

16 March 2023

Department of Industry, Science and Resources

Industry House,
10 Binara Street,
Canberra ACT 2601

EVC Submission to National Battery Strategy

The Electric Vehicle Council (EVC) welcomes the opportunity to provide feedback on the development of the Australian Government’s National Battery Strategy.

The EVC is the national peak body for the electric vehicle (EV) industry in Australia. Our mission is to accelerate the electrification of transport for a sustainable and prosperous future. We represent members across the EV value chain, including car, bus and truck manufacturers, importers, operators, charging infrastructure suppliers and network providers.

In this submission, we focus on opportunities that exist for Australia across the EV battery value chain, which encompasses everything from mining of critical minerals, refining and processing battery precursor materials, and battery manufacturing through to the development of second life applications and the recycling of used EV batteries to facilitate the re-use of critical minerals (see **Figure 1**).

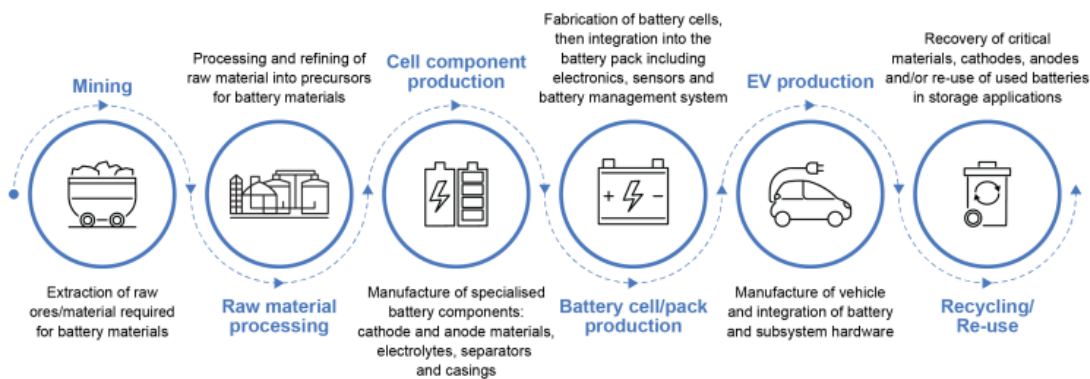


Figure 1. An overview of the EV battery value chain. IEA, [Global EV Outlook 2022](#) (2022).

Moving up the value chain

Economic opportunity

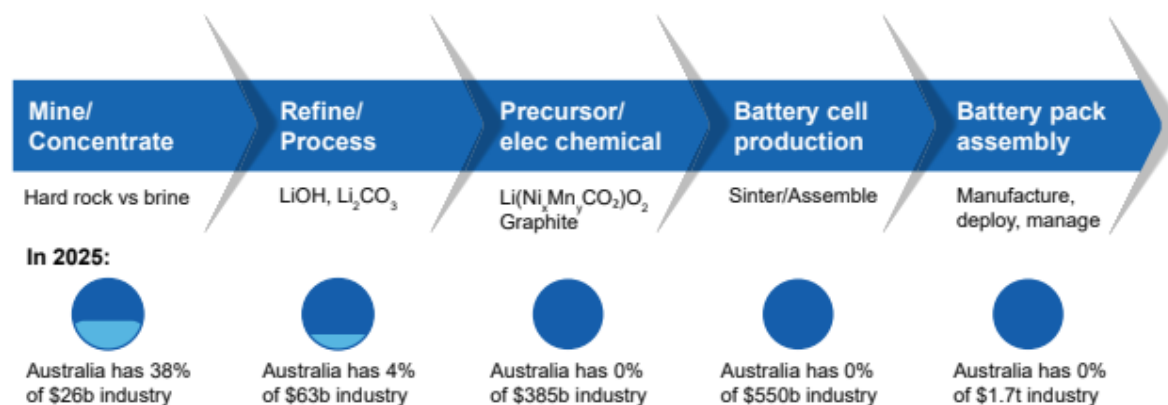
Despite considerable potential, Australia currently lags comparable countries in the development of a lithium-ion battery supply chain beyond extraction and export of raw materials. Analysis by the Future Battery Industries CRC (FBICRC) estimates that a diversified battery industry (including refining and processing, and cell manufacturing) could provide \$7.4 billion of value add and over 30,000 jobs in the Australian economy.¹

