

# Aluminium Industry in Australia



Worsley Alumina mines bauxite near the town of Boddington and operates an alumina refinery in Worsley; both communities are in Western Australia.  
(Photograph was provided courtesy of South32.)

## Overall Aluminium Industry

Australia is one of the few countries in the world that has all three key elements of the aluminium industry: bauxite mining, alumina refining, and aluminium smelter operations. Not only is the aluminium industry an important business segment within the nation, it's also a major export industry for Australia. Both businesses headquartered domestically within the nation as well as companies headquartered in other countries lead the aluminium industry in Australia. Among the global businesses with operations here include Alcoa, Hydro, Rio Tinto, RUSAL, and South32. Some of Australian aluminium operations are 100% owned by one firm, whilst others are joint ventures. Alcoa of Australia Limited (Alcoa), for example, is owned 60 percent by Alcoa Corporation and 40 percent by Alumina Limited, according to a statement from Alcoa.

"The Australian aluminium industry has been operating since 1955 and has significantly contributed to the economy throughout this period," stated Ms. Marghanita Johnson, Executive Director of the Australian Aluminium Council. "Members of the Australian Aluminium Council include bauxite mines, alumina refineries, aluminium smelters, extruders and distributors, as well as organisations associated with the industry. The industry is a key employer and contributor in the communities in which we operate. The Australian industry employs thousands of people and adds value to Australia's local, state, and national economies at every stage, as well as having world-class environmental standards. Within the regions in which the industry operates, there is not only high-quality employment at mines, refineries, and smelters, but also the opportunities for local contractors to grow where the industry provides a

baseline of work on which they can then build."

Euromonitor International, a market research provider, has forecasted that overall aluminium production in Australia has grown from (US) \$24,653,800,000 in 2019 to (US) \$25,242,100,000 in 2020. This represents a forecast of a 2.4% increase. The overall aluminium industry category included, reported Euromonitor International, production of aluminium from alumina, electrolytic refining of aluminium waste and scrap, production of aluminium alloys, semi-manufacturing of aluminium, production of aluminium oxide (alumina), and aluminium wrapping foil.

## Bauxite Mining

"There are currently five large bauxite mines in Australia providing feedstock for the six alumina refineries and the export market," said Ms. Johnson of the Australian Aluminium Council. "Australia is the world's largest producer of bauxite. Australian bauxite deposits have high grades and are shallow and relatively easy to mine. The quality of Australian bauxite means there are a number of small new mines now operating in Australia, as well as exploration activities underway for new resources." **Fig 1**

Among the major bauxite mines in Australia are ones operated by Alcoa in Huntly and Willowdale, both communities in Western Australia. Rio Tinto operates bauxite mines in Grove, Northern Australia, and in Weipa, Queensland, whilst South32 operates a bauxite mine near Boddington, Western Australia.

"The majority, more than 60%, of Australian bauxite is used domestically in Australia's alumina refineries," indicated Ms. Johnson. "The balance is exported, with China being the main market. In 2019-20, Australian bauxite production

was 107 million tonnes (Mt). Forty-one Mt of bauxite were exported, and the remainder converted to Australian alumina. This is an eight percent increase in tonnage compared to the previous year."

"Global bauxite demand is forecast to increase at almost four percent per annum," stated Ms. Johnson. "Australia is on track to continue to produce around a quarter of the world's bauxite." Ms. Johnson reported that in 2018, the Australian Aluminium Council, together with the International Aluminium Institute and the Brazilian Aluminium Association, co-authored the Sustainable Bauxite Mining Guidelines. She explained that these guidelines "... share the expertise learned from many decades of sustainable mining practices in Australia with the global industry."

