Battery Sector Environmental Scan

Final Report

Prepared April 2026

Report For

Waste Management Institute New Zealand

Project Team

Duncan Wilson

Lisa Eve

Mark Hilton

Molly Coombes

Rachel Stoner

Katy Chamley

Approved By

Lisa Eve

Project Director

Acknowledgements

Our thanks to Charlotte Whiter, Saeid Baroutian, L'Rey Renata, the WasteMINZ Battery Collection Working Group, and the Ministry for the Environment.

Contact

Eunomia Research & Consulting Ltd
35 Gilfillan Street
Auckland 0604
New Zealand

Tel +64 9 376 1909
Fax +64 9 360 5187
Web www.eunomia.nz

Eunomia has prepared this report with due care and thoroughness, and in accordance with industry best practice. In preparing this report, Eunomia may have relied upon, and presumed accurate, information provided by the client and other sources. Except as otherwise stated in the report, Eunomia does not verify the accuracy or completeness of any such information. If the information is determined, following publication, to be obsolete, false, inaccurate or incomplete then it is possible that our observations and conclusions, as expressed in this report, may change. To avoid any doubt, Eunomia makes no warranty or guarantee (further to this disclaimer statement), whether expressed or implied, as to the content of this report, to the extent permitted by law.

Executive Summary

The WasteMINZ Battery Collection Working Group identified the need to conduct an 'environmental scan' of small batteries in Aotearoa New Zealand. From an awareness of the multitude of small battery-related issues such as unclear and inconsistent regulations and guidelines, absence of product stewardship and appropriate end-of-life capture, alongside the operational and environmental risks associated with improper disposal; the working group discerned that work must be done to understand the small battery problem holistically and fully before developing solutions.

The purpose of the environmental scan is to provide an overview of the situation, outlining the challenges faced by members of the small battery sector, including diving deeper into the issues that are already known and exposing those that are hidden. The environmental scan presents the current landscape of small batteries domestically and looks globally to provide informed and actionable recommendations. One of the major motivators for this research is the increasing frequency with which battery-related fires are perceived to be occurring – within and outside of the waste sector.

Approach

The environmental scan involved two complementary workstreams: stakeholder engagement and research. The report provides an overview of the current management of small batteries in New Zealand and identifies opportunities for improvement.

The Environmental Scan report sets the scene by looking nationally. Illustrating the small battery lifecycle within New Zealand brings to light complexities including the multitude of stakeholders from a wide range of sectors involved at various and specific parts of the small battery life cycle. This includes reviewing how many small batteries and small battery-containing products are likely to exist, how they are regulated and managed from manufacture to end-of-life, key chemistries and what risks they pose and when, and which stakeholders are involved, how, and when.

Key findings

New Zealand Context

The New Zealand context for management of small batteries includes te ao Māori considerations, legislations such as the Waste Minimisation Act (2008) and the Hazardous Substances and New Organisms Act (1996), supporting regulation such as that relating to priority products and the waste disposal levy, standards such as the Dangerous Goods Rule (2005), and compliance with international conventions that we are signatory to, such as the Basel Convention (as amended in 2025).

However, none of the legislation, regulation, standards or international conventions identify small batteries specifically and so create a disjointed framework for management, with no specific agency having a clear lead role in small battery management and no overarching management approach.

Infrastructure and collection networks that include small batteries are variable in extent across the country, with no active reprocessors, and service provision distributed variously amongst territorial authorities (TAs), battery recyclers, community groups, and individual retailer chains. There is no consistent methodology for recycling, storage, transfer, or stockpiling while awaiting export or recycling; and in cases where batteries are damaged and unsuitable for export there is no defined way to dispose of them safely. It is worth noting, however, that the network has improved dramatically over the last five years largely through the activity of private sector battery recyclers.

There are a wide and growing range of small battery chemistries and uses in New Zealand, and this reflects international trends with increasing numbers of small appliances and other items using rechargeable batteries, with different chemistry (often lithium-based) to traditional single-use batteries (historically largely alkaline).

There is little data available regarding the number and type of small batteries that enter New Zealand each year, nor the destination of these at end-of-life (or end-of-use).

Issues and Barriers

To thoroughly explore the issues and barriers preventing better management of end-of-life small batteries, extensive stakeholder engagement was undertaken through group workshops and one-to-one interviews.

Stakeholders from throughout the small battery lifecycle shared issues, challenges, and barriers to better understand small battery management, confirming known issues, and uncovering previously unknown ones. Issues brought forward typically fell into the following categories:

- Legislation, regulation, and guidelines:
  - Lack of consistent, specific national regulation or legislation
  - No clear leadership leads to disconnected action and reluctance from key players such as government, the waste sector, or importers/retailers to drive coordinated action
  - Limited guidance, best practice, and procedures available.
- Ownership and responsibility
  - Poor producer responsibility and no formal product stewardship scheme (voluntary or otherwise) – with responsibility for managing the problem instead falling on the waste sector
  - Little engagement from importers, manufacturers, and retailers (with some exceptions) in problem solving – such as participation in this project itself.
- Imports, data and monitoring
  - Little data relating to the quantities and types of batteries coming into the country
  - The import information management system does not enable records to be kept, particularly when batteries enter the country as part of another product
  - Anecdotally, the lack of oversight over small batteries as a specific material stream is resulting in a number of undesirable informal practices, such as stockpiling and inappropriate repurposing of second-hand rechargeable batteries (e.g. using batteries from vapes to make a DIY power bank).
- Fires, risk and insurance
  - The increasing fire risk posed by rechargeable batteries, often lithium-ion (Li-ion), is having an impact on the waste and recycling sectors through the cost of managing the fires, health and safety, risk management and mitigation measures, higher insurance costs, and potential to impact facilities and services if a fire is extensive

- Risk is difficult to assess and mitigate due to lack of clear best practice guidance and operating procedures, and poor historical record keeping of battery-related fires across the wider waste sector
- There is no clear or consistent approach to managing battery-related fires when they happen.

- End-of-life management
  - There are no onshore facilities to recycle small batteries resulting in reliance on export or encasing batteries in concrete and sending to landfill
  - Along with the increasing risks experienced by the waste sector, efforts to capture end-of-life small batteries and recover valuable components have similarly increased; however, these are still fragmented and without an overarching management framework
  - Effective end-of-life small battery management requires increasing knowledge and technologies to keep up with the rapidly changing battery market.
- Consumer education and behaviour
  - Online shopping and marketplaces make it difficult for consumers to discern the quality of products and encourage consumers to buy more than they need
  - Educating consumers about how to store and prepare end-of-life small batteries, and what recycling services to access, is challenging when there is no clear message to communicate
  - There is also increasing concern that consumers are not aware of the implications of the wider range of small batteries now on the product market and, as a result, are using these for inappropriate purposes or not handling them correctly.

International Research

Further afield, research into best practice management in Australia, Europe and the United Kingdom provided some inspiring solutions that could potentially be considered in the New Zealand context. Approaches raised in the report include extended producer responsibility and product stewardship, retail take-back schemes, transport and handling processes, compliance and enforcement, as well as alternative battery technologies.

Summary Recommendations

The report acknowledges the significant interconnected nature of the challenges met at various points in the small battery lifecycle; and that they are often caused by similar weaknesses such as unclear roles and responsibilities, lack of regulation and legislation, and lack of data. An enduring resolution of these issues requires a comprehensive approach.

- Clear governance, with a cross-sector group established with membership reflecting the full lifecycle and maintains ongoing stakeholder engagement (including with mana whenua).
- Mandatory product stewardship, incorporating eco-modulation and with an extended producer responsibility approach taken for a clearly defined 'small battery' product and with a clear leadership agency.
- Improved data relating to small batteries – particularly quantities and chemistries entering the market in New Zealand.

- Legislation and regulation that identifies small batteries specifically as a product stream requiring focused management, including controls and restrictions on small batteries entering the country that focuses on risk reduction.

- Guidance and best practice operating procedures that cover use, handling, collection, storage, management of damaged/compromised batteries, fire prevention and management, recycling, and consumer education.

Table of Contents

Executive Summary **1**

1.0 Introduction **8**

1.1 Purpose 9

1.2 Batteries Basics 9

1.2.1 Small Battery Chemistries 10

1.2.2 Environmental and Operational Risks 12

1.2.3 Alternative Battery Technologies 14

1.2.4 Battery Recovery 15

1.3 Scope 16

1.3.1 Small Batteries Scope 16

1.3.2 Small Battery Lifecycle Scope 16

1.3.3 Stakeholders and Stakeholder Engagement Scope 18

1.3.4 National Data Scope 18

1.3.5 International Research Scope 18

1.3.6 Negative Impacts Scope 19

1.4 Methodology 20

1.4.1 Stakeholder Engagement 20

1.4.2 Research 22

2.0 National Context **24**

2.1 Te Ao Māori 24

2.2 Waste Minimisation Act (2008) 26

2.2.1 Product Stewardship 26

2.2.2 Responsibilities of Territorial Authorities 27

2.2.3 Proposed Changes to the WMA 28

2.3 Collection Points 28

2.3.1 WasteMINZ Map of Battery Recycling and Collection Facilities 29

2.4 Export Permit Holders 30

2.5 Import, Transport, and Export Standards ... 31
2.5.1 HSNO Act ... 31
2.5.2 The Dangerous Goods Rule ... 32
2.5.3 The Basel and Waigani Conventions ... 32
2.6 National Quantification ... 35
2.6.1 WasteMINZ Great Battery Hunt ... 35
2.6.2 FENZ Data ... 36
2.6.3 Stats NZ Data ... 36
2.6.4 Vapes and Smartphones ... 38
3.0 Issues, Challenges, and Barriers to Better Management Identified in Stakeholder Engagement ... 39
3.1 Ownership and Responsibility ... 39
3.2 Legislation, Regulation, and Guidelines ... 40
3.3 Imports, Data, and Monitoring ... 41
3.4 Fires, Risk, and Insurance ... 43
3.5 End-of-life Management ... 46
3.6 Consumer Education and Behaviour ... 47
4.0 International Approaches ... 49
4.1 The EU and the UK ... 49
4.2 Australia ... 50
4.3 Retail Take-Back ... 51
4.4 Labelling, Communication, and Consumer Instructions ... 53
4.5 Transport and handling ... 54
4.6 Product Stewardship Design ... 55
4.7 Compliance and Enforcement ... 57
4.7.1 Case study ... 57
4.8 Summary of Learnings ... 57
5.0 Summary and Recommendations ... 59
5.1 Interconnections Between Key Themes ... 59
5.2 Ownership and Responsibility ... 60

5.3 Legislation, Regulation, and Guidelines 61
5.4 Imports, Data, and Monitoring 63
5.5 Fires, Risk, and Insurance 65
5.6 End-of-life Management 66
5.7 Consumer Education and Behaviour 67
5.8 Summary Recommendations 70
Appendices 73
A.1.0 Assumptions Behind Quantification Estimates 74
A.2.0 Issues, Challenges and Barriers Identified During Stakeholder Engagement 79
A.3.0 Environment Centred Pyramid 82
A.4.0 Additional National Context 83

1.0 Introduction

The Waste Management Institute New Zealand ('WasteMINZ') Battery Collection Working Group ('the Working Group') was formed in early 2024 and brought together 12 representatives from territorial authorities (TAs), Fire and Emergency New Zealand (FENZ), waste operators, and electronic recyclers to support the safe diversion of small batteries from landfill; with the working group meeting at least five times per year. The Working Group and WasteMINZ identified the need to conduct an environmental scan that provides a holistic overview of the small battery situation in Aotearoa New Zealand; to ensure a wide breadth of understanding that can inform further work in this space. Eunomia Research and Consulting (Eunomia) was commissioned to undertake this work.

The increased use and dependence on electronics in modern times has brought about a great range of benefits and issues. While the challenges are not unique to New Zealand, the report seeks to understand them in the New Zealand context, while looking to experiences overseas for valuable insights. Challenges met by the increasing use of small batteries of relevance to the waste sector include:

- A large and increasing number of volatile fires caused by small batteries that pose significant risks to people, the environment, infrastructure, and services.
- Lack of comprehensive standards, guidelines, and best practice information available in the public domain for end-of-life small battery management (as well as small battery related fires).
- Unclear roles and responsibilities across government agencies and the waste sector (in part due to lack of regulation and legislation).
- Lack of access to end-of-life infrastructure such as recycling on shore, and inability to export damaged batteries overseas for recycling.

The report focuses on management of small batteries from generation to end-of-life but does not meaningfully consider prevention (this was considered out of scope of the project).[1]

The environmental scan involved extensive stakeholder consultation across nine workshops, 18 interviews, and three surveys, as well as robust national and international research. The scope and methodology are discussed in Sections 1.3 and 1.3.6, respectively.

This report begins by introducing the project, its purpose, the scope and the methodology in Section 1.0. It also explains how a battery works, what they're made from, the risks they pose, how they can be recovered, and potential alternatives to the chemistries that pose the most risks.

Following on, the report looks to what is happening with small batteries nationally in Section 2.0. The national overview provides insight into who interacts with small batteries when and how, what risks small batteries pose, and standards, legislation, and end-of-life management that are in place to reduce these risks. It also provides a brief overview of key battery chemistries on the New Zealand market and provides estimates of quantification of batteries by item type, albeit with significant limitations in available data.

The report then unites the challenges, issues, and barriers brought forward during stakeholder engagement into six key themes in Section 3.0. Although the stakeholders engage with small batteries at various times throughout the life cycle, they largely all recognise the same difficulties when handling batteries in their respective capacities.

[1] It is acknowledged that a te ao Māori lens is likely to consider whether the issues that harm whenua (land), wai (water), and tangata (people) is acceptable in the first instance.

Looking further afield, the report analyses solutions that have been implemented internationally in Section 4.0. Across five solution types, the report assesses what problems the solutions address within the six key themes. It also provides a horizon scan of upcoming battery technologies that may mitigate some risks associated with particular battery chemistry types.

To connect the Environmental Scan report together, the closing sections present a summary of key themes, as well as next steps and recommendations in Section 5.0.

The appendix is comprehensive, presenting data assumptions for quantifications and additional national context. The national context includes a more granular look into product stewardship, para kore (zero waste) case studies, and communications by TAs, drop-off points, FENZ, and media outlets.

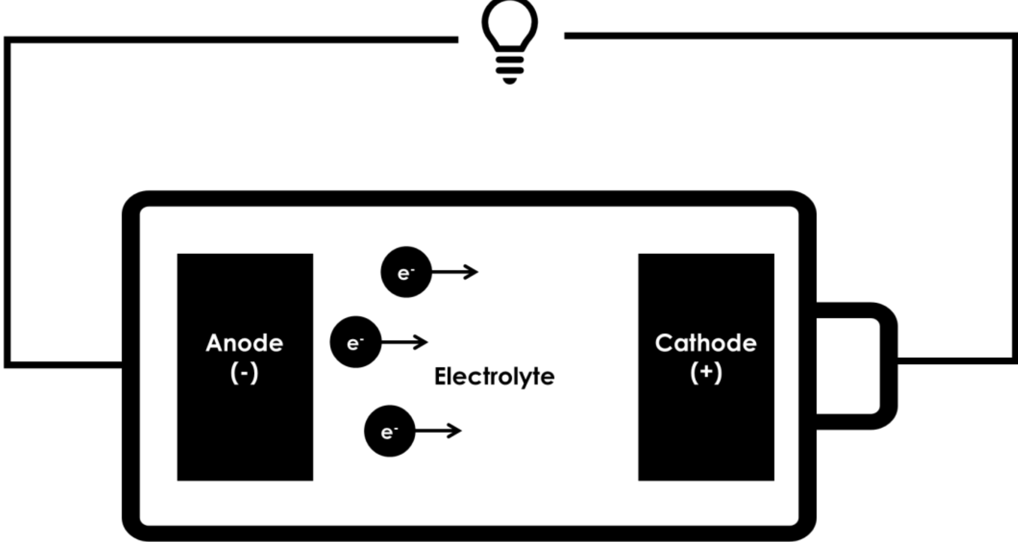
1.1 Purpose

The purpose of the environmental scan is to provide an overview of the current situation and outline the challenges faced by the small battery sector; including diving deeper into the issues that are already known and exposing those that are hidden. This will be used to understand the current landscape of small batteries domestically and provide global context to support informed and actionable recommendations. While the Environmental Scan report explores solutions that are operating nationally and globally and identifies those that could be useful in the New Zealand context, it is not expected to consider the prioritisation or detailed implementation of solutions.

1.2 Batteries Basics

A battery is a device that converts chemical energy into electricity, which is stored and later used as a source of power. When a battery is connected to a device and the device is on, a chemical reaction causes electrons (negatively charged particles) to flow from one part of the battery (the anode) to another (the cathode) through a substance (electrolyte) that allows the particles to move. This movement of the electrons creates an electrical current that can be used to power devices. When there are no more electrons at the anode the battery is drained or dead. If the battery is rechargeable and connected to a charger, the energy moves electrons back to initial anode (now deemed the cathode) for the reaction to begin again on next use. Figure 1-1 presents a simple diagram to illustrate this process, where the lightbulb icon represents the device that the battery is being used to power.

Figure 1-1: Diagram of a Simple Battery Circuit



Different combinations of materials used for the anode, cathode, and electrolyte will produce different chemical reactions. These material choices affect factors such as how much energy the battery can store and provide, how long it lasts, and how it performs in different applications.

For example, in a Li-ion battery; graphite is typically used for the anode, and the cathode is typically made from a metal oxide. The electrolyte is a lithium salt in an organic solvent, with electrically-charged lithium particles (ions) flowing between the cathode and anode depending on their charge.

A cell refers to a single battery 'block' consisting of one set of an anode, cathode and electrolyte. A typical household small battery (e.g. AA or AAA size) would be a single cell. However, many applications may require more power than could be provided by a single cell; so cells can be connected in the form of a modular battery system. Most modern battery systems also incorporate a battery management system (BMS), which monitors the performance and charging of cells, aiming to maintain safety by mitigating risks like overheating or overcharging.

1.2.1 Small Battery Chemistries

Small battery chemistries have different risks. An overview of small battery types commonly used in New Zealand, their common uses, advantages, and disadvantages is summarised in Table 1-1.

Alkaline (zinc and manganese) batteries are the most commonly-used non-rechargeable batteries and lithium batteries are the most-used rechargeable batteries. Batteries that contain cadmium, lead, and mercury (e.g. nickel-cadmium) have either been replaced by lithium and Li-ion batteries or different chemistries (e.g. zinc carbon); however, while these battery chemistries may have been phased out as new battery chemistries have entered the market, these batteries will be present in historical stockpiles both in homes and businesses. It is notable that while these older chemistries (with cadmium, lead, or mercury) are particularly toxic, all battery chemistries pose risks to people and the environment[2].

Table 1-1: Overview of Common Battery Chemistries[3]

Battery chemistry	Common uses	Advantages	Disadvantages
Alkaline ($Zn\text{-}MNO_2$)	Household devices (e.g. remotes, clocks, flashlights, toys) Most used non-rechargeable battery	• Inexpensive • Widely available • Long shelf life • Good for low-drain devices	• Not rechargeable • Poor performance in high-drain devices
Nickel–cadmium (NiCd)	Power tools, emergency lighting, aviation, some medical devices	• Robust and durable • Good for high-drain devices • Can operate over wide temperature ranges • Long life, if well-maintained	• Charging needs managing to prevent 'memory effect'[4] • Cadmium is relatively toxic • Lower energy density than newer chemistries • Largely superseded by Li-ion

[2] Comprehensive Overview of Non-rechargeable Batteries Trends: 2025-2033
[3] Overview created for this report by Eunomia summarising a wide selection of publicly accessible information and reports.
[4] A battery's capacity can become reduced over time if it is recharged without being fully discharged too frequently

Battery chemistry	Common uses	Advantages	Disadvantages
Nickel–metal hydride (NiMH)	Rechargeable AA/AAA batteries, hybrid vehicles, cameras	• Higher energy density and lower toxicity than NiCd • Good performance in moderate temperatures	• Can lose charge (self-discharge) without use • Shorter cycle life than Li-ion • Poor tolerance to high temperature • Mostly superseded by Li-ion
Li-ion (lithium-ion)	Smartphones, laptops, EVs, drones, power tools Most commonly-used rechargeable battery	• Very high energy density • Low self-discharge • Lightweight • Many physical shapes • Rechargeable	• Can overheat and cause fires if damaged • Requires BMS when in multi-cell configurations • Loses capacity over time
Lithium-polymer (Li-Po)	Drones, RC models, portable electronics, wearables	• Very lightweight • Flexible shapes • Good for devices with high drain requirements • Rechargeable	• Relatively expensive[5] • Sensitive to overcharge / discharge • Shorter cycle life than Li-ion
Lithium Iron Phosphate ($LiFePO_4$)	Electric vehicles, solar energy storage, un-interruptible power supply systems	• Very safe and thermally stable • Long cycle life • Can meet high drain requirements • Rechargeable	• Lower energy density than other Li-ion types • Relatively heavy and expensive
Silver–Zinc (Ag–Zn)	Military, aerospace, medical devices, hearing aids	• Very high energy density • High reliability • Compact • Rechargeable • Thermally stable	• Very expensive • Limited cycle life • Not commonly available
Zinc–air	Hearing aids, some energy storage backup systems	• Very high energy density • Lightweight • Uses atmospheric oxygen, reducing mass	• Not rechargeable (most types) • Sensitive to humidity and air exposure

[5] Evaluating value for money for different small battery chemistry types involves an assessment of retail cost and energy output. This table indicates relative estimated costs only.