Australia is already well-positioned to capitalise on the growing demand for critical minerals, with established global dominance in the mining of lithium, nickel, and other key minerals required for EV batteries. Australia can leverage its existing advantages by investing in R&D to expand capability in battery materials and precursor manufacturing, and innovation in second-life applications and recycling. Establishing these capabilities will be key to building out Australia's domestic EV value chain and ensuring we can capture the opportunities provided by the switch to EVs and the renewable energy transition more broadly.

Value-add to exports

Expanding downstream processing and manufacturing of battery components will provide significant opportunities for long term prosperity for country, by adding value to products exported to global markets. This is particularly important as our economy progressively transitions away from its traditional fossil fuel resource base over the coming years.

With the right policy settings in place, taking advantage of value-add opportunities involved with transforming raw materials into battery grade products may also further facilitate domestic production of battery precursors and cell components, and enable Australia to capture significant financial gains from integrated battery industries (see **Figure 2**).



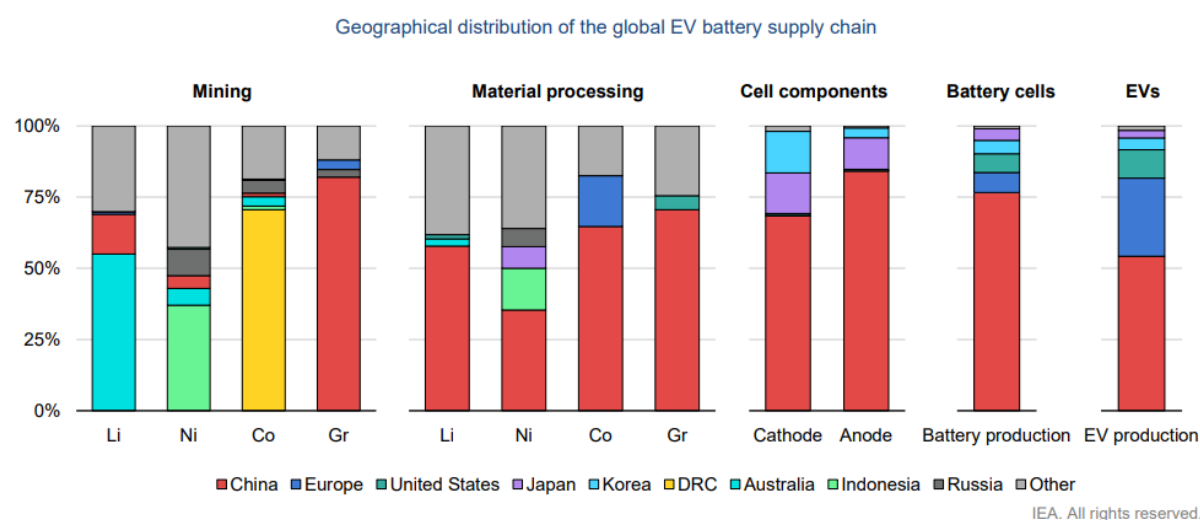
Source: Porteous et al, Office of the Chief Scientist (2018) *Taking Charge: The Energy Storage Opportunity for Australia*. Department of Industry, Science, Energy and Resources (2021).

Figure 2. Projected value of lithium battery value chain. [Australian Government](#) (2021).

¹ FBICRC, 2021. <https://fbicrc.com.au/wp-content/uploads/2021/06/Future-Charge-Report-Final.pdf>

Barriers and vulnerabilities

A significant level of investment will be required to establish onshore processing, refining and recycling of battery minerals. Without substantial financial backing from both government and private investors to support R&D and commercialisation to scale domestic production, the energy intensity and high capital outlay required to establish and sustain a mature industry in Australia will continue to prove to be substantial barriers. In addition, as battery manufacturing supply chains are currently dominated by major economies that are investing heavily to capture the economic opportunities provided by the clean energy transition,² Australia risks being left behind given our relatively small market size and limited existing industry. The geographical distribution of the global EV battery supply chain is shown in **Figure 3**.



