



Strengthening Our Aluminium Industry

From mine to market, growing regional Australia for over 65 years

July 2022

Our Members



Mine to Metal Process



Australia is one of the very few countries globally which has **bauxite mining**, **alumina refining**, **aluminium smelting** and **aluminium extrusion** industries.

Australia's Highest Earning Manufacturing Export

- **Australia** is the world's largest producer of bauxite.
- **Australia** is the world's largest exporter of alumina.
- **Alumina and aluminium ores (bauxite)** are Australia's 2nd largest non energy resources export.



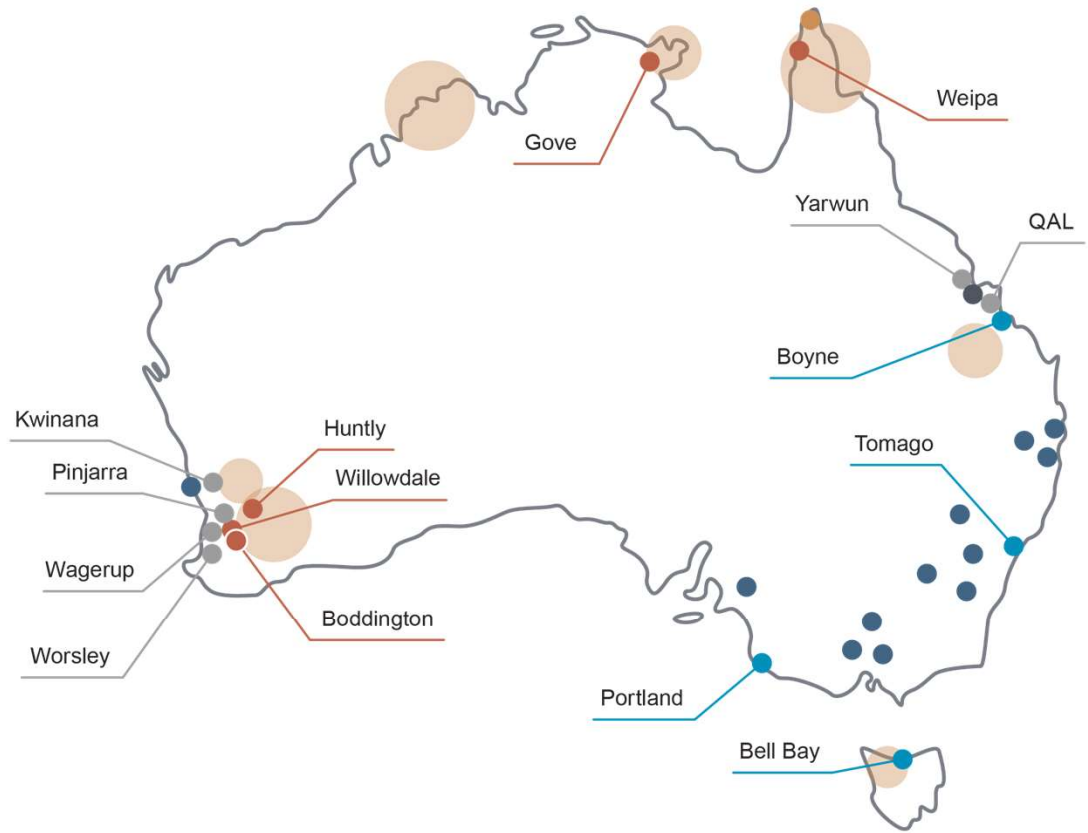
Bauxite \$1.3B **Alumina \$7.6B** **Aluminium \$4.8B**

101 MT:	21 MT:	1.6 MT:
61 MT Domestic consumption	3 MT Domestic consumption	0.2 MT Domestic consumption
40 MT Export	18 MT Export	1.4 MT Export

