Aluminium, alumina and bauxite

Resources and Energy Quarterly June 2018

Australia's global ranking

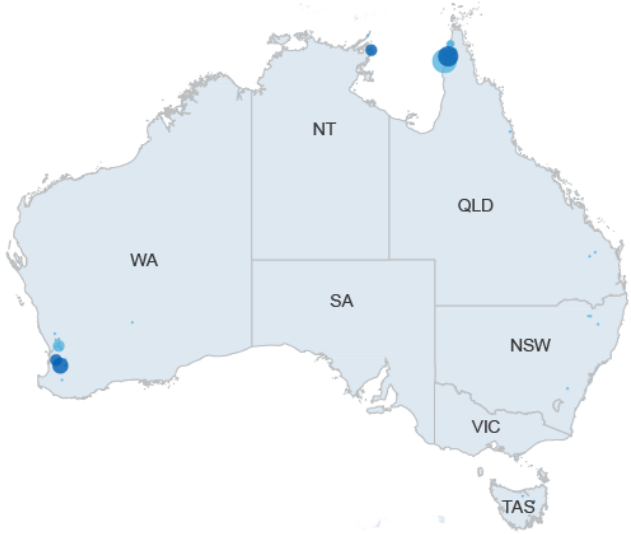
- 1st — Alumina exporter
- 1st — Bauxite producer
- 2nd — Alumina producer

3 stages of producing aluminium

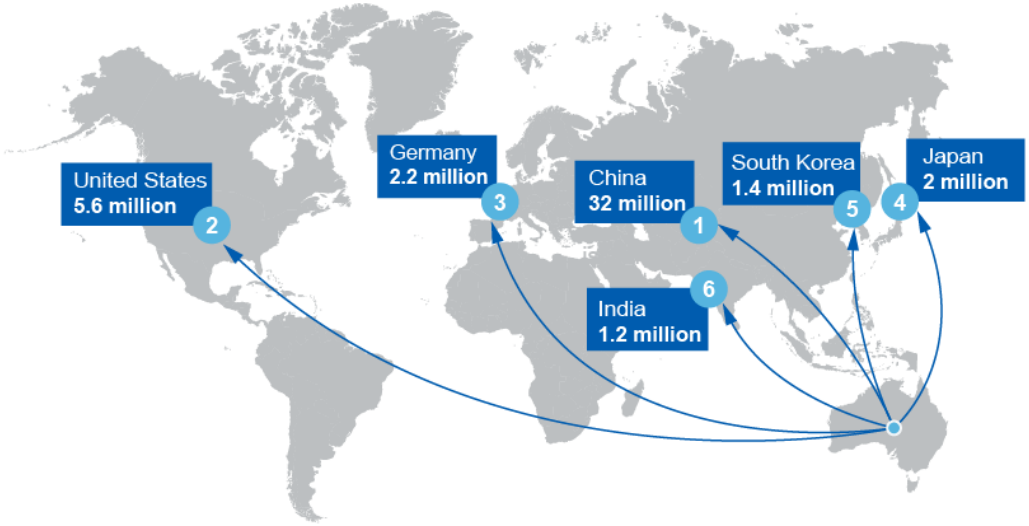
1. **Mining** bauxite ore
2. **Refining** to recover alumina
3. **Smelting** to make aluminium

Major Australian alumina deposits (Gt)

- <0.01
- 0.02–0.03
- 0.04–0.09
- 0.10–0.20
- 0.21–0.44
- >0.45
- Deposit
- Operating mine



Key consumer markets for aluminium (tonnes)



Global uses of aluminium

- **41%** Transport and manufacturing
- **20%** Packaging
- **14%** Construction
- **8%** Electrical
- **7%** Consumer durables
- **7%** Machinery
- **3%** Other

11.1 Summary

- Uncertainty in global aluminium supply chains is expected to drive prices up during 2018 to US$2,138 a tonne for aluminium and US$401 a tonne for alumina. Prices are forecast to decline to US$2,062 a tonne for aluminium and US$358 a tonne for alumina by 2020.
- Australia's aluminium and alumina exports are expected to remain steady through to 2019–20 at 1.4 million tonnes and 18 million tonnes per annum. Bauxite exports are forecast to increase from 27 million tonnes in 2017–18 to reach 30 million tonnes in 2019–20.
- Total Australian export value of aluminium, alumina and bauxite are forecast to decline from an estimated $14 billion in 2017–18 to $13 billion in 2019–20, reflecting a decline in prices.

