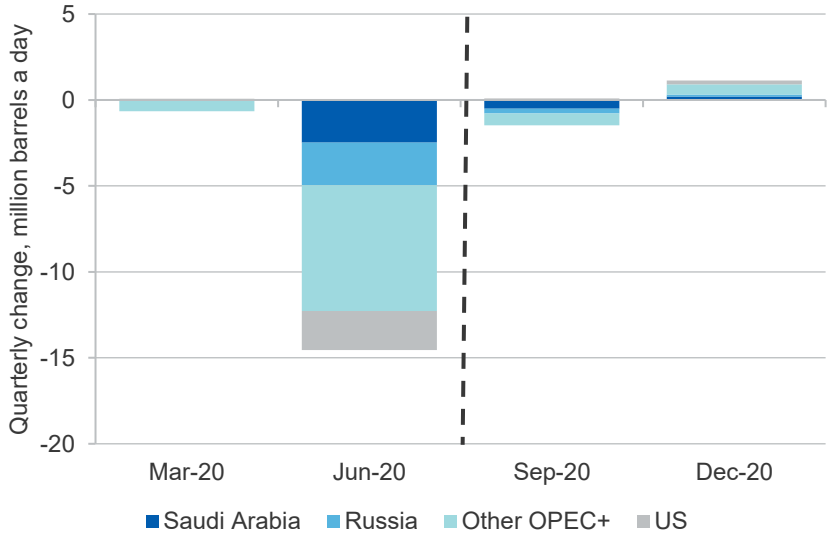
Indian consumption in 2020 is forecast to fall by 9.0 per cent to 4.7 million barrels a day. In late March 2020, India entered national lockdown for an initial three weeks, with this lockdown later extended to June 30 for certain areas of the country. Consumption fell significantly in the June quarter of 2020, reflecting these strict quarantine measures. Some state-based containment measures remained beyond June 30, as localised hotspots and differing state government responses restricted mobility. Consumption is forecast to reach 5.1 million barrels a day in 2021.

Non-OECD consumption in 2021 is forecast to increase by 5.3 per cent to 51 million barrels a day, largely driven by higher demand in China and India. Consumption is forecast to reach 53 million barrels a day in 2022.

8.4 World Production

Global oil production is forecast to fall in 2020, as OPEC+ production declines to meet targets and output in other nations (such as the US) falls in response to lower global prices (Figure 8.5). Output is forecast to fall by 8.1 per cent to 92 million barrels a day. In 2021, oil production is forecast to increase marginally to 93 million barrels a day, before recovering to 98 million barrels a day in 2022.

Figure 8.4: Change in oil production by major producers



Note: This assumes OPEC+ members fully comply with output targets from September 2020.
Source: Department of Industry, Science, Energy and Resources (2020); International Energy Agency (2020)

Low oil prices are likely to influence investment decisions, which will affect production in future years. Investment decisions are the most sensitive in higher-cost producing nations such as Canada and the US, though all producing nations are expected to be affected. This is evident in the Saudi Aramco March 2020 announcement, which flagged plans to reduce capital expenditure, despite Saudi Arabia being one of the lowest cost producers.

OPEC+ output targets have succeeded in lowering world production

During 2020, OPEC+ output was lowest between May and July, and is expected to steadily rise later in the year. During May/June, compliance with output cuts was relatively high, although certain members exceeded their targets. These nations agreed to compensate with further output cuts between July and September. On 15 July 2020, OPEC+ agreed to reduce the output cuts to 7.7 million barrels a day from August 2020. Output is forecast to remain about these levels until December 2020.

From 2021, output is expected to rise further until targets expire in April 2022. From May 2022 to December 2022, production is expected to be slightly higher than 2019 levels. Compliance with the OPEC+ agreement across member countries is a key risk to excess global production, and may result in OPEC+ tensions resurfacing.

For countries exempt from the recent OPEC+ agreement, production is assumed to remain low over the outlook period. Libyan production has been affected by blockades on oil fields and export facilities, initially imposed in January 2020 but remaining in place for much of 2020. The timing of this blockade ending remains uncertain as of 17 September, but the subsequent output recovery is likely to be slow, due to required infrastructure investment.

A lack of funds for much needed investment is also expected to limit any sizable increase in Venezuelan output over the outlook period, even if international sanctions end.

Iranian production has the greatest potential to increase: US sanctions on Iranian exports could be influenced by the outcome of the November 2020 US elections.

OPEC+ production in 2020 is expected to average 46 million barrels a day, down 16 per cent from 2019. This year-on-year decline is expected to be limited by elevated production between January and April. Output is expected to fall further to 44 million barrels a day in 2021; as output targets are assumed to be in place for the whole of 2021. In 2022, production is forecast to recover to 50 million barrels a day.

Non-OPEC+ production to drop in response to low prices

In 2020, production is also expected to decline significantly in non-OPEC+ nations, as producers respond to low global prices. Non-OPEC+ output was estimated to be at its lowest point in the year in the June quarter, before increasing marginally as some producers respond to slightly higher prices.

US production is forecast to fall by 5.3 per cent to 16 million barrels a day in 2020. The majority of this decline is expected to have occurred in the June quarter 2020, with production averaging 14 million barrels a day. In the first half of 2020, US producers reduced capital expenditure and their oil rig count. In combination with declining production from existing wells, this is expected to keep US production low in 2021. US oil production may also be affected by the ongoing legal challenge on the Dakota Access Pipeline. Although the pipeline is allowed to continue operating while legal proceedings are ongoing, this presents a downside risk to US supply, as some fields become less economically viable.

In 2021, US production is forecast to increase to 17 million barrels a day, before increasing to 18 million barrels a day in 2022.

Canadian production is forecast to decline by 4.4 per cent to 5.2 million barrels a day in 2020, as relatively high production costs and dwindling storage capacity influence producer decisions. Canadian production is forecast to increase to 5.5 million barrels a day in 2021, and 5.7 million barrels a day in 2022.

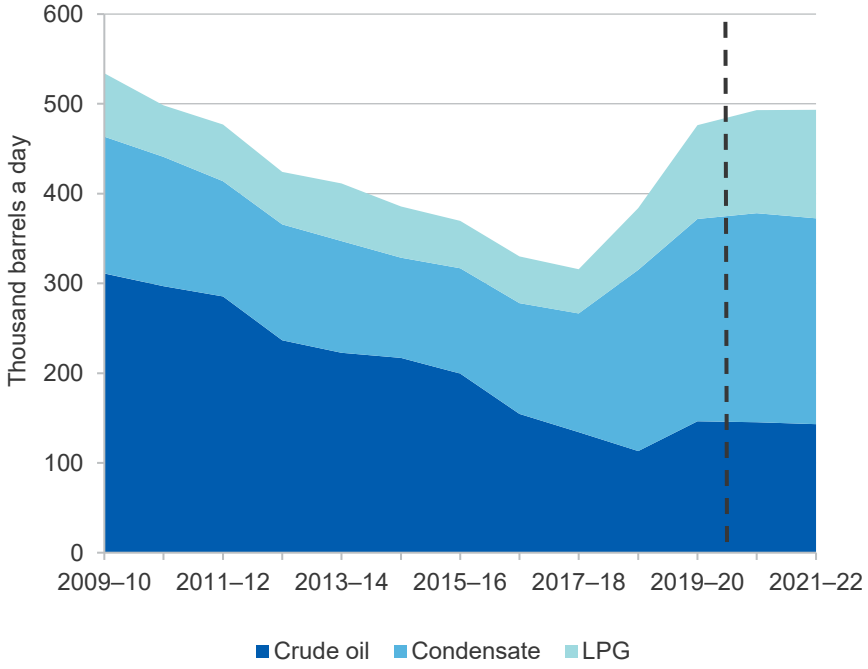
In 2021, non-OPEC+ output is forecast to rise by 7.8 per cent to 47 million barrels a day. Non-OPEC+ output is forecast to rise further in 2022, to 48 million barrels a day.

8.5 Australia

Final investment decisions on gas projects to influence oil production

In 2019–20, Australian crude and condensate production is estimated to have increased by 18 per cent to 372,000 barrels a day, as crude production rose as a result of Woodside's Greater Enfield project. Late in the fiscal year, condensate and LPG production was affected by the temporary shutting of the Prelude FLNG project from February 2020 (see the *gas* chapter). As of 17 September, Prelude remains offline, with no official restart date announced.

Figure 8.6: Composition of Australian oil production



Source: Department of Industry, Science, Energy and Resources (2020)

Production is forecast to increase marginally in 2020–21, as output recovers at existing fields. Output is expected to remain around these levels in 2021–22. Beyond the outlook period, the deferral of final investment decisions (FIDs) for several gas projects may affect future condensate and LPG production, with the production of both commodities typically associated with gas production (see the *gas* chapter). In 2019–20, condensate accounted for 47 per cent of total Australian crude oil, condensate and LPG production. LPG accounted for a further 22 per cent (Figure 8.6).

Australian exports to be affected by low prices

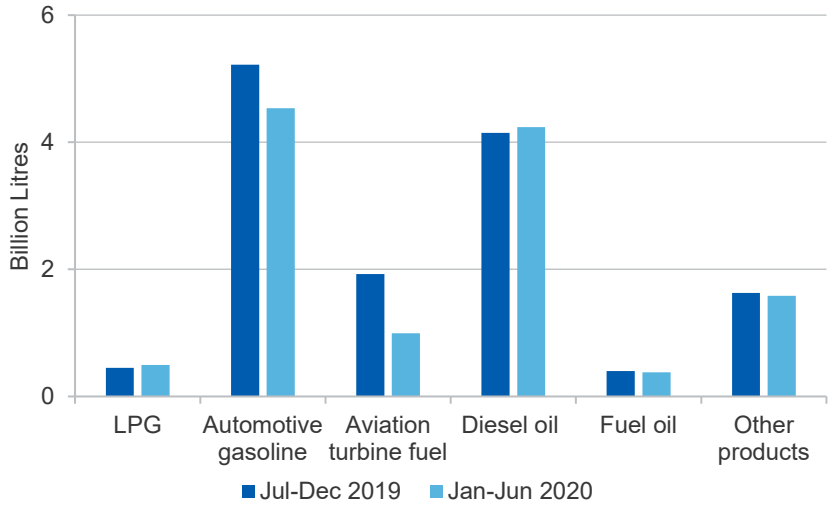
In the first half of 2020, Australian export values have fallen as global prices declined. Export values in 2019–20 were $9.1 billion. This value is 0.1 per cent lower than what was recorded in 2018–19, despite export volumes increasing by 15 per cent. In 2020–21, export values are forecast to decline by 20 per cent to $7.3 billion, as prices are assumed to be low over the full fiscal year. Export volumes are expected to increase by 5.9 per cent. Export values in 2021–22 are forecast to increase by 15 per cent to $8.4 billion, driven by higher prices.

Australian refineries to be squeezed by low consumption

Australian refinery throughput fell significantly in early 2020 (Figure 8.7), as low transport demand reduced the profitability of the Australian refineries. As a result, all four of Australia's remaining refineries announced plans to adjust production until margins recovered. These low margins may also affect the future operations of Australian refineries, with Ampol and Viva announcing that they are assessing the long-term viability of their Australian refineries.

Australian refinery production is expected to recover gradually from September 2020, as Ampol resumes production at their Brisbane refinery. Production at all of Australia's four refineries is assumed to increase gradually in the December quarter as refining margins improve, with normal monthly volumes expected to be reached by the June quarter of 2021. Over the rest of the outlook period, refinery throughput is forecast to remain at around these levels, fluctuating in line with plant maintenance.

Figure 8.7: Australian refinery output 2019–20



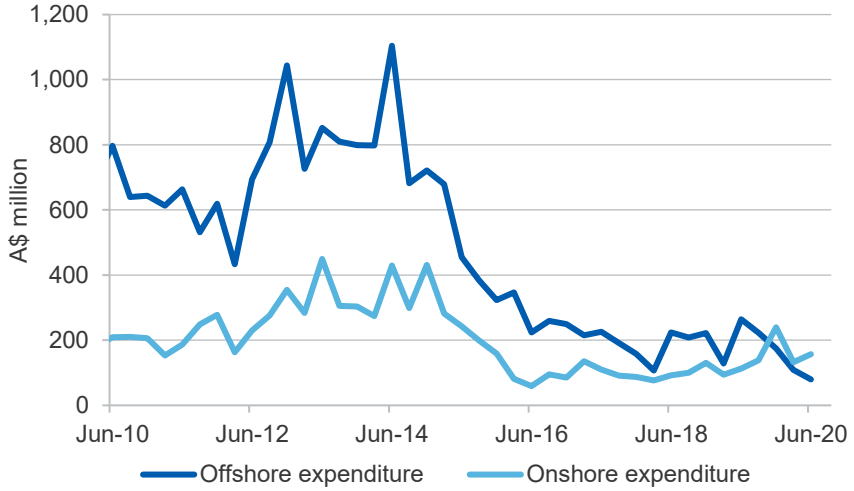
Source: Department of Industry, Sciences, Energy and Resources (2020)

Australian refined product consumption fell in 2019–20, as COVID-19 containment measures weighed heavily on activity in the first half of 2020. Consumption is forecast to recover in 2020–21, as containment measures across states ease. However, aviation demand is expected to remain low, as travel is expected to be restricted. In Australia, aviation consumption accounts for a relatively high share of product usage — about 15 per cent in 2019.

Exploration

In the June quarter of 2020, Australian petroleum exploration expenditure was $219 million, on a seasonally adjusted basis, a quarterly decline of $76 million or 26 per cent. The national decline was largely driven by lower expenditure in Western Australia, which fell by $69 million.

Figure 8.8: Australian petroleum exploration



Source: ABS (2020) Mineral and Petroleum Exploration, Australia, 8412.0

8.6 Revisions to the outlook

The forecast for Australian export earnings has been revised up by $0.4 billion for 2020–21, reflecting upwards oil price revisions. Export earnings in 2021–22 have been revised downwards by $0.2 billion, largely reflecting upwards exchange rate revisions.

Table 8.1: Oil Outlook

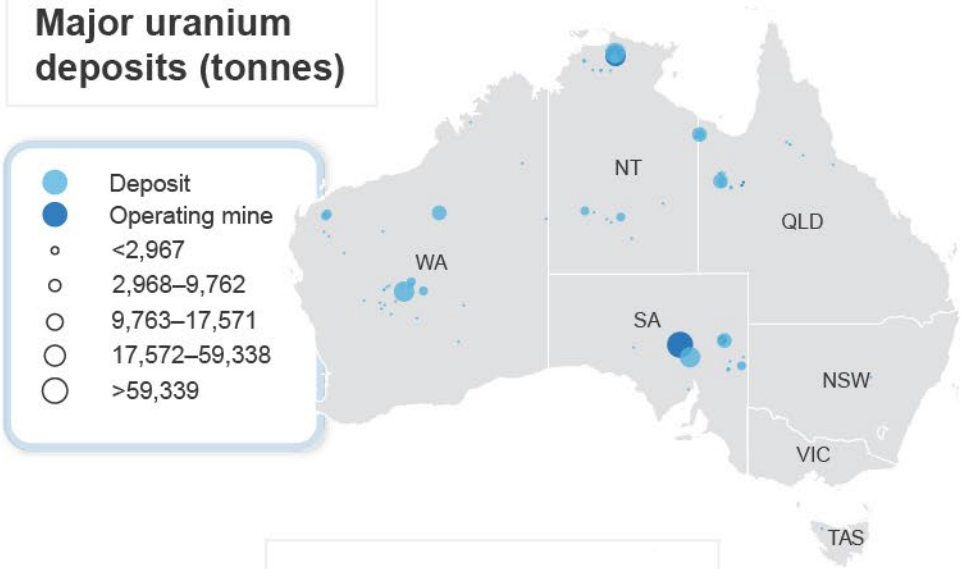
World	Unit	2019	2020[f]	2021[f]	2022[f]	Annual percentage change 2020[f]	2021[f]	2022[f]
Production[a]	mb/d	100.1	91.9	93.1	97.3	-8.1	1.4	4.5
Consumption[a]	mb/d	100.0	91.4	96.5	99.1	-8.7	5.7	2.6
WTI crude oil price								
– nominal	US$/bbl	56.7	40.4	44.4	51.3	-28.8	9.9	15.6
– real[b]	US$/bbl	57.7	40.4	43.3	49.1	-30.0	7.3	13.4
Brent crude oil price								
– nominal	US$/bbl	63.9	42.2	47.3	55.1	-34.0	12.1	16.7
– real[b]	US$/bbl	65.0	42.2	46.1	52.8	-35.1	9.5	14.4
Australia	**Unit**	**2018–19**	**2019–20**	**2020–21[f]**	**2021–22[f]**	**2019–20**	**2020–21[f]**	**2021–22[f]**
Crude and condensate								
Production[ac]	kb/d	315	372	378	373	17.9	1.7	-1.5
Export volume[a]	kb/d	254	293	310	310	15.4	5.9	-0.3
– Nominal value	A$m	9,071	9,060	7,274	8,357	-0.1	-19.7	14.9
– Real value[h]	A$m	9,424	9,288	7,274	8,191	-1.4	-21.7	12.6
Imports[a]	kb/d	375	317	342	345	-15.4	7.9	0.9
LPG production[acd]	kb/d	69	104	115	121	52.2	10.1	5.1
Refined products								
– Refinery production[a]	kb/d	502	447	442	490	-10.9	-1.2	10.9
– Export volume[ae]	kb/d	17	17	11	9	-2.2	-32.9	-20.8
– Import volume[a]	kb/d	645	643	699	688	-0.3	8.7	-1.5
– Consumption[ag]	kb/d	1,045	984	1,016	1,068	-5.9	3.3	5.1

Notes: **a** The number of days in a year is assumed to be 365, and a barrel of oil equals 158.987 litres; **b** In 2020 calendar year US dollars; **c** Historical production data was revised in the September quarter 2020 to align with Australian Petroleum Statistics. **d** Primary products sold as LPG; **e** Excludes LPG; **g** Domestic sales of marketable products, including imports; **f** Forecast; **h** In 2020–21 financial year Australian dollars; **s** estimate.

Sources: ABS (2020) International Trade in Goods and Services, Australia, Cat. No. 5368.0; International Energy Agency (2020); EnergyQuest (2020); US Energy Information Administration (2020); Department of Industry, Science, Energy and Resources (2020).

92 U 238.029 Uranium

Major uranium deposits (tonnes)



Uranium facts

Originally formed in supernovae more than **6 billion years ago**

Nuclear plants can supply electricity to **4-5 million people**

Nuclear has among the **lowest death and accident rates** of any power source

Consumer markets

27% EU

26% USA

21% Others

15% China

9% Russia

2% Japan

Australia's Uranium

Ranked no 1 for **uranium resources**

3rd largest uranium producer in the world

Exports worth **$734m** in 2018–19

9.1 Summary

- Uranium prices are expected to largely hold steady over the rest of 2020, reflecting a resumption of output from Canada's Cigar Lake mine. The pause in output from this mine — which accounts for around 10 per cent of global supply — drove a surge in prices in early 2020.
- Australian production is set to decline from 2021, due to the closure of the Ranger uranium mine.
- The value of Australia's uranium exports is expected to ease, with price growth partially offsetting falling production. Export earnings are expected to fall from $688 million in 2019–20 to $629 million by 2021–22.

9.2 Prices

A recovery in Canadian supply will limit any further price growth

Uranium supply has tightened up noticeably since the start of the COVID-19 pandemic (Figure 9.1), reflecting significant cuts in output from Canada, Namibia and Kazakhstan. These cuts were enacted as a response to falling global energy demand, which has contracted significantly since the start of the COVID-19 pandemic.

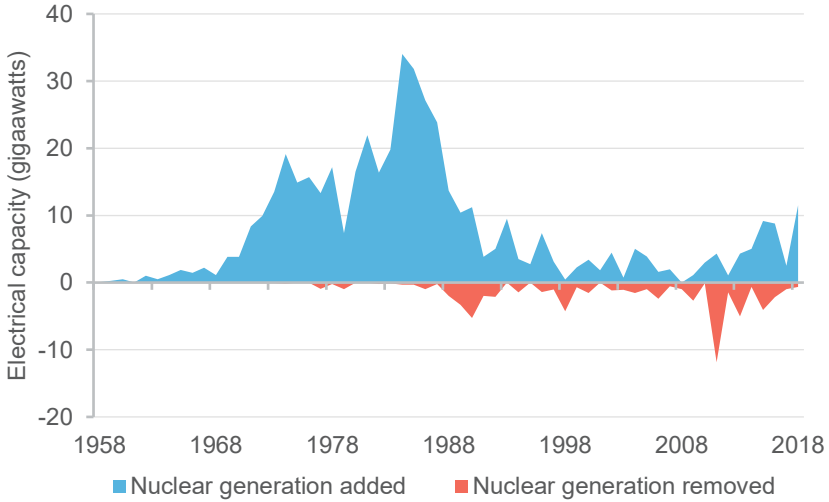
One of these supply cuts now appears likely to be reversed. In April 2020, Cameco announced that output from its Cigar Lake mine in Canada — which accounts for 10 per cent of global uranium output — would be suspended. However, in August the company announced that production would resume, with refining also set to return to normal operation by September. This reopening will likely prevent any further significant price growth over the remainder of 2020.

Demand is unlikely to exert any significant upward pressure on prices over the rest of 2020, with inventories set to remain high in the near term. However, demand is expected to exert modest but growing upward price pressure after 2020 as new reactors open up in Asia and Eastern Europe (Figure 9.2). While suppliers retain significant capacity to increase their output from existing mines, there are few prospects for new mines, with many potential supply projects still on hiatus following years of low prices.

Figure 9.1: Uranium price outlook

Source: Cameco Corporation (2020) Uranium Spot Price; Ux Consulting (2020) Uranium Market Outlook

Figure 9.2: World nuclear power generation



Source: International Energy Agency (2019); World Nuclear Association (2019); Department of Industry, Science, Energy and Resources (2020)

9.3 World consumption

A number of reactors are currently progressing towards completion

The September quarter saw several reactors progressing through the final construction stages in Asia. Few reactors are being built in the OECD, though governments continue to invest in emerging nuclear technology.

In China, unit 5 of the Tianwan plant was connected to the grid on 8 August. The 1080 MWe reactor — which was designed and built in China — is expected to enter commercial operation in late 2020.

The United Arab Emirates has started up its first reactor, with unit 1 of the Barakah plant expected to enter commercial operation in late 2020. The reactor generated its first sustained chain reaction in July. Construction of unit 2 of the Barakah nuclear plant has also concluded, with preparations now underway to finalise its operating licence. Two further APR-1400 reactors are expected to commence commercial operation by 2021, resulting in a significant nuclear power grid for the country.

In India, unit 3 of the Kakrapar power plant achieved a sustained chain reaction in late July, and is expected to be connected to the grid shortly. The reactor is India's 23rd, but is the first domestically-designed 700MWe to be completed. In Bangladesh, Atommash has concluded hydraulic tests for unit 1 of its Rooppur nuclear plant in July. This follows completion of similar hydraulic tests for the company's Akkuyu nuclear plant in Turkey.

Mexico's Ministry of Energy has authorised unit 1 of the Laguna Verde nuclear plant to operate for another 30 years, extending its life to 2050.

In Russia, the loading of the fuel assemblies at unit 2 of the Leningrad II nuclear plant commenced in July. Fuel loading has commenced at unit 1 of the Belarusian nuclear plant, with 163 assemblies set to be loaded by the end of August.

EDF — France's state-owned power utility — has revised its nuclear output estimate for 2020 up from 300 terawatt hours (TWh) to 315-325 TWh. This will likely result in notably higher fuel consumption in France, where about 75 per cent of power is generated from nuclear energy.

In the UK, the owners of the Flamanville and Hinkley Point C projects have announced potential construction delays of between 9 and 15 months, as a result of labour problems associated with the COVID-19 pandemic.

The US Government is pressing forward with long-standing efforts to accelerate nuclear construction and development. The US Senate passed the Nuclear Energy Leadership Act in July, with a goal to 're-establish US leadership in nuclear energy'. The Act amends the National Defence Authorization Act and allows for the use of defence appropriations to support development of small modular and micro-reactors. The US Government has also lifted its long-standing prohibition on funding overseas nuclear energy projects, with an aim of supporting developing allied countries which lack energy resources. The US House Select Committee on the Climate Crisis has also published a report calling for support to ensure US nuclear plants remain operational. The report also recommends additional funding to support emerging technology.

Work on small modular reactors also continues to progress. In August, the US-based Jacobs Engineering Group was selected to contribute to development work on the 300 MWe Stable Salt Reactor. A five-year agreement has also been signed by the Ultra Safe Nuclear Energy Corporation and Hyundai Engineering, which will support development of the USNC Micro Modular Reactor.

In Canada, Alberta has joined efforts already underway by New Brunswick, Ontario and Saskatchewan, with the provinces working together to design and build modular reactors for use by off-grid remote communities. Such reactors are expected to play an important role in providing reliable and scalable power across remote and inaccessible regions of the country's north.

In aggregate, global uranium consumption is expected to fall to 841,000 tonnes in 2020 as COVID-19 affects global power usage. A slow recovery is expected to follow, with consumption reaching 849,000 tonnes by 2022 as energy use recovers. Growth is expected to pick up further in the medium term as reactors are connected across Asia, Africa, and Eastern Europe (see Figures 9.3 and 9.4).

9.4 World production

Large suppliers have reduced output in the wake of COVID-19

Kazakhstan company Kazatonprom — the world's biggest uranium supplier — has announced plans to return staffing levels to normal by September. Precautions taken by the company have thus far prevented COVID-19 outbreaks at any of its sites, and the return to normal staffing levels is likely to support its output as global conditions change over time.

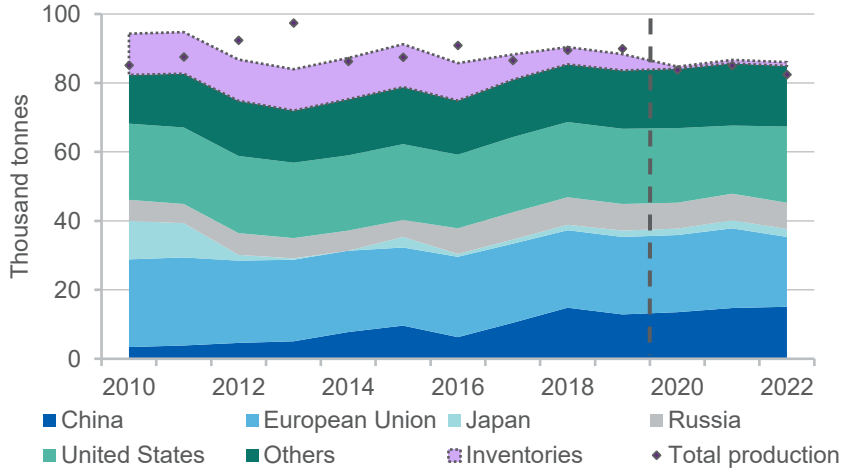
In Canada, Cameco has announced that production at its Cigar Lake uranium mine will recommence in September, with processing set to follow within weeks. The mine — one of the world's largest — has been in care and maintenance for five months, as a result of the COVID-19 pandemic. The company has linked the re-commencement of mining to recent lifts in the uranium spot price, but its decision is likely to place downward pressure on prices over coming months.

A new scoping study has found that significant capital costs can be saved at the proposed Etango uranium project in Namiba. The report notes that reducing output from 20 million tonnes per year to 8 million tonnes will greatly reduce short-term borrowing requirements. The result suggests the project is less risky and more flexible in its scaling than was previously thought.

A number of African mines have reduced their expected output for the next few years. Kazakhstan, which currently has five of the ten largest uranium mines in the world, is expected to remain dominant as a supplier as a result, though cutbacks in African output are also likely to be offset by the return to operation of the Cigar Lake mine in Canada. Namibia — which holds both of the world's largest open pit uranium mines — is also expected to remain important to global supply, despite some recent downward revision in its overall output.

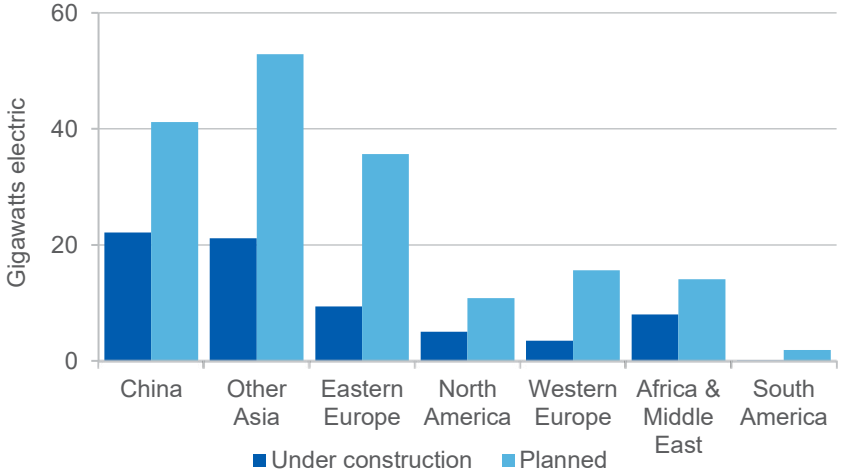
Overall global output is expected to remain somewhat below its recent average over the rest of the outlook period (see Figure 9.5).

Figure 9.3: World uranium consumption and inventory build (U3O8)



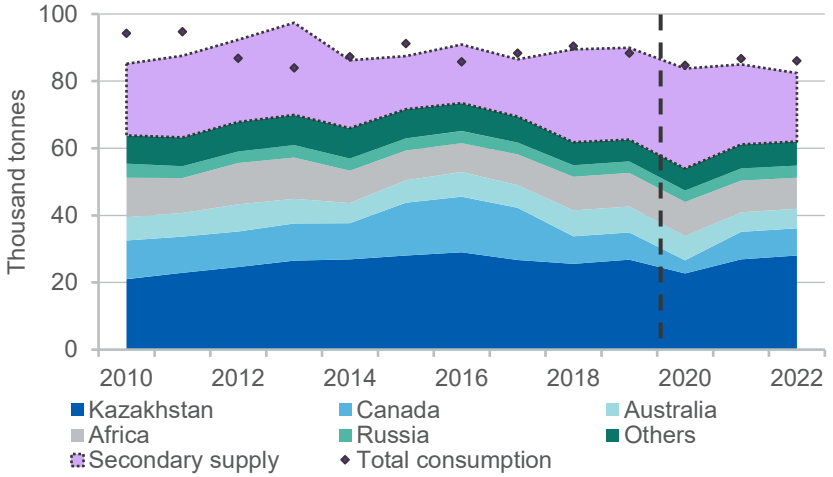
Source: International Energy Agency (2019); World Nuclear Association (2020); Ux Consulting (2020)

Figure 9.4: New nuclear capacity: medium-term expansion



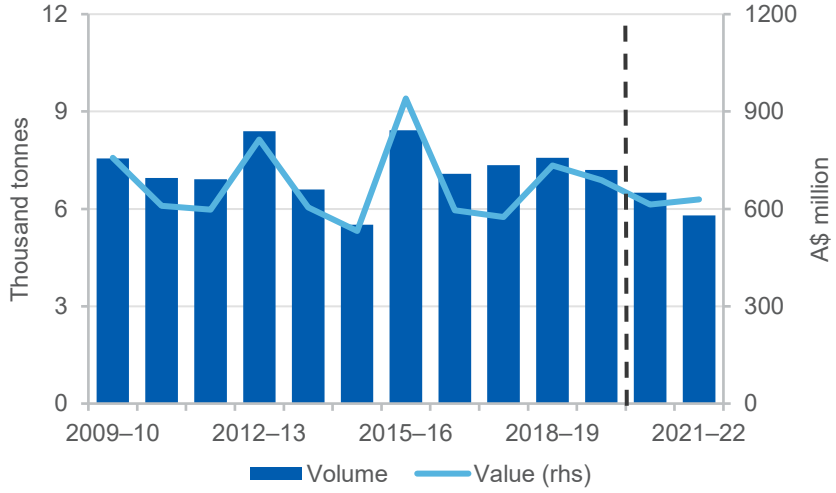
Source: International Energy Agency (2020); World Nuclear Association (2020); Department of Industry, Science, Energy and Resources (2020)

Figure 9.5: World uranium production and secondary supply (U3O8)



Source: International Energy Agency (2020); World Nuclear Association (2020); Ux Consulting (2020)

Figure 9.6: Australia's uranium exports



Source: Department of Industry, Science, Energy and Resources (2020)

9.5 Australia

Production and exports are set to decline from 2021

The Ranger uranium mine in the Northern Territory remains on schedule for final closure in January 2021. Rehabilitation is underway, with $830 million committed to restore the 950 hectare site. The funding will be used to plant at least a million trees, with the indigenous-run Kakadu Native Plants now engaged to plant and raise seedlings to revegetate the area.

Most mining works at the site have now halted, with output being drawn from stockpiles. The closure of Ranger will leave just two mines in Australia: Olympic Dam, and Four Mile, both in South Australia. These two mines still hold significant untapped resources, while at least six proposed mines still have the potential to be developed. The closure of Ranger will reduce export volumes from 2021, though small price gains are expected to provide a partial offset (see Figure 9.6).