*2021 data

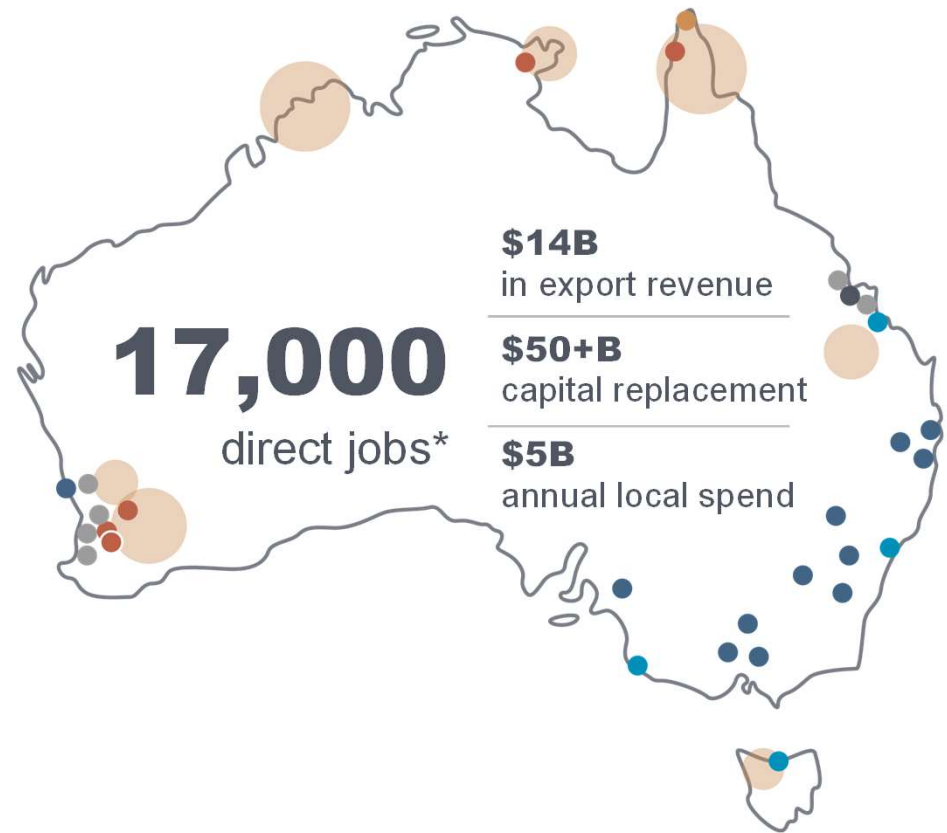
Our Presence in Regional Australia

- Bauxite Exploration
- <10 Mt Bauxite Mine
- >10 Mt Bauxite Mine
- Alumina Refinery
- Aluminium Smelter
- Extrusion Plant
- HPA Project



Our Contribution to Regional Australia

- ~**\$2B** in wages (STEM/highly skilled roles)
- Salaries **180%** Australian manufacturing average**
- **\$5B** in local spending
- Creates jobs for another **60,000***** families
- **\$8M** Community and Partnerships
- **20+** Australian extrusion presses



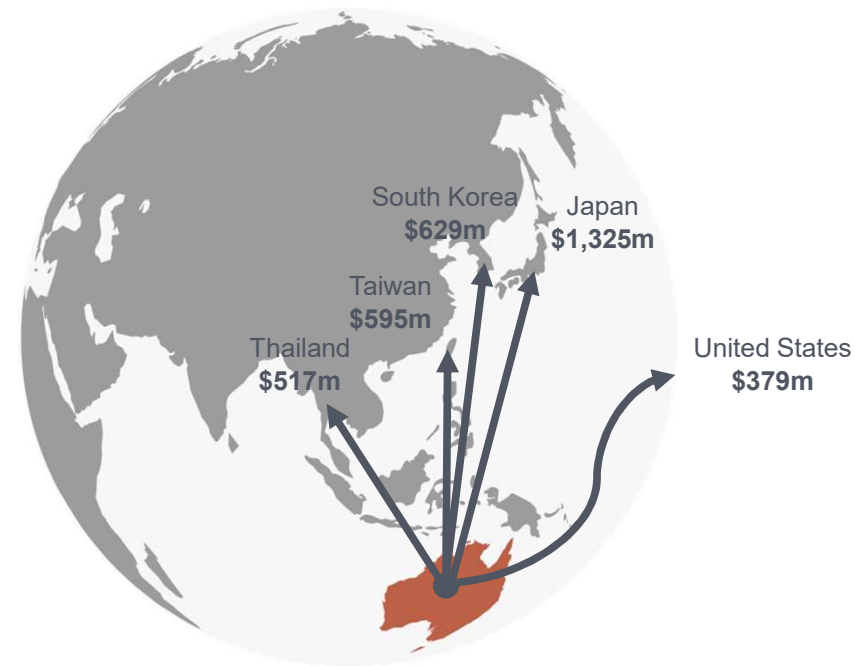
* Includes 5600 FTE Contractors

** <https://www.abs.gov.au/statistics/labour/earnings-and-work-hours/average-weekly-earnings-australia/latest-release#industry-earnings>

*** Industry multiplier of 5.2 extrapolated from QRC data for Flynn, 2021

Meeting a Global Demand for a Clean Energy Future

- Current global demand for aluminium is approximately 100 million tonnes per year.
 - This is met through $\frac{2}{3}$ primary aluminium and $\frac{1}{3}$ from recycled aluminium.
- International Aluminium Institute forecasts this will **increase to 190 mt by 2050 under a 1.5 degree, high substitution, global scenario**
 - 55:45 primary: recycled aluminium.
 - This will require >500 Mt bauxite / 200 Mt alumina to meet the primary need
- Aluminium is **critical** for **renewable energy generation and storage** and **lightweighting**.

