



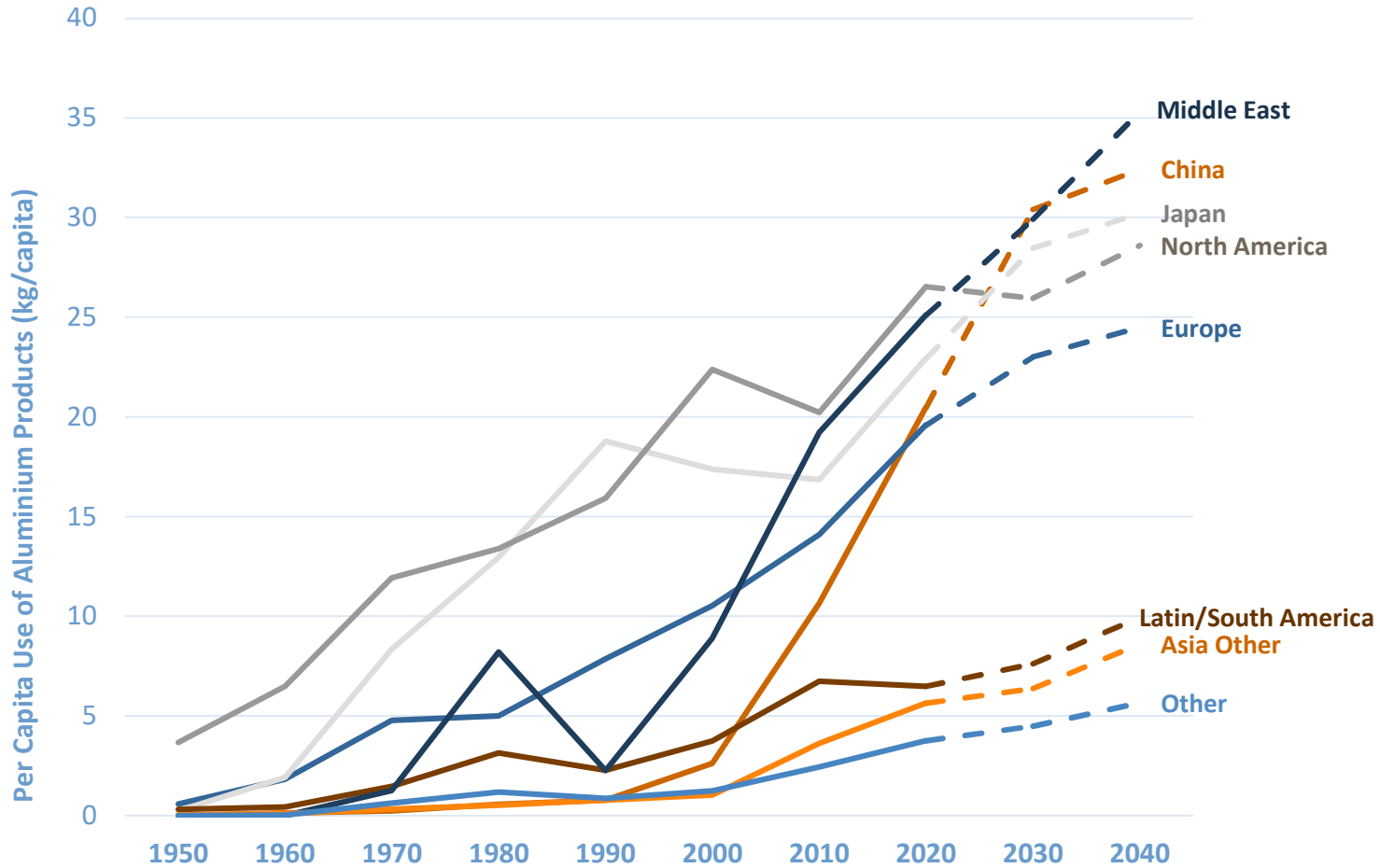
AUSTRALIA'S ALUMINIUM INDUSTRY

Sustainably Value Adding to Natural Resources





GLOBAL ALUMINIUM DEMAND PER CAPITA IS FORECAST TO INCREASE BY 50% BY 2040

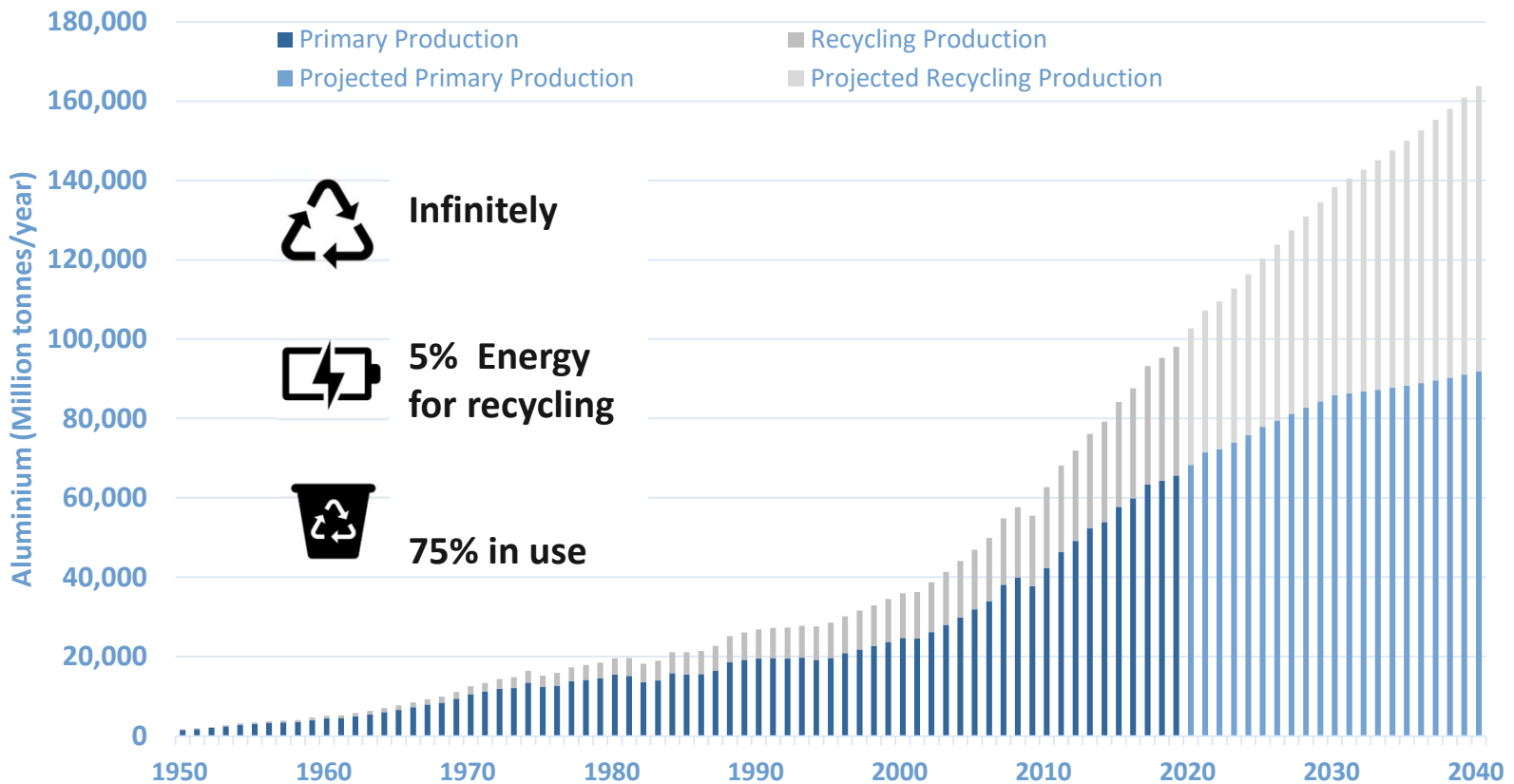