Notes: Li = lithium; Ni = nickel; Co = cobalt; Gr = graphite; DRC = Democratic Republic of Congo. Geographical breakdown refers to the country where the production occurs. Mining is based on production data. Material processing is based on refining production capacity data. Cell component production is based on cathode and anode material production capacity data. Battery cell production is based on battery cell production capacity data. EV production is based on EV production data. Although Indonesia produces around 40% of total nickel, little of this is currently used in the EV battery supply chain. The largest Class 1 battery-grade nickel producers are Russia, Canada and Australia.

Sources: IEA analysis based on: [EV Volumes](#); [US Geological Survey \(2022\)](#); [Benchmark Mineral Intelligence](#); [Bloomberg NEF](#).

Figure 3. Distribution of global EV battery supply chain. IEA (2022)

Supporting supply chain diversification

To alleviate some of the identified barriers, the Australian Government needs to work with industry and academic institutions to fund research and development, provide incentives for inbound investment, and create supportive policies and regulatory settings. This includes fostering international research and industry partnerships, through continued support of the FBICRC and other public-private partnerships to engage overseas counterparts, helping to diversify supply chains and promote Australia's capabilities.³

In developing funding programs, the Government can look at the example set by the US with its Battery Materials Processing Grants Program which has allocated US\$3 billion in government support to expand local battery materials processing,⁴ and the Battery

² See, US Government (2022), *Inflation Reduction Act* <https://www.whitehouse.gov/cleanenergy/inflation-reduction-act-guidebook/>

³ FBICRC (2022), *2022 Activity Report*, <https://fbicrc.com.au/wp-content/uploads/2022/12/Activity-Report-2022-VFINAL.pdf>

⁴ US Department of Energy (2022), *Battery Materials Processing Grants* <https://www.energy.gov/mesc/battery-materials-processing-grants>

Manufacturing and Recycling Grants Program which is providing US\$3 billion towards domestic manufacturing and recycling capabilities.⁵

In order for Australia to capture more of the battery value chain, it will be necessary to provide similarly strong policy signals to attract sufficient inbound investment and deliver investment certainty.

Regulatory harmonisation

Domestically, intergovernmental cooperation will serve to reduce duplicative approaches and ensure different regions can build on existing capabilities. The Australian Government should also work with State and Territory counterparts to coordinate industry development, harmonise regulatory approaches to avoid inefficient expenditure. While there will be space for inter-jurisdictional competition in the future, greater cooperation across Australian states and territories is necessary to ensure efforts are complimentary in establishing a domestic EV value chain.

Turning our innovative ideas into opportunity

Fostering innovation

Australia can build on its existing strengths in R&D and innovation by investing in commercialisation efforts, fostering partnerships between research institutions and industry, and promoting entrepreneurship through funding and provision of regulatory settings that incentivise locally developed technology and innovative processes.

Building onshore battery manufacturing capacity also provides opportunities for innovative start-ups and researchers to develop new software applications, and improve battery management systems to assist with diagnostics, smart-charging and other optimisation features, extending battery life and reducing life-cycle emissions as a result. Software solutions using artificial intelligence (AI) and data science can be integrated into a range of applications, providing real time monitoring of batteries, and sending alerts where a problem arises, allowing for timely maintenance and replacement.⁶

It will also be important for the Government to look at opportunities across the entire value chain, to assist with commercialising second-life applications for batteries locally, and developing the necessary infrastructure and capabilities for onshore battery recycling. The development of automation technologies and research into methods to improve disassembly of batteries can also serve to enhance materials recovery during recycling processes and improve environmental outcomes. Investing in these areas can provide significant domestic economic benefits and contribute to the reduction of environmental risks associated with end-of-life of batteries, supporting the development of a circular economy for EV batteries.