Export volumes are expected to fall from 7,195 tonnes in 2019–20 to 5,800 tonnes by 2021–22. Export values are expected to edge down from $688 million in 2019–20 to $629 million by 2021–22.

Low prices have sharply reduced uranium exploration

Only $1.6 million was invested in uranium exploration in the June quarter. This is above the historical low of $1.1 million in the March quarter, but well below the peaks recorded in 2010. A further lift in prices may result in more exploration growth over coming quarters.

Revisions to the outlook

The recent re-opening of the Cigar Lake mine in Canada has placed some downward pressure on expected prices over coming quarters. This has resulted in a downward revision for the export earnings forecast. The June 2020 *Resource and Energy Quarterly* estimates (for earnings of $623 million in 2020-21 and $752 million in 2021–22) have been revised down to $613 and $629 million, respectively.

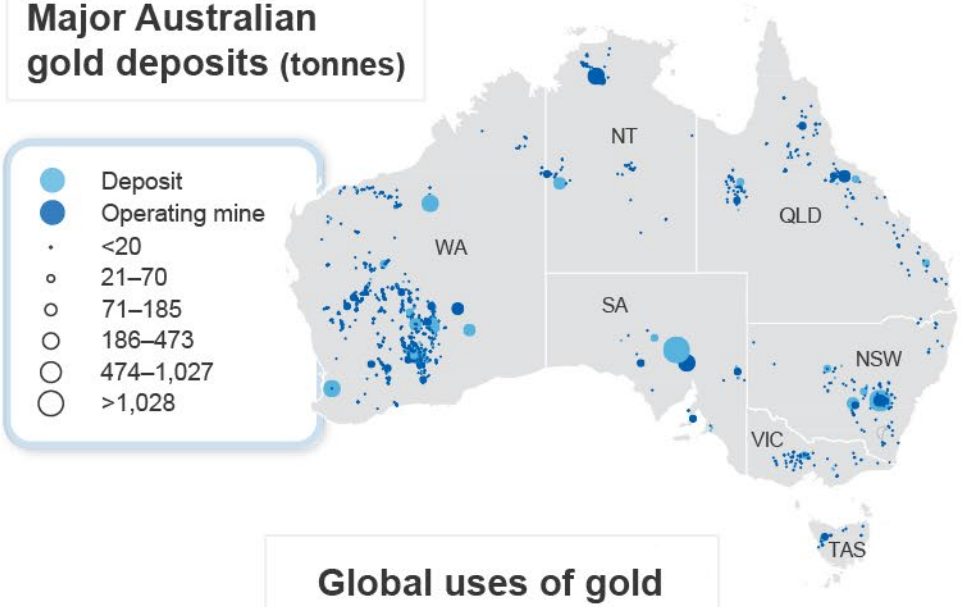
Table 9.1 Uranium outlook

					Annual percentage change			
World	**Unit**	**2019**	**2020[f]**	**2021[f]**	**2022[f]**	**2020[s]**	**2021[f]**	**2022[f]**
Production	kt	63.1	54.0	61.2	62.0	-14.5	13.4	1.4
Africa[b]	kt	10.4	10.1	9.4	9.2	-2.1	-6.9	-2.4
Canada	kt	8.2	3.9	8.2	8.2	-51.7	106.9	0.0
Kazakhstan	kt	26.8	22.7	26.9	28.0	-15.3	18.9	4.0
Russia	kt	3.5	3.4	3.6	3.6	-1.9	5.3	0.0
Consumption	kt	83.6	84.1	85.7	84.9	0.6	1.9	-0.9
China	kt	12.9	13.5	14.7	15.1	4.8	8.9	2.6
European Union 27	kt	22.5	22.4	23.1	20.3	-0.2	3.2	-12.4
Japan	kt	1.9	1.9	2.4	2.4	0.0	26.0	0.0
Russia	kt	7.7	7.4	7.6	7.6	-3.2	2.6	-0.6
United States	kt	21.8	21.7	19.8	22.0	-0.7	-8.6	11.5
Spot price	US$/lb	25.6	31.2	37.8	44.3	21.7	21.3	17.1
real[c]	US$/lb	26.1	31.2	36.9	42.4	19.6	18.4	14.8
Australia	**Unit**	**2018–19**	**2019–20[s]**	**2020–21f[f]**	**2021–22f[f]**	**2019–20[s]**	**2020–21f[f]**	**2021–22f[f]**
Mine production	t	7,618	7,349	6,500	5,800	-3.5	-11.5	-10.8
Export volume	t	7,571	7,195	6,500	5,800	-5.0	-9.7	-10.8
– nominal value	A$m	734	688	613	629	-6.2	-10.9	2.6
– real value[d]	A$m	748	623	613	617	-7.5	-12.6	0.6
Average price	A$/kg	96.9	95.6	94.3	108.5	-1.4	-1.4	15.0
– real[d]	A$/kg	100.7	98.0	94.3	106.3	-2.7	-3.8	12.7

Notes: **b** Includes Niger, Namibia, South Africa, Malawi and Zambia; **c** In 2020 US dollars; **d** in 2019–20 Australian dollars; **f** forecast; **s** estimate.
Source: Department of Industry, Science, Energy and Resources (2020); Cameco Corporation (2020); Ux Consulting (2020) Uranium Market Outlook

79 Au 196.967 Gold

Major Australian gold deposits (tonnes)



Gold

Aprox 187,200 tonnes of gold mined since the **beginning of civilisation**

The US Federal Reserve holds **6,700 tonnes of gold**

Gold makes up **3 parts per billion** of the Earth's outer layer

Global uses of gold

43% Global backed exchange traded funds

25% Jewellery

15% Coins and bars

11% Central bank reserves

6% Electronics, industrial, dental and medical

Australia's gold

World's no. 1 producer of gold forecast **for 2021**

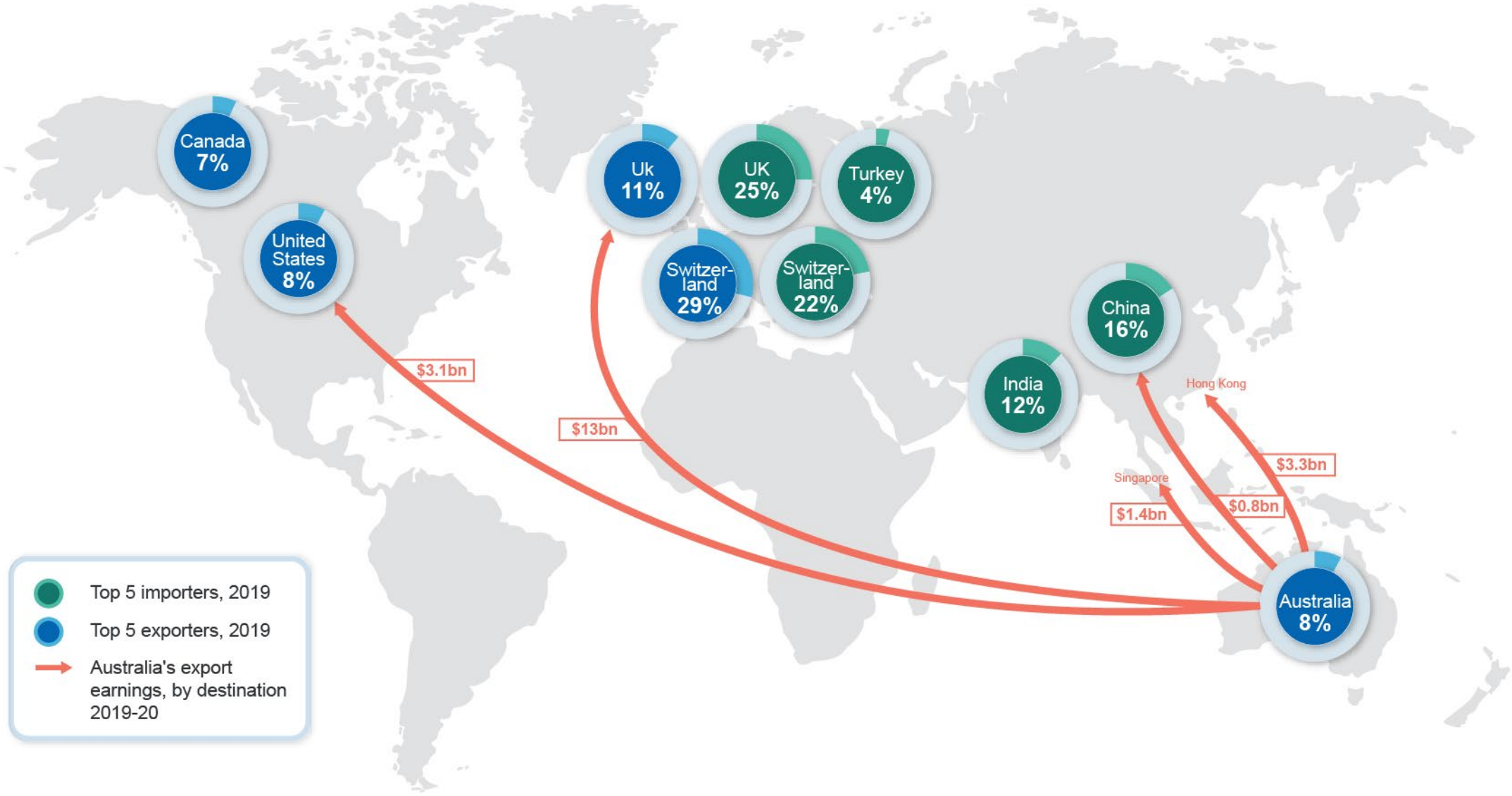
World's largest economic demonstrated **resource** of gold

World record holder for **largest gold nugget** 72kg

79 Au 196.967

Gold

Trade map | September 2020



10.1 Summary

- Due to the COVID-19 pandemic and its impacts, the gold price is forecast to reach an annual record high in 2020, averaging about US$1,770 an ounce. An expected global economic rebound is projected to see the gold price slide to around US$1,620 an ounce in 2022.
- Australia's gold mine production is forecast to reach a record 384 tonnes in 2021–22, as record prices encourage an expansion in production.
- The value of Australia's gold exports is forecast to reach a record $31 billion in 2020–21, driven by higher prices and export volumes, before declining to around $28 billion in 2021–22, as gold prices ease back.

10.2 Prices

Gold prices rose strongly in the first eight months of 2020

The London Bullion Market Association (LBMA) US dollar gold price is estimated to rise by 27 per cent year-on-year in the first nine months of 2020, to average US$1,731 an ounce. The price reached a record high of US$2,064 an ounce on 6 August 2020, benefitting from its status as a safe haven asset during the COVID-19 pandemic.

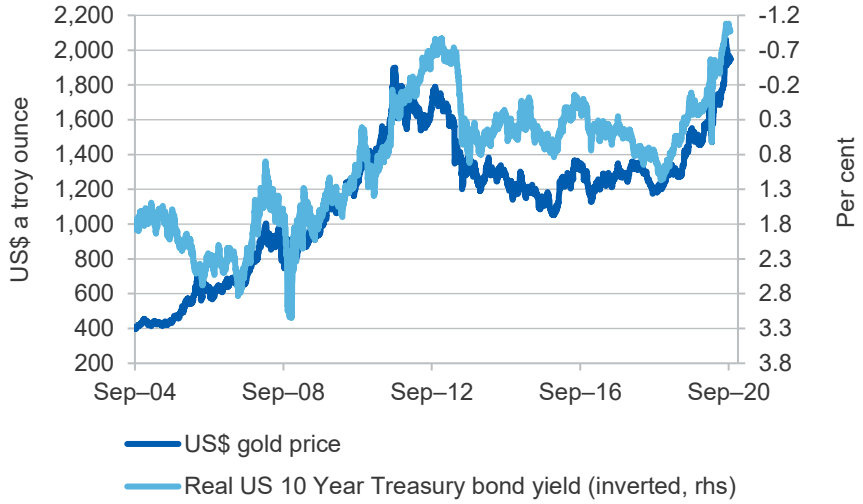
The correlation between lower real bond yields and the US dollar gold price has persisted; low (and negative) real yields have caused a rush of investor money in to gold, more than offsetting the impact of weaker demand from jewellery consumers and central banks (Figure 10.1).

Propelled by a higher US dollar gold price, the Australian dollar gold price is estimated to increase by 31 per cent year-on-year in the first nine months of 2020, to average A$2,558 an ounce. It reached a record high of A$2,861 an ounce on 7 August 2020.

Gold prices expected to fall in 2021 and 2022

The US dollar gold price is expected to remain high over the balance of 2020, as uncertainty over the COVID-19 pandemic persists. The price is forecast to average US$1,770 an ounce in 2020, a rise of 27 per cent on 2019 (Figure 10.2).

Figure 10.1: US dollar gold price and real US 10-Year Treasury yield



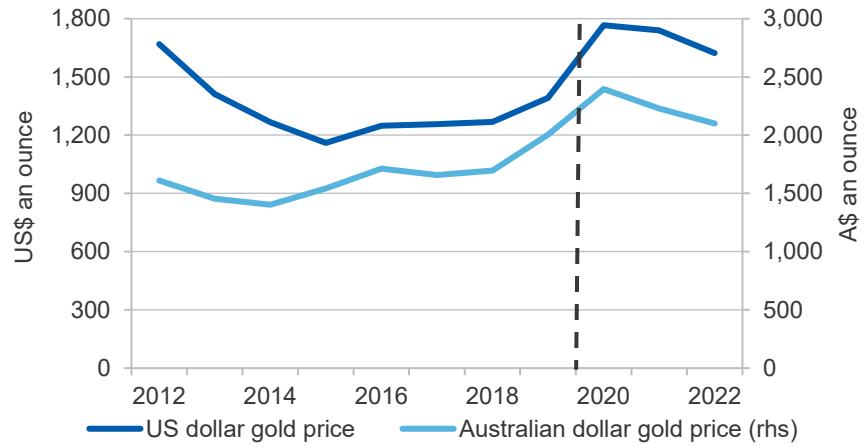
Source: Bloomberg (2020)

As the global economy recovers, the gold price is forecast to fall in 2021 and 2022; the price is expected to average US$1,740 an ounce in 2021 and US$1,620 an ounce in 2022 (Figure 10.2). The lower US dollar gold price, in combination with the higher Australian dollar, is expected to push the Australian dollar gold price lower over the outlook period, averaging A$2,100 an ounce in 2022.

The global economic recovery is expected to undermine some of gold's appeal to institutional investors: funds are expected to move out of safe haven assets like gold and into riskier assets. A risk to this assessment is an escalation of tensions between the US and China, which could push gold prices higher.

The pace of central bank gold buying is expected to decrease at an annual rate of 4.9 per cent over the outlook period, amidst a modestly diminished appetite for gold for reserves.

Figure 10.2: US and Australian dollar gold prices



Source: LBMA (2020) Gold price PM; Department of Industry, Science, Energy and Resources (2020)

10.3 Consumption

World gold consumption decreased in the first half of 2020

World gold demand decreased by 5.9 per cent year-on-year in the first-half of 2020, to 2,076 tonnes, led by a reduction in both jewellery consumption and central banks' purchases.

The COVID-19 pandemic and higher gold prices adversely impacted global gold jewellery demand in the first half of 2020. Jewellery demand dropped by 46 per cent year-on-year, to 572 tonnes, led by a 53 per cent (or 182 tonnes) fall in consumption from China — the world's largest gold jewellery consuming nation. Despite a return to a near normal life in China in recent months, the rising gold price has deterred Chinese consumers from spending on gold jewellery. In India — the world's second largest gold jewellery consuming nation — jewellery demand fell by 60 per cent year-on-year in the first-half of 2020, due to a higher domestic gold price and the COVID-19 containment measures. In the US and Europe, jewellery demand fell by 20 and 30 per cent year-on-year in the first half of 2020, to 42 and 19 tonnes, respectively.

Over this period, official sector gold buying fell by 40 per cent year-on-year to 233 tonnes. Russia's central bank — the world's largest gold buyer for the last 14 consecutive years — suspended gold buying on 1 April 2020, citing budgetary requirements to deal with the COVID-19 pandemic.

Offsetting the fall in gold jewellery demand and official sector gold buying was a 517 per cent rise year-on-year in inflows into gold-backed exchange traded funds (ETFs) in the first half of 2020, which added 734 tonnes (or net inflows of US$60 billion). The global COVID-19 pandemic, low interest rate environment and record gold prices have driven demand for gold backed ETFs.

World gold demand is forecast to fall by 16 per cent in 2020 to 3,693 tonnes, as the COVID-19 pandemic reduces incomes and deters gold jewellery consumption in many parts of the world. Gold is expected to continue to attract institutional investors.

Gold consumption expected to rise in 2021 and 2022

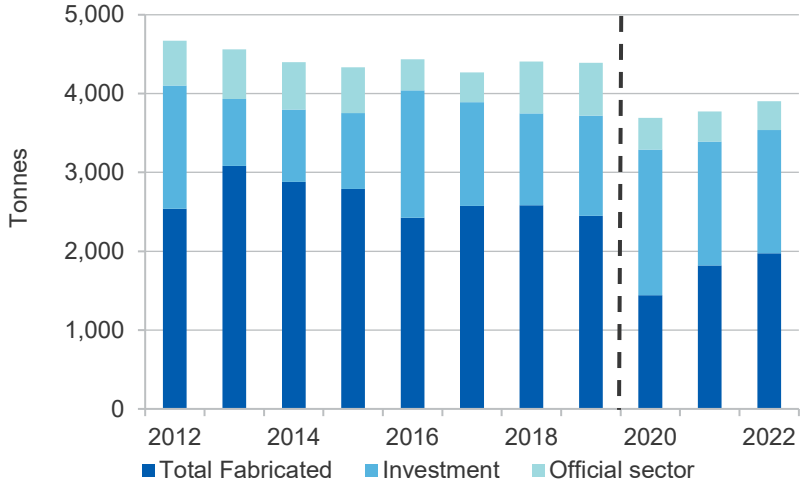
World gold consumption is forecast to grow at an average annual rate of 2.8 per cent in 2021 and 2022, to 3,904 tonnes in 2022 (Figure 10.3). Growth is expected to be mainly driven by jewellery demand, up 26 and 8.6 per cent in 2021 and 2022, to 1,818 and 1,975 tonnes, respectively.

Demand from China is expected to rise at double-digit rates in 2021, following a steep fall in 2020. Innovation in gold jewellery production — which has resulted in a wider product offering — is providing Chinese consumers with greater choices and driving higher demand for gold.

In India, jewellery demand is expected to recover in 2021 and 2022; no new lockdowns are assumed, and the economy is expected to steadily recover from the COVID-19 pandemic.

In the US and Europe, jewellery demand is also likely to recover, but at a slower pace than China and India, as US and European consumers' interest in gold jewellery is expected to remain limited.

Figure 10.3: World gold consumption by sector



Notes: Total fabricated includes jewellery consumption and industrial applications

Source: World Gold Council (2020) *Gold Demand Trends*; Department of Industry, Science, Energy and Resources (2020)

Retail investment is expected to help global gold consumption, with demand for gold bars and coins forecast to rise at an average annual rate of 15 per cent between 2021 and 2022, to 810 tonnes by 2022. This is supported by a forecast pull-back in gold prices (see *Section 10.2 prices*).

The official sector is expected to remain a net buyer over the outlook period, but at a slower pace. Central banks' gold buying is forecast to fall at an average annual rate of 4.9 per cent in 2021 and 2022, to 364 tonnes in 2022. Many central banks are expected to shift their focus from reserves diversification amid the need to support economic recovery from the COVID-19 pandemic.

Gold backed ETFs are expected to remain strong, with an average inflow of about 797 tonnes a year in 2021 and 2022. With record low interest rates in much of the world, the opportunity cost of holding gold is low.

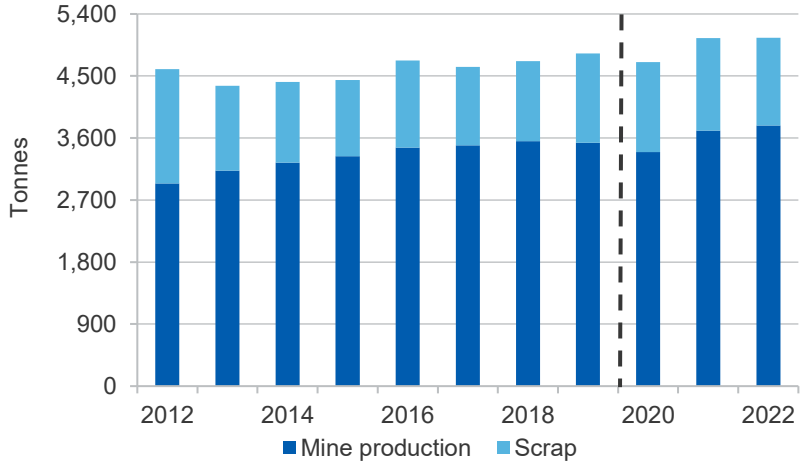
10.4 Production

World gold supply decreased in the first-half of 2020

World gold supply fell by 6.0 per cent year-on-year in the first-half of 2020, to 2,192 tonnes, due to decreased gold mine production and recycling. World gold mine production fell by 5.2 per cent year-on-year in the first half of 2020 to 1,604 tonnes, as strict COVID-19 containment measures affected gold output in some major gold producing countries. Production in China — the world's largest gold producer — decreased by 9 per cent year-on-year in the first six months of 2020, as COVID-19 containment measures affected mining activities in January and February 2020.

Outside of China, COVID-19 containment measures impacted gold mine production mainly in the June quarter 2020. Production in Mexico declined by 62 per cent year-on-year in the June quarter 2020, as mining activities were suspended in April and May 2020.

Figure 10.4: World gold supply



Notes: Total fabricated includes jewellery consumption and industrial applications

Source: World Gold Council (2020) *Gold Demand Trends*; Department of Industry, Science, Energy and Resources (2020)

In South Africa, gold mine production fell by 59 per cent year-on-year in the June quarter. In Peru, a six-week lockdown between mid-March and early May 2020 to contain the spread of COVID-19 reduced the country's gold mine production by 35 per cent year-on-year in the June quarter.

Production in Australia — the world's second largest gold producing nation — increased by 4.4 per cent year-on-year in the first half of 2020 to 169 tonnes, as there was no disruption caused by the COVID-19 outbreak.

Production in Russia — the world's third largest gold producing country — increased by 15 per cent year-on-year in the June quarter, driven by ramp-up production in new gold mines such as the 12 tonnes per year Natalka gold project and the 6.6 tonnes per year Bystrinsky gold project.

The movement restrictions during the COVID-19 pandemic have discouraged gold recycling activity. Jewellery store closures during lockdowns cut the physical exchange of gold for cash. In the first half of 2020, gold scrap supply declined by 4.8 per cent year-on-year to 570 tonnes.

For 2020, world gold supply is estimated to fall by 1.3 per cent to 4,761 tonnes (Figure 10.4), reflecting the impacts of the COVID-19 pandemic on global gold production and recycling in the first-half of 2020. Despite some countries recently encountering a surge in COVID-19 cases, stronger gold mine production and recycling supply are expected in the second-half of 2020.

In Australia, encouraged by record US dollar gold prices, many gold producers are expected to ramp up production in the second-half of 2020. Gold mines in Russia, South America and Africa are also expected to maximise production, possibly returning to some low grade deposits previously deemed uneconomic.

Gold recycling activity is expected to pick up in the second-half of 2020, driven by the strong rise in the US dollar gold price in July and August 2020. Retail consumers are likely to supply more scrap gold over the rest of 2020, as they cash in on the high gold price.

World gold supply expected to rise in 2021 and 2022

Propelled by higher mine production, world gold supply is forecast to rise by 6.2 and 0.6 per cent in 2021 and 2022, to 5,054 and 5,084 tonnes, respectively (Figure 10.4).

World mine production is forecast to increase by 9.1 per cent (to 3,706 tonnes) in 2021 and by 2.0 per cent (to 3,781 tonnes) in 2022. A solid pipeline of projects in Australia, Russia and Canada should contribute to higher world mine output, with miners focusing on expansions and extending the life of existing mines.

Gold scrap supply is forecast to rise by 3.0 per cent in 2021, to 1,342 tonnes, encouraged by the higher gold price. In 2021, unemployment is likely to remain high, causing hardship in many households: some people may be forced to sell their gold jewellery for income to use on daily living expenses. In 2022, lower gold prices and an improvement in the economic situation of many households are likely to discourage the sale of gold jewellery: gold scrap supply is forecast to fall by 5.0 per cent in 2022, to 1,274 tonnes.

10.5 Australia's exports and production

Export values increased in 2019–20

Australia's gold exports increased by 29 per cent in 2019–20, to a record high of $24 billion, driven by high gold prices. Over this period, the US dollar gold prices rose by 24 per cent, averaging US$1,562 an ounce.

Exports of Australian gold were largely dominated by the United Kingdom (UK), which accounted for nearly $13 billion (52 per cent) of Australia's total gold exports, fuelled by fund flows into UK-listed gold ETFs as investors sought safe havens. Other important destinations for Australia's gold in 2019–20 included China (including Hong Kong), which accounted for $4.2 billion (17 per cent) of Australia's total gold exports. United States was Australia's third largest gold export market in 2019-20, accounting for $3.1 billion (13 per cent) of Australia's total gold exports.

Outlook strong for Australia's gold exports

Low energy prices — all largely as the result of the COVID-19 pandemic — have driven a strong rise in margins for Australian producers. As a result, production is surging, and is expected to rise by 13 per cent in 2020–21. Australia's gold export earnings are forecast to rise by 27 per cent in 2020–21, to reach a record $31 billion (Figure 10.5).

The Ok Tedi gold/copper mine in Papua New Guinea (PNG) suspended output for 14 days from early August 2020, after 17 workers tested positive for COVID-19. Gold ores from the Ok Tedi mine in PNG are shipped to the Perth Mint for further processing and re-export. The suspension is likely to have only a minor impact on Australian gold exports.

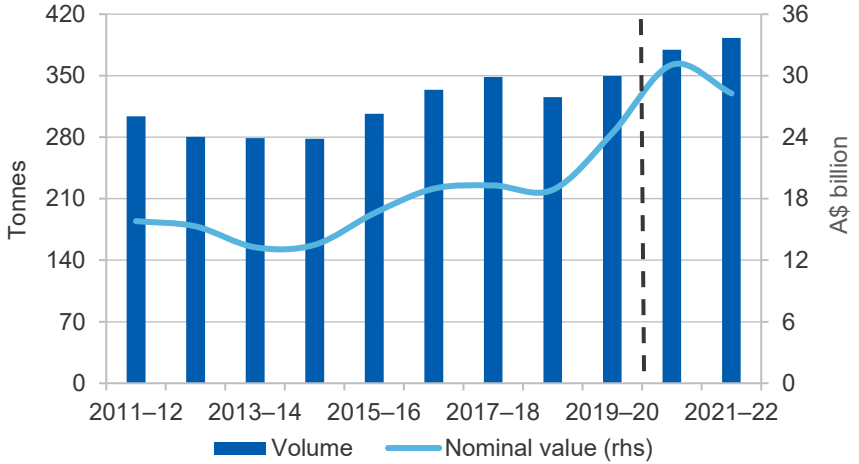
Export values are forecast to decline after 2020–21, falling to around $28 billion in 2021–22 (Figure 10.5). The decline is expected to be driven by the lower US dollar gold price and a rising Australian dollar (see *Section 10.2 prices*), which will more than offset higher export volumes.

Australian gold mine production increased in 2019–20

Australia's gold mine production rose by 1.8 per cent in 2019–20 to 328 tonnes (Figure 10.6). Output was driven by improved production from several large gold mines in Victoria, South Australia (SA) and Western Australia (WA). Production at Kirkland Lake Gold's Fosterville mine in Victoria increased by 37 per cent in 2019–20 to over 20 tonnes, driven by increased mill throughput and higher ore grades. Over the same period, production at Oz Minerals' Prominent Hill mine in SA rose by 22 per cent, to over 5.0 tonnes, propelled by higher throughput. Production at Northern Star's Jundee mine in WA increased by 14 per cent in 2019–20, to nearly 12 tonnes, driven by improved ore grades.

However, production at Newcrest's Cadia mine in New South Wales (NSW) and Telfer mine in WA declined by 7.6 and 13 per cent in 2019–20, to 26 and 12 tonnes, respectively, due to planned maintenance and lower mill throughput. Production at Newmont's Boddington mine in WA and the Tanami gold mine in the Northern Territory fell by 2.3 and 5.3 per cent in 2019–20, to 21 and 15 tonnes, respectively, due to lower ore grades.

Figure 10.5: Australia's gold exports by financial year



Source: ABS (2020) International Trade, 5368.0; Department of Industry, Science, Energy and Resources (2020)

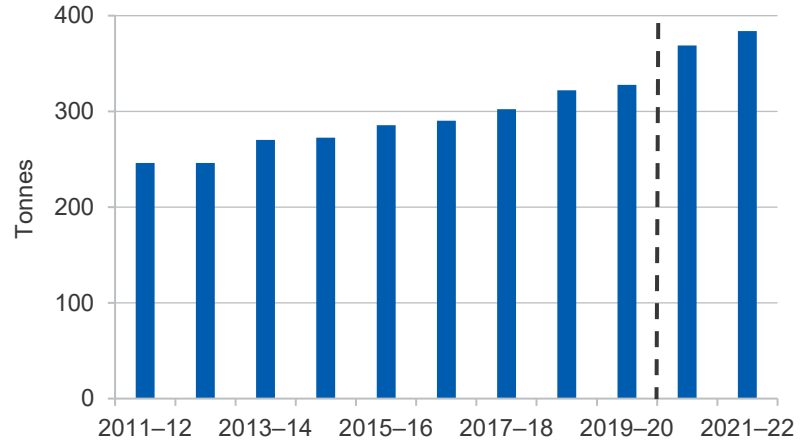
Unlike in Peru and Chile, so far in 2020, Australian gold miners have not been forced to suspend production due to the COVID-19 pandemic. However, some Australia miners have been forced to re-locate workers and reorganise shifts to cope with COVID-19 containment measures.

Higher production in the short term

Australian gold mine production is forecast to rise by 13 and 4.1 per cent in 2020–21 and 2021–22, to 369 and 384 tonnes respectively. Production of 384 tonnes by 2021–22 (Figure 10.6) will be propelled by production from new mines and higher output from existing gold mines.

Capricorn Metals' Karlawinda gold mine project (annual production of 4 tonnes) is expected to be commissioned in the June quarter 2021. The completion of St Barbara's Gwalia extension project in WA is expected to add about 3 tonnes of new output per year to the operation. Red River's 1.2 tonnes per year Hillgrove gold mine in NSW — mothballed since 2014 — is expected to resume production by the end of 2020. The start of underground mining at Evolution Mining's 8.2 tonnes per year Cowal gold mine in NSW is expected to add to Australia's gold output from 2020–21.

Figure 10.6: Australia's gold production



Source: Department of Industry, Science, Energy and Resources (2020)

Figure 10.7: Top 5 gold producing mines in Australia, 2019–20

Source: Department of Industry, Science, Energy and Resources (2020)

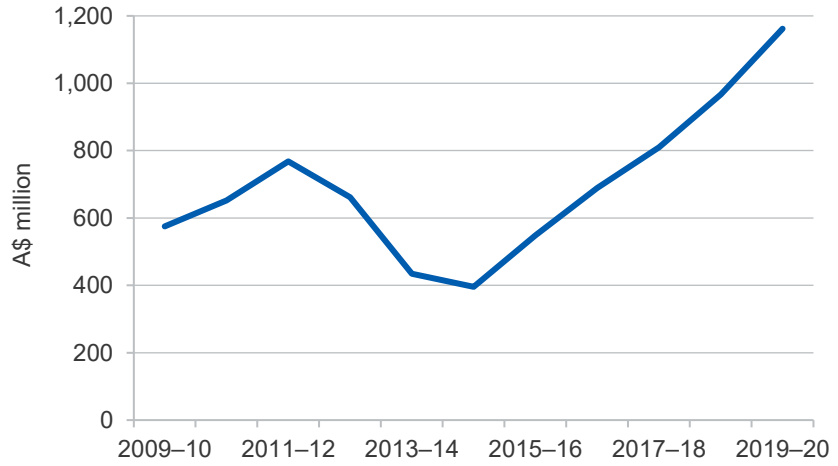
Production at Northern Star and Saracen's joint-venture Super Pit gold mine in WA is expected to rise by 32 per cent in 2020–21, to nearly 19 tonnes, following a new discovery of 591 tonnes of gold resource. The mine is expected to produce gold at 19 tonnes a year for another 15 years.

Newcrest has lowered its production outlook for the Cadia and Telfer gold mines, as they reach their production peak.

Record gold exploration expenditure in 2019–20

Australia's gold exploration expenditure reached a record high of nearly $1.2 billion in 2019–20, up 20 per cent from 2018–19, driven by higher US and Australian dollar gold prices. Gold accounted for 42 per cent of Australia's total mineral exploration expenditure (at $2.8 billion) in 2019–20. Western Australia remained the centre of gold exploration activity in Australia in 2019–20, accounting for 68 per cent (or $786 million) of total gold exploration expenditure, followed by NSW (9.9 per cent or $115 million) and Victoria (9.6 per cent or $112 million) (Figure 10.8).