Battery chemistry	Common uses	Advantages	Disadvantages
Zinc-Carbon	Clocks, remotes, low power applications	• Low cost • Long shelf life • Stable	• Low energy density • Not rechargeable • Earlier chemistries contained mercury

1.2.2 Environmental and Operational Risks

The risk of fires caused by small batteries currently has a high profile in the media and in information provided to the public by TAs.

This section describes the considerable issues small battery-related fires cause for the waste sector. Section 1.3.6 will clarify the scope of negative impacts further, and Section 3.0 will investigate the issues as reported by stakeholders within the battery lifecycle.

The consequences of small battery-related fires are numerous. They include but are not limited to:

- costly damage to waste trucks and waste facilities
- associated reduction or loss of services and employment
- increased cost of insurance for waste operators
- health risks (inhalation, burns, exposure, etc.) to people
- pollution to water, air, and surrounding environments
- loss of recoverable material (i.e. recycling) in waste trucks and at waste facilities.

The transport and handling of waste batteries have become increasingly critical issues within the waste management sector. Although not ideal, small batteries do end up in kerbside collection containers alongside other waste and recycling. As these batteries pass through the collection, consolidation, transfer, and processing stages; they are frequently subjected to conditions that increase the likelihood of damage, short-circuiting, or thermal runaway. Lithium batteries are susceptible to thermal runaway; a self-sustaining, exothermic reaction that can cause fires and explosions – and as these battery types become more common, this risk correspondingly increases.

Although e-waste was declared a priority product in 2020, a more recent sense of urgency to improve management of small batteries has partly driven by the increasing frequency of battery-related fires (as evidenced by FENZ data); and the increased number of Li-ion batteries and their uses.

This increased risk is apparent in the media and TA communications; in the first two weeks of January 2025, Auckland Council reported five truck fires.[6] Several months later, RNZ published an article about battery-related fires, highlighting the significant fires at Abilities Group's recycling facility on Auckland's North Shore and a scrapyard in Ōtara.[7] More examples of how the media and TAs communicate about small battery handling to reduce environmental risk, as well as reports of fires, are presented in Section A.4.7.

[6] https://ourauckland.aucklandcouncil.govt.nz/news/2025/01/flaming-start-for-waste-trucks/
[7] https://www.rnz.co.nz/news/in-depth/562461/fires-linked-to-lithium-batteries-have-doubled-why-the-delay-in-dealing-with-them

Besides the obvious cost of repairing or replacing waste infrastructure, battery-related fires also have wider financial implications, with increasing cost of insurance claims and premiums. This can discourage operators from hosting and installing storage sites for e-waste and other hazardous waste that would reduce the mismanagement of batteries as well as the amount entering the kerbside waste stream. Section 3.4 further discusses issues around fires, risk, and insurance.

Battery-related fires have immediate detrimental effects to the environment, as well as delayed detrimental effects from pollution. Some small batteries have components such as lead, mercury, and cadmium that are toxic and pose risks to the health of people and the environment. These components can be exposed during fires, when damaged, or when degrading.

Extensive fire damage to waste trucks and/or waste facilities also risks the loss of waste services – for example, if a fire occurred at a significant waste facility such as a materials recovery facility (MRF), collections which relay on this facility may be affected. Even temporary pauses to kerbside collections can cause confusion to householders, both short and long term; and can also result in extensive stockpiling or landfilling of otherwise recoverable material.

The case study below shares an investigation undertaken by Auckland Council in collaboration with the University of Auckland to simulate fires in a recycling truck.

Li-ion Battery Fire Simulation Research Case Study

Auckland Council has been experiencing a rapidly increasing number of waste truck fires caused by Li-ion batteries that have been incorrectly disposed into the household waste stream. In the first two weeks of 2025, five fires occurred in rubbish and recycling trucks around Auckland; the recycling facility where the region's kerbside recycling is sorted experiences 1-2 small fires every week, mostly due to Li-ion batteries.[8]

The risks and impacts of battery-related fires are manifold – the evident risk of the fire to truck drivers or workers at facilities; the impact of toxic gases emitted by batteries to both human health and the environment; the risk of such gases reigniting even after being extinguished; potential environmental contamination upon truck loads being tipped-out (the current practice when a truck fire occurs, such that emergency responders can extinguish it); the financial implications of fire damage to trucks or facilities. Auckland Council are exploring several interventions to mitigate the risks associated with these truck fires, such as early warning systems for drivers and options for extinguishing fires within the truck.

In June 2025, the Council collaborated with University of Auckland to conduct a controlled trial, igniting a Li-ion battery in a modified truck containing a full load of household recyclable waste.[9] Environmental sampling and analysis of the air and firewater runoff was conducted throughout the simulation, assessing the toxins released due to the fire.

Toxic gases, including carbon monoxide and hydrogen fluoride, were emitted throughout the burn and reached levels well over the thresholds considered safe. Notably, the Li-ion battery continued to emit such gases even after extinguishment. This phase can also lead to gas buildup within the truck, which could lead to gas explosion within the truck, or inhalation dangers to bystanders upon opening of the truck door. There was significant contamination of the surrounding air and firewater runoff, of both persistent organic pollutants (POPs) and heavy metal and fluoride compounds.

[8] https://ourauckland.aucklandcouncil.govt.nz/news/2025/01/flaming-start-for-waste-trucks/
[9] https://www.auckland.ac.nz/en/news/2025/06/26/lithium-ion-battery-fires-world-first-trial.html

Figure 1-2: Trial Simulation of a Rubbish Truck Li-ion Battery Fire[10]

1.2.3 Alternative Battery Technologies

There are various alternative chemistries and technologies emerging that could prove less risky options than currently; in particular, mitigating some of the main risks associated with Li-ion batteries, although these are at differing levels of maturity and market-readiness.[11,12] Some key considerations include:

- similarity to Li-ion in terms of manufacturing and storage techniques would allow integration into existing manufacturing processes and facilities, enabling quicker scaling of the new battery type; and
- key benefits of Li-ion that would ideally be matched by any new battery types include the high energy density and long lifespan.

The following battery options are emerging on the market and could act as potential alternatives to the commonly used Li-ion batteries – although many are not yet widely commercially available.

Sodium-ion batteries are configured in a similar way to Li-ion, so could be produced at the same facilities. Sodium is also much more abundant and cheaper than lithium, so could be a cost-effective alternative. However, although it would provide improved safety and better temperature resistance, widespread adoption of the technology is currently hindered by sodium-ion's lower energy density and shorter lifespan.

---

[10] Lyndon Collie, Auckland Council, https://www.auckland.ac.nz/en/news/2025/06/26/lithium-ion-battery-fires-world-first-trial.html
[11] https://www.gftinc.com/blog/battery-chemistry-research-safer-sustainable-alternatives-to-lithium-ion-batteries-for-energy-storage/
[12] https://www.bbc.com/future/article/20240319-the-most-sustainable-alternatives-to-lithium-batteries

Lithium-sulphur batteries are also similar in composition to Li-ion so would benefit from the ability to be manufactured in existing plants and processes if/when commercialised. Sulphur is used as an alternative to the nickel, manganese or cobalt typically used in Li-ion batteries; sulphur is more abundant than each of these. As the technology currently stands, it has higher energy density but is limited by poor rechargeability. It therefore may suit applications such as grid storage rather than personal devices (laptops, phones etc.). It is susceptible to the formation of dendrites, which can lead to short-circuiting and failure.

Solid-state batteries have not yet been widely commercialised and are still in the early stages of development. They have the potential to be safer with higher energy density, lower risk of flammability, faster charging cycles, and a reduced risk of some issues that can cause faults in batteries. However, they may be harder to scale to widespread application, with higher costs and limited ability to integrate into existing manufacturing processes due to the difference in the composition.

Iron-air batteries could offer low-cost, long-duration energy storage, but are currently challenged by size limitations and the time required for recharging.

Zinc-manganese oxide batteries are known for their safety and cost-effectiveness but are limited in their rechargeability.

It should be noted that, although these options may reduce some of the risks associated with lithium batteries, they are unlikely to have any widespread implementation in the near future (new technologies can take decades to reach market maturity), so are unlikely to materially impact the challenges associated with waste batteries in the short-medium term.

1.2.4 Battery Recovery

Battery recovery can reduce the likelihood of small-battery related harm (e.g. pollution, fires) and recovers valuable materials for further circulation, reducing the need for mining of metals and fossil fuels. Recycling of batteries is done offshore once collected and exported by onshore waste operators. The Environmental Protection Agency (EPA) publishes a list of permit holders (in accordance with the Basel Convention)[13] who can legally export small batteries, mixed batteries, and e-waste (which may contain batteries). Most current permits are for export to South Korea (42,200 tonnes, or 83%), and the permit holder with the largest tonnes allocated is Phoenix Metal Recyclers Limited (15,500 tonnes, 30%). The majority of the permits held are for used lead acid batteries (45,000 tonnes, or 88%). There is one company (Halliburton New Zealand) who holds a permit specifically for lithium batteries (10 tonnes), however lithium batteries will also be captured in the mixed battery and e-waste permit categories.

Once undamaged small batteries are consolidated by collection points (retailers, transfer stations, etc.) they are sent to operators (typically export permit holders) for sorting ahead of being exported for recycling. When batteries are received for sorting, they are typically classified by chemistry types, separated from devices if embedded, discharged, packaged according to international regulations, then shipped overseas for recycling.

Once received by offshore recyclers the batteries are further separated, likely through a shredding system to separate plastics, metals, and black mass (comprised of valuable metals ideal for battery cathodes and anodes). The shredding system may use magnetic separation for steel, air separation for plastic, and hydro or pyrometallurgy for other metals. Separated materials and black mass can then be used for new steel and battery components.[14]

---

[13] Current permits for hazardous waste | EPA
[14] https://www.stuff.co.nz/nz-news/360635983/councils-are-banning-putting-batteries-bin-so-what-earth-should-you-do-them

1.3 Scope

It is important to clearly define what a small battery is and isn't, and which lifecycle stages are considered. This establishes the parameters for the stakeholder engagement, required research and data analysis, and consideration of negative impacts.

1.3.1 Small Batteries Scope

Simply put, as decided by the Working Group, small batteries are batteries that are under 5kg. This excludes those captured by the Battery Industry Group (B.I.G) scheme (such as traction/auxiliary batteries in vehicles and boats, and home energy storage).[15] These smaller batteries are not currently subject to a developing product stewardship scheme (PSS), nor benefit from the increasing level of responsible end-of-use management.

Table 1-2 presents examples of small batteries that are in scope, and examples of their uses.

Table 1-2: Examples of Small Batteries

Small Battery Type	Example of Uses
Button and coin batteries	Watches, remotes, key fobs, and hearing aids
Cylindrical batteries (A, C, D)	Small devices such as remotes, torches, toys, digital cameras
Rectangular batteries (6V, 9V)	Smoke and gas detectors, radios, clocks, and toys
Device-specific batteries	Branded and specific to devices: vapes, laptops, digital cameras, and power tools
Power banks	Charge smartphones, tablets, and laptops
E-mobility batteries under 5kg	E-scooters and e-bikes

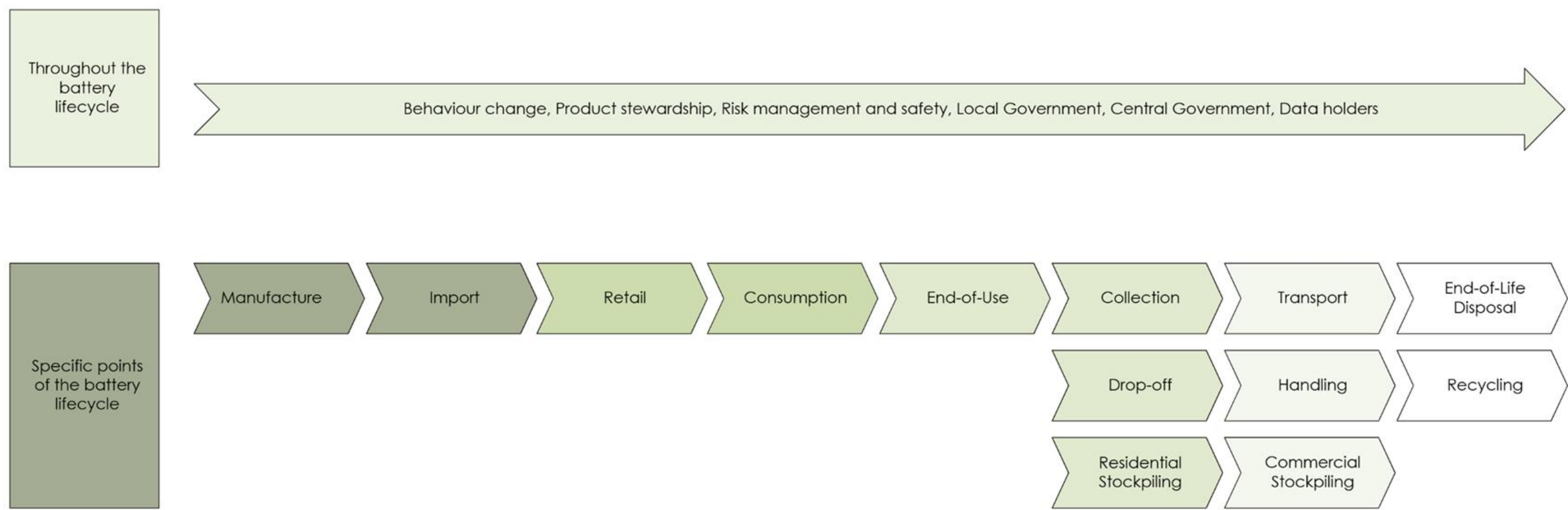
Note that this table does not provide an exhaustive list of small batteries, and there may be some small amount of crossover with other schemes and projects.

1.3.2 Small Battery Lifecycle Scope

To further illustrate the batteries that are considered in the environmental scan, a flow chart depicting the small battery lifecycle is shown in Figure 1-3. The flowchart follows the journey from a small battery being manufactured or imported to New Zealand, to when it is recovered or disposed of. Throughout the journey there are many stakeholders; some that consider specific points of a battery's journey (as per the lower sequence of arrows) and some throughout (as per the top arrow). All stages and stakeholders across the flowchart below are considered in scope.

[15] https://big.org.nz/

Figure 1-3: Scope of the Small Battery Lifecycle



1.3.3 Stakeholders and Stakeholder Engagement Scope

Twelve key groups, across 256 contacts, were identified for stakeholder engagement and were invited to participate in workshops, interviews, and surveys; to confirm suspected issues and identify those not already known to the project team. While the stakeholder engagement involved canvassing potential solutions, identification and prioritisation was out of scope. Table 1-3 shows the 12 key groups stakeholders fell into, noting that some stakeholders sat across multiple groups.

Table 1-3: Stakeholder Groups

Stakeholders interest groups	Stakeholders at stages of the battery lifecycle
1. Behaviour Change	7. Manufacturers and Importers
2. Product Stewardship	8. Retailers and Consumers
3. Risk Management and Health and Safety	9. Collection Points
4. Local Government	10. Waste Handlers
5. Central Government	11. End-of-Life Capture
6. Data Holders	12. Recyclers

1.3.4 National Data Scope

A literature scan was conducted of available data that may enable the quantification of batteries on the market in New Zealand. Section 2.6 considers the data available and its limitations and provides estimates of quantities where possible. This quantification is highly limited; batteries can be imported into the country either as standalone items or embedded within other products, where they are unlikely to be represented in the data. At the other end of the lifecycle, many waste batteries are stockpiled in homes and may never be evident in data flows; others may be captured in the e-waste stream, where their quantities are not disaggregated from other materials.

Data provided by FENZ has been used to estimate the number of battery-related fire incidents[16] that have occurred each year, presented in Section 3.4. While there are, again, limitations to this data, it demonstrates the broad trend of the increasing frequency of battery fires, and particularly those relating to lithium batteries.

1.3.5 International Research Scope

Research considered for global solutions is presented in Section 4.0. The project team reviewed solutions across Australia, Europe, and the United Kingdom. The solutions included retail take-back schemes, communications with customers, transport and handling, and compliance and enforcement. While the research identifies solutions that have been effective internationally, this report does not make assessments or recommendations for the potential implementation in New Zealand.

[16] Only significant fires, as smaller fires are not currently reported to FENZ

1.3.6 Negative Impacts Scope

Negative Impacts in Scope

The negative impacts of small batteries that are in scope are those that arise when small batteries reach end-of-use or end-of-life and become waste (for the purpose of this report, waste is material that intended to be reused, recycled, or disposed of). These issues were found in research and across stakeholder engagement and are summarised in Section 3.0.

Negative Impacts Out of Scope

While this environmental scan focuses on end-of-life issues brought forward by the small battery sector, it is important to consider the wider impact of batteries to appreciate the need to reduce the harm associated with batteries and maximise battery recovery and recycling rates. Three notable, but out-of-scope, issues are outlined below to illustrate how far-reaching the negative impacts of batteries are.

1. Mineral Extraction

The materials used within small batteries are sourced through mining of metals and fossil fuels; which causes environmental harm including land take and biodiversity loss, contamination of land and water, greenhouse gas emissions, and extensive water use, alongside social harm including poor health and safety of workers, child slavery, and displacement of indigenous communities.[17,18]

The majority of the lithium used in small batteries is mined from an area of salt flats in South America, deemed the Lithium Triangle. Mining in this area consumes around 65% of the region's water supply and has caused the salt flat to sink up to 2cm per year[19,20] while also resulting in extensive loss of vegetation cover and lagoons, affecting indigenous communities, wildlife, and the environment.[20]

Although tantalum, tin, tungsten, and gold (known as conflict minerals) are not used directly in small batteries they are essential components of consumer electronics (e.g. smartphones, tablets, and computers) which small batteries are a part of. Extraction of conflict minerals in the Democratic Republic of Congo (DRC) caused the EU, US, and OECD to introduce legislation to reduce the contribution to violence and exploitation in DRC from conflict mineral profits.[21] Trading and profit of the conflict minerals can be used to fund guerilla movements, with serious issues of worker exploitation, child labour, modern slavery, and violence. The various pieces of legislation require conflict minerals to be reported to ensure companies undertake due diligence to ensure materials were not sourced from conflict zones (deemed "DRC-conflict free" under the SEC rule).[22] This reduces the likelihood that armed groups are extracting these minerals and causing further conflict.

2. Toxicity

The impact of toxic chemicals and, notably, heavy metals can also be very significant, particularly if batteries are mishandled at end-of-life. The toxic components of batteries become dangerous to humans when touched, ingested, or fumes are inhaled, or to the environment when fires or leaching occurs. The most common small batteries are of an alkaline chemistry, which contain no heavy metals and have low toxicity relative to lithium batteries (mainly from manganese and zinc). Currently, alkaline batteries are not considered hazardous waste by the US EPA, although the EU and California do now

---

[17] Lifecycle social impacts of lithium-ion batteries, Energy Research & Social Science, Volume 118, 2024
[18] Potential Environmental and Human Health Impacts of Rechargeable Lithium Batteries in Electronic Waste, Daniel Hsing Po Kang et al, Environ Sci Technol Journal. 2013
[19] https://news.mongabay.com/2025/09/lithium-mining-leaves-severe-impacts-in-chile-but-new-methods-exist-report/
[20] https://www.instituteforenergyresearch.org/renewable/environmental-impacts-of-lithium-ion-batteries/
[21] https://policy.trade.ec.europa.eu/development-and-sustainability/conflict-minerals-regulation/regulation-explained_en
[22] https://www.responsiblemineralsinitiative.org/about/faq/general-questions/what-are-conflict-minerals/

require them to be handled as hazardous waste.[23] Unlike the European Union, which has banned the sale of most consumer nickel-cadmium batteries due to the toxic cadmium content, New Zealand does not have a comprehensive ban on their sale or use. However, as part of its commitment to the international Minamata Convention on Mercury[24], New Zealand does prohibit the import of mercury-containing batteries, and their production is also restricted.