11.2 Prices

Uncertainty in aluminium markets drove prices up during the June quarter

Aluminium and alumina prices have reached multi-year highs during the June quarter 2018, as the US administration placed sanctions on United Company Rusal — the world's second largest aluminium supplier, with 6 per cent of both global aluminium and alumina production. The company's operations are globally integrated, drawing on supplies of bauxite and alumina for its own refiners and smelters, in addition to supplying to other operations outside of Russia.

The London Metal Exchange (LME) spot price for aluminium reached a seven-year high at US$2,603 a tonne on April 19th 2018. The Free On Board (FOB) Australia alumina price reached a historical high at US$643 a tonne on May 1st 2018. Aluminium and alumina prices increased due to concerns of supply shortages resulting from the sanctions.

The US administration relaxed the sanctions in late April, giving buyers an extended period to end contracts with United Company Rusal and the opportunity for Oleg Deripaska — the major shareholder of Rusal and the target of the sanctions — to divest and relinquish majority ownership of the company. Oleg Deripaska has taken steps to have the sanctions lifted on the company by resigning as director.

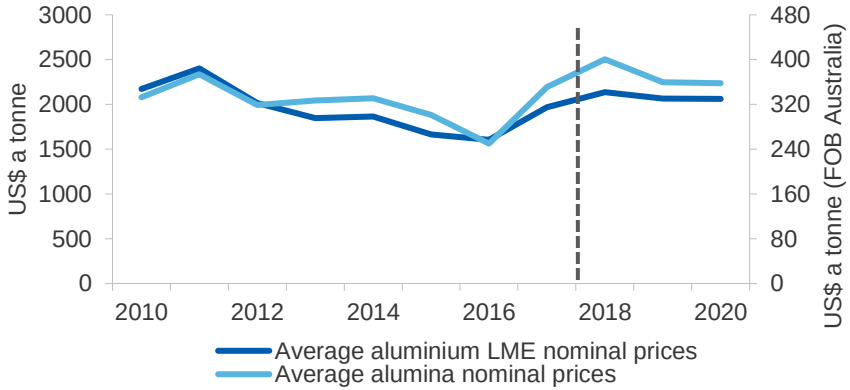
Prices have also been buffeted by uncertainty associated with the recent imposition of tariffs on some US aluminium imports. Prices are forecast to fall further and stabilise by the end of 2018, to average US$2,138 a tonne for aluminium and US$401 a tonne for alumina.

Prices to fall modestly in 2019 and 2020

The LME aluminium spot price and the FOB Australian alumina price are estimated to fall from 2018 levels. In 2020, the LME aluminium spot price is estimated to average US$2,062 a tonne. The FOB Australian alumina price is estimated to average US$358 a tonne. The decline in prices will come as supply concerns ease.

Despite the forecast declines, prices for 2019 and 2020 are still high relative to previous years, as capacity controls and restrictions on production due to air pollution concerns continue to keep the market tight in China — the world's largest aluminium and alumina producer. The Chinese Government's focus on decreasing air pollution is expected to continue until at least 2020. The policy is helping not only improve the air quality in China's major cities, but also reducing the likelihood of aggressive capacity expansion in China.

Figure 11.1: World aluminium and alumina prices



Source: LME (2018) spot prices; Metals Bulletin (2018) Alumina monthly price; Department of Industry, Innovation and Science (2018).

