ASSOCIATION FOR THE BATTERY RECYCLING INDUSTRY

31 October 2024

Submission – Opportunities in the Circular Economy

This submission focuses on opportunities to grow the battery circular economy drawing on Australia's natural advantages. It draws on the expertise and experience of the over 60 members of the Association for the Battery Recycling Industry (ABRI). This combined experience covers the entire battery value chain as well as recycling of all battery chemistries and applications. For further information on ABRI visit www.batteryrecycling.org.au .

Battery application and material recovery processes are diverse, complex and capital intensive. Therefore, battery products should be considered as different markets segmented by factors which include chemistry, materials recovery pricing, reverse logistics chains, ESG impact and size/weight.

Batteries due to their high metal and critical minerals content are generally well suited to high materials recovery rates for use in new products and batteries. The business case for materials recovery will vary depending on the chemistry and format / size of the battery.

This submission highlights both the drivers for battery circular economy success and current pinch points in an every changing value chain.

If the Productivity Commission would like to further explore the matters raised in this submission, please email secretariat@batteryrecycling.org.au .

Information Request 1 – Circular economy success stories

Lead acid batteries are one of the great circular economy success stories with reported recovery rates of +90% recovery for used lead acid batteries. There is discussion within industry about updating these figures to support sustainability claims and ensure that the latest data is available. However, based on overseas experience and domestic industry wide data this figure is a good indicator.

Lead acid recycling has the benefit of extensive use over long periods of time. As such the technology to process end of life batteries is mature, and the pricing of recycling plants for application transparent. This contrasts with lithium and other chemistries that are evolving both in terms of use case and recycling process.

The lead collected from used batteries is used in the production of lead ingots and lead acid batteries both in Australia and overseas. The mechanical process of recovery is also well developed.

The raw material produced from the recycled plastics can be developed into a range or products depending on the quality of the recovered material:

- Plastics, usually polypropylene are turned into pellets and used into new automotive batteries, flowerpots and housewares. Low density polyethylene can be used for irrigation pipes, packaging film and builders film. High density polyethylene can be used for agricultural pipes, "plastic" lumber (WPC) and plastic rubbish bins.
- Sulphuric acid is converted to become high quality sodium sulphate, which is used in the manufacturing of varied materials including detergents and fertiliser.

The factors driving the success rate for used lead acid battery recycling in Australia are:

- Value in the materials recovered from the batteries which allows collectors and recyclers to predictably cover costs and receive payment for their recovered batteries from the recyclers
- Commitments under the Basel convention to recycle hazardous materials in Australia, in this case lead, providing feedstock for the local industry
- Well established reverse logistics chains which minimise costs whilst transporting end of life lead acid batteries safely. Automotive, industrial, marine, consumer and scrap sectors are actively involved in the collection of used lead acid batteries. Old batteries can be swapped for new in one convenient transaction allowing transport efficiencies to be maximised.
- The network operates as a single Australian market with network hubs for consolidating small and then larger volumes of used batteries to send to recyclers based on truck movements. This minimises both the ESG impact and costs.
- Consumers, such as those using specialist batteries in the recreational and marine sector, are in the practice of bringing batteries back to retail stores in order to purchase new ones.

This market could be enhanced further by the removal of barriers as discussed in Information Request 3.

Information Request 2 - Priority opportunities to progress

Australia has a unique opportunity and comparative advantages to become a world leader in lithium battery recycling technology and supporting services as follows:

- Strong research and resources sector capability in hydrometallurgy is underpinning the development of exportable technology to recover of materials from lithium black mass. This competitive advantage draws on Australia's strong research and resources sector capability. From public information, two ABRI members have entered commercial arrangements with European OEMs to commericalise their critical minerals recovery technology. ABRI's members in lithium black mass technology are drawing on their mining sector expertise and that of Australian universities including:
    - ARC Training Centre for Battery Recycling based out of Adelaide University
    - Edith Cowan School of Engineering
    - Curtain University
    - Murdoch University
    - Newcastle University and the Institute for Energy and Resources
    - Queensland University of Technology
    - University of New South Wales

- Development of containers to support safe transport and storage. Three ABRI members are developing technology, including patents, in this area.

- Development of solutions for safe collection and, possibly partial processing to reduce transport costs, in regional and remote areas. Australia with its combination of renewable energy zones, mining sector decarbonisation and offgrid communities has the ideal combination of skills, technology and large volumes of batteries needing recycle in remote areas to develop best practice for these areas. The majority of the world will be using batteries outside the major regions with lithium battery manufacturing capacity and will need solutions to support low cost, safe and sustainable lithium battery recycling capability.