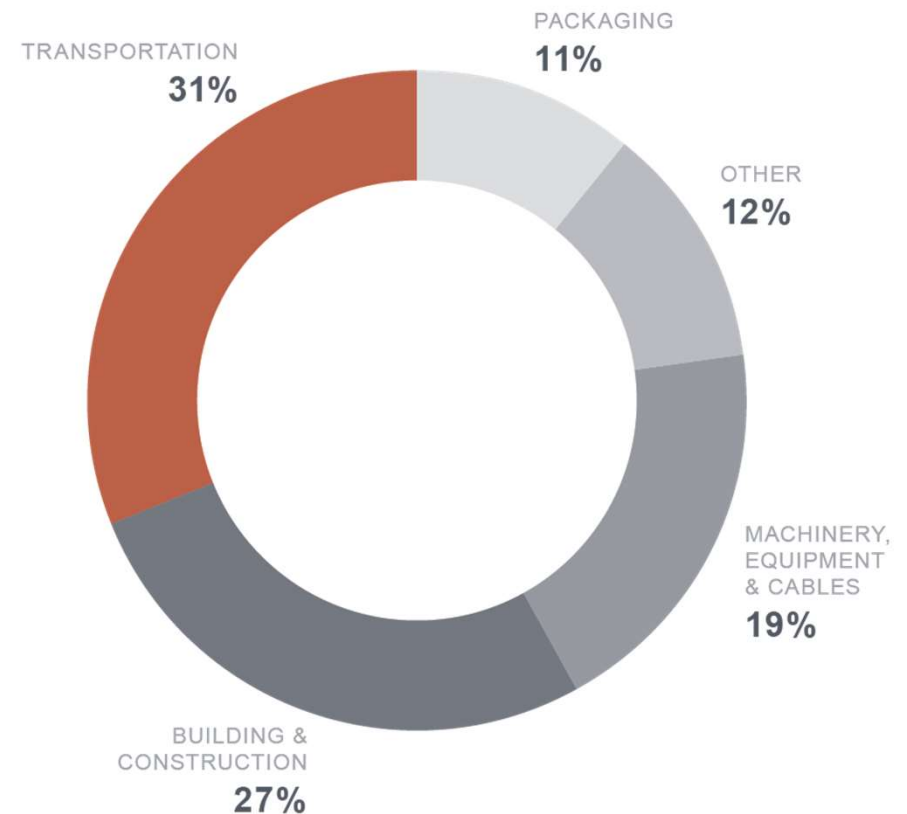


Future Focused to Capture Global Opportunity

Australia can cater for increasing demand for primary aluminium across Transport, Building & Construction, and Machinery, Equipment & Cables.

Consumer packaging is the smallest use. While consumers cannot see it, there is more aluminium in machinery and cabling than there is in soft drink cans.

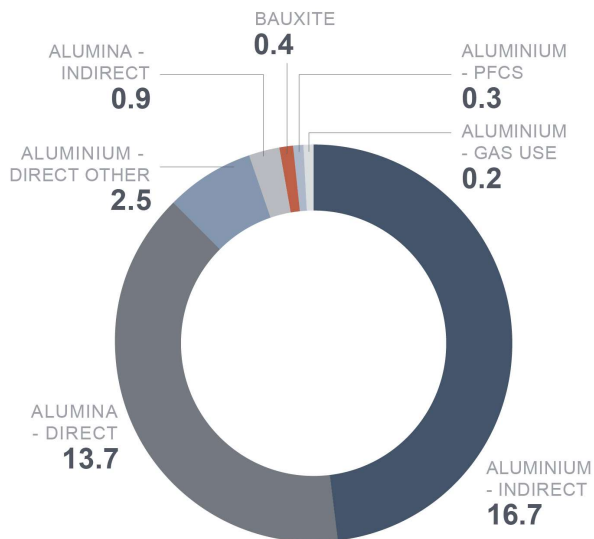
Aluminium use in cars will increase to about 250kg per car by 2025. Every 100kg used in a car* can save ~2t CO₂-e over the life of a vehicle.



*Average family petrol car. Higher for commercial / high use vehicles
Source: International Aluminium Institute (<https://www.world-aluminium.org/>)

Decarbonisation of electricity supply presents the biggest opportunity

- Total emissions ~ 34 Mt CO₂-e, which is ~7% of national emissions



- Aluminium smelting accounts for almost 60% of these emissions.
- The biggest contributor to these emissions is **emissions from electricity** used in aluminium smelting which accounts for almost half total emissions at 16.7 Mt.
- While the aluminium industry continues to invest in emission reduction technologies, the greatest decarbonisation impact rests in decarbonising the Australian grid.
- Low cost, low carbon electricity will support electrification of **alumina refineries**.

