Submission: Going Circular in Clean Energy Issues Paper

ABRI and Associate Professor Penelope Crossley strongly support NSW Government leadership to explore how NSW can create more value from a circular clean energy sector.

Batteries readily lend themselves to the circular economy framework as there are processes whereby batteries can be turned into feedstock for other products and services. The challenge is safely, sustainably and cost effectively collecting and transporting used batteries to recyclers.

This submission is being made on behalf of Associate Professor Penelope Crossley from the University of Sydney Law School, and the Australian Battery Recycling Initiative ('ABRI'). The submission draws on the learnings from a NSW Government funded research project, 'Regulating for resources: Regulating the battery lifecycle so that they can safely become a feedstock for new products' due for completion in June 2023. Associate Professor Crossley and ABRI are jointly collaborating on this project.

When dealing with batteries, safety needs to be a paramount consideration and this submission supports safety and sustainability in all contexts. This submission examines how these outcomes can be achieved in new ways to support a battery driven clean energy circular economy.

1. **What are the key barriers to adopting a circular economy for clean energy in NSW? Are there any specific barriers in your industry?**

Batteries readily lend themselves to the circular economy framework as there are processes whereby batteries can be turned into feedstock for other products and services. The challenge is safely and sustainably collecting and transporting used batteries to recyclers.

Battery recycling is the bridge between mineral and cathode recovery from used batteries through to chemical refining and active materials manufacturing for batteries. Australia's battery recycling sector is already turning lead acid and alkaline/zinc carbon batteries into materials such as lead, zinc and green cement. Companies are also undertaking R&D into repurposing EV batteries into energy storage batteries.

However, there are barriers to the sector accelerating work in collecting batteries and taking them through to new products. ABRI in conjunction with University of Sydney, Associate Professor of Law, Penelope Crossley explored risks and barriers that arise at battery end of life at a key stakeholder workshop in November 2023. At this workshop, barriers to adopting a circular economy for batteries were identified. These are summarised in the table below and further information can be found in this workshop paper.

Area	Barriers
Battery recycling and reuse	• High administration costs in waste tracking and lack of consistency across jurisdictions • Still evolving work on best practice storage standards and procedures and understanding of thresholds. This is a nascent area for all areas of the battery supply chain. Further work is needed on business processes and best practice safety. • Mismatch in investment needs and volumes. Investment needs to happen now in proof of concept and research to prepare for the large volumes of batteries coming over the next decade due to electrification of transport and the growing role of energy storage.
Battery reuse	• High levels of risk and lack of clarification around the waste framework and the interaction with the NSW resource recovery exemption framework. The risk and weaknesses with this framework were underscored in the recent Grafil[1] decision. This decision shows that a rethink is required. Resource recovery should be the basis of the framework with exemptions for disposal of product to landfill as waste. Rather than the current situation where everything is 'waste' and resource recovery is the 'exemption' with risk attached.
Battery collection	• Infrastructure collection costs. • Need for strategic planning around consolidation sites to support safe collection and minimise transport costs. • The definitions of waste and hazardous waste are problematic, particularly for lithium batteries. This then flows through the battery waste chain to WHS, environmental management, planning approvals, etc. • Expense and lack of facilities for managing damaged lithium batteries. • Still growing awareness from consumers on where and how to dispose of batteries safely at end of life.

[1] *Environment Protection Authority v Grafil Pty Ltd; Environment Protection Authority v Mackenzie (No 4)* [2021] NSWLEC 123 [178] (hereafter 'Grafil').

2. What are the key opportunities to advance a circular economy in NSW? Are there any specific opportunities in your industry?

Companies are already advancing a battery circular economy and NSW should prioritise actions to support this.

In NSW, companies across the battery supply chain are driving innovation and investment to foster a safe, sustainable and world leading battery recycling industry over the medium term. This compliments both Federal and NSW based initiatives to drive the energy transition and the recovery and reuse of critical minerals.

Battery recyclers, vehicle and battery OEMs, renewable energy investors, mining and METS companies, and the university research sector are collaborating on research and proofs of concept to expand battery recycling, the recovery of critical minerals (including cobalt, copper, nickel, graphite & lithium) and reuse. These companies recognise the groundwork needs to happen immediately to deliver their circular economy goals. This includes readiness at scale to recycle the projected 3,600% increase in lithium battery volumes over the next decade, and to also develop technology which is fit for export markets

ABRI is aware that the University of Sydney, the University of Newcastle, and the University of New South Wales, as well as the CSIRO, all have projects in NSW collaborating with industry to support delivery of a battery circular economy. These projects include supporting technologies such as packaging to support safe transport of batteries and monitor fire risks.

