

**Battery**Stewardship**Council**



# Circular Batteries Australia Position Paper

December 2023



Circular  
Australia



# Table of contents

<b>1. Summary</b>	<b>3</b>
1.1 Research limitations	4
1.1.1 Options for improving economic data collection and verification	5
<b>2. Key Insights and Issues</b>	<b>5</b>
2.1 Overview of the B-cycle scheme	5
2.1.1 High level insights	6
2.1.2 Options	7
2.2 The levy instrument	7
2.2.1 Overview of the levy	7
2.2.2 Levy insights	7
2.2.3 Options for consideration	8
<b>3. The rebate instrument</b>	<b>9</b>
3.1 The Collection Rebate	9
3.1.1 Overview of the B-cycle collection rebate	9
3.1.2 Insights	9
3.1.3 Options to improve the effectiveness and efficiency of collection rebates	10
3.2 The Sorting rebate	10
3.2.1 Overview of the B-cycle sorting rebate	10
3.2.2 Insights	10
3.2.3 Options to improve efficiency & effectiveness of the sorting rebate	11
3.3 The processing rebate	12
3.3.1 Overview of the B-cycle processing rebate	12
3.3.2 Insights	12
3.3.3 Options to improve efficiency & effectiveness of the processing rebate	13

# 1. Summary

The circular economy opportunity in batteries is significant for Australia's economic growth, material efficiency, domestic critical minerals recovery and value capture, along with carbon reductions.

This paper has been authored by the Battery Stewardship Council (BSC) through the direct experience and operation of the B-cycle stewardship scheme; reports commissioned by the BSC to understand battery markets and life cycle outcomes; analysis of available economic data from B-cycle participants; and surveys with domestic and international industries and regulators in other global jurisdictions.

This paper draws on the latest insights and information to outline the key issues and priorities to action to develop a competitive Australian battery recycling sector that will advance onshore product stewardship, harness valuable critical minerals for the renewable energy transition, and improve sustainability and safety.

The Australian battery recycling sector continues to grow since the launch of B-cycle in 2022, demonstrated by the end-of-life battery collection rate almost doubling to 12% and a significant four-fold expansion of the collection network presenting positive trends towards a strengthened stewardship landscape. The BSC believes ongoing growth is essential but will not occur without strong and urgent action from government and industry.

Externalities associated with battery stewardship include:

- + Geographically dispersed collection aligning to human geography of Australia and rising costs of transport along with other rising costs of goods and services due to inflation
- + Rapidly expanding waste streams
- + Volumes insufficient to motivate investment
- + Rapidly expanding risks
- + Burden on local communities
- + Loss of valuable resources
- + Cost of service delivery higher than the authorised rebate.

This paper presents its findings by describing the element under review; providing insights gained by the research team and providing model options to be considered in BSC's:

- + upcoming scheme review which has been initiated to understand and address operational and financial challenges of the scheme design; and
- + advocacy for regulatory reform to address free riders.

These options will be considered for implementation over the next two financial years (FY 2023-24, FY 2024-25) to secure industry buy-in, develop onshore capabilities to process greater volumes safely, and contribute to securing critical minerals for Australia's transition to Net Zero and circularity by 2030.

## 1.1 Research limitations

This paper sets out the conclusions of an economic analysis of the B-cycle scheme. The lack of available and detailed economic data regarding the inputs and outputs of the recycling industry presents challenges in understanding the financial efficacy of the Scheme. At this early stage of market development, these challenges can be expected due to matters of commercial in-confidence within a small market. However, greater transparency will be required into the future to make better informed decisions.