Figure 10.8: Australian gold exploration expenditure



Source: ABS (2020) Mineral and Petroleum Exploration, Australia, 8412.0

Revisions to the outlook

The forecast for Australian gold exports in 2020–21 has been revised down by $505 million to $31 billion. Export earnings in 2021–22 have been revised down to $28 billion, down $1.3 billion from the forecast in the June 2020 *Resources and Energy Quarterly*, reflecting higher exchange rate assumptions.

Box 10.1: Australia's gold export earnings scenario analysis

Gold prices have increased sharply in 2020, driven by the fallout of the global COVID-19 pandemic, including slowing economic growth, plunging real US Treasury bond yields and, more recently, a weaker US dollar. The US dollar gold price has risen by 27 per cent in 2020, to US$1,929 an ounce on 25 August 2020. The US dollar gold price reached a record high of US$2,064 an ounce on 6 August 2020.

There are a number of uncertainties that have the potential to impact gold prices for the remainder of 2020, and in 2021 and 2022. The main uncertainty is the degree of containment/elimination of the COVD-19 pandemic. If containment is only limited, the gold price could go up significantly further.

To illustrate the potential impacts of gold price movements on Australian gold export earnings, a baseline and three scenarios are examined for gold prices (Figure 10.9). The scenarios use different assumptions on global economic outlook and COVID-19 recovery. For the purpose of this analysis, all other factors which influence Australian gold export earnings (exchange rates and export volumes) are held constant.

Baseline

The baseline uses the gold price forecasts in this chapter. Under the baseline, Australia's gold export earnings are forecast to increase from $24 billion in 2019–20 to nearly $31 billion in 2020–21, before declining to around $28 billion in 2021–22.

Scenario 1: The gold price averages US$3,000 an ounce in 2021–22

Scenario 1 is the most bullish of the three scenarios. Gold prices are assumed to average US$2,500 an ounce in 2020–21, and US$3,000 an ounce in 2021–22 (Figure 10.9). It assumes that the COVID-19 pandemic is slow to be contained, with many countries experiencing subsequent waves of COVID-19 cases. It is assumed that no vaccine is developed until mid-2021, and the global economy remains heavily disrupted in 2021. Further fiscal and monetary stimulus from governments and central banks is needed. The real US Treasury bond yield is assumed to decline further

in a negative territory. Business and consumer confidence is assumed to deteriorate over the outlook period.

Under Scenario 1, relative to the baseline scenario, Australia's gold export earnings are estimated to be $11 billion higher in 2020–21, and around $23 billion higher in 2021–22 (Figure 10.10).

Scenario 2: Gold prices to average US$2,500 an ounce in 2021–22

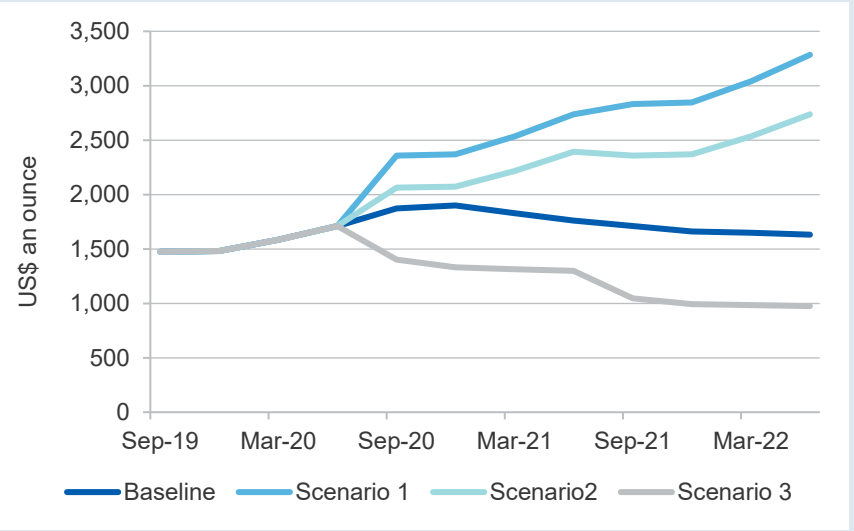
Scenario 2 is slightly less optimistic on the gold price than Scenario 1. Gold prices are assumed to average US$2,187 an ounce in 2020–21, and US$2,500 an ounce in 2021–22 (Figure 10.9). It assumes business confidence is steady and the COVID-19 pandemic outbreak and its impacts are more moderate. Under Scenario 2, relative to the baseline scenario, Australia's gold export earnings are estimated to be $6 billion higher in 2020–21, and $14 billion higher in 2021–22 (Figure 10.10).

Scenario 3: Gold prices to average US$1,000 an ounce in 2021–22

Scenario 3 is the most pessimistic scenario, and gold prices are assumed to fall from an average US$1,562 an ounce in 2019–20 to average US$1,000 an ounce in 2021–22 (Figure 10.9). It assumes the outbreak of the COVID-19 pandemic is likely to be contained by the end of 2020, with an effective vaccine(s). The global economic recovery is expected to be quicker and stronger. Business and consumer confidence is expected to improve in 2021 and 2022. The US Federal Reserve is expected to return to a policy of normalising interest rates. Real US Treasury bond yields are expected to return to positive territory.

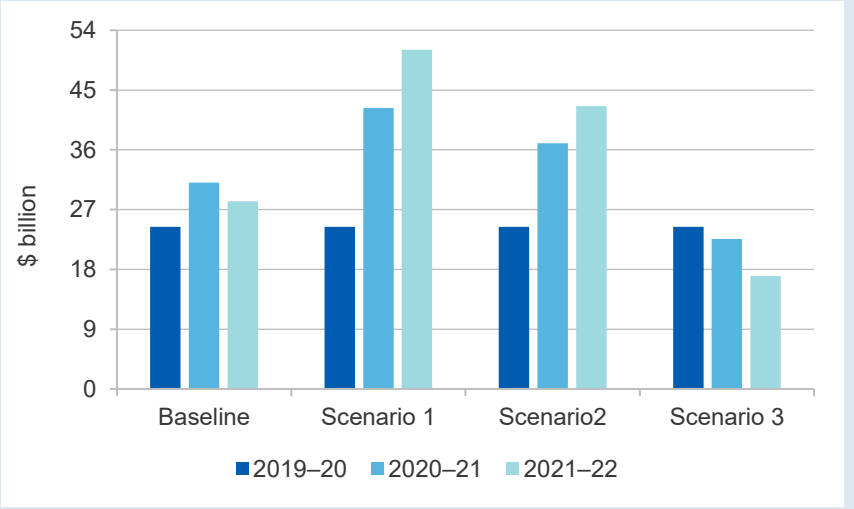
Under this scenario, relative to the baseline scenario, Australia's gold export earnings are estimated to be nearly $9 billion lower in 2020–21, and $11 billion lower in 2021–22 (Figure 10.10).

Figure 10.9: Gold price scenarios



Source: LBMA (2020); Department of Industry, Science, Energy and Resources (2020)

Figure 10.10: Australia's gold export earnings



Source: ABS (2020); Department of Industry, Science, Energy and Resources (2020)

Table 10.1: Gold outlook

						Annual percentage change		
World	**Unit**	**2019**	**2020[f]**	**2021[f]**	**2022[f]**	**2020[f]**	**2021[f]**	**2022[f]**
Total demand	tonnes	4,390	3,693	3,772	3,904	-15.9	2.1	3.5
Fabrication consumption[b]	tonnes	2,449	1,443	1,818	1,975	-41.1	26.0	8.6
Mine production	tonnes	3,531	3,398	3,706	3,781	-3.8	9.1	2.0
Price[c]								
Nominal	US$/oz	1,392	1,766	1,740	1,623	26.9	-1.5	-6.8
Real[d]	US$/oz	1,416	1,766	1,699	1,553	24.7	-3.8	-8.6
Australia	**Unit**	**2018–19**	**2019–20**	**2020–21[f]**	**2021–22[f]**	**2019–20**	**2020–21[f]**	**2021–22[f]**
Mine production	tonnes	322	328	369	384	1.8	12.5	4.1
Export volumes	tonnes	326	350	380	393	7.4	8.5	3.5
Export value - Nominal	A$m	18,867	24,395	31,069	28,270	29.3	27.4	-9.0
Export value - Real[e]	A$m	19,599	25,008	31,069	27,707	27.6	24.2	-10.8
Price								
Nominal	A$/oz	1,769	2,338	2,548	2,239	32.2	9.0	-12.1
Real[e]	A$/oz	1,838	2,397	2,548	2,195	30.4	6.3	-13.9

Notes: **b** includes jewellery consumption and industrial applications; **c** London Bullion Market Association; **d** In 2020 calendar year US dollars; **e** In 2020–21 financial year Australian dollars; **f** Forecast.

Source: ABS (2020) International Trade, 5368.0; London Bullion Market Association (2020) gold price PM; World Gold Council (2020); Department of Industry, Science, Energy and Resources (2020).

Aluminium

13 Al 26.982

Major Australian bauxite deposits (Gt)

Aluminium

- **Bauxite** is refined to **recover alumina** and smelted to make **aluminium**
- **2-3 tonnes of bauxite** is required to produce one tonne of alumina
- China is the world's largest producer & consumer of **primary aluminium**
- Each electric vehicle **contains 0.25 tonne** of aluminium

Key consumer markets for primary aluminium

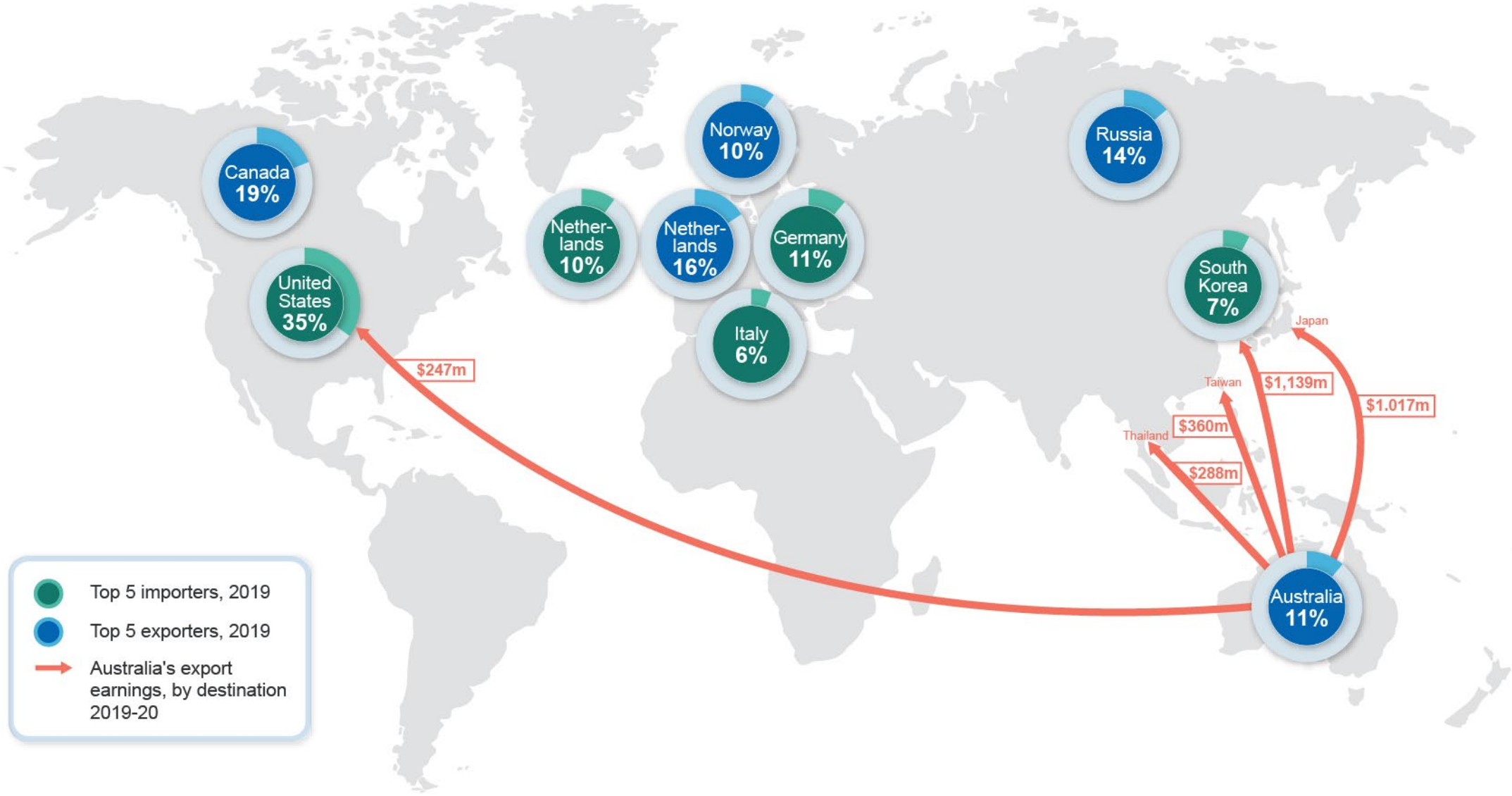
57% China	8% United States	3% Germany
3% Japan	3% India	2% South Korea

Australia's aluminium

- **World's 1st** **bauxite** producing nation
- **World's 2nd** bauxite exporter in 2019
- **World's 2nd** alumina producer in 2019

Aluminium

Trade map | September 2020



11.1 Summary

- The global aluminium industry is facing challenging conditions caused by the impacts of COVID-19, with slowing demand and rising inventory levels. Aluminium prices are forecast to average US$1,600 a tonne in 2020, before recovering to US$1,760 a tonne in 2022.
- Annual Australian output is expected to be broadly steady over the outlook period, remaining at around 1.6 million tonnes of aluminium and 20 million tonnes of alumina.
- The total value of Australian exports of aluminium, alumina and bauxite is forecast to fall by 9.2 per cent in 2020–21 to $12 billion, and then hold steady in 2021–22, hurt by low aluminium and alumina prices and declining bauxite export volumes.

11.2 Prices

Aluminium and alumina prices declined in the first eight months of 2020

The London Metal Exchange (LME) spot price for primary aluminium is estimated to fall by 10 per cent year-on-year in the first nine months of 2020 to average US$1,628 a tonne. The price has been affected by the COVID-19 pandemic and growing supply from China; Chinese primary aluminium producers have taken advantage of lower input costs (lower alumina and fuel prices) to ramp up their production. This increased production has contributed to a rise in aluminium inventories on the LME (Figure 11.1). LME stocks have risen to a three year high since February 2020, due to increasing supply and slowing demand; LME off-warrant aluminium stocks have also risen since the first data was released in February 2020. SHFE stocks rose in the first three months of 2020, but have fallen since April 2020 as Chinese demand recovered.

The aluminium price is expected to decrease by 11 per cent to an average US$1,600 a tonne in 2020 (Figure 11.2), as additional aluminium output from new and existing aluminium smelters in China adds to global aluminium inventories.

Figure 11.1: Exchange aluminium stocks

Source: London Metal Exchange (2020); World Bureau of Metals Statistics (2020)

The free on board (FOB) Australian alumina price is estimated to decrease by 32 per cent year-on-year in the first nine months of 2020, to average US$267 a tonne, as a market surplus (of around 870,000 tonnes) from 2019 was added to global alumina output.

The FOB Australian alumina price is estimated to fall by 22 per cent in 2020 to US$265 a tonne (Figure 11.2), as more alumina refineries return to full production following the widespread easing of COVID-19 related restrictions.

A risk to the alumina price outlook is a 55 per cent reduction in production capacity of Norsk Hydro's Alunorte alumina refinery in Brazil — the largest alumina refinery outside China — for two months (August and September 2020), due to extended maintenance at the bauxite mine that supplies the refinery.

Aluminium and alumina prices expected to rise in 2021 and 2022

The LME aluminium spot price is forecast to increase by 5.7 per cent to average US$1,695 a tonne in 2021, and to rise by a further 3.7 per cent in 2022 to average US$1,760 a tonne (Figure 11.2). The forecast rise in the primary aluminium price is sensitive to the assumption that the world economy recovers from the COVID-19 pandemic over the outlook period, and that governments implement further economic stimulus measures over the outlook period (see Chapter 2 *Macroeconomic outlook*).

Recovering Chinese aluminium consumption is expected to be a driver of the rise in aluminium prices. However, the aluminium price is not expected to return to 2018 levels: supply is strong, and global aluminium demand was slowing before the COVID-19 pandemic impacted deeply on the world economy.

The FOB Australian alumina price is forecast to rise by 3.2 and 5.5 per cent in 2021 and 2022, to average US$274 and US$289 a tonne, respectively. (Figure 11.2). The rise will be driven by a rise in world aluminium production — forecast to increase at an average annual rate of 2.6 percent in 2021 and 2022.

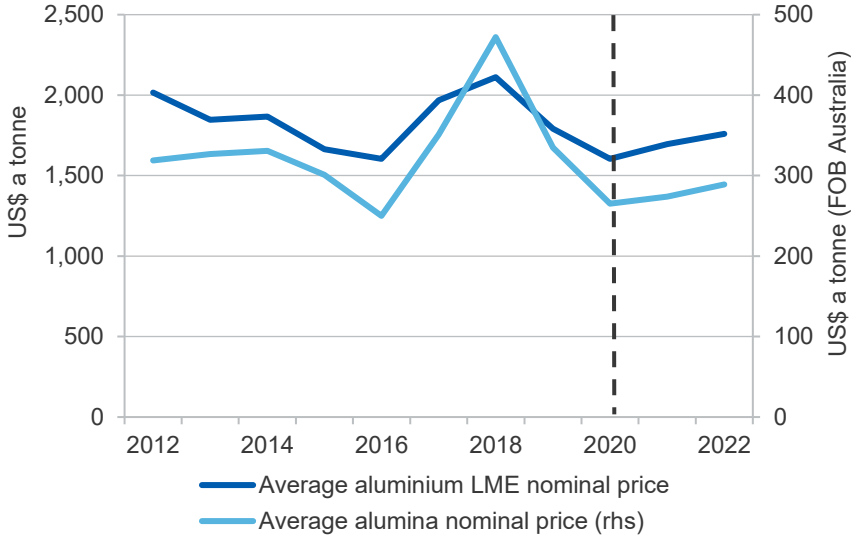
11.3 Consumption

Global aluminium, alumina and bauxite usage rose in the first half of 2020

Global primary aluminium consumption increased by 0.9 per cent year-on-year in the first half of 2020 to 31 million tonnes, driven by growing aluminium consumption in China — the world's largest aluminium consuming country. COVID-19 containment measures reduced aluminium recycling activity, driving a rise in the use of primary aluminium as a substitute for scrap aluminium.

China's primary aluminium imports increased by 389 per cent year-on-year in the first half of 2020 to 162,000 tonnes, the largest rise in over a decade. As a result, primary aluminium consumption in China rose by 2.0 per cent year-on-year in the first half of 2020, to nearly 18 million tonnes.

Figure 11.2: World aluminium and alumina prices



Source: LME (2020) spot prices; Metals Bulletin (2020) Alumina monthly price; Department of Industry, Science, Energy and Resources (2020).

Primary aluminium consumption in the US rose by 1.0 per cent year-on-year in the first half of 2020 to 2.4 million tonnes, driven by rising demand for aluminium packaging. US brewers have shifted more of their production from kegs to cans, in order to accommodate a switch to beer consumption at home during COVID-19 lockdowns.

COVID-19 lockdown measures affecting the global automotive industry had an adverse impact on global aluminium usage. Car sales fell sharply across the world, as the loss of jobs and income reduced consumer spending on discretionary items. Global car sales decreased by 27 per cent year-on-year in the first half of 2020 to nearly 29 million units. Over the same period, car sales in China fell by 17 per cent year-on-year to 10 million units, and in Europe they dropped by 37 per cent to 5.9 million units.

World primary aluminium consumption is forecast to rise by 2.7 per cent to 64 million tonnes in 2020 (Figure 11.3), driven by a 1.5 per cent rise in aluminium consumption in China. Car sales are expected to recover, and could be supported by changing consumer preferences: people may prefer to travel by car rather than by bus or other forms of public transport, however an increase in remote working may reduce car usage.

World alumina usage increased by 0.8 per cent year-on-year in the first half of 2020, to nearly 59 million tonnes. The rise came as Chinese aluminium smelters ramped up production after COVID-19 lockdowns ended (see *Section 11.4 production*). Over this period, China's alumina consumption rose by 1.7 per cent year-on-year, to nearly 34 million tonnes. Demand for alumina from Western Europe and South America fell by 4.1 and 1.7 per cent, to 3.1 million and 928,000 tonnes, respectively, due to lower aluminium production.

World alumina demand is estimated to increase by 1.8 per cent in 2020 to nearly 121 million tonnes (Figure 11.4). An expected rise in global primary aluminium production in 2020 is likely to provide some support for alumina demand. China is expected to contribute to the growth in alumina usage, as Chinese aluminium smelters ramp up their production to maximise the benefits of low alumina and energy prices. Outside of China, aluminium production in Russia is expected to recover from a 1.8 per cent fall year-on-year in the first half of 2020, due to COVID-19 lockdowns.

World bauxite consumption increased by 2.6 per cent year-on-year in the first half of 2020 to 155 million tonnes, driven by an increase in bauxite consumption in China. Over this period, China consumed nearly 64 million tonnes of bauxite, up 1.6 per cent year-on-year; bauxite supply chains were disrupted at the height of the COVID-19 pandemic in January and February 2020 (see *Section 11.4 production*).

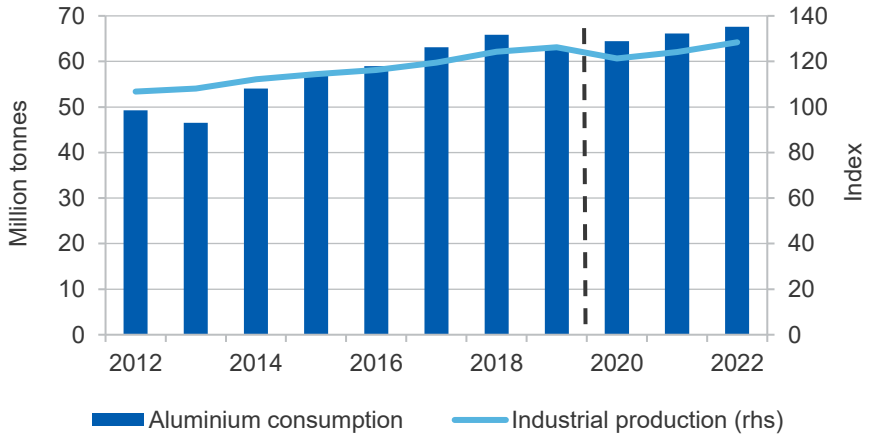
World bauxite consumption is estimated to increase by 3.5 per cent to 311 million tonnes in 2020, driven by increased alumina production from China — the world's largest alumina producing country.

Aluminium, alumina and bauxite demand set to increase in 2021 and 2022

World primary aluminium demand is forecast to rise at an average annual rate of 2.4 per cent between 2020 and 2022, to 68 million tonnes by 2022 (Figure 11.3). The growth is expected to be driven by increased demand from the transport, construction and consumer durables sectors. Advanced and developing economies are expected to continue with economic stimulus measures, such as increased infrastructure spending. In 2021 and 2022, global industrial production growth — strongly correlated with aluminium demand — is expected to recover from a sharp fall in 2020. The global economic recovery is expected to support the demand for cars, houses and electrical equipment, and thus aluminium.

Aluminium is an important material for the transition to a lower carbon economy, including in the car manufacturing sector where it is valued for being 10 to 40 per cent lighter than steel.

Figure 11.3: World aluminium consumption and industrial production



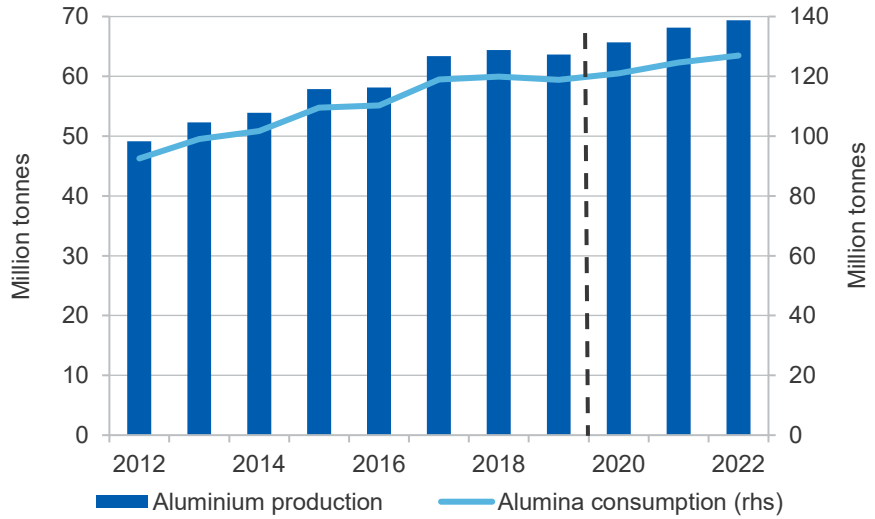
Source: International Aluminium Institute (2020); Netherland CPB (2020); Oxford Economics (2020); World Bureau of Metal Statistics (2020); Department of Industry, Science, Energy and Resources (2020)

Despite slowing economic growth due to the impacts of the COVID-19 pandemic on the country's economy, the Chinese government's infrastructure projects and ambitious initiatives for promoting electric vehicle production are expected to bolster the demand for aluminium. China's primary aluminium consumption is expected to continue to grow strongly over the next two years, reaching 38 million tonnes in 2022.

World alumina consumption is forecast to rise at an average annual rate of 2.4 per cent in 2021 and 2022, to 127 million tonnes in 2022 (Figure 11.4). Alumina demand is driven by primary aluminium production, which is forecast to increase by 2.6 per cent a year between 2021 and 2022.

World bauxite consumption is forecast to grow at an average annual rate of 4.3 per cent between 2021 and 2022, to 337 million tonnes by 2022. This is expected to be driven by new alumina capacity in China and India.

Figure 11.4: World aluminium production and alumina consumption



Source: International Aluminium Institute (2020); AME (2020); World Bureau of Metal Statistics (2020); Department of Industry, Science, Energy and Resources (2020)

11.4 Production

Bauxite output fell, but aluminium and alumina output rose in H1 2020

Global primary aluminium production has been largely unaffected by the COVID-19 lockdowns. Production increased by 1.3 per cent year-on-year in the first half of 2020, to 32 million tonnes, propelled by higher output in China — the world's largest aluminium producer. China produced 18 million tonnes of primary aluminium over the first half of the year, up by 1.7 per cent year-on-year, as primary aluminium producers ramped up their production.

Over the same period, primary aluminium production in the Middle East rose by 7.7 per cent year-on-year to 2.9 million tonnes, driven by the ramp up of production at the 1 million tonnes per year SALCO aluminium smelter in Iran. Production in Europe fell by 1.0 per cent year-on-year in the first half of 2020, to 3.7 million tonnes, due to COVID-19 related lockdowns.

Primary aluminium production in China is expected to continue rising over the rest of 2020. New and existing Chinese aluminium smelters are likely to take advantage of low input costs (alumina and fuel prices) and a post-COVID-19 industrial recovery to ramp up production. About 59,000 tonnes of annual capacity was restarted in China's south western Chongqing province in June 2020. Another 160,000 tonnes of capacity was commissioned in Yunan province in south west China in July 2020. As a result, China's aluminium output in 2020 is forecast at 37 million tonnes (up 3.4 per cent).

Russia is expected to produce around 4 million tonnes of primary aluminium in 2020. Indian primary aluminium production is expected to remain steady at 3.7 million tonnes in 2020, on an expectation of consistent performance from their aluminium smelters. As a result, world primary aluminium production is forecast to increase by 3.2 per cent in 2020 to over 66 million tonnes (Figure 11.4).

World alumina supply increased by 1.4 per cent year-on-year in the first half of 2020, to 62 million tonnes, driven by a 1.6 per cent (161,000 tonnes) rise in Australian alumina output and a 62 per cent (706,000 tonnes) increase in the Middle East's alumina output. Production in Australia — the world's second largest alumina producer — has been resilient amidst the COVID-19 pandemic, with all Australian refineries have remaining in operation during the COVID-19 lockdowns. In the Middle East, the 2.0 million tonnes per year Al Taweelah alumina refinery in the UAE started production in the first half of 2019 and reached full capacity in the first half of 2020.

Production in China — the world's largest alumina producer — fell by 5.3 per cent in the first half of 2020, to 32 million tonnes, due to the disruption to China's bauxite supply.

World alumina supply is forecast to increase by 3.2 per cent to over 127 million tonnes in 2020, driven by higher production in China and Australia. China's alumina production is forecast to increase by 2.3 per cent to 69 million tonnes in 2020, as the disruption in China's bauxite supply is forecast to ease in the second-half of 2020. Production at Norsk Hydro's Alunorte refinery is expected to decline by 880,000 tonnes in the September quarter 2020, due to extended maintenance at its Paragominas bauxite mine.

World bauxite supply declined by 1.6 per cent year-on-year to nearly 179 million tonnes in the first half of 2020, as bauxite supply chains in China, India and Brazil were disrupted at the height of the COVID-19 pandemic.

Over the first half of 2020, production in Australia — the world's largest bauxite producer — rose by 3.3 per cent to 53 million tonnes, with Australian bauxite miners largely unaffected by the COVID-19 lockdowns. Production in Guinea — the world's second largest producer — rose by 4.1 per cent year-on-year in the same period, to around 42 million tonnes.

World bauxite supply is forecast to rise to 363 million tonnes (2.3 per cent) in 2020, driven by higher Australian and Guinean output (Figure 11.5).

Aluminium, alumina and bauxite output set to rise over the outlook period

World primary aluminium production is forecast to increase at an average annual rate of 2.8 per cent between 2020 and 2022, to reach about 69 million tonnes by 2022 (Figure 11.3). The gains will be driven by additional capacity in China, Iran and Vietnam. In China, more greenfield aluminium smelters are anticipated, located in regions where power is cheap and abundant (such as Yunnan province). The 396,000 tonnes per year Baiyinhua aluminium smelter is expected to start production in late 2020 or early 2021. Guizhou Zhengzhongyuan Mining's 500,000 tonnes per year Weng'an aluminium project is expected to be commissioned in 2022.

Outside of China, Iran is implementing a plan to increase its annual aluminium production to 1.5 million tonnes by 2025, with the first phase (300,000 tonnes) of the 1 million tonnes per year SALCO aluminium smelter ramping up production over the outlook period. In Vietnam, the delayed Tran Hong Quan aluminium project (nameplate capacity of 436,000 tonnes per year) is expected to start production in early 2021.

A risk to global primary aluminium supply is rising power costs, which has the potential to impact the viability of some producers. Rio Tinto announced plans to shut its 340,000 tonnes a year Tiwai Point aluminium smelter in New Zealand in August 2021, due to high energy costs. The company is also reviewing the viability of the ISAL smelter in Iceland.

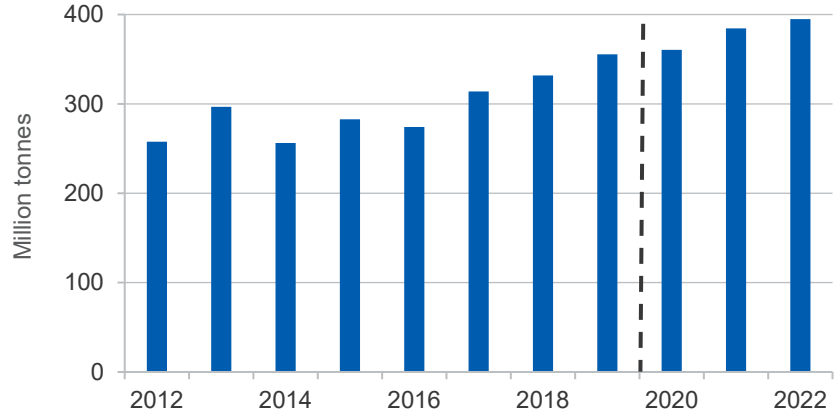
The LME has outlined plans to support sustainable primary aluminium production with a spot trading platform for low-carbon aluminium and a register — called LME Passport — whereby primary aluminium producers voluntarily log their metal's carbon related details. The trading platform and LME Passport are expected to be launched in the first half of 2021.

World alumina supply is forecast to rise at an average annual rate of 1.3 per cent between 2020 and 2022, to 131 million tonnes by 2022. This growth is expected to be driven by China, India and Cameroon.

In China, new alumina refineries are expected to be constructed in order to comply with the Chinese government's stricter environmental regulations.

Aluminium Corporation of China's 1 million tonne per year Chalco Hebei Huanghua alumina refinery started production in 2020, and is expected to ramp up production to 4 million tonnes per year over the outlook period. In India, production at Vedanta's Lanjigarh refinery is expected to rise from 300,000 tonnes per year in 2020 to 1.8 million tonnes per year by 2022. In Cameroon, the 3 million tonnes per year joint-venture CAL alumina refinery project is expected to come online in 2022. Alumina production in Australia is expected to remain steady at about 20 million tonnes per year.

