

# National Battery Strategy

Leading the charge towards a competitive and diverse Australian battery industry

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| industry.gov.au/NationalBatteryStrategy

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Our department recognises the First Peoples of this Nation and their ongoing cultural and spiritual connections to the lands, waters, seas, skies, and communities.

We acknowledge First Nations Peoples as the Traditional Custodians and Lore Keepers of the oldest living culture and pay respects to their Elders past and present. We extend that respect to all First Nations Peoples.

Meeting Place icon: DISR employee Amy Huggins.

Artwork: Connection to Country, 2021 by Shaenice Allan.

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# **Minister's foreword**

The global demand for batteries is set to quadruple by 2030 as the world transitions to net zero. Australia is already a leading producer of battery minerals, providing approximately 45% of the world's lithium in 2023. While we mine critical minerals here, we currently make less than 1% of global battery materials or components.

The global energy transition to renewables presents a significant opportunity for Australia to expand our economy, industry and manufacturing capabilities thanks to our home-grown advantages: our resources and our people. The security and resilience of battery supply chains is also critical to Australia's ability to become a renewable energy superpower, and to its energy security. However, battery supply chains are currently among the most concentrated in the world, compromising Australia's economic resilience.

The National Battery Strategy builds on Australia's existing strengths and provides a pathway to move up the battery value chain and capitalise on key opportunities – such as manufacturing stationary energy storage systems and higher value battery active materials, building battery safety and security, and continuing to develop emerging battery chemistries. This will allow Australia to capture a once in a generation opportunity presented by a thriving domestic battery industry.

Last year about 3.7 million Australian homes used rooftop solar to lower their electricity bills – but only about 250,000 of these homes had a battery. By strengthening the resilience of Australia's battery supply chains and strengthening critical battery manufacturing capabilities, Australian manufacturers can meet the growing demand for stationary energy, provide more choice to consumers, support more people to harness cheap renewable energy and contribute to more diverse and resilient global supply chains.

Australia has unmatched natural advantages to create a battery industry. These include world-leading renewable energy resources, critical minerals, skilled workers and a strong international trading reputation. If we mine it here, we should make it here. By leveraging these advantages with the targeted measures announced in our 2024–25 Budget, the strategy will support a future made in Australia and play a role in achieving our net zero goals.

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The strategy is the latest milestone in Australia's impressive history in battery advancement. Australia has been at the forefront of the battery industry for decades, from pioneering the vanadium redox battery at the University of New South Wales to installing the world's first big lithium battery in South Australia. Across Australia, businesses continue to innovate in the battery industry.

The strategy is at the forefront of global change towards economic resilience, setting Australia on a path that aligns strongly with our national interests. The National Interest Framework under the forthcoming *Future Made in Australia Act* will outline how government will support priority industries, including clean energy manufacturing such as batteries, into the future. Australia is moving beyond a 'hope for the best' approach for economic security, to one that capitalises on our advantages, makes Australia an indispensable part of global supply chains and creates the secure jobs of the future.

The strategy sets out the government's measures to create a diverse and competitive Australian battery industry, headlined by new actions:

- \$523.2 million Battery Breakthrough to transform our battery industry by helping manufacturers to move up the battery value chain in Australia. This will:
  - provide a targeted production incentive to support Australian battery manufacturers to build capabilities that are critical to our economic resilience
  - be paid on production, and will focus on producing high-value battery products that align with Australia's areas of advantage and that support the climate energy transition.
- \$20.3 million Building Future Battery Capabilities measure to build our future battery capabilities and strengthen national collaboration. This includes funding to deliver a supply chain navigator tool, battery innovation and scale-up program, best practice guidelines and standards, and provide battery industry skills and training.
- \$1.7 billion for the Future Made in Australia Innovation Fund to support innovation, commercialisation, pilot and demonstration projects and early-stage development in priority sectors

   including manufacturing clean energy technologies such as batteries.

Together the measures in the strategy will give Australia access to cheaper and cleaner energy, capture more value from our natural resources, boost long-term productivity and create well-paying jobs.



The Hon Ed Husic MP Minister for Industry and Science

#### Our 2035 vision for Australia





# Strategy at a glance

Improving Australia's access to batteries will be essential for building Australia's economic resilience as Australia transitions to net zero, and diversifying and modernising Australia's industrial base.

For this reason, the National Battery Strategy is a key part of the government's Future Made in Australia agenda. The strategy will improve Australia's resilience and security and drive economic growth by expanding Australia's battery manufacturing capabilities and building skills. This will help us meet our target of 82% renewable energy and secure our place in global battery supply chains.

#### Australia is well placed to seize opportunities in renewable energy thanks to Australia's:

- availability of resources including battery minerals (e.g. lithium, nickel, copper and cobalt)
- strong environmental, social and governance (ESG) standards
- reputation as a trusted trading partner with a low-risk and stable investment environment
- pioneers in battery and energy storage research.

# **Our vision**

By 2035, Australia is a globally competitive producer of batteries and battery materials, providing secure and resilient battery supply chains, delivering affordable and secure energy for Australians, boosting productivity and creating wealth and opportunity while being part of the global energy transition.

# Strategic battery priorities

We'll create a fully charged Australian battery industry by focusing on 5 key priorities:

- 1. Build battery manufacturing capabilities in ways that strengthen economic resilience, leverage Australia's comparative advantages and add value to our economy.
- 2. Build knowledge and skills to create secure Australian-made jobs.
- 3. Secure Australia's place in global battery supply chains.
- 4. Lead the world on sustainability, standards and the circular economy.
- 5. Bring all levels of government together.

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# New battery actions: Budget 2024–25

- **Battery Breakthrough: \$523.2 million** will incentivise the production of high-value battery products in Australia's areas of advantage such as stationary energy storage to strengthen economic resilience and support critical battery manufacturing capabilities.
- **Building Future Battery Capabilities: \$20.3 million** build our future battery capabilities and strengthen national collaboration, including:
  - **\$9.9 million** to the Future Battery Industries Cooperative Research Centre (FBICRC) to map Australian battery capability and value chains, drive battery innovation and scale-up and deliver best practice guidelines and standards for the battery industry.
  - **\$10 million** to the Powering Australia Industry Growth Centre (PAIGC) to develop workforce skills and training to enable a safe and sustainable battery industry.
- Support to deliver the Australian Made Battery Precinct: \$5.6 million has been committed to conduct foundational work to support the establishment of the Australian Made Battery Precinct, in partnership with the Queensland Government. This will help realise the Australian Government's commitment to invest up to \$100 million in the precinct.
- Future Made in Australia Innovation Fund: \$1.7 billion will accelerate the deployment of innovation in priority industries, which includes clean energy technologies such as batteries manufacturing.

### Outcomes



Support Australia's renewable energy transition through secure and well-paying jobs, value-adding to Australia's refined minerals, capturing a larger share of the global battery value chain.



Meet our responsibilities to address climate change and transition to renewable energy, leading strong ESG standards in global battery markets.



Diversify global battery supply chains and strengthen Australia's economic resilience, ensuring reliable energy storage that will support greater use of renewables in Australia's energy systems.



# High value opportunities for Australia



Use Australian innovation to build **safer, more secure** batteries



Manufacture energy storage systems (ESS) for **renewable grids** 





Provide battery active materials to the **world** 



Provide batteries for our transport manufacturing industry

To strengthen the resilience of battery supply chains and build critical battery manufacturing capabilities, the National Battery Strategy will target the following high-value opportunities for Australia:

# Manufacture energy storage systems (ESS) for renewable grids

Australia will have a high demand for ESS across both utility scale (grid level) and smaller scale (community, business and household) installations. To meet this demand, Australia will need batteries with short, medium, and long-term duration. These needs are best served by different technologies and chemistries. Australia has deep experience with batteries that are optimised for our climate and for integration with our renewables grid. Australia is therefore well positioned to develop and commercialise energy storage and standalone power systems, which provide off-the-grid electricity for remote areas. This will help secure Australia's energy transition and will position Australia to help countries in similar climates as they decarbonise, including southeast Asia and the Pacific.

# Provide battery active materials to the world

Downstream mineral processing is a priority of the Critical Minerals Strategy. Industry revenue across the global lithium-ion value chain is projected to increase five-fold by 2030 (McKinsey 2023), with 96% of the total revenue opportunity expected to occur downstream of the mining stage (Accenture 2023). Australian battery active materials can integrate into the supply chains of automotive manufacturers. Cathode and anode active materials from Australia can qualify for *Inflation Reduction Act* electric vehicle (EV) subsidies if they are part of US automotive battery supply chains. This integration would diversify global supply chains with lower cost, higher standard and higher value products. This industry can also use recycled materials from Australia's uptake of stationary storage batteries and EVs.

# Provide batteries for our transport manufacturing industry

Australia has existing bus, truck, boat, mining equipment, defence and caravan manufacturing industries. Australian businesses are involved in automotive supply chains including EV conversions. As these industries continue to electrify and decarbonise, there will be gigawatts of demand for batteries. Local batteries are closer to ship, easier to adapt to meet local manufacturing needs and will help reduce supply chains vulnerable to disruption. Australian batteries will help our manufacturers adapt to the net zero future of transport.

