Aluminium, alumina and bauxite

Australia’s global ranking

1. Alumina exporter
2. Bauxite producer
3. Alumina producer

3 stages of producing aluminium

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

Key consumer markets for aluminium (tonnes)

1. China 32 million
2. United States 5.6 million
3. Germany 2.2 million
4. South Korea 1.4 million
5. Japan 2 million
6. India 1.2 million

Global uses of aluminium

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

- Lower alumina and bauxite demand is projected to reduce the value of Australia’s aluminium, alumina and bauxite exports by around 2.4 per cent each year, with a decline to $11 billion (in real terms) by 2022–23.
- Global aluminium markets are expected to absorb the impacts of the United States’ 10 per cent tariffs on imported aluminium without significant disruption.
- Australian aluminium exporters are likely to benefit from the US tariff exemption in the event that US aluminium premiums rise.

11.2 Prices

Production cuts in China pushed up aluminium and alumina prices in 2017

Production cuts in China in the 2017–18 winter season were the main catalyst for price rises in 2017. The London Metals Exchange (LME) spot aluminium price increased by 20 per cent in 2017, to average US$2,014 a tonne in real terms, propelled by increased demand from America (up 6.2 per cent) and China (up 1.0 per cent), which is the world’s largest aluminium consumer. Reflecting the tighter market, LME stocks fell by 50 per cent in 2017, to 1.1 million tonnes — a nine-year-low. Over this period, a 2.8 per cent rise in world aluminium production boosted alumina demand and prices. The average FOB Australia alumina price was US$359 a tonne in real terms, up 38 per cent from 2016.

Environmental regulation in China is the key driver of aluminium and alumina prices in the short to medium term

In the short term, the average LME aluminium spot price and FOB Australia alumina prices are estimated to remain high, at around $US2,014, and $US349 a tonne in real terms in 2019, respectively, as capacity controls and environmental regulation are expected to continue to keep the market tight in China. The Chinese Government pledged a commitment to carry out further air pollution crackdowns at the Communist Party’s 19th National Congress in October 2017. This commitment, in turn, reduces the likelihood of aggressive capacity expansion in China, which is the world’s largest aluminium producer. In the United States, a 10 per cent tariff imposed on imported aluminium is likely to have minimal impacts on aluminium prices. The Trump Administration’s commitment to infrastructure spending is likely to support higher demand and prices for aluminium.

In the medium term, the Chinese Government’s policies of capacity and environmental regulation are expected to continue. Production in China is likely to grow at a more sustainable rate, which will support high aluminium prices. However, China’s demand growth is forecast to slow as a result of the Chinese Government’s effort to contain excess residential construction. Furthermore, a possible global trade war — from the imposition of US tariffs — would likely have negative impacts on aluminium prices. On balance, the average LME aluminium spot price is projected to fall at an annual average rate of 2 per cent, to around US$1,854 a tonne in real terms in 2023.

The Chinese Government’s environmental crackdowns are expected to influence global alumina demand and prices significantly in the medium term, given China’s importance in global aluminium markets. The

**Figure 11.1: World aluminium and alumina prices**

![Graph showing world aluminium and alumina prices from 2013 to 2023](data:image/png;base64,iVBORw0KGgoAAAANSUhEUgAAAACAAAACgCAAAAxOmkvAAAAGXRFWHRTb2Z0d2FyZQBBZG9iZSBJbWFnZVJlYWR5cCLLAAAAAElFTkSuQmCC)
enforced constraints on growth in smelting capacity are expected to continue over the next few years, leading to a more stable alumina pricing regime. As a result, the average FOB Australia alumina price is projected to remain just above US$300 a tonne in real terms by 2023.

In the short to medium term, the average FOB Kamsar Guinea bauxite price is forecast to fall from its current level of US$38 a tonne, due to abundant supply from Australia and Guinea, and the return of Malaysia to the global bauxite export markets. Bauxite mining in Malaysia was banned in January 2016.

11.3 Consumption

China and US drove consumption growth in 2017

In 2017, world aluminium consumption grew by 2 per cent to 59 million tonnes, driven by strong consumption growth in the United States (up 9.6 per cent to 5.6 million tonnes), as the US economy has continued strengthening. Consumption in China — accounting for 54 per cent of world aluminium consumption — increased by 0.9 per cent to nearly 32 million tonnes (a record high). The automotive sector is one of the largest aluminium consumers in China, and vehicle sales in China grew by 3.6 per cent in 2017, to nearly 29 million units. This is not likely to persist, as it reflects efforts by Chinese consumers to buy vehicles before an increase in the vehicle sales tax, which commenced January 2018.

Over this period, world alumina consumption increased by 1.7 per cent to 112 million tonnes, while global aluminium production rose by 2.8 per cent. Alumina consumption in China — the world’s largest alumina consumer — rose by 1.9 per cent to 61 million tonnes. This was in line with growth in aluminium production.