Source: International Aluminium Institute



PRIMARY ALUMINIUM PRODUCTION IS FORECAST TO INCREASE 40% BY 2040

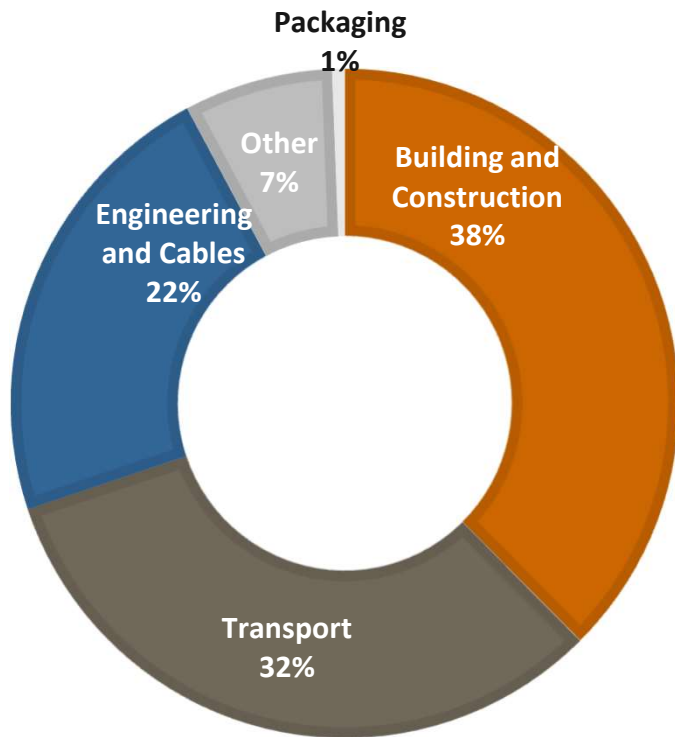
THIS WILL BE COMPLIMENTED BY A 220% INCREASE IN RECYCLED ALUMINIUM PRODUCTION, ASSUMING AN AMBITIOUS RECYCLING RATE