# Use Australian innovation to build safer, more secure batteries

Cybersecurity is crucial for battery installations, especially in sensitive environments like defence estates. Batteries need to work with management and control systems that meet the challenges of grid integration and safety. This includes grid-forming inverters to allow batteries to operate to their full potential in the grid. Australian businesses already have software and power electronics solutions that can comply with world leading battery standards. Australian design and innovation will help batteries work at their best and safest.



# Introduction

Addressing climate change is the defining challenge of our time. The government is transitioning Australia's electricity grid to 82% renewable energy by 2030. This will support Australia's commitment to reduce emissions by 43% by 2030 and realise the economic opportunities that the net zero transformation presents for Australia.

Strong and secure battery supply chains will be essential to achieving this transformation. The Australian Energy Market Operator (AEMO) has forecast that Australia will need 19 GW of energy storage capacity in the grid by 2030. This will more than double to 43 GW by 2040, with over a half of it in home and community batteries (including EV to grid) (AEMO 2023).

Battery industries have a long history in Australia. Australian businesses like Century Batteries have been manufacturing lead acid batteries continuously since 1928. Demand for batteries is expected to grow sharply in the near future. Cumulative energy storage capacity is forecast to grow to 1,877 gigawatt hours (GWh) by 2030 (Kou 2023), up from 34GWh in 2020. This is expected to attract USD\$262 billion in investment between 2021 and 2030 (Bloomberg 2021). The growth in domestic and global demand for a diverse range of batteries creates a significant opportunity for Australian battery manufacturers. This strategy will support Australian manufacturers to make the most of these opportunities.

Major economies around the world are acting quickly to secure the global capital investment, skills and mineral resources they need to build clean energy industries. However, more than 75% of batteries are currently produced in one country. As this market evolves, it's important to ensure Australia builds sovereign capabilities where it is a necessary and efficient way to strengthen Australian economic resilience or security.

Australia has a role to play in diversifying global supply chains. Australian battery innovation and manufacturing can meaningfully reduce economic vulnerabilities and make an important contribution to Australia's trade partnerships. Building this industry now will ensure Australia can develop and access the newest battery technologies, securing the economy and helping protect against potential market shocks.

Demand for battery recycling is also growing. Effective development of battery recycling practices and markets will be critical to ensuring that batteries continue to have a positive environmental impact and promote the growth of circular economy.

A strong battery industry will help improve the lives of Australians and support economic resilience and security into the future. For this industry to thrive, we need Australian battery manufacturers and researchers to create new projects and technologies. We need batteries built to power our net zero transition, and ready to export across the globe to power the world's shift to green energy. We need to create a competitive and diverse domestic battery sector.

To achieve this, we must move the industry further downstream from minerals extraction and refining to higher value products. By doing this, we'll build a stationary storage battery manufacturing industry that uses our rich mineral wealth and high penetration of solar and wind. Australia has potential to contribute value-added products like battery active materials to the global EV industry, and support the electrification of our mining, defence and heavy transport sectors by producing batteries for the vehicles we manufacture here.

There are clear opportunities for a battery industry in Australia. We can:

- build stationary energy storage to transition our grid and our region to renewable energy
- upgrade Australia's battery minerals into active materials for the global EV industry
- produce batteries for heavy vehicles and equipment Australia excels in manufacturing
- ensure safe and secure operations for batteries with enabling technology.

The National Battery Strategy sets out the pathway for governments, industry and researchers to realise these opportunities. These actions will strengthen Australia's position in global battery supply chains and expand Australia's battery manufacturing capabilities in ways that improve Australia's economic resilience and security. This means we'll be able to secure our part of the global renewable energy transition opportunity and build Australia's ongoing energy security.

The strategy has been developed in consultation with industry, researchers, unions, state and territory governments, and the community.

This strategy is also underpinned by significant consultation and analysis and backed by government action. The centrepiece is the \$523.2 million **Battery Breakthrough** that will provide production-linked incentives to Australian battery manufacturers. This initiative will boost economic resilience by building capability in high value areas of competitive advantage across the battery value chain. Additionally, the \$20.3 million **Building Future Battery Capabilities** measure will build future battery industry skills and capabilities and strengthen national collaboration. These programs build on existing efforts through **New Energy Apprenticeships, Critical Minerals Trade Enhancement Initiative** and more.

The strategy is part of the Australian Government's Future Made in Australia agenda to secure our future prosperity amid the global energy transition and industrial transformation. The 5 strategic battery priorities outlined in the strategy incentivise investment in priority industries. These include clean energy technology manufacturing such as battery manufacturing to create secure jobs, bolster domestic capability and ensure economic resilience and security.

The strategy will support Australia's battery industry to operate on a more level playing field with its international competitors and support it to move up the battery value chain. This will allow us to meet part of our domestic battery needs, provide greater domestic supply security and create export opportunities that will diversify the global battery market.

# What are batteries and how are they made?



nadium

long cycle (recharge and discharge) life

cheaper to scale up

useful for large storage systems

Batteries are critical to the renewable energy transition, as they allow for renewable energy to be accessed even when it isn't being produced.

Through a controlled and reversible chemical reaction, batteries store energy for use at any time.

Different battery chemistries provide different benefits, including varying duration, cost and purpose. For example:

- Lithium-ion batteries are highly energy dense, making them suitable for weight and size sensitive applications such as EVs, electric bikes and mobile phones.
- Flow batteries, like vanadium, zinc-bromine or iron flow batteries, are cheaper to scale up and have long cycle life, making them suitable for large stationary energy storage systems.

The National Battery Strategy is chemistry and technology agnostic and considers all battery types, as technologies continue to rapidly improve and evolve.

From rocks to recycling, the battery value chain is a complex process that incorporates other government priorities.

The National Battery Strategy complements work covered by the government's <u>Critical Minerals Strategy</u> and the National Electric Vehicle Strategy (NEVS).

The Critical Minerals Strategy provides a national framework to grow Australia's critical minerals by adding value onshore. This includes diversifying global supply chains of critical minerals used in priority technologies, including batteries and battery components.

The <u>National Electric Vehicle Strategy</u> is supporting further research into EV and other large format battery recycling, reuse and stewardship. It seeks to build an EV circular economy in Australia.

This strategy is also consistent with the Powering Australia Plan, the Future Made in Australia National Interest Framework and the government's plan to make Australia a renewable energy superpower.





# 1. Manufacturing

Build battery manufacturing capabilities in ways that strengthen economic resilience, leverage Australia's comparative advantages and add value to our economy.

# Summary of actions table

New actions	Battery Breakthrough
	Support to deliver the Australian Made Battery Precinct
	Future Made in Australia – Innovation Fund
	Critical Minerals Processing Tax Incentive
Existing actions	Powering Australia Industry Growth Centre (PAIGC)
	Australian Made Battery Precinct
	Powering Australia Plan:
	Capacity Investment Scheme
	Rewiring the Nation
	Community Batteries For Household Solar Program
	National Robotics Strategy
	Future Battery Industries Cooperative Research Centre (FBICRC)
Linked initiatives	The National Reconstruction Fund (NRF)
	Net Zero Economy Authority
	Clean Energy Finance Corporation (CEFC)
	Australian Renewable Energy Agency (ARENA)
	Industry Growth Program (IGP)
	The R&D Tax Incentive (RDTI)
	Critical Minerals Strategy
	Northern Australia Infrastructure Fund (NAIF)

# **Opportunities**

Australia has all the ingredients to be a world leading battery manufacturer – the minerals, expertise, relationships and ambition. With effective investment in strong foundations, Australia can have a thriving, diverse battery industry that strengthens Australian supply chain resilience and builds critical sovereign capabilities.

The Critical Minerals Strategy identified that Australia has significant potential to add more value to its natural resources. The government's Future Made in Australia policy promotes private investment in processing and refining of critical minerals at scale, making Australia even more central to battery supply chains.

As Australia grows its critical minerals processing and refining capabilities, the costs of vertically integrated production of battery active materials are in turn expected to decline. This will provide Australian producers with a cost advantage relative to international competitors (Accenture 2023). This is especially the case for battery active materials and batteries that are installed for final use in Australia, such as flow batteries that are integrated into renewable electricity systems and industrial facilities.

Australia is also a compelling market to commercialise and scale new battery innovations. Access to leading innovators, a skilled workforce, strong trade partnerships, local demand and a competitive business environment have underpinned the success of Australia's advanced manufacturing sector.

These factors are already supporting the competitiveness of companies manufacturing battery packs and cells for specialised applications in Australia. The growth of the global batteries market presents a significant growth opportunity for this sector. Australian manufacturers have the potential to build expertise and competitiveness in critical components and product segments. Trade integration will expand Australian businesses' market opportunities and continue to be an important conduit for new innovations.

