

SUBMISSION

Submission to the Department of Industry, Science and Resources

# Submission to the National Battery Strategy

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**The Australian Academy of Technological Sciences and Engineering (ATSE) is a Learned Academy of independent, non-political experts helping Australians understand and use technology to solve complex problems. Bringing together Australia’s leading thinkers in applied science, technology, and engineering, ATSE provides impartial, practical, and evidence-based advice on how to achieve sustainable solutions and advance prosperity.**

ATSE welcomes the opportunity to provide a submission to the Department of Industry, Science and Resources consultation on the National Battery Strategy. The National Battery Strategy provides an opportunity for the Australian Government to embrace a technology-led transition to net zero greenhouse gas emissions and emerge as a leader in battery technologies. ATSE argues that the National Battery Strategy should promote both the development and deployment of batteries in Australia, taking a comprehensive and integrated approach, utilising natural resource endowments and setting up appropriate manufacturing capabilities to enable commercialisation and production to meet national demand and build a strong export market.

ATSE recommends the following actions to be included in the National Battery Strategy:

## Recommendations

**Recommendation 1:** Develop policies that encourage the use of Australia’s abundant natural resource endowments and take a value-added strategy to domestically produce advanced batteries, for both Australian and international markets.

**Recommendation 2:** Invest in research institutes that carry out fundamental research and support them to connect with domestic pathways for development, to advance battery technologies.

**Recommendation 3:** Invest in STEM education and training programs to develop sufficient skilled personnel to support a thriving domestic battery industry.

**Recommendation 4:** Establish hubs that specialise in different aspects of the battery value chain.

**Recommendation 5:** Drive investment in prototyping and manufacturing infrastructure to establish efficient and technology-forward modern battery manufacturing capabilities.

**Recommendation 6:** Develop policies such as supply chain tracking that establish supply chain resilience to improve Australia’s strategic position in the global battery economy.

**Recommendation 7:** Develop circular economy-supporting policies that require the reuse and recycling of critical components across the value chain and leverage technological advances that contribute to this goal.

**Recommendation 8:** Establish policies that require the use of renewable sources of energy for domestic battery manufacturing.

**Recommendation 9:** Establish standards and regulations in collaboration with domestic and global stakeholders to ensure battery safety, performance, and reliability in both primary and secondary markets.

**Recommendation 10:** Develop standards to help support the commercialisation of new and emerging battery technologies.

**Recommendation 11:** Embed Environmental Social Governance requirements through stakeholder consultations in the National Battery Strategy.

### Commercialising natural resource endowments

Australia is a global leader in the supply of critical minerals and is ranked fifth in the world in electric battery technologies research impact (Australian Government, 2022). There is an opportunity to commercialise leading battery technologies research which is already underway in Australia. Over the five years from 2016 to 2020, the overall volume of published research in batteries has been growing by 8% per year, with one-fifth of that research including international collaboration (Australian Government, 2022).

Australia's natural resource endowment in batteries minerals must be viewed as an intergenerational opportunity to develop future industries. Australia has a history of manufacturing and innovation in manufacturing. Existing federal initiatives like the transition to a green energy superpower and the national reconstruction fund should be leveraged to set up innovative manufacturing opportunities across the battery supply chain. The Strategy should have a clear vision to have a value-add approach to already available natural resources, ensuring financial investment flows to support Australia's domestic battery industry as well as exports.

**Recommendation 1:** Develop policies that encourage the use of Australia's abundant natural resource endowments and take a value-added strategy to domestically produce advanced batteries, for both Australian and international markets.

#### Advancing the battery industry through research and development

Australia has a great history of being an innovator of battery technology. For example, it has been the leading global innovator of advanced battery technologies like Vanadium Flow Batteries (VFB) that provide a high long-duration energy storage capacity (Phiddlan, 2022; Skyllas-Kazacos et al., 1988). Despite leading in vanadium and iron battery technology, Australia has failed to achieve scale in production, with domestic innovation often commercialised abroad. Establishing local production of battery components and stack (pack) assembly will help further build Australia's battery industry, but to compete more favourably with battery stacks assembled in countries like China and India, utilisation of digital technologies is needed, to set up automated battery stack assembly lines. As electric cars and renewable energy solutions are deployed extensively across the economy, the demand for more high-performing and cost-effective battery solutions will rise. To keep up with this increasing demand, it is important that the National Battery Strategy invests in research and development of new battery technology through established centres like university research hubs and the Future Battery Cooperative Research Centre (FBICRC).