Source: International Aluminium Institute



ALUMINIUM IN USE BY 2040



Aluminium is lightweight and strong enabling the aviation, aerospace, shipping and rail industries



2kg of steel in a car can be replaced by 1kg of aluminium
Aluminium use in cars will increase to about 250 kg per car by 2025
Every 100 kg used in a car* can save ~2T CO₂-e over the life of a vehicle



Interior aluminium has an infinite life
Aluminium is used in cables and wires because of its conductivity and lightweight (overhead)

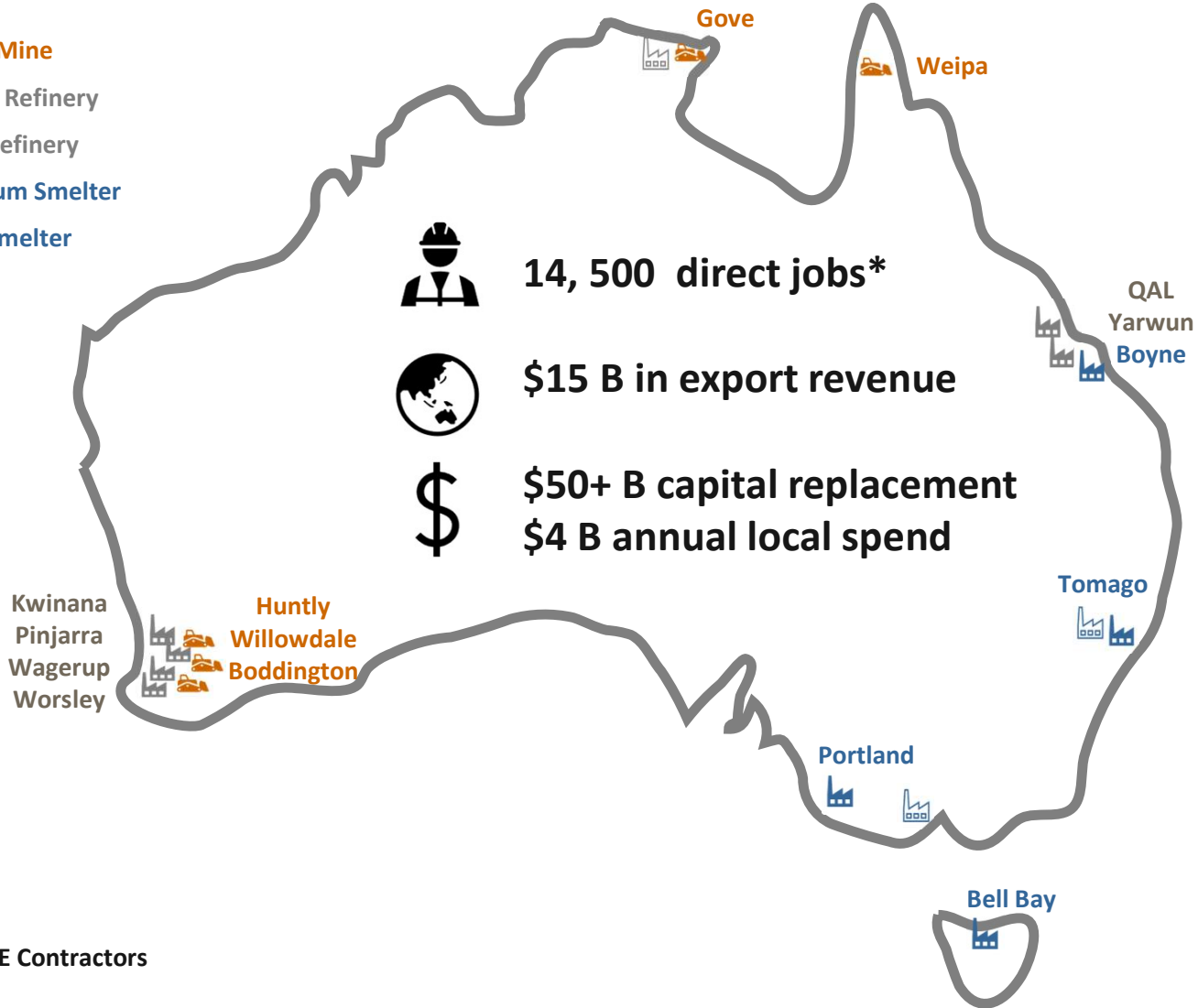
*Average family petrol car. Higher for commercial / high use vehicles