Thanks to our high-quality mineral and renewable energy resources, Australia has potential to produce battery products that have lower emissions and better ESG standards than many other countries. For example, Australian produced refined-sulphide nickel produces only one-half to one-sixth the emissions of refined-laterite nickel (Mandala 2024). Lower emissions intensities are possible with further deployment of renewables and electrification. Effective product standards such as the Guarantee of Origin scheme will support Australian producers to demonstrate compelling emission intensity standards to customers. A growing onshore battery industry with strong ESG credentials will support Australia to compete in these expanding markets and accelerate their development.

Australia's commitment to reaching net zero by 2050 and reducing emissions by 43% by 2030 is also driving significant growth in domestic demand for batteries. Demand from Australian customers for products that meet high cybersecurity and climate resilience standards will also provide a source of differentiation for some domestic manufacturers. This will contribute to supporting Australia's broader economic resilience and security.

Effective public policy and targeted investments can support the growth of a competitive industry. Public provision of important infrastructure supports new industries to operate at scale, achieve high levels of productivity and promote strong competition where new entrants can compete effectively with incumbents. This has included building ports, roads, pipelines and train lines to support the development of traditional industries such as resources and agriculture. As Australia diversifies its industrial base and adds more value to existing resources, new infrastructure and public investment can play a role promoting the growth of new competitive industries.

Battery manufacturing has also been identified as being aligned with the principles for priority industries under the Future Made in Australia National Interest Framework's Economic Resilience and Security Stream. Reflecting this, the government is making targeted investments that unlock private investment in battery manufacturing at scale, in ways that improve economic resilience and security.

Targeted actions that support the strategic development of Australian battery manufacturing capabilities can support Australia's energy transition, improve Australia's economic security and resilience, and make a significant contribution to economic growth and the modernisation of Australia's industrial strengths.

#### National Battery Strategy

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#### **Transforming Australian industry**

A thriving battery industry will play a vital role in rebuilding Australia's industrial base. There are three aspects to this transformation:

#### Value

The government is supporting the battery industry to capture greater value from our natural resources and shift towards higher value-added manufacturing activities. This will create sustainable long-term growth and give us a commercial advantage that is difficult for rivals to imitate because of our natural mineral advantages providing vertical integration benefits.

#### Diversification

To create a diversified battery industry, the government will seek to build flexible capability by capitalising on new points of competitive advantage. This includes Australia's high ESG and cybersecurity standards, and the unique needs for local climates and energy systems. To ensure diversification, Australia will continue to explore the opportunities of nascent and emerging battery technologies and highlight the capabilities of the domestic industry to attract investment.

#### Scale

The government will catalyse the growth of the battery industry by supporting businesses to access new markets, diversify their product base and attract investment. This will advance Australia's renewable energy superpower ambitions, align with state and territory programs, and build on bilateral and multilateral relationships. This will help create a strong, credible and more predictable demand for Australian made batteries and components.

### What we are doing

The Powering Australia Plan focuses on creating jobs, cutting power bills and reducing emissions by boosting renewable energy. As part of this plan, the government has set the goal of powering Australia with 82% renewable energy by 2030.

Growing battery manufacturing capabilities can play a vital role achieving this target. Australian made batteries can secure a grid based on renewable electricity. The Australian Energy Market Operator (AEMO) has forecast that Australia will need 19 GW of energy storage capacity in the grid by 2030. This will more than double to 43 GW by 2040, with over a half of it in distributed consumer scale energy storage (including EV to grid) (AEMO 2023). Bringing batteries into the grid will create energy storage to help with grid stabilisation and flexibility.

#### Powering Australia Industry Growth Centre (PAIGC)

The \$14 million PAIGC will support Australian businesses looking to manufacture, commercialise and adopt renewable technologies. The PAIGC will:

- 1. support businesses looking to locally manufacture renewable technologies and commercialise their ideas
- 2. encourage connection between critical minerals producers and renewables manufacturers
- 3. facilitate partnerships between governments, research institutions, and industry to drive the development and adoption of renewable technologies in Australia
- 4. support businesses in navigating battery regulatory barriers, and support First Nations businesses to contribute to developing renewable technologies through engaging a First Nations Business Adviser.

### **Existing actions**

- The <u>Powering Australia Industry Growth Centre</u> (PAIGC) fulfils a commitment by the Australian Government to help Australian businesses manufacture, commercialise and adopt new renewable technologies – including batteries.
- Committed up to \$100 million in investment to establish the Australian Made Battery Precinct in partnership with the Queensland Government.
- The government's Powering Australia Plan, to create jobs, reduce pressure on energy bills and lower emissions by boosting renewable energy deployment. These initiatives create clear opportunities for battery manufacturers. Initiatives under the Plan include:
  - The <u>Capacity Investment Scheme</u> (CIS) which provides a national framework to encourage new investment in 9GW of clean dispatchable capacity, such as battery storage, as well as 32GW of new generation capacity.
  - Unlocking investment in the electricity grid with <u>Rewiring the Nation</u>, \$20 billion funding in low-cost finance over 4 years.
  - The \$224.3 million <u>Community Batteries For Household Solar Program</u>, funding up to 400 community batteries.
- The <u>National Robotics Strategy</u>, which the government is creating to guide Australia's development, manufacturing and responsible use of robotics and automation technologies. These are vital for battery cell manufacturing processes.
- The \$25 million <u>Future Battery Industries Cooperative Research Centre</u> (FBICRC) is an independent centre located at Curtin University in Western Australia that enables the growth of battery industries to power Australia's future.

#### Linked initiatives

- The \$15 billion <u>National Reconstruction Fund</u> (NRF) will finance projects that diversify and transform Australia's industry and economy. The NRF includes:
  - Up to \$3 billion for renewables and low emissions technology
  - \$1 billion for value-adding in resources
  - \$1 billion for critical technologies
  - \$1 billion for advanced manufacturing.
- <u>The Net Zero Economy Authority</u> will promote an orderly and positive net zero economic transformation for Australia, its regions, industries, workers and communities. Using our skilled workforce to support battery manufacturing industries scaling up.
- <u>Clean Energy Finance Corporation</u> mobilises investment in renewable energy projects, as well as manufacturing businesses and services.
- <u>Australian Renewable Energy Agency</u> (ARENA) provides grant funding to improve competitiveness and supply of renewable energy.
- <u>Industry Growth Program</u> provides advice and matched grant funding for small and medium-sized enterprises (SMEs) and start-ups to commercialise research.
- The <u>R&D Tax Incentive</u> supports companies conducting eligible R&D in all industry sectors, including R&D in battery materials and technology.
- The <u>Critical Minerals Strategy</u> provides a framework and initiatives to grow Australia's critical minerals sector.
- The Northern Australia Infrastructure Facility (NAIF), which is actively supporting the Northern Australia as a place for the battery industry. To support the Critical Minerals Strategy, NAIF has earmarked \$500 million to support critical minerals projects in Northern Australia.

#### National Battery Strategy

# What we will do

The government's actions will support Australian industry to move beyond extraction and into highervalue opportunities and jobs. This will build sovereign capacity in battery manufacturing that is competitive, sustainable, vertically integrated, and diverse.

These actions will help battery SMEs to bridge the commercialisation 'valley of death' and capture opportunities for growth. This will ensure more batteries and components are manufactured in Australia and help keep and attract battery expertise onshore. These actions will also support medium to large battery businesses to take on larger scale projects and reduce operational costs. This will help businesses capture more opportunities across the battery value chain.

The government will provide \$22.7 billion over 10 years from 2023–24 to accelerate investment in Future Made in Australia priority industries, including renewable hydrogen, green metals, low carbon liquid fuels, refining and processing of critical minerals and manufacturing of clean energy technologies including in the solar and battery supply chains. Funding will catalyse clean energy supply chains and support Australia to become a renewable energy superpower.

The government's proposed *Future Made in Australia Act* will include a National Interest Framework that identifies priority industries where public investment may be warranted to align economic incentives with the national interest and unlock private investment at scale. Under the framework, priority industries can be identified through two streams – the 'net zero transformation stream' and the 'economic resilience and security stream.' Clean energy manufacturing – including batteries – is a priority industry under the economic resilience and security stream. Domestic battery manufacturing capability will be necessary to deliver economic resilience and security for Australia in our transition to net zero. As global demand for batteries increases, domestic battery manufacturing provides an opportunity to add more value to Australia's resources and integrate into global supply chains, building resilience into those supply chains from potential disruptions or barriers.

Australia is moving beyond a 'dig and ship' economy to become a renewable energy superpower. This is an opportunity unique to Australia, as no other nation has the advantages Australia does. Now is the time to capitalise on this economic opportunity.