**Recommendation 2:** Invest in research institutes that carry out fundamental research and support them to connect with domestic pathways for development, to advance battery technologies.

#### Investing in a STEM (science, technology, engineering and mathematics) skilled workforce

[ATSE's joint submission with the Australian Academy of Science](#) to the Inquiry into Australia's Transition to a Green Energy Superpower highlighted the importance of education and training pipelines to supply skills for the green energy transition. ATSE also released a report, [Our STEM Skilled Future](#), which identified that the challenge is not simply to meet current skills needs but to rebuild and modernise the educational and training capacity of universities and vocational education and training institutions to provide the professionals and tradespeople required in future decades (Australian Academy of Technological Sciences and Engineering, 2022). Investment in STEM education pathways is critical within and beyond the battery industry.

**Recommendation 3:** Invest in STEM education and training programs to develop sufficient skilled personnel to support a thriving domestic battery industry.

#### Establishing manufacturing capacity

ATSE supports the development of manufacturing precincts and collaborative vertical integration as outlined in the National Battery Strategy consultation paper. This should not be limited to manufacturing precincts but should be established for all parts of the value chain (including the ideation and research stages) to improve the domestic battery industry's commercialisation capability. The National Battery Strategy must utilise the efficiency resulting from agglomeration, leveraging pooled resources to be competitive in the global market. For example, precincts should include researchers and industries across different parts of

the supply and manufacturing chain. This would allow collaboration and exchange of ideas right from ideation through to translation. Such precincts should be distributed across different geographic locations, with the Strategy encouraging collaborative resource exchange within and across the different precincts.

The ability to commercialise domestic innovation and achieve scale will be limited by the capacity of domestic manufacturing. Government support in the form of tax incentives, grants and low-cost loans would help grow battery manufacturing capabilities. Australia must also attract diverse, large-scale industrial activity into a select number of vertically integrated hubs to ensure these businesses can be competitive within global value chains. A coordinating body is needed to pull ideas together for cross-institutional R&D projects, allowing cross-learning, co-development and industry capacity building.

The capabilities built within this ecosystem have the potential to leverage from and support other high-technology industries. Utilising and investing in the application of digital technologies in battery manufacturing and assembly is a crucial factor if Australia is to compete with lower labour-cost manufacturers. With sensor technologies, robotics, and autonomous vehicles, Australia is already utilising the power of technology to compete with the global market for mining. A similar approach is needed in setting up battery manufacturing and assembly.

**Recommendation 4:** Establish hubs that specialise in different aspects of the battery value chain.

**Recommendation 5:** Drive investment in prototyping and manufacturing infrastructure to establish efficient and technology-forward modern battery manufacturing capabilities.

#### Supporting supply chain resilience

The high costs of operating and the small market size in Australia are well known. This is compounded by a lack of a robust supply chain and large-scale manufacturing and assembly plants. The value chain for making batteries is very complex at each stage, from the mining and processing of raw materials through the production of the numerous components and their subsequent assembly, all the way to the end-user and recycling. There are also many challenges in the value chain, including the scarcity of raw materials (feedstock), the negative effects of traditional mining on the environment and nearby populations, and the high cost of acquiring and recycling basic materials.

The National Battery Strategy should build robust domestic supply chains for the raw materials and components and equipment necessary for battery production. Supply chain tracking could strengthen Australia's competitive positioning, and enable information to support the upkeep, repurposing, and recycling of end-of-life products. Consumers all over the world are looking for open, trustworthy, and sustainable supply chain partners. In light of the anticipated rise in battery demand, maintaining the sustainability of the sector will be of utmost importance. Due to a lack of construction materials, manufacturing tools, and the skilled labour necessary to ramp up production, many battery-cell plants are experiencing significant delays. More collaboration, vertical supply chain integration, and long-term contracts could all assist to alleviate some of these issues. The National Battery Strategy must create regulations that help develop resilience to raw material shortages and business practices are open, environmentally friendly, and circular.

