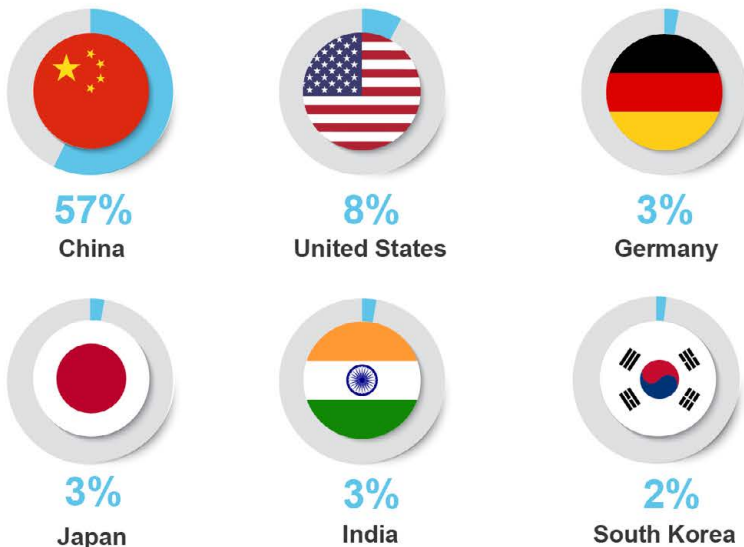


Aluminium

Major Australian bauxite deposits (Gt)



Aluminium



- Bauxite is refined to **recover alumina** and smelted to make aluminium
- 2-3 tonnes of bauxite** are 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

Australia's aluminium



11.1 Summary

- Slowing demand and strong supply are expected to see aluminium and alumina prices fall in the short term, before recovering as global economic growth picks up. Prices are projected to average US\$1,640 a tonne for aluminium and US\$307 a tonne for alumina in 2025 (in real terms).
- With no planned expansions to smelter or refinery capacity, annual Australian output is expected to be broadly steady over the outlook period, at 1.6 million tonnes of aluminium and 20 million tonnes of alumina.
- After reaching a peak of \$16 billion in 2018–19, the total value of Australian exports of aluminium, alumina and bauxite is projected to fall at an average annual rate of 4.6 per cent, to \$12 billion (in real terms) in 2024–25, due to softening prices for aluminium and alumina, and lower bauxite export volumes.

11.2 Prices

Aluminium and alumina prices fell strongly in 2019

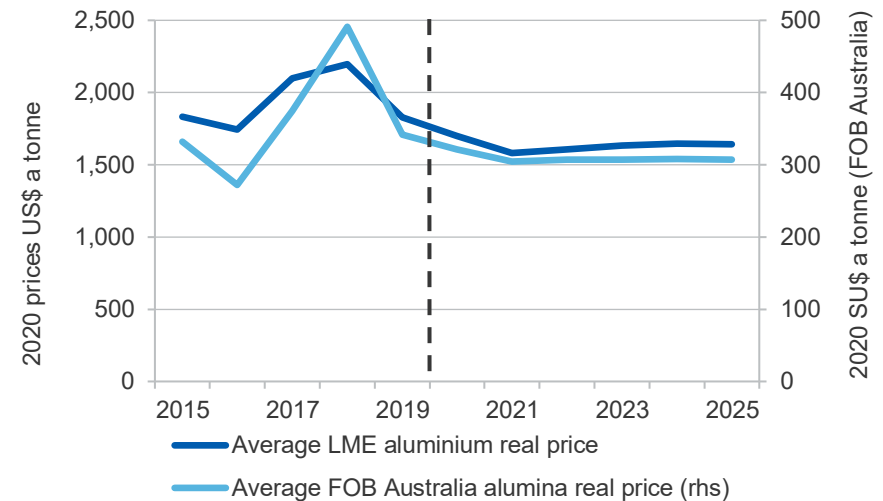
The London Metal Exchange (LME) spot price for aluminium fell by 17 per cent in 2019, averaging US\$1,830 a tonne (Figure 11.1). Prices were affected by US-China trade tensions, US aluminium import tariffs, and slowing world economic growth. The US government lifted sanctions on United Company Rusal — a major producer — in late January 2019, easing supply concerns and causing the aluminium spot price to fall.