#### **New actions**

- The \$523.2 million Battery Breakthrough will strengthen economic resilience by providing production-linked incentives to support Australian manufacturers to develop critical battery manufacturing capabilities. It will help Australia capture a once in a generation opportunity to develop a thriving domestic battery industry. The government will work closely with industry and other stakeholders to design, develop and deliver the Battery Breakthrough.
- \$1.7 billion over 10 years from 2024–25 for the Future Made in Australia Innovation Fund, to be administered by the Australian Renewable Energy Agency (ARENA), to support innovation, commercialisation, pilot and demonstration projects and early-stage development in priority sectors. These include renewable hydrogen, green metals, low carbon liquid fuels and clean energy technology manufacturing such as batteries.
- The Australian Government will provide \$7 billion in support for Australian critical minerals processing from 2027–28 to 2040–41 through the new Critical Minerals Production Tax Incentive. The Critical Minerals Production Tax Incentive will start from 1 July 2027 and provide a refundable tax offset of 10% of eligible Australian processing costs for all 31 critical minerals currently on the critical minerals list. This includes many commonly used battery minerals like lithium, cobalt, nickel, graphite and high purity alumina.
- \$5.6 million has been committed for further analysis and research to support the delivery of the Australian Made Battery Precinct, in partnership with the Queensland Government. The precinct will support industry collaboration and pilot-scale manufacturing of battery technologies, helping manufacturers grow their businesses.



# 2. Knowledge and skills

Build knowledge and skills to create secure Australian made jobs.

# Summary of actions table

New actions	Building Future Battery Capabilities
	Support to deliver the Australian Made Battery Precinct
	<ul><li>Future Made in Australia:</li><li>Innovation Fund</li></ul>
	Skilling the Clean Energy Workforce
	Expanding the New Energy Apprenticeships Program
	Building Women's Careers Program
	Diversity in STEM Funding
Existing actions	Powering Australia Industry Growth Centre (PAIGC)
	10,000 New Energy Apprenticeships
	Clean Energy Capacity Study
	National Skills Agreement
	Powering Australia Plan:
	Capacity Investment Scheme
	Community Batteries For Household Solar Program
	Australian Energy Employment Report
Linked initiatives	National Science and Research priorities
	Net Zero Economy Authority (NZEA)
	CSIRO
	Cooperative Research Centre Program
	Economic Accelerator
	Australian Research Council
	The Trailblazer Universities Program
	The Startup Year Program
	Australian Universities Accord

# **Opportunities**

In 2020, only 6% of renewable energy jobs in Australia related to batteries (CEC 2020). Most of these jobs focused on small-scale distributed batteries. Just 1 to 2% of workers were in large-scale battery construction and projects (CEC 2020). Job supply is not meeting demand, with skill shortages and competition for talent in several key roles such as battery design, deployment and installation (CEC 2022).

A thriving domestic battery industry needs a diverse range of professionals, including engineers, metallurgists and electricians. Australia has world-class universities, a substantial university-educated population and TAFE-based vocational education and training facilities. However, several of the most specialised battery-relevant fields, such as engineering, are seeing declining graduate numbers (Accenture 2021). The government is therefore pursuing an ambitious skills agenda starting with the Jobs and Skills Summit in 2022 and outlined in the *Working Future* White Paper (2023). This is spearheaded by actions like \$30 billion National Skills Agreement to ensure Australia has the skills for a renewable energy workforce.

To attract the talent needed, Australia must create and foster an inclusive and diverse workforce. Improving gender diversity in our manufacturing workforce at all levels can improve business performance, address workforce shortages and improve the economic security and social wellbeing of underrepresented groups (AGEC 2022). For this reason Australia is a member of <u>Equal by 30</u>, which is a commitment to work towards equal pay, leadership and opportunities for women in the clean energy sector by 2030 (DCCEEW 2024).

Australia is home to world-leading research institutions and R&D capabilities. Australia ranks highly in the Global Innovation Index for institutions (17th) and human capital and research (7th) (Dutta et al. 2023).

Our researchers have a strong track record pioneering new battery technologies. Australia ranks 18th in the world as a filer of battery patents, and 10th as a jurisdiction for patent protection by global applicants (IP Australia 2023).

Battery innovation is critical to improving the efficiency, cost and safety of energy storage, and creating new ways to use electricity. Such innovations will create new, high value commercialisation and export opportunities for our battery industry. Lowering costs will further improve the competitiveness of firmed renewable energy.

Globally, there is a shortage of battery workers with the right skills. The grid will need 19GW of storage to hit 82% renewables by 2030 (AEMO, 2023). This means that Australia must expand its battery workforce to support battery industries and meet the growing demand for batteries. Training programs can help ensure we meet the emerging skills needs of the battery industry.

Supporting workers in regional Australia and carbon-intensive industries to transition to clean energy manufacturing roles can help Australia meet future workforce needs. The Net Zero Economy Authority (NZEA) will broker investments that create jobs in key regions and support workers affected by the net zero transition. This will include assisting workers directly impacted by the closure of some coal and gas-fired power stations to access new employment.

Australia already has substantial knowledge that applies to battery mineral mining and refining processes (FBICRC 2021a). For example, Australia's existing alumina industry uses a crystallisation process that is similar to what is used to manufacture precursor cathode active materials, creating particles of a high purity chemical. Skills in these adjacent industries can transfer to clean energy manufacturing and can be leveraged to improve Australia's battery manufacturing capabilities.

#### Australian innovations in battery technologies

Australian research institutions have a strong track record in battery innovation, ranging from technology to use and system integration.

In the 1980s, Professor Maria Skyllas-Kazacos and her research team at the University of NSW developed a new type of flow battery using vanadium. Forty years later, this type of battery is starting to become

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more mainstream. It is especially useful in stationary energy storage, where it is safe, reliable, long-lasting and scalable. Vanadium flow batteries are projected to capture around 10% of the global battery storage market in 2040 (IEA 2021).

Other battery technologies, such as sodium ion batteries and new flow battery chemistries, as well as battery manufacturing and recycling innovations, are also in development across the research sector. Australian intellectual property is a source of advantage for local battery manufacturing. Australians have filed 332 patent families related to battery technologies since 2015, putting us 18th in the world as a filer of battery patents globally (IP Australia 2023).

# What we are doing

Australia has the technical expertise and research skills to support innovation along the whole battery value chain. For example:

**The Queensland University of Technology (QUT) Advanced Battery Facility (ABF)** was established in 2017 and comprises of battery research, development, state-of-the-art testing equipment and leading capabilities and expertise. Specifically, the ABF offers commercial partners and collaborators access to:

- Research and development services for battery active materials
- Production of battery active materials at pilot scale
- Support with scale-up of battery active material processing/manufacturing
- Benchmarking, qualifying and testing services for battery active materials
- Prototyping of lithium-ion batteries in coin-cell, pouch cell and cylindrical cell formats
- Research and development services for battery modules/pack assembly and BMS integration
- Cell/module/pack testing for batteries

**Austvolt's dedicated Cathode Precursor (pCAM) Pilot Plant** in Technology Park, adjacent to Curtin University, is producing qualification samples for some of the world's leading battery manufacturers and automotive OEM's. Concurrently, Austvolt is working with local and international engineering companies, and equipment manufacturers to design and build a 40ktpa pCAM Plant at their site in the Kwinana Industrial Area, 40km south of Perth, Western Australia. When operational, the plant will have the capacity to produce pCAM for in excess of 500,000 electric vehicles per year. The cathode is a vital, high value battery component, making up over 40% of the cost of lithium battery cells (Benchmark Minerals 2023). The quality of the cathode is crucial for battery performance and safety. PCAM and cathode active materials (CAM) are essential to manufacture cathodes for lithium-ion batteries.

**The Battery Research and Innovation Hub at Deakin University** has world-class, purpose-built research facilities. These support battery research, development and design, including pilot-scale cell manufacturing and commercialisation of energy storage technologies. A cell is the smallest assembled unit of a battery – it stores and generates electricity. Making battery cells is a high-precision advanced manufacturing process.

**The Battery Storage and Grid Integration Program at the Australian National University** is working to develop decarbonised and resilient energy systems. It is pioneering pathways for integrating and optimising energy storage in electricity grids and electricity markets. This includes doing social research, designing and applying policy, and economic modelling to support energy and battery storage.

**CSIRO** is revolutionising advanced electrochemical systems with FASTER – an autonomous testing, screening and evaluation robot to develop battery electrochemical materials. With this technology, CSIRO can test 400 electrolyte chemistries in the span of a weekend.

Battery technologies are evolving quickly as manufacturers seek to improve the stability and performance of their batteries. Research bodies are also advancing technologies and developing marketable products across the battery value chain. The government is taking action to harness our deep technical expertise and supercharge our high value battery innovations.

#### Organising industry-research collaboration

The demand for battery technologies to meet specific uses will continue to grow. To realise this potential, industry and researchers will need to collaborate.

Australia has a long history of industry-research collaboration through its Cooperative Research Centres (CRC), including battery manufacturing research undertaken by the FBICRC.

The National Battery Strategy aims to develop entire industry innovation ecosystems around a critical mass of infrastructure and expertise.

Australian researchers collaborating with industry partners are already making major breakthroughs:

- **Gelion**'s lithium sulfur, lithium silicon sulfur, and zinc hybrid batteries for energy storage and e-transportation use, in partnership with the University of Sydney.
- **Feline** is an Australian advanced manufacturer of lithium-ion cells and battery packs. Feline's advanced next generation lithium-ion batteries deliver high performance and safety over what is commercially offered, in partnership with Defence Science and Technology Group.
- In collaboration with CSIRO, **Energy Renaissance**'s Australian-made battery management system (BMS). The BMS is the nerve centre of the battery, responsible for managing a battery's operations to ensure it is safe, optimised, and cyber-secure.
- Sicona Battery Technologies acquired silicon composite battery anode IP from the University of Wollongong in 2020 and has since been scaling up the manufacturing of this next generation battery anode material. The Company closely collaborates with the University of Wollongong on various research activities. Sicona's SiCxTM battery materials technology delivers +20% increase in energy density over conventional graphite only lithium ion battery cells and a +40% faster charge rate.