⁵ US Department of Energy (2022), *Battery Manufacturing and Recycling Grants* <https://www.energy.gov/clean-energy-infrastructure/battery-manufacturing-and-recycling-grants>

⁶ See, e.g. K Bucharest (2021), 'The Czech startup helping us make better use of our batteries,' *Sifted (FT)* <https://sifted.eu/articles/batterycheck-startup-czech/>.

Encouraging investment to grow our battery industries

Alleviating barriers to investment

Key barriers to investing in Australia's battery industries include supply chain transparency, regulatory settings, and global policies - these can be mitigated by creating a supportive policy and regulatory environment, promoting public-private partnerships, and providing financing and tax incentives.

Government support through funding mechanisms, like the National Reconstruction Fund (NRF), will play a vital role in enabling Australian industry to become globally competitive in battery technologies, particularly given the existing dominance in global markets by a limited number of countries. In the wake of the substantial policy support provided in the US by the *Inflation Reduction Act* and related funding programs which will draw a significant level of global investment,⁷ Australia will need to leverage its existing strengths in critical minerals extraction and proximity to Asian markets to highlight its potential to compete in the global supply chain. Part of this could include building on existing relationships with key offtake partners, including the US, to establish support for supply chain diversification initiatives.

Providing investment certainty

To support domestic battery industries, the Government can establish the Powering Australia Industry Growth Centre and deliver manufacturing precincts that provide networking and matchmaking services between different supply chain participants (both domestically and offshore) to foster innovation along the battery value chain, including R&D into EV battery reuse applications in stationary storage. These initiatives should be supported by a range of policies that incentivise local industry development and provide regulatory clarity to enable investment certainty.

Creating the enabling environment for industry growth

Workforce development

To develop necessary workforce for domestic battery industries, Australia should invest in training and education programs, create targeted battery industry apprenticeships and internships, and implement measures to promote diversity and inclusivity across the sector as it evolves. The Government should work with industry to identify any skills gaps and create education and training programs that will provide current employees with the necessary skills and knowledge, and collaborate with tertiary education institutions to develop a future workforce to take advantage of the opportunities presented across the battery value chain.

Enhancing Australia's reputation

Although it will ultimately be the responsibility of private sector organisations across the industry to uphold responsible practices and consider the environmental and social impacts

⁷ US Government (2022), *Fact Sheet: The Inflation Reduction Act Supports Workers and Families*, <https://www.whitehouse.gov/briefing-room/statements-releases/2022/08/19/fact-sheet-the-inflation-reduction-act-supports-workers-and-families/>.

of their activities, the Government can play a role in standard-setting by increasing supply chain transparency and upholding accountability with regulatory disclosure frameworks.

It is also important to recognise the role of green energy in supporting the development of a local EV battery value chain. Given the abundance of potential renewable energy sources in Australia, the energy transition presents a massive opportunity to attract investment, as other jurisdictions strengthen regulations to reduce emissions from the battery supply chain (including raw minerals extraction, manufacturing and recycling).⁸ Accelerating the green energy transition also presents an avenue to bring down production costs from energy consumption, making Australia more globally competitive in downstream battery material processing and manufacturing.⁹ At present, only approximately 30% of energy generated in Australia comes from renewable sources.¹⁰ To facilitate decarbonisation of the full EV value chain, there is a need to support the colocation of renewable energy generation sources at mining, manufacturing and recycling facilities.

Product safety

Australia has robust regulatory and testing regimes that ensure product safety standards are adhered to. While there may be reasonable concerns related to the fire hazards of imported light e-mobility devices, it is important that these issues are not conflated to apply across the full spectrum of lithium-ion batteries, in particular given the stringent regulatory environment that already apply to road-registered vehicles.¹¹

Accordingly, when developing any product safety regulations, there is a need to distinguish between batteries incorporated into portable electronics such as laptops and mobile phones and batteries for e-mobility (such as e-bikes and e-scooters), from EV batteries that have much longer lifespans and provide for second-life applications for stationary energy storage. While battery stewardship arrangements may be suitable to increase collection of household lithium-ion batteries to reduce the volume of batteries entering landfill and address related safety concerns, the introduction of import levies for EV batteries may result in unintended consequences that inhibit EV supply to Australian consumers by increasing upfront purchase costs.

