



**AUSTRALIAN  
BATTERY  
INSTITUTE**

**WORKFORCE TRAINING CENTRE**

# **Towards 2030**

**AUSTRALIA'S BATTERY POWERED FUTURE**



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# THE FUTURE BATTERY INDUSTRIES COOPERATIVE RESEARCH CENTRE (FBICRC) REPRESENTS AUSTRALIA'S LARGEST PARTNERSHIP OF INDUSTRY, GOVERNMENT AND RESEARCH ORGANISATIONS FOCUSED ON DEVELOPING A NATIONAL BATTERY INDUSTRY.



Comprising over 70 participants, our research portfolio of 15 projects is national in scope and spans the battery value chain, with a combined value in excess of \$120 million to be delivered over six years. Our work is critical in making Australia's industries more competitive by harnessing the research skills and industry expertise

required to create new commercialisation and economic opportunities.

Our purpose includes conducting industry-led research projects and recommending evidence-based policy to enable Australia to capture a larger share of global battery value chains.

# 70

PARTICIPANTS

# 15

RESEARCH PROJECTS

# \$120<sub>MIL</sub>

COMBINED VALUE OVER 6 YEARS

# Executive Summary

## BATTERIES PLAY A KEY ROLE IN KEEPING OUR INCREASINGLY DIGITAL SOCIETY FUNCTIONING AND MOBILE.

As global energy systems move towards net-zero, energy storage, batteries, and battery minerals are becoming increasingly critical. Batteries are an essential component of any sovereign manufacturing capability and essential to decarbonisation.

- Global battery demand is expected to grow at least 9 to 10-fold over the next decade with sales values expected to be between US\$133-\$151 billion by 2030<sup>1</sup>.
- Looking ahead to 2050, the International Energy Agency forecast a 40-fold increase in battery investment, eclipsing the opportunity for solar, wind and hydrogen.
- Batteries are expected to capture 70%<sup>2</sup> of all renewable energy investment in a net zero world.

The battery industry currently adds \$1.3b value and 6,000 jobs to Australia's economy. We have a 50% market share in critical ores and growing domestic demand for energy storage products. Most of our trade is with China, which controls 90% of the world market in battery chemicals, pre-cursors and cell manufacturing.

Australia's critical minerals endowment, emerging materials and manufacturing capabilities, global strategic partnerships and reputation as a low-risk investment destination makes it uniquely positioned to play a leading role in the global battery technology revolution.

However, it's clear that time is running out for Australia to compete in the parts of the value chain that hold most of the

value-creation and macro-economic opportunity<sup>3</sup>. Beyond minerals extraction, Australia could feasibly manufacture the chemicals, advanced materials, cells and modules for integration into global value chains.

Given the global scale and importance of the battery industry, we need to coordinate all levers behind an ambitious national goal –

**TO BUILD A VIBRANT,  
DIVERSIFIED BATTERY INDUSTRY  
AND SECURE AUSTRALIA'S  
SHARE OF THIS SIGNIFICANT  
ECONOMIC PRIZE.**

To do that, we propose a range of measures that fall into two broad categories of a visionary policy

environment that is underpinned by mechanisms to drive consumption.

### **Visionary policy settings to drive investment:**

- Develop and champion a National Battery Strategy.
- Expand the MMI with an investment of \$1 billion per year for batteries for five years.
- Invest \$750m to establish an Australian Battery Institute.

### **Underpinned by mechanisms to support domestic and international consumption:**

- Adopt practical measures such as rebates, fiscal support, concessions.
- Promote Australia as the sustainable, trusted choice for battery industries.

## DEVELOP AN AUSTRALIAN BATTERY STRATEGY TO MAXIMISE THE IMPACT OF INVESTMENT IN AUSTRALIA'S BATTERY INDUSTRY

A national strategy would send a strong message, signal that we are 'open for business' and that we recognise the economic and strategic importance of the battery industry. Our major trading partners already have battery strategies that acknowledge the strategic importance of batteries and battery materials. A national strategy would strengthen Australia's position at the negotiating table with our trading partners.