Aluminium demand should continue to grow in the short to medium term

World primary aluminium demand is projected to grow at an average annual growth rate of 2.0 per cent in the short to medium term, reaching 67 million tonnes in 2023. China’s aluminium consumption has grown for 28 consecutive years, from just 861,000 tonnes in 1990 to nearly 32 million tonnes in 2017. This growth is expected to continue over the next five years (reaching 37 million tonnes in 2023), supported by strengthening residential and infrastructure construction. Outside of China, an acceleration in global economic activity is expected to come from the US, Eurozone, and emerging market and developing economies. India’s aluminium consumption is projected to grow by 7 per cent per year, to 1.9 million tonnes in 2023, driven by infrastructure, power and transport initiatives.

Demand for automobiles (with an increasing proportion of aluminium components) and aluminium-based consumer durable goods, will remain strong in the short to medium term, as the middle class in China and the rest of Asia continues to expand. The Chinese Government has promoted the production and use of energy-efficient cars, which utilise higher aluminium content in order to reduce vehicle weight. It is now targeting 2 million units to be sold in 2020, increasing to over 3 million units in 2025. Yunnan Aluminium, a Chinese aluminium producer, has teamed up with Phinergy, an Israeli company, to produce aluminium batteries for electric vehicles. The joint-venture is expected to produce the world’s leading aluminium air battery technology within the next few years. Other potential areas of increasing aluminium demand are the manufacture of busbars —

Figure 11.2: World aluminium and alumina consumption

strips of metal used to conduct electricity — (traditionally used copper), and the construction of China’s high voltage and ultra-high voltage electrical networks.

However, a modest risk to the assessment is the rising use of recycled (secondary) aluminium — which requires up to 95 per cent less energy than primary aluminium production. The British firm Axion has recently joined the ground-breaking Jaguar Land Rover aluminium recycling project. Launched a decade ago, the project allowed the automaker to reuse over 75,000 tonnes of scrap aluminium in the production of new vehicles in 2017.

**Growth in alumina demand in line with aluminium production**

World alumina consumption is projected to grow at an average annual rate of 2.0 per cent in the short to medium term, reaching 125 million tonnes in 2023 — 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. As personal income rises in China, the demand for durable goods and aluminium is expected to grow significantly.

The Middle East’s alumina consumption is projected to reach 12 million tonnes in 2023, driven by growing aluminium production in Iran as well as the Gulf Cooperation Council — which comprises Bahrain, Oman, Saudi Arabia, Qatar and the UAE.

India is also expected to contribute to growth in global alumina demand, increasing its usage from 5.2 million tonnes in 2018 to 6.9 million tonnes in 2023. However, this growth path is subject to risks, due to energy supply issues and the development of the country’s stretched transport infrastructure.

### 11.4 Production

**World production increased sharply in 2017**

World aluminium production increased by 2.8 per cent to nearly 60 million tonnes in 2017, driven by modest growth in China. Chinese smelters boosted their production in anticipation of production cuts in the 2017–18 winter season. Chinese refineries also ramped up their production (up 16 per cent) to meet increased demand. The rise in aluminium production lifted world alumina production by 9.1 per cent, to 125 million tonnes.

In response to increased aluminium and alumina production, global bauxite producers also accelerated their production. Production rose strongly in Australia — the world’s largest bauxite producer. Australian production rose by 5.2 per cent in 2017, to 88 million tonnes. In Guinea, bauxite production increased by 34 per cent, to 40 million tonnes. These rises contributed to a 7.3 per cent increase in global bauxite production in 2017, to 292 million tonnes.

**Figure 11.3: World aluminium, alumina and bauxite production**

![Figure 11.3: World aluminium, alumina and bauxite production](image-url)
Environmental regulation in China to slow world aluminium and alumina production in the short to medium term

In the short to medium term, world aluminium production is projected to grow at an average annual growth rate of 2 per cent, reaching 67 million tonnes by 2023. 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 projects.

Aluminium production has also faced broader shifts within China: Henan province’s output of primary aluminium (12 million tonnes) has — for the first time in six years — surpassed that of neighbouring Shandong province (11 million tonnes), making it China’s largest aluminium producing city.

With Chinese production checked, production in non-China countries is expected to be the engine of global production growth. Iran plans to increase its annual aluminium production from 450,000 tonnes to 1.5 million tonnes by 2025. In India, Vedanta’s Jharsuguda expansion continues to ramp up production. India’s state-run smelter National Aluminium Company (Nalco) plans to boost aluminium capacity to 1.1 million tonnes by 2024. In Azerbaijan, the 500,000 tonnes per annum Ganja aluminium smelter — idle for over a decade — is expected to restart in 2018. Israeli conglomerate Delek Group is also planning to build a one million tonne per annum Ramat Hovav aluminium smelting operation, powered by natural gas.

