

Aluminium



Australia's aluminium sector



103m tonnes of annual bauxite output, the world's largest producer



\$16 billion primary aluminium, alumina and bauxite exported, 2022



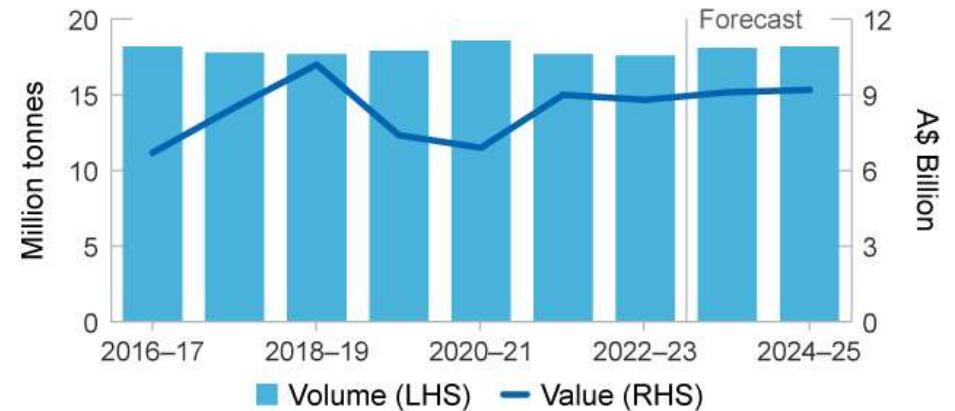
Around 98% of Australian bauxite is exported to China

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



Major Australian bauxite deposits, Gt

Australian alumina exports



Outlook



Prices set to rise as energy efficient technology supports aluminium demand



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



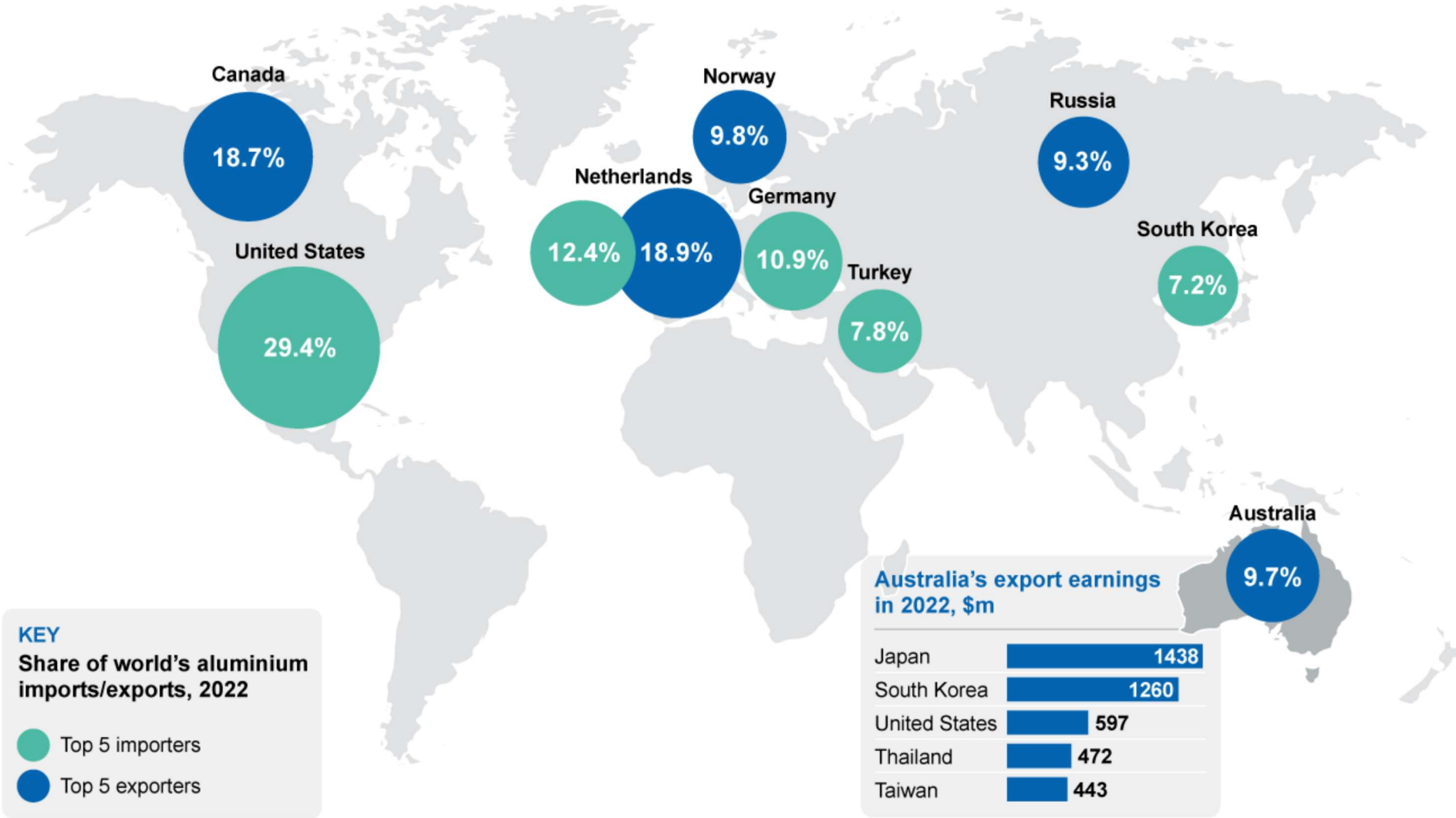
Bauxite export volumes set to increase with Indonesia's Jun 2023 bauxite export ban



Demand for new energy efficient cars and technologies support Australian exports

SOURCE: DISR; OCE

Aluminium TRADE MAP



SOURCE: WBMS; ABS

11.1 Summary

- Global demand for primary aluminium is sluggish, particularly in Europe. Tighter monetary conditions are likely to impact Western aluminium demand in 2023–24.
- Production outages in China's Yunnan Province have reduced supply. Declining energy prices are restoring the profitability of aluminium production.
- Earnings for Australian exports of aluminium, alumina and bauxite are expected to rise from \$16 billion in 2022–23 to \$17 billion in 2024–25, as prices rise.

