Aluminium

Australia's aluminium sector

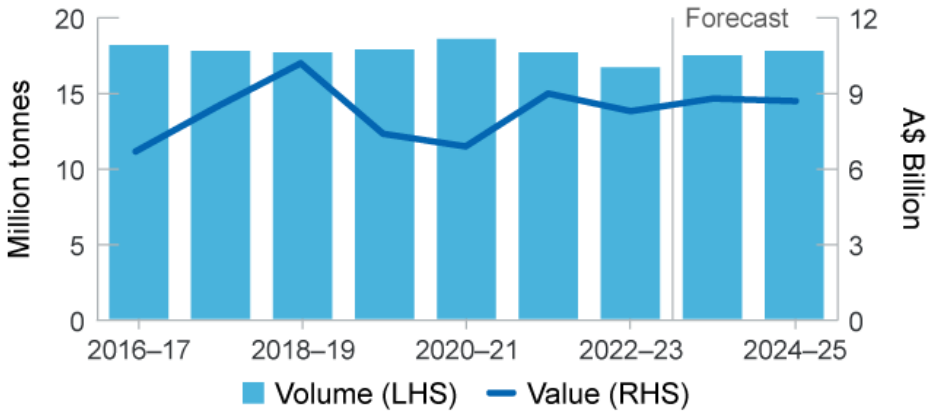
100m tonnes
of **annual bauxite output**, world's 2nd largest producer

$16 billion
primary aluminium, alumina and bauxite **exported,** 2022-23

Around 98%
of Australian bauxite is **exported to China**

Major Australian bauxite deposits, Gt

Australian alumina exports



Outlook

Prices set to rise as energy efficient technology supports aluminimum demand

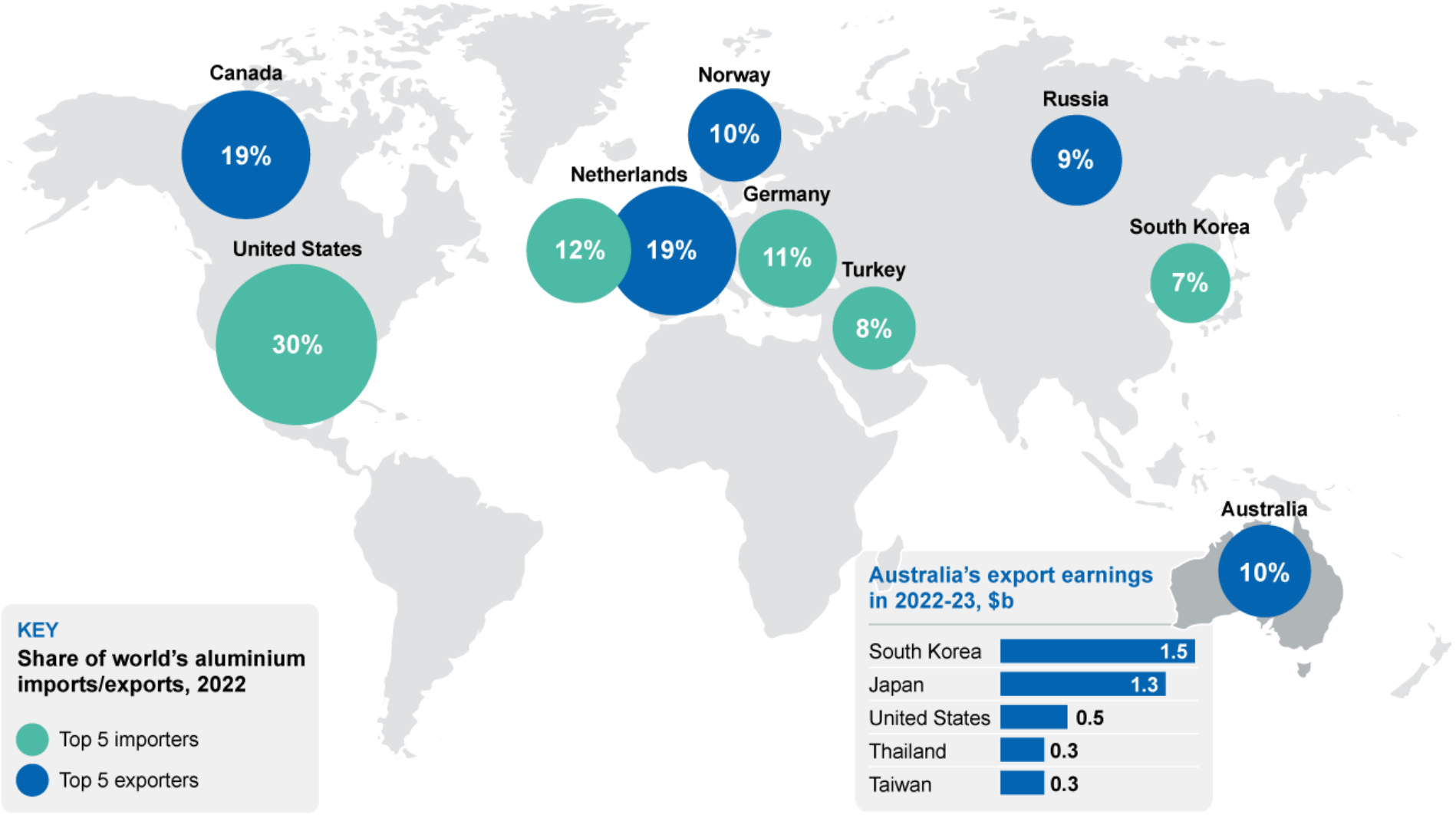
Future earnings for exports of aluminium, alumina and bauxite to **lift as prices rise**

Bauxite export volumes **set to increase** with Indonesia's bauxite export ban on June 10

Demand for new energy efficient cars and technologies **support Australian exports**

SOURCE: DISR; OCE

Aluminium TRADE MAP



SOURCE: WBMS; ABS

11.1 Summary

- Primary aluminium prices declined in the September quarter, on the back of rising supply from China and falling global demand.
- Sluggish global construction activity is expected to be offset by the impact of higher demand from vehicle manufacturers, as output rises and efforts to raise the energy efficiency of vehicles lift aluminium usage over the outlook period.
- Earnings for Australian exports of aluminium, alumina and bauxite are expected to rise from $16 billion in 2023–24 to $17 billion in 2024–25, as prices rise over the outlook period.

11.2 World consumption

Sluggish world economic growth reduced demand in mid-2023

A weak Chinese property sector and relatively tight monetary conditions in Western economies decreased global primary aluminium demand by 0.5% year-on-year in H1 2023 to nearly 34 million tonnes (Mt). In Europe and the US, falling primary aluminium demand (down by 17% and 11% year-on-year, respectively) reflected subdued activity in the construction sector.