11.3 Consumption

China and the US driving global consumption

Global aluminium consumption fell by 2.3 per cent year-on-year in the March quarter of 2018, driven primarily by declines in consumption in China (down 1.6 per cent year-on-year) and the US (down 17 per cent year-on-year). China accounts for 54 per cent of world aluminium consumption, and the US accounts for 9.5 per cent. Sales in the Chinese automotive sector (one of the country's largest aluminium consumers) grew by 1.5 per cent year-on-year. However global vehicle sales for the March quarter of 2018 were down year-on-year by 2.3 per cent.

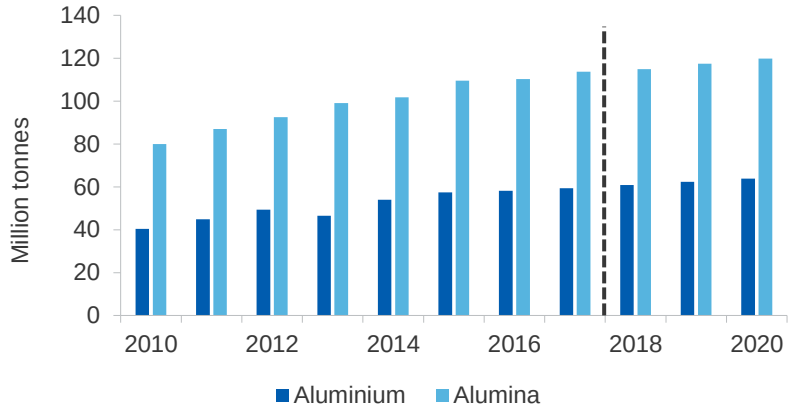
World alumina consumption decreased by 1.9 per cent year-on-year in the March quarter 2018, driven by lower alumina usage in China (down 3.4 per cent year-on-year) — the world's largest alumina consumer. Declines in alumina consumption broadly matched aluminium output for the quarter. In 2018, consumption of both aluminium and alumina will benefit from firm growth in global industrial production, with aluminium demand forecast to rise by 2.7 per cent to 61 million tonnes. World alumina consumption is also forecast to rise, by 2.6 per cent to 115 million tonnes, as aluminium smelter capacity returns from winter production cuts in China.

Aluminium demand continues to grow

Over the forecast period, world primary aluminium demand is projected to grow at an average annual growth rate of 2.4 per cent, to reach 64 million tonnes in 2020. China's aluminium consumption is expected to continue to grow firmly over the next two years (reaching 35 million tonnes in 2020), supported by strengthening residential and infrastructure construction. Outside of China, growth in global economic activity is expected to be driven by the US, Eurozone, and emerging/developing economies.

A significant driver of aluminium demand is expected to come from cars, particularly energy efficient vehicles with a rising portion of aluminium components. Demand for automobiles is expected to remain strong through to 2020. The Chinese Government is promoting the use and production of energy-efficient cars (utilising higher aluminium content) to reduce vehicle weight. It is now targeting 2 million units to be sold in 2020.

Figure 11.2: World aluminium and alumina consumption



Source: World Bureau of Metal Statistics (2018); Department of Industry, Innovation and Science (2018)

Other potential areas of increasing aluminium demand are the manufacture of busbars — strips of metal used to conduct electricity — (traditionally used copper), and the construction of China's high voltage and ultra-high voltage electrical networks.

Growth in alumina demand in line with aluminium production

World alumina consumption is projected to grow at an average annual rate of 2.1 per cent, reaching 120 million tonnes in 2020 — in line with the average annual growth rate of aluminium production. This reflects a future of more strictly controlled capacity approvals in China's aluminium production, and the growth of recycled aluminium.

China continues to be the largest alumina consumer in the world — accounting for 54 per cent of global alumina demand — reaching 65 million tonnes in 2020. For elsewhere in the world, the Middle East's alumina consumption is projected to increase from 8 million tonnes to reach 11 million tonnes in 2020, driven by growing aluminium production in Iran as well as the Gulf Cooperation Council — which comprises Bahrain, Oman, Saudi Arabia, Qatar and the UAE.