#### **Existing actions**

- The <u>Powering Australia Industry Growth Centre</u> will facilitate partnerships between governments, research institutions, and industry to drive the development and adoption of renewable technologies in Australia.
- 10,000 <u>New Energy Apprenticeships</u>, which will grow a workforce that will support our clean energy transition.
- The <u>Clean Energy Generation Report</u>, which outlines current and future workforce challenges for Australia. This report gives analysis and insights to support workforce planning as Australia transitions to a net zero economy (JSA 2023).
- The <u>Australian Energy Employment Report</u>, which addresses critical challenges for the energy workforce. This includes attracting and keeping workers by offering quality careers and improving coordination between the Australian, state and territory governments (DCCEEW 2023).
- The <u>National Skills Agreement</u>, which is a joint agreement between the Commonwealth, states, and territories, includes up to \$30 billion in funding to the VET sector over 5 years. This includes a \$12.6 billion investment from the Commonwealth Government, which includes a priority of supporting the Net Zero transformation.
- The <u>Capacity Investment Scheme</u>, which provides a national framework to encourage new investment in 9GW of clean dispatchable capacity, creating a clear project pipeline for jobs.
- The <u>Community Batteries for Household Solar program</u>, which provides \$224.3 million in funding for 400 community batteries. As a program delivered in part by ARENA, it includes a knowledge sharing requirement to advance technology and commercial readiness in the battery sector.
- Australia's Jobs and Skills Councils, which give industry a stronger voice to ensure Australia's vocational education and training (VET) sector has better outcomes for learners and employers.

### Linked initiatives

- The <u>National Science and Research Priorities</u> are under review and will likely highlight the need to develop and harness emerging technologies, including energy storage, to support the transition to net zero.
- <u>The Net Zero Economy Authority</u> will promote an orderly and positive net zero economic transformation for Australia, its regions, industries, workers and communities. Supporting green industry with transferable skills to clean energy manufacturing and improving Australia's battery manufacturing capabilities.
- <u>CSIRO</u> gives funding and advice to support research and commercialisation of battery technologies.
- The <u>Cooperative Research Centres Program</u> gives grant funding for short to long-term, industry-led research collaborations.
- The Strategic Examination of R&D will present an opportunity to further explore how industry and government can leverage Australia's comparative advantages to catalyse greater levels of R&D investment, including R&D in areas like battery related technologies.
- <u>Australia's Economic Accelerator</u> targets funding for projects aligned with national research priorities with high commercial opportunity.
- The <u>Australian Research Council</u> (ARC) gives competitive grant funding for basic and applied research, promotes research-industry collaborations, and evaluates the impact of university research.
- The <u>Trailblazer Universities Program</u> will build new research capabilities, create commercialisation outcomes and invest in new industry engagement opportunities.
- The Startup Year Program builds a pool of knowledgeable new entrepreneurs.
- The <u>Australian Universities Accord</u> outlines an ambitious tertiary education reform agenda to transform the Australian higher education system.

# What we will do

Government actions will support Australia's world-leading research expertise to develop and commercialise new Australian-made battery technologies. This will help domestic manufacturers capture cutting edge, high value opportunities to grow the battery industry and create more well-paying jobs.

The government will capitalise on the success of existing research and industry collaborations by setting up the Australian Made Battery Precinct and committing to build future battery capabilities. These initiatives bring business and research together to collaborate on batteries. This will target battery research towards areas of demand. Together, we will transform more great Australian ideas into successful battery products and services.

#### **New actions**

- The \$20.3 million Building Future Battery Capabilities measure will include support for battery innovation and scale up as well as the development of workforce training. The delivery of targeted training will support Australia's workforce to develop and maintain the necessary skills for battery manufacturing, deployment, maintenance, safety assessment and recycling.
- The government has committed \$5.6 million to conduct options analysis and research to support the delivery of the Australian Made Battery Precinct, in partnership with the Queensland Government. By supporting collaboration between industry and researchers, the precinct will help develop the knowledge and skills needed for an innovative and future-ready workforce.
- The government's Future Made in Australia agenda includes the following actions to support battery technology innovation and workforce development:

#### National Battery Strategy

- \$1.7 billion Innovation Fund which over 10 years from 2024–25 will support innovation, commercialisation, pilot and demonstration projects and early-stage development in priority sectors including batteries. This is on top of \$1.5 billion over 10 years from 2027–28 to supercharge ARENA's core investments. ARENA's work advances industry knowledge and commercial readiness in clean energy technology.
- \$91 million over 5 years from 2023–24 (and a further \$0.6 million over three years from 2028–29) to support the development of the clean energy workforce, including through addressing vocational education and training sector trainer workforce shortages, and funding new and existing training facility upgrades across a range of clean energy occupations.
- From 1 June 2024, expanding the New Energy Apprenticeships Program to provide incentives that encourage more people into sectors that are playing a critical role in transitioning Australia to a net zero economy.
- \$55.6 million over 4 years to establish the Building Women's Careers Program to support women achieve high-paying careers in key male-dominated industries such as construction, clean energy, technology and digital, and manufacturing.
- Providing \$38.2 million over eight years from 2023–24 (and \$1.3 million per year ongoing) to provide funding for a range of Science, Technology, Engineering and Mathematics (STEM) programs to increase diversity in STEM education and industries.





# 3. Global supply chains

Secure Australia's place in global battery supply chains.

# Summary of actions table

New actions	Building Future Battery Capabilities
	Support to deliver the Australian Made Battery Precinct
	Critical Minerals Trade Enhancement Initiative
	Future Made in Australia
	Innovation Fund
	trade and investment policy reforms
Existing actions	Australia-United States Battery Supply Chain and Research Working Group
	Australia-United States Taskforce on Critical Minerals
	Climate Club
	The Australian Trade and Investment Commission (Austrade)
Linked initiatives	International Agreements
	Export Finance Australia
	Major Projects Facilitation Agency (MPFA)
	Critical Minerals Office / Department of Foreign Affairs and Trade
	Foreign Investment Framework
	Invested: Australia's Southeast Asia Economic Strategy to 2040

# **Opportunities**

The current global battery supply chain is highly concentrated. China is a global leader across the supply chain, representing up to 87% of global production in lithium hydroxide and 66% in lithium carbonate (March 2024 Resources and Energy Quarterly). This global concentration creates risks for both battery producers and consumers, who are vulnerable to supply disruptions and volatile prices.

For trading partners and Australian industry, a more diversified market would help improve economic resilience. Trade partnerships can be used to improve Australia's access to a wider range of battery supply chains, and promote competition in international markets. The United States, Europe, Canada, France and India are adopting incentives that will likely lower geographic concentration of battery manufacturing. Trade partnerships can help Australia benefit from these investments in diversification.

The government is also working closely with international partners to improve market access for Australian companies. Australia has 18 free trade agreements (FTAs) in force, including multiple regional trade agreements in the Indo-Pacific region. These cover the top 5 automotive manufacturing countries: China, US, Japan, India and South Korea. These FTAs create competition in local markets, particularly for finished products. They provide prospective markets for Australian products that value add to our extracted minerals, like cathode and anode active materials.

Targeted collaboration with trading partners can help Australia improve the resilience of existing supply chains, support their diversification over time and ensure Australian companies become an indispensable part of global net zero supply chains.

# What we are doing

Australia can build new, secure, stable and diverse supply chains across critical minerals, batteries and battery components by collaborating closely with international partners. Australia has bilateral agreements in place to advance cooperation on critical minerals with partner countries. These include the United States, United Kingdom, India, Japan, the Republic of Korea, France and Germany. We participate in several multilateral frameworks on critical minerals, such as the Minerals Security Partnership, the Indo-Pacific Economic Framework Critical Minerals Dialogue and the Quad Clean Energy Supply Chains program. Australia can also build sovereign capabilities in processing battery minerals and producing more battery components for future battery needs.

The government is supporting Australia's battery industries to strengthen supply chain resilience. Government efforts are targeting manufacturing to support more people using clean technologies. The government is also assessing barriers to better battery manufacturing in Australia. Insights from this work will inform possible future actions to plug supply chain gaps.

This complements the work through the Critical Minerals Strategy, which promotes diverse, resilient and sustainable global critical mineral supply chains. Australia's battery mineral resources make the nation less exposed to supply disruption risks. Large reserves of lithium, nickel, cobalt, and vanadium give Australia a supply chain advantage.

#### Boosting battery foreign investment opportunities

Investment drives economic growth, creates skilled jobs, improves access to overseas markets and improves productivity. Austrade's *Why Australia* benchmark report outlines Australia's strengths as an investment destination. Australia is ranked 5th in the Renewable Energy Country Attractiveness Index (EY 2023). Our reputation as an open, prosperous and innovative economy makes Australia a leading and attractive destination for global business.