11.2 World consumption

European led lower aluminium consumption in the March quarter 2023

Global primary aluminium consumption fell by 1.5% year-on-year in the March quarter 2023 to 16 million tonnes (Mt), due to a 28% year-on-year fall in European primary aluminium consumption. Weaker European demand was due to subdued activity in the housing and construction sectors — the sectors worst affected by rising inflation and interest rates. In Germany, the S&P Global Germany Construction Purchasing Managers' Index (PMI) has been in 'contraction' territory since March 2022, with a sharp fall to 42.9 in March 2023 from 48.6 in February 2023. Germany's primary aluminium demand fell by 44% year-on-year in the March quarter 2023 to 320,000 tonnes.

China's primary aluminium demand rose by 7.0% year-on-year in the March quarter 2023 to over 10 Mt. Helping demand was strong electric vehicle (EV) sales: in January and February 2023, there were 922,400 EVs sold in China, up 25% year-on-year.

World secondary aluminium consumption rose by 4.6% year-on-year in the March quarter 2023 to 6.3 Mt, as automotive makers in Asia, Europe, and the US sourced secondary — rather than primary — aluminium to cut costs. In Asia, secondary aluminium usage in Japan and South Korea increased by 5.9% and 5.5% year-on-year in the March quarter 2023, respectively, while in the US, secondary aluminium consumption increased

by 2.4% year-on-year. Amongst major European purchasers, demand for secondary aluminium in Germany and Italy rose by 2.0% and 3.8% year-on-year in the March quarter 2023, respectively.

World alumina consumption rose by 5.1% year-on-year in the March quarter 2023 to 33 Mt, driven by higher global primary aluminium production. China remained the world's largest alumina consumer, accounting for 59% of global alumina usage, and drove most of the gain (up 7.3% year-on-year). Outside of China, alumina consumption in Canada and Russia rose by 7.1% and 1.3% year-on-year in the March quarter 2023, respectively.

World bauxite usage rose by 1.5% year-on-year in the March quarter 2023 to 88 Mt, driven by higher global alumina production. China remained the world's largest bauxite consumer, accounting for 54% of global usage.

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

Demand for primary aluminium in 2023 is expected to be mainly driven by China, as the gradual pick up in growth in the Chinese economy lifts usage in the construction and vehicle manufacturing sectors. On 21 June 2023, the Chinese Government's passenger electric vehicle (PEV) subsidy was extended to 2025, with half of this subsidy available until 2027. This announcement will support growth in aluminium demand from the Chinese automotive industry.

Outside of China, PEV sales in Europe and 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. As a result, global primary aluminium consumption is forecast to increase by 1.5% in 2023, to 69 Mt (Figure 11.1).

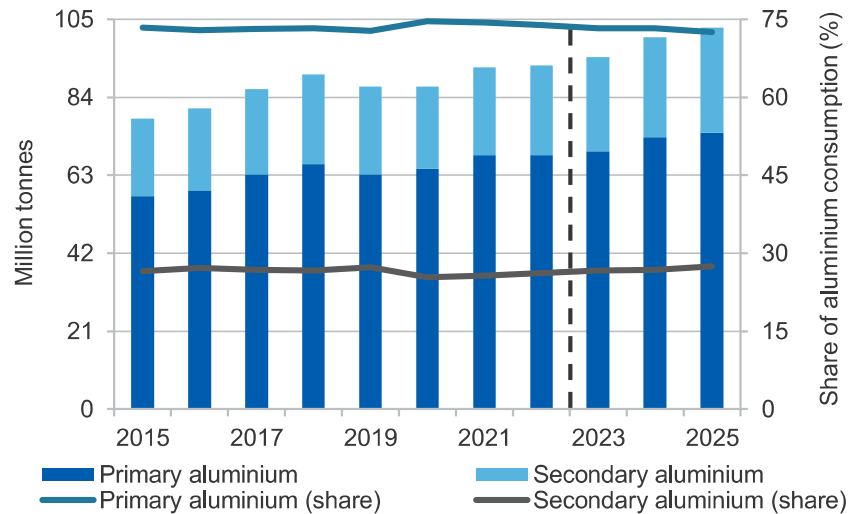
Beyond 2023, world primary aluminium consumption is forecast to grow at an annual average rate of 3.6% to 74 Mt by 2025. Demand will be boosted by the rising sales of energy-efficient vehicles, which are more aluminium intensive. Lower interest rates in 2024 and 2025 are likely to boost housing and commercial building activities, and thus aluminium demand.

World secondary aluminium demand is forecast to increase by 4.6% year-on-year in 2023 to 25 Mt. After 2023, world demand is forecast to increase at 5.5% a year over the outlook period (Figure 11.1). Rising primary aluminium prices and the use of low carbon aluminium are expected to be the drivers of higher secondary aluminium consumption.

In line with world primary aluminium production, world alumina consumption is forecast to grow by 3.0% year-on-year to 138 Mt in 2023 (Figure 11.2). After 2023, world alumina demand is forecast to rise at an average annual rate of 1.9% over the outlook period (Figure 11.2). Alumina demand is driven by primary aluminium production, which is forecast to lift by an average 1.9% a year between 2024 and 2025.

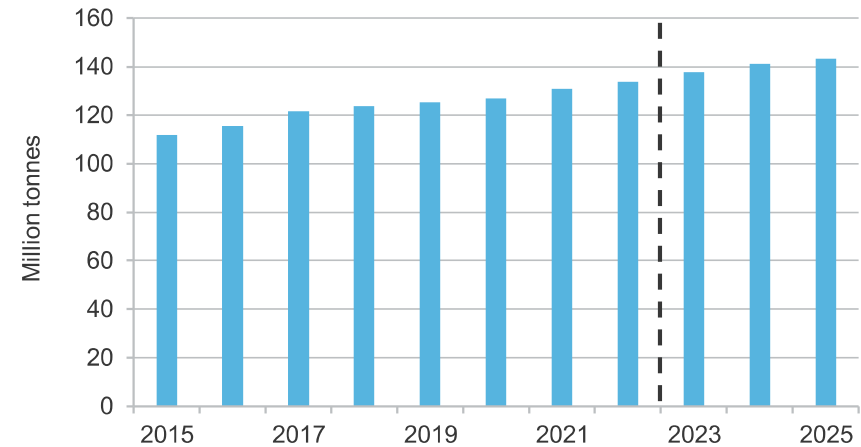
World bauxite usage is forecast to increase by 1.0% in 2023 to 367 Mt. After 2023, world bauxite demand is forecast to rise at an average annual rate of 1.0% over the outlook period (Figure 11.3). Bauxite demand is driven by alumina production, which is projected to lift by an average 1.4% a year between 2024 and 2025.