The free on board (FOB) Australian alumina price was also lower in 2019, averaging US\$342 a tonne (Figure 11.1). The price decline was driven by rising supply — with the return to full production of Brazil’s Alunorte refinery after 19 months of restricted operation — and lower aluminium demand.

Aluminium and alumina prices to fall in 2020 and 2021 and then rebound

The LME aluminium spot price is forecast to decrease by 7.1 per cent to average US\$1,699 a tonne in 2020, and to fall by a further 7.0 per cent in 2021 to average US\$1,581 a tonne in real terms (Figure 11.1). The fall

Figure 11.1: World aluminium and alumina prices



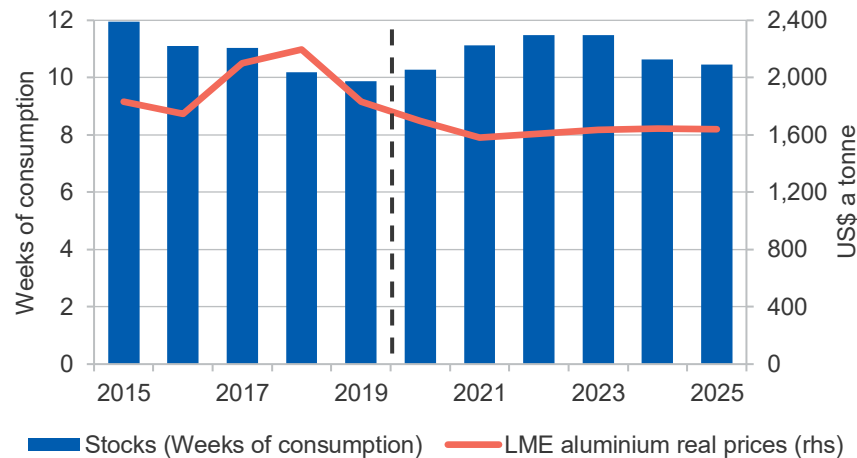
Source: LME (2020) spot prices; Metals Bulletin (2020) Alumina monthly price; Department of Industry, Science, Energy and Resources (2020).

reflects the combination of growing aluminium production — which is projected to increase at an annual average rate of over 2.5 per cent over the outlook period — and weaker aluminium consumption — which is expected to decrease at an average rate of 1.2 per cent a year in 2020 and 2021. A consequent build-up of aluminium stocks is expected in the short term (Figure 11.2).

The COVID-19 (coronavirus) outbreak is expected to reduce aluminium demand in China — which accounts for 57 per cent of global aluminium consumption — by 2.5 per cent in 2020. Despite a recent easing of monetary policy in China, there will be considerable lags before a boost in demand shows through in the construction sector. Adding further pressure to aluminium prices is the impact of falling input costs, with alumina prices forecast to continue declining through the outlook period.

The FOB Australian alumina price is forecast to fall by 5.9 per cent to average US\$322 a tonne in 2020, and then to US\$305 a tonne in 2021 (in

Figure 11.2: Aluminium real prices and stocks



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

real terms) (Figure 11.1). The price decline is expected to be driven by growing global alumina supply (due to the return to full production of Alunorte) and slowing global demand from aluminium producers. Slowing demand growth from the world automotive sector is having a considerable impact on global aluminium demand and prices.

After 2021, the LME aluminium spot price is projected to rise at an annual rate of 0.9 per cent to average US\$1,640 a tonne (in real terms) in 2025 (Figure 11.1), as growth in the global economy picks up. Recovering Chinese aluminium consumption is expected to be a driver of the recovery in aluminium prices.

World alumina production is projected to grow at an annual rate of 1.5 per cent after 2021, falling below demand. As a result, the FOB Australian alumina price is projected to rise at 0.2 per cent a year to US\$307 a tonne in 2025 in real terms (Figure 11.1).

11.3 Consumption

Falls in global aluminium and alumina demand in 2019

Global aluminium consumption fell by 3.3 per cent in 2019, to be just under 64 million tonnes (Figure 11.3). US–China trade tensions and a related slowing in global economic growth resulted in softer demand for aluminium. China — the world’s largest aluminium consumer — consumed 36 million tonnes of aluminium in 2019, a fall of 3.8 per cent.