In contrast, there is strong demand from the EV sector. Strong electric vehicle (EV) sales in China helped drive Chinese aluminium demand up by 3.1% year-on-year in H1 2023 to nearly 21 Mt. Over this period, sales of new energy vehicles (EVs and plug-in hybrids) rose by 37% year-on-year to 3.1 million units, while internal combustion engine car sales dropped by 8.0% year-on-year.

In the US, improved consumer sentiment has provided the US automotive sector with some support in recent months. It is estimated that vehicle sales will rise from 13.8 million units in 2022 to 15.2 million units in 2023.

The European Union (EU) automotive sector appears to have managed to weather the storms of high inflation and interest rates. EU car registrations grew by 18% year-on-year in H1 2023 to 5.4 million units. In Germany, vehicle output was up by 32% year-on-year in H1 2023 to 2.2 million units.

Higher global primary aluminium production boosted the demand for alumina by 1.1% year-on-year in the first half of 2023 to 67 Mt. Demand in Canada rose by 8.2% year-on-year in the first half of 2023, as Canadian aluminium smelters required more alumina to accommodate increased primary aluminium production.

Lower global alumina production reduced global bauxite usage by 2.9% year-on-year in the first half of 2023.

Aluminium, alumina, and bauxite demand to rise over the outlook period

Strong global vehicle manufacturing activity is expected to offset weak construction activity to help drive global aluminium demand up by 1.0% in 2023 to nearly 69 Mt.

In China, the Government is lifting support for the EV sector. In June, the Chinese Government's passenger electric vehicle (PEV) subsidy was extended to 2025, with half of this subsidy available until 2027. This measure will support aluminium demand from the Chinese auto sector.

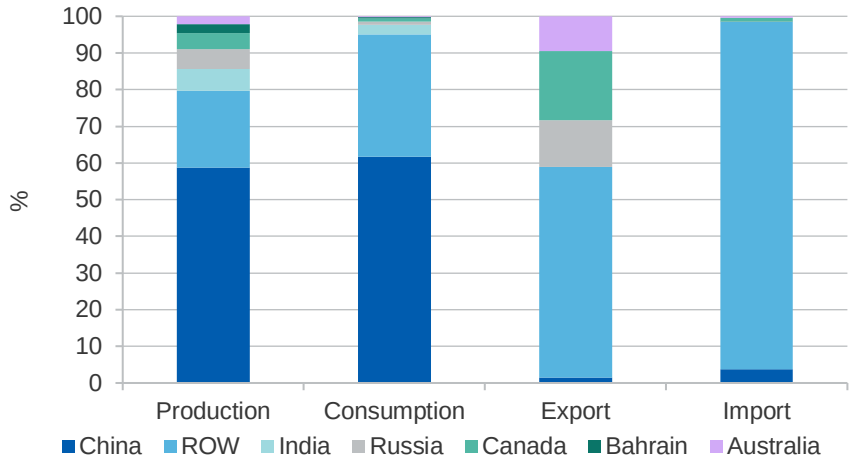
PEV sales in the US are expected to rise in 2023, driven by an improvement in the supply chain. According to AutoForecast Solutions' April 2023 forecasts, North American automotive production is forecast to increase by 9.1% year-on-year in 2023 to 15.6 million units.

Beyond 2023, rising sales of energy-efficient vehicles (which are more aluminium intensive) and lower interest rates in 2024 and 2025, are expected to boost global aluminium demand. In the US and Europe, housing and commercial building activities are expected to recover when interest rates fall, most likely in late 2024 or in 2025.

Electric vehicles drive aluminium demand over the outlook period

A significant driver of aluminium demand is expected to come from world automakers seeking to reduce vehicle weight by increasing the proportion of aluminium in the vehicle. Aluminium is 10-40% lighter than steel in comparable components. EV makers are particularly focused on reducing vehicle weight, since it impacts heavily on the driving range of the vehicle.

Figure 11.1: Shares of global primary aluminium production, consumption, exports and imports, 2022



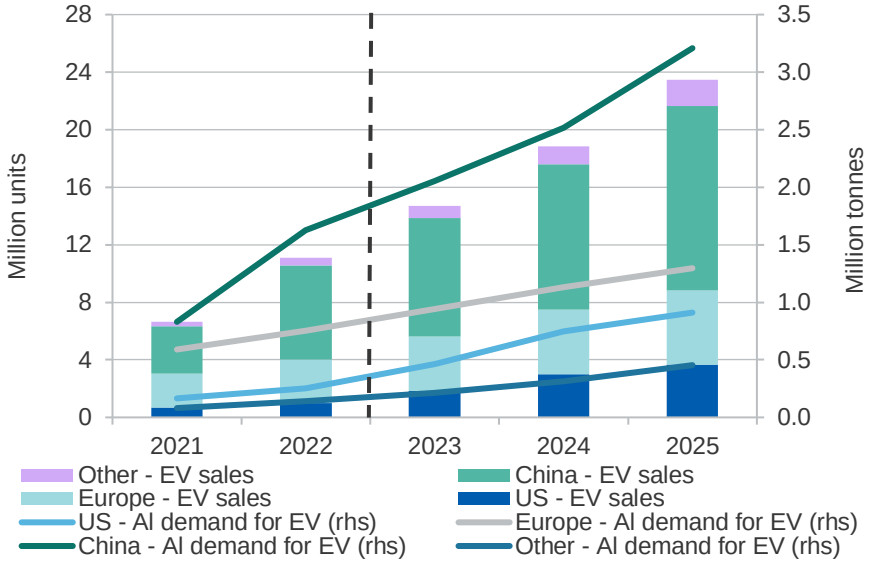
Source: ABS (2023); UN Comtrade (2023); World Bureau of Metals Statistics (2023); Wood Mackenzie (2023); Department of Industry, Science and Resources (2023)

Strong EV sales will boost aluminium demand over the outlook period. It is estimated that EV sales in China will rise from 8.2 million units in 2023 to 12.8 million units in 2025, Europe (from 3.8 million units in 2023 to 5.2 million units in 2025) and the US (from 1.9 units in 2023 to 3.6 million units in 2025) (Figure 11.2). With an average aluminium content of 250 kilograms per EV, aluminium usage in EVs in China is forecast to rise from 2.1 Mt in 2023 to 3.2 Mt in 2025, Europe (from 0.9 Mt in 2023 to 1.3 Mt in 2025) and the US (from 0.5 Mt in 2023 to 0.9 Mt in 2025) (Figure 11.2).