This report presents findings at a high level as:

- + Sample size of respondents is small and statistically insignificant. This reflects the dominance of two operators across the three stages of the process: collection, sorting and processing.
- + Non-disclosure agreements signed with participants means that details of data cannot be shared with BSC as this would break commercial confidence.
- + The experience of scheme participants varies widely, making it difficult to draw robust conclusions for the industry as a whole.
- + Not all costs have been included by all respondents.
  - + For example, one provider did not upload depreciation costs to the survey but provided qualitative information. Expenses were included overstating true costs such as full management costs, which should be prorated to reflect the percentage of management time spent on scheme-related activities only. This data was subsequently requested but not received. These costs were removed from calculations of average cost per tonne.
- + **Some potential revenue sources are not provided**, such as R&D tax offsets and government grants for investment in a plant.
- + Financial results received in Phase 2 of data collection indicate that collection costs may have come down since the start of the program. Consultations suggested further scope for economies of scale could be achieved if volumes increase with collection rates rising to 35% or higher.

Despite these limitations, it is estimated that the respondents represented a significant proportion of rebates received for collection, sorting and processing over the first year of the Scheme. It has therefore been possible to draw broad conclusions from the data provided in combination with consultations held.

## 1.1.1 Options for improving economic data collection and verification

- + **Improve participation in economic data collection:** Consult with participants to better understand the importance of data collection and verification.
- + **Improve participation through enforcement:** Consider linking future data collection to rebate payments to demonstrate the importance of the data collection process.

# 2. Key Insights and Issues

## 2.1 Overview of the B-cycle scheme

In September 2020, ACCC granted authorisation to the BSC until 26 September 2025 to enable the establishment and operation of a national stewardship scheme, now known as B-cycle, for managing certain types of end-of-life batteries (the Authorisation). The scheme design was based on an accreditation model that saw a voluntary levy applied to importers of in-scope batteries and a partial offsetting of costs of collection, sorting and recycling of batteries to encourage industry investment and expansion.

The Scheme commenced in Jan 2022 with a focus on consumer handheld batteries. Automotive lead acid batteries are exempt from the Scheme on the basis that there is an effective market already in place. The Scheme has been designed to enable the inclusion of light mobility, electric vehicle and energy storage batteries; however, timing would be dependent on discussions with industry and government.

The objectives of the Scheme are to:

- + increase resource recovery and recycling and minimise the environmental, health and safety impacts of end-of-life batteries in Australia
- + achieve a net benefit for the broader recycling system by removing a potentially significant contaminant
- + ensure that the whole supply chain participates in the stewardship of batteries in the Australian market
- + develop an efficient and innovative domestic battery recycling industry
- + create new job opportunities, including jobs with social outcomes
- + foster a circular economy where batteries are recovered for recycling and reused to make batteries or other products.

## 2.1.1 High level insights

### Positive impact

All evidence indicates that B-cycle has positively impacted consumer education, collection, recovery growth, and industry development. B-cycle presents a unique opportunity for leadership in market development and national stewardship of battery recycling and is well-positioned to lead Australia towards a sustainable, circular battery future. By focusing on the key policy, economic and operational aspects presented in this paper, stakeholders and policymakers can make informed decisions to improve the Scheme and maximise its long-term economic potential.

Since the establishment of B-cycle, consumer access has been raised through implementation of awareness campaigns and the Scheme has quadrupled the network of Drop off points from prior B-cycle launch. However, the collection rate for in scope batteries remains low by international standards. Yet when compared with international schemes in their first year of operation, the collection rate is nearly double the average.

### Importance of producer responsibility

There is a need to further enhance engagement and producer responsibilities towards stewardship and avoid the further loss of valuable resources due to industry inaction.

### International benchmarking

Insights from international experience can inform the debate and guide the further development of the B-cycle Scheme. When compared with the EU Schemes examined, it appears Australia's levy may be lower than those imposed in EU markets, noting however that their Schemes are mandated and their levy models differ in that they are based on battery chemistry and unit rates (vs the Australian EBU method). It is also worth noting that many other international Schemes offer a "fee-for-service" model and deliver, in various forms, the collection and sorting processes to achieve efficiencies and maintain control over costs.

### Global market

The escalating focus on sustainability standards in global markets serves as a catalyst for advancing onshore product stewardship with the prospect of stricter compliance requirements in these lucrative markets likely to propel Australian industries to improve local waste management and life cycle protocols.