To provide further surety around product safety across the battery value chain, the Government should work with State Government agencies to establish nationally consistent data collection initiatives, including fire and safety incident reporting to share learnings and support data analysis.

Developing the circular economy

Governments and industry can play an important role in achieving emissions reduction targets and environmental objectives by funding the development of onshore recycling

⁸ See, e.g., European Parliament (2020), *Proposal concerning batteries and waste batteries, repealing Directive 2006/66/EC and amending Regulation (EU) No 2019/1020*, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020PC0798>

⁹ Nahum, D (2020), *Powering Onwards: Australia's Opportunity to Reinvent Manufacturing through Renewable Energy*, Centre for Future Work at the Australia Institute. https://d3n8a8pro7vhm.cloudfront.net/theausinstitute/pages/3311/attachments/original/1588894059/Powering-Onwards_FINAL.pdf?1588894059

¹⁰ Australian Government (2022), *Australian Energy Update 2022*, Figure 18. <https://www.energy.gov.au/publications/australian-energy-update-2022>

¹¹ See, Electric Vehicle Council (2023), *EVC Submission to ACCC Lithium Ion Battery Safety Consultation*, <https://electricvehiclecouncil.com.au/wp-content/uploads/2023/02/EVC-submission-to-ACCC-Lithium-Ion-Battery-Safety-consultation-final.pdf>.

capabilities for EV batteries, providing support for industry innovation to reduce the life-cycle emissions of battery technology through second-life applications, and deliver additional employment opportunities for Australians. This is particularly important as global efforts work towards reducing the resource intensity of batteries and clean energy technology, increasing the need for recycled components to build more sustainable supply chains.¹²