Figure 11.5: World bauxite production



Source: Department of Industry, Science, Energy and Resources (2020)

World bauxite output is forecast to grow at an average annual rate of 4.3 per cent over the outlook period, reaching 395 million tonnes by 2022 (Figure 11.5). The gains are expected to be driven by newly added capacity in Guinea, where production is rising rapidly. Guinea's bauxite output is forecast to grow at an average 9.0 per cent a year in 2021 and 2022. The Compagnie des Bauxites de Guinée mine in Guinea, which expanded from 13 to 18 million tonnes per annum in 2019, is due to expand to 28 million tonnes by 2022. Emirates Global Aluminium is planning to ramp up output at its bauxite mine in Guinea, targeting 12 million tonnes per year towards the end of the outlook period.

11.4 Australia's exports and production

Lower aluminium and alumina prices cut export earnings in 2019–20

Australia's aluminium, alumina and bauxite exports declined by 19 per cent in 2019–20, to nearly $13 billion. The decline was due to softening prices for aluminium and alumina (see *Section 11.2 Prices*), and lower aluminium export volumes, partially offset by higher export volumes of alumina (Figure 11.7) and bauxite (Figure 11.8).

Exports to fall over the outlook period

Despite a forecast of improvement in aluminium and alumina prices in 2021 and 2022, Australia's aluminium, alumina and bauxite export earnings are forecast to fall by 9.2 per cent in 2020–21, to nearly $12 billion, and then hold steady in in 2021–22. The fall is expected to be driven by a decline in bauxite export volumes. Over this period, bauxite export volumes are forecast to decrease at an average annual rate of 8.7 per cent, to 34 million tonnes by 2021–22.

Australian bauxite exports could be affected by the rise of Guinea as a major producer and exporter of bauxite. Guinea has overtaken Australia as China's largest supplier of bauxite, accounting for 42 per cent of China's total bauxite imports in 2019–20. Over the last few years, Chinese and European companies have invested heavily in Guinea to build up the country's bauxite production capacity.

Indonesia's bauxite exports to China are likely to rise in 2020 and 2021, as the Indonesian government relaxes its stance on mineral ore exports. It is expected that the Indonesian government will re-introduce mineral export bans — including bauxite — in early 2022. In Malaysia, bauxite exports have been banned since January 2016 — due to environmental concerns — and are unlikely to resume in 2020 due to the COVID-19 pandemic.

The risks of trade tensions between major aluminium producing and consuming countries have escalated in recent weeks, with the US reinstating a 10 per cent tariff on imports of Canadian primary aluminium on 15 August 2020. Canada's retaliatory tariffs — on US imported goods

valued at US$2.7 billion — will go into effect on 16 September 2020. On the other side of the Atlantic, the European Commission opened an anti-dumping probe into Chinese aluminium products on 14 August 2020.

Steady aluminium output, but 2019–20 alumina and bauxite output higher

Australia's aluminium output was broadly unchanged at around 1.6 million tonnes in 2019–20, with no output losses due to the COVID-19 lockdown.

Australia's alumina output increased by 1.5 per cent in 2019–20 to 20 million tonnes. The increase is attributed to a 3.7 per cent rise in South 32's Worsley alumina refinery in WA, and a 1.0 rise in Rio Tinto's Yarwun alumina refinery in Queensland.

Australia's bauxite output rose by 7.8 per cent in 2019–20 to 107 million tonnes, driven by an 18 per cent rise in Rio Tinto's Weipa operations (including the Amrun bauxite project) in Queensland, and a 1.7 per cent rise in Rio Tinto's Gove operations in the Northern Territory.

Steady aluminium and alumina production over the outlook period

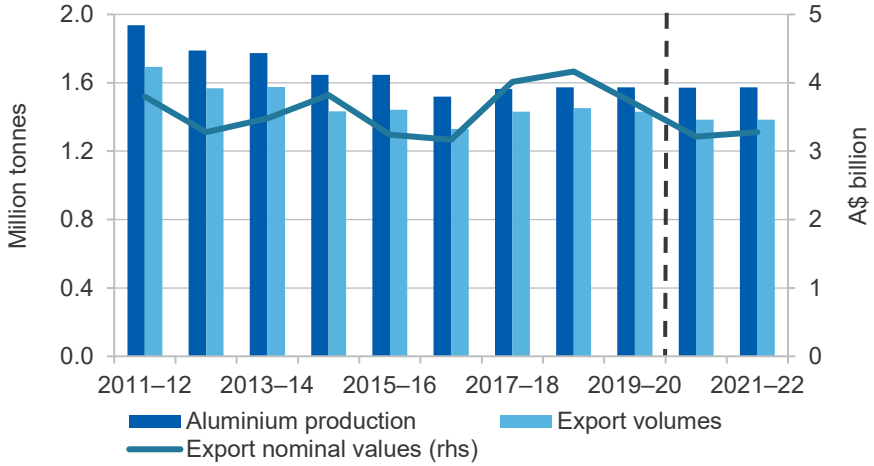
Australia's aluminium production is forecast to remain at around 1.6 million tonnes a year out to 2021–22 (Figure 11.6).

Australia's alumina production is expected to remain at around 20 million tonnes per annum over the outlook period (Figure 11.7).

Australia's bauxite production is forecast to fall by 5.3 per cent in 2020–21 to 102 million tonnes, as production at Metro Mining's 6 million tonnes a year Bauxite Hills mine in Queensland is to be suspended from September 2020 to April 2021, due to a planned wet season shutdown.

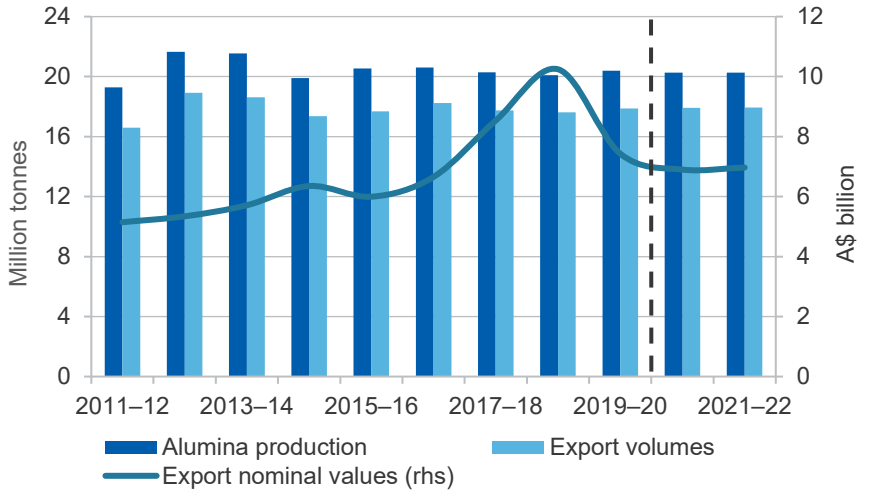
In 2021–22, Australia's bauxite production is forecast to rise by 4.3 per cent, to 106 million tonnes (Figure 11.8).

Figure 11.6: Australia's aluminium exports and production



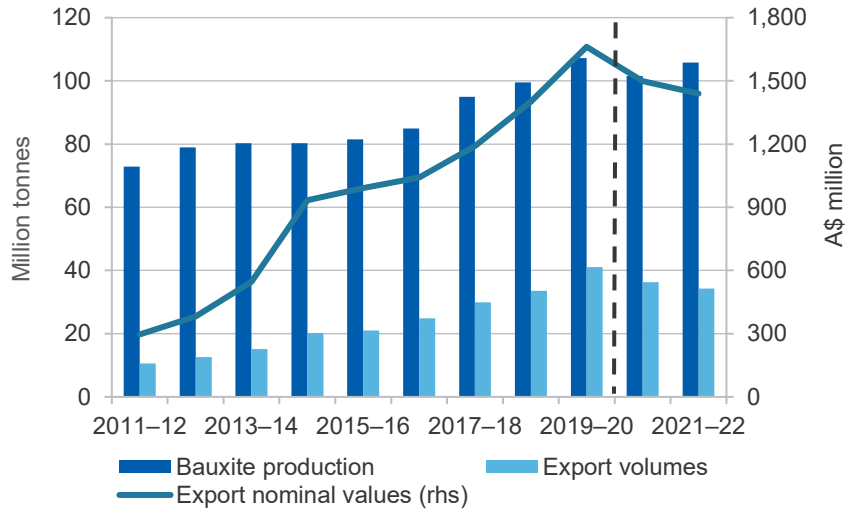
Source: Source: ABS (2020) International Trade in Goods and Services, 5368.0; Department of Industry, Science, Energy and Resources (2020)

Figure 11.7: Australia's alumina exports and production



Source: ABS (2020) International Trade in Goods and Services, 5368.0; Department of Industry, Science, Energy and Resources (2020)

Figure 11.8: Australia's bauxite exports and production



Source: ABS (2020) International Trade in Goods and Services, 5368.0; Department of Industry, Science, Energy and Resources (2020)

Revisions to the outlook

The forecast for Australia's aluminium, alumina and bauxite exports earnings has been revised down from the June 2020 *Resources and Energy Quarterly* — by $730 million to nearly $12 billion in 2020–21, and by $562 million to nearly $12 billion in 2021–22.

The revision reflects a slightly larger-than-expected fall in aluminium and alumina prices in the first nine months of 2020. The forecast for the LME aluminium spot price has been revised down by 2.4 per cent (or US$39 a tonne) in 2020, and the FOB Australian alumina price has been revised down by 2.6 per cent (or US$7.00 a tonne) from the June 2020 *Resources and Energy Quarterly*.

Table 11.1: Aluminium, alumina and bauxite outlook

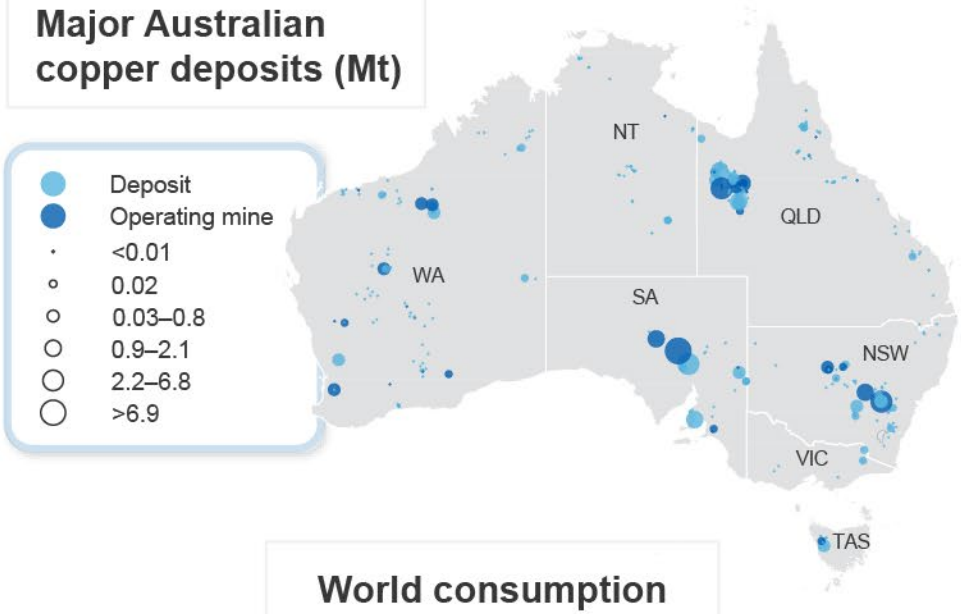
						Annual percentage change		
World	**Unit**	**2019**	**2020[f]**	**2021[f]**	**2022[f]**	**2020[f]**	**2021[f]**	**2022[f]**
Primary aluminium								
Production	kt	63,635	65,696	68,125	69,366	3.2	3.7	1.8
Consumption	kt	62,765	64,437	66,156	67,580	2.7	2.7	2.2
Prices aluminium[c]								
- nominal	US$/t	1,792	1,604	1,695	1,759	-10.5	5.7	3.7
- real[d]	US$/t	1,823	1,604	1,656	1,684	-12.0	3.2	1.7
Prices alumina spot								
- nominal	US$/t	335	265	274	289	-20.7	3.2	5.5
- real[d]	US$/t	340	265	267	277	-22.1	0.8	3.5
Australia	**Unit**	**2018–19**	**2019–20**	**2020–21[f]**	**2021–22[f]**	**2019–20**	**2020–21[f]**	**2021–22[f]**
Production								
Primary aluminium	kt	1,573	1,573	1,572	1,573	0.0	0.0	0.0
Alumina	kt	20,103	20,400	20,261	20,255	1.5	-0.7	0.0
Bauxite	Mt	99.5	107.2	101.5	105.8	7.8	-5.3	4.3
Consumption								
Primary aluminium	kt	156	188	237	237	20.9	25.8	0.0
Exports								
Primary aluminium	kt	1,452	1,430	1,384	1,384	-1.5	-3.2	0.0
- nominal value	A$m	4,166	3,696	3,211	3,278	-11.3	-13.1	2.1
- real value[e]	A$m	4,327	3,789	3,211	3,213	-12.4	-15.3	0.1
Alumina	kt	17,619	17,876	17,912	17,948	1.5	0.2	0.2
- nominal value	A$m	10,245	7,431	6,900	6,969	-27.5	-7.2	1.0
- real value[e]	A$m	10,642	7,618	6,900	6,830	-28.4	-9.4	-1.0
Bauxite	kt	33,546	41,050	36,307	34,234	22.4	-11.6	-5.7
- nominal value	A$m	1,401	1,658	1,498	1,440	18.4	-9.6	-3.9
- real value[e]	A$m	1,455	1,700	1,498	1,411	16.8	-11.8	-5.8
Total value								
- nominal value	A$m	15,811	12,785	11,609	11,687	-19.1	-9.2	0.7
- real value[e]	A$m	16,425	13,106	11,609	11,454	-20.2	-11.4	-1.3

Notes: **c** LME cash prices for primary aluminium; **d** In 2020 calendar year US dollars; **e** In 2020–21 financial year Australian dollars; **f** Forecast.

Source: ABS (2020) International Trade in Goods and Services, 5368.0; AME Group (2020); LME (2020); Department of Industry, Science, Energy and Resources (2020); International Aluminium Institute (2020); World Bureau of Metal Statistics (2020).

29 Cu 63.546 Copper

Major Australian copper deposits (Mt)



Copper facts

- The average home contains **180 kg of copper**
- 80% of copper ever produced **is still in use today**
- An electric car contains about **5x more copper** than an equivalent ICE car
- China consumes half of the **world's copper**

World consumption

- **31%** Equipment
- **30%** Building Construction
- **15%** Infrastructure
- **12%** Transport
- **12%** Industrial

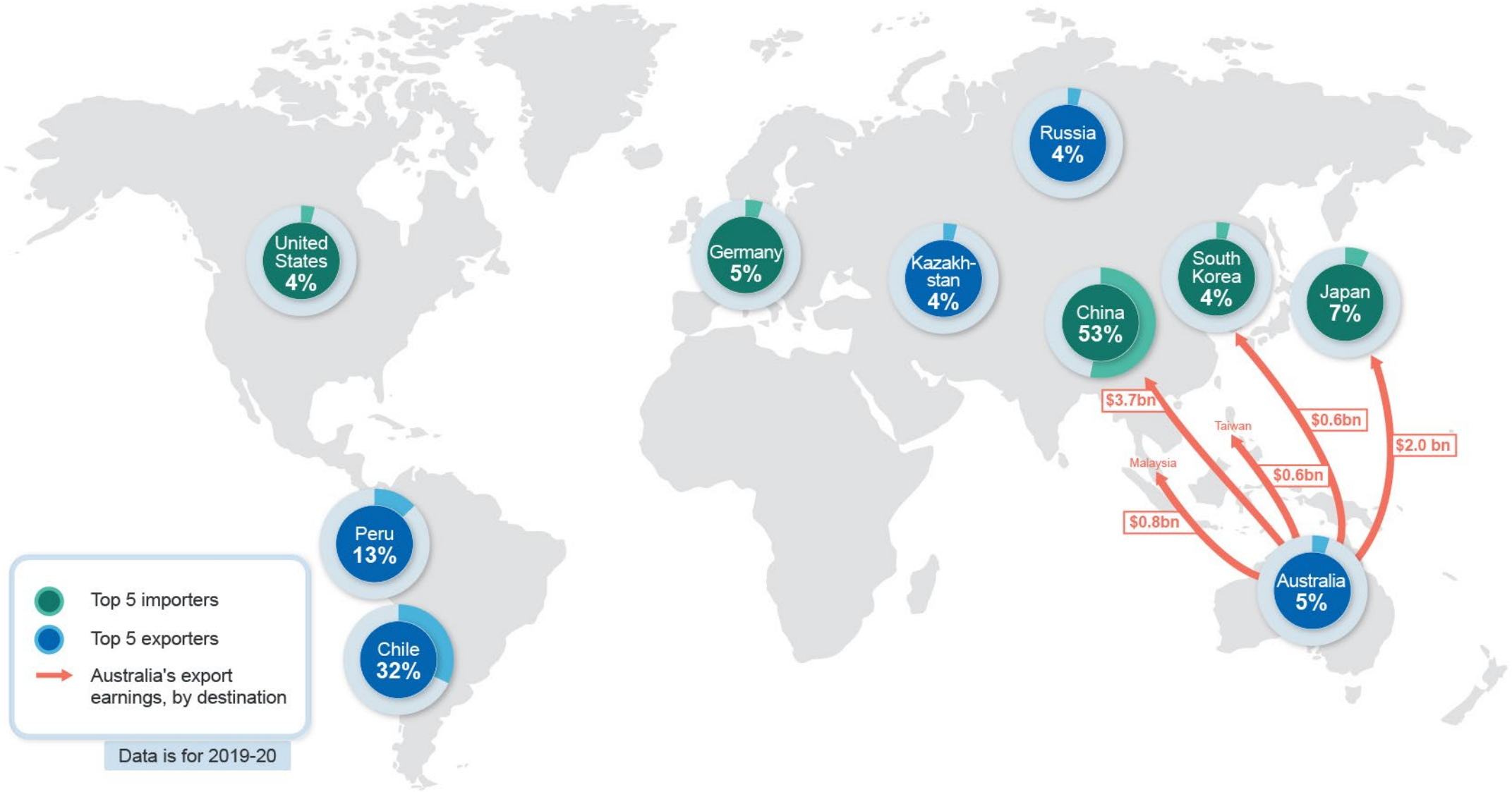
Australia's copper

- **Ranked no 2** for **copper resources**
- **7th largest copper producer** in the world
- **Copper exports** worth more than **$10 billion** in 2019-20

29 Cu 63.546

Copper

Trade map | September 2020



12.1 Summary

- Despite recent price strength, copper prices are forecast to average US$5,980 a tonne in 2020, slightly lower than 2019, due to the economic downturn. Improving consumption is expected to lift prices to US$6,620 a tonne in 2022.
- Australia's copper exports are forecast to rise from 928,000 tonnes in 2019–20 to 942,000 tonnes in 2021–22 (in metal content terms), as output from existing mines expands and new mines start-up.
- After reaching $9.9 billion in 2019–20, Australia's export earnings are forecast to rise 4 per cent a year to a forecast $11 billion in 2021–22.

12.2 Prices

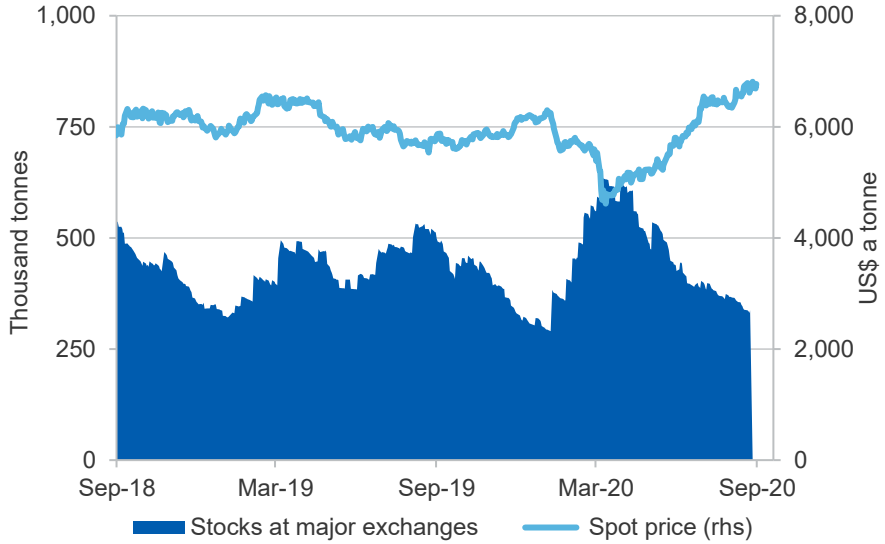
China's rebound and economic stimulus have helped a price recovery

The copper price has recovered from the sharp, COVID-19 related falls made in the March quarter 2020. Concerns about COVID-19 related production constraints, the rollout of economic stimulus and US dollar depreciation supported strong prices in August and September. A rebound in economic activity in China improved both economic sentiment and copper consumption, facilitating the LME price reaching US$6,810 a tonne in early September, the highest level since mid-2018. After averaging US$5,340 a tonne in the June 2020 quarter, prices have lifted to US$6,420 a tonne in the September quarter, 11 per cent higher year-on-year (Figure 12.1). Copper stocks have steadily fallen since May, to multi-year lows.

2020 copper prices to reflect market surplus

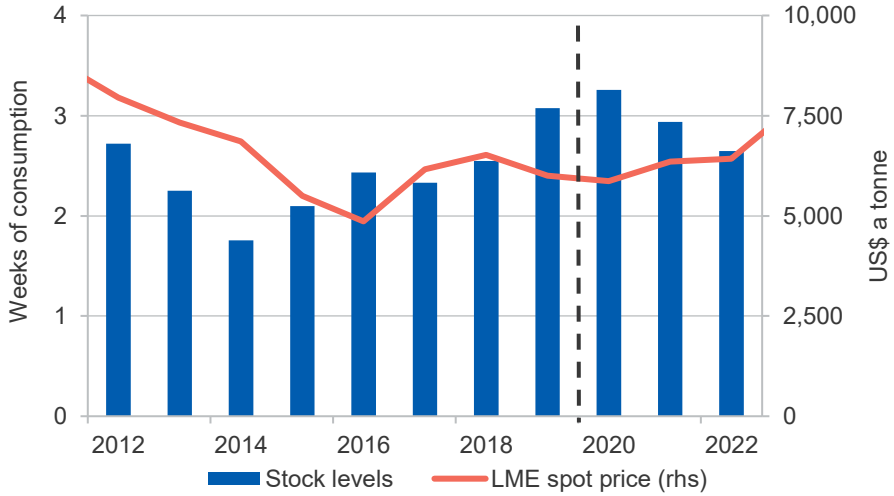
Recent price strength may be short-lived and 2020 copper prices are expected to be slightly lower than 2019. In 2020, the LME copper spot price is forecast to average US$5,980 a tonne, 1 per cent lower than the 2019 average of US$6,010 a tonne. While production and consumption are expected to fall with similar levels of magnitude, the 2019 market surplus is likely to be maintained. The copper market is expected to tighten over the outlook period, with strong consumption growth potentially pushing the market into deficit. In 2022, the copper price is forecast to reach US$6,620 a tonne, up an average 5 per cent a year (Figure 12.2).

Figure 12.1: Recent copper prices and stock movements



Source: LME (2020) official cash price; Bloomberg (2020) inventories LME, COMEX, SHFE

Figure 12.2: Forecast copper price and stock levels



Source: LME (2020) official cash price; Bloomberg (2020) Department of Industry, Science, Energy and Resources (2020)

12.3 World consumption

Copper consumption to fall in 2020

After little change in 2019, world copper consumption is slightly lower in 2020, as COVID-19 related consumption losses in the first half of 2020 weigh on consumption growth. Consumption is forecast to fall 1 per cent to 24 million tonnes in 2020, before recovering in-line with world GDP growth and industrial production expectations (Figure 12.3).

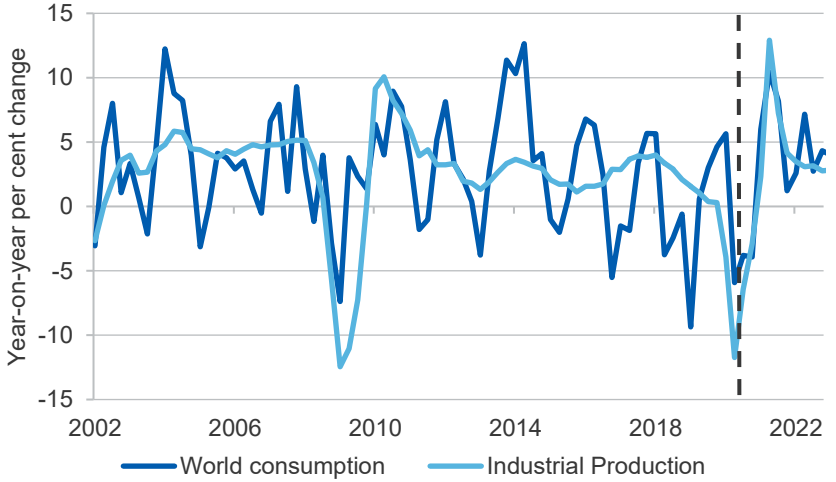
China consumes around half of the world's copper and has recorded consumption growth of 5 per cent a year over the last five years. In the first half of 2020, China's copper consumption fell, however record import levels in recent months have signalled a returning appetite (August imports were up 66 per cent year-on-year). Higher demand has occurred amid increasing manufacturing activity and constrained scrap supply (COVID-19 impacts on supply chains and new scrap regulations in China). Low copper prices and infrastructure spending have also supported growing consumption. China's full year consumption for 2020 is forecast to fall less than 1 per cent to 12 million tonnes.

Consumption fell sharply in the US and EU in the first half of 2020, down by more than 20 per cent year-on-year. Consumption in Japan fell 13 per cent and 5 per cent in South Korea over the same period. However, consumption is now recovering, and copper intensive end-use sectors — such as manufacturing and EV charging infrastructure — have been the target of some economic stimulus plans which could boost short-term consumption.

Expanding markets and traditional consumption growth expected to return

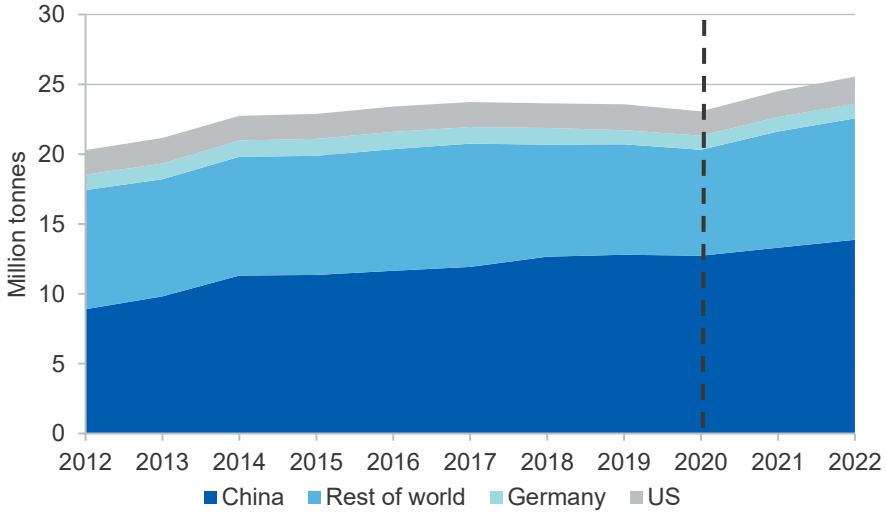
In 2021 and 2022, a lift in economic activity is expected to support copper usage. World consumption is forecast to reach 26 million tonnes in 2022, up an average 5 per cent a year from 2020 (Figure 12.4). This is expected to be facilitated by broad-based world growth — China's copper consumption is forecast to increase an average 4 per cent a year, with consumption in other major markets around 3 per cent a year.

Figure 12.3: Industrial production and copper consumption



Source: World Bureau of Metal Statistics (2020); Department of Industry, Science, Energy and Resources (2020)

Figure 12.4: Refined copper consumption by major market



Source: World Bureau of Metal Statistics (2020); Department of Industry, Science, Energy and Resources (2020)

12.4 World production

COVID-19 shutdowns weigh on 2020 production

Recent production shutdowns in Chile, Peru and Panama — as operations were suspended to manage rising COVID-19 cases — have suppressed world mine production. After rising marginally in 2019, world copper mine production is forecast to contract by 1 per cent to 20 million tonnes in 2020 (Figure 12.5).

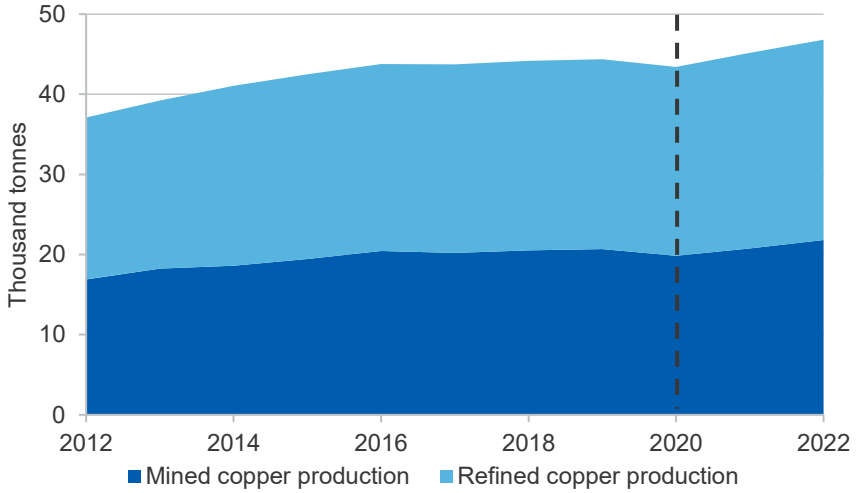
In Chile, the world's largest copper producer, copper output rose in the first half of 2020 despite a reduced workforce. Rising COVID-19 cases and union responses led to operations being suspended at Codelco, though they subsequently reopened in August. After increasing to 796,000 tonnes in the June quarter, Codelco's September quarter production is expected to lower. Production at BHP's Escondida mine increased in the June quarter due to record concentrator output, however operating restrictions are expected to weigh on September quarter production.

In Peru, copper production for the first half of 2020 fell over 20 per cent compared to 2019, with shutdowns, operational issues and weather limiting production. First Quantum's Cobre Panama mine in Panama reopened in August, after suspending operations in April. There are future production risks faced by a number of countries on the horizon, including local pandemic conditions, potential labour shortages and lower ore grades (Figure 12.6).

Postponed production expansions could lead to tight world markets

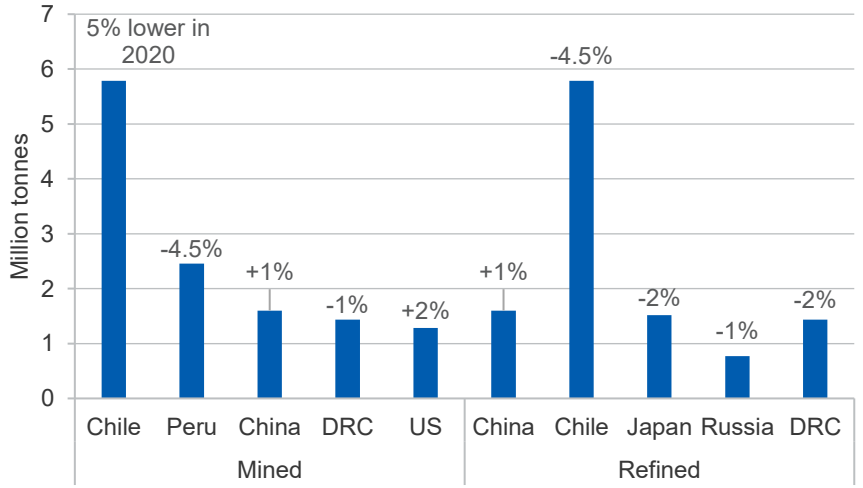
Over the outlook period, mine production is expected to expand, however potentially at a slower pace than previously expected. COVID-19-related interruptions and low copper prices have impacted the project development pipeline, and a number of new and expansion projects have been delayed. In 2022 the transition to underground mining at Freeport's Grasberg mine in Indonesia is expected to be completed and Anglo American's Quellaveco project in Peru is expected to come online. In 2022, world mine production is forecast to reach 23 million tonnes, up an average 6 per cent a year.

Figure 12.5: Outlook for copper mine and refined production



Source: World Bureau of Metal Statistics (2020); Department of Industry, Science, Energy and Resources (2020)

Figure 12.6: Copper production by major country, 2019 and forecast change in 2020



Source: World Bureau of Metal Statistics (2020); Department of Industry, Science, Energy and Resources (2020); S&P Global (2020)

Short-term constraints on refined copper production

Marginal contractions in refined copper production are expected in 2020, weighed down by plant closures and constraints on refinery inputs. Refined production is forecast to fall by 1 per cent to 23 million tonnes in 2020.