The international market for batteries and battery components is competitive. Other countries have substantial programs to support both new and existing battery industries. However, investors are already taking advantage of Australia's stability for energy storage projects. Projects worth over \$2 billion reached the investment stage in the second quarter of 2023 alone, representing 3.8GWh of storage (Austrade 2023). Since the mid-2010s, WA alone has attracted more than \$9 billion in investment for a range of battery and critical mineral projects (WA Gov 2023).

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#### Australia-United States Battery Supply Chain and Research Working Group

On 25 October 2023, the Prime Minister released a <u>Joint Leaders Statement</u> with US President Biden. The statement outlined new areas of cooperation on science and critical and emerging technologies to help build an 'Innovation Alliance'. Australia and the US agreed to collaborate on clean energy supply chains.

This included setting up a Battery Supply Chain and Research Working Group. The group will explore both countries' manufacturing capability and advance battery technology research and development. It will also organise our collaboration on batteries under the Australia United States Climate, Critical Minerals and Clean Energy Transformation Compact.

Partnering with the US will strengthen Australia's sovereign capabilities and advance national interests through sharing information and knowledge. Initial steps include mapping how our supply chains complement each other and where there are gaps. We will also set up an R&D mission between Australia and US battery industry and researchers.

#### **Existing actions**

- The Australia-United States Battery Supply Chain and Research Working Group, established under the <u>Australia-United States compact</u>, will drive the development of emerging battery technologies to ensure our nations can lead energy storage.
- Australia and the United States have established the ministerial-level Australia-United States Taskforce on Critical Minerals.
- Engaging with international partners on practical action to address climate change, which includes multiple bilateral partnerships and joining the Climate Club in July 2023.
- Through our development cooperation programs in Southeast Asia, Australia is supporting our partners' clean energy transition and helping to develop clean energy supply chains. This includes cooperation on battery energy storage systems.
- In the Pacific, Australia also finances batteries and clean energy projects with its development programs, including the Australia Infrastructure Financing Facility for the Pacific.

#### **Linked initiatives**

- Bilateral agreements such as the:
  - Australia-United States Climate, Critical Minerals and Clean Energy Transformation Compact
  - Singapore-Australia Green Economy Agreement
  - India-Australia Critical Minerals Investment Partnership
  - Japan-Australia Critical Minerals Partnership
  - Australia-Republic of Korea Memorandum of Understanding on Cooperation in Critical Minerals Supply Chains
  - Australia-France Strategic Dialogue on Critical Minerals
  - Australia-Germany Critical Minerals Joint Declaration of Intent.
- Policy dialogue and advocacy through international frameworks such as the Minerals Security Partnership, Indo-Pacific Economic Framework and the Quadrilateral Security Dialogue.
- Export Finance Australia provides finance solutions to businesses to help grow exports.
- The <u>Major Projects Facilitation Agency</u> and the <u>Major Project Status</u> initiative make it faster and easier to invest in major project development in Australia.
- The <u>Critical Minerals Office</u>, working with the Department of Foreign Affairs and Trade, has many international partnerships that promote investment and building diverse and secure global supply chains.

#### National Battery Strategy

- The <u>Australian Trade and Investment Commission</u> (Austrade) organises commercial partnerships to increase the growth of Australian exporters and attract productive foreign direct investment. This investment brings skills and new technologies to Australia. Austrade also uses its global network to strengthen Australia's position in the global supply chain for renewable energy storage. This includes supporting critical minerals companies looking for offtake to increase investment in Australian battery projects, downstream processing and value chain creations.
- The government has announced changes to Australia's Foreign Investment Framework. These changes deliver a stronger, faster, and more transparent approach to foreign investment. This will ensure that Australia can attract the significant foreign capital needed to support our economic priorities while protecting the national interest in an increasingly complex economic and geostrategic environment. The changes will deliver benefits to investors by providing the transparency, clarity, timeliness and predictability they need to invest with confidence.
- Strengthening two-way trade and investment with Southeast Asia and supporting more diverse clean energy supply chains through Invested: Australia's Southeast Asia Economic Strategy to 2040.

### What we will do

The government's actions will help to reduce the risk of Australia experiencing price spikes and help Australia to counter supply threats. They will also reduce unintended knock-on impacts from complex and integrated battery supply chains and help meet net-zero targets. Australia will focus its local support on manufacturing that builds supply chain resilience, in the national interest.

Australia is working with international partners to explore opportunities for partnership and to advocate for Australian battery industries and research abroad. Australia's international collaborations will:

- deepen collaboration to tackle the global climate challenge.
- support regional and global electricity access and transformation.
- build new clean energy trade opportunities for Australia.
- increase and diversify clean energy supply chains.
- promote high ESG standards and recognition.

Australia is also taking a place-based approach to investment attraction. Precincts create clearer and more attractive opportunities to build a local supply chain and workforce around opportunities. Precincts can also help networks of organisations to work together. This can save costs on logistics and materials, help transfer knowledge and share infrastructure to reduce waste. Precincts can also build an ESG reputation, to differentiate and market products in a globally competitive industry.

Australia will draw on its existing advantages as a business friendly investment destination. This will grow local battery industries and ensure Australian battery manufacturers continue to access critical technology supply chains. Existing trade and investment connections with the world's fastest growing economies means Australia is a natural gateway for global business.

#### **New actions**

- The \$20.3 million Building Future Battery Capabilities measure will include the mapping of battery value chains, supporting integration of Australian industry into international supply chains and developing national capabilities.
- The government has committed \$5.6 million to conduct options analysis and research to support the delivery of the Australian Made Battery Precinct, in partnership with the Queensland Government. Precincts create clear opportunities for businesses to fill in gaps in the supply chain, and clearer signals for international investors.
- The government's Future Made in Australia agenda includes:
  - A new front door for investors with major, transformational investment proposals related to the agenda to make it simpler to invest in Australia and attract more global and domestic capital. The final approach to delivering an effective front door will be developed in consultation with investors, businesses, governments, unions, communities and other experts over 2024.
  - \$15.7 million to deliver a stronger, more streamlined, and more transparent approach to foreign investment, and \$17.3 million to implement a comprehensive agenda to mobilise private investment in sustainable activities.
  - \$5.8 million for a critical minerals trade enhancement initiative to help address strategic behaviour in critical minerals markets.





# 4. Sustainability, ESG & circular economy

Lead the world on sustainability, standards and the circular economy.

# Summary of actions table

New actions	Building Future Battery Capabilities
	Future Made in Australia – Innovation Fund
Existing actions	National Electric Vehicle Strategy
	Lithium-ion Batteries and Consumer Product Safety Report
	Sustainable Finance Strategy
Linked initiatives	Guarantee of Origin Scheme
	Standards Australia
	National Waste Policy Action Plan
	Atlas of Australian Mine Waste



# Opportunities

Global markets and consumers are increasingly concerned about the ethics and origins of their products (PWC 2021). Australia is in prime position to develop and demonstrate high ESG standards on batteries. Across Australia, ESG reporting is a core business practice. Eighty-seven per cent of the nation's top 200 companies now publish substantive ESG information (PWC 2021). Australia's battery industry can use these practices and regulatory frameworks to capture a greater share of the battery market.

ESG credentials are becoming vital to gain access to certain battery markets. For example, the EU is creating a 'Battery Passport' that certifies compliance with legal and societal emission standards for lithium-ion batteries. In June 2023, the <u>EU Parliament also mandated traceability requirements</u> for certain batteries. These laws require a carbon footprint declaration and label for batteries. This applies to EVs, electric scooters, bikes and other modes of transport using rechargeable batteries with a capacity over 2 kilowatt hours (kWh).

Programs such as these present a chance for Australia to capitalise on our existing strengths. This includes high potential for low-cost renewable energy in processing, effective engagement with First Nations communities, and safe and transparent labour practices in the supply chains. This gives international partners confidence that Australia's batteries are made ethically.

#### Creating a circular economy

Batteries are vital for Australia's renewable energy transition. However, the transition will result in waste stock of batteries and their components. Effectively recycling batteries will help Australia avoid environmental impacts and supply chain disruptions and boost the economy.

Australia is already a battery recycler and can seize the opportunity of a circular battery economy. In 2021, Australia recycled 99% of lead acid batteries, compared to just 10% of lithium-ion batteries (CSIRO 2022). Lithium-ion battery recycling in Australia faces limitations because of a lack of feedstock, safety concerns and costs. We send most lithium-ion batteries overseas for processing, where they can still end up in landfill (McKell 2022).

By 2035, Australia could be generating 137,000 tonnes of lithium battery waste annually (McKell 2022). As a result, a domestic recycling industry for lithium batteries could be worth \$603 million to \$3.1 billion in just over a decade (FBICRC 2021b). Recycling and reusing batteries presents an opportunity to expand Australia's battery industry.

EV batteries need replacing when they reach 70–80% of original capacity and no longer meet performance standards. This presents an opportunity to repurpose these batteries for other applications, most notably in stationary storage. Stationary storage powered by used EV batteries could exceed 200 GWh worldwide by 2030 (McKinsey 2019). EV batteries are being repurposed for stationary storage around the world, including to power manufacturing plants and stadiums.

