# Towards a National Recycling Scheme for Power-Tool Batteries

## An important investigation into the feasibility of recycling power tool batteries

February 2017

**A nine-month pilot has been conducted in Brisbane to investigate the feasibility of collecting used power tool batteries for recycling. The results of the pilot are being used to inform the development of future battery recycling and schemes.**

## Why this pilot was needed

A national recycling program for used rechargeable batteries is being shaped by the Battery Implementation Working Group (BIWG) with the goal to increase recovery of this problematic waste stream.

Members of the BIWG include the Australian Battery Recycling Initiative (ABRI), the QLD Department of Environment and Heritage Protection (DEHP), battery manufacturers and retailers.

In 2014 power tool batteries were identified by the BIWG and ABRI as a priority product for recycling. This was due to:

- their relative weight and volume in consumer battery recycling programs
- the lack of accessible collection options for users
- the toxicity of nickel cadmium (NiCd) batteries in older power tools.

## What we wanted to understand

The pilot project was designed to investigate the feasibility of collecting used power tool batteries for recycling to understand:

1. To what extent are consumers willing to return their used power tool batteries to hardware and specialist tool retailers for recycling?
2. How much contamination is likely to be received, i.e. other types of batteries?
3. What is the likely cost of an ongoing power tool battery recycling program?
4. What operational, safety and environmental issues would need to be addressed in the design of an ongoing program?

# Design of the pilot

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|---|---|
| ▶ The pilot was promoted through local media, community radio announcements, the Planet Ark website and social media. | PROMOTION |
| ▶ Collection bins were placed in stores on 1 September 2015 and supported by in-store posters, an information sheet for retail staff and a brochure for consumers. | COLLECTION BINS |
| ▶ Batteries were collected in 19 stores in the Brisbane metropolitan area: Bunnings (9), Trade Tools (6) and Masters (4) over a nine-month period. | COLLECTION |
| ▶ For each battery type collected the data was compiled: by the store where they were dropped off, by their chemistry and by brand.<br>▶ Additional data on battery chemistry and brand was collected from a pre-existing stockpile at Trade Tools (an additional 1,398 kg or 2,299 units). Where relevant this data has been excluded from the analysis. | DATA ANALYSIS |
| ▶ Consumers feedback was invited on their interest in power tool battery recycling and their involvement in the pilot through two on-line surveys: one that was open to all consumers (202 responses) and the other targeting power tool users (71 responses). | CONSUMER SURVEY |
| ▶ Retail partners were also surveyed towards the end of the pilot to gather any feedback on operational issues (10 responses). | RETAILER SURVEY |

# What we discovered

The pilot was designed to inform BIWG members on key issues that could impact delivery of an effective power tool recycling battery program, with the following questions being explored.

**QUESTION 1:** To what extent are consumers willing to return their used power tool batteries to hardware and specialist tool retailers for recycling?

The pilot gave a strong indication that consumers are willing to recycle if options are provided, with a total of 2,300 batteries (1,222 kg) were collected during the pilot period.

## Consumer feedback

The consumer surveys indicate a high level of consumer support for an ongoing program, although care needs to be taken in extrapolating from the results because the sample size was limited:

| | |
|---|---|
| SURVEY 1: ALL CONSUMERS | ▶ 14% stated they use power tools for work and 83% for personal use only.<br>▶ Just over 90% indicated that the ability to recycle batteries in a store would make them feel more positive about the retailer.<br>▶ Knowing where to recycle batteries was the main barrier to recycling (88%). |
| SURVEY 2: PROFESSIONAL POWER TOOL USERS | ▶ This is the group that regularly disposes of used batteries.<br>▶ Two-thirds said they typically dispose of 1-5 power tool batteries per year.<br>▶ The majority (64%) said they were very likely to drop-off their used power tool batteries if there was a free, easy-to-use collection system.<br>▶ 52% identified a hardware store as the most convenient drop-off location, 17% identified a specialist tool retailer as the most convenient drop-off location.<br>▶ 12% identified a building supplies store as the most convenient drop-off location. |

## Most popular drop-off locations

The most popular individual drop-off point was Trade Tools at Eagle Farm (353kg). Bunnings stores were all popular drop-offs, particularly Cannon Hill (172kg), Stafford (90kg), Oxley and Rocklea (both 86kg) and Everton Park (82kg). The smallest collections were from the two Masters stores at Richlands and Parkinson (17kg and 8kg respectively).


