



Strengthening Our Aluminium Industry

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

October 2021

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 4th largest mineral export.



Bauxite \$1.3B **Alumina \$6.3B** **Aluminium \$3.6B**

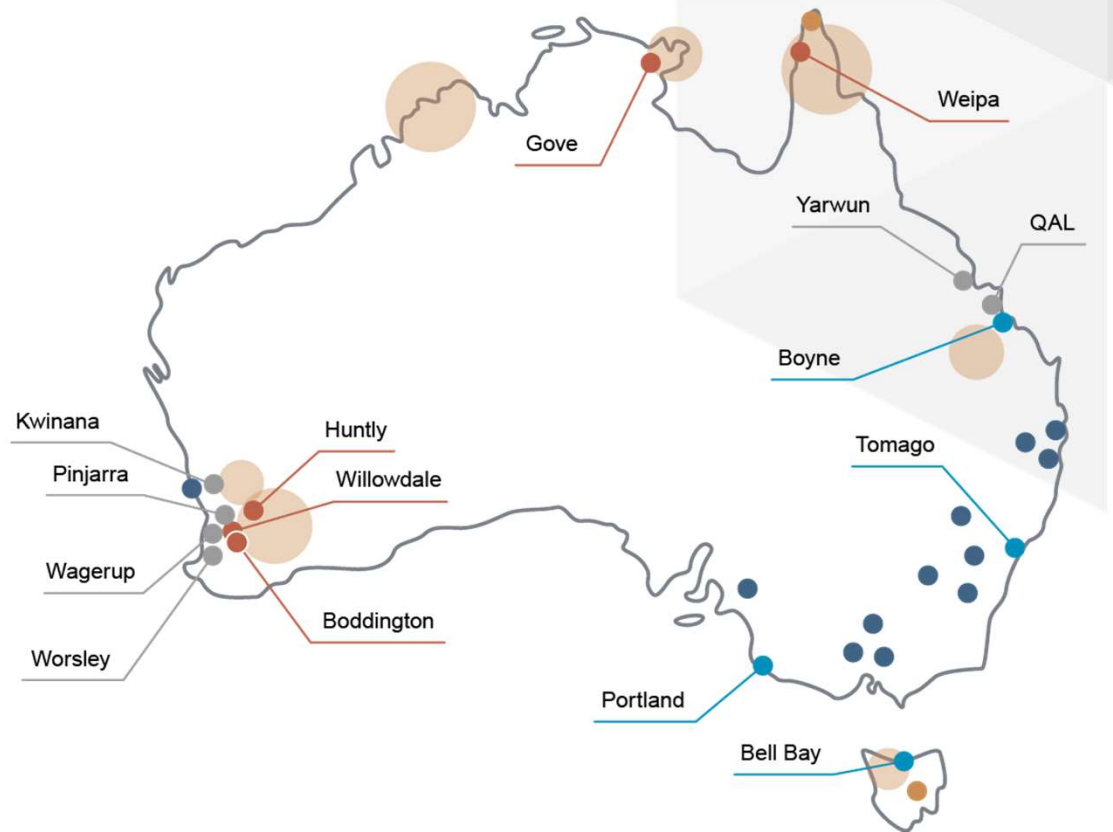
102 MT:	21 MT:	1.6 MT:
65 MT Domestic consumption	3 MT Domestic consumption	0.2 MT Domestic consumption
37 MT Export	18 MT Export	1.4 MT Export