Sales in the Chinese automotive sector (one of the country’s largest aluminium consumers) fell by 8.1 per cent in 2019 to nearly 26 million units. The fall in car sales in China was due to the withdrawal of government subsidies for low priced hybrid and electric cars.

World alumina usage declined by 2.2 per cent in 2019 to 117 million tonnes (Figure 11.4), driven by lower global aluminium production, which was down by 1.2 per cent in 2019. Aluminium output in China fell by 1.9 per cent in 2019, as US–China trade tensions impacted negatively on Chinese aluminium demand.

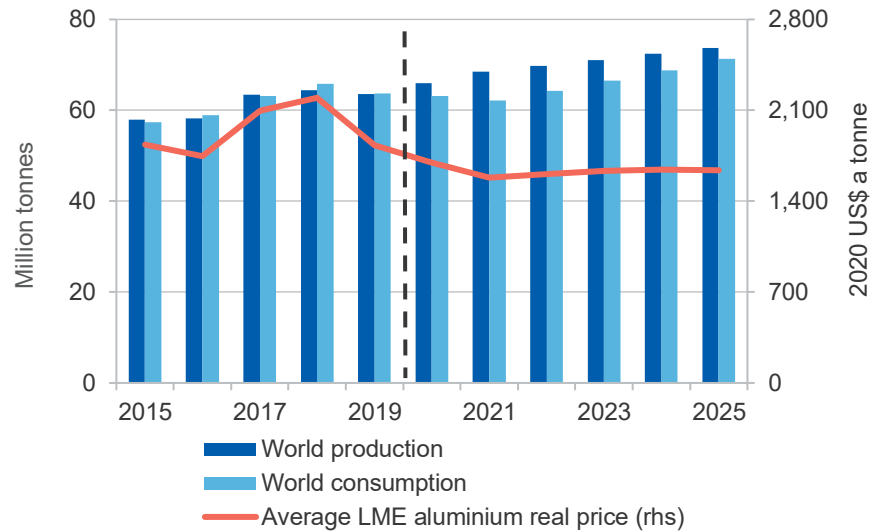
World bauxite usage rose by 2.6 per cent in 2019 to 299 million tonnes, propelled by increased global alumina production (up 6.0 per cent in 2019). The growth in alumina production was driven by the resumption to full production at Brazil’s Alunorte alumina refinery and a production ramp-up at the UAE’s 4 million tonnes per year Al Taweelah alumina refinery.

Short term decline in aluminium demand, but medium term rises for aluminium, alumina and bauxite demand

World primary aluminium demand is forecast to fall at an average annual rate of 1.2 per cent in 2020 and 2021, to 62 million tonnes by 2021 (Figure 11.3). The decline is expected to be driven by slowing demand from the automotive industry. The COVID-19 outbreak is likely to postpone consumers’ vehicle purchase decisions, with new vehicle sales in China expected to fall in the short term. The outbreak is also expected to impact the production and sales of vehicles in Japan, South Korea, and Europe, though to a lesser extent. In the US, higher vehicle prices (driven by new import tariffs) are expected to reduce consumer demand for vehicles.

After 2021, global aluminium consumption is projected to grow at an annual rate of 3.5 per cent to reach over 71 million tonnes in 2025, driven by rising infrastructure spending and demand from the transport and consumer durable sectors. Global industrial production, strongly correlated with aluminium demand, is projected to increase at an average of 2.3 per cent per annum over the outlook period.

Figure 11.3: World aluminium production, consumption and prices



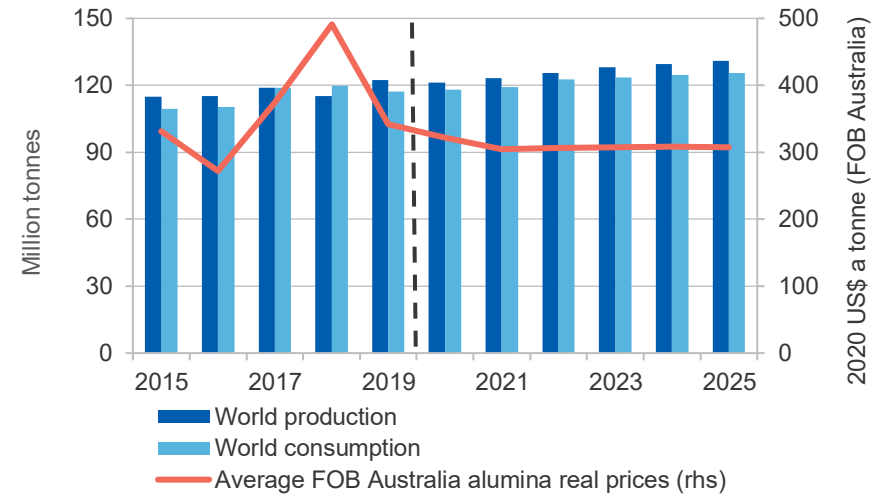
Source: International Aluminium Institute (2020); AME (2020); World Bureau of Metal Statistics (2020); Department of Industry, Science, Energy and Resources (2020)