## QUESTION 2: How much contamination is likely to be received, i.e. other types of batteries?

For this purpose, 'contamination' is defined as any item that was not targeted in the recycling program, including other (non-power tool) batteries and general rubbish.

Non-power tool batteries accounted for 16% of collected batteries by count and 12% by weight, and most of these were general household (alkaline) batteries. See Figure 1 for batteries collected by chemistry.

Non-power tool batteries were primarily from Bunnings stores, which accounted for 93% of alkaline batteries and 67% of lead batteries collected in the pilot. The reasons for this could include their more general consumer base, poor supervision of the bins and/or inadequate training of staff.

Other contamination, which was not a significant problem, included some other products (e.g. a light bulb) and general rubbish.

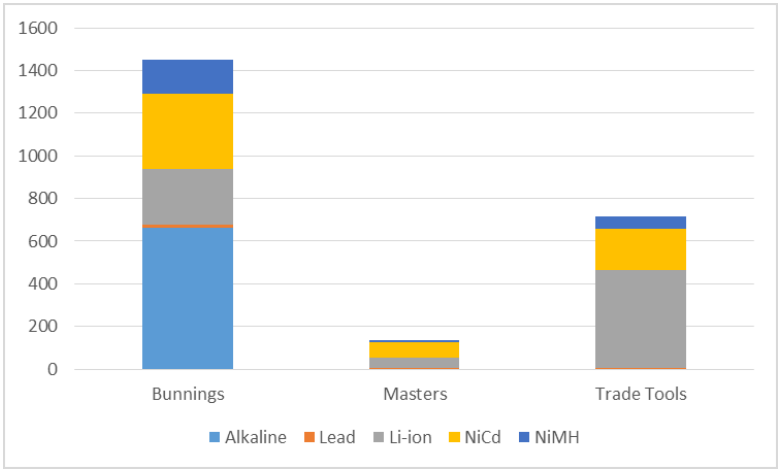


**Figure 1: Batteries collected by chemistry from each retail group (number of batteries) ★**

★ Excludes Trade Tools stockpile (total = 1,222.5kg or 2,304 units)

## QUESTION 3: What is the likely cost of an ongoing power tool battery recycling program?

The project provided some useful data and insight into potential costs of an ongoing program. The budget would need to include fixed costs (e.g. administration, marketing, communications, & insurance) plus variable costs (e.g. collection containers, collection/transport, sorting, reprocessing).

Indicative costs of collecting, sorting and recycling batteries are shown in **Table 1**. This compares actual costs for the pilot, expected costs of an ongoing program based on achieving economies of scale, and 'best practice' costs based on the in this report (summarised in section 4).

***Table 1: Cost summary***

| SERVICE | Pilot ($ per kg) | Ongoing $ | Best practice |
|---|---|---|---|
| COLLECTION | $1.08 | $0.80 | $0.10 |
| SORTING | $0.30 | $0.23 | $0.10 |
| RECYCLING | $2.00 | $1.50 | $0.50 |
| SUB-TOTAL | $3.38 | $2.53 | $0.70 |

## ASSUMPTIONS AND IMPLICATIONS OF COST DATA

- The use of reverse logistics of retailers such as Bunnings back to a distribution centre would substantially reduce this cost to something in the order of $0.10 kg
- The cost of sorting product into respective chemistries is costed at $0.30 per kg
- Cost of recycling for chemistries was set for this trial at $2.00 per kg. This price point was at low end of costings at the time of quotation. This price point would be expected to reduce by over 50% with time with increased volumes and further competition.
- Currently, sorting is undertaken manually, which increases the error rate in sorting. Contamination of sorted streams can lead to increased wastage and potential OH&S issues.
- With adequate markings by industry using a uniform system, sorting costs could be more than halved on the basis commercial volumes were available.
- With an automated sorting using a universal marking system it would be possible to reduce the cost of sorting significantly and improve the error rate.

It is important to note that recycling costs must be viewed in light of best practice and transparency. The recycling services utilised were all licenced by relevant authorities and held all requisite licences permits and compliance to environmental standards.