*2020 data

Our Presence in Regional Australia

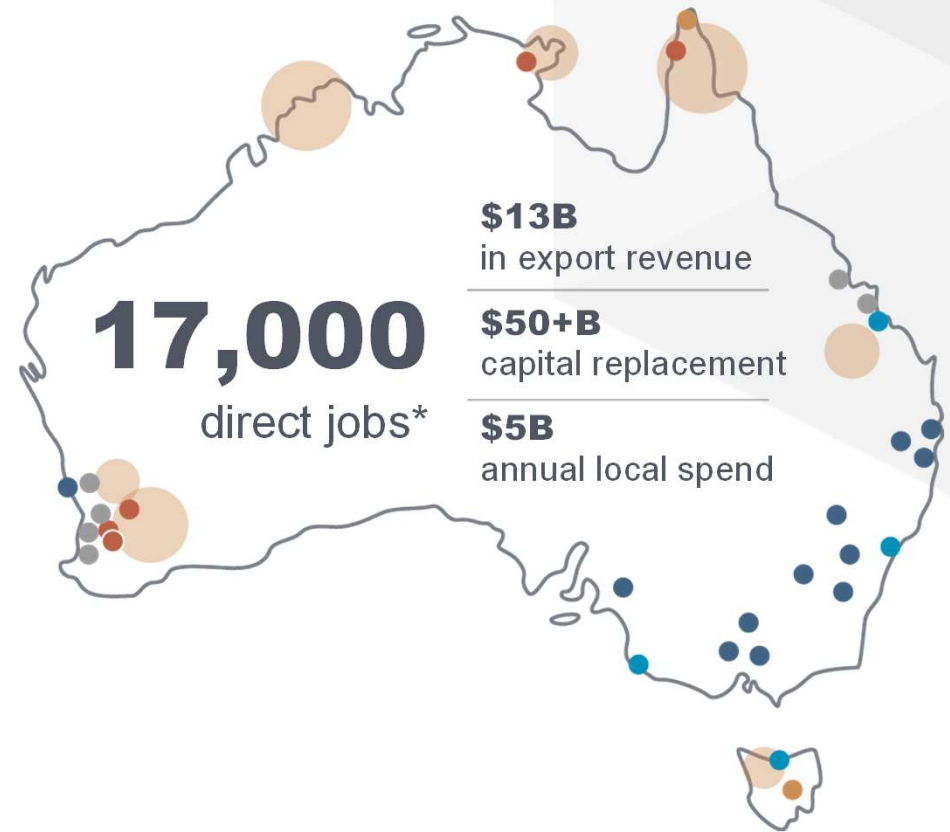
- Bauxite Exploration
- <10 Mt Bauxite Mine
- >10 Mt Bauxite Mine
- Alumina Refinery
- Aluminium Smelter
- Extrusion Plant

Please note: Map not to scale.



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 3700 FTE Contractors

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

*** Industry multiplier of 4.6 extrapolated from QRC data for Flynn, 2020

Future Focused to Capture Global Opportunity



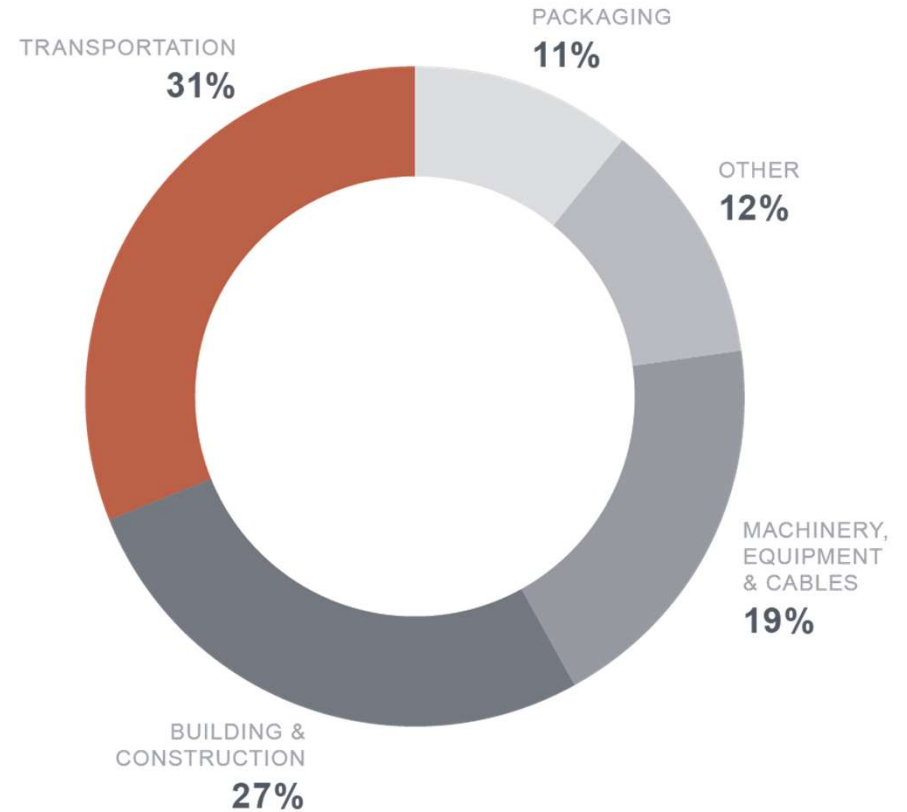
Australia can cater for increasing demand for primary aluminium across Transport, Building & Construction, and Machinery, Equipment & Cables.