3. Energy intensity

There are significant positive climate change impacts associated with battery use and the wider decarbonisation of electricity use however the extraction, processing, and manufacture cycles for small batteries are themselves very energy intensive. The increasing use of renewable energy in electricity grids and increasing end-of life recycling rates reduce this impact significantly. There often remains, however, a lack of economic incentive to recycle in places like New Zealand where it is not mandated; given that processes used in recycling batteries to reclaim metals often require more energy use and overall cost than extracting and refining those metals from ores (with the exception of lead-acid batteries, which are recycled via an energy-efficient process).[25]

How materials are sourced, toxicity, and energy efficiency sit outside of the typical waste hierarchy which considers waste. Auckland Council published an extended waste hierarchy titled an ‘environment-centred pyramid' in the 2024 Waste Minimisation and Management Plan (WMMP) included in A.2.0. While the upper tiers of the waste hierarchy (reduce, reuse, recycle) are relevant, the upper tiers of the environment-centred pyramid (regenerate, restore, replenish) gives importance to the environment and people, both of which are harmed or are at risk of harm at all stages in the battery lifecycle.

1.4 Methodology

The environmental scan covered two workstreams, stakeholder engagement and desktop research, which were undertaken simultaneously. The workstreams are outlined in more detail below.

1.4.1 Stakeholder Engagement

The stakeholder engagement sought a wide range of input to understand the breadth of the problem while also enabling in-depth discussion to develop insights that are not readily available in literature. The foundational components were to produce a stakeholder database, map, and engagement plan. The plan identified that the majority of stakeholders could effectively be engaged through workshops and interviews, supported by surveys and peer review components. These surveys and interviews were a tool used to gather both quantitative and structured qualitative data. Findings from the engagement were used to inform the issues, challenges and barriers identified in Section 3.0.

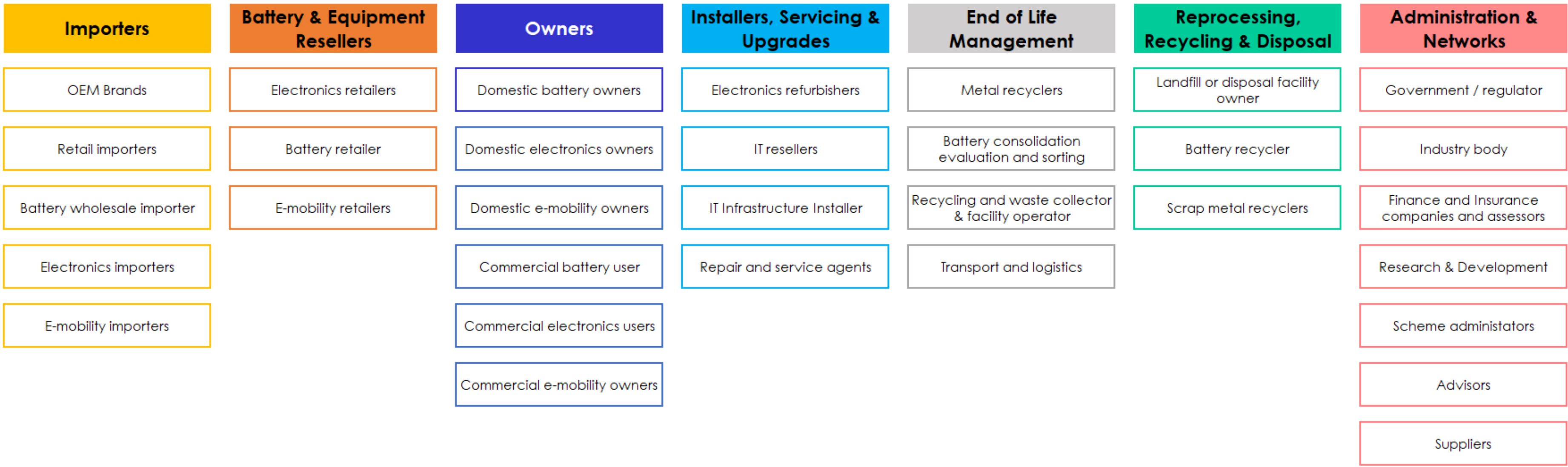
Specific mana whenua engagement was not undertaken for this report. Any future work done, for example the design of a small battery PSS, should prioritise early and meaningful engagement with mana whenua.

[23] https://environment.ec.europa.eu/news/battery-related-waste-codes-update-set-boost-circular-economy-2025-03-05_en
[24] https://minamataconvention.org/en
[25] Life Cycle Analysis of AA Alkaline Batteries, Ramsey Hamade et al, Procedia Manufacturing, Volume 43, 2020

1.4.1.1 Stakeholder Mapping

The stakeholder engagement plan was supported by a value chain map and stakeholder database. A simplified version of the value chain map is shown in Figure 1-4, and identifies the types of stakeholders involved in the small battery lifecycle. Alongside this, the database was a live document that enabled the wider project team to enter details for any identified stakeholder, allocate appropriate engagement method/s, assign a project team member as the key contact, and track engagement with the stakeholder.

Figure 1-4: Value Chain Map



1.4.1.2 Workshops

The value chain map, database, and consideration of appropriate engagement methods for each stakeholder guided the implementation of the engagement. Workshop groupings were designed to achieve a functional split of stakeholders, considering numbers in each group and sectors.

This process resulted in eight primary workshop groups:

1. Behaviour Change
2. Manufacturers and Importers
3. Retailers and Consumers
4. Collection Points
5. Waste Operators
6. End-of-Life
7. Government Agencies
8. Territorial Authorities

These workshops were attended by a total of 79 unique attendees and 129 total attendees. One additional workshop was held for the members of the Waste and Recycling Industry Association, which followed more of a stakeholder interview format with this small established group.

Attendees were able to self-select for all workshops, except for the workshops for central government agencies and for territorial authority officers. The structure of each of the eight main workshops allowed for open discussion amongst stakeholders of the relevant issues and challenges they face. Each workshop was recorded, and brief notes and outcomes were circulated to the attendees, along with a brief feedback survey.

1.4.1.3 Interviews

Some stakeholders were designated as 'key', based on their level of interest, influence, and/or involvement; and were interviewed individually (in addition to their desired workshop participation); such as larger waste companies, government agencies, and recycling companies.

Seventeen interviews were held with stakeholders including those involved in industry associations and bodies, product stewardship (both e-waste and otherwise), risk management and health and safety, and government. The interviews followed a proforma to capture consistent information about the organisation, their relationship to batteries (if any), any data they hold, issues and risks they experience, behaviour change, barriers to better management, and preferred solutions.

1.4.2 Research

The research workstream looked both nationally and internationally to understand the current landscape of small batteries, related issues, and types of solutions. Findings from the research were used to inform sections 2.0 and 4.0. The research undertaken covered the topics outlined in Table 1-4.

Table 1-4: Research Components

Current New Zealand battery landscape
• Analysis of the small battery lifecycle and quantification of small batteries and products containing small batteries • Inventory of schemes and initiatives • Environmental and operational risks • Key chemistries of batteries in the NZ market • Small battery-related fires, specifically surveys to FENZ, TAs, and waste operators, communications from TAs and media, and ways to reduce these fires.
International solutions to battery-related issues identified during research
• Product stewardship through voluntary retail take-back programmes • Behaviour change through labelling, communications, and instructions to consumers • Transport and handling • Mandatory PSS • Compliance and enforcement • Alternative technologies to lithium batteries.

2.0 National Context

This section introduces the Māori context including te ao Māori (Māori worldview), with links between creation myths and associated whakapapa (lineage) to kaitiakitanga (guardianship) of te taiao (environment), and other principles explored. Case studies of para kore (zero waste) in action are included in appendix A.4.1 as inspiration when considering how best to manage small batteries at end-of-use. Following this, guiding documents including the Waste Minimisation Act (2008), product stewardship, the waste levy, responsibilities of territorial authorities and other national and international standards relating to small battery management used will be presented. The section will also explore the current infrastructure and drop off points available across the country, various stakeholders involved in the small battery life cycle, environmental and operational risks. Finally, this section further sets the scene by quantifying small batteries through available NZ data.

2.1 Te Ao Māori

Some Māori believe that the beginning of life started with only darkness, Te Kore, a void. From Te Kore emerged Ranginui, the sky father, and Papatūānuku, the earth mother, who held each other in a seemingly inseparable embrace. Ranginui and Papatūānuku had many children, some of which grew tired of the darkness they lived in. Several children tried to separate the parents, until Tāne Mahuta (Tāne) succeeded by lying on his back and pushing his father up into the sky with his legs, away from his mother who remained on the ground. This became the world as we now know it, with the children now atua (gods) who act as kaitiaki (guardians) for all parts of nature including people, land, waterways, animals, and agriculture. Tāne is also often credited for creating the first human woman, Hineahuone. He moulded her from clay and soil, then breathed hau (essence) or mauri (life) into her nose, and she sneezed and came to life. These creation myths can connect Māori to their whakapapa. As descendants of atua, mana whenua are connected to te taiao (the environment) and act according to kaitiakitanga (guardianship) principles. It is noted that Māori are not a homogenous group, and that narratives, principles, and priorities will vary between groups and individuals.

Māori were the first ethnic group to settle in Aotearoa and arrived from East Polynesia as early as the 13th century. The British first arrived in Aotearoa in 1769, with large-scale settlement beginning in 1840. He Whakaputanga o te Rangatiratanga o Nu Tireni (Declaration of Independence of the United Tribes of New Zealand) and Te Tiriti o Waitangi (the Treaty of Waitangi) are said to be the founding documents of Aotearoa New Zealand. He Whakaputanga was signed in 1831, likely in response to potential colonisation by the French, and Te Tiriti was signed in 1840, likely in response to extensive purchases of land by the New Zealand Company.[26] While He Whakaputanga was written in Māori, Te Tiriti had two versions – Te Tiriti o Waitangi in Māori and the Treaty of Waitangi in English. Most signatures collected from rangatira (chiefs) were on the Māori version. While Māori understood what they were signing in te reo, they didn't know that the English version held different meanings.

Interpretations between the Māori and English versions of te Tiriti o Waitangi and the Treaty of Waitangi are greatly disputed. Some groups have deduced three principles - partnership, participation, and protection.[27] These principles act as tohu (guides), to ensure that Māori are included in active partnership with the Crown, that Māori rangatiratanga (sovereignty) is upheld, and that taonga (property, treasures), including the environment, are protected. Mana whenua inclusion (partnership principle) and mātauranga Māori (participation principle) can support solutions (protection principle) that not only uphold responsibilities to the treaties but also benefit te taiao, Māori, and others.

Before British settlement, Māori had waste systems that were sanitary and organised and protected residents and the environment. Māori used middens and latrines located away from living areas, and

[26] https://natlib.govt.nz/he-tohu/korero/interview-with-dame-anne-salmond
[27] https://www.auckland.ac.nz/en/news/2024/09/25/how-the-treaty--principles--evolved-and-why-they-don-t-stand-up-.html

used water deposited to land rather than bodies of water. With settlement came new challenges such as new material types, increased volumes of waste, and houses built with poor access to organised disposal of waste and water.

When considering waste alongside kaitiakitanga (guardianship), para kore (zero waste) is prioritised. This approach aligns with a circular economy where prevention at the first instance is prioritised and material at end-of-use is recovered, however para kore expects recovery to be done in a way that does not harm te taiao. Para kore uses mātauranga Māori (knowledge) and tikanga (customs) to determine the best pathways to minimise and manage waste. It also considers generations to come and how current generations can reduce harm done to te taiao now through cycles and regeneration.

Most products we use day-to-day are made from materials associated with social and environmental harm, but the benefits associated with our standard of living mean that people ignore or are unaware of this harm. Small battery components are mostly sourced through mining (oil for plastics, elements and chemicals for metals and electrolyte components). Mining for these materials mostly takes place offshore and causes significant harm to the environment and people, as discussed in Section 1.3.6. Once the mined components are made into batteries and the batteries are in circulation, and particularly at end-of-life, they pose harm to the environment such as leaching toxic chemicals and causing fires in waste trucks and at waste facilities, as discussed in Section 1.2.2. Although these materials and products are sourced and made in other countries, the risks are not only actualised internationally but also here in Aotearoa.[28]

Materials and products that are imported to Aotearoa may be viewed as manuhiri (guests). Under a tikanga lens, hosts of manuhiri have obligations and responsibilities to care for them. Given that the materials and products did not originate in Aotearoa they pose a burden to the systems and environments as they are not designed to safely or effectively manage them. A te ao Māori perspective may raise that mana motuhake (self-determination) extends to the ability of mana whenua to determine whether the import, distribution, normalisation, and risks of small batteries are acceptable, where the limits should be set, and how the consequences will be managed.

Burdens of small batteries are essentially forced downstream from start-of-life buyers and manufacturers to people who did not explicitly accept the conditions or responsibility to manage the materials at end-of-life such as consumers, some retailers, councils, and waste trucks and waste facilities. The limited visibility of data such as imports, exports, and fires analysed in Section 3.0 as well as batteries embedded in products undermines the whakapapa (history) of small batteries and associated risks. By obscuring the quantity of and negative impacts associated with small batteries the start-of-life buyers and manufacturers avoid accountability and responsibility. Visibility allows for prevention as the quantification supports answering the question of whether risks should be tolerated, as well as risk reduction as members of the small battery sector are able to form informed plans and strategies for end-of-life management.

Te ao Māori and para kore perspectives lean toward cyclical regeneration and prioritise prevention over downstream mitigation. While this report focuses on battery management once small batteries have become waste, the te ao Māori lens prompts the location of responsibility to fall earlier in the lifecycle. Recognising responsibility earlier in the small battery lifecycle avoids the ethical issue of responsibility being placed on those with the least influence of risks and the greatest pressures and consequences to respond to. Section 2.2.1 of the report details how e-waste has been declared as a priority product and is awaiting a PSS, and Section 4.0 talks to approaches taken internationally to manage small batteries at end-of-life. Given the para kore lens' focus on prevention, methods to prevent and/or minimise harm are listed below:

- Reject mining of metals and plastics

[28] While this report discusses environmental and operational risks, it does not elaborate on how these risks extend to communities and across generations, which a te ao Māori perspective is likely to prioritise.

- Reject use of virgin materials for manufacture
- Reuse metals that are already in circulation
- Utilise political levers (product bans, product stewardship, levies, improved data requirements)
- Deliver consumer education (product transparency, right to repair, conscious consumption) and provide consumer access to systems like repair, reuse, and recovery.

Two examples of para kore (zero waste) in practice are presented in the appendix (A.4.1) to illustrate how Māori-led projects prevent materials from becoming waste.

2.2 Waste Minimisation Act (2008)

The Waste Minimisation Act 2008 (WMA) is New Zealand's principal legislation for reducing waste and its environmental impact.[29] It provides the regulatory framework and economic instruments to achieve this purpose, including product bans, priority product declarations, PSS, and the waste disposal levy. The Act also clarifies the obligations of territorial authorities in relation to waste management and minimisation and establishes the Waste Advisory Board to advise the Minister for the Environment. The following sections will explore product stewardship, TA responsibilities, and proposed changes to the Act. Information on the waste disposal levy can be found in appendix A.3.1.

2.2.1 Product Stewardship

Product Stewardship Schemes (PSS) are one tool that may be applied to direct markets towards more sustainable and equitable outcomes, with greater responsibilities for 'producers' across their product lifecycles.

The intention of PSS is to internalise 'externalities' and deal with so-called 'market failures', i.e. the costs that are not normally picked-up by commercial manufacturers and importers (notably the costs of managing the waste product at its end of life), and potentially not at all (e.g. the upstream environmental impacts of production, such as environmental impacts from mining). Ensuring producers pay towards end-of-life costs allows the gap to be filled between the net revenues that can be obtained from commercial waste management operations (which are often low and can, in some cases, be negative), and the actual cost of proper environmental management to meet desirable environmental outcomes.

The aim can also be to encourage those involved throughout the supply chain to ensure that these external impacts are minimised. Early PSS in Europe, and most outside of Europe, have focused on ensuring that systems are in place to collect and recover, or safely dispose of, the in-scope products once they reach their end-of-life; this being funded by the producers. More recent European schemes have been more ambitious, introducing incentives to improve product design for durability, use of sustainable materials, and to facilitate repair, reuse and recycling.

Importantly, regulated product stewardship (RPS) obligations apply to both domestically produced and imported products, helping to level the playing field and reduce the prevalence of low-quality imports. Obligated producers generally include manufacturers, importers and/or brand owners, while retailers/distributors may also have certain obligations placed upon them. Under a regulated product stewardship model, participation in the scheme for producers is mandated. This prevents the problem of 'free riders' where some importers/manufacturers avoid contributing to the scheme, placing a greater burden on those that do participate and fund the initiative.

[29] https://www.legislation.govt.nz/act/public/2008/0089/latest/DLM999802.html

2.2.1.1 Product Stewardship Schemes in New Zealand

The WMA allows for two types of product stewardship – mandated and voluntary. Both types can be accredited by the Minister for the Environment (the Minister). Accreditation allows the Minister to endorse and give credibility to a scheme. The two scheme types are explained below, and a national inventory of priority schemes is provided in appendix A.4.3.

- **Voluntary product stewardship**: product stewardship organisations can voluntarily choose to develop a PSS and have it accredited by the Minister (if it meets the specific criteria).
- **Mandatory (priority product stewardship)**: when a product has been declared a 'priority product' a PSS must be developed, and accreditation must be obtained "as soon as practicable"[30].

In 2020, Government declared electrical and electronic products (or e-waste, including batteries) as one of six priority products for mandatory product stewardship under the WMA. This means that a PSS must be developed and accredited, and regulations can be made to support the accredited scheme, such as the regulation to prohibit the sale of the product except in accordance with an accredited scheme. In response to this declaration:

- The Batteries Industry Group (B.I.G.)[31] proposed a large battery PSS design in 2021 for batteries weighting over 5 kilograms.
- TechCollect New Zealand[32] submitted an e-waste PSS design in 2023, followed by an application for accreditation in 2025. The proposed e-waste PSS design would capture small batteries that are embedded in in-scope products; with loose small batteries captured in a later phase of the scheme.

Further information about PSS can be found in appendix A.4.3. The Ministry for the Environment's (MfE) website states that e-waste is complex by nature and further work is still required to advance these projects.[33]

As an aside, a prohibition of sale was declared in June 2025 for disposable vapes (typically powered by Li-ion batteries), due to their accessibility to young people and associated detrimental health effects. While this was enacted under the Smokefree Environments and Regulated Products Amendment Act (No 2) 2024 (2024 No 53),[34] not under the WMA, there are relevant co-benefits of reducing waste and risks associated with lithium batteries.[35] Unfortunately, the Government revoked the requirement of vapes to have removable batteries in September 2025.[36] While allowing embedded batteries may not increase rates of vaping, embedded batteries require extra steps for recovery and consumers are less likely to make the connection that the device has a battery, risking improper disposal.

2.2.2 Responsibilities of Territorial Authorities

While TAs are not strictly required to provide general waste management services, they are required to ensure that appropriate facilities and services are available.