Figure 11.1: World primary/secondary aluminium consumption



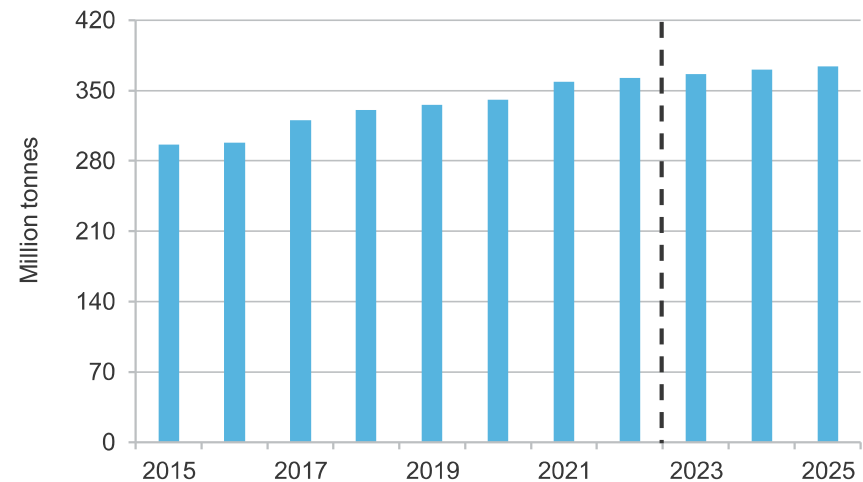
Source: Wood Mackenzie (2023); Department of Industry, Science and Resources (2023)

Figure 11.2: World alumina consumption



Source: World Bureau of Metals Statistics (2023); CRU (2023); Department of Industry, Science and Resources (2023)

Figure 11.3: World bauxite consumption



Source: World Bureau of Metals Statistics (2023); Department of Industry, Science and Resources (2023)

11.3 World production

Aluminium and alumina output grew in the March quarter 2023

World primary aluminium production increased by 2.1% year-on-year in the March quarter 2023 to 17 Mt, propelled by higher output in China — the world's largest aluminium producer. China produced 10 Mt of primary aluminium in the March quarter 2023, up by 4.9% year-on-year, driven by production restarts at some major aluminium producing cities. Bosai Group Aba Aluminium in Sichuan restarted 178 electrolytic tanks in March 2023. This is equivalent to 173,000 tonnes a year of capacity. Aluminium smelters in Guizhou restarted 70% of their operating capacity in the March quarter 2023. In Yunnan Province (the fourth largest producing province), low hydropower output — due to drought and low reservoir levels — prevented local aluminium smelters from restarting their curtailed capacity.

In Europe, the aluminium smelting capacity that was curtailed in 2022 — due to high energy costs — remained largely offline in the March quarter 2023.

World secondary aluminium production decreased by 0.7% year-on-year in the March quarter 2023 to nearly 7.8 Mt, due to lower output from Germany and Japan. Over this period, Germany's secondary aluminium fell by 30% year-on-year, while the US secondary aluminium production fell by 5.6% year-on-year.

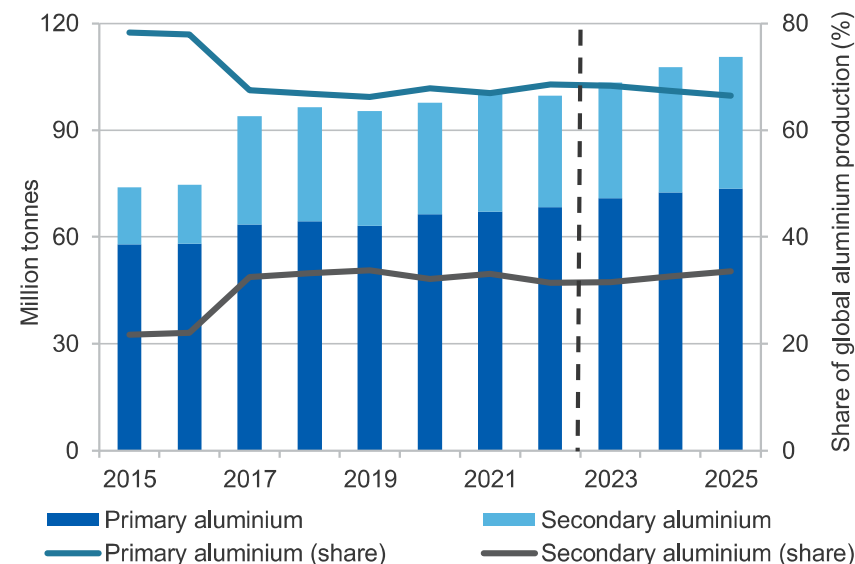
World alumina supply rose by 0.7% year-on-year in the March quarter 2023 to 34 Mt, driven by higher output in China and Indonesia. Production in China — the world's largest alumina producer — rose by 4.6% year-on-year, as Chinese refiners raised output to accommodate higher aluminium production.

Outside of China, Indonesia's alumina output rose by 31% year-on-year in the March quarter 2023, propelled by production ramp-up at the 300,000 tonnes a year Tayan alumina refinery.

Alumina production in Australia — the world's second largest alumina producer — fell by 0.7% year-on-year in the March quarter 2023 to 4.9 Mt, due to lower production at Rio Tinto's QAL and Yarwun refineries in

Queensland. Over this period, alumina production in Brazil — the world's third largest alumina producer — fell by 6.1% year-on-year to 2.5 Mt, due to a belt system failure at Brazil's Alumar refinery.

Figure 11.4: World primary & secondary aluminium production



Source: World Bureau of Metals Statistics (2023); Department of Industry, Science and Resources (2023)

World bauxite production fell by 12% year-on-year in the March quarter 2023 to 86 Mt, due to lower output in Australia and Guinea — the world's two largest bauxite producers. Production in Australia fell by 6.7% year-on-year in the March quarter 2023 to 23 Mt (see *Australia's exports and production* section). Over this period, production in Guinea decreased by 18% year-on-year to 20 Mt.