The production of automobiles is expected to be a significant driver of aluminium demand going forward, as the auto sector attempts to improve energy-efficiency by switching from steel to aluminium components. Growing electric vehicle production will add to this trend. Bloomberg New Energy Finance estimates that passenger electric vehicle (EV) sales will rise from 2.6 million units in 2019 to 9.9 million units in 2025.

With an estimated average aluminium content of 250 kilograms per electric vehicle, aluminium usage in EVs is projected to increase from 740 thousand tonnes in 2019 to about 2.8 million tonnes in 2025 (Figure 11.5).

China is expected to be a major driver of higher energy-efficient vehicle output, with passenger EV sales projected to grow at an annual rate of 21 per cent, to 4.7 million units in 2025.

Figure 11.4: World alumina production, consumption and prices

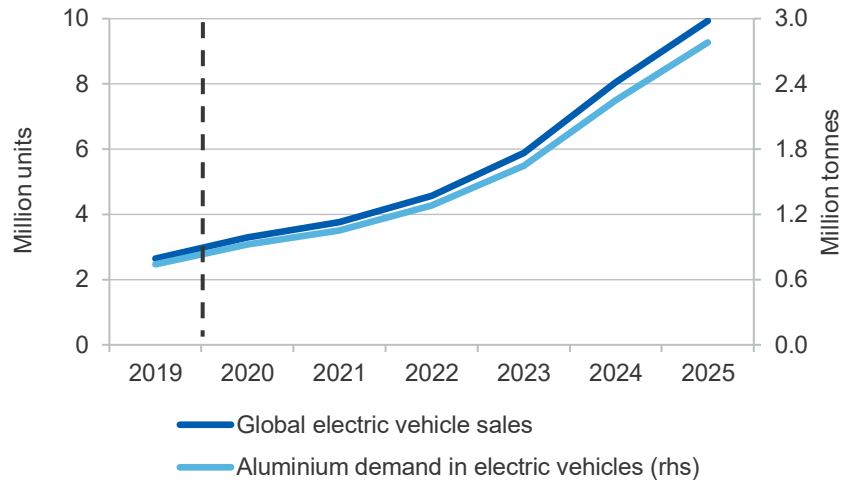


Source: International Aluminium Institute (2020); AME (2020); World Bureau of Metal Statistics (2020); Department of Industry, Science, Energy and Resources (2020)

World alumina consumption is projected to increase at an average annual rate of 1.2 per cent over the outlook period, reaching nearly 126 million tonnes by 2025 (Figure 11.4). Alumina demand is driven by primary aluminium production, which is projected to increase by 2.3 per cent a year between 2021 and 2025.

World bauxite consumption is projected to grow at an average annual rate of 1.8 per cent over the next five years, reaching 337 million tonnes by 2025. This is expected to be driven by new alumina capacity in China and Indonesia.

Figure 11.5: Global electric vehicle sales and aluminium demand



Source: Bloomberg New Energy Finance (2020); Aluminium Insider (2020); Department of Industry, Science, Energy and Resources (2020)

11.4 Production

Aluminium production fell, but alumina and bauxite output grew in 2019

World aluminium production for 2019 was nearly 64 million tonnes (Figure 11.3), a 1.2 per cent fall from 2018, due to lower output in China.

Production in China — the world’s largest aluminium producer — decreased by 1.9 per cent in 2019 — the first yearly fall in a decade — to just under 36 million tonnes. Trade tensions with the US and the Chinese government’s stricter environmental regulations slowed production growth in China.