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.



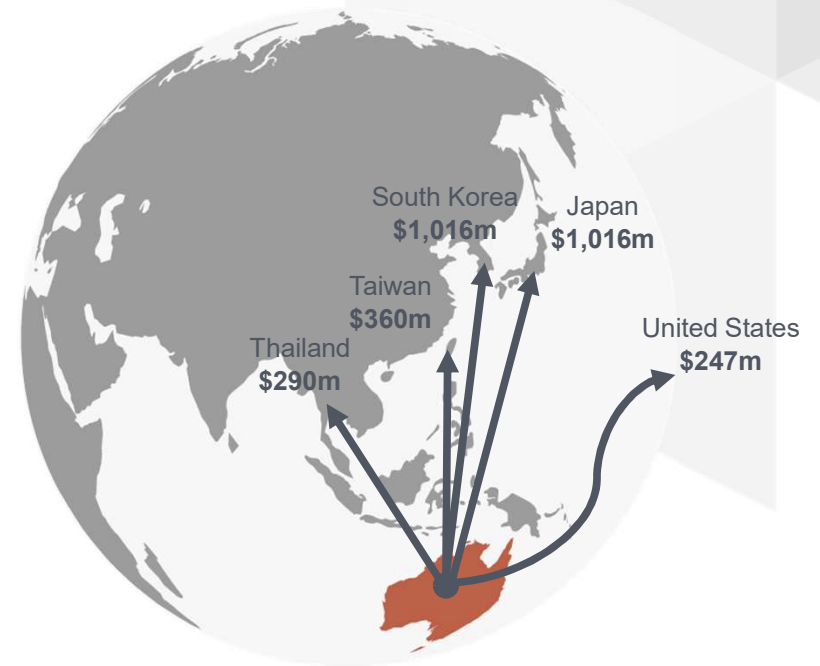
Aluminium use in cars will increase to about 250kg per car by 2025. Every 100kg used in a car* can save ~2t CO₂-e over the life of a vehicle.