Decarbonisation likely to boost demand for secondary aluminium

Demand from automotive and construction market participants with decarbonization targets will boost demand for secondary aluminium consumption over the outlook period, reaching 28 Mt by 2025. CRU expects secondary aluminium to account for over 50% of US aluminium demand by 2028. Other industrialised nations such as Germany, Japan, Italy and South Korea will also lift their secondary aluminium usage to

Figure 11.2: Electric vehicle (EV) sales and aluminium demand



Notes: EV sales include battery and hybrid EVs. An estimated average aluminium content of 250 kilograms per EV.
Source: Wood Mackenzie (2023); Department of Industry, Science and Resources (2023)

achieve decarbonisation targets. As a result, world secondary aluminium usage is forecast to rise from 25 Mt in 2023 to 28 Mt in 2025.

An expected rise in global primary aluminium production is likely to drive higher demand for alumina over the outlook period. In line with world primary aluminium production, world alumina consumption is forecast to grow by 2.1% in 2023, 2.3% in 2024 and 1.4% in 2025.

An expected fall in Australia's alumina production is likely to reduce global bauxite consumption by 0.7% in 2023 to 360 million tonnes. Australia is the world's second largest alumina producer, accounting for around 14% of global alumina production. Beyond 2023, an expected improvement in Australia's alumina refining operations will lift global alumina output, and therefore, global bauxite consumption.

11.3 World production

China's restarts boosted global primary aluminium output in H1 2023

The restart of China's major aluminium producing cities largely contributed to a 1.1% year-on-year rise in the global primary aluminium output in the first half of 2023. In Yunnan Province (China's fourth largest producing province), local aluminium smelters have restarted over 1.1 Mt a year capacity since mid-June 2023, as the supply of hydropower improves.

A production lift at Alumar aluminium smelter boosted Brazilian primary aluminium output to 493,000 tonnes in H1 2023, up 39% year-on-year.

Higher production at Rio Tinto's 150,000 tonnes a year Kitimat aluminium smelter boosted Canadian primary aluminium output to 1.6 MT in the first half of 2023, up 8.2% year-on-year.

Lower alumina output in Australia led to a 3.4% year-on-year fall in global alumina output in the first half of 2023 to nearly 69 Mt. Over this period, production in Australia — the world's second largest alumina producer — fell by 2.9% year-on-year to 9.6 Mt, due to lower production at Rio Tinto's Queensland Alumina Limited (QAL) refinery in Queensland.

Indonesia's alumina output rose by 7.3% year-on-year in the first half of 2023, propelled by production ramp-up at the 300,000 tonnes a year Tayan alumina refinery.

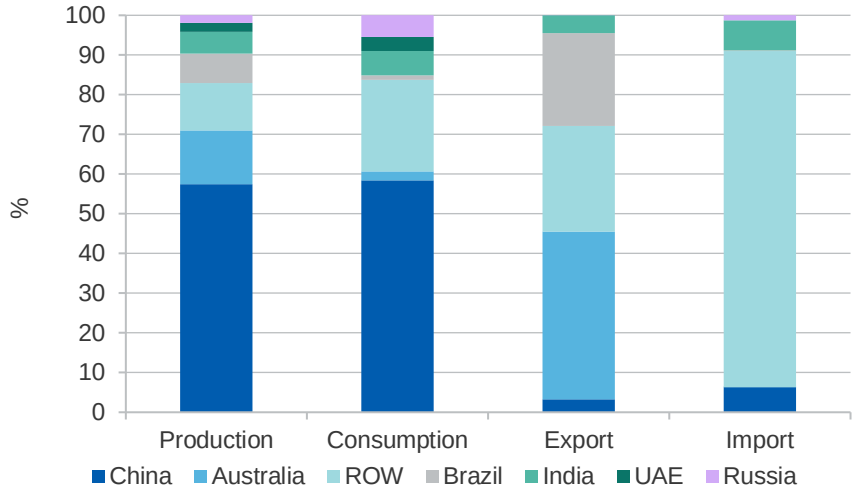
Higher output in Guinea — the world's largest bauxite producer — increased world bauxite production by 0.6% year-on-year in the first half of 2023 to 194 Mt.

Aluminium and alumina output set to rise over the outlook period

Production ramp-ups in China and Brazil and the restart of idled capacity in Europe are expected to drive global primary aluminium output higher in H2 2023 and over the rest of the outlook period. In China, primary aluminium output is forecast to rise from 42 Mt in 2023 to 43 Mt in 2025. By the end of the outlook period, primary aluminium production will edge closer to the maximum production cap of 45 Mt a year set by the Chinese Government in 2017.

Primary aluminium production in Brazil is forecast to increase from 1.2 Mt in 2023 to 1.3 Mt in 2025. In Europe, primary aluminium production is forecast to increase from 6.8 Mt in 2023 to 7.2 Mt in 2025, as lower energy prices support a restart of idled capacity.

Figure 11.3: Shares of global alumina production, consumption, exports and imports, 2022



Source: ABS (2023); UN Comtrade (2023); World Bureau of Metals Statistics (2023); Wood Mackenzie (2023); Department of Industry, Science and Resources (2023)

The Alba Aluminium smelter in Bahrain completed a pre-feasibility study for its Line 7 expansion project in the September quarter 2022. It is highly likely that the proposed Line 7 project will start in 2023. Once completed, it will increase the smelter's output from 1.56 Mt in 2021 to 1.68 Mt in 2024.

Russian aluminium producer, Rusal, and the Nigerian government have discussed a possible restart of 200,000 tonnes a year Alscon aluminium smelter in Nigeria. The smelter ceased operation in 2012, due to low aluminium prices and a lack of reliable gas supply.

The failure to reach an energy supply deal between Rio Tinto and the energy supplier for its 341,000 tonnes a year Tiwai Point aluminium

smelter in New Zealand is another risk to the assessment. The current energy supply agreement is to expire by end 2024. At the time of writing, both Rio Tinto and energy supplier (Meridian Energy) had not reached a new long term power supply agreement.

Driven by the increasing demand for recycled aluminium, global secondary aluminium output is forecast to rise from 32 Mt in 2023 to 36 Mt in 2025. China accounts for most of this increase, with secondary aluminium production forecast to rise from 12 Mt in 2023 to 14 Mt in 2025.