In preparation, the battery recycling sector, with the support of companies across the battery supply chain, is working towards these goals:

- Becoming the leading downstream supplier of low emissions and sustainably produced minerals feedstock for battery manufacturing; and
- Australia becoming an innovation hub and developer of technology to support battery recycling and reuse sustainability, safety and reverse logistics.

The industry would welcome partnership from the NSW Government in these endeavours.

3. What role can a circular economy play in building resilient and circular supply chains for clean energy technologies? What industries or areas should be a focus?

Battery reuse and recycling, which recovers critical minerals including cobalt, copper, nickel, graphite and lithium, should be priority areas as they are the part of the clean energy circular economy. Recycling is the starting point in circular economy battery manufacturing processes as recycling takes existing materials and manufactures inputs for feedstock for new battery products.

Materials produced from recycled lithium and nickel metal hydride batteries have 38% lower greenhouse emissions than virgin materials.[2] Whilst spent batteries require significantly less resource to obtain one ton of battery grade cobalt or lithium as illustrated in the following diagram:[3]

4. How can the NSW government facilitate a circular economy for clean energy? What policy options could the NSW Government explore?

Modernising the regulatory framework to prioritise resource recovery

Resource recovery should not be the exception, it should be the norm and have its own framework in place. A resource recovery framework should support safety, transparency, clear lines of responsibility and full recovery of battery waste for use as feedstock in new products.

The current framework does not achieve these objectives. It places risks on businesses using recycled waste products for feedstock, including batteries, effectively meaning they need to be licensed waste facilities and incur unmanageable risks. This approach imposes additional planning permissions, licensing approvals and costs on recycling businesses, which serve as a barrier to battery recycling and reuse in secondary products. Further, the exemptions route is ineffective for supporting resource recovery due to the inherent risks. This lack of

[2] Marja Rinne, Heini Elomaa, Antti Porvali, Mari Lundström, (2021) Simulation-based life cycle assessment for hydrometallurgical recycling of mixed LIB and NiMH waste, *Resources, Conservation and Recycling,* Volume 170, https://www.sciencedirect.com/science/article/pii/S0921344921001956?via%3Dihub.
[3] US Department of Energy, Office of Energy Efficiency and Renewable Energy, *Vehicle Technologies Offices' Research plan to reduce, recycle and recover critical materials in lithium-ion batteries*

clarity has significant impacts for the emerging EV to energy storage battery conversion industry.

In *Grafil*,[4] Pain J criticised the current approach to resource recovery exemptions in the context of recovered fines as consumers incurred liability for the recovered product even where they had no ability to know they had incurred the liability.

Battery reuse and recycling of materials require high product quality and safety levels. The NSW government could consider an approach where the processor of the recovered product incurs the liability for any defects in the subsequent feedstock produced. We believe this would impose the obligation on a party who is best able to manage that risk. There are a number of models which could be explored. e The point in Grafil that producers need responsibility for product quality and safety is critical if a circular economy is to evolve.

The responsibility of the company recovering the resource needs to be supported by consideration of how the *Protection of the Environment Operations Act 1997* (NSW) ('POEO Act') defines waste. The POEO Act defines waste in a broad and ambiguous way, yet is currently being applied strictly by the courts (see, e.g., *Grafil*). This means that recycled, re-used or recovered substances is deemed to be waste even if it retains an economic value and can be sold, this approach expands the liability of consumers of these substances. Clarity is required around between:

(i) feedstock for a new product, which we argue should fall outside the existing waste category; and
(ii) 'true waste', which consists of materials that are never likely to be recovered as the technology and/or the business capacity will not evolve in Australia due to a lack of a secondary market, a lack of economic scale or the recovery is uneconomic with current technologies.

The business accepting the recovered product for input into new products would still have the responsibility to have safe work practices and the legal obligation to on sell products that are compliant with the applicable laws and fit for purpose. Battery recycling inherently involves very high standards of product quality, especially where materials are being used to manufacture new batteries or for other applications, such as input to fertilizer.

<u>Streamlined regulatory processes</u>

ABRI and Associate Professor Crossley strongly support the NSW Government's work program to streamline regulatory processes and will continue to advocate for expedited development of the harmonised waste tracking project.

[4] *Environment Protection Authority v Grafil Pty Ltd; Environment Protection Authority v Mackenzie (No 4)* [2021] NSWLEC 123 [178].