### Life cycle impact

The circular economy opportunity in batteries is significant for Australia's economic growth, material efficiency, domestic critical minerals recovery, value capture, and emission reductions. A strong and vibrant battery recycling sector is a critical linchpin in this process and increased battery recycling rates have the ability to offset the need for primary minerals production in battery manufacturing; offering a significant reduction in CO<sub>2</sub>e by up to 50%.

## 2.1.2 Options

- + **Amplify awareness and behaviour change:** Leverage use of B-cycle's partners to increase use and sharing of communication and education assets in a cost-effective manner.
- + Continue to participate in international benchmarking activities.

## 2.2 The levy instrument

### 2.2.1 Overview of the levy

On approval of the Scheme design, the ACCC authorised a levy of 4c/ EBU however, in response to concerns raised by battery importers, BSC agreed to commence the Scheme with a discounted rate of 2c/ EBU. In mid-2022, it became clear that collections were higher than anticipated and the discount was reduced from November 2022 to 3c/ EBU. In September 2023, at the time of drafting this report, the BSC Board resolved to adopt the ACCC authorised levy of 4c/ EBU commencing January 2024.

### 2.2.2 Levy insights

The levy has injected significant funds to address battery stewardship. For 2023 and beyond, the sufficiency of the levy will depend on the rate of growth in Scheme collections. The levy receipts at a 3c levy rate are expected to total \$16.3 million in 2023<sup>1</sup>, which would be sufficient to cover an increase in collection rate from 16% to 26%. However, should collections increase more quickly than this, the rebate would need to be lifted to 4c before the end of 2023.

The monthly Consumer Price index peaked in the 12 months to December 2022 at 8.4% and increased 4.9% in the 12 months to October 2023. Since the levy was established the Scheme design does not allow for such an increase to be recovered via the levy process.

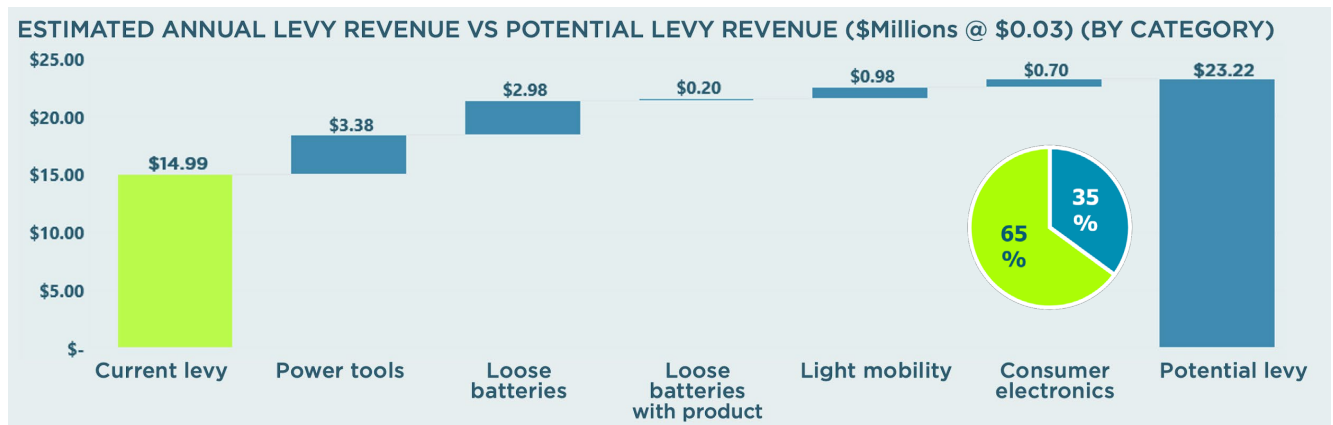
#### Free riding

The battery recycling landscape in Australia is further complicated by instances of "free riding," where entities avoid their responsibilities, undermining the collective efforts aimed at achieving better recycling outcomes. This is challenging for all voluntary Schemes and puts undue pressure on scheme budgets as shown figure below which illustrates the potential lost income with an overall free rider rate of 35%.