World alumina supply rose by 6.0 per cent in 2019, to above 122 million tonnes (Figure 11.4). The Alunorte alumina refinery in Brazil operated at half of its 6.3 million tonne per annum capacity between March 2018 and June 2019, due to restrictions imposed by Brazilian environmental authorities (amid concerns of water contamination). The refinery’s return to full production has brought three million tonnes per year of alumina capacity back online. The two million tonne per year Al Taweelah alumina

refinery in the UAE has produced around 1.0 million tonnes of alumina since commencing production in April 2019.

World bauxite production increased by 4.9 per cent in 2019 to nearly 345 million tonnes (Figure 11.6), driven by the production ramp-up at the Amrun bauxite project in Western Australia and Aluminium Corporation of China’s 12 million tonnes a year Boffa bauxite mine in Guinea which started production in December 2019.

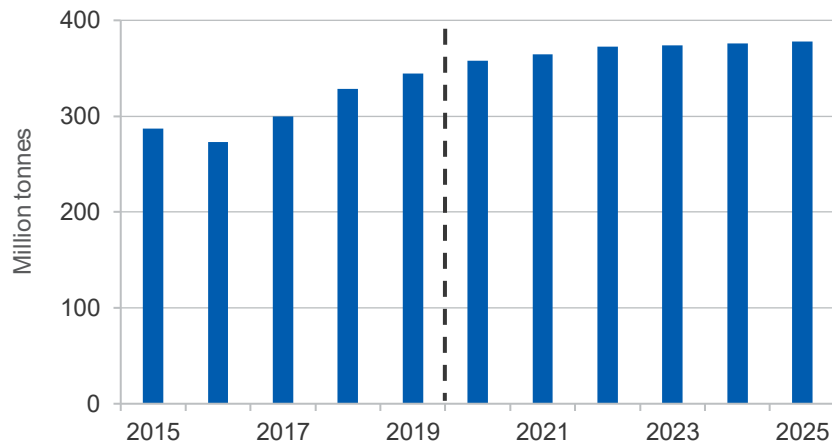
Aluminium, alumina and bauxite output set to rise over the outlook period

World aluminium production is projected to rise by 2.3 per cent a year over the outlook period, reaching nearly 74 million tonnes by 2025 (Figure 11.3). The gains will be driven by additional capacity in China, Iran and Indonesia. In China, more greenfield aluminium smelters are anticipated, located in regions (such as Yunnan province) where power is cheap and abundant. The 396,000 tonnes per annum Baiyinhua aluminium smelter is expected to commence production in late 2020 or early 2021. The 250,000 tonnes per annum Henan Yulian Group’s Yulian Guangyuan aluminium smelter is expected to come online in 2025.

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 commencing production in 2019. In July 2019, PT Indonesia Asahan Aluminium (Inalum) announced plans to increase production at the Asahan aluminium smelter in Indonesia from 250,000 tonnes to 2.0 million tonnes per year by 2035.

World alumina production is projected to increase at an average annual rate of 1.5 per cent over the outlook period, reaching nearly 131 million tonnes by 2025 (Figure 11.4). This growth is expected to be driven by China, India and Cameroon. In India, bauxite sourcing has improved, with Vedanta planning to increase production capacity at its Lanjigarh refinery to 2.7 million tonnes in the short term, and 6.0 million tonnes in the medium term.

Figure 11.6: World bauxite production



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

In China, greenfield alumina refineries are expected to be constructed in order to comply with the Chinese government’s stricter environmental regulation. Notably, Aluminium Corporation of China’s Chalco Guangxi Huasheng alumina refinery is expected to commence production (of around 2 million tonnes per year) from 2023. In Cameroon, the 3 million tonnes per year joint-venture CAL alumina refinery project (Emirates Global Aluminium, Hindalco and Hydromine) is expected to come online in 2022.