Source: International Aluminium Institute



INDUSTRY SNAPSHOT

-  **Bauxite Mine**
-  **Alumina Refinery**
-  **Closed Refinery**
-  **Aluminium Smelter**
-  **Closed Smelter**



*Includes 4000 FTE Contractors



COMMUNITY CONTRIBUTOR

**CONTRIBUTING TO THE AUSTRALIAN ECONOMY SINCE 1955,
BUT EVERY CELL IN A SMELTER IS <6 YEARS OLD**



\$1 B in wages



Salaries 190% Australian manufacturing average



\$4 B in local spending



Creates jobs for another 40,000* families

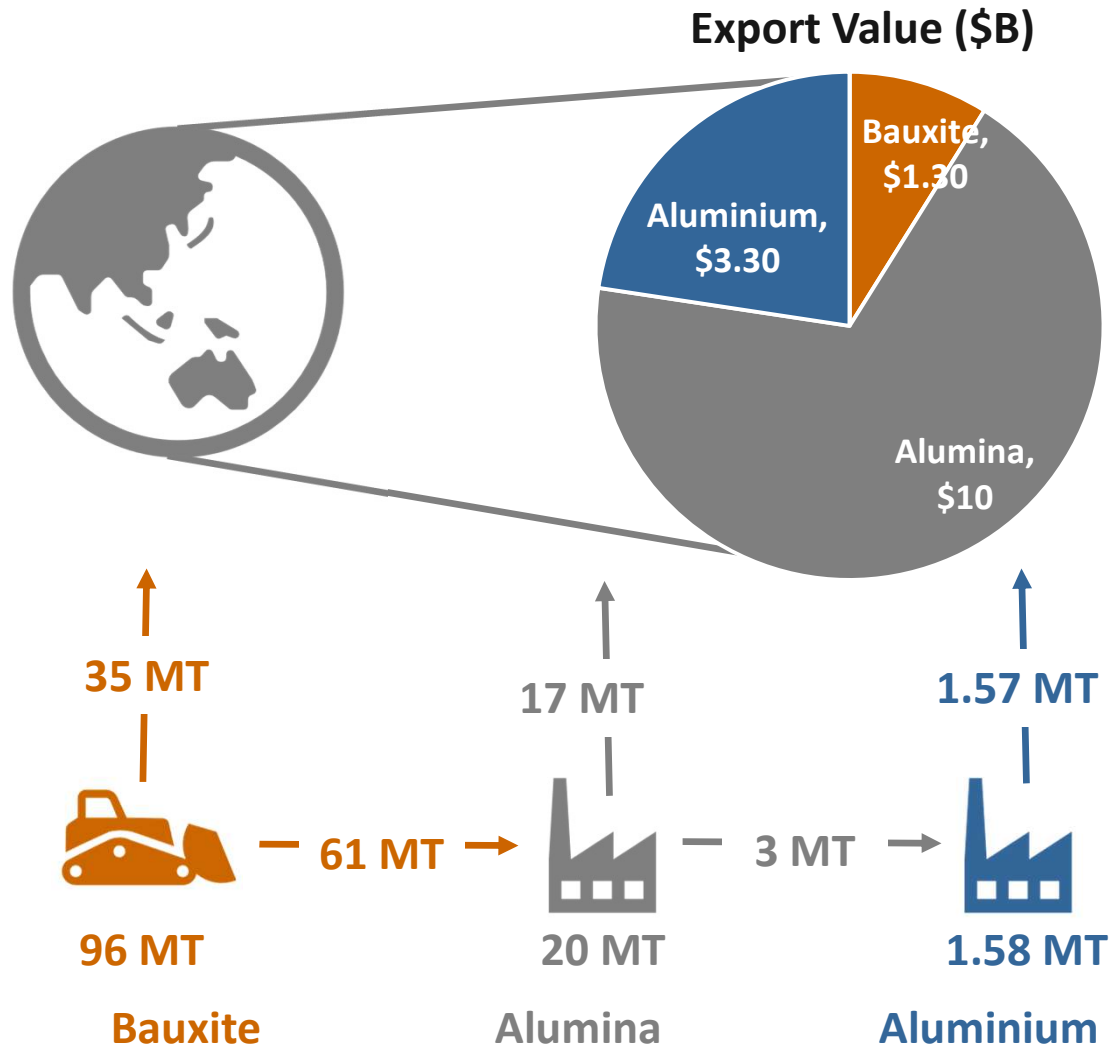


\$5M Community and Partnerships

* Industry multiplier of 3.7 extrapolated from QRC data for Flynn, 2018



VALUE ADDING



Australia is the worlds:

- Largest producer of Bauxite
- 2nd largest producer of Alumina
- 6th largest producer of Aluminium

Alumina is Australia's 5th largest non service export industry*

14 of the 15** most sustainable future bauxite orebodies are located in Australia

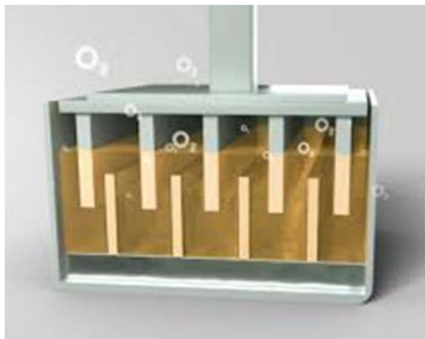
* DFAT, Composition of Trade Australia 2017-18
 **Sustainable Minerals Institute, Source risks as constraints to future metal supply



OPPORTUNITIES

Zero Direct Emissions Smelting

- Partnership between Rio Tinto, Alcoa and Apple
- Technology aims to be commercialised by 2024
- Can be retrofitted with major capital investment