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<sup>1</sup> BSC raised the levy rate from 2c to 3c in Nov 22 FY23. Data collected after this analysis was completed shows a total levy of \$13.7m - insufficient to achieve collection rates for that year

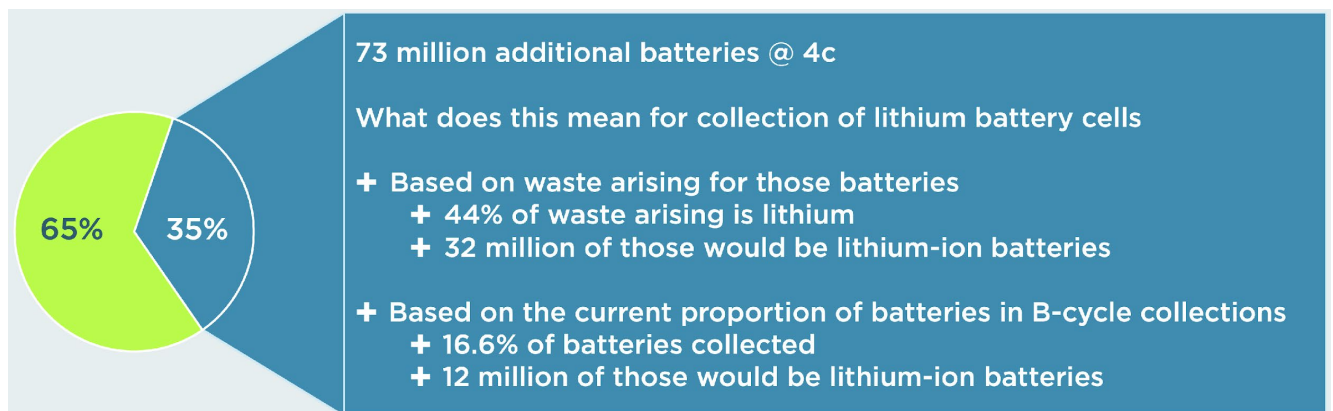
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This does not include online sales, vapes, embedded batteries, or emerging products such as portable energy storage which could represent significant volumes.

## Opportunity cost

Just looking at current in scope batteries, if the levy was 4c, the following provides a summary of the number of batteries that could be diverted if levy from free riders were accessible.



## 2.2.3 Options for consideration

- + **Address free riding as a matter of urgency:** Continue to work with Governments and Industry to address Free Riders and ensure a level playing field across all aspects of the battery supply chain is an essential component to secure a financially viable circular economy for batteries.
- + **Evaluate levy options:** Consider moving to a formula-based levy and ensure it accounts for CPI increases.
- + **Evaluate differentiated levy:** Consider establishing different levies based on chemistry / product categories to recognise different risks and economic profiles.
- + **Consult with industry on Scheme expansion:** continue to work with industry to understand how best to expand the Scheme scope and include emerging products such as electric vehicles and energy storage systems.



## 3. The rebate instrument

The ACCC authorised three rebates with the intent to offset the cost of safe recovery of batteries in Australia. Rebates are offered based on successful accreditation to B-cycle Collection and Recycling Network Accreditation Protocols and verification of rebate claims for collection sorting and processing.

The Australian battery recycling sector has experienced growth since the launch of B-cycle in 2022, demonstrated by the almost doubling of the collection rate to 12% and a significant four-fold expansion of the collection network presenting positive trends towards a strengthened stewardship landscape.

### 3.1 The Collection Rebate

#### 3.1.1 Overview of the B-cycle collection rebate

The Scheme provides rebates for Collection (Metro \$2.50/kg and Regional \$3.50/kg). Regional was defined to include all of TAS WA and NT in recognition that there were limited local options and high transport costs. The collection rebate was weighted to address the high cost of collection and transport of in scope batteries which was identified by the BSC as the most significant market failure to battery recycling. The Scheme has been established to address these issues as well as to provide additional incentives for sorting and processing to occur onshore, promoting a domestic circular economy.