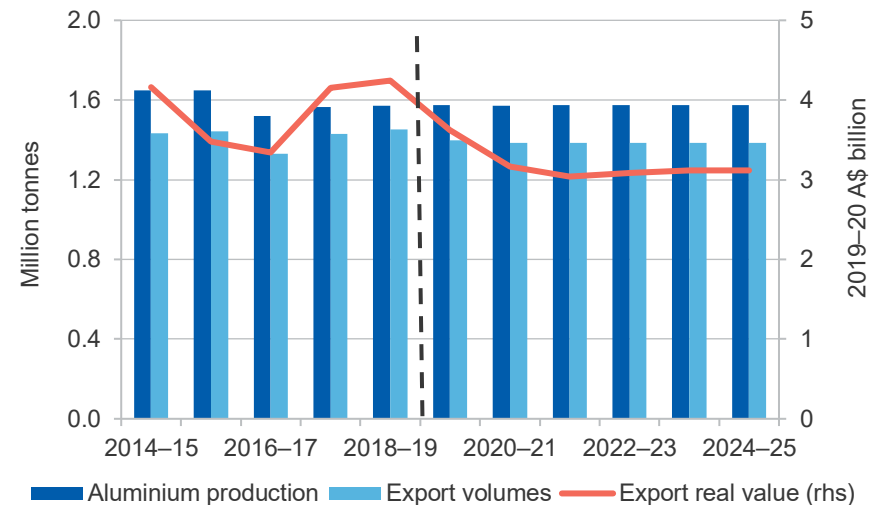
World bauxite production is projected to grow at an average annual rate of 1.2 per cent over the outlook period, reaching 376 million tonnes by 2025 (Figure 11.6). The gains are expected to be driven by newly added capacity in Australia — the world’s largest bauxite producer — and Guinea, where production is rising rapidly. The Compagnie des Bauxites de Guinée (CBG) mine in Guinea, which expanded from 13 to 18 million tonnes per annum in 2019, is due to expand to 28 million tonnes per annum by 2022. Emirates Global Aluminium is planning to ramp up production at its bauxite mine in Guinea, with a goal of 12 million tonnes per year by the second half of the outlook period.

11.4 Australia’s production and exports

Steady aluminium, alumina and bauxite production over the outlook

No expansions or major disruptions are expected at existing aluminium and alumina operations in Australia. This implies little change in production over the short to medium term. Australia’s aluminium production is projected to remain at around 1.6 million tonnes a year out to 2024–25 (Figure 11.7). Alumina production is expected to remain at around 20 million tonnes per annum over the outlook period (Figure 11.9).

Figure 11.7: Australia’s aluminium exports and production



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

A recent power outage — caused by severe weather conditions during summer — poses a risk for aluminium production. Any power blackout that lasts for more than three hours has the potential to damage production infrastructure. On 31 January 2020, Alcoa’s Portland aluminium smelter in Victoria operated at 55 per cent of capacity, after a storm cut power lines for more than three hours.

Other risks to the aluminium outlook include the operating costs of aluminium smelters. Figure 11.8 shows the total operating costs of aluminium smelters in the United States (US), Australia, the United Arab Emirates (UAE), Brazil and China. Australian smelters' total operating costs are lower than the US, but higher than the UAE, Brazil and China. High operating costs have been a challenging issue for aluminium smelters in Australia. US-based Alcoa announced a review of its global aluminium operations at the end of 2019 — which includes the Portland Aluminium smelter in Victoria. Rio Tinto has also announced a review of its aluminium smelter operation in New Zealand.

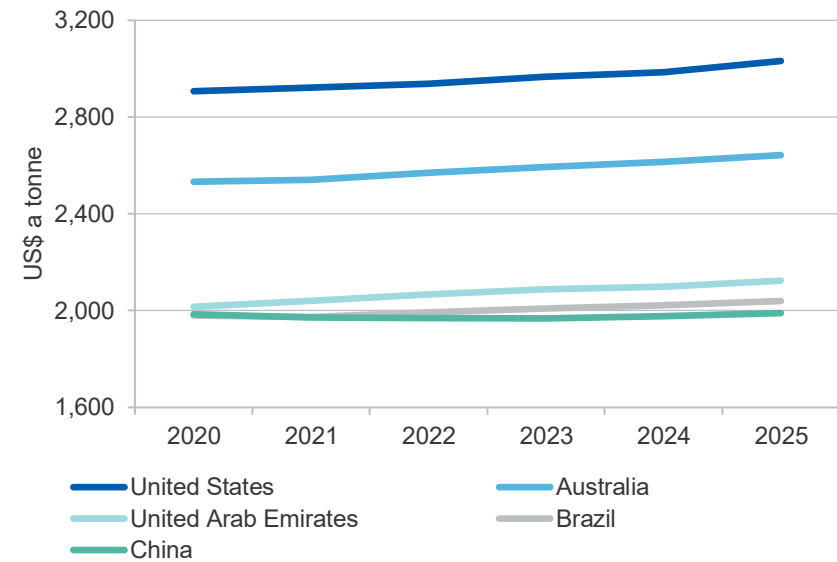
Australia's bauxite production is forecast to grow by 6.0 per cent in 2019–20, reaching 105 million tonnes (Figure 11.10). This is expected to be driven by the attainment of full production capacity at Amrun (23 million tonnes per year) and Bauxite Hills (6 million tonnes per year). After 2019–20, production is projected to remain steady out to 2024–25, with no planned expansions or major disruptions expected at existing operations.