In China, June quarter 2020 refinery production recovered from low, COVID-19 impacted output in the previous quarter. However, constraints on refinery inputs persist. Reduced availability of copper concentrate (due to international mine outages) and copper scrap (due to new import regulations in China) could impact output of refined production going forward. Lower-than-expected refinery production in China — down 1 per cent to 9.5 million tonnes — is expected to have the largest impact on lower world production in 2020.

Beyond the outlook period, refinery production is expected to recover, as prices improve and new refinery capacity comes online. World refined production is forecast to increase by an average 4 per cent a year, to reach 25 million tonnes in 2022.

12.5 Australia

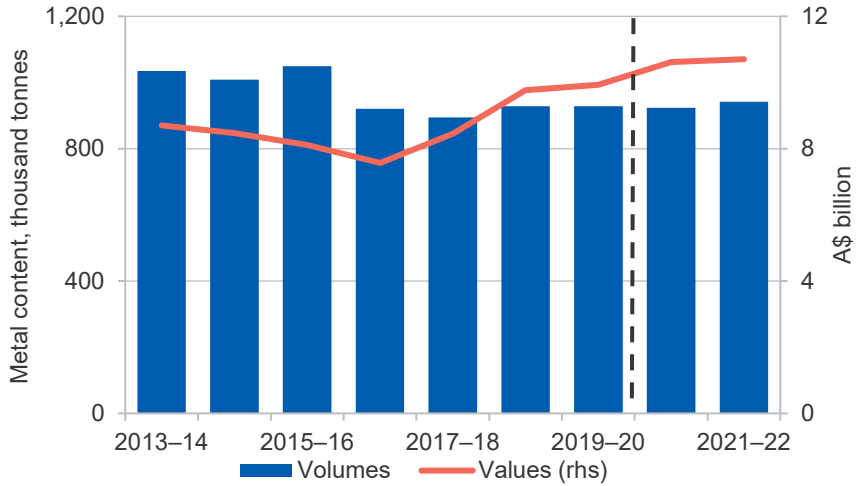
Copper export earnings reach $10 billion and expected to stay high

Copper export earnings reached $9.9 billion in 2019–20, a 2 per cent rise over the year (Figure 12.7). Momentum in earnings growth is expected to be maintained and earnings are forecast to reach $11 billion in 2020–21 and 2021–22.

Short-term decline in copper production

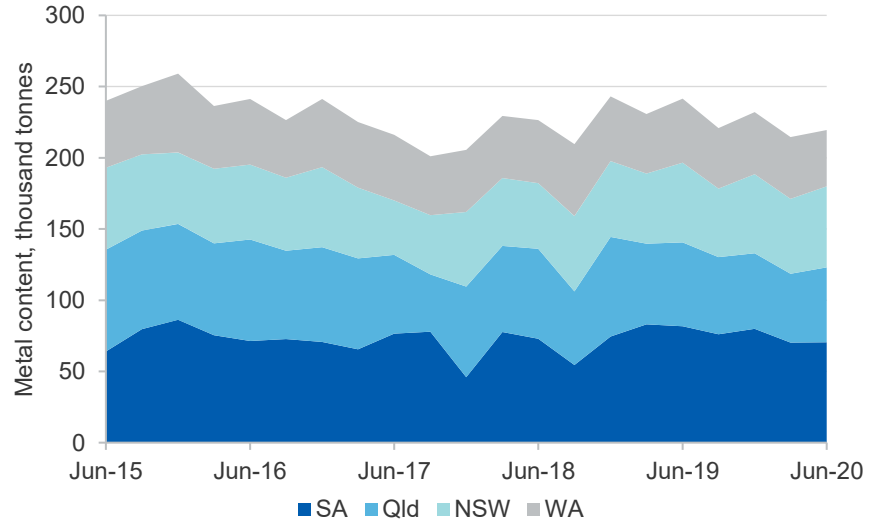
After significant growth in 2018–19, Australia's mined copper production fell by 4 per cent to 891,000 tonnes in 2019–20, as a number of mine closures came into effect, including Hillgrove Resources Kanmantoo mine in SA, Metals X's Nifty mine in WA and FMR Investments' Eloise mine in Queensland.

Figure 12.7: Australia's copper export volumes and earnings



Source: ABS (2020) International Trade in Goods and Services, 5368.0; Department of Industry, Science, Energy and Resources (2020)

Figure 12.8: Australia's copper production by state



Source: Department of Industry, Science, Energy and Resources (2020)

The June quarter saw strong production results from Newcrest's Cadia Valley operations in NSW, with improved mill throughput following targeted debottlenecking (Figure 12.8). The ramp-up at Oz Minerals' Carrapateena mine in SA, which came online in late 2019, has exceeded expectations.

Australia's copper operations have managed COVID-19 related movement restrictions with minimal impact on output to-date, through changing rostering arrangements, reverting to state-based employment or relocating contractors. Operations at Heron Resources' Woodlawn facility have remained suspended since March.

New and expanded projects bring production potential

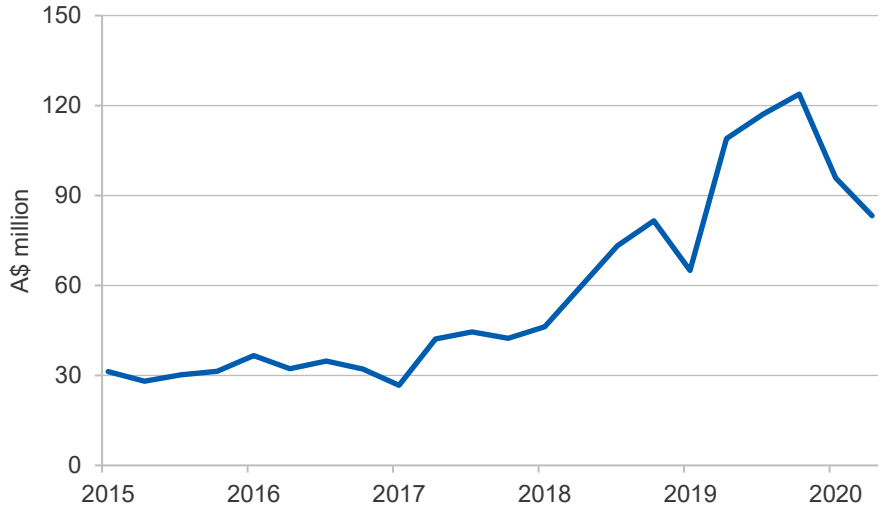
Over the outlook period, Australia's production is expected to grow modestly to reach a forecast 902,000 tonnes in 2021–22, up 1 per cent a year. Development projects on the horizon include Golden Cross Resources' Copper Hill mine in NSW, and expansions at Newcrest's Cadia Valley, BHP's Olympic Dam and Oz Minerals Carrapateena and Peak Hill operations.

Beyond the outlook period, there is significant potential for new production to come online at Rio Tinto's recently announced Winu copper gold project in Western Australia. Initial resource estimates have been significant and the development process has begun; production could start in 2023. Exploration is continuing at BHP's Oak Dam project with third phase drilling undertaken.

Exploration activity remains strong supported by growth potential and gold

In the June quarter 2020, copper exploration expenditure was $83 million, 24 per cent lower year-on-year (Figure 12.9). This fall was related to a marked decrease in exploration in WA, which accounts for over half of Australia's copper exploration. COVID-19 related movement restrictions may have limited exploration activity.

Figure 12.9: Australia's copper exploration expenditure, quarterly



Source: ABS (2020) Mineral and Petroleum Exploration, Australia, 8412.0

Revisions to the outlook

Since the June 2020 *Resources and Energy Quarterly*, the forecast for Australia's copper export earnings has been revised up by $1.4 billion and $780 million in 2020–21 and 2021–22, respectively, due to upward revisions to Australia's production profile and copper prices.

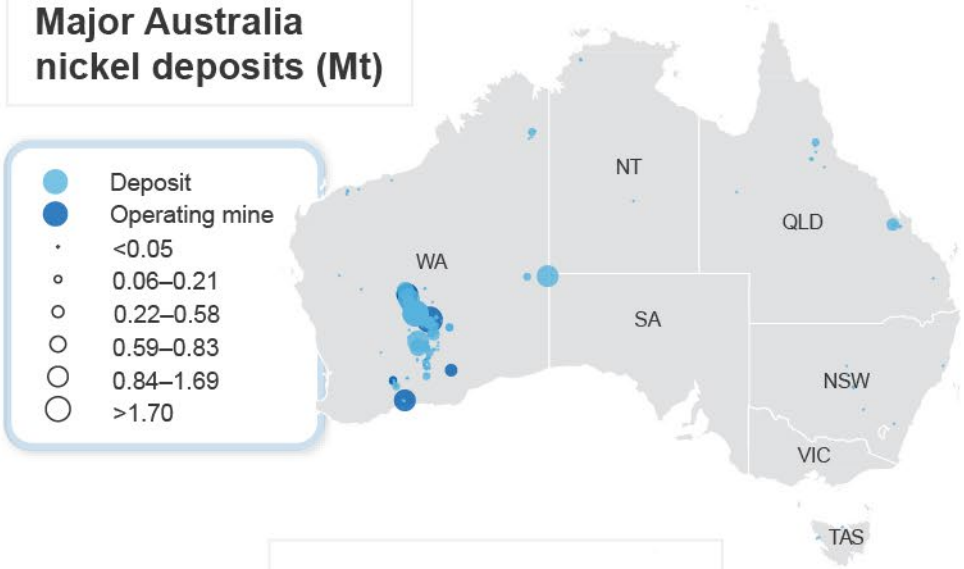
Table 12.1: Copper outlook

						Annual percentage change		
World	**Unit**	**2019**	**2020[f]**	**2021[f]**	**2022[f]**	**2020[f]**	**2021[f]**	**2022[f]**
Production								
– mine	kt	20,688	20,418	21,684	22,811	-1.3	6.2	5.2
– refined	kt	23,619	23,427	24,364	25,338	-0.8	4.0	4.0
Consumption	kt	23,573	23,466	24,656	25,685	-0.5	5.1	4.2
Closing stocks	kt	1 394	1 390	1 317	1 139	-0.3	-5.2	-13.5
– weeks of consumption		3.1	3.1	2.8	2.3	0.2	-9.8	-17.0
Prices LME								
– nominal	US$/t	6,005	5,976	6,508	6,615	-0.5	8.9	1.6
	USc/lb	272	271	295	300	-0.5	8.9	1.6
– real[b]	US$/t	6,109	5,976	6,355	6,333	-2.2	6.3	-0.3
	USc/lb	277	271	288	287	-2.2	6.3	-0.3
Australia	**Unit**	**2018–19**	**2019–20**	**2020–21[f]**	**2021–22[f]**	**2019–20**	**2020–21[f]**	**2021–22[f]**
Mine output	kt	931	891	886	902	-4.3	-0.6	1.9
Refined output	kt	407	411	389	395	0.8	-5.3	1.7
Exports								
– ores and cons[c]	kt	1,895	1,914	1,912	1,953	1.0	-0.1	2.1
– refined	kt	396	392	379	387	-1.0	-3.2	2.1
– total metallic content	kt	929	928	924	942	0.0	-0.5	2.0
Export value								
– nominal	A$m	9,770	9,934	10,617	10,704	1.7	6.9	0.8
– real[d]	A$m	10,149	10,183	10,617	10,490	0.3	4.3	-1.2

Notes: **b** In 2020 calendar year US dollars; **c** Quantities refer to gross weight of all ores and concentrates; **d** In 2020–21 financial year Australian dollars; **f** Forecast.
Source: ABS (2020) International Trade, 5465.0; LME (2020) spot price; World Bureau of Metal Statistics (2020); Department of Industry, Science, Energy and Resources (2020)

28 Ni 58.693 Nickel

Major Australia nickel deposits (Mt)



Nickel facts

- Nickel is used in the **US, UK and Euro coins**
- Nickel has a growing role in **electric vehicle batteries**
- Nickel is **magnetic** at room temperature and is **fully recyclable**
- Nickel is the **second most abundant element** in the Earth's core after iron

World consumption

- **70%** Stainless steel
- **8%** Alloys
- **8%** Plating
- **8%** Casting
- **5%** Batteries
- **1%** Other

Australia's nickel

- Australia has **26%** of world **nickel resources**
- **200,000 tonnes produced** each year
- **Contributes more than $3b** to the economy

13.1 Summary

- Lower consumption and an oversupplied market are expected to see nickel prices average US$13,100 a tonne in 2020, down 6 per cent on 2019. Prices are forecast to recover to US$15,300 a tonne in 2022, fuelled by strong consumption growth.
- New projects and expansions are expected to lift Australia's export volumes from 246,000 tonnes in 2019–20 to a forecast 335,000 tonnes in 2021–22.
- Australia's nickel export earnings are expected to rise with higher export volumes and recovering prices, reaching a forecast $5.8 billion in 2021– 22, up from $3.7 billion in 2019–20.

13.2 Prices

Nickel prices strengthen with China's return

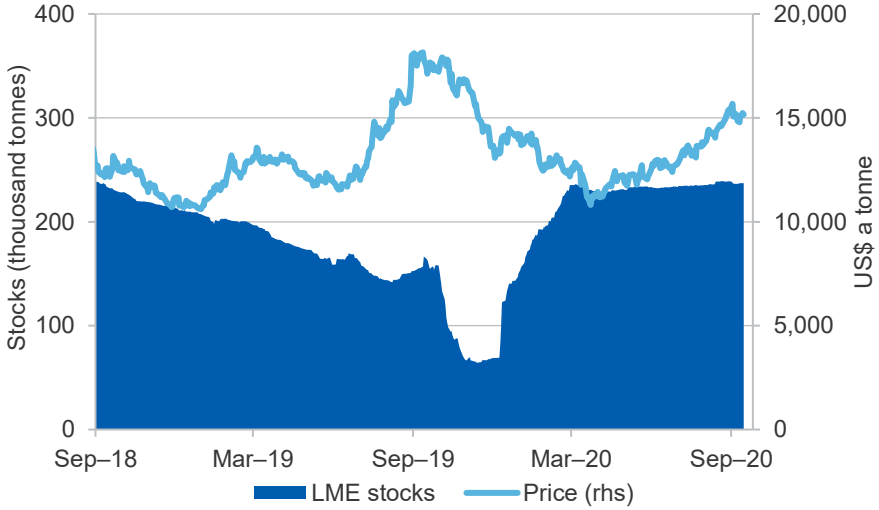
Nickel prices have continued to increase from the March 2020 lows. Rising Chinese consumption, expectations of stimulus spending and concerns about production shortages have pushed prices higher, despite inventory levels continuing to hold well above the lows of late-2019 (Figure 13.1).

The LME spot price reached a 2020 high of US$15,700 a tonne in early September, spurred by strong stainless steel production in China. The September quarter 2020 price average is estimated at US$13,900 a tonne, up 14 per cent quarter-on-quarter, but down 11 per cent year-on-year.

There is significant consumption growth anticipated for nickel for use in batteries of electric vehicles (EVs), however picking the timing of this take-off is difficult: an oversupplied market and thus weaker prices are expected in the short-term. For the first time since 2015, the nickel market is expected to be in surplus in 2020. The 2020 average price is forecast to be US$13,100 a tonne, down 6 per cent on the 2019 price of US$13,900 a tonne (Figure 13.2).

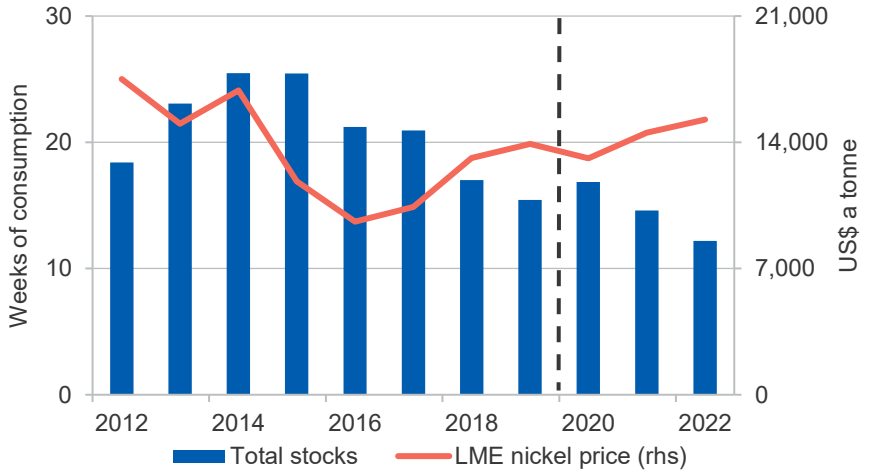
Provided economic conditions continue to improve, growing stainless steel demand and restrained production are expected to drive price growth of 8 per cent a year, to a forecast US$15,300 a tonne average in 2022.

Figure 13.1: Recent nickel prices and LME stock level trends



Source: Bloomberg (2020); London Metal Exchange (2020)

Figure 13.2: Nickel price and stock levels



Notes: Total stocks include warehouse and estimated privately held stocks.

Source: Bloomberg (2020) London Metal Exchange (2020); S&P Platts Global (2020); Department of Industry, Science, Energy and Resources (2020)

13.3 World consumption

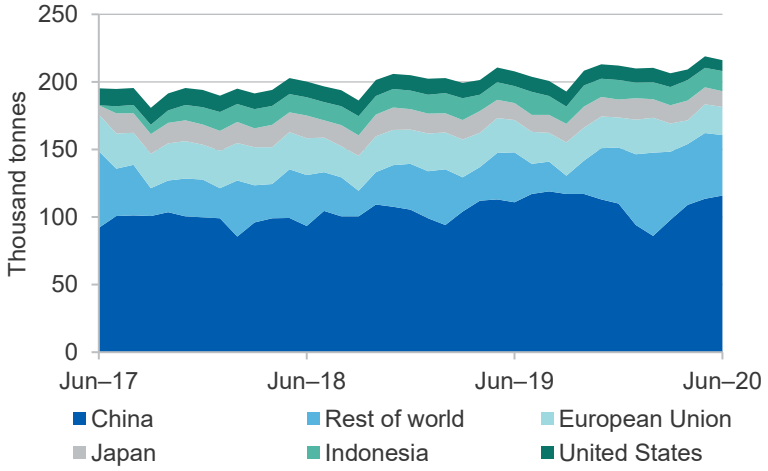
Nickel consumption impacted by COVID-19 fallout in 2020

After healthy growth in recent years, nickel demand is forecast to contract by 7 per cent to 2.3 million tonnes in 2020, as COVID-19 restrictions impact on economic activity. Consumption is expected to recover by 2022, growing 8 per cent a year to a forecast 2.7 million tonnes.

China's consumption recovering, supported by government stimulus

China accounts for just over half of world nickel consumption. In the first half of 2020, China's consumption fell by over 10 per cent year-on-year driven by COVID-19 related shutdowns in the March quarter 2020. China's auto manufacturing has recovered to pre-COVID levels: June quarter production was up 14 per cent year-on-year, although EV manufacturing was down. Recovering stainless steel production (up 4 per cent year-on-year in August) and a broader rebound in industrial activity are expected to support a return in China's consumption. Overall, China's full year consumption is forecast to reach 1.2 million tonnes, 6 per cent lower than 2019 levels.

Figure 13.3: Refined nickel consumption by major country



Source: International Nickel Study Group (2020); Department of Industry, Science, Energy and Resources (2020)

Broad depression in consumption markets, growth on the horizon

Consumption in other major markets has also fallen in the first half of 2020, with Europe and the US down 17 per cent and Japan down 4 per cent year-on-year (Figure 13.3). COVID-19 related stimulus which targets nickel-intensive sectors, including EV subsidies, may support consumption going forward.

Battery consumption prompts calls for higher production

Nickel plays a vital role in batteries, improving their energy intensity. Currently accounting for around 5 per cent of nickel use, batteries are expected to be the largest source of growth in the medium to long term. In addition to expanding battery manufacturing, the nickel intensity of batteries is expected to increase as battery chemistries evolve.

Aligning this consumption growth with mine production can be difficult, as battery grade nickel production is limited by resource quality and refinery capacity. This has prompted a call from Tesla's Elon Musk for greater nickel production, in an 'efficient' and 'environmentally sensitive' way. Depending on the processing technology and feedstock source (particularly laterite ores), production can be energy intensive and costly to produce in environmentally sustainable way.

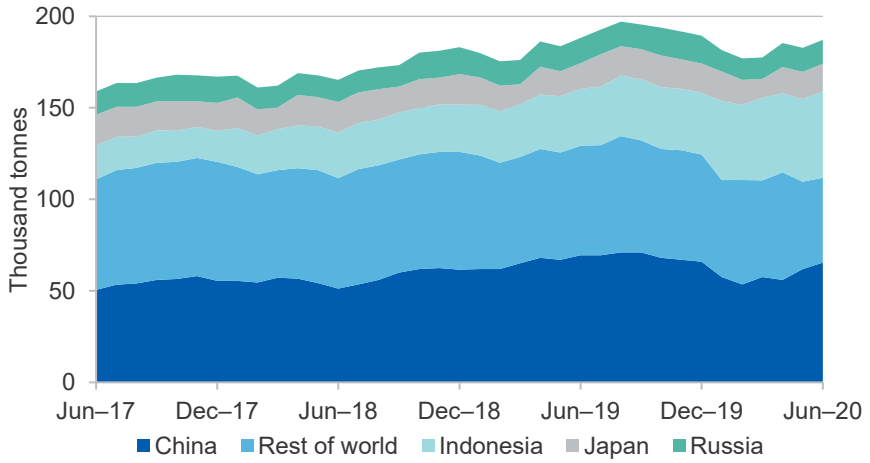
13.4 World production

Indonesia's ban and COVID-19 interruptions weigh on production

Mine production has steadily grown in recent years (by 9 per cent a year since 2017), however in 2020, mine production is forecast to fall by 13 per cent. So far in 2020, the most significant COVID-19 related mine closures have been in the Philippines, which accounts for around 13 per cent of world production. Operations in the Philippines have resumed since the shutdowns in April.

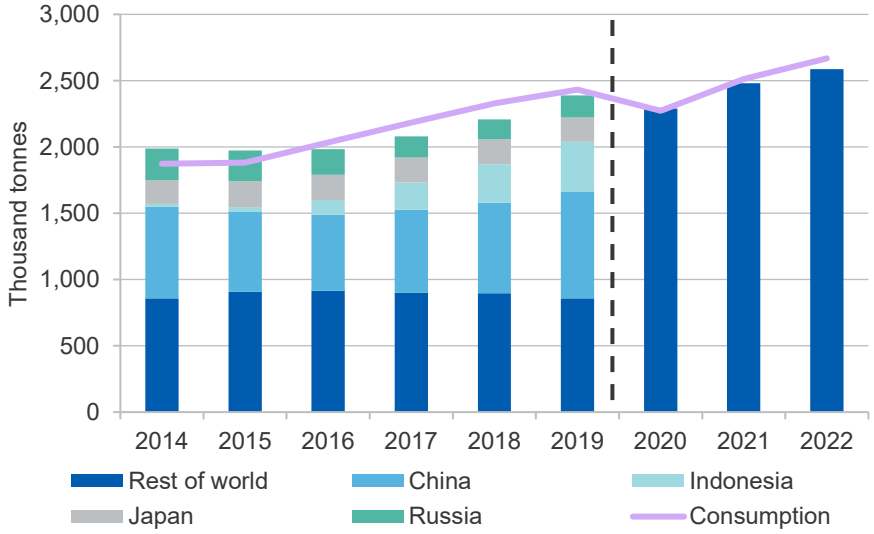
The main contributors to reduced world mine production in 2020 will come from lower Indonesian mine output — due to the government ban on exports of nickel ores — and COVID-19 related shutdowns in the Philippines, South Africa and Canada (Figure 13.4).

Figure 13.4: Refined nickel output by major producing country



Source: International Nickel Study Group (2020); Department of Industry, Science, Energy and Resources (2020)

Figure 13.5: Forecast for world refined nickel market



Source: International Nickel Study Group (2020); Department of Industry, Science, Energy and Resources (2020)

Refined production to fall in 2020, before rising in 2021 and 2022

As weak consumption and low prices weigh on output, 2020 refined output is forecast to fall 4 per cent to 2.3 million tonnes. This follows significant growth in 2019, when refined output increased 9 per cent over the year to 2.4 million tonnes. New refining capacity in Indonesia, Australia and Brazil is expected to come online and support production growing by 6 per cent a year to 2.6 million tonnes in 2022.

Despite lower production, a more significant fall in world consumption is expected to result in a market surplus in 2020. Over the outlook period, market tightness is expected to return amid strong consumption growth (Figure 13.5).

Export ban makes for tough transition for mine operations in Indonesia

Indonesia's ban on the export of nickel ores, introduced in January 2020, is expected to remove around 8 per cent of world mine production in 2020. Miners in Indonesia face low domestic prices for concentrates, despite the Government introduction of a price floor. Although domestic refinery capacity is expanding, in-line with the purpose of the export ban, adequate capacity will take some time to come online, particularly with low ore prices.

The construction of new refining capacity and access to cheap feedstock is expected to energise Indonesia's refined output over the outlook period, prompting a rise of more than 40 per cent to 550,000 tonnes in 2021 and 755,000 tonnes in 2022. Much of Indonesia's new refining capacity will be high-pressure acid leaching, which is energy intensive and has significant environmental consequences. With low (carbon-intensive) electricity costs and access to raw materials, Indonesia is positioning itself as a battery metals processor with potential for downstream expansion.

Indonesia's export ban is expected to have transformative impacts on the nickel market more broadly. In China, nickel pig iron production is expected to decline in 2020, as substituted imports from the Philippines are only a partial replacement for nickel ore imports from Indonesia.

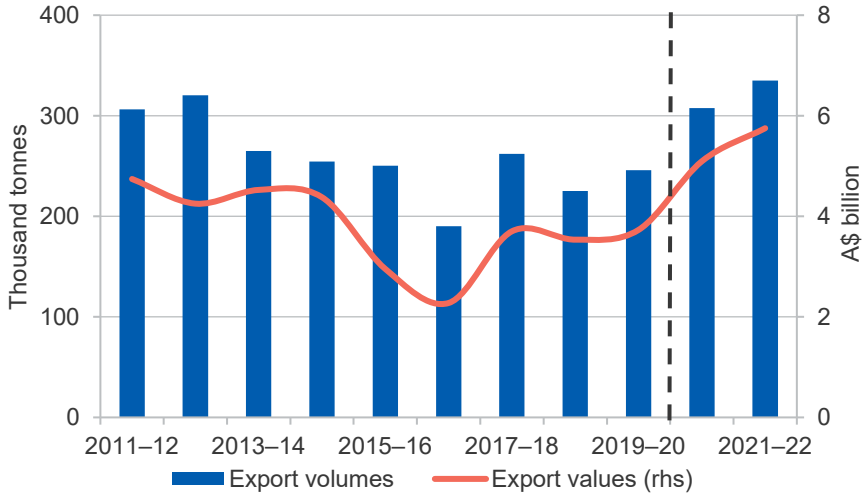
13.5 Australia

Volumes growth and a price recovery support export earnings

Nickel export earnings are forecast to reach $5.2 billion in 2020–21, up 39 per cent on 2019–20 earnings of $3.7 billion (Figure 13.6). Over the outlook period, this growth is expected to continue, with export earnings forecast to reach $5.8 billion in 2021–22.

Stronger export volumes, assisted by new capacity investment, is forecast to generate this growth. Export volumes are forecast to total 308,000 tonnes in 2020–21, rising 26 per cent to 335,000 tonnes in 2021–22.

Figure 13.6: Australia's nickel export volumes and values



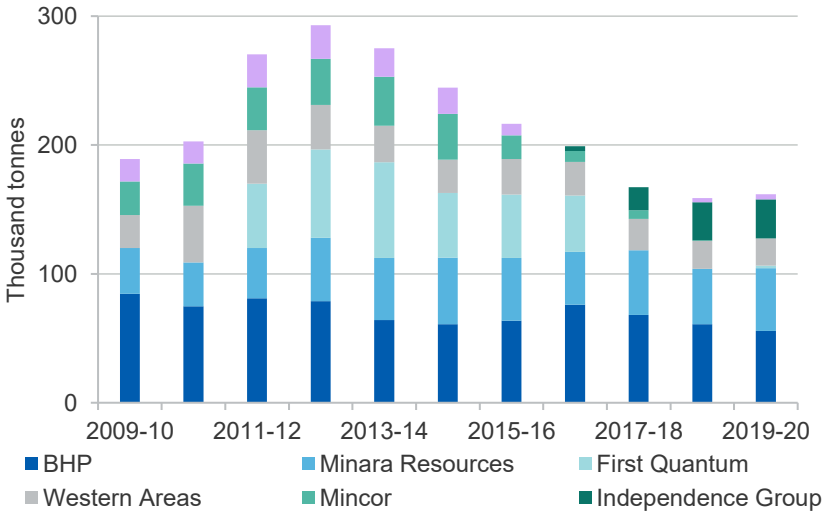
Source: ABS (2020) International Trade in Goods and Services, 5368.0; Department of Industry, Science, Energy and Resources (2020)

Strong production in the June quarter

Higher production from BHP's Nickel West and Minara Resources' Murrin Murrin operations contributed to higher mine production in the June quarter (Figure 13.7). The reopening of the Ravensthorpe mine, which went into care and maintenance in 2017, saw its first shipment in the June quarter and has 2021–22 guidance of 15,000-17,000 tonnes.

Mining operations have broadly accommodated COVID-19 related movement restrictions. At Panoramic Resources' Savannah mine, exploration and site activities have resumed. A restart of operations is market dependent and may happen in the first half of 2021.

Figure 13.7: Historical mine production, by company



Source: Department of Industry, Science, Energy and Resources (2020); Company reports

Expectations of market growth support expansions and restarts

Although nickel prices likely face some short-term weakness, the strong prospects for long-term consumption growth — driven by nickel used in batteries — is supporting capacity investment and higher production prospects.

Australia's mine production is forecast to lift from 162,000 tonnes in 2019–20 to 263,000 tonnes in 2021–22, up 27 per cent year-on-year, with the ramp-up of production at First Quantum's Ravensthorpe and BHP's Yakabindie mines.

A final investment decision has recently been taken for the restart of Mincor's Kambalda operations in Western Australia, which is expected to

start production in 2021–22, and has a nameplate capacity of 71,000 tonnes per year (16,000 tonnes metal in concentrate).

The pace of nickel price growth will influence a number of projects currently under development. Poseidon Nickel's Black Swan mine could restart if the outlook for nickel prices appears strong. Growing development interest is also highlighted by BHP's recent acquisition of Norilsk Nickel's Australian assets, including the Honeymoon Well project. The development of these projects will likely depend on the prospects for growth in EV and battery manufacturing.

Refinery production up and positive growth potential

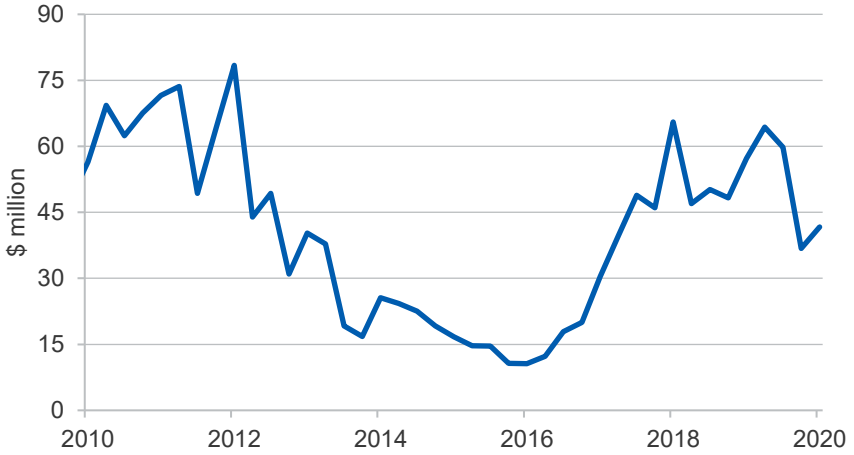
Refinery production continued to rise in the June quarter 2020, with higher output from BHP's Kwinana refinery and Minara Resources' Murrin Murrin facility.

Australia's refinery production is forecast to increase from 108,000 tonnes in 2019–20 to 139,000 tonnes in 2021–22, up an average 14 per cent a year. Higher production is expected from BHP's facilities following major maintenance shutdowns at the Kwinana refinery and the Kalgoorlie smelter, as well as the expected restart of First Quantum's Ravensthorpe facility. BHP's nickel sulphate plant, with an annual capacity of 100 thousand tonnes, is expected to be online in the first half of 2021. BHP is considering further developments with Stage 2 capacity expansion to the plant, as well as repurposing a separate nickel sulphate test site to produce a cathode precursor.

Exploration expenditure

In the June quarter 2020, nickel and cobalt exploration increased to $42 million, 27 per cent lower year-on-year (Figure 13.8). Lower nickel and cobalt prices could have dampened exploration activity.

Figure 13.8: Australia's nickel and cobalt exploration expenditure



Source: ABS (2020) Mineral and Petroleum Exploration, Australia, 8412.0

Revisions to the outlook

The forecast for Australia's nickel export earnings has been revised down since the June 2020 *Resources and Energy Quarterly*, most notably by $1.0 billion in 2021–22. This follows downward revisions to Australia's production and export profile.