The risks to this assessment lie in the addition of new capacity outside policy-affected regions, 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 in the short to medium term.

World alumina production is forecast to increase at an annual average rate of 1.4 per cent in the short to medium term, reaching 137 million tonnes in 2023. This growth rate is slower than that of the last few years, due to China’s aggressive supply reforms — which include capacity swaps, winter production cuts, and illegal capacity cuts. The 5 million tonnes per annum of illegal capacity that was shut down in 2017 is not expected to return to production, unless the market is undersupply.

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. 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. 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 — from the state-run Odisha Mining Corporation on a long term basis.

Australia and Guinea to contribute to a large rise in world bauxite production in the short to medium term

World bauxite production is forecast to grow at an annual rate of 7.3 per cent in the short term (2018 and 2019) and 1.4 per cent in the medium term, to reach 357 million tonnes by 2023. The gains will be driven by new capacity in Australia — notably the commissioning of Bauxite Hill and Amrun projects — and in Africa. Australia is forecast to produce over 103 million tonnes of bauxite by 2023.

The rise in bauxite production in Africa is dominated by a strong performance from Guinea, currently the world’s fourth largest bauxite producer. The Chinese transformer-production firm Tebian Electric Apparatus Stock Company has invested US$2.8 billion in Guinea to build a 10 million tonne per annum bauxite mine, with production commencing in mid-2019.
11.5 Australia

High prices to drive strong exports in 2017–18

Higher aluminium and alumina prices contributed to a 20 per cent year-on-year rise in total aluminium, alumina and bauxite export values in the first half of 2017–18, to $6.3 billion in real terms. The LME spot aluminium price reached a near 6 year high on 19 January 2018, at US$2,256 a tonne. The monthly FOB Australia alumina price reached a multi-year high in October 2017, at US$469 a tonne.

In 2017–18, Australia’s aluminium, alumina and bauxite exports are estimated to grow strongly, up 17 per cent at $13 billion in real terms, with aluminium and alumina prices estimated to remain high in 2018. The global aluminium market balance (production less consumption) is estimated to tighten further, from a surplus of 534,000 tonnes in 2017 to a surplus of just 150,000 tonnes in 2018. Chinese alumina output is expected to recover after the production cuts in the 2017–18 winter season, causing a flow-on rise in bauxite exports to China.

Lower prices lead to weaker export outlook in the short to medium term

After reaching a 10-year high of $13 billion in 2017–18, Australia’s aluminium, alumina and bauxite exports are projected to fall by an average 2.4 per cent annually to $11 billion (in real terms) by 2022–23, 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. President Xi 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 projected sustainability of high aluminium and...
alumina prices, exports are likely to be constrained by capacity limits and increased competition from low-cost producers in other nations.

The US Government's decision to impose 10 per cent tariffs on imported aluminium is likely to have positive impacts on Australian alumina exports. If the US responds to the imposition by restarting idled aluminium capacity, demand for alumina will likely rise, creating opportunities for Australian alumina refineries to expand sales to the US.

The Malaysian Government's decision to extend its bauxite mining ban to the end of June 2018 is likely to create opportunities for Australian bauxite exporters to export more to China. Prior to the mining ban, Malaysia was the largest source of China's bauxite imports.

**Steady aluminium and alumina production, but moderate growth in bauxite production in 2017–18**

Australia produced 784,000 tonnes of aluminium in the first half of 2017–18, up 12 per cent from the second half of 2016–17. This was due largely to the recovery of Portland Aluminium’s production following its power outage incident in December 2016.

Over the first half of 2017–18, Australia’s alumina production increased 0.5 per cent from the second half of 2016–17, to 10 million tonnes.

Australia’s bauxite production increased by 6.9 per cent year-on-year in the first half of 2017–18, driven by a higher output from Rio Tinto's Gove and Weipa operations.

In 2017–18, Australia’s aluminium and alumina production is estimated to remain steady at 1.6 and 20 million tonnes, respectively. However, bauxite production in Australia is estimated to increase by 4.7 per cent, to nearly 89 million tonnes, driven by the commissioning of Metro Mining’s Bauxite Hills project in April 2018. In 2018, Rio Tinto is expected to mine 42 million tonnes of bauxite, refine 6.9 million tonnes of alumina, and smelt 1.2 million tonnes of aluminium.

**New capacity contribute to a strong growth in bauxite production in the short to medium term**

There are no planned/expansions or major disruptions expected at existing operations. This suggests little change in production in the short to medium term. However, there is a downside risk to aluminium production if the Liddell power station — which provides electricity to Tomago Aluminium — shuts in 2022, as proposed.