Lower aluminium and alumina prices lead to weaker export outlook

After reaching a record high of \$16 billion in 2018–19, Australia's aluminium, alumina and bauxite export earnings are forecast to fall at an average annual rate of 4.6 per cent, to \$12 billion (in real terms) in 2024–25. The decline is due to softening prices for aluminium and alumina, and lower bauxite export volumes, which will only be partially offset by increased export volumes of alumina.

Risks to the aluminium outlook include trade protection policies that have the potential to slow global demand and prices in the short term. On 24 January 2020, the US Administration introduced additional tariffs on steel and aluminium imports, which commenced on 8 February 2020. The announced tariff measures are small but targeted imported steel and aluminium from Taiwan, China, Japan and the European Union. Australia, Canada and Mexico have been exempted from the additional tariffs. The announced tariffs cover 1 per cent of the steel and aluminium trade that were covered in the March 2018 tariffs — US\$450 million of US imports of

Figure 11.8: Aluminium smelter total operating costs



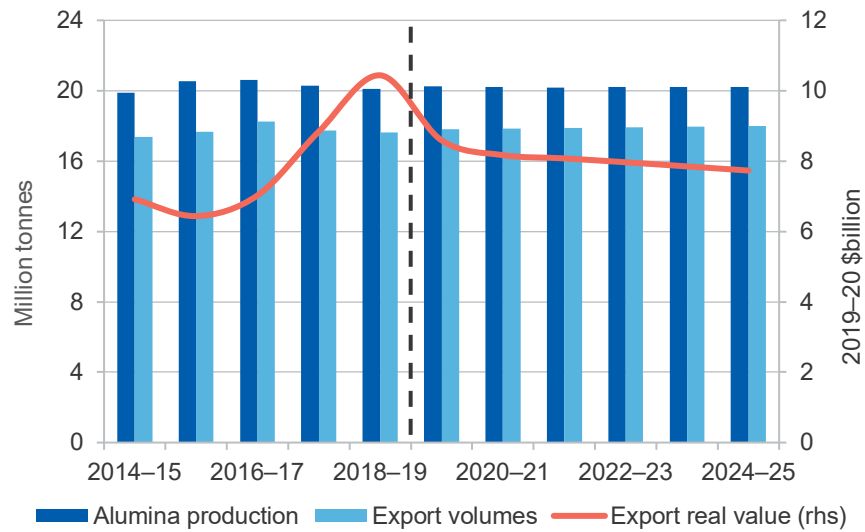
Source: AME (2020)

steel and aluminium bumpers, steel nails, aluminium wires, and body stamping for tractors.

Australian bauxite exports could be affected by the rise of Guinea as a major producer and exporter of bauxite. Guinea is China's second largest supplier of bauxite (after Australia), accounting for 44 per cent of China's total bauxite imports in 2019. Over the last few years, Chinese and European companies have invested heavily in Guinea to build up the country's bauxite production capacity.