Table 13.1: Nickel outlook

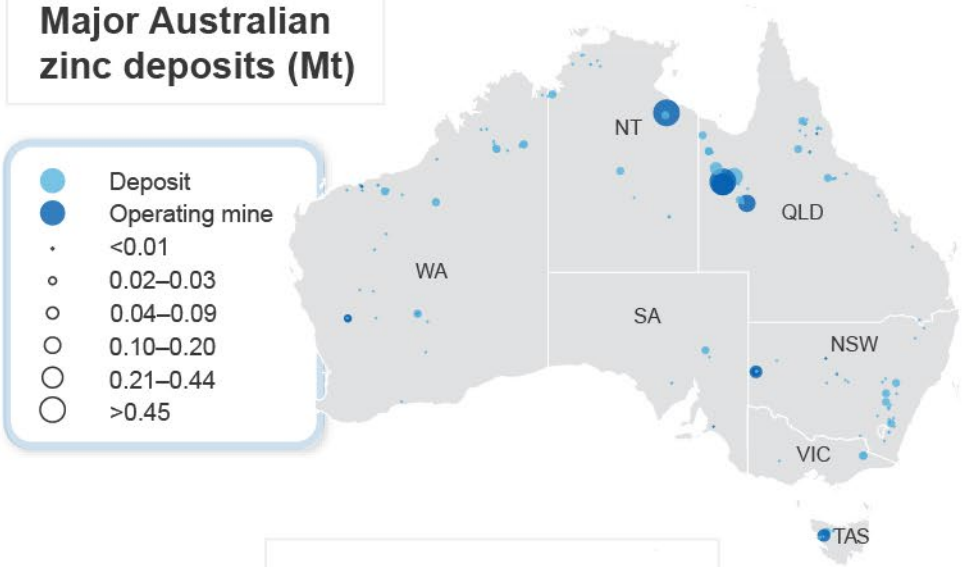
						Annual percentage change		
World	**Unit**	**2019**	**2020[f]**	**2021[f]**	**2022[f]**	**2020[f]**	**2021[f]**	**2022[f]**
Production								
– mine	kt	2,530	2,408	2,611	2,723	-4.8	8.4	4.3
– refined	kt	2,374	2,289	2,481	2,588	-3.6	8.4	4.3
Consumption	kt	2,432	2,274	2,512	2,668	-6.5	10.5	6.2
Closing stocks	kt	720	735	704	623	2.1	-4.3	-11.4
– weeks of consumption		15.4	16.8	14.6	12.1	9.2	-13.4	-16.6
Prices LME								
– nominal	US$/t	13,904	13,115	14,526	15,259	-5.7	10.8	5.0
	USc/lb	631	595	659	692	-5.7	10.8	5.0
– real[b]	US$/t	14,146	13,115	14,185	14,608	-7.3	8.2	3.0
	USc/lb	642	595	643	663	-7.3	8.2	3.0
Australia	**Unit**	**2018–19**	**2019–20**	**2020–21[f]**	**2021–22[f]**	**2019–20[s]**	**2020–21[f]**	**2021–22[f]**
Production								
– mine[c]	kt	159	162	213	263	1.8	31.5	23.3
– refined	kt	114	108	129	139	-5.3	19.8	7.5
– intermediate		13	15	27	33	23.9	72.5	24.9
Export volume[d]	kt	225	246	308	335	9.2	25.2	8.9
– nominal value	A$m	3,535	3,742	5,169	5,826	5.9	38.1	12.7
– real value[e]	A$m	3,672	3,836	5,169	5,710	4.5	34.7	10.5

Notes: **b** In 2020 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 2020–21 financial year Australian dollars; **f** Forecast.

Source: ABS (2020) International Trade in Goods and Services, Australia, Cat. No. 5368.0; Company reports; Department of Industry, Science, Resources and Energy (2020); International Nickel Study Group (2020); LME (2020); World Bureau of Metal Statistics (2020)

30 Zn 65.38 Zinc

Major Australian zinc deposits (Mt)



Zinc facts

Zinc ore was used in ancient Greece to produce brass

Zinc is used by the human body to **fight infection**

Zinc is used in wound-care and sunscreen

Zinc is an **emerging battery mineral**

World consumption

50% Galvanise steel

17% Diecasting

17% Brass & bronze alloys

6% Rolled zinc

6% Chemicals

4% Other

Australia's zinc

3rd highest producer of zinc in the world

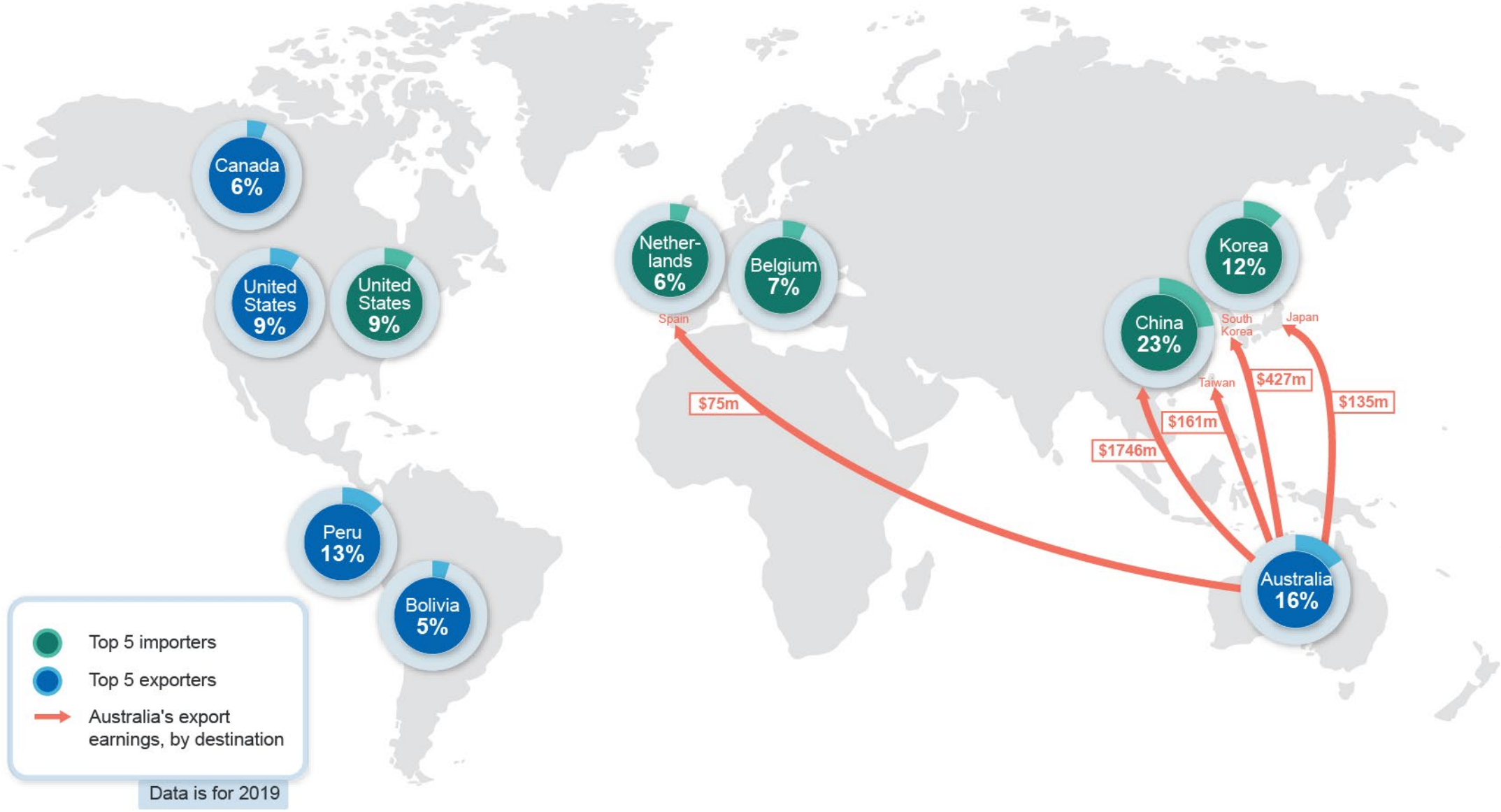
World's no.1 zinc exporter

Holds **29%** of world zinc resources

Zinc

30 Zn 65.38

Trade map | September 2020



14.1 Summary

- Zinc prices are expected to soften over the remainder of 2020, despite some COVID-19 supply concerns. Prices are expected to increase from the forecast average of US$2,080 a tonne for 2020 to US$2,110 a tonne in 2021, before declining modestly to average US$2,025 a tonne in 2022 as new supply enters the market.
- Australia's zinc mine production is forecast to increase from 1.4 million tonnes (metallic content) in 2019–20 to 1.6 million tonnes in 2021–22.
- Australia's zinc export earnings are forecast to decline from $3.6 billion in 2019–20 to around $3.1 billion in 2020–21 and $3.2 billion in 2021–22, as the Australian dollar appreciates and prices ease slightly.

14.2 Prices

Price increases reflect anticipation of possible fall in inventories

After averaging US$1,960 a tonne in the June quarter, the zinc price has since performed more strongly than expected, peaking above US$2,500 a tonne in August. While production has recovered, localised shortages of concentrate, coupled with COVID-19 stimulus packages, have resulted in markets anticipating falling global inventories.

Treatment and refining charges rose by around 5 per cent to US$165-185 a tonne as increased concentrate supplies made their way to market and most mining operations returned to work. Treatment and refining charges are, however, well below the peak of US$305 a tonne in February 2020.

Adding to price strength, the Chinese provinces of Yunnan and Gansu raised the need for non-ferrous strategic stockpile requirements for smelters in response to the COVID-19 pandemic in late April.

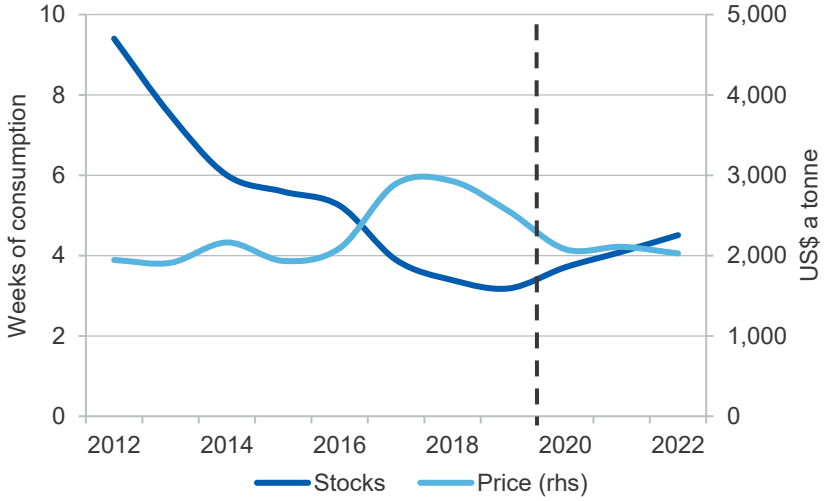
Inventories continue to build from decade lows as most mines return to work as COVID-19 containment measures ease. Zinc stocks now stand at close to 300,000 tonnes for both the LME and Shanghai Futures Exchange (SHFE), having risen from around 200,000 tonnes in mid-June.

However, metals traders expect the price to remain high in the short term with a net long position of 84,602 tonnes in early September, the largest since January 2018.

The impact of stimulus packages and continuing uncertainty with the COVID-19 pandemic will likely continue to influence prices positively in the short term, but may ease later in the year. The LME zinc spot price is forecast to average US$2,080 a tonne over 2020, up from the June 2020 *Resource and Energy Quarterly* estimate of US$1,995 (Figure 14.1). The balance of green stimulus packages versus traditional infrastructure will also influence prices over the forecast period.

With stimulus packages likely winding down in 2021–22, inventories are forecast to rise — as expanding mine production outpaces a recovery in demand. In 2021, the zinc price is forecast to average US$2,110 a tonne, falling to US$2,025 a tonne in 2022, as stimulus measures begin to taper.

Figure 14.1: Zinc prices and stocks, annual



Source: London Metal Exchange (2020); Department of Industry, Science, Energy and Resources (2020)

14.3 World consumption

Infrastructure and green stimulus packages spur consumption

Infrastructure stimulus packages are assumed to spur zinc consumption in the second half of 2020 after a global 8.5 per cent year-on-year decline in zinc imports in the first half of 2020.

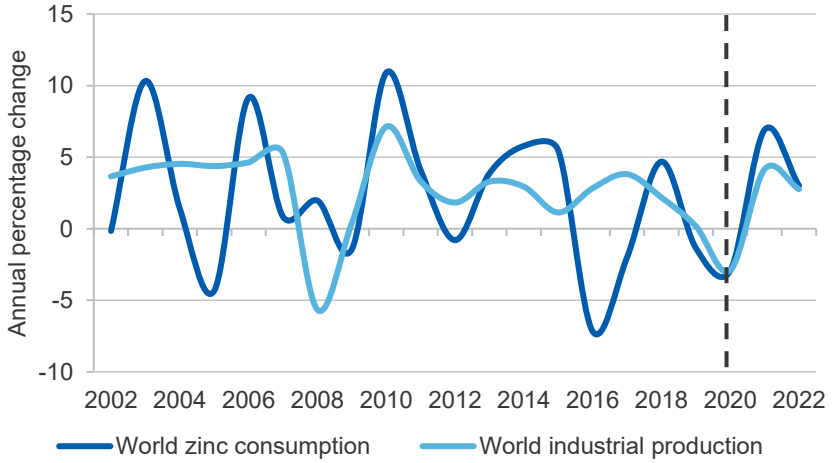
The IMF is assuming a contraction in world GDP in 2020 before growth in 2021. (see the *macroeconomic outlook* chapter). Additionally, in the June quarter, world industrial production declined 10.5 per cent year-on-year and 6.9 per cent quarter-on-quarter. However, Purchasing Managers' Indices (PMI) in the major industrial economies suggest a rebound in industrial production (IP) has commenced. China's manufacturing sector is expanding, with their PMI increasing for the fifth consecutive month (to 51.1) in July 2020. The IMF is forecasting a modest expansion of China's economy in 2020 followed by more robust growth in 2021. Infrastructure inputs, such as galvanised sheet production support the view of rising zinc consumption within China.

Zinc consumption typically moves in sync with world IP (Figure 14.2). Zinc's primary use is galvanising steel, either through hot dipping or cold plating. As such, zinc consumption also traditionally tracks well with steel usage — particularly in the production of automobiles — and this relationship is expected to continue (Figure 14.3).

Global automotive sales fell 44 per cent year-on-year during the June quarter but rebounded in the month of June as COVID-19 containment measures tapered. Europe followed this pattern too, with June sales gains partly propelled by buyers seeking to beat tightening emissions requirements, which come into force on 1 January 2021.

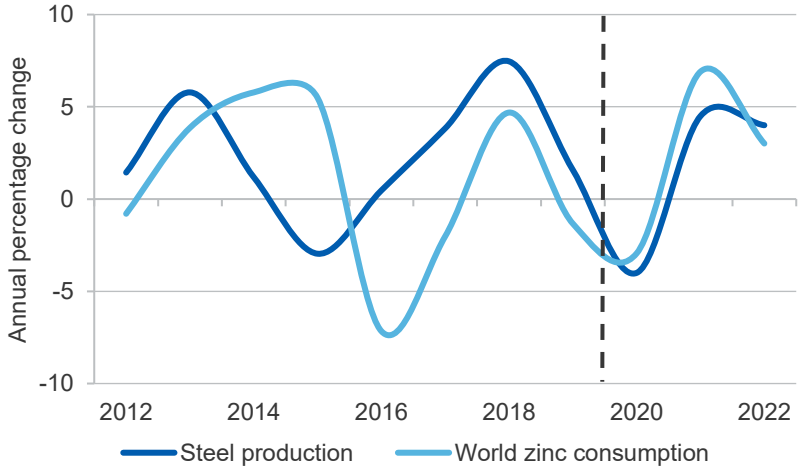
Electric vehicle sales in China increased by 130 per cent for the June quarter but were down 20 per cent quarter-on-quarter in Europe after strong growth in the December and March quarters (44 per cent and 21 per cent increases respectively), supported by subsidies. (see the *lithium* chapter, Section 15.3, Electric vehicle sales).

Figure 14.2: World zinc consumption vs industrial production



Source: International Iron and Steel Institute (2020); CPB Netherlands Bureau for Economic Policy Analysis (2020); Department of Industry, Science, Energy and Resources (2020)

Figure 14.3: Steel production vs world zinc consumption



Source: International Iron and Steel Institute (2020); Department of Industry, Science, Energy and Resources (2020)

Europe may play an increasing role in zinc consumption if green stimulus packages keep supporting the purchase of electric vehicles with strong support from government for local manufacturers. However, China and South Korea are still expected to continue to dominate global zinc usage.

Global zinc consumption is forecast to rise modestly over the outlook period, from 13.5 million tonnes in 2020 to 13.9 million tonnes in 2022, having fallen from 13.7 million tonnes in 2019 (Table 14.1).

Zinc batteries continue to improve

Zinc is forecast to play an increasing role in renewable energy storage over time, with new demand sources providing further opportunities for Australian mines. Redflow, an Australian zinc bromine battery manufacturer, raised $5.3 million during August to accelerate the development of its Gen3 battery for power storage. These batteries have applications in stationary power storage, such as attached to homes. In particular, zinc batteries offer the advantage of being able to be left inactive for extended periods of time whilst lithium batteries generally require regular charging and discharging.

14.4 World production

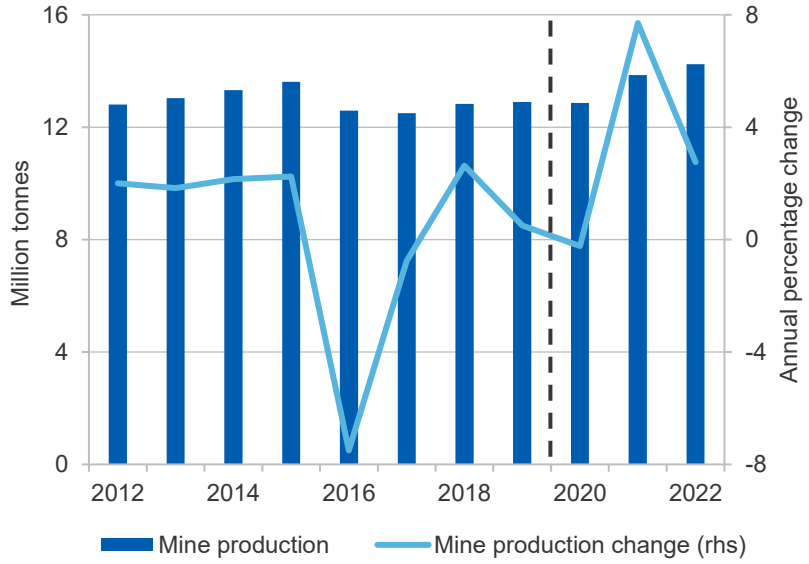
Mine production is set to rise over the outlook period

Recent zinc price appreciation has drawn miners back into production rapidly, after COVID-19 containment measures started to ease.

Global mine output is expected to rise from 12.9 million tonnes in 2020 to 14.2 million tonnes in 2022 (Figure 14.4). The rise in output is the result of previous investments in exploration, mine commissioning and expansion.

Most major zinc producing nations have resumed operations in recent months. Glencore's production rose 3 per cent for the half year, compared to the same period in 2019, thanks to obtaining higher grades of ore from its Matagami underground sulphide mine in Canada, despite the operation being affected by the COVID-19 pandemic.

Figure 14.4: World zinc mine production, metallic content



Source: International Lead Zinc Study Group (2020); AME Mineral Economics (2020); Department of Industry, Science, Energy and Resources (2020)

Treatment charges for smelting concentrate appreciated slightly, as production recommenced from BHP's Antamina operation in Peru. However, the Santandar mine in Peru was closed for the first half of July, — to prevent an outbreak of COVID-19 at the mine — which led to more uncertainty in the market.

Nexa Resources is maintaining its zinc production guidance for 2021 after producing 486,000 tonnes in the June quarter from its operations in Peru and Brazil. The guidance is being maintained despite the company being a higher cost producer, which suggests the company has confidence in the future of the zinc price.

Operations at San Cristobal in Bolivia have been suspended again as protocols are redesigned to minimise risks from the COVID-19 pandemic.

South African mines returned to work, but logistical challenges at ports due to COVID-19 have made shipping product to customers more challenging, exacerbating uncertainties in zinc supply. Vedanta's Skorpian open pit operation in Namibia remains on care and maintenance. The operation faced technical difficulties prior to COVID-19 and faces extended downtime while these issues are resolved.

The International Lead Zinc Study Group estimated that 11 per cent of global mine production was likely to be lost in 2020, due to the COVID-19 pandemic and other supply disruptions. However, recent responses from miners are improving the situation, potentially closing the gap to around 7 per cent.

Refineries continue to operate during COVID-19

Refinery production is expected to largely follow the trajectory of mined production. However, any further disruption to concentrate supply may still send ripples through the smelter market.

Namibia's refinery was most affected, with the suspension of Skorpian due to technical difficulties rather than the COVID-19 pandemic.

Smelters in China are operating well following significant restocking of zinc concentrate supplies last quarter from Australia. Zinc imports to China from Australia have fallen back in recent months as a consequence.

As mined supply of concentrate once again increases, limits in smelter capacity will cap intake from miners, and result in increased treatment and refining charges. This will detract from returns to those miners who are in the position to offer concentrate to the smelters. Existing high cost miners will likely face stiff competition from generally newer operations with higher grades (and therefore generally lower costs).

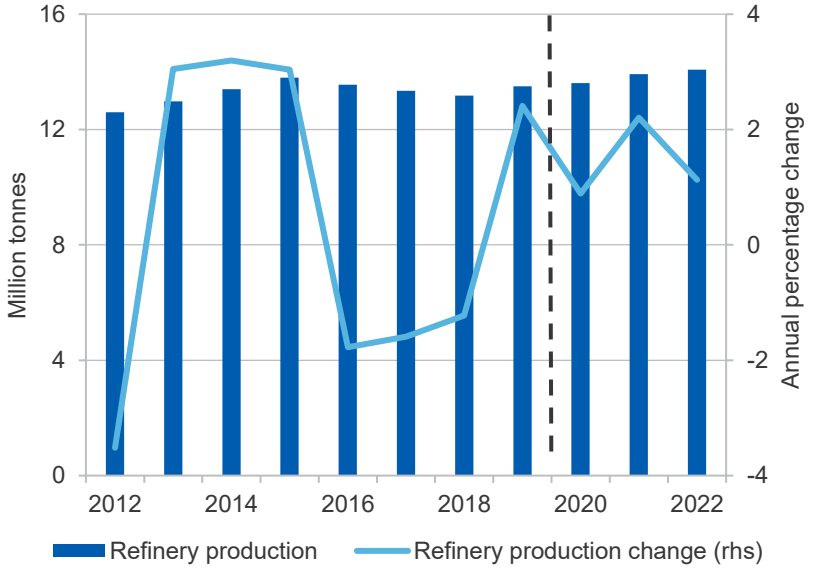
However, given the supply disruption factors during the quarter, the market is likely to remain volatile on price until mine production normalises.

Globally, 4 per cent of refinery production is estimated to be lost in 2020 due to the COVID-19 pandemic (Figure 14.5). This is an amount not more than ordinary annual variation. This compares with annual percentage changes in mining, being typically twice the size (Figure 14.4).

Changes to refinery production are less responsive than mining production due to the higher costs of restarting smelters.

Refined production for 2020 (including recycling) is estimated at 13.6 million tonnes with 2021 and 2022 forecast at 13.9 million tonnes and 14.1 million tonnes respectively.

Figure 14.5: World zinc refinery production, metallic content



Source: International Lead Zinc Study Group (2020); Department of Industry, Science, Energy and Resources (2020)

14.5 Australia

Export earnings declining modestly

Australia's zinc export earnings are forecast to decline from $3.6 billion in 2019–20 to around $3.1 billion in 2020–21 and $3.2 billion in 2021–22, as the Australian dollar appreciates and prices ease slightly.

Australian mine production is expected to increase

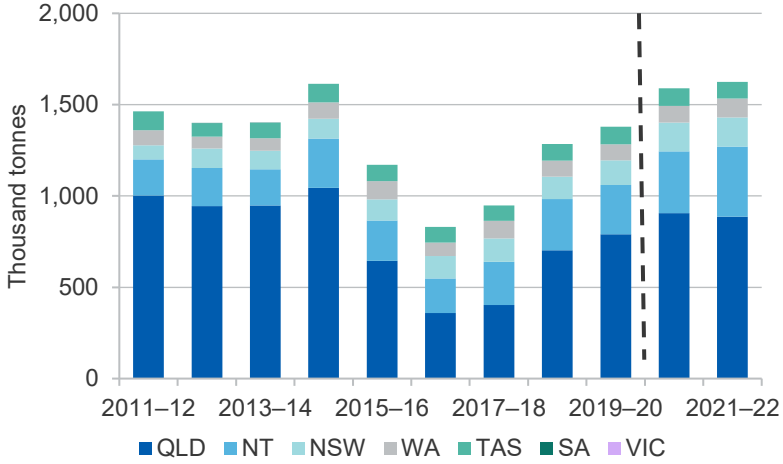
Australia's June quarter zinc production was up 4 per cent quarter-on-quarter (Figure 14.6). The Century mine in Queensland (QLD) declared they had reached planned production levels after having difficulties ramping up during the previous March quarter, with heavy rainfall events and electrical issues causing recoveries to drop from 49 to 46 per cent.

Production at Dugald River in QLD rebounded from the March quarter low of 35,500 tonnes of zinc in concentrate, rising to 43,700 tonnes in the June quarter 2020. Mount Garnet in QLD recommenced processing ore in May, after closing during late March due to health concerns surrounding the COVID-19 pandemic. Overall, QLD production increased 10 per cent.

The Woodlawn mine in New South Wales (NSW) has not resumed production as yet, though it may resume in the near future, aided by copper as part of its revenue stream. Production decreased at Hera but increased at Peak in NSW. The ore at these NSW mines is gold based, with zinc being a by-product. This makes its output variable and contingent on the volume of other metals extracted.

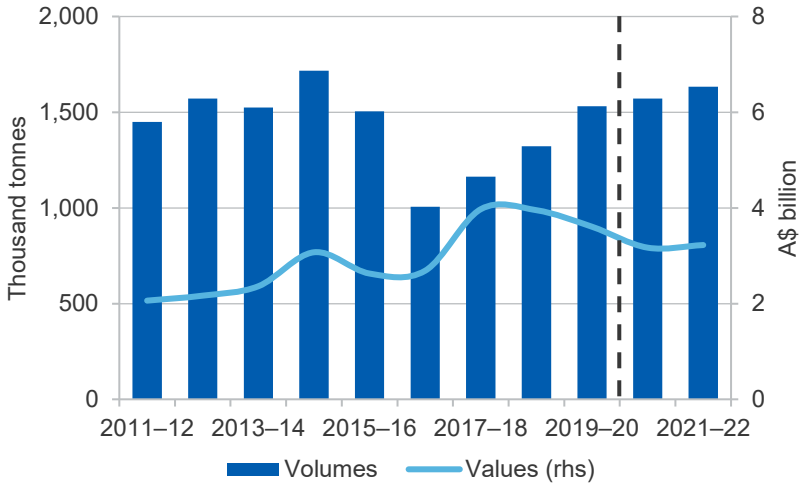
Australian export volumes for zinc concentrate grew by 33 per cent over the June quarter, quarter-on-quarter, but by only 10 per cent by value over the same period, based on declining zinc prices over the quarter. Refined exports increased 36 per cent over the June quarter, quarter-on-quarter based on Chinese restocking but only 15 per cent by value over the same period. Overall for the June quarter, China imported 63 per cent of Australia's zinc concentrates and 27 per cent of Australia's refined zinc products.

Figure 14.6: Australia's zinc mine output by state, metallic content



Source: Company reports; Department of Industry, Science, Energy and Resources (2020)

Figure 14.7: Australia's zinc exports, metallic content



Source: ABS (2020) International Trade in Goods and Services, 5368.0; Department of Industry, Science, Energy and Resources (2020)

Australia's zinc mine production is projected to increase from 1.4 million tonnes (in metallic content) in 2019–20 to 1.6 million tonnes in 2021–22 based on expansion at McArthur River. The rising Australian dollar may reduce revenue, with export earnings in 2020–21 and 2021–22 forecast to decline relative to 2019–20, despite increasing production (Figure 14.7).

Refined production of zinc is forecast to increase by 50,000 tonnes a year over the outlook period. There are two zinc refiners in Australia: Nyrstar, which refines zinc at its Hobart refinery, and South Korean-owned Sun Metals, which operates a smelter near Townsville. The expansion of the Sun Metals refinery is due for completion in 2021.

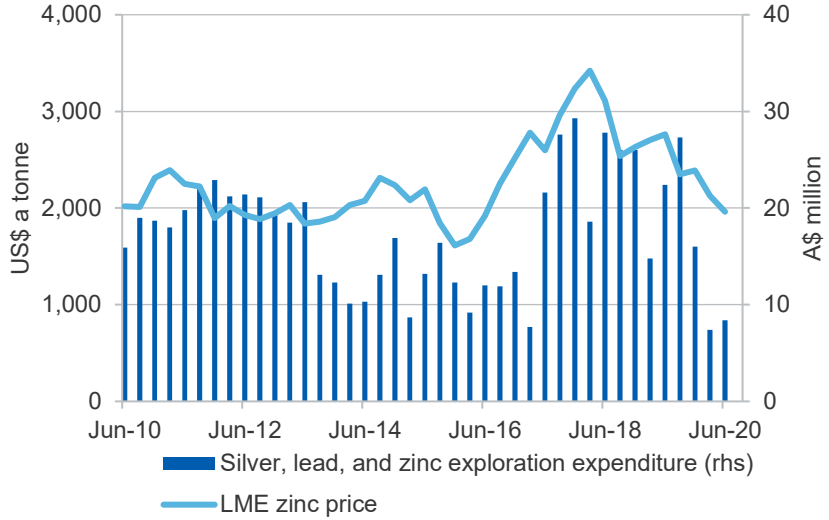
Exploration expenditure increased

Exploration expenditure for silver, lead and zinc has increased 14 per cent quarter-on-quarter for the June quarter, despite a 7.8 per cent decline in zinc prices over the same period (Figure 14.8). The increase in exploration may be the result of the easing of containment measures due to the COVID-19 pandemic.

Revisions to the forecast

Compared with the June 2020 *Resources and Energy Quarterly*, estimates for export revenue were revised down by 2.0 per cent for 2020–21 to $3.1 billion and down 2.8 per cent for 2021–22 to $3.2 billion. This resulted from changes to the forecast price for zinc and an appreciating Australian dollar, despite forecast increases in zinc production and export of concentrate.