Strategic/macro scale planning for management of collection and consolidation of used batteries

Strategic planning is required to understand the optimal arrangements for safe and effective collection of used batteries across metro and regional areas. Used battery collection, consolidation and transport of batteries to recyclers is expensive to support safety and compliance with the strict dangerous goods and hazardous waste planning requirements. Coordinated planning will be required to ensure ease of access for customers to drop off used batteries, including damaged batteries.

Collaboration on best practice

Given WHS, dangerous goods transport, fire safety and planning requirements, ABRI and Associate Professor Crossley request government collaborate with industry to:

- determine what best practice storage looks like; and
- support safe and optimised collection networks.

At the moment *ad hoc* and inconsistent decisions are having the unintended consequence of forcing batteries into landfill and waste transfer facilities. Industry and government, in consultation with consumers, should look to setting a pathway that removes batteries from landfill and supports a safe and sustainable collection framework.

Vehicle and battery manufacturing OEMs are already working with recyclers to develop collection networks. However, there is much work to go with the EV sector still relatively new and growing rapidly. Further, barriers are emerging across a range of regulatory settings, including requirements for written off cars to be sold as scrap. Thus it is critical that that any circular economy strategy is cognisant of the full range of outcomes that might eventuate and does not preclude optimal outcomes such as ensuring the battery goes to recycling.

Collaboration on used and damaged battery infrastructure

The University of Sydney/ABRI workshop, identified that the most serious risk at end of life is fire. The primary cause of fires is damaged batteries. To reduce the fire risk, it is important to reduce consumer batteries entering waste and landfill streams. This could be achieved by:

- Improving both the accessibility of, and processes through which, battery collections can be safely managed;
- Banning batteries from landfill; and
- Embarking on a cultural change and education task about safe battery disposal at end of life. This needs voices appropriate to specific target audiences. As the Australian Battery Industry Association highlighted in its submission to the ACCC issues paper on lithium batteries, all sectors need to contribute to this task. Information can be provided to consumers at point of sale. However, the majority of

a battery's life is in the hand of the consumer, which can be many years. Therefore, consideration needs to be given as to how to ingrain safe battery disposal practices. B-cycle, battery recycler and waste sector education initiatives are working towards this but further support is needed.
- Addressing the challenge of 'Hidden' embedded batteries which present a massive problem and are difficult to manage.

This task cannot happen in isolation of understanding what best practice of collection infrastructure, location of sites and storage processes look like. Ease and accessibility will be critical to encourage used battery drop off in the community. The regulatory framework and its administration are intertwined with education and collection infrastructure; therefore, ABRI and Associate Professor Crossley would like to collaborate with government on achieving this outcome.

Research hub

Given the significant work being undertaken on battery recycling by NSW based research institutions plus the strong clean energy research network across the state, establishment of an information and research hub would help share learnings across industry in a fast-moving area. Collaboration with industry including on NSW Government initiatives such as learnings from the Circular Solar program, which is funding battery recycling, would accelerate sharing of information and help cement NSW as a leader in the sector. The research and technology work underway has the potential to underpin technology exports.

Data collection

ABRI has identified the following no regrets data collection needs in its submission to the National EV Strategy consultation paper:

- Nationally consistent fire incident reporting to share learnings from incidents and support future data analysis.
- Implementation of the national waste tracking system to improve data collection and streamline business operations. This should include clarification of where batteries for reuse and repurposing sit within this framework.

In addition, OEMs are implementing material tracking systems for EV and energy storage system batteries as many have commitments to manage end of life batteries. Energy storage and EV companies are already tracking batteries and Australian recyclers are part of the barcode tacking process to confirm batteries have been recycled.

5. What are some additional issues in creating a circular clean energy sector (if any) that haven't been discussed in the issues paper?

Consideration should be given to adding battery recycling and reuse to the NSW policy, program and funding landscape to:

- Recognise existing and start-up business operating in battery recycling. This includes four ABRI members who are investing in and starting up lithium battery recycling businesses and an existing lead acid recycler;
- Identify regulatory barriers to the circular clean energy sector and the interplay with critical minerals recovery;
- Identify broader manufacturing opportunities such as safe and recyclable battery packaging and other safety tools;
- Map in research projects at university looking at the battery circular economy.

This mapping would identify that NSW does have the foundation blocks for a clean energy manufacturing sector as used batteries are turned into feedstock for other products. In the case of lithium batteries, this is companies working on advanced manufacturing of critical minerals and battery chemistries.

6. What are other ways (apart from the circular economy) the NSW could improve the sustainability of the clean energy transition?

No further comments at this time.

For further information, please contact:

Katharine Hole, CEO ABRI: secretariat@batteryrecycling.org.au

Ass/Prof Penelope Crossley, Sydney Law School: penelope.crossley@sydney.edu.au