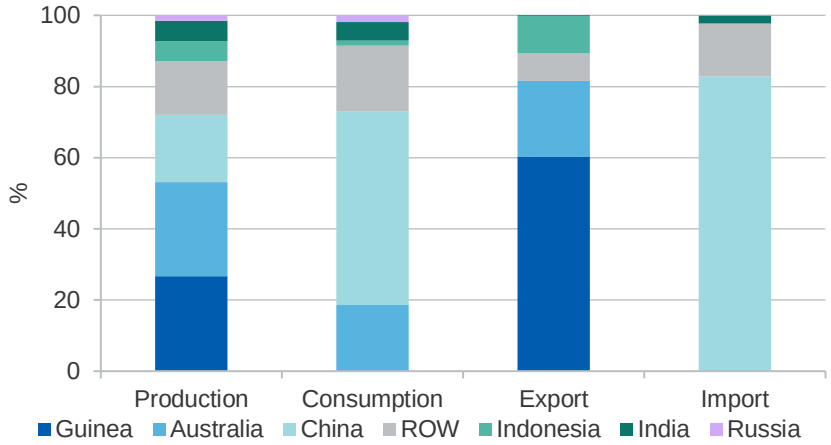
Rio Tinto's 30,000 tonnes a year Arvida recycling facility in Quebec, Canada, is expected to be commissioned in the March quarter 2025. In July 2023, Rio Tinto and Giampaolo Group (one of North America's largest fully integrated metal management businesses) entered into an agreement to form a joint-venture to manufacture and market recycled aluminium products. Hydro's Navarra and Sjunnen recycling facilities in Spain and Sweden are adding 20,000 tonnes a year each more output.

Rising output from new/existing refineries in China, Spain and Indonesia is expected to drive up global alumina output over the outlook period. Around 3.6 Mt of new alumina capacity is expected to come online in 2023. In China, alumina production is expected to continue to rise, worsening the market surplus in 2023. In Spain, Alcoa's 1.2 Mt a year San Ciprian alumina refinery has lifted output. In Indonesia, China Aluminium Company and the Indonesian joint-venture partners' 2 million tonnes a year Mempawah alumina refinery, is expected to come online in 2024. It is expected that eight more alumina refineries will be built in Indonesia in the coming years, with a total capacity addition of around 10 Mt.

In Australia, Rio Tinto has revised its 2023 alumina guidance for its QAL refinery in Queensland down to 7.4 Mt from 7.7 Mt. The downward revision reflects the company's implementation of initiatives to improve the QAL refinery's operational stability.

Global alumina output is estimated to fall by 0.7% in 2023 to 142 Mt, before resuming to grow in 2024 and 2025.

Figure 11.4: Shares of global bauxite production, consumption, exports and imports, 2022



Source: ABS (2023); UN Comtrade (2023); World Bureau of Metals Statistics (2023); Wood Mackenzie (2023); Department of Industry, Science and Resources (2023)

The Indonesian bauxite export ban (commenced in June 2023) is expected to reduce global bauxite production in 2023. Indonesia produced 22 Mt of bauxite in 2022 (accounting for 5.7% of global output, 5th largest producer) and exported 18 Mt of bauxite in 2022 (11% of global bauxite exports, third largest exporter). With the current domestic bauxite consumption of around 9.0 Mt a year, a cut in production seems to be the only viable option for Indonesian bauxite producers.

World bauxite production is expected to grow by 2.1% in 2023, 3.7% in 2024 and 3.5% in 2025. Australia and Guinea are expected to contribute most to this rise. In Guinea, Alliance Mining Commodities launched the 1.5 billion tonnes (estimated reserve) Koumbia bauxite project in mid-February 2023. A recent feasibility study found that the project is commercially viable and will require a capital investment of over US$1 billion.

Vietnam is planning to build three new bauxite mines in the northern region with a combined capacity of 2.0 Mt a year. Vietnam has the second largest bauxite reserves in the world (estimated 5.8 billion tonnes) after Guinea with an estimated reserve of 7.4 billion tonnes.

Green aluminium, alumina and bauxite

Globally, producers are moving with plans to decarbonise aluminium supply chains. In partnership with Sumitomo, and with A$32.1 million co-funding support from the Australian Renewable Energy Agency (ARENA), Rio Tinto will build a hydrogen pilot plant in Gladstone, Queensland, in 2024 to trial lower carbon alumina refining. The plant is a part of Rio Tinto's A$111.1 million Yarwun Hydrogen Calcination Pilot Demonstration Program aimed at demonstrating the viability of using hydrogen as a replacement for natural gas in the alumina calcination process.

In the June quarter 2023, Hydro's Navarra recycling facility in Spain produced the first batch of recycled aluminium using green hydrogen as an energy source.

In India, Hindalco aims to ramp up production of low carbon aluminium output to 30% of its output within the next four years. The 100 megawatt capacity pilot project — where a renewable energy provider to power supply from pumped water storage to its 365,000 tonnes a year Aditya aluminium smelter — is expected to commence operations in 2024.

11.4 World trade

Weak aluminium, alumina and bauxite exports in H1 2023

Lower exports from Russia reduced global primary aluminium exports by 13% year-on-year to 6.5 Mt in H1 2023. Despite no direct sanctions on Russian aluminium by Western nations, Russia's share of world primary aluminium exports fell from 12% in H1 2022 to 7.3% in H1 2023.

Offsetting the fall in aluminium exports from Russia was higher primary aluminium exports from the Netherlands (up 10% year-on-year in H1 2023) and Australia (up 10% year-on-year in H1 2023).

The slower than expected restart of idled primary aluminium capacity in Europe reduced world secondary aluminium exports in the first half of 2023. European aluminium users turned to secondary aluminium as a substitute for primary aluminium. As a result, less secondary aluminium was available for export, which declined by 8.9% year-on-year.

Lower alumina exports from Australia — the world's largest alumina exporter — cut global alumina exports by 7.9% year-on-year in the first half of 2023 to 19 Mt. Over this period, Australian alumina exports to India fell 40% year-on-year, as Indian alumina importers reduced their imports.

Lower bauxite exports from Australia — the world's second largest bauxite exporter — reduced global bauxite exports by 8.8% year-on-year in the first half of 2023 to 76 million tonnes. Over this period, higher than average annual rainfall in northern Australia slowed down bauxite exports from mines in the Northern Territory and Queensland.

Guinea exported 52 million tonnes of bauxite in the first half of 2023, up 6.9% year-on-year.

Lower aluminium imports from Europe and the US

Weak primary aluminium consumption in Europe and the US reduced global primary aluminium imports by 11% year-on-year in the first half of 2023. Over this period, German and Italian primary aluminium imports decreased by 18% and 27% year-on-year, respectively. In the US, primary aluminium imports fell by 1.6% year-on-year in the first half of 2023.