Continuing the rebate process for collection, sorting and recycling is a pivotal mechanism to incentivise ongoing Scheme participation especially while collection rates remain low. However, the rebates may need to be more accurately calibrated to mirror cost variances of collection in regional and remote areas, and the different battery chemistries if a national approach to stewardship is desired.

#### 3.1.2 Insights

Since the Scheme design in 2016 the economics and costs associated with battery recycling have changed. Challenges identified include geographically dispersed collection and rising costs of transport, rapidly expanding waste streams, low volume of batteries being available for collection, burden on local communities, risks to community health and safety, loss of valuable resources and the need to understand the scheme as a system.

### 3.1.3 Options to improve the effectiveness and efficiency of collection rebates

Options for BSC to continue to pursue or initiate include:

- + **Consider re-evaluation of the BSC collection rebate structure:** Analyse the need for broader systematic support to establish an effective circular battery economy including through policy levers, legislation harmonisation, research and development, and enabling infrastructure investment.
- + **Re-evaluate the efficacy of the offset model** in consultation with importers, retailers and recyclers.
- + **Undertake a detailed review and adjustment of the rebate structure,** focusing on redefining metro, regional and remote to balance geographical variances in cost.
- + **Fire-Safe Container Subsidy:** Explore fiscal measures in collaboration with the government and private sector to support or subsidise fire-safe receptacles to ease the financial burden on collectors.
- + **Harmonisation of State Regulations:** Advocate for standardised state policies on dangerous goods and lithium transport to simplify compliance and reduce the costs associated with interstate transport.
- + **Inter-Scheme Collaboration:** Continue to use the B-cycle's unique leveraging model to work with other stewardship Schemes to consolidate transport and optimise costs.
- + **Stricter Penalties for Non-Compliance:** Advocate for increased financial disincentives for improper disposal to encourage better participation in the Scheme.

## 3.2 The Sorting rebate

### 3.2.1 Overview of the B-cycle sorting rebate

The B-cycle sorting rebate was authorised at \$1.00/kg to ensure batteries were properly sorted in preparation for recycling.

### 3.2.2 Insights

The Sorting stage presents its own unique set of challenges, primarily around economic feasibility and operational efficacy resulting from manual and mechanical sorting capacity. Sorting costs vary widely, especially between household and commercial waste streams, making it challenging to maintain a one-size-fits-all rebate structure. The absence of standardised labelling complicates the sorting process. Labour and capital investment costs significantly outweigh the current rebate rate, leaving sorters reliant on these rebates for their

## CIRCULAR BATTERIES BATTERY RECYCLING POSITION PAPER

operations. Over time, as the number of facilities, volume of available feedstock and variation in battery chemistries increases; advanced sorting capabilities will become more important and greater competition for highly profitable chemistries is anticipated. Scheme participants reported the following issues affecting the economic and operational aspects of end-of-life battery sorting:

- + Increasingly diverse battery chemistries and non-standard or absent labels, particularly on imported batteries, make identification and sorting challenging and time consuming.
- + The effectiveness of battery sorting is constrained by the ongoing evolution of the battery market.
- + Future battery chemistries may impact offtake yields for recyclers and this will influence the economics of manual vs automated sorting.
- + Manual processing is significantly less feasible than mechanical sorting, even with rebate support. However, vertical integration, technology and machinery, and economies of scale appear to allow the existing large processors to sort effectively under the current level of rebate.

As new batteries are added to the Scheme, this should be reviewed, specifically noting that some battery types such as EV and mobility batteries are more likely to be source separated and aggregated through B2B partnerships (i.e. recyclers providing circularity-as-a-service to bike stores, vehicle dealerships etc) therefore limiting the need for advanced sorting requirements. On the other hand, as households increase their propensity to recycle end-of-life consumer batteries, more efficient sorting systems will be required.