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

World primary aluminium output is forecast to grow by 3.5% year-on-year to nearly 71 Mt in 2023 (Figure 11.4). The gain is expected to be driven by production ramp-ups in China and India, as well as the restart of idled capacity in Europe.

China's primary aluminium output is forecast to reach nearly 42 Mt in 2023, up 4.2% year-on-year. Outside of China, primary aluminium production in India is forecast to increase by 4.5% year-on-year to 4.2 Mt in 2023. Aluminium Dunkerque, which operates the Dunkerque aluminium smelter in France, restarted production capacity that was idled in 2022 due to high energy costs.

Montenegro's aluminium producer Uniprom announced in mid-May 2023 that its KAP aluminium smelter will close after over half a century of production. The timing of the closure is expected to be in the second half of 2023.

After 2023, world primary aluminium production is forecast to rise by 1.9% a year over the outlook period, reaching 73 Mt by 2025 (Figure 11.4). The gains will be driven by China, as more output is produced from greenfield aluminium smelters. China's primary aluminium production is projected to reach 43 Mt by 2025. This is edging closer to the capacity cap of 45 million tonnes per year, a policy introduced by the Chinese Government in 2017 in response to environmental and oversupply concerns. As China edges closer to its primary aluminium capacity cap, other primary aluminium producing nations — such as India, Canada, Brazil, and the UAE — will get the chance to fill any market gaps that develop.

According to Shanghai Metals Market, on 8 May 2023 China's Chongqing municipality authority issued a statement outlining that enterprises in highly polluting and energy intensive industries such as steel and aluminium will be subject to differential electricity prices and tiered electricity prices.

Outside of China, 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 commence in 2023. Once completed, it will increase the smelter's output from 1.56 Mt in 2021 to 1.68 Mt in 2024.

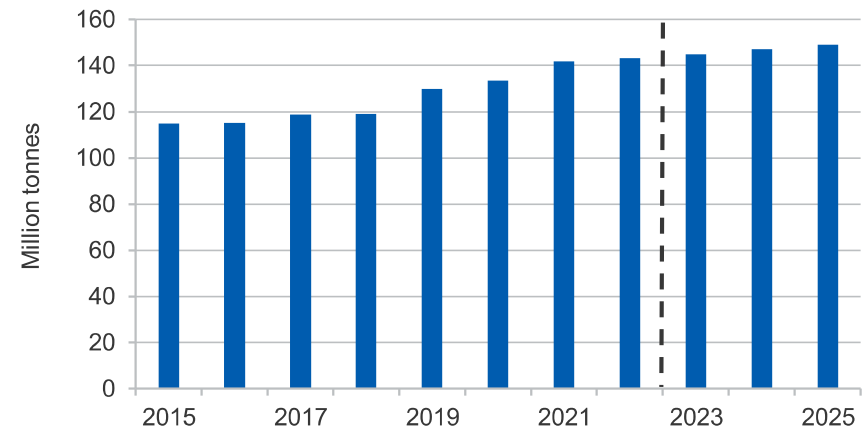
Egyptian Company for Metal Constructions (Metalco) announced on 14 April that it is in talks with a partner to build a 600,000 tonnes per year

aluminium smelter in the Golden Triangle area of Egypt. The project requires an investment of about US\$2.7 billion and is expected to reach a final investment decision in 2023.

World secondary aluminium output is forecast to increase by 4.6% year-on-year in 2023 to nearly 33 Mt, driven by higher output from China (up by 7.3% year-on-year) and the US (up by 7.0% year-on-year). After 2023, world secondary aluminium is forecast to rise at 6.6% a year, reaching 37 Mt by 2025 (Figure 11.4). Rio Tinto's 30,000 tonnes a year Arvida recycling facility in Quebec, Canada, is expected to be commissioned in the March quarter 2025.

World alumina output is forecast to grow by 1.2% year-on-year to 145 Mt in 2023, driven by rising output from new/existing refineries in China and Australia (Figure 11.5). 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. Construction was completed at the second phase of 1.2 Mt a year Tiandong Jinxin alumina refinery, the third and fourth phases of 2.4 million tonnes a year Hebei Wenfeng alumina refinery, and the second phase of 1 Mt a year at Lubei

Figure 11.5: World alumina production



Source: World Bureau of Metals Statistics (2023); CRU (2023); Department of Industry, Science and Resources (2023)

Chemical Industry alumina refinery. These refineries were expected to commence production in the June quarter 2023. Australian output is forecast to rise by 1.9% year-on-year to nearly 20 Mt in 2023, driven by improved operating performance of alumina refineries.

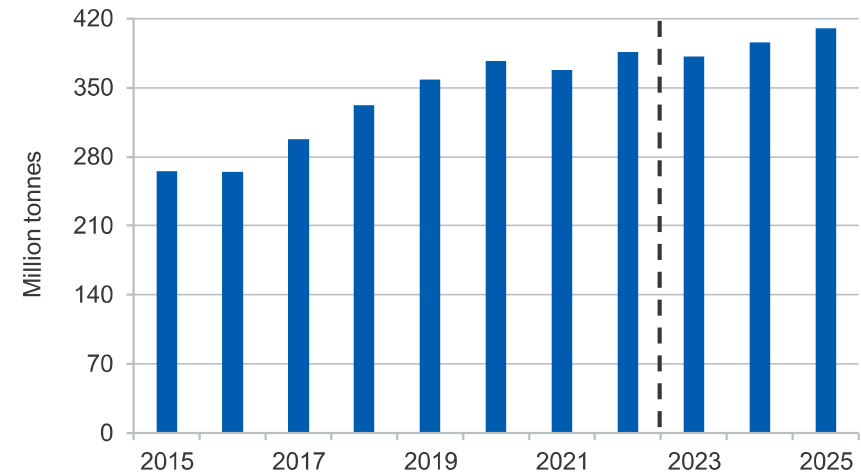
After 2023, world alumina output is forecast to rise by 1.4% a year over the outlook period, reaching 149 Mt by 2025 (Figure 11.5). The gains are forecast to be driven by China, India, and Indonesia. This will include China Aluminium Company and the Indonesian joint-venture partners' 2 million tonnes a year Mempawah alumina refinery in Indonesia, 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 August 2022, the east Indian state of Odisha approved Adani's 4 Mt a year alumina refinery project. The cost of the project is estimated to be US\$5.2 billion; the start and completion dates for the project are unknown.