Australia’s bauxite production is projected to grow at an annual average rate of 7.8 per cent in the short term, to 103 million tonnes in 2019–20, and remains at this level until 2022–23. The engine of this strong growth is the addition of new capacity from the Bauxite Hills and Amrun projects. Metallica Minerals has obtained a mining lease from the Queensland Government. The lease opens the door to mining at the Urquhart bauxite project once the proper infrastructure is in place.

**Figure 11.6: Australia’s bauxite exports and production**

Box 11.1: US aluminium tariffs

The US Administration has imposed a 10 per cent tariff on aluminium imports into the United States following the US Department of Commerce’s release of investigations into the national security impact of aluminium and steel imports. The key findings from these investigations are that “aluminium is essential to the US national security; the US Government does not maintain any strategic stockpile of bauxite, alumina and aluminium; and the imports adversely impacts the economic welfare of the US aluminium industry” (US Department of Commerce).

US aluminium producers and workers are likely to benefit from the tariffs, as more output is produced domestically and more employment is created. However, aluminium consumers in the US are likely to suffer, as the cost of imported materials rises. There are expected inflationary pressures in aluminium-related industries, such as manufacturing, packaging and construction. Steve Fisher (CEO, Novelis Inc.) — an Atlanta based rolled and recycled aluminium company — estimates that “aluminium tariffs could add to US$1.0 billion per year to the cost of aluminium beverage cans and US$3.0 billion to the cost of producing automobiles every year”. This will add to inflationary pressures in the US economy.

Canada and China are the largest sources of US aluminium imports. In value terms, the US imported US$6.9 billion of aluminium from Canada, and US$1.8 billion from China in 2017. Exports of aluminium to the US account for around 0.7 per cent of Canada’s GDP (or US$11.6 billion), and 0.02 per cent of China’s GDP (or US$2.4 billion). Argentina, Australia, Brazil, Canada, Mexico, South Korea and the European Union (EU) have been given an exemption from tariff increases. As a result, China is likely to be the country most affected by President Trump’s decision.

The US will not impose tariffs on Australian aluminium. But even if tariffs were applied to Australian products, the impact would be minimal: Australia exported 48,000 tonnes of aluminium to the US in 2016–17, with a value of $127 million. This means the US accounts for just 4 per cent of Australia’s aluminium exports.

The exemption is likely to provide incentives to Australian aluminium exporters to divert export to the US from Asia, should US aluminium premiums rise.

However, US tariffs could indirectly cause harm to the Australian aluminium industry, with the primary risk being Asian aluminium exporters redirecting aluminium products they are unable to sell to the US into the Australian market.

The US tariffs are expected to have negligible impacts to the global aluminium markets, as the US accounts for less than 1 per cent of global aluminium production. Aluminium markets will likely absorb the impacts of tariff increase relatively easily, though there is a potential for escalation to a trade war should the EU and China retaliate against President Trump’s actions without first pursuing remedies through the World Trade Organisation (WTO) dispute settlement process.

The US’s tariffs on imported aluminium theoretically provides incentives to US aluminium producers to upgrade technology or develop new capacity. However, these options seem to be unviable. Such upgrades would not necessarily create long-term competitive installations, given the established technology footprint. Similarly, any development of greenfield smelters — integrated supply chain and cheap energy source — may come at a prohibitive capital cost (Source: AME Group).

The largest source of primary aluminium imports to the US is Canada, where aluminium smelters are powered by cheap hydro-electricity. With reliable and cost effective supply from neighbouring Canada and other major aluminium producers, the importation of overseas aluminium may prove more cost effective in the short to medium term.

Source: US Department of Commerce; AME Group (2017); Macquarie Research (2018)
Table 11.1: Aluminium, alumina and bauxite outlook

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<td>1,239</td>
<td>1,244</td>
<td>3.0</td>
</tr>
<tr>
<td>- real value e</td>
<td>A$m</td>
<td>1,063</td>
<td>1,192</td>
<td>1,232</td>
<td>1,164</td>
<td>1,137</td>
<td>1,127</td>
<td>1,104</td>
<td>0.6</td>
</tr>
<tr>
<td><strong>Total value</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- nominal value</td>
<td>A$m</td>
<td>10,864</td>
<td>12,950</td>
<td>12,830</td>
<td>12,634</td>
<td>12,699</td>
<td>12,791</td>
<td>12,870</td>
<td>2.9</td>
</tr>
<tr>
<td>- real value e</td>
<td>A$m</td>
<td>11,083</td>
<td>12,950</td>
<td>12,536</td>
<td>12,060</td>
<td>11,835</td>
<td>11,635</td>
<td>11,423</td>
<td>0.5</td>
</tr>
</tbody>
</table>

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; f Forecast; z Projection; r Compound annual growth rate (per cent), for the period from 2017 to 2023, or from 2016-17 to 2022-23.
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)