Many TAs identify small batteries, amongst other 'difficult to manage' waste streams, in their Waste Management and Minimisation Plans (WMMPs, required under the WMA). Some directly address the issue

[30] Section 10 of the WMA
[31] https://big.org.nz/
[32] https://techcollect.nz/
[33] https://environment.govt.nz/what-government-is-doing/areas-of-work/waste/product-stewardship/priority-product-stewardship/
[34] Smokefree Environments and Regulated Products Act 1990 No 108 (as at 17 June 2025), Public Act 20FA Prohibition of disposable vaping devices – New Zealand Legislation. https://www.legislation.govt.nz/act/public/1990/108/en/latest/#LMS1448824
[35] https://www.beehive.govt.nz/release/vapes-stores-go-dark-disposable-vapes-banned
[36] https://www.health.govt.nz/regulation-legislation/vaping-herbal-smoking-and-smokeless-tobacco/requirements/recent-changes-to-smokefree-laws

through various tools; such as providing or funding drop-off points for small batteries, educating residents and businesses about appropriate management, undertaking behaviour change campaigns to improve the understanding of small batteries with a view to reducing waste and harm, and providing grants to their communities for small battery-associated work.

TAs cannot, however, implement any regulation relating to small batteries from a centralised EPR or PSS perspective. Most TAs also don't operate at a scale sufficient to justify investment in their own small battery recycling systems or infrastructure, beyond acting as a collection and aggregation point for existing recycling systems. As a result, larger, centralised action will be required to fully manage end-of-life small batteries.

2.2.3 Proposed Changes to the WMA

In December 2025 the Minister for the Environment published a proactive release of a Cabinet paper discussing waste legislation amendments.[37] In this proactive release the Minister proposes changes, including to:

- Adjust the allocation of waste levy funds, with the intention of recognising costs that smaller councils face; moving "*from a purely population-based allocation to a base rate of 20 per cent of the total portion plus a population-based calculation of 80 per cent of the total portion*".
- Provide more flexibility for councils to spend their waste levy funds on a wider range of waste and environmental priority activities
- Replace the existing product stewardship provisions with a new framework for EPR.

The proposed changes to the framework for a modernised EPR would:

- Remove the requirement for accreditation of voluntary product stewardship and declarations of priority products
- Enable the appointment of suitable PROs, clarify delegated roles of the PROs and the Secretary for the Environment, including empowering PROs to set scheme charges
- Improve financial management and governance for effective monitoring and enforcement
- Make PROs responsible for the day-to-day operation of the scheme, and the Minister for the Environment to set performance expectations via regulations.

If this proposed framework for a modernised EPR comes into effect, small batteries will no longer need to be declared a priority product to have a regulated scheme put in place. This means that there could in theory be a regulated PSS in place for small batteries outside of the RPS for e-waste. It does, however, mean that an accredited voluntary PSS is no longer an option.

2.3 Collection Points

There are currently no operational facilities to reprocess or recover the valuable components of batteries onshore in New Zealand; to effect recovery, batteries must therefore be exported. Because of the dangers posed by used batteries, there are restrictions on their transport and shipping. Batteries must be prepared correctly for export, presenting barriers and costs to freight companies and exporters. Given

[37] Minister for the Environment (2025). Proactive-release-of-Cabinet-paper-for-waste-legislation-Ammendments. Available at: Proactive-release-of-Cabinet-paper-for-waste-legislation-amendments.pdf

the lack of onshore facilities, proper management and recovery is expensive and can be inaccessible to consumers and other stakeholders.

Where export or specialist handling is not feasible (e.g. batteries are damaged) they may instead be stabilised through encasement in concrete and disposed to landfill. This process represents a significant loss of recoverable materials and a system gap.

2.3.1 WasteMINZ Map of Battery Recycling and Collection Facilities

WasteMINZ have compiled a map that shows sites across the country, both free and paid, where consumers can drop off their small batteries; shown in Figure 2-1. Most of the free facilities highlighted on this map are either council-funded or provided by major retailers. Some individual businesses or community groups also provide drop off points, but in many cases the cost is passed onto the consumers. This map also shows the geographical gaps across the country as the east coast of the North Island and the west coast of the South Island. These gaps are likely due to sparse populations and logistical inaccessibility; areas that are either physically difficult to reach or where providing services is not operationally or cost-effective given distance, transport constraints, and low service volumes. In practice, this means that residents in these areas must either stockpile their batteries until a trip to a disposal site is worthwhile or, perhaps more likely, dispose of batteries through municipal waste streams, as this option is more accessible to them.

Figure 2-1: WasteMINZ Map of Battery Recycling and Collection Facilities[38]

2.4 Export Permit Holders

Historically, the e-waste collection and processing sector has been characterised by a relatively large number of smaller operations that were often not-for-profit or community based. This has changed over the last 5-10 years as the sector has become more visible, and larger operators have emerged. However, only a subset of recyclers hold export permits, meaning that much of New Zealand's e-waste ultimately relies on a small number of accredited operators to move materials offshore for responsible processing. Phoenix Metal Recyclers and Upcycle are the only holders of a permit specifically for mixed battery waste (some operators hold permits specifically for used lead-acid batteries).

As discussed earlier in Section 1.2.4, the EPA administer export permits, and a full list of current permit holders is provided on their website.

[38] https://www.wasteminz.org.nz/our-work/battery-recycling-and-collection-facilities

2.5 Import, Transport, and Export Standards

This section provides detail for small battery import and use within New Zealand (HSNO Codes of Practice), transport standards within New Zealand (the Dangerous Goods Rule), and international export conventions (Basel and Waigani Conventions).

2.5.1 HSNO Act

In New Zealand, approval is required under the Hazardous Substances and New Organisms Act 1996 (HSNO Act) before any hazardous substances can be imported, manufactured, supplied or used. According to the HSNO Act, a hazardous substance is any substance with one or more of the following characteristics:

- Explosiveness
- Flammability
- Capacity to oxidise
- Corrosiveness
- Toxicity (including chronic toxicity)
- Ecotoxicity, with or without bioaccumulation; or
- Which on contact with water or air generate a substance with the above properties.[39]

Although batteries have characteristics in this list, New Zealand EPA have made an exemption for batteries as they are seen as "manufactured articles" rather than hazardous substances, meaning that batteries do not need to be approved under the HSNO Act.[40,41] This exemption has practical implications, particularly in relation to import controls and regulatory oversight. Where a product is subject to HSNO approval, it is typically linked to customs and border management systems through HS classification codes, which can trigger automatic flags at the point of import. When there is a trigger at the point of import, Customs is able to identify consignments for compliance checks and confirm that the relevant approvals, controls, permits, and safety requirements are in place. Because batteries are exempt from HSNO approval as manufactured articles, these HSNO-linked import screening and approval mechanisms generally are absent.

However, this does not mean small batteries are unregulated or not a dangerous good. Risk management responsibilities are addressed through other regulatory frameworks, including dangerous goods transport rules, workplace health and safety requirements and international frameworks for waste batteries such as the Basel Convention, explored earlier in Section 2.3.3.

[39] Section 2. The Hazardous Substances and New Organisms Act 1996. Available at: https://www.legislation.govt.nz/act/public/1996/0030/latest/DLM381227.html
[40] EPA. Hazardous Substances, How we manage hazardous substances. Available at: https://www.epa.govt.nz/hazardous-substances/how-we-manage-hazardous-substances/about-hazardous-substances-and-hsno/
[41] Note: when batteries are broken, opened, or during transport they then are considered dangerous goods (Class 8 for lead-acid, Class 9 for lithium)

2.5.2 The Dangerous Goods Rule

The Land Transport Rule Dangerous Goods (2005) is often referred to as the Dangerous Goods Rule (Rule) sits alongside the Land Transport Act (1998).[42,43] The Rule came about to ensure the safe transport of dangerous goods within New Zealand. It does this by setting requirements for consignors (i.e. manufacturers, importers, and distributors), loaders, and drivers and operators. The Rule essentially limits risk by setting quantity limits for the transport of dangerous goods (including small batteries), outlines for how they should be packaged, handled, and transported, and requires appropriate documentation to be kept and shared with other parties involved in the transport of the goods. The Rule also has provisions to audit vehicles and issue enforcement penalties (fines) if breaches have been made by consignors, loaders, and drivers and operators.

The Dangerous Goods Rule is one of a variety of dangerous goods regulatory systems. Other regulatory systems that are relevant to the transport of dangerous goods are shown in appendix A.4.5.

2.5.3 The Basel and Waigani Conventions

The Basel Convention dates to 1989 and was the first global agreement on transboundary (inter-country) control of hazardous wastes;[44] a major aim being to prevent the dumping of hazardous waste from developed and industrialised (notably OECD and EU) countries on less developed countries that lacked the means to treat that waste safely and effectively. The convention now extends to controls over 'other wastes requiring special consideration' as well as hazardous wastes and specifically includes e-waste. Controls include notification, prior informed consent (PIC), and movement tracking. New Zealand became a signatory of the Basel Convention in 1994.

The Waigani Convention[45] is modelled on the Basel Convention. It applies the strict controls of the Basel Convention to the South Pacific area and ensures that hazardous waste cannot travel from New Zealand or Australia to another Pacific country.

In addition, the OECD's Decision of the Council on the Control of Transboundary Movements of Wastes Destined for Recovery Operations regulates the sending of hazardous waste between OECD countries. It establishes a streamlined, two-tier control system (Green for certain hazardous wastes and Amber for others) to facilitate environmentally sound management in an efficient way.

In New Zealand these agreements have been ratified by parliament and are legally binding. They are administered by the Ministry for the Environment, largely through the Imports and Exports (Restrictions) Prohibition Order (No 2) 2004,[46] with import and export permits administered by the EPA.[47]

2.5.3.1 Controls on the export of wastes

Under the Basel Convention, transboundary movements of hazardous wastes and 'other wastes' requiring 'special consideration' are permitted only if:

---

[42] New Zealand Transport Agency Waka Kotahi. Dangerous Goods 2005. Available at: https://www.nzta.govt.nz/assets/resources/rules/docs/dangerous-goods-2005.pdf

[43] Fortune Manning. 8-Dangerous-Goods. Available at: https://fortunemanning.co.nz/wp-content/uploads/2019/12/8-Dangerous-Goods.pdf

[44] UNEP, Basel Convention, *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal*, https://www.basel.int/TheConvention/Overview/TextoftheConvention/tabid/1275/Default.aspx

[45] Waigani Convention, *The Convention to Ban the importation into Forum Island Countries of Hazardous and Radioactive Wastes and to Control the Transboundary Movement of Hazardous wastes within the South Pacific Region*, https://www.sprep.org/convention-secretariat/waigani-convention

[46] https://www.legislation.govt.nz/secondary-legislation/pco-drafted/2004/202/en/latest/#DLM271704

[47] https://www.epa.govt.nz/hazardous-substances/certificates-permits-and-permissions/hazardous-waste-shipping/hazardous-waste-including-e-waste/

- Such wastes, if exported, are managed in an environmentally sound manner in the country of import or elsewhere; and
- One of the following conditions is met:
    - The country of export does not have the technical capacity and the necessary facilities, capacity or suitable disposal sites to dispose of the wastes in question in an environmentally sound and efficient manner; or
    - The wastes in question are required as a raw material for recycling or recovery industries in the country of import; or
    - The transboundary movement in question is in accordance with other criteria decided by the parties.

The Basel and Waigani Conventions have set up a very strict control system, based on the PIC procedure of the notification of transboundary movement of hazardous wastes (or 'other wastes' subject to the Basel Convention). This means that transboundary movements of hazardous wastes (or 'other wastes') can take place only upon prior written approval of the Competent Authorities of the State of import and transit. Parties have adopted a 'notification document' for this purpose. The waste shipment may occur only after the transit and receiving countries have given consent for the shipment.

Furthermore, each shipment of hazardous wastes (or other wastes subject to the Basel Convention) must be accompanied by a '*movement document*' from the point at which a transboundary movement begins to the point of disposal, including countries through which the waste transits. All Parties have the sovereign right to prohibit or restrict transboundary movements of hazardous and/or other wastes and can impose additional requirements on such movements in their territory.

Best practice is also that the wastes are transported according to generally accepted and recognized packaging, labelling and transport international rules and standards, such as the United Nations Recommendations on the Transport of Dangerous Goods and Model Regulations.[48]

This approach was seen as ineffective in regard to exports to developing countries (non-OECD and EU states under Annex VII of Basel), however, and in 1994 a 'Ban Amendment' to the Basel Convention was agreed. This is a full export ban on all forms of hazardous wastes to developing countries, from OECD and EU countries, for reuse, recycling and other recovery operations as well as disposal. This 'Ban Amendment' came into force in 2019, and so far has been ratified by 104 of the Parties to the Basel Convention.

2.5.3.2 E-waste and the Basel Convention

In 2022, amendments were made to Annexes II, VIII and IX to the Convention by adding entries on electrical and electronic waste specifically, clarifying the situation around movement of e-wastes.

- Annex II (waste that requires special consideration: subject to the PIC procedure): addition of new entry Y49 covering all e-wastes; equipment, its components and wastes from the processing of e-waste (e. g. fractions from shredding), except for those e-wastes covered by entry A1181 (in Annex VIII);
- Annex VIII (waste presumed to be hazardous: subject to the PIC procedure): addition of new entry A1181 covering hazardous e-wastes; equipment, its components and wastes from the processing of e-waste (e. g. fractions from shredding), and deletion of existing entry A1180;

[48] UN, 2019, *Recommendations on the Transport of Dangerous Goods, Model Regulations, Volume I, Twenty-first revised edition*, https://unece.org/fileadmin/DAM/trans/danger/publi/unrec/rev21/ST-SG-AC10-1r21e_Vol1_WEB.pdf

- Annex IX (waste presumed not to be hazardous: not subject to the PIC procedure): deletion of the existing e-waste entries B1110 (e-wastes) and B4030 (single-use cameras).

Under this amendment, e-waste is defined as any electrical or electronic equipment that is waste, including all components, sub-assemblies, and consumables, which are discarded, intended to be discarded, or required to be discarded. Batteries are included as e-waste with various codes under the convention, including A1170 for unsorted waste batteries. There are recently updated technical guidelines on the environmentally sound management (ESM) of waste lead-acid batteries and draft (May 2025) technical guidelines on the ESM of other waste batteries[49]. It is worth noting that certain plastic waste is also a regulated material under Basel.

Under the Basel Convention, hazardous wastes are defined as:

- wastes that belong to any category contained in Annex I (e.g. containing or contaminated with cadmium, lead, mercury, organohalogen compounds or other Annex I constituents) unless they do not possess any of the hazardous characteristics contained in Annex III; and

- wastes that are not covered under the above, but are defined as, or are considered to be, hazardous wastes by the domestic legislation of the Party of export, import or transit.

It is important to note that the Ban Amendment relating to a ban of waste exports to developing countries, only applies to the hazardous e-wastes, defined under Annex VIII, not the 'other waste requiring special consideration' under Annex II. This applies to those countries that have ratified the 'Ban Amendment' (Annex VII of the Basel Convention).

In terms of the export of used electrical and electronic equipment, there are two key factors:

- Whether the used EEE is waste or intended for reuse; and

- Whether the e-waste is hazardous, or still requiring 'special consideration' under Basel (i.e. problematic even if non-hazardous per se)

If the answer to both questions is yes, then the e-waste can only be exported under the Basel restrictions (and Waigani Convention restrictions if exporting to the Pacific).

It is also worth noting that, through disassembly and testing, the quantity of hazardous waste can often be reduced or isolated and export restrictions eased – e.g. by removing hazardous printed circuit boards from metal assemblies it then becomes unambiguously non-hazardous, and without the need for export controls. However, importers and exporters should contact the EPA to determine whether a permit is required.

2.5.3.3 Current New Zealand procedures

The Basel Convention amendments regarding e-waste became effective on 1 January 2025, after which date both hazardous and non-hazardous e-waste transboundary movements are subject to the PIC procedure. This means that in New Zealand importers and exporters of all e-waste, including non-hazardous e-waste, need a permit to ship their waste. Previously, permits were only required for hazardous e-waste.

Under the Basel Convention, shipments without proper permits may be:

---

[49] The guidelines can be found here by selecting 'e-waste' in the filter: Revised technical guidelines on transboundary movements of electrical and electronic waste and used electrical and electronic equipment, in particular regarding the distinction between waste and non waste under the Basel Convention

- Denied entry at the destination
- Stopped in transit
- Returned to the country of origin at the exporter's expense.

Annex II entry Y49 of the Basel Convention, on 'other wastes' requiring special consideration, can include mixed and non-hazardous e-waste, but these wastes still need trade controls to protect the environment and provide transparency due to the likelihood of improper management (e.g. informal recycling or dumping due to proper recycling being uneconomic). The default control procedure is still therefore PIC – i.e. Prior Informed Consent sought from the importing nation.

For further information see the EPA website: New permit requirements for e-waste

2.6 National Quantification

There is no comprehensive dataset quantifying the number of batteries placed on the market in New Zealand. The limited available data has significant gaps and limitations which are outlined and discussed below.

The available datasets evaluated are outlined in Table 2-1. The data from FENZ and the Ministry of Health has been reviewed as it is presented; the data from Stats NZ has previously been used by Eunomia for modelling in another project, with limited further analysis conducted for this report.

Table 2-1: Datasets Evaluated for Small Battery Quantification

Data Owner	Dataset	Limitations
FENZ (Fire and Emergency New Zealand)	Lithium Batteries – What's the Problem (2020)	Fragmented datasets, difficult to quantify embedded batteries
Stats NZ	Import data (2022)	Categorisation and descriptions are not always explicit and clear. Items can be miscategorised. Quantity is not mandatory.
Ministry of Health	Notifiable product annual sales returns for vapes (2024)	Incomplete data, not recommended for use in in-depth research or analysis.

2.6.1 WasteMINZ Great Battery Hunt

WasteMINZ started an awareness campaign called the Great Battery Hunt in September 2025.[50] The campaign was not intended to be statistically sound but engaged people across the country and had interesting findings. The campaign found that the average home had 73 batteries and that 82% of people guessed that there were less batteries in their home than there were.

[50] https://www.wasteminz.org.nz/batteryhunt

2.6.2 FENZ Data

A 2020 report from FENZ quantifying the size of the Li-ion battery market in New Zealand, faced challenges with fragmented datasets.[51] The report assessed products that are likely to contain an embedded Li-ion battery (such as laptops, cell phones, power tools etc.), but found it was not possible to conclusively quantify these markets due to the wide variety of both uses and routes into New Zealand. Table 2-2 summarises the findings presented in the report.

Table 2-2: Quantification of Market Size for Common Battery-Containing Products

Item	Battery type / size	Market size
Laptops	Mostly in the 40-65 watt-hours (Wh) range, but can be up to 100-110 Wh.	Not quantified
Cell phones	Capacities are generally increasing, from an average of 2,500 milliampere-hours (mAh) in 2013 to 3,400 mAh in 2018.	4.96 million devices in active use in 2018, a 27% increase from 2017. Consumers are likely to also hold onto old devices; a UK survey found that 45% of participants stored at least 5 unused devices at home.
Power tools	Historically powered by NiCd or NiMH batteries, most now use Li-ion with rapidly growing capacities.	Not quantified
Power banks	Increasingly popular, with some up to 150 Wh.	Not quantified
E-scooters and e-bikes	Typically 36 volts (V) and range from 7 to 17 Ah, i.e. 252 - 612 Wh.	Almost 4,500 commercially operated e-scooters across NZ (e.g. Lime, Flamingo). 40,000 existing e-bikes in NZ in 2018, with an additional 47,000 e-bikes and e-scooters imported that year.
Vapes	Generally contain 1-2 standard Li-ion cells in series.	Not quantified.

2.6.3 Stats NZ Data

Data is published by Stats NZ for items being imported and exported into/out of New Zealand. This data has been assessed by Eunomia to estimate the quantity of batteries and products that likely contain batteries. There were significant limitations to the data, requiring various assumptions and extrapolations to be made:

- Identifying electrical and electronic products within the import data:

[51] Fire Emergency New Zealand, January 2020, Lithium Batteries – What's the Problem?, available at: https://www.fireandemergency.nz/assets/Documents/Files/Report_174_Lithium_Batteries_Whats_the_problem.pdf

- The categorisation and descriptions associated with import data are not always explicit and clear in what type of item it refers to. It is also possible for importers to miscategorise items.
- Although data on the financial value of imports is mandatory and always recorded, data on the quantity is not always captured. Where only financial data is available, assumptions have been made to convert this to the quantity in terms of number of units where feasible.
- Where the quantity of items is recorded, this could be according to various units of quantity: no. of items or weight are the most typical, but others can also be used (e.g. "no. of cells").