The Guinean Government has planned to develop its alumina refinery industry. With a vast bauxite resource, developing refinery capability would add more value to the Guinean economy. In early May 2023, a French-Guinean businessman asked the French Government to back his alumina refinery project in Guinea.

World bauxite output is forecast to fall by 1.1% year-on-year to 382 in 2023, due to lower production in Indonesia (Figure 11.6). Indonesian production is forecast to fall by 40% in 2023, as the bauxite export ban — commenced in June 2023 — will have an impact on the country's bauxite production. Production at the Tayan bauxite operation and the Ketapang bauxite operation are forecast to fall by 79% and 33% year-on-year in 2023 to 0.7 and 7.2 Mt, respectively.

After 2023, world bauxite production is forecast to increase by 3.6% a year, reaching 410 Mt by 2025 (Figure 11.6). 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

Figure 11.6: World bauxite production



Source: World Bureau of Metals Statistics (2023); Department of Industry, Science and Resources (2023)

the project is commercially viable and will require a capital investment of over US\$1 billion.

Green aluminium, alumina and bauxite

The UAE's Emirates Global Aluminium (EGA) — the Middle East's biggest aluminium producer — joined Australia's Heavy Industry Low-carbon Transition Cooperative Research Centre (HILT CRC) in April 2023. Joining HILT CRC enables EGA to participate with the Australian alumina refining industry in finding technological solutions to the decarbonization challenges in alumina refining.

Bosnian aluminium firm Aluminij signed a deal with Glencore in May 2023 to build a 60 MW solar power project and aluminium recycling facility. The green aluminium plant is expected to be commissioned in 2025.

Norsk Hydro signed a contract to buy land in Spain in June 2023 for building a 120,000 tonnes per year aluminium recycling plant. The facility will strengthen Hydro's capabilities to produce low carbon aluminium.

11.4 World trade

Weak aluminium and alumina exports in the March quarter 2023

World primary aluminium exports fell by 44% year-on-year in the March quarter 2023 to 2.1 Mt, largely due to lower exports from Russia. The fallout from the Russian invasion of Ukraine reduced Russian primary aluminium exports by 85% year-on-year to 94,000 tonnes in the March quarter 2023. Despite no direct sanctions on Russian aluminium by the US and other Western nations, Russia's share of world primary aluminium exports fell from 16% in the March quarter 2022 to 4.4% in the March quarter 2023.

Offsetting the fall in aluminium exports from Russia was higher primary aluminium exports from Canada (up 25% year-on-year in the March quarter 2023) and Iceland (up 7.2% year-on-year in the March quarter 2023).

World secondary aluminium exports fell by 14% year-on-year to 517,000 tonnes in the March quarter 2023, driven by lower exports from Europe. Exports from Italy and Poland fell by 32% and 31% year-on-year in the March quarter 2023, respectively. The slower than expected restart of idled primary aluminium capacity forced European aluminium users to turn to secondary aluminium as a substitute.

World alumina exports declined by 4.9% year-on-year in the March quarter 2023 to nearly 9.4 Mt. Over this period, exports from Australia — the world's largest alumina exporter — declined by 6.5% year-on-year. This followed a 0.7% fall in Australian alumina production over the same period (see *Australia's exports and production* section). Offsetting the decline in Australia's alumina exports was an increase in exports from China, rising 465% year-on-year in the March quarter 2023.

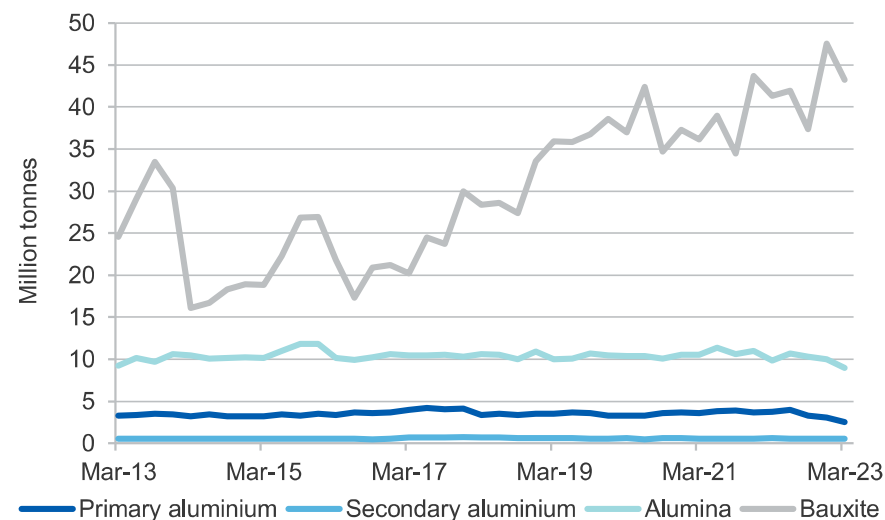
World bauxite exports increased by 4.7% year-on-year in the March quarter 2023 to 43 Mt. This was propelled by a 35% year-on-year rise in Guinea — the world's largest bauxite exporter. Over the same period, bauxite exports from Australia — the world's second largest bauxite exporter — decreased by 22% year-on-year. Bauxite exports from

Indonesia decreased by 58% year-on-year in the March quarter 2023, as the Indonesian bauxite producers slowed down their production in preparation for the export ban commenced on 10 June 2023.

The bauxite export ban — reported to be part of the Indonesian Government's efforts to support domestic supply chains and increase the country's alumina production — is likely to benefit Australian bauxite exporters, with tighter global supply expected to push up bauxite prices. However, Indonesia's determination to raise its alumina refining capacity is unlikely to impact Australia's status as the world's largest alumina exporter in the near term at least.

The government of Ghana is expected to introduce a ban on bauxite exports in 2023. Ghana is a very small bauxite producer, accounting for only 0.13% and 0.09% of global bauxite production and exports, respectively.

Figure 11.7: World aluminium, alumina and bauxite exports



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

Lower aluminium demand led to lower aluminium imports in Europe

World primary aluminium imports fell by 32% year-on-year in the March quarter 2023 to 3.5 million tonnes, largely due to lower European imports. Many nations reduced their aluminium demand and imports. This included German primary aluminium imports, which decreased by 70% year-on-year in the March quarter.