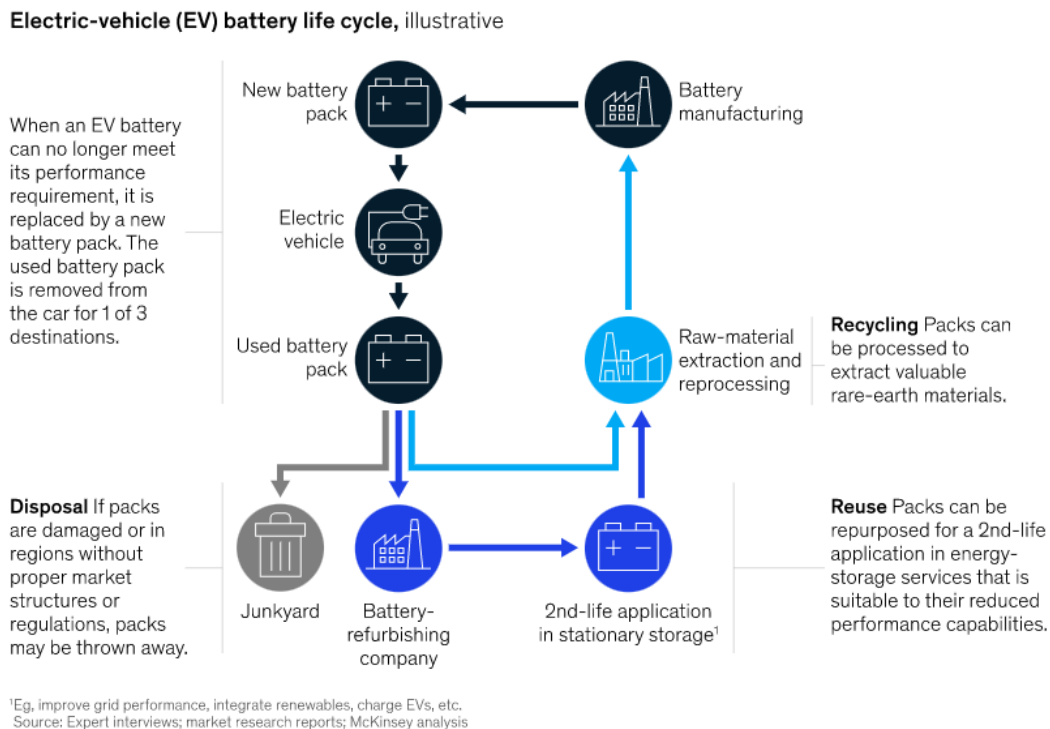


Figure 4 EV battery lifecycle including reuse and recycling (2019) *McKinsey*

EV batteries are generally expected to significantly outlast their usage in a vehicle (See **Figure 4**). Following average 10+ year lifespan in a vehicle, EV batteries are expected to retain 80% of their energy storage capacity, which makes them attractive for several secondary use cases prior to recycling.¹³ While they may no longer be suitable to power a vehicle (depending on the EV owner’s requirements), second-life batteries remain useful until about 30% original capacity before the battery is deemed to be spent and needs to be recycled (see **Figure 5**).¹⁴ Depending on the second use application, this can provide an additional 10-15 years of use.¹⁵

¹² See, e.g., European Parliament (2020), Proposal concerning batteries and waste batteries, repealing Directive 2006/66/EC and amending Regulation (EU) No 2019/1020, <https://eur-lex.europa.eu/legalcontent/EN/TXT/?uri=CELEX:52020PC0798>.

¹³ IEA (2022) World Energy Outlook, p. 48; ICCT (2023), *Scaling Up Reuse and Recycling of Electric Vehicle Batteries: Assessing Challenges and Policy Approaches*, <https://theicct.org/wp-content/uploads/2023/02/recycling-electric-vehicle-batteries-feb-23.pdf>

¹⁴ Font, C et al (2023), ‘Second Life of Lithium-Ion Batteries of Electric Vehicles: A Short Review and Perspectives,’ *Energies* 16(2) <https://www.mdpi.com/1996-1073/16/2/953>.

¹⁵ Schulz-Mönnichhoff, M and Evans, S (2022), ‘Key tasks for ensuring economic viability of circular projects: Learnings from a real-world project on repurposing electric vehicle batteries,’ *Sustainable Production and Consumption*, 35(1) <https://www.sciencedirect.com/science/article/pii/S2352550922003219>.

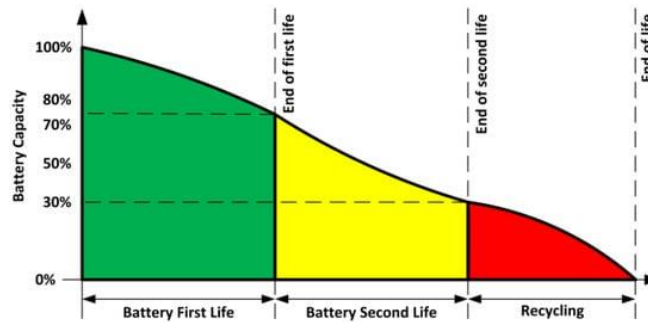


Figure 5 Plot of EV battery life range as function of battery capacity (2023) [Font et al.](#)

As previously mentioned, global EV battery manufacturing supply chains remain dominated by major economies deploying significant investments to maintain and increase their positions, which limits the ability for Australia to directly embed circularity into every stage of design and production. Irrespective of whether Australia develops onshore manufacturing of EV battery cells, there is a need to develop effective solutions to process EV batteries once they reach the end of their life in a vehicle, whether that involves recycling, refurbishing or second-life applications in stationary storage.