A National Battery Strategy would:

- Plan for and facilitate industry deployment in advantaged hubs<sup>4</sup>.
- Address trade and treaty levers to support domestic industry development.
- Drive investment in skills, prototyping and research infrastructure.
- Develop policies supporting Australian battery industries.
- Ensure the industry has effective environmental and safety governance.
- Ensure sufficient investment is directed to industry development.



Since 2015, Australia has supported its battery industry through various grants to the value of approximately \$300 million. However, these grants have been provided by various bodies with different mandates and have achieved limited scale and collective impact. In the absence of a national approach, Australia has been less effective than our trading partners in leveraging our financial and non-financial levers, including trade and defence agreements.

In contrast, China, US<sup>5</sup>, EU<sup>6</sup> and Japan<sup>7</sup> have adopted national strategies to develop

their domestic battery industries. Their strategies have been successful in attracting and growing battery industries which have supported broader industrial aims. These foreign strategies aim to capture low value raw materials direct from the mine site, retaining value adding activities within their borders, which is at odds with Australia's current industrialisation aims.

In addition, foreign efforts are receiving material financial support<sup>8</sup>. The EU has committed over \$9.6 billion in subsidies for battery production, and China is

offering "tens of billions of dollars" in state support. The UK has provided \$740 million in R&D support alone to create the Faraday Institution and UK Battery Industrialisation Centre.

While Australia may not match the scale of the Chinese, EU or US investments, it can compete by being more focussed, by leveraging cooperative international relationships, and by continuing to consult with and work in close collaboration with state governments, in the execution of their existing battery investment strategies.

## EXPAND THE MODERN MANUFACTURING INITIATIVE WITH \$1 BILLION PER ANNUM FOR FIVE YEARS TO SUPPORT INDUSTRY DIVERSIFICATION

Our vision is for Australia to produce high value chemicals in place of exporting ore; manufacture quality cells that perform in our harsh environment and sustain our critical industries; build and export battery modules; and sustainably repurpose and recycle battery systems at their end of life.

To achieve this diversified industry vision<sup>9</sup>, \$17-23 billion investment is required by 2030. Of this figure, \$6-9 billion is required for value added manufacturing (\$4-6 billion in refining and active materials, \$2-3 billion in cell manufacture and \$0-0.5 billion in integration and services).

It is important to put the vision in context, \$2-3 billion investment in cell manufacturing is only 1-2 world-scale factories representing a small market share of the 200 planned and operating factories globally<sup>10</sup>.

To develop and attract quality anchor tenants, Australia needs to provide investment incentives that are internationally competitive and commensurate with the manufacturing legacy a battery industry could contribute.

While Australia is an attractive investment destination, there are other attractive markets offering incentives to develop battery industries. For instance, Tesla recently declined an offer of \$1.6 billion in subsidies<sup>11</sup> to build a new factory in Germany. This funding was offered as part of the European Commission's recent \$4.6 billion European Battery Innovation Scheme. This scheme is in addition to the \$5.0 billion offered in 2019 across seven countries.

A strategic "whole of value chain" approach must be taken to seed investment across each sector at a sufficient scale to ensure that the whole ecosystem is competitive and economically sustainable. This approach requires focused investment to build Australian businesses, attract

global leaders and to create regional specialisations and centres of excellence. With a competitive, low risk, high quality value chain, Australia should be seen as a battery investment destination of choice.

This approach offers real potential for large employment outcomes.

**IT IS ESTIMATED THAT A DIVERSIFIED BATTERY INDUSTRY COULD SUPPORT 34,700 JOBS BY 2030<sup>12</sup>.**

The largest integrated chemical complexes employ up to 39,000 people<sup>13</sup>. There are currently over 200 Gigafactories in the global pipeline, with each 30-40GWh factory employing 3,200 people (10,000 indirectly).