**Recommendation 6:** Develop policies such as supply chain tracking that establish supply chain resilience to improve Australia's strategic position in the global battery economy.

#### Embedding a circular economy into the battery industry

The Strategy must be built on a circular value chain, in which used materials are designed from the start to be repaired/refurbished, repurposed, reused or (as a last resort) recycled. Cross-industry effort and coordination will be needed to achieve the full potential of a circular value chain. As Australia does not yet have a significant, established minerals processing sector, the nation has an opportunity to build a

processing industry with more efficient, effective, and sustainable technologies and practices. This is a comparative advantage over countries with more established processing industries that have sunk costs in traditional technologies and processes (Barham & Coomes, 2005).

ATSE's report [Towards a Waste-free Future](#) showcases how technology can transform Australia's waste and resource-recovery sector, and support the transition towards a thriving circular economy. The National Battery Strategy should develop policies to implement circular economy and industrial principles and practices.

**Recommendation 7:** Develop circular economy-supporting policies that require the reuse and recycling of critical components across the value chain and leverage technological advances that contribute to this goal.

#### Leveraging renewable energy

Australia is a world leader in Mining Equipment, Technology and Services (METS) (Australian Trade and Investment Commission, 2021). Australia also has access to abundant renewable energy that can be utilised to refine and manufacture chemicals, and cell components such as high-purity current collector foil with a lower current footprint while maintaining a higher Environmental, Social, and Corporate Governance (ESG) standard. There is an opportunity to incentivise and establish policies that require the use of renewable sources of energy for domestic battery manufacturing. For example, policy and regulatory settings should be used to drive greater adoption of 'behind the meter'<sup>1</sup> and grid battery storage systems to support the integration of photovoltaics and other renewables in the country. This would also result in increased demand for batteries, opening up more opportunities for cell and battery manufacturing in Australia.

**Recommendation 8:** Establish policies that require the use of renewable sources of energy for domestic battery manufacturing.

#### Developing industry standards and regulations

Diverging manufacturing standards and local regulations increase costs and pose barriers to faster scale-ups. A National Battery Strategy should establish standards and regulations to ensure battery safety, performance, and reliability. This includes developing and testing new battery technologies and certification protocols for market testing. Standards should state requirements for battery recycling and disposal, along with the handling and transportation of batteries, this would help in the formation of a second-hand market. Standards and regulations must also be established in collaboration with global partners. This would help promote the development of Australian batteries as a major export product.

ATSE also recommends that the National Battery Strategy look at developing standards for new and emerging battery chemistries and accompanying technologies (other than the traditional Lithium-ion approach). This should include policies to support across the commercialisation stages. Having a set of regulations for new and emerging products would help in the commercialisation process and contribute to different economic opportunities for the domestic industry.

**Recommendation 9:** Establish standards and regulations in collaboration with domestic and global stakeholders to ensure battery safety, performance, and reliability in both primary and secondary markets.

**Recommendation 10:** Develop standards to help support the commercialisation of new and emerging battery technologies.

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<sup>1</sup> behind the meter refers to anything that happens onsite, on the energy user's side of the meter. Conversely, anything that happens on the grid side is deemed to be in front of the meter.

### Adhering to Environmental Social Governance (ESG) requirements

The future of the battery sector depends on establishing international industry standards, and these are adopted as a framework for assigning firm accreditation. Australia's high ESG standards, enshrined in legislation, make the nation an attractive, sustainable, and ethical trading partner. Laws that regulate ESG matters have been established at the state and territory level, and a national level, companies that are publicly listed on the Australian Securities Exchange (ASX) are required to provide an annual Corporate Governance Statement reporting against a range of ESG factors (Asten et al., 2021).

These standards and the establishment of global regulations like the [Carbon Border Adjustment Mechanism](#) make Australia a valuable export partner for economies looking to reduce reliance on environmentally damaging imported materials. To achieve ESG standards, data availability and transparency would be fundamental requirements for the National Battery Strategy. This would enable the industry to achieve its growth and ESG targets and help monitor compliance and progress.

**Recommendation 11:** Embed Environmental Social Governance requirements through stakeholder consultations in the National Battery Strategy.

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