Investment in R&D to assist with commercialising second-life applications for batteries can provide significant environmental benefits by extending the life of batteries prior to recycling, thus reducing life-cycle emissions. At present it remains challenging for businesses to scale activities in this space, given the limited supply of EV batteries requiring recycling or refurbishing and high upfront capital costs. Government support through the NRF and other funding programs can play a key role in de-risking investment to enhance attractiveness of the industry to private investors. This will enable local industry to develop innovative solutions to enhance material recovery in recycling and build further capacity in battery reuse applications. Australian recycled materials can also then be used to meet minimum recycled content requirements in other countries.¹⁶

Regulatory uncertainty presents another barrier to adopting a circular economy for EV batteries. As regulatory frameworks take a considerable amount of time to evolve, the relative complexity and fragmentation across different jurisdictions can substantially increase costs of compliance and place a significant barrier to entry for businesses looking to set up and operate.

The Australian Government has a crucial role to play in ensuring coordination between different States and Territories to create regulatory clarity for industry. Accordingly, it is also imperative that Australia develops rules that align with international standards, rather than setting up bespoke regulations that are not fit-for-purpose, and place our country at a global disadvantage. By aligning with standards established in overseas markets, including the EU and China, the Government can enable industry to develop globally consistent approaches to managing end-of-life batteries, ensuring better traceability and circularity.¹⁷

¹⁶ See, e.g., European Parliament (2020), *Proposal concerning batteries and waste batteries, repealing Directive 2006/66/EC and amending Regulation (EU) No 2019/1020*, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020PC0798>.

¹⁷ See, e.g., European Parliament (2022), 'Batteries: deal on new EU rules for design, production and waste treatment', <https://www.europarl.europa.eu/news/en/press-room/20221205IPR60614/batteries-deal-on-new-eu-rules-for-design-production-and-waste-treatment>

Summary

To ensure Australia can capture the economic opportunities provided by the EV transition and broader energy transition, significant near-term investment is required to enable the necessary development of infrastructure, and the creation of new supply chain capabilities.

Beyond being a reliable supplier of critical minerals to the world, by implementing the right policy settings, Australia can and should move further downstream into refining and processing critical minerals, as well as manufacturing, reuse and recycling of batteries.

To achieve this, the Government should prioritise policy settings that can provide strategic direction and incentivise industry development, while supporting the necessary transition to an electrified vehicle fleet.¹⁸

In summary, the Electric Vehicle Council recommends that the Australian Government develops a National Battery Strategy that will:

- Encourage investment in the full EV value chain, including mineral extraction, processing, battery manufacturing, and electric vehicle manufacturing and assembly.
- Reduce regulatory barriers and provide policy certainty to investors to de-risk early investment, including tax exemptions, and harmonisation with international standards.
- Identify opportunities for public-private partnerships across the EV battery value chain to increase job opportunities domestically and generate a return on investment.
- Guarantee purchases of downstream products to secure investment in local manufacturing.
- Explore consumer incentives that prioritise domestic content without replacing general incentives for all EVs.
- Encourage a circular economy for second-life applications of EV batteries and components, and invest in a domestic battery recycling industry, with a focus on locally developed technology and innovative processes.
- Solidify Australia's role in the global EV value chain, which may include supplying critical minerals (including recycled battery materials) to international partners, and strategic allies like the US, to produce batteries overseas.
- Support for transitioning workforces in declining industries to upskill into the green industries enabled by the development of a domestic EV value chain.
- Foster intergovernmental cooperation across Australia to support all States and Territories to capitalise on the EV transition and reduce regulatory fragmentation.

We note that the Australian Government is also developing the National Battery Strategy in parallel with the National Reconstruction Fund and Critical Minerals Strategy, and encourage coordination to ensure alignment between these respective strategies.

¹⁸ Zhao, Y et al (2021), *Australian Landscape for Lithium Ion Battery Recycling and Reuse in 2020 - Current Status, Gap Analysis and Industry Perspectives*, CSIRO, Australia.
<https://publications.csiro.au/publications/publication/Plcsi:EP208519>

If you have any questions on this submission, please do not hesitate to contact Natalie Thompson, Senior Policy Officer, Electric Vehicle Council: office@evc.org.au

Thank you for your consideration of our submission.

Yours sincerely,

A handwritten signature in black ink, appearing to read "B Jafari". The signature is written in a cursive, fluid style.

Behyad Jafari

Chief Executive Officer

Electric Vehicle Council