## Alumina Refining

The six Australian alumina refineries include three operated by Alcoa in Kwinana, Pinjarra, and Wagerup, all three of which are locales in Western Australia. Rio Tinto operates an alumina refinery in Yarwun, Queensland, and is also in a joint venture with RUSAL for Queensland Alumina Ltd, an alumina refinery located in Parsons Point, Gladstone, Queensland. RUSAL reported that this joint venture "... company's infrastructure includes a wharf and storage facilities on South Trees Island in Gladstone Harbour. Alumina production began in March, 1967." **Fig 2**

The sixth refinery, Worsley Alumina, is operated by South32 in Worsley, Western Australia. South32 noted that the bauxite mined by the company near the town of Boddington "... is transported by overland conveyor to the alumina refinery near Collie and turned into alumina powder, before being transported by



Fig 1. Bauxite is seen arriving at Alcoa's Wagerup Alumina Refinery in Western Australia. (The photograph was provided courtesy of the Australian Aluminium Council.)



Fig 3. Alcoa operates this alumina refinery at Wagerup in Western Australia. (This photograph was provided courtesy of the Australian Aluminium Council.)

rail to Bunbury Port. It is then shipped to smelters around the world, including South32's Hillside and Mozal aluminium smelters in Africa." South32 detailed that the business owns 86 percent of Worsley Alumina, "whilst Japan Alumina Associates (Australia) Pty Ltd owns ten percent and Sojitz Alumina Pty Ltd owns four percent." South32 indicated in its financial filing for Year 2020 (ending 30 June 2020) that its portion of the saleable production at Worsley Alumina increased by two percent to 3,886kt in fiscal year 2020. Future growth in production is anticipated, according to South32.

"As Australia only has four aluminium smelters, with collective capacity of 1.6 Mt primary aluminium, the majority (around 85%) of Australia's alumina production is exported, predominantly to the Asia Pacific region," said Ms. Johnson of the Australian Aluminium Council. "Australia alumina production in 2019-20 was 20.5 million tonnes. Australia maintained its position as the second largest producer of alumina and the world's largest exporter, with 17.9 Mt exported in 2019-20 contributing more than (AUS) \$7 billion in export revenues. This is a one percent increase in tonnage from the previous year."

"Australia's alumina refineries are forecast to continue to produce about 20.5 Mt per annum," stated Ms. Johnson. "Global demand for primary aluminium is forecast to continue to increase at two percent per annum, driving alumina demand." **Fig 3**

### Aluminium Smelters

The Australian Aluminium Council reported that Australia is the world's sixth largest producer of primary aluminium metal, with the four aluminium smelters operating in Australia producing 1.57 million tonnes of primary aluminium metal in 2019-2020; of that amount, 1.43 Mt was exported. The aluminium smelters include ones in Bell Bay, Tasmania, and



Fig 2. Alumina being loaded at Alcoa's berth at the Bunbury Port for export from Western Australia. (This photograph was provided courtesy of the Australian Aluminium Council.)

in Boyne Island, Queensland, both operated by Rio Tinto. Alcoa operates a smelter in Portland, Victoria, whilst a smelter operated by Tomago Aluminium Company Pty Limited – a joint venture of several businesses, including CSR, Hydro, and Rio Tinto – is located in Tomago, New South Wales.

"Tomago Aluminium is Australasia's largest aluminium smelter and has been operating 24 hours a day since 1983," noted a statement from the business. "The owners provide raw materials to Tomago that are converted to aluminium at the Tomago plant. The product is supplied back to the owners who then take it to market...The company contributes (AUS) \$1.5 billion annually to the Australian economy, of which (AUS) \$800 million is spent locally. The smelter

produces 585,000 tonnes of aluminium every year, which is 25% of Australia's primary aluminium. Ninety percent of the product is exported to the Asia-Pacific region." Among products manufactured by Tomago Aluminium, according to a statement from Hydro, include "... primary aluminium as well as aluminium ingots, extrusion billet, and rolling slabs."

"Smelter location tends to be dictated primarily by the availability and proximity to historically low-cost electricity sources," said Ms. Johnson of the Australian Aluminium Council. "Location is also influenced by other factors such as transport costs and the availability and quality of other infrastructure. All of Australia's aluminium smelters are located close to or on the coastline."