11.4 Production

World output of aluminium, alumina and bauxite continues to rise in 2018

World aluminium production decreased by 0.7 per cent year-on-year for the first five months of 2018, to 32 million tonnes, driven by Chinese aluminium production (down 2.7 per cent year-on-year). The decline in Chinese aluminium production occurred while winter production cuts were in place as part of the focus on reducing air pollution. Global production is estimated to reach 61 million tonnes in 2018, with curtailed capacity expected to return during the remainder of the year.

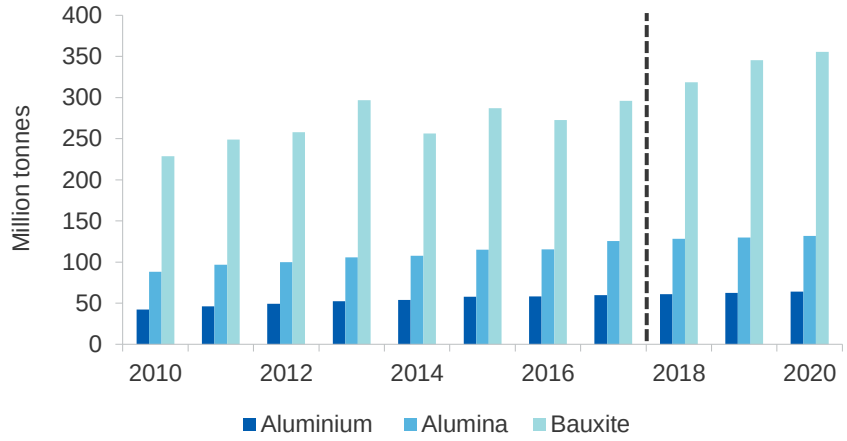
Chinese alumina refineries increased production to meet increased demand for aluminium before the 2017–18 winter production cuts, lifting global production by 9.1 per cent in 2017 to reach 126 million tonnes. World alumina production declined by 5.0 per cent year-on-year for the first four months of 2018, driven by the reduction in Chinese production. World alumina production is estimated to increase modestly from 2017 levels to reach 128 million tonnes in 2018 to meet demand for global aluminium. A risk to this assessment is the Alunorte refinery in Brazil, where production has temporarily been halved due to environmental considerations. The refinery has an annual capacity of 6.4 million tonnes.

Global bauxite production increased 8.9 per cent year on year for the March 2018 quarter, driven by increased production in Guinea, up 49 per cent. Australia — the world's largest bauxite producer — had its production increase by 6.7 per cent year-on-year. Global bauxite production for 2018 is estimated to increase by 7.6 per cent in 2018, to 319 million tonnes.

Environmental regulation in China to slow world aluminium/alumina output

Over the outlook period, world aluminium production is forecast to grow at an average annual growth rate of 2.4 per cent, reaching 64 million tonnes by 2020. Supply growth is expected to be slowed by environmental initiatives in China, which seek to control capacity expansion and reduce air pollution in major cities. Small and inefficient Chinese aluminium smelters may choose permanent closure under the laws, which allow them to sell their capacity quota to new or larger more efficient operations.

Figure 11.3: World aluminium, alumina and bauxite production



Source: International Aluminium Institute (2018); World Bureau of Metal Statistics (2018); Department of Industry, Innovation and Science (2018)

There is uncertainty over further winter production cuts in China, as the authorities respond to concerns about air pollution. Further uncertainty regarding China's supply lies in the addition of new capacity outside pollution-affected areas, the restart of idled capacity and the Chinese Government's production curtailment exemption granted to large state-owned corporations. Chinese aluminium smelters have the potential to add capacity equivalent to around 15 per cent (or 9 million tonnes) of annual global aluminium supply. If this occurs, the aluminium prices and alumina demand will weaken over the outlook period.

Aluminium supply growth outside of China is expected to occur in a number of countries. Iran plans to increase its annual aluminium production from 450,000 tonnes to 1.5 million tonnes by 2025, with a new 300,000 tonne capacity smelter on track to be completed in 2019. Expansion of the Alba smelter in Bahrain, due to be completed in 2019, increases capacity by 540,000 tonnes per annum.

In India, Vedanta's Jharsuguda expansion continues to ramp up production.