### 3.2.3 Options to improve efficiency & effectiveness of the sorting rebate

- + **Re-evaluate Sorting Rebate Structure:** Consider re-evaluating the BSC sorting structure to understand variations between households and commercial waste streams with multiple and emerging chemistries, along with reforms to standardise clear labelling for imported batteries, and further analysis of the techno-economic impact of automated smart sorting systems.
- + **Complex Battery Labelling:** Advocate for standardisation of labels on imported batteries, in consultation with industry to improve the cost effectiveness of the sorting process.
- + **Techno-economic impact on smart sorting systems:** Further investigate future battery chemistries trends and potential yields for recyclers, to better understand future automated sorting capability requirements.
- + **Encourage government investment in regional sorting hubs:** Focused on sorting necessary for safe and effective recycling and reducing transport costs if the 100% exclusion of lithium batteries can be achieved.

## 3.3 The processing rebate

### 3.3.1 Overview of the B-cycle processing rebate

The B-cycle process rebate was authorised at \$1.00/kg to ensure batteries were properly processed in preparation for further materials recovery.

### 3.3.2 Insights

As an emerging sector, the Processing stage of battery recycling faces substantial challenges, primarily in revenue generation, volume limitations and technological complexities. Currently dominated by three processors, the industry primarily relies on rebates rather than downstream revenues. The emergence of new entrants focusing on larger Lithium-ion batteries highlights the changing dynamics and commercial interests within the sector. Materials recovered at present include steel, manganese, zinc, nickel and black mass. International insight into the commodities market suggests that critical battery materials and black mass are, in many cases, over supplied placing downward pressure on commodity prices in 2023 with a more positive outlook over a 5-year period. With over 70% of feedstock entering the secondary processing stream coming from the manufacturing process the opportunities for strong price for feedstock from the used battery sector is marginal.

Key insights from participants underscored the following industry challenges:

- + materials extracted from batteries currently represent limited revenue streams due to fluctuating market prices and insufficient local demand (i.e. for black mass).
- + participants observed that the economics for lithium battery processing are currently unfavourable but are expected to improve within five years.
- + limited responses to the economic analysis resulted in a limited understanding of how rebates influence processor decisions.
- + processing of Lithium-ion batteries involves technical difficulties that impede both the quantity and purity of recovered materials. This aligns with findings in UTS fate-mapping and life-cycle analysis studies.
- + household batteries currently contribute minimally to volumes, with greater focus being placed on larger Lithium-ion batteries such as those used in electric vehicles.
- + insufficient volumes make certain types of recycling unfeasible, often leading to exports.
- + stakeholders reported receiving e-mobility batteries and have begun gearing up for anticipated further market growth.

### 3.3.3 Options to improve efficiency & effectiveness of the processing rebate

The options available to the BSC in partnership with government and industry to improve onshore processing efficiency and effectiveness include:

- + **Strengthen Market Intelligence:** Conduct a comprehensive survey among processors to better understand the role of commodity pricing dynamics to inform future rebate design.
- + **Offtake Market Development:** Explore opportunities and barriers to enhancing downstream revenues and consider how offtake contracts within the processing sector can reduce price volatility, enhance market certainty, and lessen dependence on rebates.
- + **National Processing Capability Plan:** Investigate the feasibility of broadening Australia's processing capabilities towards 2030, both in terms of technology and capacity, to capture more of the available domestic volumes.
- + **Strategic Investments:** Encourage targeted investment in processing of household batteries, which currently represent a marginal portion of the market.

## About Battery Stewardship Council

The Battery Stewardship Council is a not-for-profit organisation operating the industry-led stewardship scheme B-Cycle, to provide battery recycling to consumers across Australia. B-cycle is supported by the Commonwealth and all State and Territory Governments, is authorised by the Australian Competition & Consumer Commission (ACCC), accredited by the Australian Government, and has received financial support from the Australian Government and industry.

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## About Circular Australia

Circular Australia is an independent, national peak not-for-profit body working to transition Australians, governments and businesses to a circular economy by 2030. Its expertise, programs and partnerships drive change, measure impact and accelerate the circular economy transition. Its mission is to lead and inspire others to implement circular actions to accelerate the circular economy in Australia.

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