### COVID-19

"Australian bauxite miners were largely unaffected by the COVID-19 lockdowns," stated Ms. Johnson of the Australian Aluminium Council. "Alumina production in Australia has been resilient amidst the COVID-19 Pandemic, with all Australian refineries remaining in operation during the COVID-19 lockdowns. However, members of the Australian Aluminium Council took a number of measures, depending on the regional impacts." **Fig 4**

"During the first half of 2020, commodity prices collapsed because of COVID-19," she explained. "Whilst prices have, in part, recovered, the longer-term future of industry will depend on the rate of recovery of the global manufacturing sector and the impact this has on international demand. Equally, the COVID-19 Pandemic has underscored the importance of domestic manufacturing, supporting a productive and resilient economy. The COVID-19 crisis has demonstrated the advantages of not only the ability to value add within an almost exclusively domestic supply chain but also the importance of local industry

which provides the underpinning market for our dependent contracting and manufacturing sector. This capability was able to pivot to meet rapidly changing domestic needs such as sanitiser, face shields, and ventilators. The mineral processing and metal manufacturing industries provide not only current regional jobs, but also support the smart Australian jobs of the future."

The Australian Workers' Union helped in the efforts to keep the aluminium industry operating during the COVID-19 Pandemic. This organisation, which represents many of the workers in the aluminium industry as well as in a number of other industries, issued a statement dated May 5, 2020, explaining that it "...has been working hard to keep the manufacturing sector as a whole operating. Intense lobbying early on during the COVID-19 crisis took place at the state and federal level as there was genuine concern governments would shut down the entire aluminium industry. What became clear was that many politicians had no idea about the complexity and damage involved in closing down a smelter or refinery and had no concept of the impact this would have had on the wider economy."

"This is why we joined forces with the [Australian] Aluminium Council, to call for an exemption from any shutdown and for the industry to be deemed essential," the statement from the union continued. "Our hard work paid off and we are pretty confident that the threat of government-mandated shutdown has passed. We also worked with all the major employers to put in place health and safety regulations that will keep our members safe. Temperature checks when starting work, staggered starts and meal breaks, and a sharp increase in cleaning on all sites."

Ms. Johnson noted that the Australian Aluminium Council also worked with a number of other mining industry associations to respond to shortages in the supply of certain critical services and supplies arising out of the circumstances of the COVID-19 Pandemic: "This included collaborating to share inventories for critical mining supplies and services; coordinating scheduling and supply chain activities of those supplies and services; and sharing details of potential suppliers of PPE [personal protective equipment]."

"Some of the critical impacts have been around movement of people across inter regional and state borders," Ms. Johnson continued. "Members of the Australian Aluminium Council put in place strict protocols in place globally, in line with government guidance and directives, and best practice advice from leading medical experts and international health organisations to keep employees,



Fig 4. "One of the best ways to prevent the spread of COVID-19 is by washing our hands often with soap and water, or if that is not an option, by using hand sanitiser," according to a news statement from Rio Tinto. The aluminium smelter operated by the firm at Bell Bay, Tasmania, was one of several Rio Tinto facilities globally, the news statement indicated, that collectively produced more than 7,000 litres of hand sanitiser to help "...keep our employees' hands germ-free, and also free up supplies for other people in our communities." (Photograph was provided courtesy of Rio Tinto, 2020.)

contractors, and partners safe. These range from physical distancing to travel restrictions, roster changes and team splits, to flexible working arrangements, rapid screening, and personal hygiene controls. For operational staff, the size of operations and shift patterns naturally limit physical interactions. Our sites already use protective equipment such as respirators, gloves, and face protection, in their day-to-day work."

### Growth

Growth is anticipated to continue in the aluminium industry in Australia for years to come. An example is the Wuudagu Bauxite Project, which is in the "...feasibility stage development located near the community of Kalumburu in the Shire of Wyndham East Kimberley in the North Kimberley region of Western Australia," according to Mr. Ryan de Franck, Managing Director, VBX Limited. "The project is being designed to produce a beneficiated bauxite product for supply to alumina refining customers." **Fig 5**

Surface mining, road haulage, beneficiation, marine loading, and transhipment are the elements included in this project, noted VBX Limited. The firm detailed that the workforce may include up to 100 people during construction and up to 250 people during operations.