Once batteries have been safely sorted and discharged, there are various methods to recover the raw minerals used in them. How to best recover these materials depends on the type of battery being recycled and the materials being recovered. Using recycled minerals and materials can reduce the emissions generated from mining and extracting resources. European estimates indicate that recycling battery materials could provide 45–77% of supply by 2050 if technologies are mature and commercialised (Gregoir et al. 2022).

Victorian company Envirostream is a recycling facility in Australia with the capability to collect, sort and shred lithium-ion batteries (Envirostream 2024). The active components found in lithium-ion batteries (graphite, cobalt, nickel, and lithium) are used to produce a 'mixed metal dust'. This product goes into manufacturing cathode materials for new lithium-ion batteries outside Australia. Envirostream also recovers other components for recycling from battery packs.

Recycling can create market access for exports. The EU have recently mandated stringent targets for battery collection, recycling and resource recovery. This includes minimum levels of recycled content in new batteries.

# What we are doing

Australian ESG standards are world leading. Strong ESG credentials are vital for securing social license for new technologies, like batteries. They also support broader policy aims. For example, Australia is a foundation member of the Sustainable Critical Minerals Alliance. Through this Alliance, Australia is building sustainable and socially responsible mining practices. This includes supporting local First Nations communities, restoring ecosystems and creating a circular economy (King 2022). In the 2024–25 Budget, the Australian Government provided \$5.8 million for a critical minerals trade enhancement initiative. It will accelerate efforts, building off work to date with our international counterparts, to realise the premium of sustainably producing critical minerals to high ESG standards in global markets.

Australian ESG credentials put local businesses in a strong position to maximise the value of locally made batteries. Australia's battery industry can use this strength further by certifying their ESG practices through globally recognised schemes.

Batteries with ethical supply chains and practices will have access to premium markets where consumers may pay above market price. Australia can produce batteries that meet the highest global standards, giving Australia's battery industry an advantage over many nations. This will also mean Australian batteries limit environmental risks, positively impact communities and have access to diverse global markets.

The <u>National Waste Policy Action Plan</u> outlines how Australia can adopt better waste management and circular economy practices. Under this plan, Australia has set the goal of developing a common approach to restrict the disposal of lithium-ion batteries and e-waste materials in landfill by 2024. This will ensure we minimise environmental impacts and achieve the best economic outcome from Australian batteries.

#### Making safer batteries

While lithium-ion batteries are generally safe, sometimes they can present hazards. These can be because of defects from poor manufacturing, overcharging from poor battery management systems and software, or environmental or external factors. In these circumstances, lithium-ion batteries can catch fire, explode or release a vapour cloud which can cause property damage, serious injury or death.

All types of batteries present safety risks. However, failure of lithium-ion batteries can be particularly catastrophic because of their flammable and volatile liquid electrolyte solution. The Australian Competition and Consumer Commission (ACCC) published *the Lithium-ion Batteries and Consumer Product Safety Report* in October 2023. This report recommends ways to improve the safety of lithium-ion batteries.

The state and territory electrical safety regulators are primarily responsible for regulating electrical consumer products under state and territory laws. While the existing framework has protected consumers for many years, the states and territories will need to work together to create a modern, fit-for-purpose safety framework. This will improve battery safety for consumers and businesses.

Through the Department of Finance and the ACCC, we are exploring options with the states and territories for aligning the existing regulatory framework to electrical consumer products such as lithium-ion batteries. A better safety framework will help build consumer confidence in the safety of lithium-ion batteries and improve uptake.

### **Existing actions**

- Through the <u>NEVS</u>, the government has committed to carry out research to inform a recycling, reuse and stewardship initiatives for EV and other large format batteries. This will reduce waste, grow jobs and support emerging Australian industries.
- The Lithium-ion Battery and Consumer Product Safety Report by the ACCC recommends a multifaceted approach to address the risks and hazards associated with lithium-ion batteries. These recommendations include actions that the ACCC will carry out, as well as recommendations that others may take up.
- The <u>Sustainable Finance Strategy</u>, in development by the Department of the Treasury, will support Australia's pathway to net zero by providing an ambitious and comprehensive framework for reducing barriers to investment into sustainable activities.

#### Linked initiatives

- Beginning with hydrogen, the government is creating a <u>Guarantee of Origin scheme</u> to certify renewable energy use and track and verify emissions from clean energy products (opt-in scheme).
- The government is continuing to engage with both <u>Standards Australia</u> and relevant international bodies on standards and conformance.
- The <u>National Waste Policy Action Plan</u> establishes a product stewardship investment fund to accelerate recycling schemes for batteries.
- Geoscience Australia's <u>Atlas of Australian Mine Waste</u> is an interactive online mapping tool that provides governments, industry and the community with accurate information about Australian mine tailings, waste rock, smelter residues and related mine waste materials.

# What we will do

As an evolving sector, the government supporting the creation of battery recycling facilities across Australia. Battery recycling remains an active area of basic and applied research in Australia, including through the ARC Training Centre for Battery Recycling. Through the CRC-P grants, the government has also supported the testing of innovative approaches to battery and solar recycling.

These actions will invest in existing strengths and extract greater value from Australian-made and consumed batteries. This will give consumers and markets confidence that Australian batteries will be ethical, safe and sustainable. Strong ESG measures will also help achieve other important goals, such as supporting First Nations communities and ethical labour practices. Capitalising on strengths and opportunities in sustainability, recycling and standards will make Australian-made batteries competitive on the world stage (FBICRC 2022).

#### **New actions**

- The \$1.7 billion Future Made in Australia Innovation Fund will fund the deployment of innovative technologies relating to priority industries. Potential areas for innovation can include the commercialisation of technologies to extract valuable battery material from waste, or enable battery redeployment.
- The \$20.3 million Building Future Battery Capabilities will include the mapping of battery value chains, support the development of nationally consistent guidelines and standards and further strengthen our ESG credentials.
- The government will provide \$23.0 million in 2024–25 to continue delivery of the government's circular economy policy, program and legislative functions.



# 5. Government coordination

Bring all levels of government together.

# Summary of actions table

New actions	Battery Breakthrough
	Building Future Battery Capabilities
	Support to deliver the Australian Made Battery Precinct
	Critical Mineral National Productivity Initiative
Existing actions	State and territory government initiatives
Linked initiatives	Australian Industry Participation National Framework
	Buy Australian Plan
	National Energy Transformation Partnership



# Opportunities

All states and territories have a role in making Australia a renewable energy superpower. Each is home to either vast reserves of critical minerals, cutting-edge battery projects or ambitious emissions reduction targets. All jurisdictions are working to shift to renewable energy. Supporting an Australian made battery industry needs coordination and joint effort across government at all levels – industry, business, unions and research.

Greater coordination across all levels of government will help streamline processes to support basic infrastructure, including access to reliable energy, water and industrial land ready developments.

One example of coordinated action is by local governments through the Climate Council's Cities Power Partnership pledge. More than 180 local councils, representing over 70% of Australians, have promised to work towards a clean energy future. This pledge involves choosing 5 actions to advance renewable energy and electrification in local government areas. These include policies that increase battery uptake such as:

- installing renewable energy (including battery storage) on council buildings
- electrifying public transport systems and fleet vehicles
- support community renewable energy projects.

The grid will have an estimated 33GW of storage to hit 82% renewables by 2035 (AEMO, 2023). Government policies have a role in creating this demand for batteries. As well as indirect incentives, governments are directly involved in buying batteries though procurement, grants, incentives, underwriting and the activity of state-owned corporations.

#### Making the most of energy transformation programs

Australia is acting on climate change, to reduce its emissions 43% by 2030 and hit net zero by 2050. To meet this target, federal, state, territory and local governments have substantial policies to procure, subsidise and underwrite renewable energy, including batteries. The government has a target of 82% renewables by 2030. We are unlocking over \$67 billion in private investment into renewable energy deployment through the Capacity Investment Scheme, Renewable Energy Transformation Agreements and the National Energy Transformation partnership.

These programs often have distinct assessment criteria, or eligibility requirements, that can be developed to consider Australia's industrial capabilities. For example, NSW's Electricity Infrastructure Roadmap's auctions include regional development criteria, including local supply chain and workforce requirements, for its billion-dollar renewable energy tenders. Each round represents billions in renewable energy projects.

#### Harnessing the power of government-owned corporations

As well as direct government grants, several state-owned corporations operate in the electricity market. This includes Snowy Hydro (Commonwealth), Western Power and Horizon Power (WA), the State Electricity Commission (Victoria) and Power and Water Corporation (NT) among others. While independent, they follow government regulations, including around financial performance and risk management. These companies have large operating budgets that can also create opportunities for local manufacturers.

#### Supporting Australia's skills and knowledge base

Given the growing demand for battery storage, battery procurements can serve a dual role as demonstration projects. Program design can reflect this. This may include boosting technology developments for nascent applications, demonstrating novel system management or proving a new operating model for batteries.