Higher imports by China offset the fall in European and US imports. In H1 2023, China imported 490,000 tonnes of primary aluminium, a rise of 145% year-on-year. Aluminium demand from the automotive and solar energy sectors was the driving force behind China's increased imports.

Lower European imports reduced global secondary aluminium imports by 1.6% year-on-year in H1 2023. Many European countries reduced secondary aluminium consumption to deal with slowing construction activities. In Poland, secondary aluminium imports in the first half of 2023 fell by 16% year-on-year to 168,000 tonnes. Over this period, Italy's secondary aluminium imports fell by 4.9% year-on-year to 97,000 tonnes.

Higher alumina production in India reduced global alumina imports by 6.2% year-on-year in H1 2023. Over this period, India imported 1.2 Mt of alumina (down by 8.8% year-on-year). Russia's alumina import data is not available and is not included in this assessment.

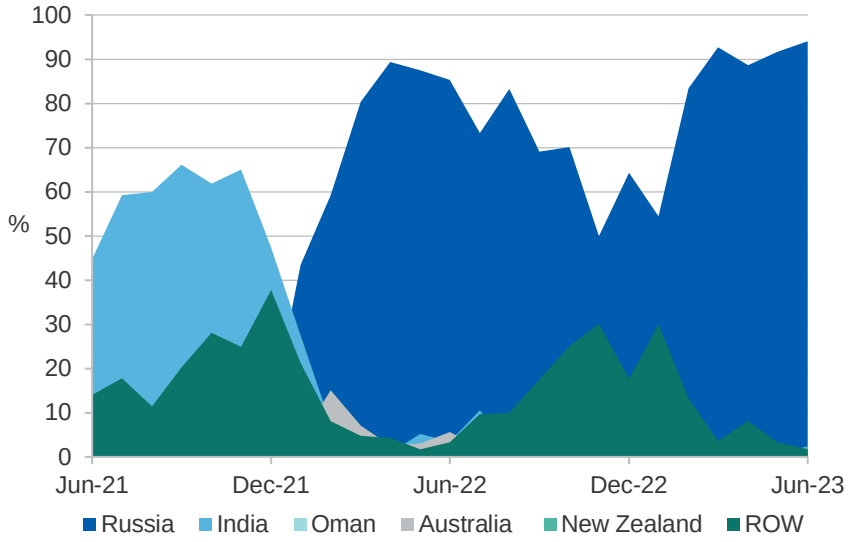
Lower bauxite imports from Europe reduced global bauxite imports by 2.2% year-on-year in H1 2023. Over this period, Spain imported 810,000 tonnes of bauxite (down 59% year-on-year). In Ireland, bauxite imports fell by 57% year-on-year in H1 2023.

More Russian primary aluminium entering Chinese market

China's imports of Russian primary aluminium have increased significantly so far in 2023; from 313,717 tonnes in the second half of 2022 to 416,943 tonnes in the first half of 2023. On a monthly basis, Russia's share of China's total primary aluminium imports reached a record high in June 2023, accounting for 94% of China's total primary aluminium imports (Figure 11.5).

Chinese imports are likely to rise further over the forecast period, as international buyers cease buying Russian aluminium.

Figure 11.5: China's primary aluminium import sources



Notes: ROW: Rest of the world

Source: China Customs

11.5 Prices

Sluggish Chinese economic growth is a headwind to aluminium prices

Rising supply and weak world demand have pushed prices down from levels averaged in the June quarter. Demand has suffered from the impact of tighter monetary policy in the Western economies and sluggish economic growth in China. The London Metal Exchange (LME) spot price for primary aluminium has decreased 5.9% so far in 2023, sitting at US$2,200 a tonne on 22 September 2023 — compared to an average of US$2,830 a tonne in the first nine months of 2022.

Low aluminium stocks have helped prevent deeper price falls as world demand weakens (Figure 11.6). LME stocks have fallen from a 7-month high of 579,525 tonnes in May 2023 to 482,300 tonnes in September 2023. Shanghai Future Exchange aluminium stocks followed the same trend, falling from an eleven-month high of 295,920 tonnes in February 2023 to 90,293 tonnes in September 2023. LME off-warrant stocks fell from a fourteen-month high of 435,869 tonnes in January 2023 to 291,754 tonnes in July 2023.

Figure 11.6: Exchange aluminium stocks

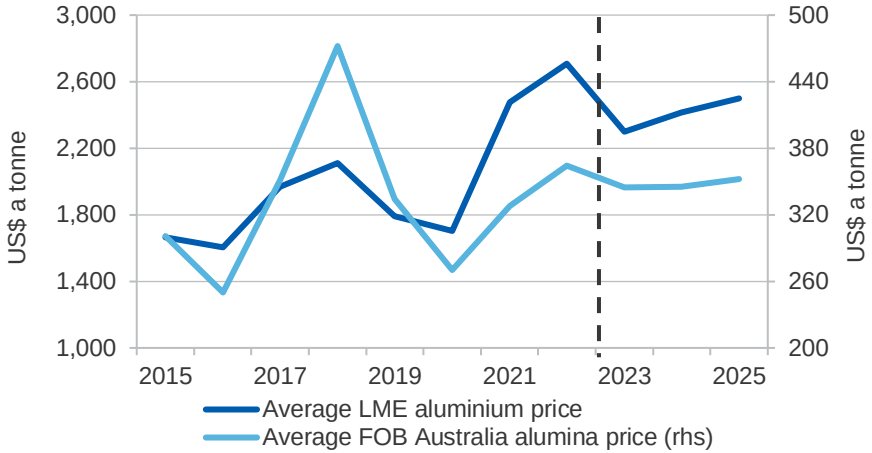
Source: London Metal Exchange (2023); Bloomberg (2023)

The free on board (FOB) Australian alumina price has fallen by 3.6% so far in 2023, at US$341 a tonne on 22 September 2023 — and compares to an average price of US$376 a tonne in the first nine months of 2022.

The prospect of rising Chinese aluminium supply and sluggish Chinese economic growth (see the *Macroeconomic chapter*) is likely to be a headwind to aluminium prices over the rest of 2023. As a result, the LME primary aluminium spot price is estimated to average US$2,300 a tonne in 2023, a fall of 15% year-on-year (Figure 11.7). The LME aluminium price is forecast to average US$2,415 and US$2,500 a tonne in 2024 and 2025, respectively (Figure 11.7).

New alumina capacity additions — about 3.6 Mt of new capacity in 2023 — are likely to put alumina prices under pressure. The free on board (FOB) Australian alumina price is estimated to decrease by 5.5% in 2023 to an average US$344 a tonne (Figure 11.7). Growing global demand for new, energy-efficient cars and technologies will boost aluminium usage and prices over the outlook period. The FOB Australian alumina price is forecast to rise at an average annual rate of 1.1%, averaging US$352 a tonne in 2025 (Figure 11.7).