Mr. de Franck noted that the Wuudagu Bauxite Project "is being developed by VBX Limited, an affiliate of the Valperlon Group, which is an Australian-based project generation and corporate development group focused on the natural resources sector." He

explained that "Wuudagu" is both the project's name and general site location: "'Wuudagu'...means 'rocky place' in the local language."

Approvals for the development of this site are currently expected to be secured in 2022, stated Mr. de Franck: "The development and commissioning period is anticipated to be within 6 months of the approvals being received." He said that the investment in the Wuudagu Bauxite Project is anticipated to be about (AUS) \$50 million.

"The potential customers for the Wuudagu Bauxite Project are alumina refineries that are seeking a stable, consistent and long-term supply of high-quality bauxite," reported Mr. de Franck. "This includes existing refineries and new refineries under development who are interested in securing a new source of bauxite or blending Wuudagu material with other existing sources of bauxite. The favourable mineralogy and low silica and impurity levels mean there is strong demand for Wuudagu bauxite material from a large number of potential customers. The Wuudagu Bauxite Project is ideally located in close proximity to a number of potential export markets including China, India, and the Middle East."

As development occurs, Mr. de Franck indicated that VBX is "committed to implementing a responsible resource development at Wuudagu and intend to operate the project in line with the International Aluminium Institute Sustainable Bauxite Mining Practices which are globally recognised as industry best practice. There are a number of initiatives we are currently progressing, including in collaboration with our traditional owner partners, to maximise the sustainability of the project."

### Challenges

"The biggest challenge facing industry is the delivered cost of energy," explained Ms. Johnson of the Australian Aluminium Council. "The Australian alumina industry is highly dependent on gas for its operations and viability; directly using more than 160 PJ of gas per annum. Energy typically accounts for 30-40% of the industry's cost base, and therefore it is a key determinant of their international competitiveness. The Australian domestic gas market is currently neither efficient nor deep. The Australian Aluminium Council seeks a national energy policy framework which is transparent, stable, and predictable, whilst maintaining the economic health of the nation including vital import and export competing industries. Access to gas is a crucial aspect of this for the alumina industry."

"The Australian Aluminium Council

believes that gas will have an important and necessary bridging role in lowering carbon emissions, as it is technically and economically viable today; whilst zero emissions alternatives are more fully developed in the future," Ms. Johnson continued. "Australia's alumina refineries already produce some of the lowest emissions alumina globally, and are well below the global industry average, at 0.7 t CO<sub>2</sub>-e / t alumina compared to 1.2 t CO<sub>2</sub>-e / t alumina globally. The industry is currently developing new technologies and articulating a range of costed technology pathways, which will inform a future transition. However, the time, cost, and complexity of developing viable, large-scale alternatives to the use of gas should not be underestimated."

Ms. Johnson noted that "Alumina refineries already provide some demand response to the grid. However, if there was to be an increased supply of competitively priced zero-emissions electricity, there is the potential to materially increase the electrification of alumina refineries combined with demand response, which



Fig 5. This image from a promotional video details the planned Wuudagu Bauxite Project in Western Australia. (The image was provided courtesy of the Valperlon Group.)

could supplement electricity firming in the Australian market. Australia's industry is seeking a restoration of international competitiveness. Efficient deployment of technological changes will support the transition of economically important

industrial sectors such as alumina, enabling a greater manufacturing sector. In deploying these technologies, Australia will also need to address its relatively high-cost capital costs, compared to international competitors." ■

Do you have questions about the aluminum industry? Governmental regulations? Company operations? Your questions may be used in a future news column. Contact Richard McDonough at [aluminachronicles@gmail.com](mailto:aluminachronicles@gmail.com). © 2021 Richard McDonough



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