- Imported loose batteries are categorised by their chemistry, so the type of battery can be readily identified:
  - In many cases, the description specified the item as having a volume either higher or lower than 300cm^3; batteries above this threshold were excluded, as they would not be considered in scope of 'small batteries'.
- For electrical and electronic items, we have reviewed the types of products and assigned the typical battery chemistry that would likely be used with that product. It has been assumed that each imported product contains one battery. Further detail can be found in Appendix A.1.0.

A summary of this estimated quantification of battery types is provided in Table 2-3.

Table 2-3: Estimate of the Quantities of Small Batteries Imported into New Zealand, by Type

Battery type	Number of units (millions) imported in 2022			
	Loose	Embedded in devices	Total	%
Alkaline	41.0	18.9	**59.9**	55%
Li-ion	2.0	24.3	**26.3**	22%
Other lithium	3.4	-	**3.4**	3%
Button*	-	0.9	**0.9**	1%
Carbon zinc	8.9	-	**8.9**	8%
Air zinc	3.9	-	**3.9**	4%
Nickel cadmium	1.4	-	**1.4**	1%
Nickel metal hydride	0.6	-	**0.6**	1%
Silver oxide	0.2	-	**0.2**	<1%
Manganese dioxide	0.02		**0.02**	<1%
Mercuric oxide	0.01	-	**0.01**	<1%
Other**	6.1	-	**6.1**	6%
Total	**65.4**	**44.0**	**109.5**	

* Some devices, such as watches and pocket calculators, typically use button batteries so were assigned this battery type. Button batteries can be a range of chemistries, including zinc, lithium, manganese dioxide, and silver oxide.

** The import data includes one category for all batteries “other than manganese dioxide, mercuric oxide, silver oxide, lithium or air-zinc” (all of which are captured elsewhere).

2.6.4 Vapes and Smartphones

Of particular interest is the import of certain devices that are becoming increasingly prevalent and are also typically powered by Li-ion batteries. Vapes, for example, have grown massively in popularity in recent years. They are a ‘notifiable product’, meaning retailers must notify the Ministry of Health that they sell these products.[52] The Ministry of Health publishes annual returns filed by manufacturers, importers and retailers, but it is noted that the estimate of the total sales is based on incomplete data.

- The Stats NZ import data point relating to vapes[53] was only recorded in terms of the financial value, with $52.6 million worth imported in 2022. Using assumptions such as the average value of a single vape product (financial value upon import, not retail price) suggests that around 10.5 million vapes were imported in 2022, although this figure is dependent on the assumptions used.

- The Ministry of Health data relating to importers and manufacturers suggests that over 12.9 million items (of various sizes) were placed on the NZ market in 2024.[54]

Similarly, the use of mobile phones, which tend to be powered by Li-ion batteries, has grown significantly in recent years.

- The data point relating to mobile phones[55] was also not always recorded in terms of quantity (some data lines were, but the majority were not). Over $1.1 billion worth of products were imported in 2022. Using assumptions such as the average value of a single product (financial value upon import, not retail price) suggests that around 2.3 million units were imported in 2022.

[52] https://www.health.govt.nz/regulation-legislation/vaping-herbal-smoking-and-smokeless-tobacco/requirements/regulatory-guidelines
[53] HS code 8543.400.000 Electrical machines and apparatus; electronic cigarettes and similar personal electric vaporising devices
[54] https://www.health.govt.nz/regulation-legislation/vaping-herbal-smoking-and-smokeless-tobacco/requirements/complete-a-notifiable-product-annual-return/annual-returns-2024
[55] HS code 8517.130.000 Telephone sets; smartphones for cellular or other wireless networks

3.0 Issues, Challenges, and Barriers to Better Management Identified in Stakeholder Engagement

The issues, challenges, and barriers were primarily explored through workshops and interviews. While the key issues identified in each workshop varied slightly, it was broadly seen that many of the issues reflected just slightly different experiences of the same base problem. The issues were defined during the workshops using the wording and terminology of the stakeholders involved. A full list of the issues identified and prioritised by attendees is presented in Appendix A.2.0.

During the individual interviews with key stakeholders, issues and themes were not quantified to the same extent. However, key concerns and issues were discussed with each stakeholder and can also be categorised into the same key themes.

The priority issues fell into the following six key themes, which are discussed in more detail in the following sections:

1. Ownership and responsibility
2. Legislation, regulation, and guidelines
3. Imports, data and monitoring
4. Fires, risk and insurance
5. End-of-life management
6. Consumer education and behaviour.

The key themes often have specific issues that overlap and could be addressed through common improvements - explored as recommendations in Section 5.0.

3.1 Ownership and Responsibility

There is currently a perceived lack of clarity on who is, or should be, taking leadership in ensuring small batteries are managed better across their lifecycle. All other key issues can be seen as downstream effects of this absent or minimal responsibility; and are likely to greatly resolved or facilitated once ownership and responsibility is clear.

It is also notable that this project has not been able to successfully engage with the retail or manufacturing sectors, beyond interviews with a few key stakeholders. This restricts their ability to act collectively and effectively across the small battery lifecycle and indicates a perceived lack of responsibility.

Some stakeholders suggested that this issue is partly reflective of wider confusion at the central government level about where regulation of waste materials sits, with both the EPA and MfE holding a role (and with MfE also working on strategy and policy).

For example, there is no single entity responsible for the implementation and enforcement of the existing legislation and regulation that is in place. When exporting waste from New Zealand, permits are required if it is considered hazardous; the EPA takes a reactive approach to enforcement of these permits. Items

being imported and exported are only 'flagged' by Customs if there is an automated alert in place for the tariff code used.[56] In this case,

This is an issue faced internationally as well – stakeholders in Australia noted similar challenges; despite legislation, such as mandatory export permitting under both the Commonwealth and EPA, neither party enforces this and the responsibility is passed around. The issue is, however, exacerbated in New Zealand, where there is no active onshore recycling so there is no alternative to exporting.

Without a PSS in place, the responsibility for and costs of collection and end of life management falls largely upon the consumers and TAs, or on the retailers that have voluntarily implemented collection points. Similarly, the responsibility for behaviour change and messaging to the public currently falls largely upon the TAs who are currently dealing firsthand with many of the challenges associated with the end-of-life of batteries – rather than stakeholders at the beginning of the lifecycle who have the most influence to reduce risk (i.e. central government, government-adjacent agencies, manufacturers, importers, and retailers).

There are other downstream impacts of fragmented approaches to guidance for stakeholders for management, storage, handling, risk mitigation and management. This results in organisation-specific codes of practice, which are unshared often due to perceptions of potential legal risks (e.g. if information is incorrect) or a commercial advantage.

Lack of ownership and uncoordinated action has led to a siloed approach to end-of-life management of batteries; playing a part in the confusion that consumers face (discussed further in Section 3.6) and discouraging participation.

This also means that there is little planning or research undertaken for end-of-life management for future needs to meet the increasing and changing small battery waste stream.

3.2 Legislation, Regulation, and Guidelines

There is currently a lack of consistent, battery-specific regulation or legislation concerning the handling or management of batteries at the end of their life. A range of regulatory and industry bodies are involved at various points; including MfE, EPA, WorkSafe, FENZ, and waste sector organisations like WasteMINZ and the WRIA. This has created a commercial gap – without clear signals from the government about future legislative direction, industry has been reluctant to significantly invest or drive progress. Even though Government declared 'electrical and electronic products (e-waste including batteries)' as priority products in June 2020, there has been stagnation with progress in the development of PSS, with no confirmed funding for the next stages of implementation. There also remains no PSS that directly captures small batteries, while noting the intention is for a subsequent stage of the TechCollect programme to cover small batteries.[57]

Existing regulation is viewed as confusing, outdated, and in some cases absent (i.e. individuals or businesses that are on-selling or taking part in second hand marketplaces). There is a lack of clarity about which regulations and standards to follow, and how. The HSNO Act does not cover small batteries meaning that there are currently no import controls or oversight (i.e. import flags, compliance checks, granular data) specifically relating to small batteries. There is also confusion amongst the industry around exactly how the Basel Convention applies to (or does not apply) to small battery shipments out of New Zealand, with some stakeholders holding permits for export of mixed e-waste, which may include batteries. There are also beliefs that a loophole exists, where exporters classify e-waste and small battery-containing waste simply as waste to export without a permit. Even amongst government agencies, there can be a lack of clarity around whether certain used batteries fall under international conventions that

---

[56] A tariff, or HS, code is a numerical code used to classify imported goods in New Zealand's customs system, identifying what the product is and determining the applicable duties, taxes, and trade controls.
[57] National-Network-Assessment-Report—-E-product-and-e-waste-management-services-in-Aotearoa-New-Zealand_WEB.pdf

would require them to have a permit or not (standards and permits are discussed further in Section 2.5). The Waste Minimisation Act review provides further complexity as it is not certain that provision for priority products and PSS will apply or be implemented in the same way under future legislation, particularly voluntary schemes.

As discussed in Section 3.1, a key concern raised by stakeholders is that without a central agency taking leadership on the development of legislation, regulation and guidelines, there is disjointed and inconsistent work underway with potentially duplicated effort across the sectors, variable accessibility to developed guidance, and multiple gaps. Without clear roles, responsibilities, and clear ownership it adds further risk to businesses or organisations that want to create and or publish guidance in the cases that it is incorrect and/or adds confusion, and there is no official avenue to seek funding.

A lack of consistent guidelines also impacts stakeholders across the value chain, in addition to those importing and exporting – organisations who could act as collection points, such as retailers and community groups, face uncertainty around how to safely handle used batteries, the risks associated, and the potential impacts on their operations, such as costs and accessibility of insurance.

Comprehensive guidance could alleviate these concerns and encourage willingness to accept used batteries, which would also have the benefit of increasing accessibility for consumers. The lack of clear regulation for small batteries also leaves the door open for informal and ad hoc recycling operations, which may not be operating in an ideal manner in terms of battery storage and reuse of 'end-of-use' small batteries. There is no guidance for managing battery stockpiles (or legislation to define a stockpile) which can occur when there are commercial loads of small batteries deposited at a drop-off point for residential waste, at these informal operations, or when processing initiatives are closed. Stockpiling can also occur at the consumer stage of the lifecycle when costs for, or access to, correct disposal routes are prohibitive.

Stakeholders reported knowledge of various guidance documents being developed, such as through the WRIA and WasteMINZ, FENZ guidance for consumers relating to fires, and by specific recyclers. The need for clearer, consistent, guidance and best practice was also highlighted by the Insurance Council as a key factor in driving down insurance costs by clearly identifying and mitigating risks through best practice.

A question raised in several stakeholder workshops was how to manage damaged batteries and battery fires – while there are a number of products on the market, those handling these items need impartial and effective advice about which tools to use and when.

Without legislation and regulation, the biggest impact of small batteries management tends to fall to those that are 'the ambulance at the bottom of the cliff' – TAs, waste operators, community recycling centres, and recyclers. The lack of clear guidance relating to how small batteries should be managed results in confusion and the increased likelihood that they will be managed in an incorrect and/or unsafe manner.

The international research identified a number of examples of best practice guidelines, such as the UK Environment Agency technical guidelines;[58] it is likely that some of these could easily be applied in New Zealand following review to ensure they reflect the local context.

3.3 Imports, Data, and Monitoring

The overarching challenge being faced by the waste management sector is the rapidly increasing number and chemistries of batteries, and battery-containing products, being placed on the market that subsequently enter the waste stream. There also needs to be a clear definition of what falls into the

---

[58] https://consult.environment-agency.gov.uk/environment-and-business/waste-batteries-appropriate-measures-for-permitted/supporting_documents/Waste batteries_appropriate measures for permitted facilities guidance.pdf

"small battery" category. Currently there is scope for confusion around, for example, modular battery systems as once separated they could technically be viewed as small batteries.

There is a notable lack of data on small batteries, meaning it is hard to ascertain the true scale of the problem. It is essentially unknown how many batteries are being placed on the market in New Zealand, either being sold individually, or embedded in other devices. As shown in appendix A.1.0, some estimates have been made; suggesting that more than 100 million units (loose and embedded) are likely to have been imported into New Zealand in 2022. It is important to note that this data has many limitations as Customs do not actively monitor small batteries and the system relies on self-reporting from importers (for all products) and involves large quantities of data. For Customs to track small batteries they would need to be included in the HSNO Act or some other very specific ruling; however, the EPA is clear that batteries are exempt as the intention of their use is not explicitly hazardous. Batteries imported specifically as a battery product come with country of import and country of manufacture; while a product containing a battery will only come with country of import for the product with little known about the battery it contains. As previously mentioned, the confusion around how to quantify modular battery systems also has repercussions for data and reporting.

In addition to the challenges of quantifying the number of batteries imported and placed on the market, there is also no quantification of the number of batteries reaching their end-of-life, both in regard to number of end-of-life batteries entering the waste stream, and the number being stored at homes, office places, or at waste facilities. It is common practice for consumers at households and offices to stockpile batteries and other e-waste until they have 'enough' to dispose of them, potentially due to perceived difficulty and confusion of how to do so. It is also known that waste facilities can store large quantities of batteries in case reprocessors or other end points don't have capacity or end-markets to manage or on-sell components. Being able to quantify the potential market size is crucial to planning of legislation, responsibilities and jobs, and infrastructure. This quantification would also encourage industry investment, with reassurance that there is a significant enough waste stream for any planned facilities to be viable.

Anecdotally, stakeholders across the value chain report that Li-ion batteries have surged in popularity, and the associated risks have emerged as a new consideration for the waste sector. The Stats NZ import data suggests that alkaline batteries are still the most commonly used, although a significant amount of Li-ion batteries are also anticipated to have been imported, and most of these are embedded in devices rather than imported loose. Globally, the number of both types of batteries dwarfs any other individual type of small battery.

The increasing popularity of products with embedded batteries, such as vapes and e-mobility devices (e.g. e-bikes and e-scooters), creates additional challenges with the management of such products at end-of-life, due to the difficulty of separating the battery from the device in addition to the standard material processing.[59] Products like these are being imported into New Zealand both by retailers in bulk, and also individually by consumers through online marketplaces which are particularly difficult to monitor and address through legislation.

Retailers reported challenges with a lack of detail and data relating to the items they are importing. While there are existing systems for managing sourcing and inventory, which do record whether a product contains a battery; they do not record detailed information about the batteries, such as their chemistry or size.

Some stakeholders noted concerns around low quality batteries being imported. Particularly with the rise in purchases of both cheaper electrical items and loose small batteries from online marketplaces, it is possible for batteries to enter New Zealand without testing and without meeting the quality standards typically required. For example, WorkSafe have identified imported batteries that have a very similar

[59] Note: while disposable vapes have been banned by the New Zealand Government as of June 2025, rechargeable vapes do not have to have removable batteries as of September 2025. https://www.beehive.govt.nz/release/removeable-battery-regulations-revoked

appearance to high quality batteries from reputable manufacturers, but lack the equivalent verifiable testing and quality control.

While WorkSafe do collect some data, this only relates to battery-related uses that falls within their remit; i.e. any items that are used for work purposes. Significant issues are likely to be found within poorly regulated retail spaces like online trading marketplaces (e.g. Facebook marketplace), online retailers, and drop shippers (i.e. businesses that order items from suppliers on behalf of customers rather than keeping inventory).

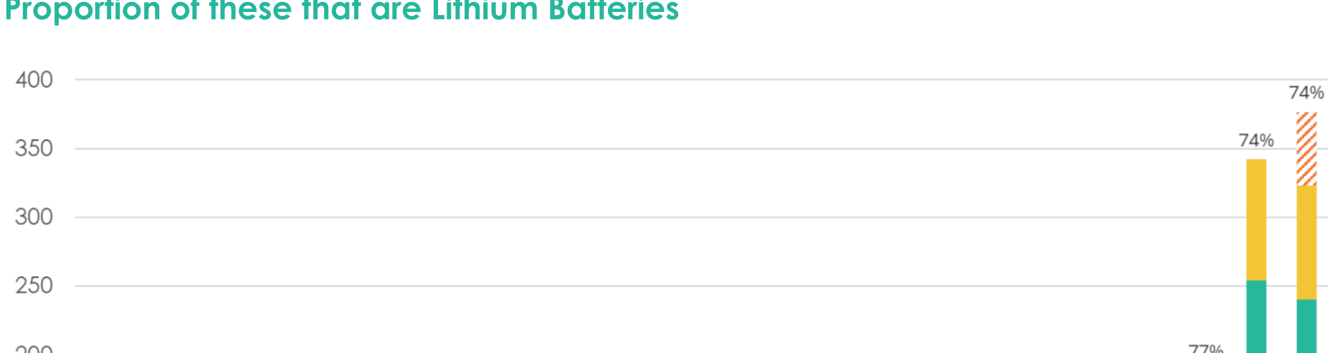
3.4 Fires, Risk, and Insurance

The number of potentially battery-related fires appears to have been increasing in recent years; sometimes causing significant and costly damage to both vehicles, facilities, and buildings, along with the risk of damage to the environment and human health. While the report scope focuses on batteries as a waste stream, and thus battery-related fires that occur at waste trucks and at waste facilities, it does acknowledge that fires occur in the battery use phase (active operation and discharging) in many varied environments. Impacts of fires were introduced in Section 1.2.2 and included the environmental impacts of immediate fire response (e.g. health risks, pollution), and ongoing risks (e.g. pollution, staff and services, rebuilding, insurance).

Data provided by FENZ, presented in Figure 3-1, gives an indication of the increasing number of battery-related fires across New Zealand. There are some limitations to this data in terms of the way it is recorded and how it has been interpreted in order to identify lithium battery fires. The data has been retrieved from the FENZ system based on meeting certain search term criteria – there is the possibility that some fires are captured in this data that are not in fact related to batteries, as the categorisation (e.g. relating to "power devices") may also capture other causes. The data from FENZ was retrieved on 11th November 2025, and as such does not quite account for the full 2025 calendar year. An estimate for the year has been calculated and is shown in Figure 3-1.

Where possible, cases were identified that specifically mentioned lithium, lithium-polymer, or Li-ion batteries, or mention devices such as power tools, e-mobility, mobile phones, laptops or vapes (as these devices are typically powered by lithium batteries). This enabled the estimation of the proportion of battery fires that are related to lithium batteries as opposed to other chemistries. This may also be limited by other variables such as cases where the type of battery was not recorded or recorded inaccurately.

Figure 3-1: Number of Battery Fires Experienced per Year in New Zealand, and the Proportion of these that are Lithium Batteries



The data clearly shows a dramatic increase in the number of battery-related fires, generally since around 2012 but particularly in the last 2 years (although this is in part due to the way in which data has been recorded by FENZ; the need to begin identifying when batteries were involved led to a change in reporting, implemented in early 2024).

The average number of battery fires per year throughout the 2020s has increased nearly 20-fold compared to the average number per year during the 2000s. It should be noted that the figures reported will only capture fires that FENZ are called to; less serious incidents that are dealt with onsite without involvement from FENZ will not be captured. Discussions with stakeholders revealed that this frequently occurs at waste facilities, where small fires are often identified and handled quickly onsite[60]. One stakeholder raised that their waste facility experiences at least three small battery-related fires per week, which are often handled by stomping on the fire and suffocating it.

Figure 3-1 also reveals a general trend of an increasing proportion of battery fires being caused by lithium batteries, rather than other chemistries – from roughly less than a quarter until around 2012, rising to around two-thirds to three-quarters throughout the 2020s.

Stakeholders noted that such fires can have a range of causes, such as products being incorrectly charged or stored, or batteries being damaged – either already upon receival to a facility, or occurring at the facility itself, e.g. during the collection and handling of waste, batteries can be pierced or crushed by impact with machinery.

Waste operators report that the nature of battery fires means they can escalate quickly and are difficult to extinguish; thermal runaway can mean a fire appears to be extinguished and then re-ignite. There can be limited knowledge of methods to manage them (as opposed to non-battery fires) amongst staff at facilities due to their recent emergence as an issue. They therefore can result in substantial damage to

[60] While these fires are reported internally, there is currently no requirement to report these fires externally. This meaning that there is not a full understanding of the quantity of these kinds of fires.

vehicles and facilities, with recovery efforts being expensive, as well as causing disruption to the operation of facilities, resulting in loss of service and increased costs to the operator.