World alumina production is forecast to increase at an annual average rate of 1.4 per cent, reaching 132 million tonnes in 2020. This growth rate is slower than that of the last few years, due to China's supply reforms — which include capacity swaps, winter production cuts, and illegal capacity cuts.

New alumina capacities are not only subject to policy restraints, but also the availability of bauxite. Refining operations are typically set up close to quality bauxite sources in order to establish integrated supply chains. Indonesia, where there are bauxite rich regions, is expected to increase alumina production as new refineries come in to operation during 2019. The Chinese Hongqiao Group is expanding bauxite exports from Guinea to China, and the company's future refinery developments are being planned in closer proximity to bauxite resources in Guinea and Indonesia.

A new refinery is expected to begin production in 2019 in the UAE, with a capacity of 2 million tonnes per annum. The refinery will use bauxite imported from Guinea. In India, Vedanta has obtained permission from the Odisha State Government to expand its Lanjigarh Alumina refinery from 1 million tonnes per annum to 6 million tonnes per annum. The company is able to purchase bauxite — a longstanding supply problem constraining capacity — from the state-run Odisha Mining Corporation on a long term basis.

Australia and Guinea to drive rising global bauxite output in 2019 and 2020

World bauxite production is forecast to grow at an annual rate of 5.6 per cent to reach 355 million tonnes by 2020. The gains will be driven by new capacity in Australia — notably the commissioning of Bauxite Hill and Amrun projects — and in Guinea. Guinea is currently the world's third largest bauxite producer. The Chinese transformer-production firm Tebian Electric Apparatus Stock Company has invested US$2.8 billion to build a 10 million tonne per annum bauxite mine in Guinea, with production due to commence in mid-2019.

11.5 Australia's exports and production

High prices to drive strong exports in 2017–18

Higher aluminium and alumina prices contributed to a 22 per cent year-on-year rise in total aluminium, alumina and bauxite export values for the first four months of 2018. In 2017–18, Australia's aluminium, alumina and bauxite exports are estimated to grow strongly, up 27 per cent from 2016–17, to $14 billion. The increase is driven by strong prices in 2017–2018, the result of the US administration's sanctions on Rusal.

Lower prices lead to weaker export outlook to 2019–20

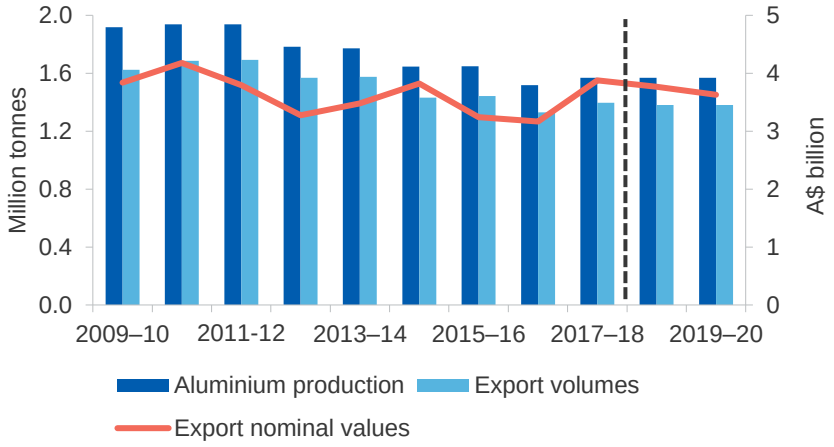
After reaching an 11-year high of $14 billion in 2017–18, Australia's aluminium, alumina and bauxite exports are forecast to fall by an average 3.3 per cent annually, to $13 billion by 2019–20, driven by an expected fall in aluminium and alumina prices. Environmental priorities are likely to remain an important influence on the Chinese aluminium, alumina and bauxite industries, and hence, Australian alumina and bauxite exporters. The Chinese President is committed to curb air pollution in major Chinese cities, and is expected to close smelters and refineries which fail to meet new environmental regulations. This will reduce demand for Australian alumina and bauxite in the short term.