World secondary aluminium imports fell by 9.9% year-on-year in the March quarter 2023 to 757,000 tonnes, largely due to lower European imports. Many European countries reduced secondary aluminium consumption to deal with slowing construction activities. In the Netherlands, secondary aluminium imports in the March quarter 2023 fell by 14% year-on-year to 90,000 tonnes. Over this period, secondary aluminium imports from Poland fell by 19% year-on-year to 79,000 tonnes.

World alumina imports fell by 12% year-on-year in the March quarter 2023 to 7.3 Mt, driven by a 2.9% year-on-year fall in Chinese alumina imports. Chinese imports fell due to higher Chinese domestic alumina production. Russia's alumina import data is not available and included in the assessment.

World bauxite imports decreased by 0.8% year-on-year to nearly 40 Mt in the March quarter 2023, due to lower imports from Spain (down 58% year-on-year) and the US (down 22% year-on-year). China — the world's largest bauxite importer — imported 35 Mt of bauxite in the March quarter 2023, up 8.3% year-on-year. Over this period, Guinea was the largest supplier of bauxite to China, accounting for 77% of China's total bauxite imports, followed by Australia (accounting for 18%) and Indonesia (accounting for 5.3%).

On 14 July 2021, the European Commission released its draft regulation on the Carbon Border Adjustment Mechanism (CBAM). The draft regulation sets out the policy for the European Union (EU) to tax imports based on the greenhouse gases emitted to make them. The CBAM — the world's first carbon tax on imports — applies to EU imports of iron ore, steel, aluminium, cement, fertiliser, electricity and hydrogen. After nearly

two years of consultation, the EU's parliament approved the CBAM legislation on 18 April 2023. Starting in October 2023, European companies will have to report the emissions of their imported goods, including the indirect emissions released by the electricity generation that powers overseas factories. European importers will have to pay taxes on the emissions from 2026 and onwards.

The introduction of EU CBAM is unlikely to impact Australia's primary aluminium exports. The EU accounted for 0.1% (\$2.9 million) of Australia's total primary aluminium exports in 2022. Over this period, Australia exported \$5.6 billion of primary aluminium; 26% to Japan, 22% to South Korea, 8% to Thailand, and 8% to Taiwan.

11.5 Prices

Aluminium market deficit fails to boost aluminium prices

Sluggish primary aluminium demand in Europe and tight monetary conditions in major economies have slightly outweighed the impacts on aluminium prices of supply disruptions in China's Yunnan province. The London Metal Exchange (LME) spot price for primary aluminium has fallen by 8.0% so far in 2023, at US\$2,152 a tonne on 27 June 2023 — compared to an average US\$2,339 a tonne in the second half of 2022.

LME stock changes reflect the sluggish ex-China primary aluminium demand, rising from 407,325 tonnes in January 2023 to 572,775 tonnes in June 2023. Shanghai Future Exchanges aluminium stock changes reflect the supply issues in Yunnan, falling from 295,920 tonnes in February 2023 to 123,669 tonnes in June 2023. LME off-warrant stocks follow the same trend, falling from 435,869 tonnes in January 2023 to 276,587 tonnes in April 2023 (Figure 11.9).

The free on board (FOB) Australian alumina price has fallen by 5.6% so far in 2023, at US\$334 a tonne on 27 June 2023 — compared to an average of US\$329 a tonne in the second half of 2022.

The LME aluminium spot price is forecast to fall by 13% year-on-year in 2023, to average US\$2,365 a tonne (Figure 11.8). Slowing world growth is

expected to be a significant driver of lower aluminium prices.

New alumina capacity additions in China — 3.4 Mt of new capacity in the first half of 2023 — are likely to put alumina prices under pressure. The free on board (FOB) Australian alumina price is forecast to decrease by 5.5% in 2023 to an average US\$344 a tonne (Figure 11.8).

On 2 June 2023, China’s Securities Regulatory Commission approved the registration of alumina futures on the Shanghai Futures Exchange (SHFE). The decision allows the SHFE to launch the world’s first alumina contract with physical delivery. The contract started trading on 19 June 2023.

Higher aluminium prices in the short term

After 2023, the LME aluminium price is forecast to rise, averaging US\$2,544 and US\$2,629 a tonne in 2024 and 2025, respectively (Figure 11.8). Growing global demand for new, energy-efficient cars and technologies will support aluminium usage. The FOB Australian alumina price is forecast to fall in 2024, before resuming to grow in 2025, averaging US\$350 a tonne in 2025 (Figure 11.8).

Figure 11.8: Primary aluminium and alumina prices



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

Figure 11.9: Exchange aluminium stocks



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

11.6 Australian exports and production

Lower aluminium and alumina prices reduced exports in the March quarter

Australia’s aluminium, alumina and bauxite (AAB) exports decreased by 6.7% year-on-year in the March quarter 2023 to \$3.8 billion, driven by lower aluminium and alumina prices. A 27% year-on-year fall in the LME aluminium price in the March quarter 2023 reduced Australian primary aluminium export values by 2.7% year-on-year to \$1.4 billion in the March quarter 2023. Over this period, primary aluminium exports to Japan and Taiwan fell by 18% and 49% year-on-year to \$332 million and \$66 million, respectively. Largely offsetting the fall in exports to Japan and Taiwan was a 54% year-on-year rise in export to South Korea to \$442 million, and a 39% year-on-year rise in export to the US to \$235 million.

Australian alumina export values fell by 12% year-on-year to nearly \$1.9 billion in the March quarter 2023, due to a 14% year-on-year fall in alumina prices in the March quarter 2023. Alumina export volumes were down by 7.5% year-on-year to 3.8 Mt in the March quarter 2023.

Australian bauxite export values increased by 9.1% year-on-year to \$285 million in the March quarter 2023, despite a 19% year-on-year fall in bauxite export volumes.

A weak earnings year for Australia's AAB exports in 2022–23

An expected fall in average aluminium and alumina prices in 2023 is likely to reduce earnings for Australian aluminium smelters, alumina refiners and bauxite miners. Australia's AAB exports are estimated to have decreased by 5.5% in 2022–23 to nearly \$16 billion (Figure 11.10).

Higher alumina, aluminium and bauxite export earnings after 2022–23

Over the outlook period, Australia's AAB exports are forecast to increase at an average annual rate of 3.7% a year, reaching \$17 billion by 2024–25, with the price of primary aluminium forecast to rise in 2024 and 2025 (Figure 11.10).