A 2024 survey conducted by the Australian Council of Recycling (ACOR), surveying around a quarter of the waste and resource recovery sector, assessed the increasing costs related to the impacts of battery fires, as shown in Table 3-1.[61]

Table 3-1: Estimated annual cost increases related to battery fires at waste and resource recovery facilities in Australia

Cost element	Average (NZ$[62])
Damage, rebuilding, and replacement costs, including vehicles	$208,135
Insurance increases	$136,613
Clean-up costs	$113,047
Legal costs	$22,491
Feedstock losses	$18,256
Workplace compensation	$957
Fines and penalties	$0
Total	**$499,509**

As a result of the significant risks of such fires, operators across the value chain in New Zealand are beginning to face difficulties with insurance; there are indications that operators may be declined insurance if they are collecting batteries for recycling, or face significantly higher costs of insurance. The 2024 ACOR survey found that increasing insurance costs were one of the highest contributors to the costs of battery-related fires, having risen on average by $114,200 AUD over the 12 preceding months.

Some New Zealand operators are opting to self-insure as a way of managing this challenge. Stakeholders report that in Australia, where take-back networks are becoming more well developed than in New Zealand, this is also a concern – although no big retailers have dropped out of the scheme due to this challenge (likely because they can afford to self-insure), smaller operators may not wish to partake in the scheme due to this risk.

The Insurance Council proposed that the waste sector develop a set of industry best-practice standards for those involved in handling end-of-life small batteries. This is a tool that has been used effectively in other sectors. Insurance risk can be clearly assessed when insurers have a clear understanding of exactly what clients should have in place to manage and mitigate the risks involved. Practices vary significantly across the sector at present, with varying use of measures such as fire-proof collection and storage containers and locating collection points away from the main fire exits of retail outlets.

Similarly, stakeholders note that fewer transportation operators are willing to accept Li-ion batteries due to the risks of fires. One recycler noted that in Australia they operate their own fleet of vehicles to transport batteries and are facing challenges in New Zealand; particularly with inter-island transportation

[61] ACOR, *Industry survey: Battery fires in waste & recycling*, June 2024, https://acor.org.au/wp-content/uploads/2024/06/240603-ACOR-battery-fire-survey-summary.pdf
[62] Converted to NZ$ using exchange rate 1AUD:1.196NZD

on the ferries. This may become even more problematic for New Zealand in the future. No onshore processing exists, so all batteries must be exported internationally for any processing to occur; these shipping routes may be restricted or unavailable if transportation operators are no longer willing to accept batteries.

3.5 End-of-life Management

With the relatively recent rise in the quantity and types of batteries in the waste stream, industry practices have changed significantly as a response. A growing proportion are now being recovered for recycling, but collection points, waste trucks, and waste facility operators are facing growing challenges with their handling. The increasing interest in separating batteries for recycling can cause issues, with some retailers reporting that domestic consumer collection points in-store can be overwhelmed by large quantities of batteries from commercial sources, dumping of batteries when the collection point is closed, and damaged batteries that require different treatment and pose an increased risk of fires. This misuse of collection points, whether intentional or unintentional, places additional responsibility and cost burdens on collection point operators.

The rapidly changing battery market means that increased, new, knowledge – as well as new technology – is required for safe handling and management across the small battery lifecycle, which is not widely employed. Risk mitigation measures for fires can include actions such as staff training, sprinkler systems, thermal cameras, rapid response and isolation, and provision of appropriate extinguishers. Stakeholders noted that guidance is not widely available, particularly for more challenging situations such as dealing with damaged batteries which pose a higher risk and require specialised treatment.

As discussed in Section 3.1, various parties in the waste sector have developed guidelines for end-of-life management in the absence of national legislation and official guidelines but these are not widely shared for a variety of reasons; and there may also be other guidance that is currently in development. There is therefore a risk of duplication as well as contradictions in work currently underway.

Retailer drop-off points are often managed by staff that are typically customer-facing and not necessarily trained to identify compliant items. This can result in the unintentional acceptance of non-compliant items (including small batteries) without understanding the risks or impacts. Collection points also reported instances of consumer "dumping" after hours, when the quantities and types of batteries dropped off cannot be monitored. Operators in Australia note that this is not a challenge there because there is an established PSS providing a legitimate route for such items.

There are instances of poor practices being employed, mainly as an interim while handlers wait for sufficient facilities, treatment, and advice to emerge. For example, end-of-life operators may be stockpiling batteries (both damaged and not) until a feasible, safe route emerges – but in the meantime, those stockpiles themselves pose serious risks. Stockpiles can occur when operators are unclear of the proper means of disposal or recovery, cannot afford these options, options for disposal or recovery are not available, or when there is no end market available.

Currently, the accepted solution for damaged batteries is to encase them in concrete, but this is not always feasible for operators, and anecdotally some landfills are also no longer accepting batteries in this condition. Dropping off damaged batteries often incurs extra cost, as the handling requires extra care and there is no income received (as there would be for selling recyclable components and this is usually passed on to the consumer that is trying to dispose of their waste responsibly.

Devices containing embedded batteries also pose a large challenge, as they are harder to process with additional steps required such as separating the battery from the other materials, and conducting a charge test prior to processing. When these devices are recognised by consumers and drop-off points, they may incur a cost that is greater than that of a separate battery because of these additional steps, and this cost may be a barrier to consumers resulting in inappropriate methods of disposal increasing the likelihood of harm to people, the environment, and infrastructure. There are no requirements for these

items to be manufactured in a way that enables batteries to be removed easily, whether for safe disposal at end-of-life or replacement of the battery.

There is currently no active onshore processing in New Zealand for any batteries – recyclers note that a critical mass needs to be reached for this to become economically viable. One collector anecdotally reports growth of 20-30% per year, so these volumes may soon be reached. The industry's approach to processing is also evolving, with growing interest in recovery of materials and a move towards recycling to black mass (a byproduct from shredding that is comprised of valuable metals) – but scale and surety of supply is needed.

3.6 Consumer Education and Behaviour

Across the majority of the value chain from retailers, collection points and waste handlers, concerns around consumer handling of waste batteries were raised as a major challenge.

It was widely recognised that there is currently a limited number of drop-off and collection options across New Zealand where consumers can safely dispose of batteries, and also that even where collection points exist, they are often not widely accessible (e.g. can only be reached by car, cost, operating hours, conditions of what is accepted, etc.) which limits consumers' ability and likelihood of using suitable options.

An added challenge is limited consumer knowledge that leads to incorrect behaviour. Stakeholders believe that much of the public do not realise that batteries can be a problem in the waste stream and should be taken to dedicated collection points, so instead simply dispose of them in their household kerbside bins. Some stakeholders indicated that they believe consumers may interpret alkaline household batteries as safe to be disposed of in regular bins, due to the more prominent messaging around lithium batteries in comparison and historic messaging around end-of-life battery management.

A further knowledge gap is the minimal awareness of consumers that certain items contain batteries. Products with embedded batteries that are commonly used in households include vapes, toothbrushes, toys, light-up shoes, and greeting cards; many do not have an obvious, visible, removable battery. This can lead to consumers being unaware that a product contains a battery as the product does not trigger the same awareness.

There is also a lack of meaningful and consistent messaging to consumers. Ambiguous phrasing such as "recycle responsibly" or "dispose of responsibly", and mixed messages due to the fragmented approach and inconsistent approach to the collection and handling of batteries across the country, contribute to confusion for consumers. The use of the term "recycle" also connects consumers to kerbside recycling bins rather than a specific form of recycling suitable for small batteries. Alongside inconsistent language, there is also no consistent labelling such as symbols or colours. There is typically a disconnect between the consumer and the ultimate processor, and at each stage in between, messaging can be lost.

An example is the requirement of collection points that consumers tape the terminals of batteries for recycling collections. This requirement is a recent change that is encouraged by FENZ alongside collection points, TAs, etc. Collection point stakeholders reported that they still face challenges with promoting this safe behaviour.

Another example of confusion and accessibility limitations for consumers is the various retailers that do or do not take back products, or are variable in what they may or may not accept. Retailer types that more commonly accept take-back of products include vape, hardware, and electronic retailers, however not all retailers do. In some cases, a retail chain may offer take-back, but it has not been rolled out at all of the individual stores due to the high cost of operating the collection points.

Consumer behaviour that can result in unsafe situations (e.g. fires, pollution, exposure to toxic chemicals) include disposing of batteries in kerbside bins and not taping terminals at drop-off points, dropping off large or commercial quantities at points intended for household use only, dropping off batteries and

devices at points not intended for their collection, or dropping off (i.e. dumping) after hours. Incorrect or undesired use of drop-off points may or may not be intentional, but is likely to be reduced with better education to consumers supported by proper overview of use by staff who should be trained in safe battery handling. In the case of intentional misuse, education and accessibility may also reduce occurrences.

4.0 International Approaches

4.1 The EU and the UK

Europe first introduced legislation specific to batteries in 1991, placing limits on the concentration of certain heavy metals and goals for recycling rates.[63] The directive was met with much resistance from the industry, and was poorly implemented, leading to a limited impact on the control of the waste stream; with collection rates remaining low.[64] Much of the early battery-related legislation in the EU and the UK was developed and implemented prior to the relatively recent rise in incidents involving fires that can be attributed to Li-ion batteries. These early pieces of legislation were largely designed as a response to concerns around the environmental impact of batteries, rather than emerging safety concerns. The directive encouraged general objectives, such as the reduction of heavy-metal content and the reduction and separate disposal of end-of-life batteries, but did not set quantitative targets and applied to a limited range of batteries.

Consultations to revise the directive began in the late 1990s, with several iterations of a 2003 update drafted with less stringency and acting as a compromise between the opposing views of manufacturers and environmental proponents. Concurrently, the growing popularity of portable devices such as laptops was accompanied by a spate of battery-related fires resulting from short-circuiting and overheating, leading to increased pressure from environmental groups.[65] The outcome of this process was the EU's 2006 Batteries Directive, which focused primarily on maximum heavy metal concentrations (mercury, cadmium, lead) due to concerns about their environmental impact at the batteries' end of life.

This directive was more recently superseded by the 2023 Batteries Regulation[66], which tightens these limits, while also addressing the entire battery lifecycle: from production and sourcing to waste management and recycling, helping to drive a shift towards a circular economy. The update was considered necessary due to the rapid growth and diversification of the battery market.

The 2006 Batteries Directive had not anticipated the widespread use of batteries in new technologies such as smartphones, e-mobility, and electric vehicles, and the exponentially increasing demand for such devices. In addition, the 2006 Batteries Directive allowed Member States to transpose the objectives into national law, leading to fragmented application across the EU and complexity for producers operating internationally. The 2023 Batteries Regulation instead creates a single framework, harmonised across all EU countries.

The 2023 Batteries Regulation introduces new requirements, targets and key performance indicators spanning the entire lifecycle of batteries. A key element is the reinforcement of EPR for batteries (although this was already established in the 2006 Batteries Directive, the updated regulation applies stricter requirements). An additional regulation, introduced in 2025, supplements the 2023 Batteries Regulation with new rules for calculating and verifying the rates of recycling efficiency and recovery of materials for waste batteries.[67]

In contrast, the UK's current legislative framework, no longer directly linked with the EU, is comparatively outdated. The 2008 Batteries and Accumulator Regulations were amended in 2012 and 2015, but are in need of significant updates (which are expected in the coming years) to reflect current market realities and technological developments.

---

[63] https://eur-lex.europa.eu/eli/dir/1991/157/oj/eng
[64] https://www.vertiv.com/48df39/globalassets/documents/battcon-static-assets/2010/divergence-by-harmonisation--basics-of-the-eu-directive-on-batteries.pdf
[65] https://www.sciencedirect.com/science/article/abs/pii/S0267364907000489
[66] https://eur-lex.europa.eu/eli/reg/2023/1542/oj
[67] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:L_202500606

4.2 Australia

Throughout the 2010s, batteries emerged as an increasingly complex and problematic waste stream in Australia. The scale of the challenge grew rapidly: in 2014, approximately 17,500 tonnes of waste batteries (around 700 million units) were generated nationwide, with forecasts suggesting this could rise to between 137,000 and 186,000 tonnes (around 7.7 billion units) by 2036. The country's collection rate, however, remained notably low at less than 3%; while other OECD countries, particularly in Europe, were reaching collection rates of between 25-71%.[68] The risks and impacts of batteries that were incorrectly disposed of (i.e. to landfill) fell on the local governments that handle and manage that waste stream.

The foundation for a national response was laid in 2009, when the Australian government undertook research into international product stewardship approaches and commenced a consultation on the National Waste Policy.[69] This led to the 2011 Australia's Product Stewardship Act (since replaced by the Recycling and Waste Reduction Act 2020) which set out a legislative environment for both mandatory and voluntary PSS to be developed. The Act created a pathway for developing the Minister's list of priority products from 2012/13 through to 2020/21, with batteries identified as a priority in this list.[70,71]

Early efforts to progress this priority included the formation of the Battery Implementation Working Group, which was established in 2013. The group led investigations into the feasibility of a program, conducted research, developed discussion papers and engaged with key industry stakeholders. While there was broad recognition of the need for coordinated action, many industry representatives expressed concern that a voluntary model would be vulnerable to free-riders, resulting in inequitable costs for participants.

From 2018, the option of exporting waste batteries also became significantly more limited with the introduction of China's National Sword Policy, followed by similar bans in other south-east Asian countries; meaning countries that had previously imported Australia's recyclable waste, including batteries, would no longer do so. Additionally, shipping lines began restricting the export of Li-ion batteries due to their flammable nature and an increase in related port fires.

The Battery Stewardship Council was subsequently formed in 2018, and in 2019 published a proposed stewardship scheme for batteries. The national scheme, B-cycle, was authorised in 2020 and launched in 2022 – albeit as a voluntary scheme. The design of the scheme has recently been revisited and an updated accreditation granted in 2025 for the coming five years. Despite initial progress, the scheme has continued to face challenges similar to those encountered in earlier initiatives.

Many campaigners have advocated for a mandatory, regulated product stewardship model as the only viable pathway to achieving equitable participation and meaningful national outcomes. Similarly, there has been recent discussion amongst state and federal Environment Ministers in late 2024 regarding the need for aligned reform of mandatory battery product stewardship.[72,73]

In March 2025, New South Wales became the first Australian state to mandate a battery PSS through the introduction of the Product Lifecycle Responsibility Bill, under which the proposed battery regulation will sit. Brand owners will be required to participate in a PSS, and expands the scope compared to B-Cycle to additionally include embedded batteries in e-mobility devices.[74]

---

[68] https://bcycle.com.au/wp-content/uploads/2023/03/BSC-Authorised-Scheme-Design-20191126.pdf
[69] https://www.aph.gov.au/DocumentStore.ashx?id=c92babad-45f1-4caf-b924-00167b652f98
[70] https://stewardshipexcellence.com.au/wp-content/uploads/2022/07/COE-Annual-Report-2021.pdf
[71] https://www.globalpsc.net/wp-content/uploads/2015/02/AUS_ABRI_Battery_Regulations_MR_0215_EN.pdf
[72] https://www.dcceew.gov.au/sites/default/files/documents/emm-communique-21-june-2024.pdf
[73] https://www.dcceew.gov.au/sites/default/files/documents/emm-communique-10-dec-2024.pdf
[74] https://hdp-au-prod-app-nswepa-yoursay-files.s3.ap-southeast-2.amazonaws.com/9217/6051/0995/product-lifecycle-respons-reg-2025.PDF

4.3 Retail Take-Back

Across most of Europe, including the UK, collection networks have been set up with branded collection containers in place at retailers that sell batteries, such as supermarkets, DIY/hardware stores, and electrical retailers. Many countries collect small waste electrical and electronic equipment (WEEE) such as mobile phones and light bulbs alongside batteries. For example, the UK "Battrecycle" scheme was launched in 2023 aiming to improve the visibility, awareness and consistency of battery recycling collection points[75], and now has a network of over 30,000 locations, which can be found through an online search tool.[76]

In the UK, the Waste Batteries and Accumulators Regulations 2009[77] focuses on the end-of-life of batteries (as opposed to the 2008 Batteries and Accumulator Regulations focusing on the design and manufacture phase), mandating EPR, requiring manufacturers and importers to fund and organise the separate collection and recycling of batteries at end-of-life. There is a de minimis threshold exempting small producers who place less than 1 tonne of portable batteries on the market.

Under the EU 2023 Batteries Regulation, obligations are placed on "distributors"[78] (effectively retailers). Before making a battery available on the market, they must verify that:

- The producer is registered as required by the Regulation
- The battery is marked and labelled as required by the Regulation (i.e. CE and separate collection labelling)
- The battery is accompanied by the relevant documents required (e.g. safety information, carbon footprint, performance and durability information)

The requirement to establish a take-back and collection system is placed upon the "producers" of batteries, which in this case is defined as "any manufacturer, importer or distributor that either:

- Is established in a Member State and manufactures batteries under its own name within that territory;
- Is established in a Member State and resells batteries under its own name within that territory;
- Is established in a Member State and supplies batteries from another country on a professional basis for the first time in that territory; or
- Sells batteries by means of distance contracts directly to end-users in a Member State

In addition to this, producers of both portable (<5kg) and LMT (Light Means of Transport) batteries must establish a take-back and collection system, and this must be offered free of charge.

The collection from producers must be provided "with a frequency proportionate to the area covered and the volume and hazardous nature" of the batteries. The take-back and collection system must cover the whole territory of each Member State, "taking into account population size and density, expected volume of waste portable batteries, accessibility for and proximity to end-users" and must not be limited to areas where the system is profitable. The Regulation does not quantitatively specify what this means in real terms for the collection network, however since all distributors who sell batteries are required to take back waste batteries, this implies an extensive network would be established.

[75] https://www.wastecare.co.uk/new-recycling-initiative-battrecycle/
[76] https://www.legislation.gov.uk/uksi/2009/890
[77] https://www.legislation.gov.uk/uksi/2009/890
[78] Any natural or legal person in the supply chain, other than the manufacturer or importer, who makes a battery available on the market

To ensure that the responsibility lies with the 'producers', there must also be no requirements placed on the end-user when discarding waste batteries at such collection points, in other words consumers must not be charged or obliged to purchase a new battery.

Under the Regulation there are also targets for collection. The following lays out the targets for collection that must be met:

For portable batteries:

- 45% by 2023
- 63% by 2027
- 73% by 2030

For LMT batteries:

- 51% by 2028
- 61% by 2031.

Distributors may not be producers, if they are not the *first* to place the product on the market, and therefore may not be subject to the above requirements. However, distributors are in any case required to take back waste batteries from end-users free-of-charge. There does not appear to be any de minimis threshold on this requirement, meaning that it is not limited to distributors over a certain size or selling above a certain quantity.

The requirement on distributors to take back waste batteries from end-users does *not* extend to waste products containing batteries, and therefore, distributors are only required to take back the categories of batteries that they have themselves placed on the market. They are also not obliged to accept any quantities more than the typical amount that non-professional end-users would normally discard. In the case of any sale of a battery to an end-user that includes delivery of the product, the distributor must offer to take back waste batteries free of charge at the point of delivery, and the end-user must be informed at the point of sale of this arrangement.

In Australia, in the second full year of operation (2023/24), B-cycle reported collection rates of just 15.3%; prompting investigation into its performance.[79] As a result of this investigation, several issues were identified during spot checks of B-cycle retailers and brands, and through wider online investigation. The issues identified included the following:

- Low engagement from purportedly participating retailers:
  - Less than half of participating retailers had recycling bins at all locations
  - Bins were often not placed in visible locations
  - A lack of promotion of in-store recycling or campaign materials.
- Low levels of market participation:
  - Although B-cycle reports that 90% of the loose battery market participates in the scheme, only 34% of the brands observed in the investigation were participants
  - A full investigation into AAA batteries found 155 brands available on the Australian market, of which only 12% were B-cycle participants
  - 77 e-mobility brands were identified; only one was a B-cycle participant.

[79] https://assets.nationbuilder.com/boomerangalliance/pages/4332/attachments/original/1727758457/Final_Report_2_Oct24_sm.pdf?1727758457

B-cycle note the importance of rolling out containers that are highly visible to the consumer, with prominent branding and clear messaging. The scheme had faced challenges with many of the collection bins already having been installed prior to the launch of the scheme, so implementing consistent and bold branding was not always possible.

Collection points participating in the B-cycle scheme are required to complete a risk assessment and safety plan for their facility, as well as a risk assessment on the containers that they use to collect batteries.