While the vision is broad, it is collectively necessary. Batteries are typically manufactured in vertically integrated centres to lower costs, control quality and accelerate technology development. High quality and low cost are essential across the entire production system.

Scale matters in battery manufacturing. Australia must attract diverse, large scale industrial activity into a select number of vertically integrated hubs to ensure these businesses can be competitive within global value chains.

The capabilities built within this ecosystem have the potential to leverage from and support other high technology industries. Capabilities for advanced battery manufacturing include metallurgy, precision chemistry, materials science, manufacturing, data science and AI.





# Visionary Policy Settings



## INVEST \$750M IN A BI-COASTAL AUSTRALIAN BATTERY INSTITUTE TO ENSURE INDUSTRY COMPETITIVENESS

An Australian Battery Institute (ABI) will provide advanced technology and skills development together with open access commercialisation infrastructure to deliver low cost, rapid prototyping essential to support a globally competitive battery industry.

An ABI would ensure that the domestic industry remains cost competitive. Research is the greatest contributor<sup>14</sup> to cost declines in lithium batteries, representing 54% of savings in contrast with economies of scale (30%), and learning by doing (2%).

It would bring together our industrial development, vocational education and research institutions under one roof so we can maximise the use of facilities, lower their per-use cost, and provide opportunities for high quality on-the-job training.

An ABI would lower barriers to entry for new participants and enable Australian technology to be commercialised within Australia.

And finally, an ABI would provide Australia with the opportunity to remain at the forefront of battery development, which could avoid value leakage from royalties.

Successful global examples include the UK Faraday Institution and Battery Industrialisation Centre (UKBIC) and Finland's Northvolt Labs<sup>15</sup>. Each have invested approximately US\$750 million into R&D facilities which service the entire battery ecosystem. Realistically, only Governments and multi-nationals can afford this infrastructure, and it is essential that Australia has this capability if it wishes to grow its own industry.

The FBICRC has established a solid foundation for an Australian Battery Institute; a collaboration of over 70 industry, government, and academic partners; foundational prototyping and test infrastructure; strong alignment with state government strategies. The states are well positioned to leverage the infrastructure and capabilities built through the FBICRC to maximise and accelerate the benefits of an Australian Battery Institute.

A bi-coastal investment strategy for Australia will ensure that the benefits are shared across the country. Digital connectivity can enable training and research benefits to be shared further.

Structuring the institute as an upstream materials centre, and a downstream manufacturing and services centre will

enable the institute to create and benefit from regional specialisation.

The Australian Battery Institute could follow the European application-oriented model<sup>16</sup> for industry and academic collaboration. The model improves commercial outcomes by providing the capability to develop and pilot finished products derived from early-stage research. This approach has yielded up to 18x multiplier on upfront costs.

The approach of developing deep application specific centres mirrors organisations like Fraunhofer Institutes, the Faraday Institution, the UK Battery Industrialisation Centre and the German Centre for Solar Energy and Hydrogen Research (ZSW).

The ABI, in partnership with universities, could establish specialist battery training programs, and in partnership with TAFE could develop and execute the curriculum to close gaps identified in the FBICRC's 'Vocational Skills Gap Assessment and Workforce Development Plan'.

The Australian Battery Institute could be funded as a landmark investment through the National Critical Research Infrastructure Fund.

# Mechanisms to Support Consumption

## ADOPT POLICIES THAT ENCOURAGE TAKE-UP OF STORAGE TECHNOLOGY & AUSTRALIAN MADE PRODUCTS

We must ensure that financial investment flows to support our domestic battery industry and sustain our sovereign capabilities. A vibrant and competitive domestic market for battery materials, batteries, storage and storage services is essential to that aim.



Sustained investment and growth will require the existence of a supportive policy environment, utilising a range of policy levers at both a federal and state level, to enable the domestic industry to flourish.

The following provides a summary of potential policy opportunities that could be further developed in this space. It is not intended as a prescriptive nor exhaustive list, but rather is provided to demonstrate the breadth of policy options that may need to be considered to deliver on the economic opportunity before us.