The majority (87 per cent) of Australia's aluminium and alumina production is destined for export markets. Although there are emerging opportunities for Australia from the forecast high aluminium and alumina prices, exports are likely to be constrained by capacity limits and increased competition from low-cost producers in other nations. Australia is exempt from the US aluminium tariffs, and so has an opportunity to expand sales into the US. In addition, Australian alumina exports into the US could rise if idle US aluminium capacity is restarted as a result of the tariffs.

Steady aluminium/alumina 2017–18 output, but moderate growth in bauxite

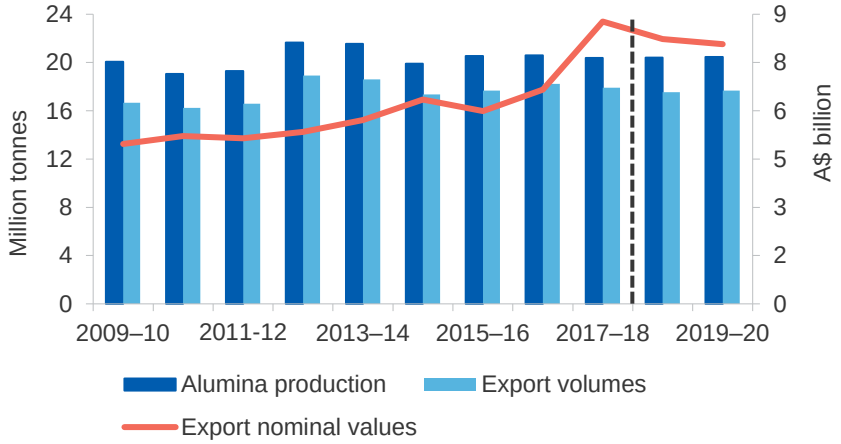
Australia is estimated to have produced 1.6 million tonnes of primary aluminium in 2017–18, up 3.4 per cent from 2016–17. The increase is attributed to the return of full production to the Portland Aluminium smelter where production was cut during December 2016, due to a power outage.

Figure 11.4: Australia's aluminium exports and production



Source: ABS (2018) International Trade in Goods and Services, 5368.0; Department of Industry, Innovation and Science (2018)

Figure 11.5: Australia's alumina exports and production



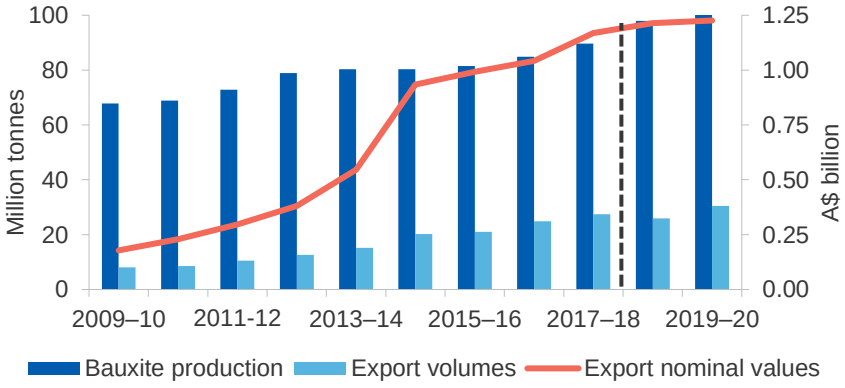
Source: ABS (2018) International Trade in Goods and Services, 5368.0; Department of Industry, Innovation and Science (2018)

Alumina output in Australia fell by 2.7 per cent year-on-year in the March quarter 2018, driven by lower output at the Queensland Alumina Limited refinery due to maintenance activity. In 2017–18, Australian alumina output is estimated to have been steady at 20 million tonnes. Australia's bauxite output rose by 6.7 per cent year-on-year in the March quarter 2018 to about 22 million tonnes. The new Bauxite Hills mine started operating in April 2018, with initial planned annual output of 2 million tonnes, rising to 6 million tonnes in the next 3 years. Australian bauxite output is estimated at 90 million tonnes in 2017–18, up 5.6 per cent.