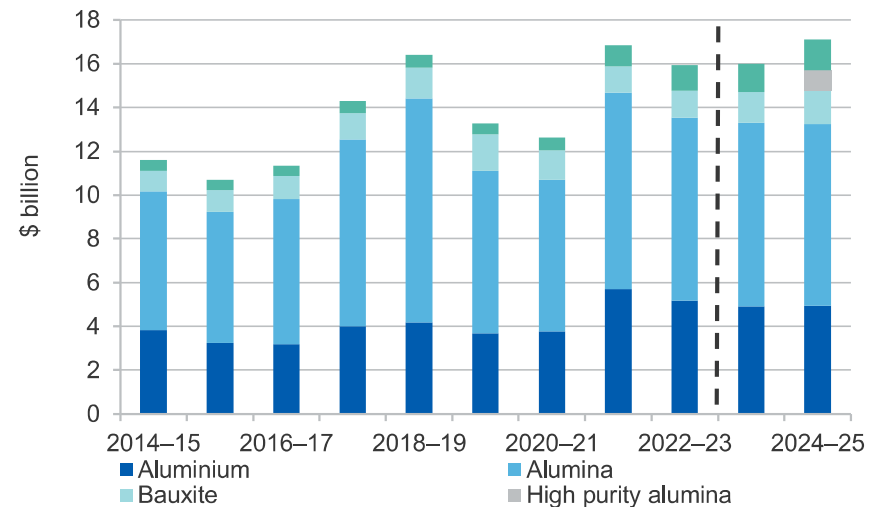
On 15 May 2023, Alcoa signed an 8-year supply agreement to supply 15.6 million tonnes of alumina from its alumina refineries in WA to Emirates Global Aluminium (EGA) in the UAE.

Australia's alumina/aluminium/bauxite production fell in the March quarter

Australia's primary aluminium output fell by 5.7% year-on-year in the March quarter 2023 to 360,000 tonnes. This was primarily due to a 4.9% year-on-year decline (to 117,000 tonnes) at Rio Tinto's Boyne Island smelter in Queensland, and a 2.2% year-on-year decline (to 45,000 tonnes) at Rio Tinto's Bell Bay aluminium smelter in Tasmania. As a result, Australia's primary aluminium output is estimated to fall by 2.3% year-on-year in 2022–23 to nearly 1.5 Mt.

Australia's alumina output fell by 4.1% year-on-year in the March quarter 2023 to nearly 4.7 Mt. Alumina output at Rio Tinto's QAL and Yarwun refineries in Queensland fell by 10% and 0.8% year-on-year in the March quarter 2023 to 790,000 and 739,000 tonnes, respectively, due to unplanned outages and plant reliability issues.

Figure 11.10: Australian aluminium/alumina/bauxite exports



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

Australia's alumina output in 2022–23 is estimated to have dropped by 4.0% year-on-year to 19.3 million tonnes. 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. As of 31 January 2023, about 20% (or 438,000 tonnes) of alumina refining capacity at the Kwinana plant was still curtailed. On 26 April 2023, Alcoa lifted the force majeure for its Kwinana operation.

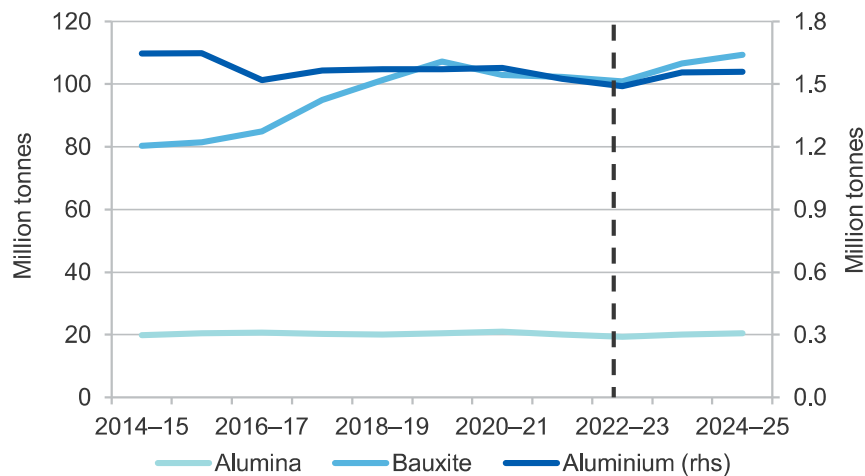
Australia's bauxite production fell by 6.7% year-on-year to 23 Mt in the March quarter 2023, due to lower production at Rio Tinto's Gove bauxite mine in the Northern Territory and the Weipa bauxite mine in Queensland. Higher than average annual rainfall reduced pit access and speed limits for mobile equipment. Metro Mining's Bauxite Hills mine in Queensland did not produce bauxite in the March quarter 2023, due to the annual wet season. As a result, Australia's bauxite output in 2022–23 is estimated to have decreased by 1.4% year-on-year to nearly 101 Mt.

Higher bauxite output over the outlook period

Over the outlook period, an expected improvement in Australian smelting and refining operations is likely to bring Australian primary aluminium and alumina output back to normality, at 1.6 Mt of primary aluminium a year and 20 Mt of alumina a year (Figure 11.11).

Australia's bauxite output is forecast to increase at 2.6% a year in 2023–24 and 2024–25, reaching 109 million tonnes in 2024–25 (Figure 11.11). The expansion of Metro Mining's Bauxite Hills mine in Queensland — from 3.5 million tonnes a year to 7 million tonnes a year — and higher production in other bauxite mines, are the main drivers of this increased output.

Figure 11.11: Australian aluminium/alumina/bauxite output



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

Australia's first high purity alumina (HPA) project to come online soon

In April 2023, Alpha HPA received a \$21.7 million grant from the Queensland Government for its 10,000 tonnes a year HPA First project in Gladstone, Queensland. Commercial operation is expected to start by the end of 2023, with an initial output of 1,500 tonnes of HPA a year.

Following the termination of a joint-venture development with Alcoa in February 2023, FYI Resources has completed a 17-day production test run at its pilot plant in WA. The plant produced HPA for targeted product marketing to potential customers.

Impact Minerals recently 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 630,000 tonnes, most of which can be processed to HPA. Further drilling is occurring, and a pre-feasibility study is ongoing.