Grid Stability

- 2,600 MW of electricity in four NEM locations
- Stable demand supports supply investment; co-dependency with generators
- Frequency Control Ancillary Services
- Short term interruptability provides shock absorber



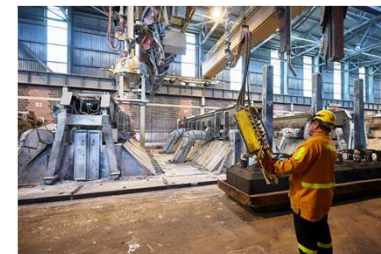
Sustainable Bauxite

- Global bauxite demand will grow by over 100 Mt by 2040
- Equivalent of 4 new Amrun mines
- Australia regarded as most sustainable resource



High Value STEM Employment

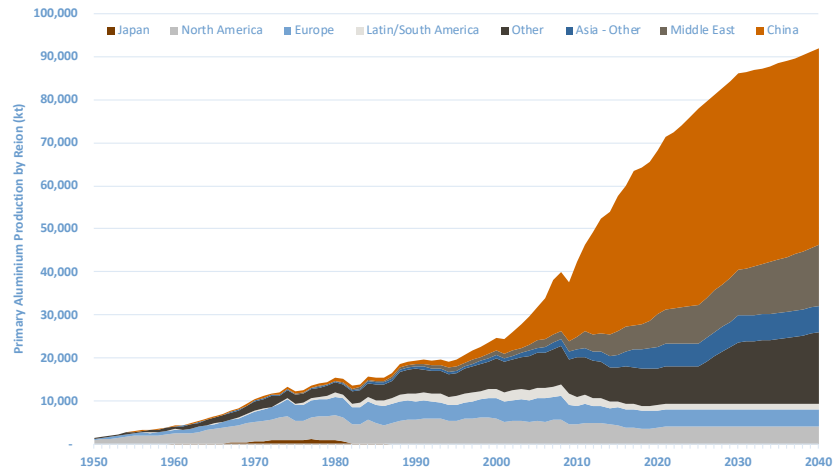
- Value adding to an Australian resource in Australia provides an additional 11,000 direct jobs in technical manufacturing roles (over and above roles in bauxite mining)





CHALLENGES

Australia is a price taker in a Global Market



Pace of Change

- Rate of change in grid
- Rate of technology development to manage change in smelters is lagging
- Technology is being developed but is not yet ready to deploy at scale or commercially viable



Unplanned Outages



Internationally Competitive Prices

- Both electricity and gas must be competitive
 - Competitive gas required to firm renewables
- Must be contractable – otherwise like building a mine with no confirmed resource
- Must be reliable - smelters have low thermal reserve and small changes can take weeks or months to restabilise