Figure 11.7: Primary aluminium and alumina prices



Source: Bloomberg (2023); Department of Industry, Science and Resources (2023)

11.6 Australian exports and production

Lower aluminium and alumina prices reduced exports in 2022–23

Lower primary aluminium and alumina prices and alumina export volumes cut Australia's aluminium, alumina and bauxite (AAB) exports by 4.7% in 2022–23 to $16 billion. A 19% year-on-year fall in the LME aluminium price in 2022–23 reduced Australian primary aluminium export values by 7.4% year-on-year to $5.3 billion in 2022–23. Over this period, primary aluminium exports to Japan and the US fell by 13% and 11% year-on-year to $1.3 billion and $0.5 billion, respectively. Largely offsetting the fall in exports to Japan and the US was a 50% year-on-year rise in exports to South Korea to $1.5 billion.

A 10% year-on-year fall in alumina prices reduced Australian alumina export values by 7.1% in 2022–23 to $8.3 billion. In 2022–23, Australian alumina export volumes were down by 6.3% year-on-year to nearly 17 Mt.

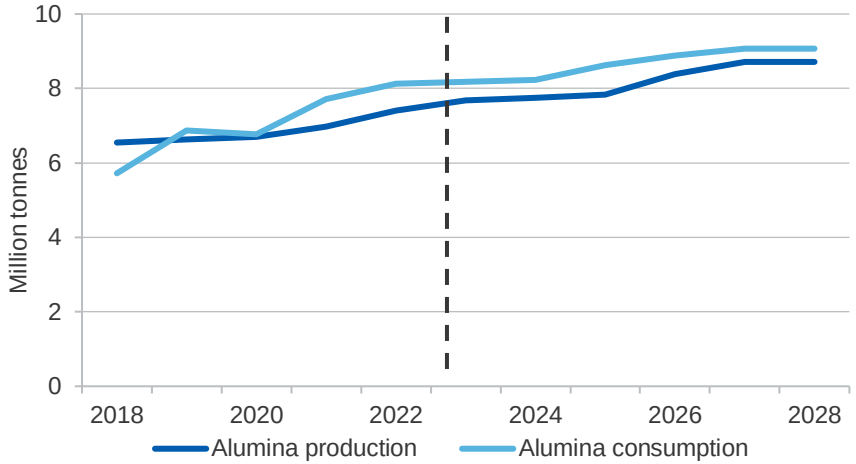
Australian bauxite export values increased by 12% year-on-year in 2022–23 to nearly $1.3 billion, despite a 4.6% year-on-year fall in bauxite export volumes. China accounted for 98% of total Australian bauxite exports in 2022–23. A ban on bauxite exports by Indonesia — which started on 10 June 2023 — seems to have assisted Australian bauxite exporters. Provisional trade data for July 2023 shows a 14% year-on-year or 12% month-on-month rise in Australian bauxite exports to China (Figure 11.8).

Higher alumina, aluminium and bauxite export earnings in prospect

An expected rise in primary aluminium prices and higher alumina and bauxite export volumes are likely to boost Australian AAB export earnings from $16 billion in 2023–24 to $17 billion in 2024–25 (Figure 11.9).

Australian alumina exports to India are expected to rise over the outlook period, as Indian alumina demand exceeds alumina production (Figure 11.10). In 2022–23, Australia exported 682,000 tonnes of alumina to India, accounting for 4.1% of Australia's exports. India is prioritising expenditure on EV and renewable energy infrastructure and battery supply chains.

Figure 11.10: India's alumina production and consumption



Source: CRU (2023); Wood Mackenzie (2023); Department of Industry, Science and Resources (2023)

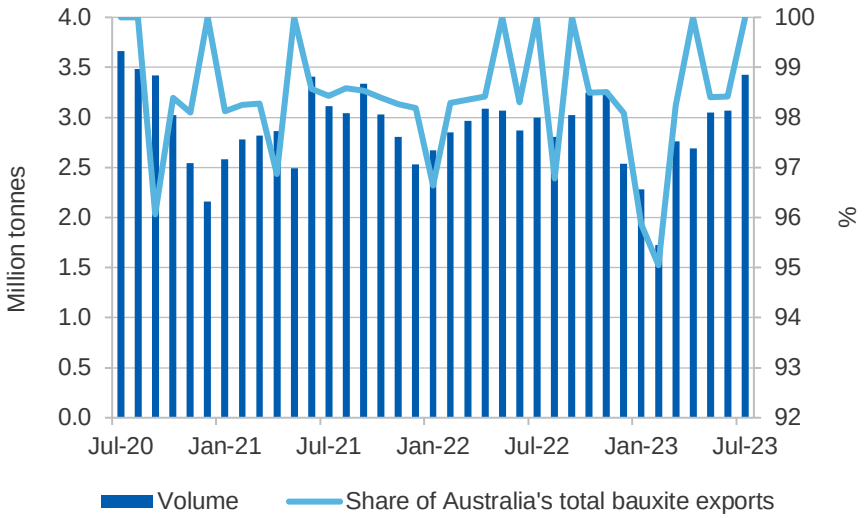
Australia's alumina/aluminium/bauxite production fell in 2022–23

Australian primary aluminium output was virtually flat in 2022–23 at 1.52 Mt. In mid-March 2023, Alcoa announced an immediate 25% production cut at Portland Aluminium amid operational instability.

Unplanned outages and plant reliability issues at Rio Tinto's Queensland Alumina Limited alumina refinery in Queensland cut Australian alumina output by 4.4% in 2022–23 to 19 Mt. In January 2023, Alcoa declared 'force majeure' — triggering a contract clause to remove liability for unforeseeable and unavoidable events that interrupt normal business — due to disruptions in natural gas supply to its operations in WA. About 20% (or 438,000 tonnes) of refining capacity at the Kwinana plant still curtailed. On 26 April 2023, Alcoa lifted the force majeure for its Kwinana operation.