Pathways to emissions reduction

In Australia, around 215 production facilities (including four aluminium smelters and six alumina refineries) are covered by the Safeguard Mechanism scheme (see the *Safeguard Mechanism* box in the Overview chapter).

The Bell Bay aluminium smelter in Tasmania has access to low emissions electricity through its electricity contract with Hydro Tasmania. The Tomago aluminium smelter in NSW is seeking to switch to renewable power supply in 2029, following the expiration of its current electricity agreement with AGL. The options to switch the Boyne Island smelter in Queensland and the Tomago aluminium smelter in NSW to renewable energy are progressing.

A Rio Tinto and Alcoa joint-venture project developing the ELYSISTM technology (to eliminate carbon emissions from the smelting process) is also progressing, with commercial scale production on track for 2024.

Alcoa is aiming to trial a 4 megawatt mechanical vapour recompression module at its Wagerup refinery in late 2023.

In November 2022, the Australian Renewable Energy Agency (ARENA) released a roadmap for decarbonising Australian alumina refining. The roadmap considers the technical, commercial and market implications for emerging low emissions alumina refining, and identifies key pathways to emissions reduction for one of Australia's hard to abate industries.

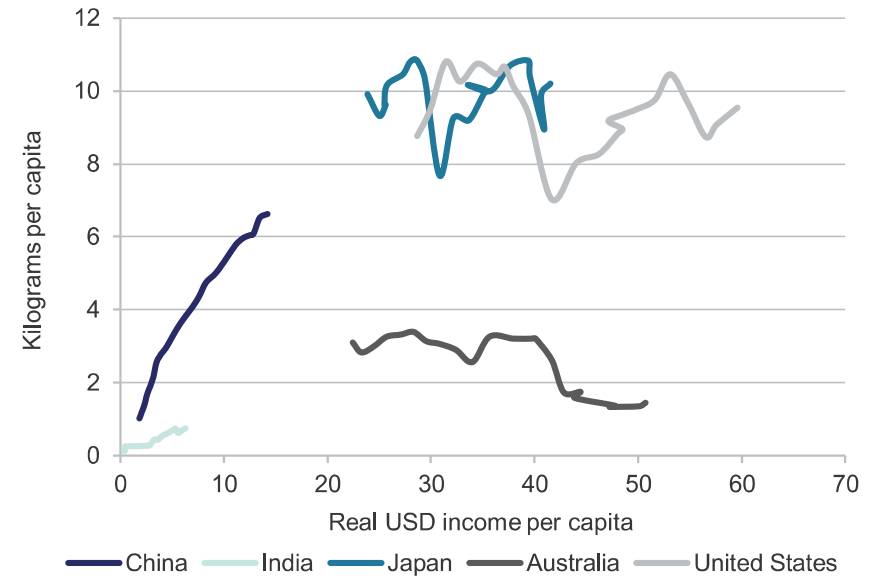
Australia's secondary aluminium consumption

Australia is far behind Japan, the US and China, with secondary aluminium consumption per capita of 1.4 kilograms (Figure 11.12). Australia consumed 38,000 tonnes of secondary/recycled aluminium in 2022, accounting for 0.2% of global secondary/recycled consumption. In the major economies, Japan has the highest secondary aluminium consumption per capita (10.2 kilograms), followed by the US (9.4 kilograms) and China (6.6 kilograms).

Revisions to the outlook

The forecasts for Australia's AAB export earnings in 2023–24 and 2024–25 have been revised down from the March 2023 *Resources and Energy Quarterly (REQ)* — by \$598 million and \$807 million, respectively. The revision reflects lower forecasts for Australia's alumina export volumes and values.

Figure 11.12: Secondary aluminium intensity use



Source: Organisation for Economic Cooperation and Development (2023); International Monetary Fund (2023); Department of Industry, Science and Resources (2023)

Table 11.1: Aluminium, alumina and bauxite outlook

						Annual percentage change		
World	Unit	2022	2023 ^f	2024 ^f	2025 ^f	2023 ^f	2024 ^f	2025 ^f
Primary aluminium								
Production	kt	68,340	70,706	72,441	73,451	3.5	2.5	1.4
Consumption	kt	68,408	69,448	73,305	74,486	1.5	5.6	1.6
Prices aluminium^c								
- nominal	US\$/t	2,708	2,365	2,544	2,629	-12.7	7.6	3.3
- real ^d	US\$/t	2,830	2,365	2,486	2,516	-16.4	5.1	1.2
Prices alumina spot								
- nominal	US\$/t	365	344	343	350	-5.5	-0.6	2.3
- real ^d	US\$/t	381	344	335	335	-9.6	-2.8	0.2
Australia	Unit	2021–22	2022–23 ^e	2023–24 ^f	2024–25 ^f	2022–23 ^e	2023–24 ^f	2024–25 ^f
Production								
Primary aluminium	kt	1,525	1,490	1,558	1,559	-2.3	4.5	0.1
Alumina	kt	20,138	19,326	20,108	20,446	-4.0	4.0	1.7
Bauxite	Mt	102.3	100.9	106.6	109.4	-1.4	5.7	2.6
Consumption								
Primary aluminium	kt	241	139	210	216	-42.4	51.2	3.0
Exports								
Primary aluminium	kt	1,368	1,422	1,418	1,419	4.0	-0.3	0.1
- nominal value	A\$m	5,710	5,174	4,914	4,950	-9.4	-5.0	0.7
- real value ^e	A\$m	6,115	5,174	4,709	4,598	-15.4	-9.0	-2.4
Alumina	kt	17,739	16,751	17,494	17,788	-5.6	4.4	1.7
- nominal value	A\$m	8,977	8,354	8,383	8,292	-6.9	0.4	-1.1
- real value ^e	A\$m	9,614	8,354	8,034	7,703	-13.1	-3.8	-4.1
Bauxite	kt	35,957	34,848	40,306	43,181	-3.1	15.7	7.1
- nominal value	A\$m	1,177	1,239	1,414	1,538	5.3	14.1	8.8
- real value ^e	A\$m	1,260	1,239	1,355	1,429	-1.7	9.3	5.4
Total value								
- nominal value	A\$m	16,854	15,924	15,984	17,098	-5.5	0.4	7.0
- real value ^e	A\$m	18,050	15,924	15,318	15,882	-11.8	-3.8	3.7

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 2022–23 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).