



Marghanita Johnson

CEO at Australian Aluminium Council

“Looking ahead, production is expected to largely recover by mid-2022, with 2023 on track to again be a record year for Australian bauxite production”, Marghanita Johnson, CEO at Australian Aluminium Council.

Marghanita Johnson has been the Chief Executive Officer of the Australian Aluminium Council since 2019. She has over 20 years of experience in the Australian mining and manufacturing sectors, predominantly within the aluminium industry. Before joining the Council she led government engagement and advocacy on behalf of Rio Tinto’s Pacific Aluminium assets and before that held key climate and sustainability roles at Rio Tinto.

Marghanita has Environmental Engineering and Chemistry degrees from the University of Western Australia. She

is currently a board member of the Energy Users Association of Australia and Vice-Chair of the Australian Industry Greenhouse Network and has previously been a non-executive director on the boards of the New Zealand Aluminium Smelter and the Tomago Aluminium Company.

AlCircle: Australia stands as a major producer of bauxite, how would you rate Australia's bauxite production performance for 2021?

Ms Marghanita Johnson: Australia is the world's largest producer of bauxite, mining more than 100Mt of bauxite a year, or about a quarter of global production. About 40% of this is exported and 60% is turned into alumina here in Australia. Meeting the continued and increasing global demand for primary aluminium will require proportionate increases in the production of bauxite and alumina. Australia is well-positioned to continue to supply global markets.

Australia's bauxite production for the full year ending June 2021 decreased by 4%, to 103 Mt, from the record 107 Mt set the previous year. This was largely due to reduced output from Rio Tinto's operations in northern Australia, which were impacted by weather.

AlCircle: What do you see ahead for 2022 and beyond in terms of bauxite production?

Ms Marghanita Johnson: Looking ahead, production is expected to largely recover by mid-2022, with 2023 on track to again be a record year for Australian bauxite production.

This growth is expected from both existing major operations as well as smaller mines, like Metro Mining's Bauxite

Hills mine in Queensland. The Australian Aluminium Council also represents an increasing number of bauxite exploration projects which are still in the development and approvals phase, including the Aurukun Project, a joint venture between Glencore and MDP Bauxite Pty Ltd (a subsidiary of Mitsubishi Development Pty Ltd), and VBX's Wuudagu Project in the Kimberly region of Western Australia.

AlCircle: What about the production of alumina and aluminium in Australia, how is this going?

Ms Marghanita Johnson: Australia is the world's second-largest producer of alumina, producing around 20.7 Mt in the full year ending June 2021. Australia's alumina output is expected to remain at about 21 million tonnes a year over the next few years.

Aluminium production held steady at just under 1.6 Mt for the year to June 2021. However, the announced restart of idled capacity at Portland Aluminium is expected to come online later in 2022, which should increase production beyond 1.6 Mt per annum.

AlCircle: The Australian Aluminium Council supports the Paris Agreement and many of your members have net zero emissions targets. As the world's second-largest producer of alumina, what role is Australia having in developing new technologies which will help support decarbonisation?

Ms Marghanita Johnson: Australia's alumina already has some of the lowest emissions in the world, with an average emissions intensity of 0.7 tonnes of carbon dioxide per

tonne of alumina (t CO₂-e/t), compared to the global industry average of 1.2 tCO₂-e/t. However, as a large producer and exporter, alumina emissions are a disproportionately large part of the Australian aluminium industry's footprint, accounting for just over 40% of the sector's emissions.

Australia also has more than 50 years of technical experience in bauxite mining and alumina refining technologies. This experience helps not only us, but our bauxite, alumina and aluminium customers, to reach their sustainability goals. Alcoa, Rio Tinto and South32's Worsley Alumina operations all have their global alumina research headquarters in Australia, helping develop new technologies for the world.

In 2021, the members of the Australian industry announced several key strategic partnerships to trial and commercialise key decarbonisation technologies within mining and refining operations.