As an example, ARENA has a 'knowledge sharing requirement' for projects under the ARENA Act 2011. This means, while respecting IP, that advances found in projects benefit the entire renewables sector.

#### Aligning state transport procurement

Several state and local governments will be electrifying their bus fleets and buying other forms of battery electric transport. We manufacture or assemble much of this electrified public transport domestically. These purchases are sometimes already subject to local content requirements that create opportunities for other companies in the supply chain. State and territory local content requirements are often specific to that state or territory and don't necessarily account for other Australian made products. Reports such as the National Transport Commission's electric bus evaluation finds that the scale of combined demand helps justify capital investment in local manufacturing (NTC 2023).

### What we are doing

All state and territory governments are working to advance their battery industries. Below is a nonexhaustive snapshot of these activities and advantages:

**NEW SOUTH WALES:** NSW is home to battery minerals, energy storage projects, research and several battery manufacturers. The Net Zero Manufacturing Initiative will provide \$275 million in clean energy manufacturing grants, including for battery technologies to improve domestic supply. To serve potential battery manufacturing industries, TAFE NSW is building a manufacturing skills centre.

**VICTORIA:** Victoria is home to several battery research facilities and innovative battery businesses. The Victorian Government's Made in Victoria 2030: Manufacturing Statement identifies batteries under its Zero and Low Emissions Technologies industry priority. The Victorian Government has also set an energy storage target of at least 6.3GW by 2035.

**QUEENSLAND:** QLD is home to several battery minerals. Under the QLD Government's Energy and Jobs Plan, the state is targeting 70% renewable energy by 2032. Battery manufacturing is a critical part of this transition. The QLD Government has promised \$500 million for grid and community batteries, as well as the \$100 million Critical Minerals and Battery Technology Fund. The Queensland Battery Industry Strategy provides \$570 million to holistically build QLD battery manufacturing.

**WESTERN AUSTRALIA:** WA has vast reserves of critical minerals, existing export markets and integrated industrial expertise. This includes battery grade chemical production. The WA Government produced a Future Battery Industry Strategy in 2019. Western Power is buying and installing over 4000 standalone power systems, incorporating solar and a battery to support grid security.

**SOUTH AUSTRALIA:** SA has large resources of battery minerals. It has 67% of Australia's copper resources, and 65% of our graphite. The SA Government's \$50 million grid scale storage fund has funded large scale battery projects. This has helped renewable energy generate 70% of underlying demand in SA in 2022.

**TASMANIA:** TAS businesses manufacture battery powered electric ferries and mining equipment. It has nickel reserves and chemical industries for further development along the battery value chain.

**NORTHERN TERRITORY:** The NT is home to the world's largest manganese deposits and other battery minerals. The NT Government has signed a memorandum of understanding with manufacturers Aleees and Avenira to produce Cathode Active Materials.

**AUSTRALIAN CAPITAL TERRITORY:** 110 MW of utility-scale batteries have been installed in the ACT under reverse auction contracts towards their 100% renewable energy target. The ACT Government has installed batteries at government sites and gives interest free loans for home batteries under its Sustainable Household Scheme.

### Linked initiatives

- The government is investing \$10.2 million in 2024–25 to work with states and territories to identify potential common user facilities for critical minerals processing, including battery minerals, through the Critical Mineral National Productivity Initiative (CMNPI). These facilities, when developed, will support small and medium sized mining companies to start downstream processing of critical minerals. They will also help SMEs to engage in the circular economy through activities including recycling and reprocessing of waste batteries and mining byproducts.
- Building on the <u>National Energy Transformation Partnership</u> framework, the Australian Government will negotiate Renewable Energy Transformation Agreements with states and territories. This will achieve shared aims in the renewable energy transition. This includes addressing non-market barriers to investment, such as planning and environmental approval bottlenecks.
- Working to build domestic industry capability by leveraging government procurement through our <u>Buy Australian Plan</u>. This includes improving local industry participation opportunities through <u>Australian Industry Participation</u> policy.
- The <u>Major Projects Facilitation Agency</u> and the <u>Major Project Status</u> provide support for projects, including with state and territory facilitation offices to assist project developers with navigating state and territory government approvals.
- Engaging with all jurisdictions on the following issues:
  - Energy and Climate Change Ministerial Council standards and regulations around home and neighbourhood battery installations, and Clean Energy Supply chains.
  - Environment Ministers' Meeting recycling and the circular economy
  - Infrastructure and Transport Ministers' Meeting Decarbonisation of Transport Working Group
  - Ministerial Council on Trade and Investment the council agreed on a coordinated national approach to clean energy and supply chain security (Farrell 2023) including across critical minerals and consistent environmental, social and governance national messaging to support investment attraction (Farrell 2024).

# What we will do

- The \$523.2 million Battery Breakthrough will provide production-linked incentives to support Australian manufacturers to develop critical battery manufacturing capabilities. It provides a pathway to transition Australia's industries and jobs in states and territories from a 'dig and ship' economy to manufacturing high demand goods in a net zero economy.
- The \$20.3 million Building Future Battery Capabilities measure will build our future battery capabilities and support the development of nationally consistent battery standards and guidelines.
- \$5.6 million has been committed to conduct options analysis and research to support the development of the Australian Made Battery Precinct, in partnership with the Queensland Government. The design of the precinct will be guided by the National Transformation Principles, with oversight from the NZEA, in alignment with the government's Future Made in Australia agenda.

By working with all levels of government, the government will take a coordinated and consistent approach to developing the battery industry in Australia. A joint approach to procurement will advance battery technologies and develop skills and knowledge across all jurisdictions. This will centrally organise and lead Australian battery manufacturers so they can compete globally.

# Summary

The National Battery Strategy is a key step towards developing a thriving domestic battery industry in Australia.

To support the success of the National Battery Strategy, the government has:

- Announced the \$523.2 million **Battery Breakthrough** to strengthen economic resilience and critical battery manufacturing capabilities. This initiative will provide production-linked incentives for high-value battery products in Australia's areas of competitive advantage, in line with the government's Future Made in Australia agenda.
- Committed \$20.3 million for the **Building Future Battery Capabilities** measure to build our future battery capabilities and strengthen national collaboration. This will include support for:
  - FBICRC to develop a supply chain navigator tool, helping build the Australian battery ecosystem and giving industry access to information on customers, capability, traceability and ESG.
  - FBICRC to use its existing links with industry and academia to create a battery innovation and scale-up program for the commercialisation of innovative Australian battery technologies.
  - FBICRC to support the development of best practice guidelines and standards for industry on how to safely install, maintain, transport and handle batteries.
  - PAIGC to support skills training on battery research, manufacturing, transport and recycling, as well as specialised equipment needs and career pathway initiatives.
- Announced a range of actions under the government's Future Made in Australia agenda that will support the growth of Australia's battery industry, including:
  - The proposed *Future Made in Australia Act* will include a National Interest Framework which will clarify how government will support a Future Made in Australia by guiding the identification of priority industries. This includes investments in clean energy technology manufacturing such as batteries.
  - \$7 billion in support for Australian critical minerals processing over the decade to 2033–34 through the new Critical Minerals Production Tax Incentive, to support downstream processing for all 31 critical minerals, many forming important battery materials.
  - \$1.7 billion over seven years from 2024–25 for the Future Made in Australia Innovation Fund. This will support innovation, commercialisation, pilot and demonstration projects and earlystage development in priority sectors – including clean energy technology manufacturing such as batteries.
  - \$1.5 billion over 10 years from 2027–28 to the Australian Renewable Energy Agency. This will supercharge ARENA's core investments in renewable energy and related technologies. These investments include the development, demonstration, commercialisation, manufacture and deployment of renewable energy technologies that will help make Australia a renewable energy superpower.
  - \$91 million over five years from 2023–24 (and a further \$0.6 million over three years from 2028–29) to support the development of the clean energy workforce. This includes addressing vocational education and training sector trainer workforce shortages, and funding new and existing training facility upgrades across a range of clean energy occupations.
  - \$5.8 million for a critical minerals trade enhancement initiative to help address strategic behaviour in critical minerals markets.
- Created the **Capacity Investment Scheme** to integrate more Australian batteries into Australia's energy system to put downward pressure on power prices and achieve 82% renewables by 2030.

- Established the \$15 billion **NRF**, including investing up to \$3 billion in renewables and low emission technologies, such as batteries. This will support Australian industries to decarbonise, while also providing opportunities to meet the increasing demand in global supply chains.
- Established **Rewiring the Nation** to invest \$20 billion in modernising Australia's electricity grid and delivering new and upgraded transmission infrastructure.
- Committed to provide \$224.3 million in funding for 400 community batteries through the **Community Batteries For Household Solar Program**.
- Supported further international collaboration with key partners to support the development of emerging battery technologies.
- Committed \$5.6 million to conduct options analysis and research to support the delivery of the Australian Made Battery Precinct. The Australian Government has committed up to \$100 million of investment into the development of the precinct in partnership with the Queensland Government.

The government will continue to consult with businesses and researchers as well as state and territory governments to keep up to date with the needs of the battery industry.



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