4.4 Labelling, Communication, and Consumer Instructions

Labelling and communication are recognised as a key mechanism to encourage consumer behaviour change and provide clarity and simplicity for the public. The EU's 2023 Batteries Regulation sets out requirements on the information that must be provided to consumers. This information that manufacturers includes providing clear and comprehensive labelling on topics including the capacity, lifespan, performance and disposal of the battery. In addition to this, from 2025, manufacturers of in-scope batteries must calculate and declare the carbon footprint.

It also introduced the concept of a "digital passport". From 2027, large batteries will be required to display detailed information about the battery's lifecycle, material composition, environmental impact, and recycling instructions, accessible via a QR code – small batteries are exempt from the requirement for a full passport, although must still provide some details via a QR code.[80]

Another aspect comes from the 2012 EU WEEE Directive, which sets out the requirement for any EEE placed on the market in Europe to be labelled with a symbol indicating that it should be separately collected and not placed in municipal waste streams. This is reinforced in the EU 2023 Batteries Regulation, which specifies that from 2026, all batteries must be marked with the "separate collection symbol", and that the symbol must cover at least 3% of the surface area of the largest side of the battery.

Figure 4-1: EU Separate Collection Symbol[81]

In Australia, the challenges relating to consumer-facing labelling were identified as another issue that may be hampering B-Cycle's success relates to consumer-facing labelling. These challenges identified are as follows:

[80] https://circulareconomy.europa.eu/platform/sites/default/files/2024-03/1qp5rxiZ-CEPS-InDepthAnalysis-2024-05_Implementing-the-EU-digital-battery-passport.pdf
[81] https://europa.eu/youreurope/business/product-requirements/labels-markings/weee-label/index_en.htm

- Inconsistent messaging across packaging:
  - Of brands not participating in B-cycle, many displayed the EU WEEE symbol (a label mandatory for any electrical equipment sold in the EU, indicating that it should not be disposed in general waste streams); none of the brands participating in B-cycle did
  - Only one brand was observed promoting in-store recycling on packaging

4.5 Transport and handling

The transport and handling of waste batteries have become an increasingly critical issue within the waste management sector. As batteries move through collection, consolidation, transfer, and processing stages, they are frequently subjected to conditions that increase the likelihood of damage, short-circuiting, or thermal runaway. These risks are compounded by the growing presence of lithium batteries in mixed waste streams. As a result, in 2021, the UK Fire Industry Association published guidance on how Li-ion battery fires start, and how they can be detected and managed.[82]

Across the waste management value chain, concerns have been expressed about the growing risk of lithium battery fires; a recent call to action authored by 8 associations across Europe highlighted the growing risk to workers' safety, infrastructure, and the financial risk to operators.[83] In the UK, insurance firm QBE published a report investigating the rise in battery fires, and highlighted the insurance risk implications, calling for improvements to Li-ion battery safety.[84] Waste operators recognised the risk that insurance cover may be withdrawn if measures such as containment systems for the transportation and storage of batteries were not employed.[85]

To address these issues, in the UK, the Environment Agency is currently consulting on proposed technical guidelines that set out standards for the design and operation of facilities that store or treat waste batteries.[86,87] The guidance is highly detailed, and would specifically address the risk of battery fires, requiring facilities to have a fire prevention plan and have fire detection and suppression systems in place wherever waste batteries are stored, handled or treated. The guidance also sets limits on how long wastes can be stored, the time limits are shown in Table 4-1.

Table 4-1: Maximum Storage Durations for Waste Battery Types

Waste type	Maximum storage duration
Alkaline and zinc carbon batteries	12 months
Lead acid batteries Other batteries (incl. NiCd, NiMH, lithium, mixed / unsorted batteries) Other wastes (incl. battery components or fractions)	6 months

In the EU, the Batteries Regulation allows for treatment of waste batteries to occur outside the Member State or outside the EU provided the shipment of such waste batteries complies with the EU Regulation

[82] https://www.fia.uk.com/news/guidance-on-li-ion-battery-fires.html
[83] https://euric.org/resource-hub/position-papers/joint-call-for-eu-action-to-protect-waste-management-from-surging-lithium-battery-fires
[84] https://www.qbe.com/my/newsroom/risk-insights-and-expertise/lithium-ion-batteries
[85] https://www.thefpa.co.uk/news/waste-site-operators-join-discussion-over-li-ion-battery-fire-threat
[86] https://consult.environment-agency.gov.uk/environment-and-business/waste-batteries-appropriate-measures-for-permitted/supporting_documents/Waste Batteries Consultation Document.pdf
[87] https://consult.environment-agency.gov.uk/environment-and-business/waste-batteries-appropriate-measures-for-permitted/supporting_documents/Waste batteries_appropriate measures for permitted facilities guidance.pdf

1013/2006 on shipments of waste, and the EC Regulation 1418/2007 on the export for recovery of certain wastes. In recognising the need for clearer controls at the point of collection, storage, and movement of batteries, the Batteries Regulation introduces minimum requirements to distinguish used batteries from those formally deemed waste. This differentiation is critical, as used batteries may not be subject to the same regulatory obligations, creating opportunities for misclassification. The Regulation also makes provision for Members States to inspect shipments in order to ensure waste batteries are not being incorrectly categorised in order to avoid requirements.

4.6 Product Stewardship Design

The EU 2023 Batteries Regulation is carefully designed to distribute responsibility onto all stakeholders across the lifecycle of batteries. For example, under the Regulation, responsibilities are clearly delineated across the different actors in the battery value chain. Producers are accountable for meeting collection targets, while recyclers carry responsibility for achieving prescribed recycling efficiencies and material recovery rates. The obligations extend beyond industry participants to include end users. Consumers are required to discard waste batteries separately from general household waste and to utilise designated collection points where these are available. In practice, this creates a legal requirement for the public to correctly segregate batteries at end of life.

Recyclers of waste batteries are obliged to accept all waste batteries and prepare them for re-use, preparation for repurposing, or recycling. They must meet the following targets for recycling efficiency and recovery of materials:

For recycling efficiency:

- By 2025: 75% of lead-acid, 65% of lithium-based, 80% of nickel-cadmium, and 50% of other batteries
- By 2030: 80% of lead-acid, and 70% of lithium-based.

For recovery of materials:

- By 2027: 90% for cobalt, copper, lead, nickel, and 50% for lithium
- By 2031: 95% for cobalt, copper, lead, nick, and 80% for lithium.

The EU Regulation allows individual (e.g. battery manufacturer) or collective organisations, i.e. producer responsibility organisations (PROs), to take on the responsibilities for end-of-life, although this can vary by Member States (i.e. they are allowed to require that a PRO be used). PROs have to be approved by the national authorities and there is a varying degree of government involvement and oversight, for example in approving fees and investment plans. The PRO must also register all member producers on a 'register of producers' and achieve minimum collection rates for portable and LMT batteries. In addition, there has to be a sectoral coordination group if several PROs are present within a member state.

At present the schemes in all countries are run by one or more PROs, with enforcement through other bodies, e.g. the Office for Product Safety and Standards in the UK. Belgium has one battery PRO, Bebat, which is a not-for-profit body. France has two PROs, Corepile (part of Ecosystem) and Screlec (working as Batribox), both of which are a government-approved non-profit waste battery collector and recycler. The UK has five approved Battery Compliance Schemes, most of which also act as WEEE and packaging PROs. This is a competitive and commercial approach with varying fees and varying business models.

In EU Member States, most PRO schemes charge a membership fee, plus a fee per tonne of batteries placed on the market by the producer. The majority of battery EPR fee structures (for portable batteries) are based on battery weight, with some schemes also using additional factors such as type and chemistry to set costs. Such approaches reflect the collection and recycling cost of a particular chemistry. Taking weight into account in theory rewards lighter weight and hence reduced use of materials in the product.

Eco-modulation is allowed under the EU Regulation, adjusted according to the category of battery, its chemical nature and where applicable, the rechargeability, recycled content, carbon footprint, and whether it is a new or second-life battery. The intent of these measures is to support broader circular economy outcomes by encouraging the design and use of batteries that are more durable, reusable, and better aligned with long-term resource efficiency. In particular, the Regulation seeks to promote greater uptake of rechargeable batteries and to stimulate a shift toward more sustainable and responsibly sourced battery materials, thereby reducing environmental impacts across the full lifecycle. Practices currently vary by PRO, with some applying a fixed rate irrespective of chemistry and some having a wide variety of categories.

In some schemes in Europe, rechargeable batteries are already charged at a lower fee rate to reflect the fact that they will have many cycles of use. Prior to the new EU Regulation, France already had the most developed existing eco-modulation system for portable batteries. The Batribox fees for portable batteries, rechargeable ('secondary batteries' or accumulators) and single use (primary) batteries are shown for 2025 in Table 4-2.

Table 4-2: EPR Fees Charged by the Batribox Scheme for 2025

Secondary batteries / accumulators	**Fee (€/kg)**	**Primary batteries**	**Fee (€/kg)**
Secondary lithium batteries (with cobalt)	0.453	Alkaline	0.402
Nickel Metal Hydrure (Ni-MH) (cylindrical < 30g)	0.181	Zinc Carbon	0.804
Secondary batteries Ni-MH >30g	0.201	Primary lithium (cylindrical) <30g	2.561
Lead	0.560	Button cell (alkaline, lithium, silver oxide, zinc air…)	3.700
Nickel-Cadmium (Ni-Cd)	1.000	Zinc air	0.440
Secondary Sodium-ion	0.260	Button cell primary bio-enzymatic	0.200
Secondary button cell lithium	2.500		
Eco-modulation			
Penalty*: secondary lithium batteries without cobalt			0.470
Bonus*: Nickel metal hydride (Ni-MH) cylindrical			0.181

** A penalty is the fee to be paid in addition to the base fee, to discourage negative design elements; a bonus is a reduction from the base fee, to encourage positive eco-design elements.*

In Australia, the B-cycle scheme has been set up with a singular, not-for-profit scheme administrator, a key benefit of which is enabling the lowest societal cost for collection, sorting and recycling of materials, as opposed to a scheme with multiple organisations – this would introduce competition, but can create significant challenges in monitoring and potential freeriding.[88]

[88] https://ppps.org.nz/wp-content/uploads/2022/12/EXPRA-10-golden-rules.pdf

Many campaigners believe the challenges faced by the B-cycle scheme could largely be addressed by introducing regulated, mandatory product stewardship to ensure a functional, financially viable programme, and B-cycle themselves have also campaigned heavily for the scheme to be made mandatory. There has been recent discussion amongst state and federal Environment Ministers in late 2024 regarding the need for aligned reform of mandatory battery product stewardship.[89,90] This is being implemented in New South Wales, the first state to mandate a battery PSS with its Product Lifecycle Responsibility Bill.[91]

4.7 Compliance and Enforcement

Effective compliance and enforcement are central to the successful operation of any product stewardship or extended producer responsibility scheme. While regulatory frameworks set out the minimum legal obligations, the extent to which these obligations translate into real-world outcomes often depends on the behaviour of producers and the robustness of oversight mechanisms. International experience shows the effectiveness of proactive engagement and early intervention.

In Germany, under Stiftung EAR, the body responsible for the management of e-waste, it is mandatory to register batteries before they can be sold on the market. It is required to specify the brand, category, and chemical composition of every battery placed on the market.[92] Setting up a registration scheme has the benefit of improving transparency of the types and quantities of batteries being placed on the market, as well as identifying all organisations that should be participating in PSS and thus minimising free-riders.

4.7.1 Case study

Bebat, the Belgian compliance scheme for batteries, takes a proactive approach to compliance and regularly reports some of the highest collection rates across Europe. Bebat directly contacts companies who may be freeriding to raise their awareness of their legal obligations. In 2019 they specifically targeted new participants through B2B marketing, developing a 5 minute test for companies to find out whether they should join Bebat, and developing brochures and a digital campaign targeting producers of “Light Electric Vehicles” (e.g. drones, e-bikes etc.).[93] In 2020, they contacted 2,389 companies and 72% of new participants registered with the scheme in this way.[94] As a result of their proactive approach, Bebat has seen the number of participants submitting declarations increasing from 1,962 in 2016[95] to 3,355 in 2024,[96] an increase of 71%.

4.8 Summary of Learnings

Although the implementation of effective PSS for batteries has historically been challenging, the experience across Europe demonstrates that high collection rates and safe, well-managed recycling systems are achievable.

---

[89] https://www.dcceew.gov.au/sites/default/files/documents/emm-communique-21-june-2024.pdf
[90] https://www.dcceew.gov.au/sites/default/files/documents/emm-communique-10-dec-2024.pdf
[91] https://hdp-au-prod-app-nswepa-yoursay-files.s3.ap-southeast-2.amazonaws.com/9217/6051/0995/product-lifecycle-respons-reg-2025.PDF
[92] https://www.stiftung-ear.de/en/guides/applying-for-battery-registration/
[93] https://www.bebat.be/en/media/220/download
[94] https://www.take-e-way.com/news/pursuit-of-freeriders-in-belgium/
[95] https://www.bebat.be/en/media/219/download
[96] https://www.bebat.be/en/media/225/download

Clear, enforceable producer responsibilities, with nationwide consistency, have been key to improving collection and recycling performance and avoiding free-riding, ensuring equitable costs across participants and financial viability for the schemes.

The effective retail take-back systems seen in Europe further illustrate the effectiveness of mandated producer obligations. When all retailers selling batteries must accept them back free of charge, and when in-store infrastructure and messaging are visible and consistent, extensive and accessible collection networks emerge.

International schemes also show the potential for the incorporation of eco-modulated fees in a PSS rewarding more sustainable battery design and penalising more damaging chemistries. While some new battery chemistries are emerging that could ultimately provide alternatives to lithium batteries, they are not yet ready to be implemented at scale.

5.0 Summary and Recommendations

The research and stakeholder engagement undertaken showed there are clear and consistent issues and barriers that cut across the various stakeholders groups, explored in detail in sections 3.1 through 3.6.

This section first discusses the interconnectedness of the key themes, then summarises key points across the research and engagement, and provides subsequent recommendations according to these themes. Where a responsible party seems clear, this has been included. However, it is important to note that a key gap in addressing issues and implementing the recommendations is the absence of a cross-sector 'governance group' that represents the full small battery lifecycle and would, amongst other tasks, drive the development of EPR/PSS for small batteries. Recommendations are provided against each key theme; this results in duplication as one recommendation can address multiple key themes. At the end of the section, the recommendations are aggregated into a single list, showing which key theme each recommendation addresses.

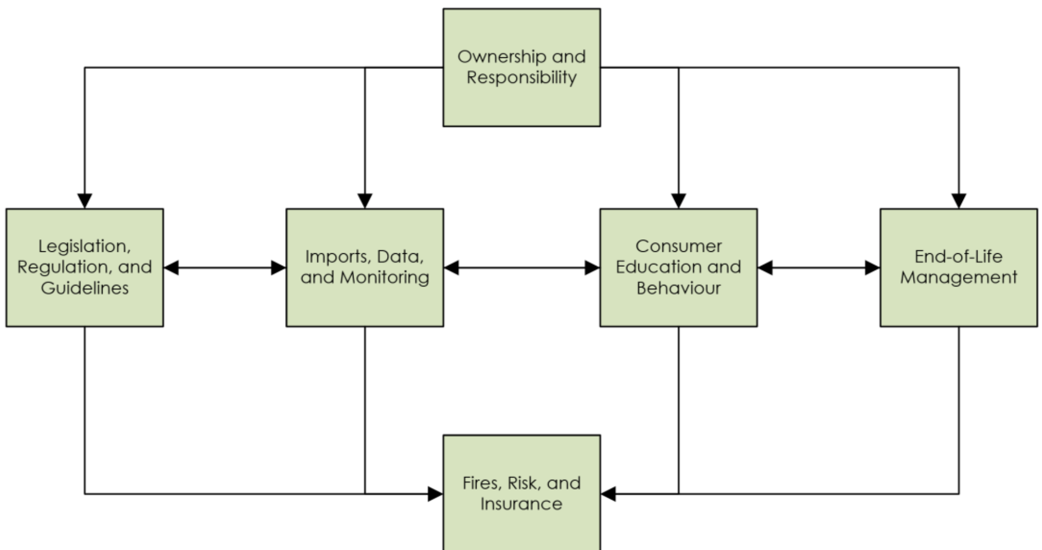
5.1 Interconnections Between Key Themes

The extent to which the issues are consistent between the key themes and stakeholder groups points to a systemic failure of small battery end-of-life management; with breakdowns across the lifecycle that lead to widely experienced issues.

Figure 5-1 visually represents how the key themes can be viewed in an interconnected way. ***Ownership and responsibility*** sit at the top of the map; when this aspect is unclear or absent, negative effects flow on to ***legislation, regulation, and guidance***; ***imports, data, and monitoring***; ***consumer education and behaviour***; and ***end-of-life management***. Poor understanding of imports and other data, for example relating to ***fires***, also diminishes the ability to hold upstream stakeholders accountable and support good future planning. The themes on the second row are all also interrelated; for example, lack of guidance results in poor **data**, confused **consumers**, and overwhelmed and uncoordinated **end-of-life management**. Lastly, prior failings within the first five themes result in increased likelihood of operational and environmental risks and increased cost of managing this risk and insurance.

On a positive note, the extensive crossover means that any potential solution/s will address needs across multiple themes.

Figure 5-1 Key Themes Interconnecting



5.2 Ownership and Responsibility

The stakeholders involved across the small battery lifecycle are many and varied, and there is a notable lack of clear ownership and responsibility. This prevents many solutions and actions from progressing or from having wide reach, and risks duplication of effort. The limited data and information that is available is distributed across sectors and there is no central agency with responsibility for collating this data, making it difficult to gain a clear understanding of the problem. Small batteries are a type of e-waste and therefore have been named a 'priority product'; however a PSS has not yet been developed.

Summary

The lack of clear ownership and leadership relating to small batteries was a point of concern across the research and stakeholder engagement phases of this project. This is a major barrier preventing solutions and actions from proceeding effectively.

Of particular note was the difficulty in engaging with the major players at the beginning of the small battery lifecycle – manufacturers, importers, and (to a lesser extent) retailers – representing the stakeholders that would hold EPR and have a key role in a PSS. This suggests that the issues relating to end-of-life small batteries management are not seen as a priority for them nor something they view as being their responsibility. Instead, the burden of managing end-of-life batteries falls on those at the end of the lifecycle (who often have the least influence to reduce harm), with the associated ethical and te ao Māori concerns relating to fairness and harm displacement.

The start-of-life stakeholders also have a key role in communicating clear and transparent information to consumers about products and how to safely use, recover or dispose of them; ensuring that products are safe and of good quality, and are able to be repaired and recovered appropriately; and in enabling the collection of data relating to the numbers and types of small batteries entering the country.

The New Zealand government declared e-waste (including small batteries) as a priority product in 2020; however, a PSS has not yet been accredited. In the absence of a PSS, responsibility falls on consumers, TAs, and the selected retailers that voluntarily offer collection points, along with the financial cost of providing information to consumers as well as collection points and disposal and recovery. There are also potential and experienced risks including receiving large or commercial amounts of small batteries at collection points not designed for this, and small battery-related fires. Beyond priority product stewardship, other policy levers that Government could enact to encourage better management include product bans, levies, and improved data requirements.

The EPA issues permits for import and export of hazardous waste in compliance with the Basel Convention requirements. They also issue permits for import and use of hazardous substances within New Zealand according to the HSNO Act. However, the EPA has exempted small batteries from the HSNO Act, resulting in weakened data collected by Customs due to lack of applicable tariff codes and increased risk due to the limited awareness of what and how many small batteries are in New Zealand.

There is also perceived confusion amongst stakeholders about which Government agencies are responsible for implementing and enforcing various legislative requirements; further contributing to the lack of clear ownership. Beyond the issues of burdening stakeholders downstream in the lifecycle, lack of co-ordinated end-of-life management, and poor visibility of data; this prevents future planning for management of small batteries, which is an increasingly urgent problem to solve given how quickly the small batteries market is evolving.

One recommendation to increase ownership and responsibility in New Zealand may be to establish a specific task force with a clear remit with membership across the entire small battery life-cycle; much like the Australian Batteries Implementation Working Group and subsequent Battery Stewardship Council. Following an EPR and PSS approach would dictate that the work of this group be funded by the importers and retailers of batteries and battery-containing products.