Figure 14.8: Exploration expenditure on silver, lead and zinc versus zinc prices



Source: ABS (2020) Mineral and Petroleum Exploration, Australia, 8412.0; Company reports; Department of Industry, Science, Energy and Resources (2020)

Table 14.1: Zinc outlook

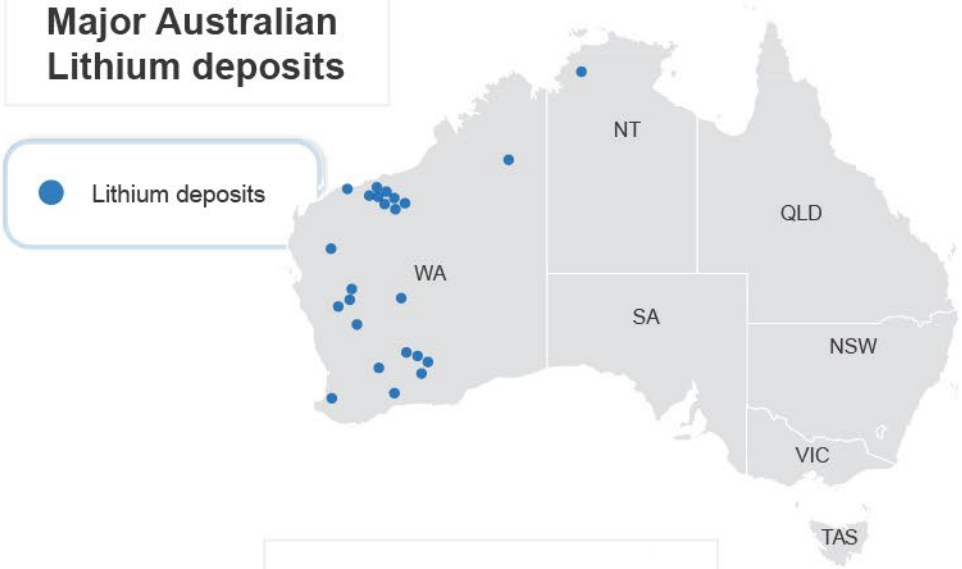
						Annual percentage change		
World	**Unit**	**2019**	**2020[f]**	**2021[f]**	**2022[f]**	**2020[f]**	**2021[f]**	**2022[f]**
Production								
– mine	kt	12,893	12,864	13,855	14,236	-0.2	7.7	2.8
– refined [a]	kt	13,495	13,615	13,916	14,073	0.9	2.2	1.1
Consumption	kt	13,699	13,492	13,792	13,949	-1.5	2.2	1.1
Closing stocks	kt	836	959	1,083	1,206	14.8	12.9	11.4
– weeks of consumption		3.2	3.7	4.1	4.5	16.5	10.4	10.1
Price								
– nominal	US$/t	2,550	2,079	2,109	2,026	-18.5	1.4	-3.9
	USc/lb	116	94	96	92	-18.5	1.4	-3.9
– real [b]	US$/t	2,594	2,079	2,059	1,940	-19.9	0.9	-5.8
	USc/lb	118	94	93	88	-19.9	0.9	-5.8
Australia	**Unit**	**2018–19**	**2019–20**	**2020–21[f]**	**2021–22[f]**	**2019–20**	**2020–21[f]**	**2021–22[f]**
Mine output	kt	1,285	1,379	1,590	1,624	7.4	15.3	2.1
Refined output	kt	480	439	465	498	-8.5	6.0	7.2
Export volume								
– ore and concentrate [c]	kt	2,091	2,556	2,754	2,816	22.2	7.7	2.3
– refined	kt	420	390	332	365	-7.3	-14.9	10.2
– total metallic content	kt	1,322	1,530	1,571	1,633	15.7	2.7	3.9
Export value								
– nominal	A$m	3,952	3,607	3,115	3,171	-8.7	-13.6	1.8
– real [d]	A$m	4,105	3,697	3,115	3,108	-9.9	-15.8	-0.2

Notes: **a** includes secondary refined zinc; **b** in 2020 US dollars; **c** Quantities refer to gross weight of all ores and concentrates; **d** In 2020–21 Australian dollars; **f** Forecast

Source: ABS (2020) International Trade in Goods and Services, Australia, Cat. No. 5368.0; Company reports; Department of Industry, Science, Energy and Resources (2020); International Lead Zinc Study Group (2020); LME (2020); World Bureau of Metal Statistics (2020)

3 Li 6.94 Lithium

Major Australian Lithium deposits



Lithium facts

Electric vehicle sales are expected to increase from 2m to 26m by 2030

Lithium exports were A$1.1b in 2019-20

Australian lithium exports are tipped to rise to 1.7m tonnes in 2021-22

Australia's production of lithium is recovering from a downturn

World consumption

46% Rechargeable batteries

26% Ceramics & glass

11% Greases & polymers

11% Other uses

4% Industrial powders

2% Air treatments

Australia's lithium

Biggest exporter in the world

Produced **55%** of the **world's lithium** in 2019

2nd refinery is **under construction**

15.1 Summary

- The spot spodumene price (delivered to China) fell by 8.2 per cent to US$390 a tonne between June and August 2020. Prices are forecast to rise to US$588 a tonne by 2022, based on rising electric vehicle uptake and government stimulus packages (in response to the COVID-19 pandemic).
- Australian lithium production is expected to rise from 231,000 tonnes (lithium carbonate equivalent) in 2019–20 to 248,000 tonnes in 2021–22 based on production tied to new offtake agreements.
- After falling from $1.1 billion in 2019–20 to $1.0 billion in 2020–21, Australian lithium export earnings are forecast to increase to $1.3 billion by 2021–22.

15.2 Prices

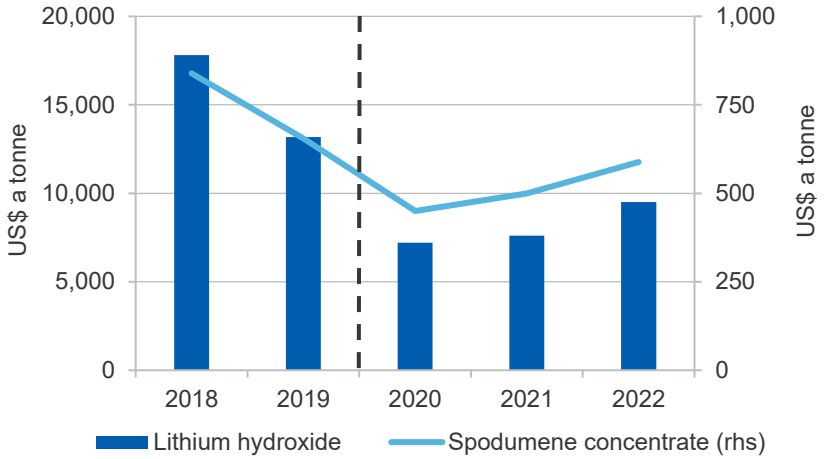
Lithium prices declined across the board but shortages in hydroxide loom

Lithium carbonate prices (delivered to China) declined by 7.4 per cent to US$6,300 a tonne from June to August, and by 38 per cent year-on-year. This compares with price falls — off a higher base (due to delivery costs and quality specifications) — in Europe of 4.9 per cent for the same period and 37 per cent year-on-year (delivered to Europe).

Lithium hydroxide prices (delivered to China) declined by 4.4 per cent to US$7,010 a tonne between June and August, and fell by 31 per cent year-on-year. This compared with a price decline of 6.9 per cent into Europe for the same period and 34 per cent year-on-year (to US$8,375 a tonne, delivered). Lithium hydroxide prices are expected to appreciate in 2021, as technical difficulties in ramping up new operations for battery grade product lead to a supply shortfall.

Spodumene prices (delivered to China) declined by 8.2 per cent to US$390 a tonne from June to August, and 34 per cent year-on-year. Spodumene prices are expected to increase in 2021 and 2022, with green government stimulus packages ongoing and electric vehicle manufacturers continuing to expand production (Figure 15.1).

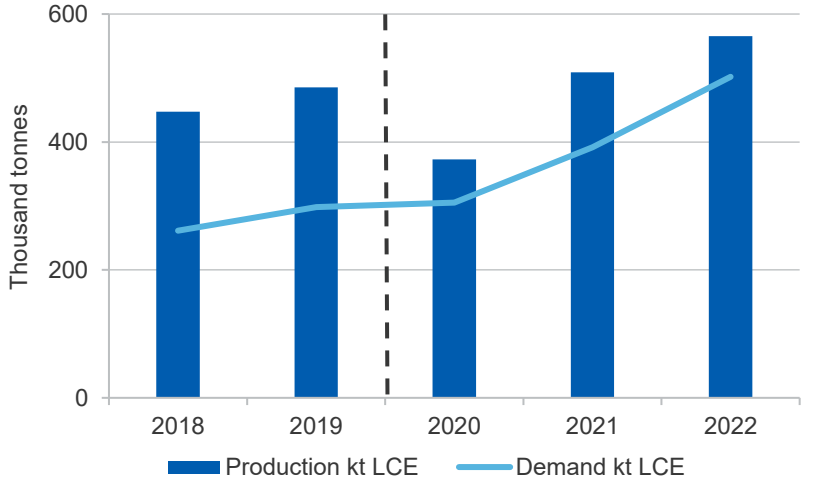
Figure 15.1: Prices of spodumene concentrate and lithium hydroxide



Notes: Lithium hydroxide price is for lower priced technical grade

Source: Roskill (2020); Brokers (2020); Department of Industry, Science, Energy and Resources (2020)

Figure 15.2: World lithium production and demand



Source: Roskill (2020); BloombergNEF (2020); Department of Industry, Science, Energy and Resources (2020)

15.3 World demand

Demand is forecast to increase over the outlook period

World demand of lithium is forecast to increase to 305,000 tonnes (lithium carbonate equivalent) in 2020, up from 298,000 tonnes in 2019. Demand is forecast at 392,000 tonnes in 2021, and 502,000 tonnes by 2022 (Figure 15.2).

The largest market for lithium carbonate is China. The COVID-19 pandemic appears to have had little impact on Chinese demand, with lithium carbonate imports on a volume basis to China up by 87 per cent year-on-year for the seven months to July 2020. The increased imports were helped by a price reduction of 45 per cent over the same period. Import increases were concentrated in the period from January to April 2020.

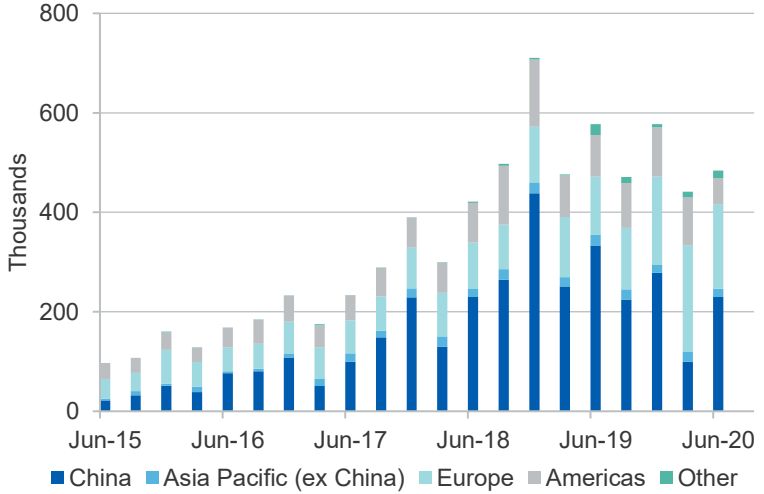
South Korea is a very important market for lithium hydroxide, due to its refineries and its battery makers. Despite COVID-19, the volume of lithium hydroxide imports to South Korea increased by 27 per cent in the seven months to July 2020 compared to the corresponding period in 2019. The increased trade came with a price reduction of 15 per cent over the same period.

Electric vehicle sales for June quarter

Global electric vehicle sales for the June quarter increased 9.6 per cent quarter-on-quarter, largely built on China's increase of 130 per cent (Figure 15.3). Sales in Europe decreased by 20 per cent quarter-on-quarter, but this was after rises of 21 per cent in the March quarter and 44 per cent in the December quarter. These earlier European increases are largely driven by impending tighter emissions standards at the start of 2021.

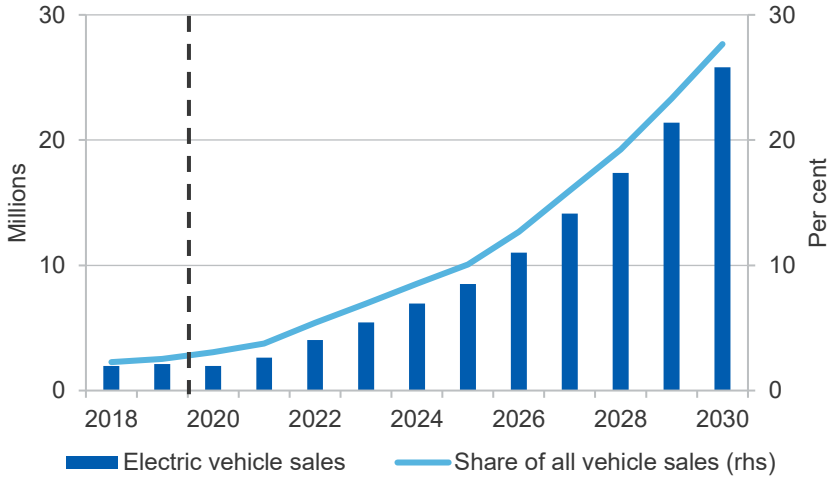
The overall strength of electric vehicle sales supports the expectation of increasing electric vehicle uptake over the long term, and therefore increasing lithium demand — despite short term falls in the prices of lithium products (Figure 15.4).

Figure 15.3: World electric vehicle sales



Source: BloombergNEF (2020)

Figure 15.4: Long-term electric vehicle sales projection



Source: Department of Industry, Science, Energy and Resources (2020); International Energy Agency (2020); BloombergNEF (2020)

Technological developments

Technology changes continue apace, with China-based SVOLT Energy (a spin-off from Great Wall Motors) claiming progress in the development of cobalt-free batteries. Their production schedule is ambitious, with a stated aim for rollout in 2021. Contemporary Amperex Technology Co. Limited (CATL) is developing nickel and cobalt-free batteries, however, no production timeline has yet been stated.

Production of electric vehicles in China has recently switched from lithium cobalt-based batteries back to lithium iron phosphate batteries (LFP) because they are comparatively cheaper. The corresponding cost reduction in the vehicle allows it to remain eligible for subsidies in China if it also meets a minimum driving range. In order to qualify on both the price and the minimum driving range, Chinese vehicle manufacturers have adopted cell to pack technology (CTP). This allows them to leave out the interim 'module' step in battery construction, creating more volume inside the battery that is available to carry charge and thereby extending the vehicles' driving range.

Patents on LFP batteries are due to expire in 2022, when production outside of China may become possible. CTP technology, although inherently simple, may take longer to trickle down. LFP batteries also have simpler recycling pathways for lithium — in contrast to batteries that contain nickel and cobalt. The recycling process for nickel and cobalt based batteries tends to recover those higher value metals, instead of lithium.

Europe COVID-19 electric vehicle subsidies and ICE bans

The United Kingdom has brought forward the planned banning of internal combustion engines (ICE) from 2035 to 2032. In Europe, imminent ICE bans range from 5 years away for Norway, to 20 years for France. The bans are also backed by generous subsidies for plug-in hybrid and full electric vehicles. Subsidies for battery electric vehicles range from US$7,700 in France to US$4,400 in the Netherlands and US$3,800 in the United Kingdom (Figure 15.5).

China has routinely tailored subsidies to market conditions. These subsidies are assisting demand in these markets of critical market share for electric vehicle production. Additionally, the Indian government is also leveraging its tendering process for government vehicles, in support of desirable characteristics for electric vehicles. Its recent tender specifications included vehicle speed, driving range, and vehicle reliability via battery degradation specifications and seating capacity. Winners of the tender included Tata and Hyundai.

Electric vehicle growth underpins lithium demand, but further developments in residential power storage and commercial marine transport are also underway.

New frontiers in demand

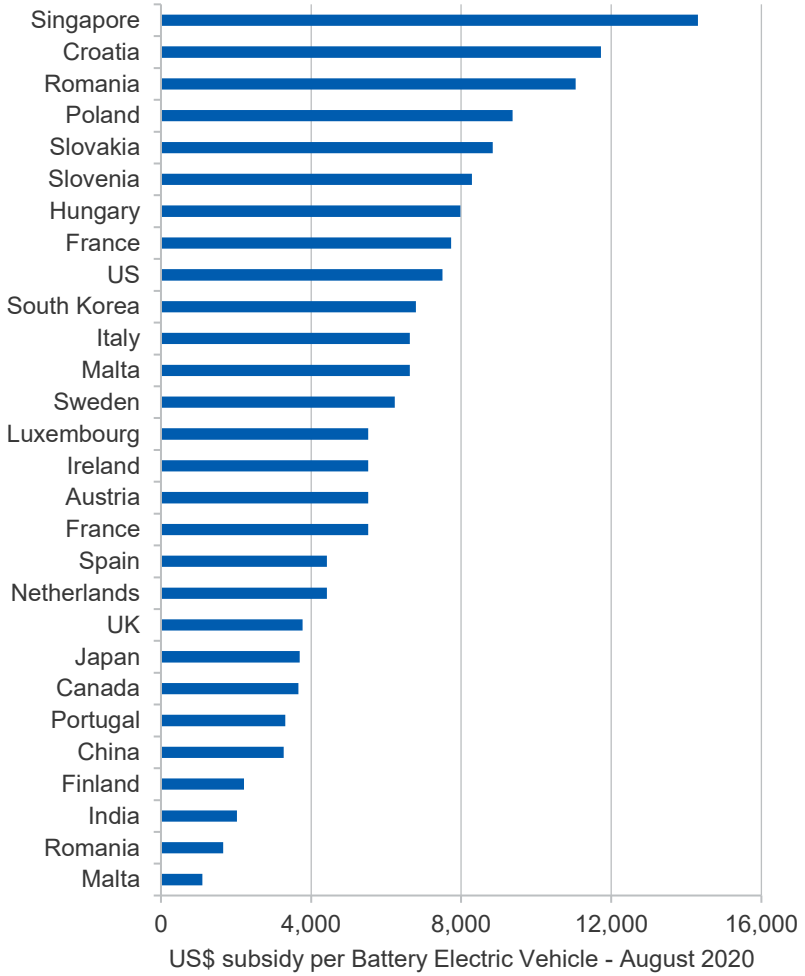
As the electric vehicle market gains critical mass, Tesla is placing increasing emphasis on producing batteries for electricity storage. However, it is struggling to keep up with demand, after California introduced incentives for battery storage. Deliveries of Tesla's 'Power-wall' for domestic power storage have been delayed to 2021.

Electric 4WD vehicles are becoming available for mining. The shift towards the use of these types of vehicles in underground mining applications may become more common, due to benefits such as the elimination of diesel exhaust fumes.

Tesla's 'Battery Day' may include some significant announcements, including bringing large scale battery production in-house, in order to avoid supply constraints and allow the company to leverage market impact for its light truck and heavy haulage business. There is also speculation of other developments, with driving range and improved battery performance likely to feature.

Finally, maritime shipping is moving towards electrification of vessels, with production in China, Japan and Korea, following on from the International Marine Organisation's 2018 strategy to curb emissions. LFP batteries are often used in this application, due to their lower fire risk and the need for higher safety standards in remote applications.

Figure 15.5: Battery electric vehicle subsidies



Notes: This graph is for direct national purchase subsidies only: There can be other indirect subsidies (e.g.: Value Added Tax (VAT) exemptions) that are not captured by the values below, as well provincial, state, or regional incentives on top of the national subsidies.

Source: BloombergNEF (2020)

15.4 World production

Spodumene stockpiles falling but lithium carbonate inventories high

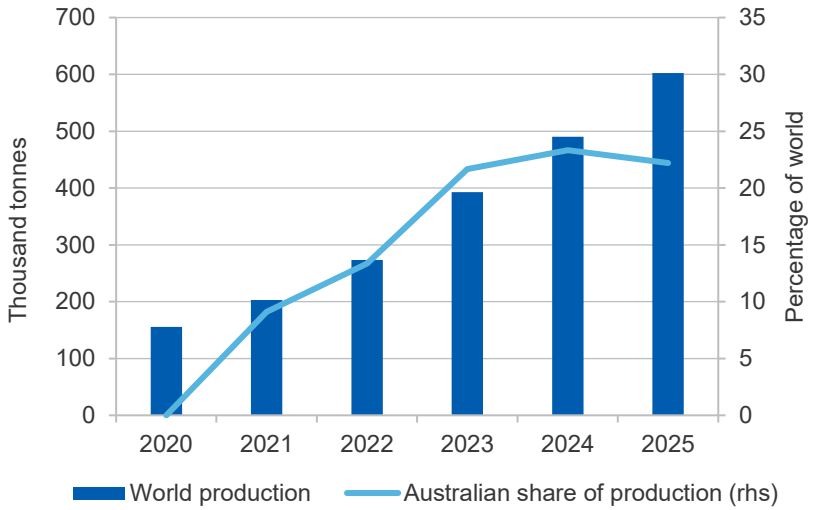
Increasing European demand for electric vehicles, coupled with green stimulus packages in response to the COVID-19 pandemic, are reinvigorating lithium demand. World production is forecast to fall to 373,000 tonnes in 2020, down from 486,000 tonnes in 2019 (lithium carbonate equivalent). But production is forecast at 509,000 tonnes in 2021, and at 565,000 tonnes by 2022.

Thus far in 2020, global production has been largely unaffected by COVID-19, as major producing countries have been able to maintain sufficiently low infection rates at their operations. Disruptions were experienced with some smaller operations in Argentina in the early stages of the pandemic as production was halted due to safety concerns, but most operations have been able to resume.

Tighter conditions have appeared in the spodumene market, with some producers potentially holding only around six weeks of concentrate supply. Meanwhile, lithium carbonate stocks have built up in the supply chain on the back of some patchy electric vehicle demand, after large imports of carbonate by China in early 2020. Chemical grade lithium carbonate is in greater supply than battery grade lithium carbonate. Stockpiles in battery grade product are likely to be drawn down before chemical grade products. However, chemical grade products can sometimes be upgraded to battery grade via additional refining.

Shortages are looming in the global battery lithium hydroxide market in 2021, after delays in project ramp ups. Weak lithium product prices and COVID-19 have contributed to delays at the Kwinana lithium hydroxide refinery owned by Tianqi. Stage 1 is now estimated to be completed by early 2021. Ramp up of the Kwinana lithium refinery's production is at risk due to expertise required for that operation. The Kemerton lithium hydroxide refinery is due for commissioning in late 2021. The value-adding of spodumene in Australia with the production of lithium hydroxide may come at an opportune time with respect to possible global supply shortages (Figure 15.6).

Figure 15.6: World lithium hydroxide production



Source: BloombergNEF (2020); Department of Industry, Science, Energy and Resources (2020)

Operation outlook positive if battery grade product produced

In August Albemarle announced they would shutter their Kings Mountain and Silver Peak operations in the US, after poor demand and low prices for their chemical grade products. However, Lithium Americas is to restart construction at Cauchari Olaroz in Argentina. The operation may produce battery grade carbonate of 15,000 tonnes by early 2021, increasing to 36,000 tonnes by 2022.

The COVID-19 pandemic has seen a pullback in capital expenditure. However, the US$330 million expansion plans of Chilean lithium carbonate producer, Sociedad Quimica y Minera de Chile (SQM) may be back on the table if improving market conditions gain momentum along with Albemarle-led expansions at La Negra III and IV by late 2021. UK-based Cornish Lithium, along with parent Geothermal Engineering Limited, have secured funding via government and markets for their 'zero carbon' geothermal lithium project.

Capital raising for lithium projects has also improved, with dual-listed (ASX/NASDAQ) Piedmont raising around $30 million to progress its Piedmont mine to hydroxide project in North Carolina. Meanwhile Vulcan Energy (ASX listed) was oversubscribed, raising $4.8 million for a prefeasibility study on its German based Rhine Valley 'zero-carbon' geothermal lithium project. AVZ Minerals (ASX listed) raised $16 million with the early works programs commenced for its Manono Lithium and Tin Project in the Democratic Republic of Congo. These projects may help to offset the effects of COVID-19 disruption on the construction of other lithium mine and brine projects.

Brine producers in South America are coming under increasing scrutiny over the sustainability of lithium carbonate production, due to its high level of water consumption. SQM has been asked to resubmit the environmental management plan for its Atacama operations. Trials are underway by Lake Resources (ASX listed) utilising the 'Lilac Ion-Exchange Technology' at its proposed operations in Argentina. The specialised process uses very little water, and Livent are understood to be successfully developing this technology at their Hombre Muerto operation in Argentina.

European production of lithium has been given a boost, with Rio Tinto allocating an additional US$200 million for feasibility studies of its Jadar project in Serbia. The deposit is understood to be of similar size and grade to Australia's Greenbushes deposit. The deposit is understood to contain the world's only occurrence of the mineral 'Jadarite'. In addition, it is expected to yield boron credits. Rio Tinto has been building expertise in the area of lithium via its Boron Mine in the US. It has been doing this by studying the potential for extracting lithium from the tailings waste stream of that mine.

15.5 Australia

Exports forecast to recover

Exports of lithium were around $1.1 billion in 2019–20. Continued low spodumene prices may see revenue fall to $1.0 billion in 2020–21, despite production from the commencement of operations at lithium hydroxide refineries. However, increased production due to new offtake agreements, is forecast to raise lithium export earnings to $1.3 billion by 2021–22.

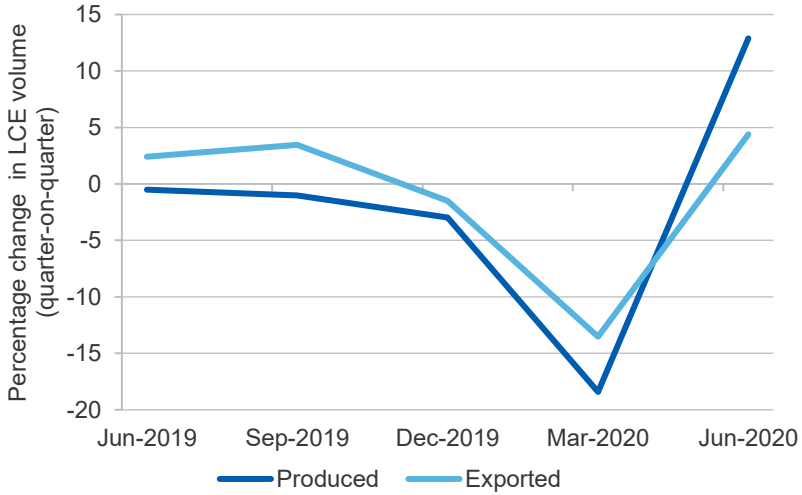
Production has started to increase

Spodumene production and sales appear to have turned the corner during the June quarter. Between the March and June quarters of 2020 production increased by 13 per cent quarter-on-quarter, with corresponding exports up 4.4 per cent after price declines since mid-2018 impacted production and sent Bald Hill into care and maintenance and delayed the development of Wodgina and Mt Holland (Figure 15.7).

Although weak prices for spodumene weighed on the market, an extension of an offtake agreement was still made by Galaxy Resources with existing customer Yahua International. Additionally, inventory levels of concentrate were at around six weeks of supply for both Altura Mining and Pilbara Minerals at the end of the June quarter, although higher for other producers. Pilbara Minerals has issued June quarter guidance forecasting sales increases of over 15 per cent for the coming September quarter. Other producers have been more muted or completely silent on their outlook. Pilbara Minerals also demonstrated increased market confidence with a reduction in its debt interest rate from 12 to 5 per cent, owing to support from BNP and the Clean Energy Finance Corporation.

Producers have once again started to quote costs of production — which remain high at around US$400 per tonne (delivered) of spodumene over the quarter. However, Pilbara Minerals achieved a cost of US$350 per tonne (delivered) in the month of June, after operating their processing plant for 65 per cent of the month. This bodes well for processing costs if they can achieve their sales guidance and stockpiles are low. Contract prices received for spodumene have become less transparent as offtakes are often linked to the prices for lithium carbonate and lithium hydroxide. Spot pricing for spodumene is still available but the market is becoming smaller due to additional offtake agreements.

Figure 15.7: Australian spodumene: production and export



Notes: Changes in volume expressed as percentage change of lithium carbonate equivalent.
Source: Company reports; Roskill (2020); Department of Industry, Science, Energy and Resources (2020)

After Bald Hill ceased production in 2019, Australia's remaining spodumene producers reduced their output and concentrated on improvements to recovery and operating cost reduction. Production is now expected to rise over the outlook period to 248,000 tonnes LCE in 2021–22, driven by anticipated price appreciation (due to rising electric vehicle demand). Spodumene exports are forecast to increase from 1.5 million tonnes in 2019–20 to 1.7 million tonnes in 2021–22 (Figure 15.8).

Australian producers are forecast to ramp up hydroxide production at Kwinana and Kemerton. The commissioning difficulties at Kwinana and the construction delays at Kemerton may contribute to lithium hydroxide shortages in 2021. A financial investment decision on Mt Holland and its associated refinery was delayed in early 2020 to March quarter 2021.

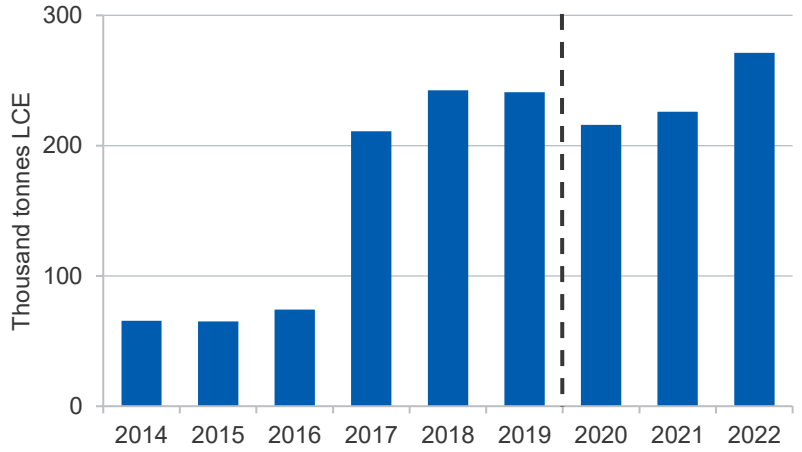
Australian companies: value-adding lithium and renewables technology

Despite challenging market conditions, Australian companies are looking to value-add in the lithium and renewables areas. This nascent drive is across the full value chain – with opportunities in mining, refining, manufacturing, power generation and recycling. Australia's earlier success in automation in iron ore may be incentivising this drive to value-adding, along with the cross fertilisation of software development and hardware/hard-rock development reminiscent of Tesla's work. Although development is often in Australia, many efforts in this direction are more global, with Australian companies evaluating development opportunities in South Korea, Germany, India and the United States (Table 15.1).

Revisions to the forecast

Despite weak spodumene prices in the short term, a turn in the market with new offtake agreements for Australian producers has seen export revenue forecasts for 2020–21 increase by 72 per cent to $1.0 billion. Exports in 2021–22 have been revised back up from $0.7 billion to $1.3 billion. These changes in revenue are due to the turnaround in the electric vehicle markets in China and Europe and the consequent pending shortfall in battery grade lithium hydroxide (Figure 15.9).

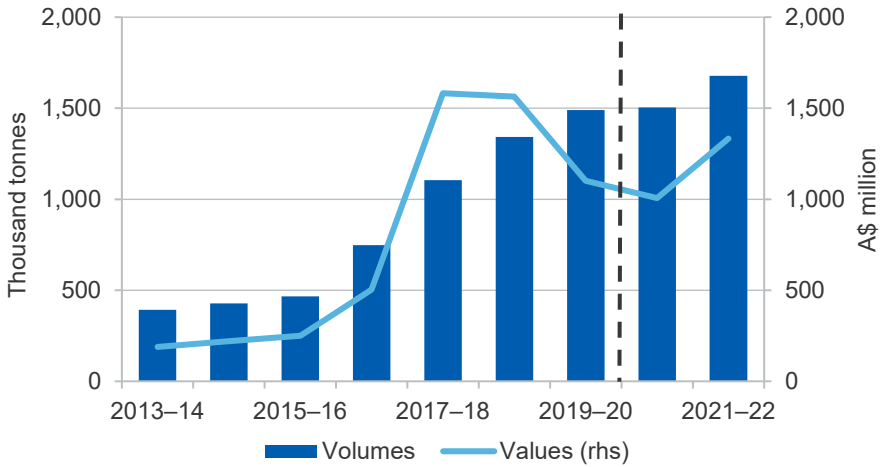
Figure 15.8: Australian spodumene concentrate production



Notes: Lithium hydroxide is not included.

Source: Company reports; Roskill (2020); Department of Industry, Science, Energy and Resources (2020)

Figure 15.9: Australian spodumene concentrate exports



Notes: Income figures include lithium hydroxide and spodumene volumes contain hydroxide.

Source: Company reports; Roskill (2020); Department of Industry, Science, Energy and Resources (2020)

Table 15.1: Australian companies: value-adding lithium and renewables technology

Company Name	Main Exchange	Country of development opportunity	Commentary
Chemical refining and new 'brands' of lithium			
Pilbara Metals	ASX	Korea	Joint venture with POSCO examining lithium hydroxide and lithium carbonate production.
Vulcan Energy	ASX	Germany	Conducting a prefeasibility on the potential production of 'zero carbon' lithium from geothermal brines. Vulcan recently obtained research grants from German statutory authorities, and their ASX capital raising of $5 million was oversubscribed.
Piedmont Lithium	ASX	United States	Recently completed a prefeasibility study on a mine to refinery project in North Carolina, close to electric vehicle and battery factories. Piedmont raised $30 million via the ASX and NASDAQ ADR.
Geo40	Private	Global	Using specialist technology to solve silica scaling issues associated with extracting lithium from geothermal brines. They have pilot plants in Japan and New Zealand.
Lake Resources	ASX	Argentina	Trialling environmentally friendly ion-exchange lithium carbonate extraction that uses minimal water.
Battery components & battery manufacture			
Novonix	ASX	United States	Developing patents for batteries capable of much longer charge/discharge service lives. Their recent capital raising was oversubscribed and raised $63 million.
Energy Renaissance	Private	Australia	The company is aiming to make batteries suitable for hot Australian conditions.
Lithium batteries and recycling			
Lithium Australia	ASX	Global	The company is developing lithium recycling and examining lithium iron phosphate (LFP) battery manufacturing.
Neometals	ASX	Germany and India	Examining lithium recycling with SMS Group (a German company) and lithium hydroxide production (in India).
Electric vehicles, charging infrastructure and renewables electricity via solar with battery storage			
Tritium	Private	Global	Brisbane based company developing and selling components for electric vehicle fast charging.
HyperPower	Private	Global	Working on production of motors for electric transport via vehicle or rail capable of speeds over 600 kilometres per hour.
Safescape	Private	Australia	Developing mine specification heavy duty 4WDs through its Bortana electric vehicle range.
Fortescue and Atlassian	ASX	ASEAN	ASEAN Powerlink – proposed $22 billion development of the world's largest solar power generation plant with battery storage in the Northern Territory for export to offshore markets.