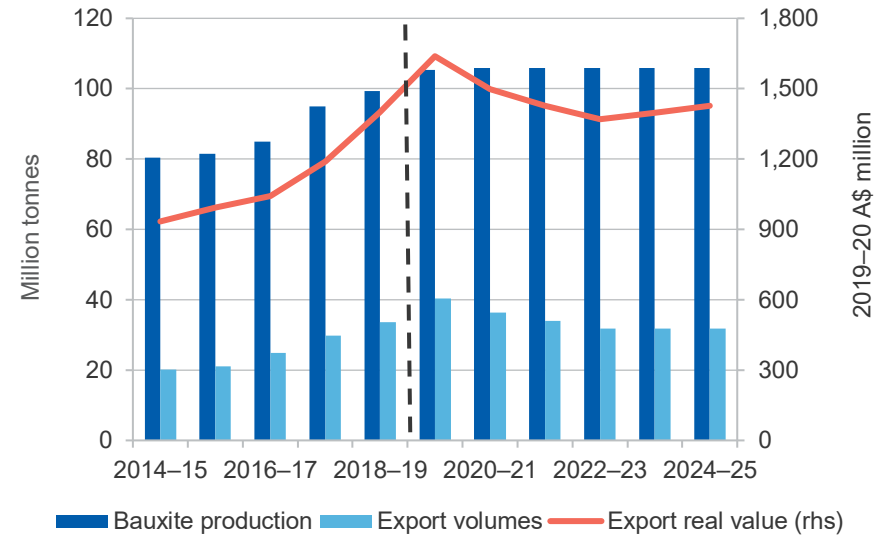
The Chinese government's environmental policies for curbing air pollution are likely to remain an important influence on aluminium and alumina production. Chinese smelters and refineries that fail to meet new regulations are likely to close. This could tighten global aluminium and alumina supply, creating an opportunity for Australian producers, but could also reduce demand for Australian alumina and bauxite in the short term.

Figure 11.9: 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 11.10: 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)

Table 11.1: Aluminium, alumina and bauxite outlook

World	Unit	2019	2020 ^f	2021 ^f	2022 ^z	2023 ^z	2024 ^z	2025 ^z	CAGR ^r
Primary aluminium									
Production	kt	63,635	65,927	68,555	69,805	71,083	72,397	73,729	2.5
Consumption	kt	63,680	63,220	62,106	64,260	66,503	68,851	71,287	1.9
Prices aluminium^c									
- nominal	US\$/t	1,792	1,699	1,614	1,679	1,746	1,799	1,835	0.4
- real ^d	US\$/t	1,830	1,699	1,581	1,607	1,634	1,645	1,640	-1.8
Prices alumina spot									
- nominal	US\$/t	335	322	311	320	328	337	344	0.5
- real ^d	US\$/t	342	322	305	307	307	308	307	-1.8
Australia	Unit	2018–19	2019–20 ^f	2020–21 ^f	2021–22 ^z	2022–23 ^z	2023–24 ^z	2024–25 ^z	CAGR ^r
Production									
Primary aluminium	kt	1,573	1,574	1,573	1,573	1,573	1,573	1,573	0.0
Alumina	kt	20,103	20,233	20,205	20,180	20,206	20,197	20,195	0.1
Bauxite	Mt	99.4	105.4	105.8	105.8	105.8	105.8	105.8	1.0
Consumption									
Primary aluminium	kt	156	198	247	248	244	249	250	8.2
Exports									
Primary aluminium	kt	1,452	1,398	1,384	1,384	1,384	1,384	1,384	-0.8
- nominal value	A\$m	4,166	3,620	3,229	3,166	3,292	3,407	3,492	-2.9
- real value ^e	A\$m	4,244	3,620	3,167	3,040	3,087	3,116	3,115	-5.0
Alumina	kt	17,619	17,825	17,861	17,897	17,933	17,969	18,005	0.4
- nominal value	A\$m	10,245	8,589	8,330	8,413	8,497	8,582	8,668	-2.7
- real value ^e	A\$m	10,437	8,589	8,168	8,076	7,966	7,849	7,731	-4.9
Bauxite	kt	33,546	40,409	36,307	33,929	31,746	31,749	31,749	-0.9
- nominal value	A\$m	1,401	1,638	1,498	1,427	1,370	1,398	1,426	0.3
- real value ^e	A\$m	1,427	1,638	1,469	1,369	1,285	1,279	1,272	-1.9
Total value									
- nominal value	A\$m	15,811	13,848	13,057	13,006	13,160	13,388	13,586	-2.5
- real value ^e	A\$m	16,108	13,848	12,805	12,485	12,337	12,244	12,117	-4.6

Notes: **c** LME cash prices for primary aluminium; **d** In 2020 calendar year US dollars; **e** In 2019–20 financial year Australian dollars; **f** Forecast; **r** Average annual growth between 2019 and 2025 or 2018–19 and 2024–25; **z** Projection. 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)