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

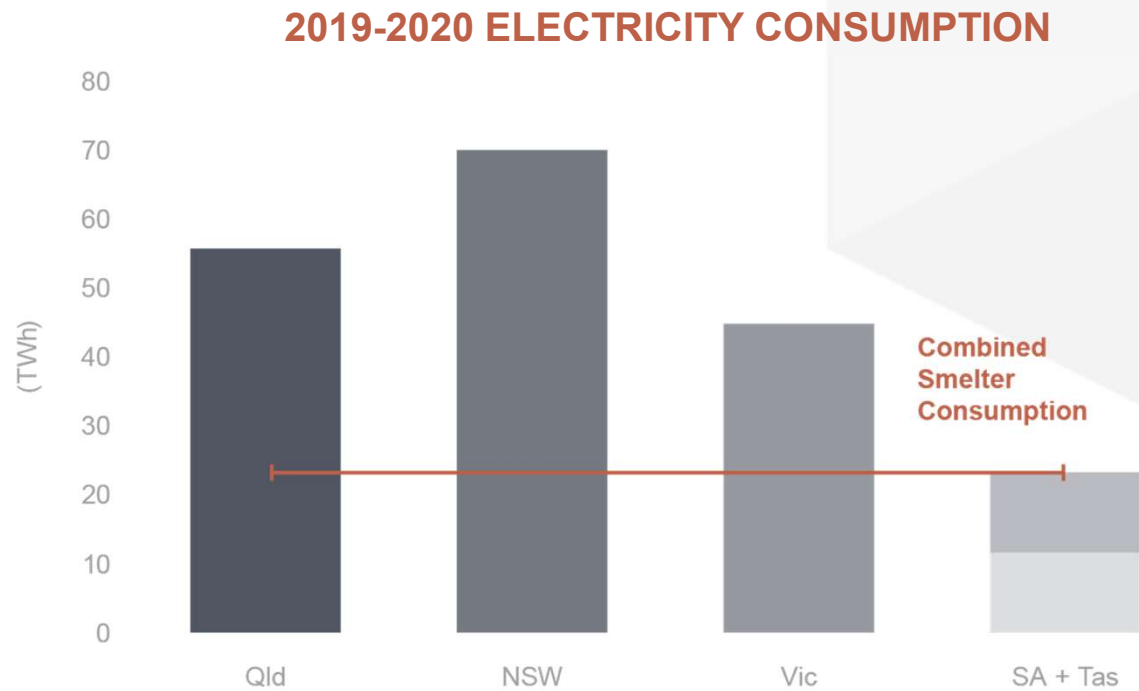
Global Demand

- Current global demand for aluminium is approximately 95 million tonnes per year.
 - This is met through $\frac{2}{3}$ primary aluminium and $\frac{1}{3}$ from recycled aluminium.
- International Aluminium Institute demand scenario forecasts a **40% increase in aluminium supply by 2050**.
 - This will be met through 50:50 primary:recycled aluminium.
- The World Bank's 2020 "Mineral Intensity of Clean Energy Report" Transition identifies aluminium as **critical** across **renewable energy generation and storage**.



Providing Network Stability

4 x aluminium smelters consume as much electricity as South Australia and Tasmania combined.*

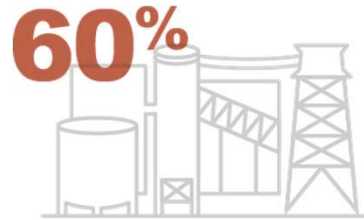


*Australian Energy Regulator, Wholesale Market Statistics, Annual electricity consumption – NEM

**Smelter energy use <https://aluminium.org.au/sustainability>

Emissions: Industry Facts

Australia's aluminium, alumina and bauxite industries combined have total Scope 1 and Scope 2 emissions of around 35Mt CO₂-e, which is around 6% of national emissions (National emissions are around 530Mt).



- Aluminium smelting accounts for almost 60% of these emissions.
- The biggest contributor to these emissions is indirect emissions associated with electricity used in aluminium smelting which accounts for almost half total emissions at 17Mt.
- 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.

Case Study #1 - Alcoa

Reducing Emissions Through Technology



Our members are investing capital to actively reduce emissions

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 and reduce emissions.



Support from Government

“It’s great to see companies like Alcoa take the initiative to create a pathway to reduce their emissions in what is an energy-intensive hard to abate process.

This is an important step on the pathway towards green aluminium in Australia.”

- ARENA CEO Darren Miller



Australian Government
Australian Renewable
Energy Agency

ARENA



Shared vision for the future

The Australian Government’s first Low Emissions Technology Statement highlights the importance of developing a low emissions aluminium industry to help reduce emissions and stimulate economic activity.

Innovation in metals refining can improve the competitiveness and emissions intensity of Australia’s aluminium production.

Case Study #2 - Rio Tinto

Reducing Emissions Through Technology



Our members are investing capital to actively reduce emissions

Rio Tinto has partnered with the Australian Renewable Energy Agency (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.



Support from Government

“If we can replace fossil fuels with clean hydrogen in the refining process for alumina, this will reduce emissions in the energy and emissions intensive refining stage of the aluminium supply chain. Exploring these new clean energy technologies and methods is a crucial step towards producing green aluminium.”

- ARENA CEO Darren Miller



Australian Government
Australian Renewable
Energy Agency

ARENA



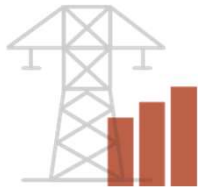
Shared vision for the future

This study will investigate a potential technology that can contribute to the decarbonisation of the Australian alumina industry.

If successful, the technical and commercial lessons from Rio Tinto's study could lead to the implementation of hydrogen calcination technology, not only in Australia, but also internationally.

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

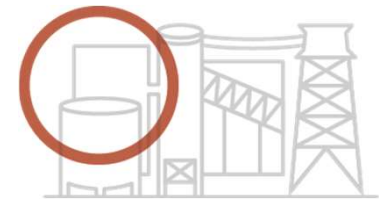
Opportunities in the Process



- Restoring internationally competitive delivered energy costs would move Australia's smelters 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.

Transition Opportunities

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

- AEMO has forecast that by 2040 renewables will rise to above 90% of energy supply in NEM. 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.
- 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.

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.