Source: Company reports (2020)

Table 15.2: Lithium Outlook

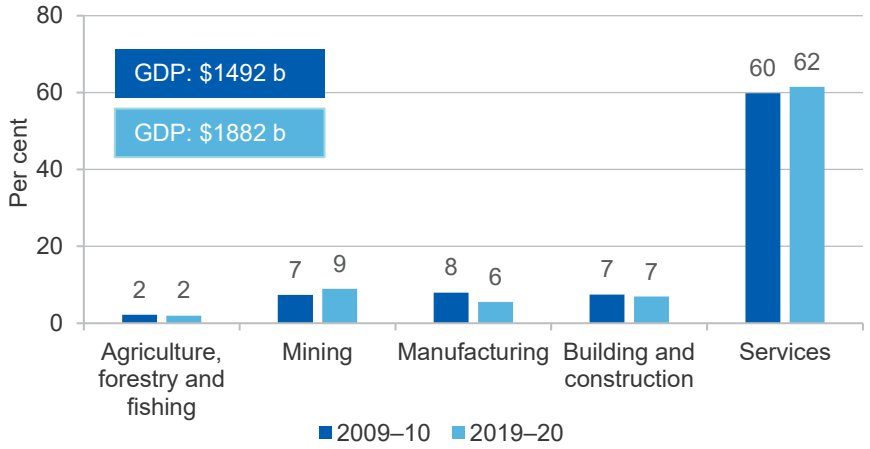
						Annual percentage change		
World	**Unit**	**2019**	**2020[f]**	**2021[f]**	**2022[f]**	**2020[f]**	**2021[f]**	**2022[f]**
Lithium production [a]	kt	486	373	509	565	-23.3	36.5	11.1
Demand [b]	kt	298	305	392	502	2.3	28.5	28.0
Stocks [c]	kt	100	100	154	198	0.0	53.4	28.4
– weeks of consumption		17.5	17.1	20.4	20.5	-2.2	19.4	0.3
Spodumene price								
– nominal	US$/t	655	450	500	588	-31.3	11.1	17.6
– real [d]	US$/t	666	450	488	563	-32.5	8.5	15.3
Lithium hydroxide price								
– nominal	US$/t	13,184	7,200	7,600	9,500	-45.4	5.6	25.0
– real [d]	US$/t	13,413	7,200	7,422	9,095	-46.3	3.1	22.5
Australia	**Unit**	**2018–19**	**2019–20[s]**	**2020–21[f]**	**2021–22[f]**	**2019–20[s]**	**2020–21[f]**	**2021–22[f]**
Mine production [a]	kt	246	231	219	248	-6.0	-5.2	13.3
Spodumene export volume [e]	kt	1,343	1,489	1,503	1,677	10.9	1.0	11.6
– nominal value	A$m	1,563	1,095	994	1,318	-29.6	-9.2	32.6
– real value [g]	A$m	1,624	1,128	994	1,292	-30.9	-11.5	29.9

Notes: **a** Lithium Carbonate Equivalent: This is a measure of the quantity of refined product; **b** Demand is ahead of consumption by approximately 12 months due to the lead time required in battery manufacturing; **c** Stockpile estimates possibly inaccurate due to increasing product purity specifications. Calculated from residual after losses from refining and allowing for lead time in battery manufacturing; **d** In 2020 US dollars; **e** Spodumene concentrates: 2018–19 products include direct ship ore, 4 per cent Li_2O concentrate and 6 per cent concentrate, thereafter mostly 6 per cent Li_2O concentrate, stockpiles run down in 2019–20; **f** Forecast; **g** In 2020–21 Australian dollars; **s** Estimate.

Source: ABS (2020) International Trade in Goods and Services, Australia, Cat. No. 5368.0; Company reports; Department of Industry, Science, Energy and Resources (2020); Roskill (2020); Government of Western Australia Department of Mines, Industry Regulation and Safety (2020)

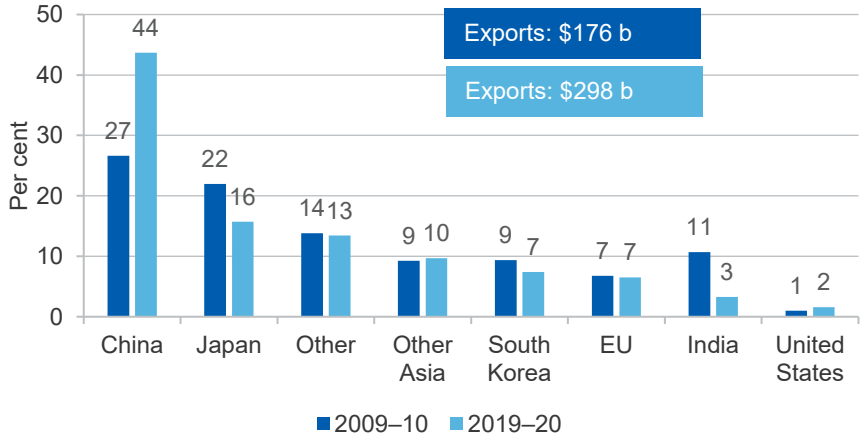
Trade summary charts and tables

Figure 16.1: Industry shares of GDP



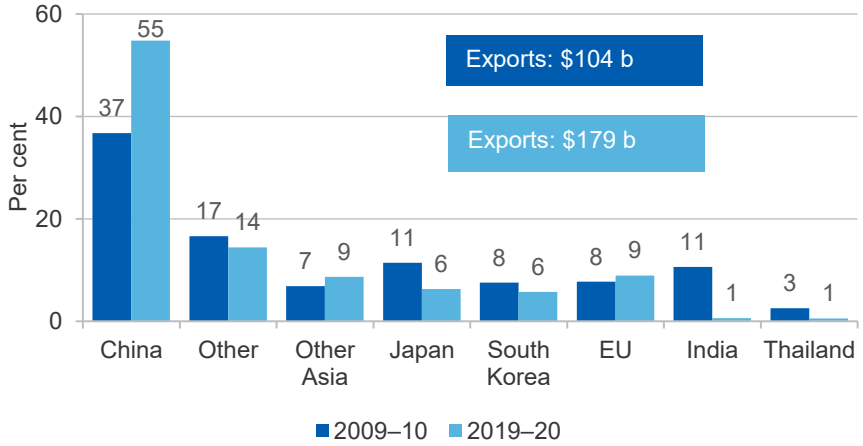
Source: ABS (2020) Australian National Accounts, National Income, Expenditure & Production, 5204.0

Figure 16.2: Principal markets for Australia's resources and energy exports, 2020–21 dollars



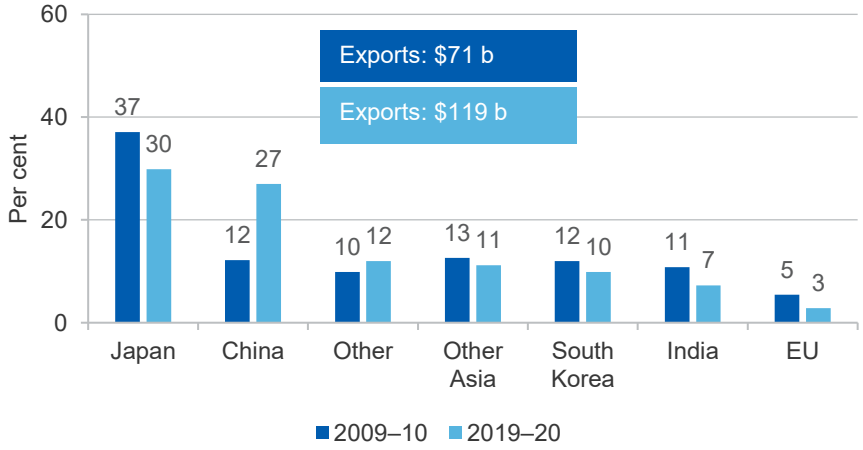
Source: ABS (2020) International Trade in Goods and Services, 5368.0

Figure 16.3: Principal markets for Australia's resources exports, 2020–21 dollars



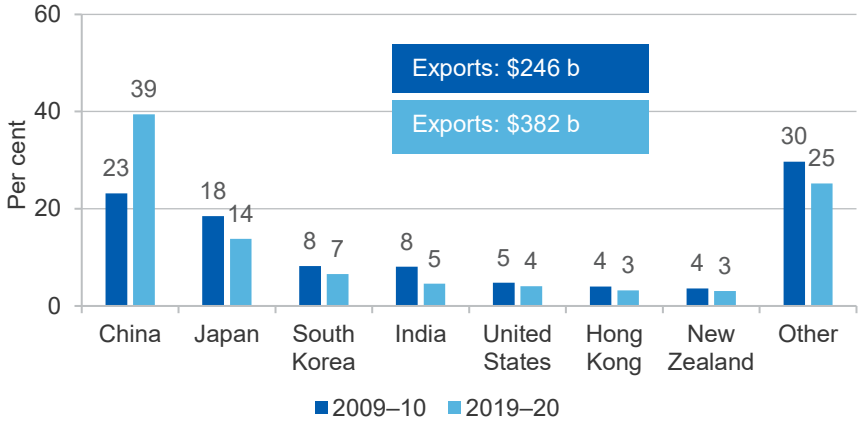
Source: ABS (2020) International Trade in Goods and Services, 5368.0

Figure 16.4: Principal markets for Australia's energy exports, 2020–21 dollars



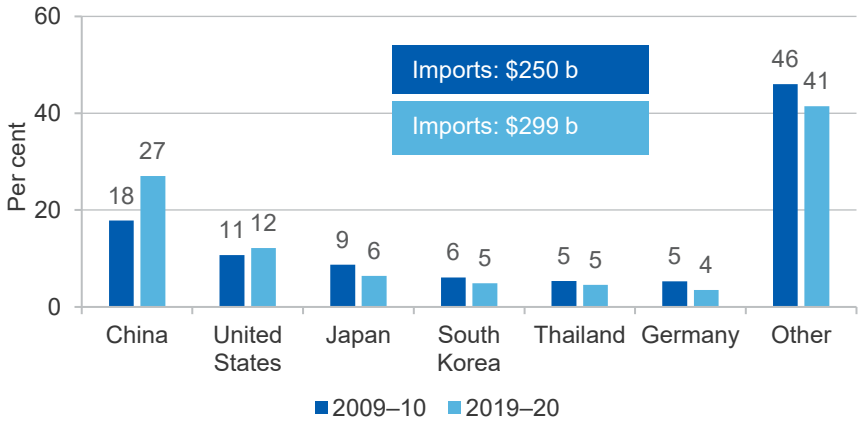
Source: ABS (2020) International Trade in Goods and Services, 5368.0

Figure 16.5: Principal markets for Australia's total exports, 2020–21 dollars



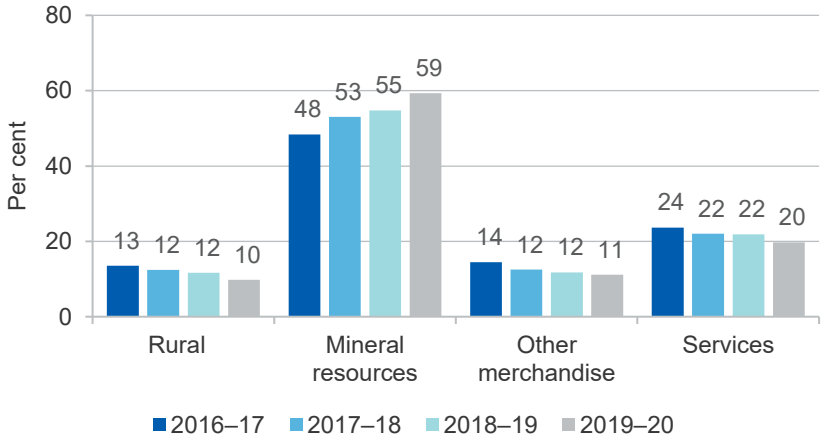
Source: ABS (2020) International Trade in Goods and Services, 5368.0

Figure 16.6: Australia's total imports by country of origin, 2020–21 dollars



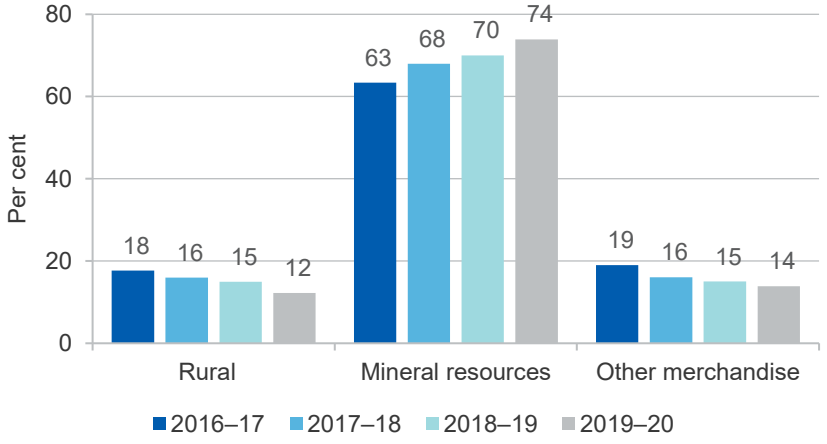
Source: ABS (2020) International Trade in Goods and Services, 5368.0

Figure 16.7: Proportion of goods and services exports by sector



Source: ABS (2020) Balance of Payments and International Investment Position, 5302.0

Figure 16.8: Proportion of merchandise exports by sector



Source: ABS (2020) Balance of Payments and International Investment Position, 5302.0

Table 16.1: Principal markets for Australia's thermal coal exports, 2020–21 dollars

	Unit	2015–16	2016–17	2017–18	2018–19	2019–20
Japan	$m	7,490	8,863	10,388	12,081	8,557
China	$m	1,897	3,774	5,003	4,394	4,029
South Korea	$m	2,761	2,760	3,138	3,960	2,923
Taiwan	$m	1,725	2,432	2,714	3,285	2,445
Vietnam	$m	108	157	135	690	1,067
Malaysia	$m	537	693	789	940	547
Total	**$m**	**16,148**	**20,344**	**23,849**	**26,966**	**20,891**

Source: ABS (2020) International Trade in Goods and Services, 5368.0

Table 16.2: Principal markets for Australia's metallurgical coal exports, 2020–21 dollars

	Unit	2015–16	2016–17	2017–18	2018–19	2019–20
China	$m	4,242	8,237	8,845	10,273	10,237
India	$m	5,049	9,008	10,013	11,679	7,726
Japan	$m	4,774	7,468	7,670	7,955	6,264
South Korea	$m	2,285	3,970	3,873	4,180	3,126
Taiwan	$m	1,064	1,961	2,041	2,698	2,054
Netherlands	$m	1,001	2,030	1,892	1,861	1,278
Total	**$m**	**21,664**	**38,031**	**39,907**	**45,331**	**35,107**

Source: ABS (2020) International Trade in Goods and Services, 5368.0

Table 16.3: Principal markets for Australia's crude oil and refinery feedstocks exports, 2020–21 dollars

	Unit	2015–16	2016–17	2017–18	2018–19	2019–20
Singapore	$m	689	1,090	1,240	2,021	1,444
China	$m	772	761	666	1,047	1,057
Malaysia	$m	158	460	618	1,704	1,039
Indonesia	$m	388	988	1,381	674	792
Thailand	$m	760	606	1,218	1,164	619
South Korea	$m	492	484	730	721	353
Total	**$m**	**5,960**	**5,893**	**7,347**	**9,424**	**9,288**

Note: Some country details have been confidentialised by the Australian Bureau of Statistics.

Source: ABS (2020) International Trade in Goods and Services, 5368.0

Table 16.4: Principal markets for Australia's LNG exports, 2020–21 dollars

	Unit	2015–16	2016–17	2017–18	2018–19	2019–20
Japan	$m	11,529	12,175	15,323	22,034	20,472
China	$m	3,218	6,139	10,095	18,161	16,730
South Korea	$m	1,838	2,750	3,894	5,513	5,305
Taiwan	$m	175	273	789	2,434	2,657
Malaysia	$m	205	225	384	906	1,490
Singapore	$m	435	1,539	1,199	1,285	1,063
Total	**$m**	**18,145**	**24,010**	**32,635**	**51,658**	**48,813**

Notes: Department of Industry, Science, Energy and Resources estimates based on International Trade Centre data, except for 2016–17 where ABS trade data is available.

Source: ABS (2020) International Trade in Goods and Services, 5368.0; International Trade Centre (2020) International Trade Statistics

Table 16.5: Principal markets for Australia's iron ore exports, 2020–21 dollars

	Unit	2015–16	2016–17	2017–18	2018–19	2019–20
China	$m	46,090	41,735	54,419	65,931	86,951
Japan	$m	7,330	5,039	5,688	5,981	7,227
South Korea	$m	4,430	3,286	4,126	4,848	6,392
Taiwan	$m	1,420	1,099	1,512	1,837	1,923
Indonesia	$m	30	58	46	45	28
India	$m	119	7	6	247	21
Total	**$m**	**52,325**	**67,395**	**64,826**	**80,564**	**104,916**

Source: ABS (2020) International Trade in Goods and Services, 5368.0

Table 16.6: Principal markets for Australia's aluminium exports, 2020–21 dollars

	Unit	2015–16	2016–17	2017–18	2018–19	2019–20
South Korea	$m	841	1,200	782	797	1,169
Japan	$m	1,595	750	984	1,371	1,043
Taiwan	$m	535	321	218	304	369
Thailand	$m	313	289	324	407	297
United States	$m	20	137	195	874	253
Indonesia	$m	150	102	160	124	98
Total	**$m**	**4,161**	**3,480**	**3,343**	**4,327**	**3,789**

Source: ABS (2020) International Trade in Goods and Services, 5368.0

Table 16.7: Principal markets for Australia's copper exports, 2020–21 dollars

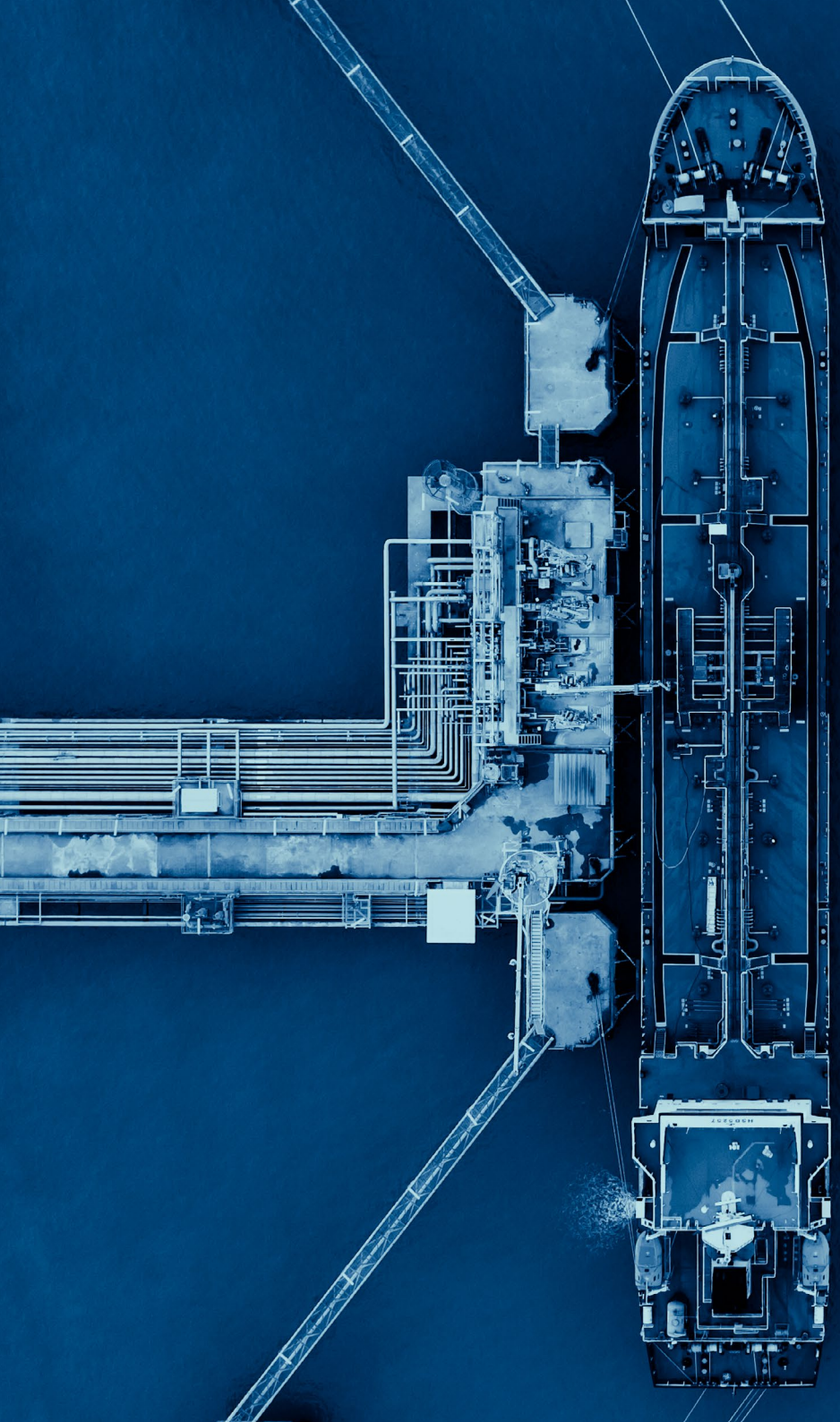
	Unit	2015–16	2016–17	2017–18	2018–19	2019–20
China	$m	3,926	2,904	3,978	3,746	3,818
Japan	$m	1,563	1,460	1,610	1,904	2,102
Malaysia	$m	676	925	919	1,289	845
South Korea	$m	537	480	307	710	652
India	$m	562	735	884	462	459
Philippines	$m	241	427	176	635	345
Total	**$m**	**8,878**	**8,146**	**8,924**	**10,149**	**10,183**

Source: ABS (2020) International Trade in Goods and Services, 5368.0

Table 16.8: Principal markets for Australia's gold exports, 2020–21 dollars

	Unit	2015–16	2016–17	2017–18	2018–19	2019–20
United Kingdom	$m	638	4,239	4,132	4,485	13,026
Hong Kong	$m	208	2,717	10,149	4,540	3,425
United States	$m	161	158	78	132	3,157
Switzerland	$m	16	93	238	1,206	1,947
Singapore	$m	3,409	1,287	319	1,651	1,459
China	$m	7,612	7,046	2,449	5,269	844
Total	**$m**	**14,480**	**17,172**	**19,388**	**19,599**	**25,008**

Source: ABS (2020) International Trade in Goods and Services, 5368.0



Appendices

Appendix A
Definitions and classifications

A.1 Exchange rates

In this report, the AUD/USD exchange rate (Australian dollar relative to the US dollars) is based on the median of economic forecasters at the time that the report is prepared. The source is the Bloomberg survey of economic forecasters.

World commodity prices are typically denominated in US dollars, and exchange rate movements can have a significant effect on the actual outcomes of commodity prices and export earnings. A change in the value of the US dollar against other floating international currencies can influence movements in world resources and energy prices. A change in the Australian dollar against the US dollar will impact on export earnings for domestic commodity exporters and producers. There is substantial uncertainty surrounding any exchange rate forecast, with changes to exchange rates influenced by changes in financial market sentiment, sometimes resulting in strong volatility.

A.2 Conversion to real dollars

Nominal values and prices are converted to real dollars using Australian and US consumer price indexes (CPI). The Australian and US CPI forecasts are based on the median of economic forecasters at the time that the report was prepared. The source is the Bloomberg survey of economic forecasters.

A.3 Time periods

The terms 'estimate', 'forecast' and 'projection' refer to different time periods in this report. Estimate refers to a time period that has passed, but for which full historical data is not yet available, while 'forecast' and 'projection' refer to different periods in the future. It is important to distinguish between different future time horizons, as factors affecting production, consumption and prices in the short-term differ from factors affecting these components in the medium to long-term. Forecasts also become increasingly imprecise over longer time horizons, due to increased risk and uncertainty. For these reasons, the Department of Industry, Science, Energy and Resources' Office of the Chief Economist (DISER OCE) uses different terminology to distinguish between short-term forecasts and medium to long-term projections, as outlined in *Table A2*.

Table A1: OCE terminology for different time periods/horizons

Period	Years	Terminology
Historical	Time period has passed but complete for data for the period is not yet available	Estimate
Short-term	1 to 2 years	Forecast
Medium-term	3 to 5 years	Projection
Long-term	Beyond 5 years	n/a

Source: Department of Industry, Science, Energy and Resources (2020)

A.4 Commodity classifications

The DISER OCE defines exports for each commodity by a selected set of 8-digit Australian Harmonised Export Commodity Classification (AHECC) codes. Where possible, the choice of AHECC codes is based on alignment with international trade data, to ensure that direct comparisons can be made. For example, groupings for various commodities are aligned with classifications used by the International Energy Agency, World Steel Association, International Nickel Study Group, International Lead and Zinc Study Group, International Copper Study Group and World Bureau of Metal Statistics.

In this report, benchmark prices and Australian production and exports are forecast for 21 commodities, as shown in *Table A2*. In estimating a total for Australia's resources and energy exports, the remaining commodities, defined as 'other resources' and 'other energy', are forecast as a group.

Table A2: Resources and energy commodities groupings and definitions

	Resources (non-energy)	Energy
Definition	Resource commodities are non-energy minerals and semi-manufactured products produced from non-energy minerals	Energy commodities are minerals and petroleum products that are typically used for power generation
Australian Harmonised Export Commodity Classification (AHECC) chapters	25 (part); 26 (part); 28 (part); 31 (part); 73 (part); 74; 75; 76; 78; 79; 80; 81	27 (part)
Commodities for which data is published, forecasts are made and analysed in detail in this report	Aluminium; alumina; bauxite; copper; gold; iron ore; crude steel; nickel; zinc, lithium	Crude oil and petroleum products; LNG; metallurgical coal; thermal coal; uranium

Notes: The AHECC chapter is the first two digits of the trade code. Groupings are made at the 8-digit level.
Source: Department of Industry, Science, Energy and Resources (2020)

Appendix B Glossary

Term	Description
A$	Australian dollar
ABS	Australian Bureau of Statistics
AHECC	Australian Harmonized Export Commodity Classification
AISC	All-In Sustaining Cost — an extension of existing cash cost metrics and incorporates costs related to sustaining production.
Base metals	A common metal that is not considered precious (includes aluminium, copper, lead, nickel, tin, zinc)
Bbl	Barrel
Bcm	Billion cubic metres
Benchmark	A standard specification used to price commodities.
BF and BOF	Blast furnace and basic oxygen furnace — used in an integrated steelmaking process that uses iron ore and coal.
Bulks	Non-liquid and non-gaseous commodities shipped in mass and loose (iron ore, coal, bauxite)
CAGR	Compound annual growth rate
Capex	Capital expenditure
CFR	Cost and freight — Seller clears exports, and pays freight.
CIF	Cost, Insurance, and Freight
Coal Seam Gas (CSG)	Natural gas found in coal seams. Also known as Coal Bed Methane (CBM)
Coke	Made by heating coal at high temperatures without oxygen, and used to reduce iron ore to molten iron saturated with carbon, called hot metal

Conventional gas	Natural gas that can be produced from reservoirs using traditional techniques. Contrasts with unconventional gas.
COVID-19	2019 Novel Coronavirus
CPB	CPB Netherlands Bureau for Economic Policy Analysis
CPI	Consumer Price Index — measures quarterly changes in the price of a basket of goods and services which account for a high proportion of expenditure by the CPI population group (i.e. metropolitan households).
Crude steel	Steel in the first solid state after melting, suitable for further processing or for sale.
DES	Delivered Ex Ship — price of LNG including shipping and insurance.
DISER	Department of Industry, Science, Energy and Resources
DMO	Domestic Market Obligation — a policy to reserve energy commodities for domestic usage
DRC	Democratic Republic of the Congo
ECB	European Central Bank
Economic growth	An increase in the capacity of an economy to produce goods and services, compared from one period of time to another. It is measured in nominal or real gross domestic product (GDP).
EIA	The United States Energy Information Administration
EAF	Electric arc furnace — a furnace that melts steel scrap using the heat generated by a high power electric arc.
ETF	Exchange Traded Fund — an exchange traded fund that allows investors to invest in gold on the exchange.
EUV	Export unit value — export value/volumes exported
EV	Electric vehicle
f	Forecast — a two year outlook
FEED	Front end engineering design
FID	Final investment decision

FOB	Free on board — seller clears export, buyer pays freight.
GAD	Gross air dried basis — For measuring coal quality.
GAR	Gross as received basis — For measuring coal quality.
GBP	Great Britain Pounds
GDP	Gross Domestic Product — measures the value of economic activity within a country/group.
GFC	Global Financial Crisis — the period of extreme stress in global financial markets and banking systems between mid-2007 and early 2009.
GJ	Gigajoule
GST	Goods and Services Tax — a value-added tax levied on most goods and services sold for domestic consumption.
HCC	Hard coking coal — The best grade of metallurgical coal used in the steel production process. Australian hard coking coal is regarded as the industry benchmark.
IEA	International Energy Agency
IMF	International Monetary Fund — an international organisation that promotes international financial stability and monetary cooperation.
IMO	International Maritime Organisation
IP	Industrial Production — measures the output of the industrial sector that comprises mining, manufacturing, utilities and construction.
IPO	Initial public offering — a process of offering shares of a private corporation to the public in a new stock issuance.
ISM	US Institute for Supply Management
ISM	Institute of Supply Management
JCC	Japan Customs-cleared Crude (or Japan Crude Cocktail) — average price of crude oil imported by Japan and a common price index in long-term LNG contracts.
JFY	Japanese fiscal year
kcal/kg	Kilocalories per kilogram

kt	Thousand tonnes
ktpa	Kilotonnes per annum
LBMA	London Bullion Market Association
LCE	Lithium Content Equivalent
Li OH	Lithium Hydroxide
LME	London Metal Exchange
LNG	Liquefied natural gas
LNY	Lunar New Year
LPG	Liquefied petroleum gas
LVPCI	Low volatile pulverised coal injection — a type of low volatile coal used in the PCI process
m	Million
MMbtu	Million British thermal units
Mt	Million tonnes
mtpa	Million tonnes per annum
MW	Megawatts
Nameplate capacity	The theoretical maximum annual production capacity
NAR	Net as received basis — For measuring coal quality
NDRC	China's National Development and Reform Commission
NEV	New energy vehicle — term used for plug-in electric vehicles eligible for public subsidies (battery electric vehicles and plug-in hybrid vehicles)

OCE	Office of the Chief Economist
OECD	Organisation for Economic Co-operation and Development
OPEC	Organisation of Petroleum Exporting Countries, a formal alliance of 14 countries to collaborate to manage the world oil market
OPEC+	Informal term for agreements between OPEC and ten other oil-producing countries (which are not members of OPEC)
Oz	Ounce
PCE	Personal Consumption Expenditure — a measure of the changes in price of consumer services and goods.
PCI	Pulverised coal injection — PCI coal is used for its heat value and injected directly into blast furnaces as a supplementary fuel, which reduces the amount of coke required.
PCI	Pulverised coal injection — a process used in blast furnace operations
PM	The afternoon price of gold set at 3.00pm each business day at the London Bullion Market Association
PMI	Purchasing Managers Index — an indicator of economic health for manufacturing and service sectors.
PPP	Purchasing Power Parity — a way of measuring economic variables in different countries that equalise the purchasing power of different currencies
RoW	Rest of world
s	Estimate — Incomplete data or subject to revision
Shale gas	Natural gas found in shales
SDR	Special drawing right
SHFE	Shanghai Futures Exchange
SSCC	Semi-soft coking coal — A type of metallurgical coal used in the steel production process alongside hard coking coal, but results in a lower coke quality and more impurities.
Tariff	A tax on imports or exports that is used by governments to generate revenue or to protect domestic industries from competition.
Tight gas	Natural gas found in low quality reservoirs

TWI	Trade Weighted Index — a measure of the foreign exchange value of the US dollar against a basket of major foreign currencies.
U3O8	Triuranium octoxide — a compound of uranium.
UAE	United Arab Emirates
UK	United Kingdom
Unconventional gas	Natural gas that is more difficult to extract, including coal seam gas, shale gas and tight gas. Contrasts with conventional gas.
US	United States
US$	United States dollar
WEO	The International Energy Agency's World Energy Outlook
WTI	West Texas Intermediate crude oil price
z	Projection — a five year outlook

Appendix C Contact details

Chapter/s	Author	Email
Overview	David Thurtell	David.Thurtell@industry.gov.au
Macroeconomic outlook, oil	Nathan Pitts	Nathan.Pitts@industry.gov.au
Steel, iron ore, uranium	Mark Gibbons	Mark.Gibbons@industry.gov.au
Metallurgical coal, thermal coal	Jeremy Coghlan	Jeremy.Coghlan@industry.gov.au
Gas	Monica Philalay	Monica.Philalay@industry.gov.au
Gold, aluminium, alumina and bauxite	Thuong Nguyen	Thuong.Nguyen@industry.gov.au
Copper, nickel	Kate Martin	Kate.Martin@industry.gov.au
Zinc, lithium	Caroline Lewis	Caroline.Lewis@industry.gov.au