New capacity to contribute to strong growth in bauxite production

With no planned expansions to smelter or refinery capacity in the short-term, output is forecast to remain at 1.6 million tonnes per annum for aluminium and 20 million tonnes for alumina through to 2019–20. Bauxite production is projected to grow at an annual average rate of 7.1 per cent, to 104 million tonnes in 2019–20. The strong growth is due to the addition of new capacity at the Bauxite Hills and Amrun projects (the latter expected to start production during 2019). Another potential addition to Australia's bauxite production is Queensland's Urquhart mine. The owners obtained a mining lease from the Queensland Government in early 2018, and mining is pending final approvals and the completion of infrastructure.

Figure 11.6: Australia's bauxite exports and production



Source: ABS (2018) International Trade in Goods and Services, 5368.0; Department of Industry, Innovation and Science (2018)

Table 11.1: Aluminium, alumina and bauxite outlook

						Annual percentage change		
World	**Unit**	**2017**	**2018[f]**	**2019[f]**	**2020[f]**	2018[f]	**2019[f]**	**2020[f]**
Primary aluminium								
Production	kt	59,755	61,005	62,514	63,637	2.1	2.5	2.3
Consumption	kt	59,266	60,853	62,317	63,802	2.7	2.4	2.4
Closing stocks[b]	kt	2,282	2,107	1,943	1,795	–7.6	–7.8	–7.6
- weeks of consumption		2.0	1.8	1.6	1.5	–10.0	–10.0	–9.8
Prices aluminium								
- nominal	US$/t	1,969	2,138	2,066	2,062	8.6	–3.4	–0.2
- real[d]	US$/t	2,016	2,138	2,022	1,980	6.1	–5.4	–2.0
Prices alumina spot								
- nominal	US$/t	351	401	360	358	14.1	–10.2	–0.5
- real[d]	US$/t	360	401	352	344	11.5	–12.2	–2.4
Australia	**Unit**	**2016–17**	**2017–18[s]**	**2018–19[f]**	**2019–20[f]**	**2017–18[f]**	**2018–19[f]**	**2019–20[f]**
Production								
Primary aluminium	kt	1,518	1,569	1,568	1,568	3.4	0.0	0.0
Alumina	kt	20,599	20,367	20,418	20,451	–1.1	0.3	0.2
Bauxite	Mt	84.9	89.7	98.0	104.2	5.6	9.3	6.3
Consumption								
Primary aluminium	kt	189	172	188	188	–9.0	9.3	0.0
Exports								
Primary aluminium	kt	1,329	1,396	1,380	1,380	5.0	–1.1	0.0
- nominal value	A$m	3,167	3,878	3,766	3,629	22.5	–2.9	–3.6
- real value[e]	A$m	3,229	3,878	3,680	3,464	20.1	–5.1	–5.9
Alumina	kt	18,230	17,902	17,515	17,638	–1.8	–2.2	0.7
- nominal value	A$m	6,655	8,772	8,226	8,070	31.8	–6.2	–1.9
- real value[e]	A$m	6,786	8,772	8,037	7,704	29.3	–8.4	–4.1
Bauxite	kt	24,851	27,453	25,963	30,475	10.5	–5.4	17.4
- nominal value	A$m	1,042	1,169	1,214	1,226	12.2	3.8	1.0
- real value[e]	A$m	1,062	1,169	1,186	1,170	10.0	1.5	–1.3
Total value								
- nominal value	A$m	10,864	13,819	13,207	12,926	27.2	–4.4	–2.1
- real value[e]	A$m	11,077	13,819	12,903	12,339	24.8	–6.6	–4.4

Notes: **b** Producer and LME stocks; **c** LME cash prices for primary aluminium; **d** In 2018 calendar year US dollars; **e** In 2017–18 financial year Australian dollars; **s** Estimate; **f** Forecast
Source: ABS (2018) International Trade in Goods and Services, 5368.0; AME Group (2018); LME (2018); Department of Industry, Innovation and Science (2018); International Aluminium Institute (2018); World Bureau of Metal Statistics (2018)