## QUESTION 4: What operational, safety and environmental issues would need to be addressed in the design of an ongoing program?

The pilot identified the following issues as key to effective design of an ongoing program:

- **Design collection container to ensure weights are below 20kg.** The average weight per shipment of 50.9 kg indicates that a two-person lift is required– this is undesirable. The average collection weight should be reduced to less than 20kg.
- **Use reverse logistics where possible.** If retailers could use their reverse logistics network to collect and consolidate used batteries at their distribution centres, this would substantially reduce the cost of transport to ~$0.10/kg.
- **Supervise collection bins.** To minimise any contamination in the collection containers should be placed in a location where they can be supervised. Retail partners should inspect bins daily to ensure that they are not over-full and remove any litter.
- **Provide an adequate budget for marketing and communications.** This project had a small budget for marketing and communications. An ongoing program would need to place a high priority on marketing, promotions and consumer education to maximise participation and correct recycling.
- **Design targeted communications for professional power tool users.** This pilot highlighted the value in using hardware stores and specialist tool suppliers as the main collection points. Location of collection bins in the power tools section is also recommended. Marketing channels should specifically target DIY and professional users.
- **Explore equitable funding models. Figure 2** shows brands for the top 9 brands in the collection as well as batteries with no brand (these collectively accounted for 93% of collected batteries by weight). This indicates which companies would need to be engaged in an ongoing program.

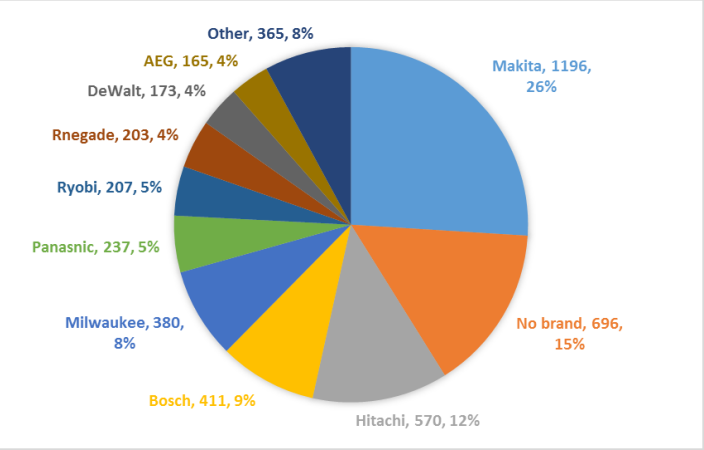


**Figure 2 Power tool battery brands collected in the pilot, by weight★**

★ Includes the Trade Tools stockpile, which may over-represent the proportion of Makita and Hitachi brands that would be collected in an ongoing program

# Feasibility of a National Power-tool Battery Recycling Scheme

**The results of the pilot suggest an ongoing program to collect and recycle used power tool batteries through hardware and specialist tool stores would be feasible**

## Recommendations

Several operational changes have been outlined above to improve safety and reduce costs. Suggested next steps include:

1 **Set up a small working group** to:

- Assess the possibility of power tool brands funding or co-funding an ongoing recycling program for used batteries and power tools, with financial support from relevant state and/or federal government agencies
- Confirm key efficiency features necessary to achieve significantly increased recovery rates
- Identify challenges and opportunities for leveraging resources with similar schemes.

2 **Disseminate the results** of this pilot to key stakeholder groups to encourage feedback and discussion on options for an ongoing program, including brands, retailers, service agents and trade/professional associations.

## Call to Action and next steps

Get involved and share your views about the future of power-tool battery recycling in Australia. The BIWG welcomes your input and encourages you to contact members of the BIWG.

For more information visit the ABRI website:

http://www.batteryrecycling.org.au/pilot-projects
Email: secretariat@batteryrecycling.org

# Acknowledgements and publication details

This pilot was sponsored by the Queensland Department of Environment and Heritage Protection. It was project managed by the Australian Battery Recycling Initiative (ABRI). The pilot was undertaken by ABRI members Infoactiv, MRI (Aust) Pty Ltd and Planet Ark. Thanks to the staff from Bunnings, Masters and Trade Tools who participated in the pilot.