### ENSURE THAT RENEWABLE ENERGY CERTIFICATES ARE TIME BOUND (T-RECS)

Time bound renewable energy certificates<sup>17</sup> (T-RECs) guarantee that renewables are supplied when the sun isn't shining, and wind isn't blowing. T-RECs must be produced and consumed within the same time period (e.g. half-hour), which ensures that the cost of providing firm power is properly priced into the market. A T-REC market creates an essential investment incentive for long-duration storage technologies, and more effectively price the intermittency of renewables in the grid.

### OFFER ELECTRIC VEHICLE AND RESIDENTIAL BATTERY STORAGE CONCESSIONS TO SUSTAIN MOMENTUM FOR DECARBONISATION

The FBICRC supports Electric Vehicle concessions, and residential battery storage subsidies as means to deepen storage capacity and utilise low-emissions energy.

### GOVERNMENT TO ACT AS A MODEL CONSUMER BY BUYING AUSTRALIAN BATTERY PRODUCTS

The electrification of government vehicles, bus fleets, transition of

government buildings to net-zero emissions, defence procurement and upgrading of remote standalone power systems provide a low-cost opportunity to sustain a sovereign Australian battery capability.

### REINFORCE THE VALUE OF "BRAND AUSTRALIA" BY SUPPORTING PROVENANCE TRACKING AND REPORTING SYSTEMS

Australia could leverage its competitive advantage over low-cost competitors by promoting the unique virtues of Australian batteries, including their carbon footprint and ESG credentials. Requiring provenance to be tracked and labelled on end products, similar to how Australian content is labelled in food, will enable Australia to monetise its brand.

### SUPPORT THE CHOICE OF FLEXIBLE ELECTRICITY TARIFFS FOR RESIDENTIAL AND COMMERCIAL CONSUMERS

Flexible tariff structures enable consumers to moderate their energy consumption depending on price and also enable owners of energy storage systems to maximise the benefit from storage capacity, by either storing from or dispatching to the grid<sup>18</sup>.

### CREATE OPEN MARKETS FOR GRID SERVICES<sup>19</sup> TO ENCOURAGE INDUSTRY PARTICIPATION AND BATTERY UPTAKE

Several potential battery revenue streams remain inaccessible to market participants or have high barriers to entry (e.g. some network support services). Others are compensated through illiquid markets with low trading frequency (e.g. black start). The opportunity to stack revenue from multiple services will help to create incentives for investment in energy storage.



# Mechanisms to Support Consumption

## PROMOTE AUSTRALIA AS THE SUSTAINABLE, TRUSTED CHOICE FOR BATTERY INDUSTRIES

Supply chain traceability and tracking could improve Australia's strategic position amongst its competitors, facilitate differentiation on the basis of provenance and provide data to help maintain, repurpose and recycle end-of-life products.

Global customers are increasingly seeking trusted, transparent and sustainable supply chain partners. With battery demand forecast to grow 9-10 fold over the next decade, ensuring the sustainability of the industry will become an increasingly important consideration. Similarly, the

recovery of valuable minerals through reuse initiatives will also be essential as will the need for careful handling and recycling of potentially harmful battery chemicals.

As batteries fail or degrade over time, we expect an increasing stream of end-of-life products to become available. If the products are disposed of instead of recycled, this represents a lost opportunity to retain critical minerals and to avoid a persistent environmental impact. The challenge is that the initial scale for recovery, reuse and recycling is limited.



## CONCLUSION: AUSTRALIA HAS A CHOICE.

We can continue our traditional focus on the mining and export of raw battery materials and accept the lost opportunity of value add for Australia.

Alternatively, we can adopt a growth strategy which offers a significant economic prize of \$7.4bn annually and more than 34, 000 jobs by 2030.

Pursuing growth will require a shift in mindset, a need to invest with purpose and underpinned by courageous and visionary policy settings.

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