Information Request 3 – hurdles and barriers

Issue	Potential solution
Lead acid battery recycling	
Illegal exports	Compliance action to send a clear signal that batteries should be recycled in Australia where there are strong environmental and sustainability requirements
Lithium battery recycling	
Piecemeal approach and lack of clear framework for prioritising industry development and support.	Develop a clear policy statement setting out the priorities for the battery recycling industry including export support. This should be supported by a clearly structured funding program to turbocharge individual technology and services verticals within the industry. Battery recycling falls into critical minerals, waste, net zero, circular economy and clean energy policy priorities. There are many 'voices' and interest groups at present that are advocating positions that at times can be at cross purposes. A single nation wide policy platform needs to be developed.
Logistics often form the largest cost in lithium battery recycling, especially transport as lithium batteries are classified as dangerous goods.	Recycling capability needs to be stood up now including exploring options for modular recycling in regions. Countries such as Australia are too small for single point high capital investment infrastructure. Australia also does not have manufacturing feedstock to provide support for battery recycling. Identification of optimal sites for a collection network including the potential for container size recycling will support least cost recycling and maximise the recovery of battery materials.
Large Format Batteries & unique challenges in recycling	With the growing dependency on Battery Energy Storage Systems (BESS) to support the main grid, resources sector decarbonisation and the move to off grid electricity networks, there will need to be additional specialist recycling services developed to deal with these products .A large scale BESS unit can weigh in the region of 50 tons and batteries in resources vehicles are

Issue	Potential solution
	also heavy. This adds another layer of complexity in relation to the requirements for recycling – spanning transport, storage, deenergisation, disassembly and processing.
Volume risks – shredding and black mass recovery	Funding is required to stand industry up at sufficient scale now to manage projected volumes. The risk is that batteries come through for recycling at volume earlier than expected. Warranties and recalls indicate that capacity at scale is required immediately. This could be done along the lines of the early ARENA solar grid scale funding program. Under this program, a targeted and one-off funding program provided the impetus for industry to invest at scale and no further funding was required.
Consumers & consumer collection networks	The most challenging collection sector is consumers due to the diversity, number and multitude of products, including embedded batteries. Low population density and large distances add to the challenges of achieving cost effective and safe end of life battery collection. Infrastructure mapping is required to optimise lithium battery recycling collection and processing chains. Identification of precinct and regional hubs with large recycling needs, such as mining, renewable energy zones and offgrid communities, provides a potential opportunity to explore localised facilities. Exploring the need for share infrastructure is another potential solution.
Readiness of collection networks – storage and automotive	Automotive service centres, solar battery installers and the scrap sector are natural collection networks for end of life EV and energy storage networks. ABRI is collaborating with these sectors and the Circular PV Alliance to consider the consequential impacts of the energy transition and what actions/supports should be prioritised.
Lack of understanding around safety	Sharing learnings and improving safety – Development of a nationally consistent fire incident reporting system to share learnings from incidents and support future data analysis.

Issue	Potential solution
	Standards for safe storage and consolidation of used batteries to support all jurisdictions develop consistent (ideally harmonised) planning and environmental licensing conditions. This would also provide a basis against which insurance companies could also assess risk when companies apply for insurance.
Rapidly rising insurance costs	An ABRI member survey in early 2023 indicated insurance costs rising at 100% and well over in a twelve month period. The issue of battery fires across the broader waste sector is also driving insurance costs higher to the point where many businesses in the waste industry are insurable. Solutions need to be developed to manage this risk.
Lack of standards for battery reuse and remanufacturing	Mandatory standards and consumer disclosure requirements are required for battery energy storage systems converted from EVs. This is critical for safety and so that consumers understand the provenance of these products.
All batteries	
Regulatory and administrative barriers – waste definitions	Batteries which are no longer usable should be provided with a resource recovery pathway and not classified as waste. Classifying batteries as waste means that: • facilities handling 'waste' batteries are classified as waste facilities requiring additional licensing requirements to those already in place for handling lithium batteries. That is any premises used for storage, treatment, processing, sorting or disposal of waste. • products (e.g. minerals or energy storage systems) recovered from EV batteries are still considered waste. This is likely to impact the ability of companies to obtain financing and sell recycled products overseas as they cannot be sold as recycled materials. • provides an uneven distribution of risk/ liability across generators/ processors, transporters and consumers of waste (i.e. energy storage batteries and critical minerals) with all parties liable across the supply chain.

Issue	Potential solution
	A resource recovery framework should still support accountability, safety and environmental outcomes. These outcomes are also likely to be driven by consumer law and financial sustainability reporting outcomes.
Regulatory and administrative barriers – waste transport and reporting	Implementation of the national waste tracking system to improve data collection and streamline business operations. Day to day administrative processes are a large cost for business. ABRI recognises that most jurisdictions are moving towards tracking lithium batteries and urges that this is done in a consistent manner. This can still be achieved if lithium batteries are moved to a resource recovery category as a way of ensuring that the batteries are sent to a facility that can recover the materials from the batteries.
State based requirements to process waste locally	The market is national and restrictions on cross border movements limit any ability to optimise logistics networks and would restrict competitive pricing for payments to customers for used lead acid batteries. The Australian market is small and further restricting it to state boundaries may remove competition and require some form of step in arrangement to manage set prices and quantities for each recycler. Analysis would be required to understand the magnitude of the impacts and appropriate solution