Partnering for Technology Solutions

Australia is leading the development of brownfield alumina decarbonisation technologies



Australian Government
Australian Renewable
Energy Agency

ARENA



Mechanical Vapour Recompression

Approximately 70 per cent of the total fossil fuels consumed in alumina refining relates to the production of steam in boilers.

Alcoa is investing \$16.9 million in addition to ARENA funding of \$11.3 million to test the feasibility of Mechanical Vapour Recompression (MVR).

This technology has the potential to improve efficiency, reduce costs, reduce emissions and reduce water use.



Hydrogen Calcination

Rio Tinto has partnered with ARENA to study whether hydrogen can replace natural gas in alumina refineries to reduce emissions.

Rio Tinto will conduct a \$1.2 million feasibility study, equally funded with ARENA through a \$580,000 grant, into using clean hydrogen to replace natural gas in the calcination process of refining at the Yarwun alumina refinery in Gladstone.

Learnings from this study could also be applied to other high temperature manufacturing processes.



Electric Calcination

Electric pressure calcination can produce pure, uncontaminated steam exhaust, which can be captured and reused, reducing demand for steam from natural gas boilers. Electric calcination could potentially reduce Australian alumina refining emissions by 40% when powered by 100% renewable electricity.

Alcoa is undertaking a \$19.7 m project in conjunction with ARENA (\$8.6m) and the WA Govt (\$1.7 M) to test this process.

The project also aims to improve understanding of load flexibility and the provision essential systems services to the SWIS.

Transition Opportunities

We want a future where Australia's world-class energy resources are translated into internationally competitive, low emission, reliable energy.

- A decarbonising grid reduces emissions but strains the system.
- The rapid pace of transition in the NEM is challenging, but highlights the important role of smelters.
- Smelters' stable demand supports supply investment and provides a co-dependency with generators.
- Smelters' interruptibility provides a shock absorber to the system.
- Low cost, low carbon electricity will support electrification of alumina refineries.
- 22 million Australians who use the NEM rely on our smelters to back up unreliable electricity supply, particularly on extreme weather days when network demands are pushed beyond capability.



What Does The Next Decade Look Like?



- While traditional industrial uses of aluminium will dominate demand, new investment in energy and space technology will progress over the coming decade.
- New aluminium products including high purity alumina, aluminium alloys and aluminium salts are continuing to be developed to meet emerging technology needs.

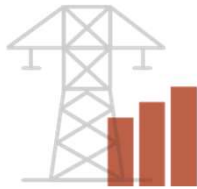


- Aluminium is a critical metal in deployment of increased renewable energy generation and energy storage.
- With the need to reduce weight to increase journey length between chargers, aluminium will be a major component of future EV transport solutions. The growth potential in electric vehicles globally cannot be overstated.



- Government and industry have an opportunity to work together across domestic issues to capitalise.
- Strengthening our national manufacturing capabilities now will put Australia in the strongest possible position to meet growth forecasts.
- Aluminium and alumina should both be priority low emission technologies and part of Australia's critical minerals strategy.

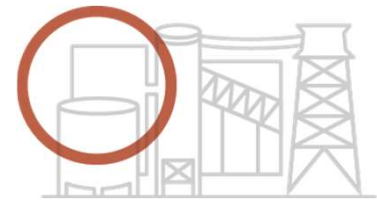
Opportunities in the Process



- Restoring internationally competitive delivered energy costs would move Australia's industry from survival mode, to being able to attract investment and capitalise on competitive energy advantage.



- Australia is widely regarded as a leading supplier of sustainable bauxite, with reduced impacts on biodiversity, land and water and promotion of community engagement, integrated rehabilitation and closure activities.



- Process improvements led by industry resulting in emissions reduction; conducted by partnering with government agencies and industry collaboration.

Summary

INTERNATIONAL IMPORTANCE

- Aluminium is one of the few commodities which you can buy in Australia which was mined, refined, smelted, extruded and distributed here.
- Australia is also one of the few countries where all these steps take place. Efficient deployment of technological changes will support the transition of existing sectors and enable a greater manufacturing sector in the future.

FUTURE FOCUSED

- Aluminium is required in the global transition to a clean energy future.
- Meeting the continued and increased global demand for primary aluminium will require Australian bauxite, Australian alumina and Australian aluminium.
- Australia is leading the development of global alumina technologies, delivering low carbon alumina to the world.

SUPPORTING AUSTRALIA'S ENERGY CHALLENGES

- The rapid pace of transition in the NEM is challenging, but highlights the important role of smelters.
- Smelters stable demand supports supply investment and provides a co-dependency with generators.
- Smelters interruptibility provides a shock absorber to the system.