For example, in May 2021 Alcoa of Australia Limited (Alcoa) announced it had received funding from the Australian Renewable Energy Agency (ARENA) to test the potential use of renewable energy technology in a process known as Mechanical Vapor Recompression (MVR). Alcoa is currently conducting technical and commercial studies to adapt MVR technology to refining. Electricity sourced from renewable energy would power compressors to turn waste vapour into steam, which would then be used to provide refinery process heat. If the feasibility studies are successful, Alcoa plans by the end of 2023 to install a three-megawatt MVR module with renewable energy at its Wagerup refinery in Western Australia, to test the technology at scale.

The MVR technology powered by renewable energy could reduce an alumina refinery's carbon footprint by 70%. The technology also has the potential to significantly reduce water use in the refining process by capturing water vapour that would otherwise be lost to the atmosphere.

In June 2021, Rio Tinto announced a partnership with ARENA to conduct a feasibility study investigating the potential to partially decarbonise its alumina refining operations using renewable hydrogen. Rio Tinto will investigate the technical implications of displacing natural gas with renewable hydrogen at its Yarwun alumina refinery in Gladstone, particularly focussed on simulating the use of hydrogen in the calcination process.

In August 2021, Rio Tinto announced a further partnership with Sumitomo Corporation to study the construction of a hydrogen pilot plant at Rio Tinto's Yarwun alumina refinery in Gladstone and explore the potential use of hydrogen at the refinery.

Importantly, the findings of these studies may have applications in other high-temperature Australian manufacturing processes, beyond alumina and even beyond the mineral processing sector. Additionally, if successful, the technical and commercial lessons could lead to the implementation of hydrogen calcination technology, not only in Australia but also internationally.

In addition to looking at bauxite and alumina specific technologies, the Australian Aluminium Council and its members are working across the major industry to help accelerate the development of technologies that may have

multiple applications in the transformational change required to achieve net-zero emissions.

In June 2021, the Australian Government announced a ten-year partnership arrangement with the Heavy Industry Low-carbon Transition Cooperative Research Centre (HILT CRC). The Council, Alcoa, South32 and Rio Tinto are all partners in the HILT CRC which focuses not only on alumina but also on iron, steel, cement, lime, hydrogen and ammonia. Australia has a unique opportunity to leverage the critical clustering of skills, resources and energy demand in the regions in which alumina refineries and aluminium smelters are located. Partnering across industries provides a framework for industries to collaborate, sharing knowledge and experience while lowering the risk of trialling the technology.

Australia is leading the way in developing technologies for the adaptation of brownfield alumina refineries to lower-carbon technologies. It is here where global emission alumina trials are being conducted. The need for low carbon solutions applies across the global mine to the market aluminium sector. Australian industry certainly demonstrated its commitment in 2021 and will continue to do so for many years to come.

AlCircle: The International Aluminium Institute has developed a global pathway for the industry. How is this being adopted in Australia?

Ms Marghanita Johnson: Through the International Aluminium Institute, the global aluminium sector, including the Australian industry, is exploring realistic and credible technological pathways for 2050 sector-wide greenhouse gas emissions reductions in line with International Energy Agency's scenarios. To support this and reflect what work is being undertaken in an Australian context, the Council has produced a series of five factsheets outlining:

1. Australia's role in a global aluminium decarbonisation pathway;
2. How Australian bauxite will help meet global demand for aluminium;
3. Australia's role in developing low carbon alumina refining technologies for the world;
4. The role of Australia's aluminium smelters in providing baseload stability in a decarbonising grid; and
5. Decarbonisation of Australia's electricity supply, which the Council sees as the single biggest opportunity to decarbonise the vertically integrated aluminium industry.

The Council intends to update these annually; reflecting not only progress in decarbonisation in the industry; but also updating the industry's views of the evolution of decarbonisation technologies, based on research undertaken in Australia and through global partnerships.