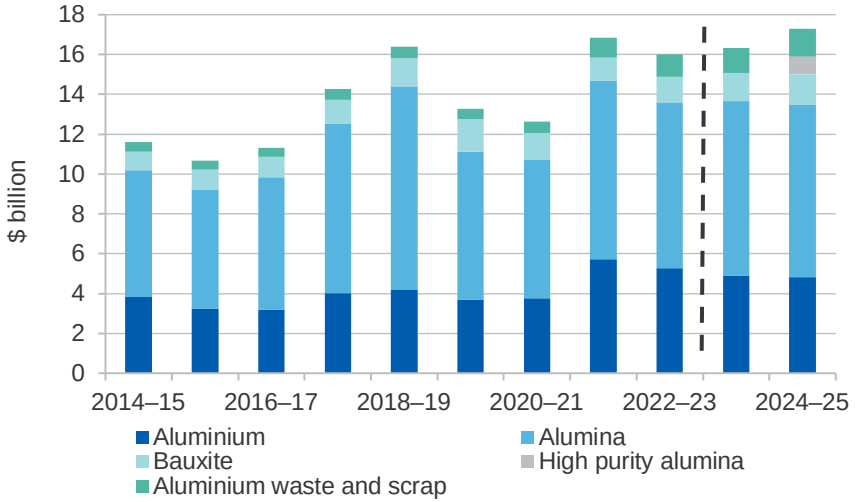
Above average annual rainfall reduced pit access and speed limits for mobile equipment at Rio Tinto's Gove bauxite mine in the Northern Territory and the Weipa bauxite mine in Queensland. As a result, Australian bauxite output fell by 1.8% in 2022–23 to 100 Mt.

Figure 11.8: Australia's bauxite exports to China, monthly



Source: ABS (2023) International Trade in Goods and Services, 5368.0

Figure 11.9: Australian aluminium/alumina/bauxite exports



Source: ABS (2023) International Trade in Goods and Services, 5368.0; Department of Industry, Science and Resources.

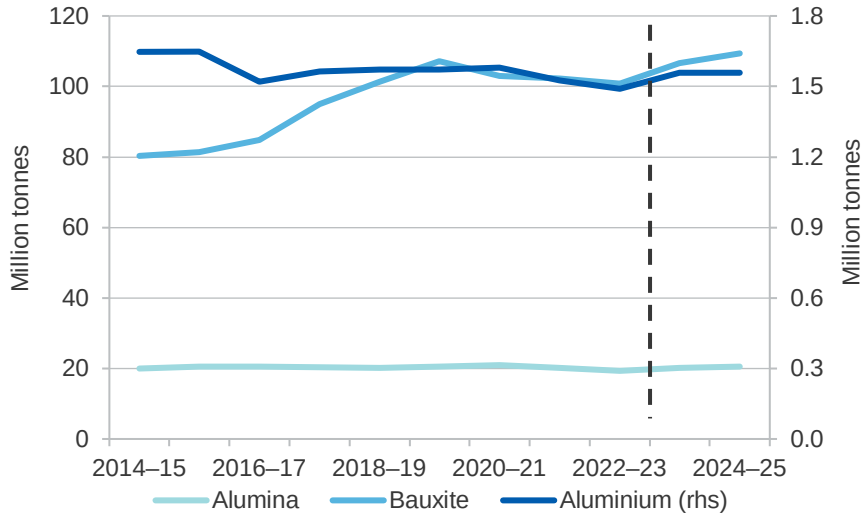
Higher bauxite output over the outlook period

Over the outlook period, an expected improvement in Australian smelting operations is likely to bring Australian primary aluminium output back to normality, at 1.6 Mt of primary aluminium a year (Figure 11.11).

Alcoa Australia has signed a new nine-year agreement with AGL to supply a proportion of the electricity requirement of Portland Aluminium smelter in Victoria to 30 June 2035.

An expected improvement in refining operations in Queensland and in Worsley (WA) offset lower alumina output from Alcoa's refineries in WA. Alcoa is still waiting for approval from the WA government for its Mine Management Program — usually approved annually on a 5-year basis. While waiting for approval, Alcoa will have to mine lower grade bauxite in approved areas until mid-2024. The company's short-term alumina output is expected to vary (to the downside) depending on bauxite grades. As a result, Australia's alumina output is forecast to fluctuate around the 20 MT a year level (Figure 11.11).

Figure 11.11: Australian aluminium/alumina/bauxite output



Source: Department of Industry, Science and Resources (2023)

The expansion of Metro Mining's Bauxite Hills in Queensland from 3.5 Mt a year to 7 Mt a year is forecast to drive Australian bauxite output up by 4.4% a year to 109 MT in 2024–25 (Figure 11.11).

High purity alumina (HPA) projects continue to progress.

The Western Australian Government has allocated $3 million from its Investment Attraction Fund for FYI Resources to develop its 900 tonnes a year HPA project. Alpha HPA will go ahead with its $300 million second stage of its HPA First project in Gladstone, Queensland. In April 2023, the company received a $21.7 million grant from the Queensland Government. Stage 1 of the project has been in operation since late 2022, producing 5N (99.99%) purity aluminium nitrate in commercial quantities. Stage 2 involves the production of aluminium sulfate, HPA, nano HPA and high purity aluminium hydroxides.

Impact Minerals bought an 80% interest in the Lake Hope HPA project in WA. It is a high-grade alumina prospect with an estimated alumina content of at least 775,000 tonnes, most of which can be processed to HPA. Further drilling is occurring, and a pre-feasibility study is ongoing.

Revisions to the outlook

The forecast for Australia's AAB export earnings in 2023–24 has been revised up from the June 2023 REQ — by $376 million. The revision reflects higher forecasts for Australia's alumina export values.

The forecast for Australia's AAB export earnings in 2024–25 has been revised up from the June 2023 REQ by $204 million. The revision reflects lower forecasts for Australian dollar.

Box 11.1: Gallium — A by-product of processing bauxite

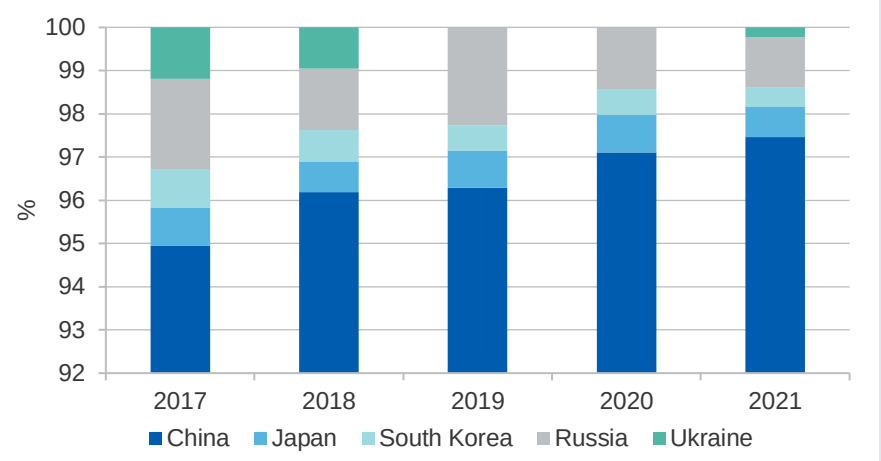
Gallium is a chemical element which has the unusual property of melting at room temperature. Unlike other resource commodities that are extracted directly from the earth, gallium is a by-product of processing bauxite — the main raw material for producing alumina and aluminium.