Aluminium is one of the six priority technologies in the Australian Government's 2021 Low Emission Technology

Statement. The 2021 LETS provided a welcome increase in focus on not just aluminium smelting, but on the aluminium value chain within Australia; recognising Australia as the world's largest producer of bauxite and the world's largest exporter of alumina.

With decarbonisation of Australia's electricity supply being the single biggest opportunity to decarbonise the vertically integrated industry, it is important to consider the role Australia's grid-connected mines, refineries and particularly smelters perform in grid stabilisation which helps with increased penetration of variable renewable electricity. The carbon intensity of the Australian grid is declining rapidly, with this increased penetration of variable renewables. The industry also has the opportunity, as part of contract renewal, to source firmed renewable electricity from on-grid sources or behind the meter sources and has signalled its intentions to do so. The industry believes that the biggest challenge is in long term storage at scale, which can address periods when there is both low solar and low wind output (dunkelflaute) which is beyond the current storage term of pumped hydro, batteries and transmission solutions.

AlCircle: Across the Australian aluminium sector, what opportunities do you feel will be seen for growth and employment in coming years?

Ms Marghanita Johnson: The Australian aluminium industry has been operating in Australia since 1955, and over the decades has been a significant contributor to the Australian economy. Alongside many decades of economic contribution, the industry is globally comparatively young and

well maintained. Aluminium is Australia's highest-earning manufacturing export. The industry directly employs more than 17,000 people, including 4,000 full-time equivalent contractors. The industry also indirectly supports around 60,000 families in regional Australia.

Australia has a unique opportunity to leverage the critical clustering of skills, resources and energy demand in the regions in which aluminium smelters and alumina refineries are located. Strengthening our national manufacturing capabilities will put Australia in the strongest possible position to meet these future forecasts for not only traditional commodities such as bauxite, alumina and aluminium; but also, other emerging aluminium related commodities, like high purity alumina (HPA), aluminium alloys and aluminium salts. As the world's largest producer of bauxite and the largest exporter of alumina, Australia is strategically positioned to support this opportunity.

Aluminium is one of the commodities most widely used in the global transition to a clean energy future. While traditional uses of aluminium will dominate demand, new aluminium products including HPA, aluminium alloys and aluminium salts are continuing to be developed to meet emerging technology needs. Australia is well-positioned to use its existing backbone of value-adding industries in Australia to develop new industries which will meet these future needs. For example, multiple HPA projects under development in Australia have strong connections with the existing industry.

Growth in both existing commodities, particularly with the growth of new bauxite mines and an increasing number of extrusion presses, combined with the development of new projects such as those in HPA, will lead to increase opportunities for employment in the sector in the future.

AlCircle: Could you please share the Council's insights on the challenges of recycling aluminium in Australia?

Ms Marghanita Johnson: Aluminium is a high value product and infinitely recyclable. Therefore, it has a very high recycling rate and almost all recovered scrap aluminium is used for recycling, including in Australia. Aluminium scrap is sourced from a wide array of consumer, commercial and industrial sources. However, as Australia has a relatively small population of 25 million people and aluminium has a long life in use; the volume of scrap generated domestically is relatively low by global standards. Additionally, while Australia has more than 20 extrusion presses, Australia no longer has manufacturing capability to produce rolled or flat sheet product, limiting the ability to integrate aluminium and manufacturing processes.

Generally, aluminium smelters have limited capacity for remelt. This is because of the safety and process risks of contamination from water, oil and other contaminants. However, Tomago Aluminium has recently signed an agreement with Capral Aluminium, an aluminium extruder and distributor. The agreement is for Capral to supply approximately 550 tonnes of production scrap to Tomago Aluminium annually for remelting. Boyne Smelters are also able to remelt some aluminium cans in their operations, in a segregated process. Additionally, some extruders recover

their pre-consumer scrap from their own production plant and remelt this to provide pre-consumer recycled content in their billet.

More than 95% of Australia's scrap aluminium is exported for recycling, with around 400kt exported in 2021. The critical pathway for aluminium is to maximise the aluminium collection and recycling rates, regardless of where this economically takes place.