Gallium plays a critical role in a range of novel technologies, from LED lighting solar cells to high efficiency semiconductors for a range of consumer and defence applications. It is used in phased array radars, electronic warfare systems, satellite communications system, 5G wireless base stations, mobile phones; optoelectronics: LED lighting, lidar, infrared lasers; power electronics: spacecraft power management, fast chargers (EVs and consumer electronics), data centres, power grid management; and clean energy: solar cells, neodymium iron boron magnets for EVs. Gallium nitride is now gaining traction for rapid charging devices. The Navitas Semiconductor company in the US is developing a gallium nitride charging system which could lower the charging time for EVs by 33%.

China's dominance in gallium is closely tied to the growth of its aluminium industry. Chinese aluminium smelters are required to create the capacity to extract gallium. As a result, China produced 423,000 kilograms of gallium in 2021, accounting for 97% of world gallium output (Figure 11.12).

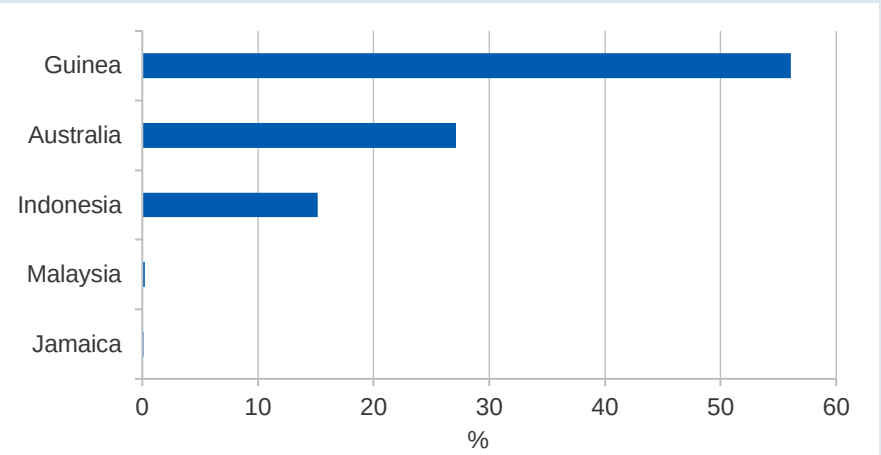
To secure a stable bauxite supply, over the last decade China's private and public sectors have invested to lift Guinean bauxite production capacity — which has the world's largest bauxite reserves. In 2022, Guinea accounted for 56% of China's bauxite imports. Australia and Indonesia (before its bauxite export ban) were the 2nd and 3rd largest source of Chinese bauxite imports in 2022 (Figure 11.13). Australia is the world's second biggest bauxite producer and its 2nd biggest exporter; we are the world's second biggest alumina producer and its largest alumina exporter.

Figure 11.12: Shares of world gallium production



Source: US Geological Survey (2023), 2021 Annual Tables

Figure 11.13: Shares of China's bauxite imports, 2022



Source: Bloomberg (2023)

Source: National Library of Medicine; Forbes, Sourcing gallium for American semiconductor supremacy; The United States Centre for Strategic and International Studies, De-risking gallium supply chains; US Geological Survey, Compilation of gallium resource data for bauxite deposits; Department of Industry, Science and Resources.

Table 11.1: Aluminium, alumina and bauxite outlook

						Annual percentage change		
World	**Unit**	**2022**	**2023 [s]**	**2024 [f]**	**2025 [f]**	**2023 [s]**	**2024 [f]**	**2025 [f]**
Primary aluminium								
Production	kt	68,529	70,301	71,949	72,931	2.6	2.3	1.4
Consumption	kt	68,050	68,734	72,649	73,816	1.0	5.7	1.6
Prices aluminium[c]								
- nominal	US$/t	2,708	2,300	2,415	2,500	-15.1	5.0	3.5
- real[d]	US$/t	2,827	2,300	2,349	2,381	-18.7	2.1	1.4
Prices alumina spot								
- nominal	US$/t	365	344	345	352	-5.5	0.2	2.1
- real[d]	US$/t	381	344	336	336	-9.5	-2.6	0.0
Australia	**Unit**	**2021–22**	**2022–23**	**2023–24 [f]**	**2024–25 [f]**	**2022–23**	**2023–24 [f]**	**2024–25 [f]**
Production								
Primary aluminium	kt	1,525	1,524	1,558	1,559	-0.1	2.2	0.1
Alumina	kt	20,138	19,242	20,108	20,446	-4.4	4.5	1.7
Bauxite	Mt	102.3	100.4	106.6	109.4	-1.8	6.2	2.6
Consumption								
Primary aluminium	kt	501	314	264	264	-37.3	-16.0	0.0
Exports								
Primary aluminium	kt	1,368	1,441	1,418	1,419	5.3	-1.6	0.1
- nominal value	A$m	5,710	5,283	4,887	4,809	-7.5	-7.5	-1.6
- real value[e]	A$m	6,360	5,499	4,887	4,657	-13.5	-11.1	-4.7
Alumina	kt	17,739	16,566	17,494	17,788	-6.6	5.6	1.7
- nominal value	A$m	8,977	8,308	8,773	8,664	-7.5	5.6	-1.2
- real value[e]	A$m	10,000	8,647	8,773	8,390	-13.5	1.5	-4.4
Bauxite	kt	35,957	34,031	40,306	43,181	-5.4	18.4	7.1
- nominal value	A$m	1,177	1,280	1,414	1,538	8.8	10.4	8.8
- real value[e]	A$m	1,311	1,333	1,414	1,489	1.7	6.1	5.3
Total value								
- nominal value	A$m	16,854	16,007	16,360	17,302	-5.0	2.2	5.8
- real value[e]	A$m	18,774	16,660	16,360	16,755	-11.3	-1.8	2.4

Notes: Total nominal and real values of Australian exports include primary aluminium, aluminium waste and scrap, alumina, high purity alumina and bauxite. **c** LME cash prices for primary aluminium; **d** In 2023 calendar year US dollars; **e** In 2023–24 financial year Australian dollars; **f** Forecast; **s** Estimate. Sources: ABS (2023) International Trade in Goods and Services, 5368.0; Bloomberg (2023); London Metal Exchange (2023); Department of Industry, Science and Resources (2023); World Bureau of Metals Statistics (2023)