Recommendations

- Establish a governance group (similar to Australia's) with defined responsibilities. This group would need to be able to act on the immediate issues identified, monitor international changes to predict future gaps and how to address them, and would lead the development of a PSS either as part of the wider e-waste material stream or specifically for small batteries (separate, encased, damaged, undamaged). This group should also conduct mana whenua engagement to assist in framing the issues that arise with small batteries and collaborate in problem solving efforts, and engage with other stakeholders that are peripherally affected by small battery-related issues – e.g. Police, transport authorities, recovery staff (e.g. tow truck drivers, waste cleanup), etc.
- Clarify the roles of various Government agencies and ensure clear communication between those with responsibility for the implementation and enforcement of existing legislation (MfE, EPA), and review and clarify roles and responsibilities of various central authority stakeholders (MfE, EPA, WorkSafe, Customs, FENZ) in terms of providing clear regulatory management and guidance across the lifecycle.
- Consider other Government levers to reduce imports of low-quality small batteries and products containing these
- Undertake audits of permitted e-waste and at-risk (i.e. waste metal) exports to determine whether permits are being exploited and whether batteries are being transported illegally (Customs, EPA, potentially other agencies)

5.3 Legislation, Regulation, and Guidelines

Currently there is no consistent small battery-specific regulation or legislation, and the existing tools are viewed as confusing and outdated. While some guidance relating to small batteries use and management exists or is in development, New Zealand guidance focuses on the end-of-life stages, has been developed largely in isolation, and isn't consistently available across the sector and/or is duplicated.

Summary

Currently there is no consistent battery-specific regulation or legislation, and the existing tools are viewed as confusing and outdated. International experience shows how important it is that legislation and regulation is kept up to date in the rapidly changing small batteries market. While some guidance exists or is in development, this has been developed largely in isolation within parts of the sector and isn't consistently available. There is some international guidance available that could potentially be used to inform guidance that fits the New Zealand context.

The previous section (5.2) presented the key Government players in terms of legislation and regulation (MfE, EPA, Customs) in the early stages of the small battery lifecycle and the earlier section (2.0) outlined the national context including key legislation, regulation, and guidance that they are mandated to manage. It discussed that there is no mandatory national PSS that captures small batteries regardless of the priority product declaration in 2020. The need to introduce a PSS for small batteries is a high priority, due to the increasing quantities of small batteries entering New Zealand and the small battery-related fires being experienced at a large scale across the country. New Zealand is significantly behind internationally in this space, but considerable learnings can be taken from international programmes and adapted to the New Zealand situation. Australia have recently reviewed their PSS which could provide a solid foundation to draw from. As mentioned in the previous section, further regulation beyond product stewardship could be prioritised by Government including introducing levies or bans on particular small batteries to reduce low quality imports and consequent waste.

The EPA and Customs rely on the HSNO Act (Section 2.5.1) at the point of import; which exempts small batteries, reducing regulatory oversight and import controls, data collection, and inhibiting risk reduction. The EPA and Customs act according to the Basel and Waigani conventions (Section 2.5.3) for export, but it is possible that the intentions of these conventions may be undermined by exporters assigning ambiguous classifications (i.e. not declaring small batteries) in paperwork.

Once on land in New Zealand, the NZ Transport Agency Waka Kotahi (NZTA) Dangerous Goods Rule (2.5.2) sets out regulation for transport of dangerous goods including small batteries. By setting out responsibilities, limiting the number of small batteries being transported, and the requirement of documentation, among other requirements, risks of battery hazards are reduced.

There is a crossover between hazardous substances (HSNO Act) and dangerous goods (Dangerous Goods Rule) which can create further uncertainties for those that are transporting small batteries. It is not intuitive that a small battery is a dangerous good but not a hazardous substance (as per the exemption from the HSNO Act), especially given that many small battery components are hazardous. According to the EPA the exemption of small batteries is because they are manufactured articles, rather than a substance, as the intended use is to power devices rather than for hazardous/chemical components to be released intentionally. The EPA recognise that transport hazards are controlled by NZTA according to international requirements, and that disposal issues are covered by MfE and TAs. Under MfE's Hazardous Waste Guidelines, waste batteries are treated as hazardous where they exhibit hazardous characteristics (e.g. flammability, toxicity, reactivity).

The report understands that there is guidance in development by WRIA, WasteMINZ, and FENZ for consumers to reduce battery-related fire risk. While there may be interest in developing guidance, there is a reluctance to invest as requirements from lead Government agencies (such as MfE, EPA) are not clear. Clarity on these requirements, and support through waste policy and strategy and funding, would support the development of consistent guidance at a national level.

There are gaps at the national level of guidance for:

- Consumers including how to make informed purchases/conscious consumption, use batteries safely, and how to handle them at end of life.

- Collection points including safe transport, handling, storage, and end-of-life management (i.e. reprocessing, disposal, export).

- Fire prevention and response for transport, collection points, and end-of-life management facilities.

Similar guidance documents exist elsewhere that could be tailored for the New Zealand context such as the UK Environment Agency technical guidelines.[97] Otherwise guidance documents developed here could be reviewed and made widely available.

Without legislation, regulation, and guidance, the downstream burden falls on those that have the least influence on risk and leaves them unprotected. Provision of current, accurate, and accessible instructions at a national level would reduce the risks associated with handling batteries and managing battery-related fires. This guidance also has the potential to provide more certainty to insurance providers and minimise the reported increase in cost of insurance and the difficulty of gaining insurance.

Recommendations

- Progress a mandatory PSS for all small batteries (separate, encased, damaged, undamaged) to improve and clarify pathways for end-of-life batteries. This could involve prioritising the small batteries

[97] https://consult.environment-agency.gov.uk/environment-and-business/waste-batteries-appropriate-measures-for-permitted/supporting_documents/Waste batteries appropriate measures for permitted facilities guidance.pdf

component of the TechCollect scheme and requiring it to include encased batteries that are not already covered in the first tranche, developing a specific small batteries PSS, or extending an existing scheme from Australia to New Zealand. Government should consider whether the WMA requirement to develop a scheme “as soon as practicable” has been met.

- A PSS should include eco-modulation of fees to increase sustainable battery components, lifespan, and design to prevent unwanted environmental impacts.
- Clarify the legislative and regulatory regime for small batteries in New Zealand for parties that import, transport, and export batteries. Explicitly declare when small batteries do and do not fall under acts and conventions (HSNO, Dangerous Goods, Basel, Waigani, MfE Hazardous Waste Guidelines) and recognise any need to update or create legislation and regulations to improve traceability and safety. (MfE, EPA, Customs)
- Consider mandatory export permits for all end-of-life batteries (loose or encased) to close any current loopholes being exploited. Review requirements around e-waste permit to ensure any loopholes are closed concerning the inclusion of waste batteries that should not be covered under the permit’s intent. (Government)
- Develop a suite of guidance documents for use across the small battery sector and for consumers covering issues such as use, handling, storage, transport, management of damaged/compromised batteries, recycling/reprocessing, and battery fires. This should involve consultation with relevant industries to confirm the information and assistance they require. (Ideally, a responsibility of the working group referenced in the previous section)
- Address the current gap in second-hand battery market regulations including permissions and requirements such as management and monitoring. (Government)

5.4 Imports, Data, and Monitoring

There is little data relating to the quantities and types of small batteries entering the market, while what information is available shows that the numbers are increasing, chemistries are changing rapidly, and the range of devices using rechargeable batteries (including encapsulated batteries) is growing. Small batteries are increasingly accessible through online retailers/marketplaces, with the associated risk that these are low-quality products. Customs data on ‘country of origin’ does not apply to smaller quantities or battery-containing products imported. Monitoring of issues such as safety, fires, and waste is fragmented and sits across a range of agencies, regulated (like WorkSafe) or voluntarily (through groups like WRIA and WasteMINZ).

Summary

There is little data relating to the quantities and types of small batteries entering the market. All available information shows that the numbers are increasing, chemistries are changing rapidly, and the range of devices using rechargeable batteries (including encapsulated batteries) is increasing. This reflects the global small batteries market and is not unique to New Zealand, however other countries with increased levels of legislation and regulation are much more likely to have better monitoring practices and more accurate data; and those are in turn expected to increase ownership and responsibility of stakeholders.

With the growing accessibility of small batteries through online retailers and marketplaces, stakeholders voiced concerns of low-quality batteries, which have been compared with higher-quality batteries by WorkSafe and do not fall under controls by Customs. As discussed in Section 3.3, when batteries are imported in large quantities the country of manufacture is declared; however this is not the case when product containing a small battery is imported, significantly reducing the understanding of what materials the battery contains and the product quality. Import controls would be beneficial to gain more insight into the number and types of small batteries entering the New Zealand market. For example, the

declaration of small battery imports would flag that they pose hazardous risks. The declaration could also require specified safety and quality information including testing and its composition. If this control was in place for loose batteries, batteries embedded in products, both new and second-hand (if possible), the scope of the issue would be clearer. Further efforts to improve the safety and quality of imports include eco-modulated fees should an extended producer responsibility or PSS be implemented (as recommended in Section 5.2).

Monitoring of issues such as safety, fires, and waste is fragmented and sits across a range of agencies, regulated (like WorkSafe) or voluntarily (through groups like WRIA and WasteMINZ). A PSS would provide significantly improved data and monitoring of small batteries. Without a PSS, the data picture could be improved through voluntary reporting of batteries placed on market by retailers – however, this would require significantly increased engagement with the issue than has been seen through this research.

With knowledge of the batteries entering New Zealand, alongside the number of batteries disposed of appropriately and the number of fires and where they occur, a material flow could be created to further illuminate the problems and vulnerable points. This increased visibility would ideally result in stakeholders collaborating more effectively and resolving the current issues faced.

Recommendations:

- Review current reporting requirements for NZ Customs for tracking batteries and products containing batteries. Consider import controls such as declarations of small batteries. (Customs)
- Prioritise the import declaration classification for reporting in the first instance – e.g. loose batteries, vapes, mobile devices (phones, tablets, laptops), e-bikes and e-scooters, rechargeable power tools. This will provide better data on relevant items being imported. (Customs)
- Develop and set minimum product guidelines for battery specifications to be included with all loose batteries or products containing batteries being imported including information about full country of origin documentation, material components, and correct disposal at end of life. (Government)
- Develop a mandatory PSS for small batteries (separate, encased, damaged, undamaged) to provide improved data.
- Review small batteries that are being imported into New Zealand and take steps to reduce small batteries that are less sustainable, poor-quality, and/or have shorter lifespans through import controls (Government) and/or eco-modulation in a PSS.
- In the absence of improved Customs import data or a PSS, voluntary reporting of batteries placed on the market by retailers could be beneficial. This could be trialled through reporting provided by a selection of general merchandise, electronics, appliances, hardware, and e-mobility retailers. Whether ongoing (i.e. report each quarter) or a single snapshot (i.e. one report over a 12-month period) it would assist in establishing the quantities available in the market. (Retailers)
- Monitor new products that enter the market with a view to proactively evaluating whether they could pose fire risks or issues with disposal at end of life, to inform other recommendations. (Government and the cross-sector governance group).
- As per the recommendation in 5.3, close current loopholes that are exploited for import and export for both loose batteries and products with encased batteries with incorrect classifications. (EPA, Customs)

5.5 Fires, Risk, and Insurance

Small battery-related fires appear to be increasing – both within and without the waste sector. This is likely due to the increasing number of more volatile battery chemistries, and the lack of information and guidance relating to use and end-of-life management. Some data is available, but this is distributed across agencies and industry groups. Some guidance and best practice procedures exist, but this is often developed in isolation leading to likely duplication. Insurance for high-risk activities such as small battery collection points and recycling facilities is becoming increasingly difficult to access and expensive.

Summary

One of the major motivators for this research is the increasing frequency with which battery-related fires are perceived to be occurring – within and outside of the waste sector. This is likely due to the increasing number of more volatile battery chemistries, such as lithium batteries, and also the lack of information and guidance about how to manage these batteries both during use, and at the end-of-use or end-of-life.

Section 3.4 summarised datasets from FENZ and ACOR that presented the number of small battery-related fires in New Zealand, and the cost related to waste and resource recovery facilities in Australia, respectively. Considering the apparent significant increase in fire frequency and the relevant costly expenses to recover from them, it is extremely important to future proof for extreme events to ensure that sufficient waste services exist. Future planning also requires improved data, as addressed in Section 5.4. Limitations of the data also includes that near misses (i.e. minor fires) are not reported to FENZ. Visibility of data and the actual impact of fires that New Zealand is facing ensures accountability of key players and compels them to action steps to reduce the number of fires occurring.

These increasing risks are causing financial impacts, especially in the waste sector; particularly from managing the impacts of small fires and the associated cost areas such as insurance and legal fees. Financial impacts include the immediate cost to put fires out, and the less immediate costs of existing service reduction or loss, job reduction or loss, and rebuilding infrastructure.

The insurance industry proposed clear guidelines and best practice operating procedures for managing and mitigating battery fire risk; which would potentially enable them to assess operators' relative performance and assess insurance costs more appropriately. Further, detailed information about best practice and lists of battery collection points could assist in insurer confidence and ability to assess risk and associated insurance costs.

More research is required into battery-related fires and how best to manage these. The outcomes from existing research need to be widely available, and incorporated into guidelines and standard operating procedures for the sector in preventing, mitigating, and managing fires.

Considering key themes beyond those mentioned above (data, guidelines), links can be drawn to unclear ownership and subsequently the insufficient legislation and regulation that, if improved, could ensure that safer, higher quality batteries are imported and used. Alongside strong consumer education for safe use and disposal of batteries, battery-related fires would be likely to reduce in number.

Recommendations

- Develop a mandatory PSS for all small batteries (separate, encased, damaged, undamaged) to improve the safety of pathways for end-of-life batteries.
- Mandate accurate reporting for all waste-related fires and near misses (minor fires). This reporting should be centralised and publicly accessible to ensure an accurate picture of the scale of the issue can be obtained. (Government, particularly FENZ)

- Undertake research into battery-related fires in various situations (e.g. onsite, in trucks, in collection bins, at waste or recycling disposal facilities) and how best to manage these. (Government and associated agencies, waste operators, recyclers, TAs)

- Undertake and publish independent reviews of products that act as solutions to battery discharge and fire management to ensure information is impartial and relevant to products available in the New Zealand market. This could inform a register of approved products. (FENZ, WorkSafe)

- Produce good, publicly available guidance for risk mitigation, health and safety, and environmental impact. This could extend to training options for staff on the correct actions to mitigate battery-related fires, and the steps to take in the event of suspected or actual battery-related fires; also agree best-practice for end-of-life battery collection and recycling locations to enable more accurate risk assessment by insurance providers. (Ideally, the cross-sector governance group mentioned above)

5.6 End-of-life Management

The stakeholders involved in end-of-life management of small batteries are currently bearing the brunt of the management challenges involved, with the risk being passed down from those involved at the beginning of the lifecycle – the opposite of EPR/PSS approaches. End-of-life small batteries are currently only recycled through export markets. Although small batteries are part of the e-waste priority product classification, a PSS has not yet been developed despite these being named as such in 2020. Lack of governance/leadership across the entire lifecycle of small batteries has inhibited progress on EPR/PSS.

Summary

When considering end-of-life management within New Zealand it considers stakeholders that receive, handle, dispose of, and export small batteries for reprocessing. These stakeholders are essentially those that receive the brunt of the challenges associated with managing small batteries. The risks are handed down from those at the beginning of the lifecycle (manufacturers, retailers) and although the process of PSS development has begun (with regulators/Government taking the step of naming small batteries a priority product), this is not yet in place resulting in risk to our environment, our people, and our waste infrastructure. As drawn on in previous sections, the absence of wider responsibility for small batteries management inhibits steps being taken to reduce the downstream burden of considerable risks and financial cost.

Although the number of end-of-life small batteries recovered for reprocessing is growing, the challenges in capturing, handling, storing, and transporting these are also increasing. The waste sector is responding to the challenges, but response is uncoordinated with variable coverage across the country. Poor practices, such as stockpiling while waiting for recycling options to appear, are adding to the concerns around battery fires and environmental impacts. While there are no operational onshore facilities small batteries must be exported for reprocessing, relying on suitable end-markets that may have variable demand over time.

Beyond market demand, other key limitations include securing appropriate export permits, meeting minimum volumes required by transporters or off-shore reprocessors, or other constraints relating to scale. Stakeholders also noted the presence of small informal and/or unregulated recycling operations which may potentially, in some cases, be illegal. The quantity of small batteries requiring end-of-life management in New Zealand has grown rapidly in recent years, and it may be that the scale and surety of supply required for improved recovery systems (whether this is availability of onshore infrastructure or improved export systems) has already been reached.

Better data and monitoring would support the business case for investment into new and extended management opportunities whether on or offshore.

Some PSS have been designed (TechCollect and B.I.G.) as a response to the declaration of e-waste as a priority product in 2020 (Section 2.2.1.1.). However, B.I.G. does not capture small batteries, and TechCollect would initially collect some products with encased batteries, with small batteries separated in a future tranche which is expected to be years away. It is important that there are clear pathways for all batteries separated or encased to be implemented as soon as possible to ensure safety of people, the environment, and infrastructure. The current landscape of PSS has considerable gaps (i.e. encased batteries beyond those considered information and communication technology (ICT) and long time frames.

Coordinated, consistent education could improve consumer behaviour, helping to prevent fires and other issues – for example, through better management of damaged batteries, or appropriate use of drop-off points. Education for staff that handle small batteries is also crucial for their safety. As new battery technology comes onto the market, education must evolve with it alongside the technology to prevent and mitigate small battery-related fires (e.g. thermal cameras, appropriate fire extinguishers, etc.). While some guidance has been developed, this needs to be centralised and widely available. The development of a PSS in New Zealand would also improve end-of-life management, with Australian operators noting that some issues, such as misuse of drop-off points, are not such a problem – likely due to the appropriate PSS mechanisms that are in place.

While consumers are likely to be confused due to conflicting and/or absent guidance, the end-of-life operators can be also. Staff employed at retailers that offer take-back schemes are not often trained in how to ensure drop-offs are appropriately managed and in some cases these are un-staffed. With appropriate training, further downstream burdens placed on transporters, transfer stations, and waste or recovery facilities could be reduced or avoided. Internationally, retailer take-back schemes have been a key component of EPR and PSS approaches, enabling a higher recovery rate than would have been achieved without them.

Recommendations

- Develop a mandatory PSS for all small batteries (separate, encased, damaged, undamaged) to improve and clarify recovery pathways for end-of-life batteries.

- Improved data collection and monitoring to support future planning and infrastructure for recovery of end-of-life small batteries.

- Consider allowing fast track permission planning requirements for agreed options for onshore recycling of small batteries (undamaged and damaged) and support with funding for start-up costs. (Government)

- Develop best practice guidance for consumers and operators that handle batteries and actively monitor new information and research for up-to-date advice. (ideally, a cross-sector governance group along with MfE, FENZ, WorkSafe)

- Consider import controls and/or eco-modulation in a PSS to prioritise small batteries that have safer compositions and longer lifespans to reduce unwanted risks and waste.

5.7 Consumer Education and Behaviour

Consumers have access to an increasingly large variety and number of small batteries and small battery-containing devices. This has not come with increased understanding of different battery chemistries and how they should be used and managed. Ambiguity in requirements and expectations can and does lead to improper use and disposal, increasing the likelihood of battery-related fires and other environmental impacts. There is no centralised or consistent education and information available to consumers.

Summary

Themed issues of ownership and responsibility, legislation, regulation, and guidelines, and end-of-life management negatively impact consumers as there are many ambiguities for them to safely manage end-of-use and end-of-life batteries. This ambiguity in turn can and does result in improper disposal of batteries and increases the likelihood that batteries will cause fires (among other undesirable impacts such as toxic exposure to people, environments, and waterways). These hazards impact people, waste services and infrastructure, and financial costs for fire response and subsequently increased insurance.

The obscurity of responsibilities, legislation, and disconnected collection points mean that educating consumers about small batteries and the preferred behaviours is difficult. Messaging around how to manage end-of-life small batteries has changed over the years, as the batteries themselves have changed. An overview of communications to consumers is in appendix section A.4.7. This messaging is inconsistent and delivered on an individual basis largely through TAs. WorkSafe and FENZ run national campaigns, but these are only focused on the subset of small batteries managed by these agencies.

Lack of consumer understanding contributes to management problems in several ways – by making it more difficult to capture end-of-life batteries safely, creating risk through inappropriate use, storage, and handling, and through using the recycling options available incorrectly (e.g. dropping off large quantities at in-store collection bins, leaving stockpiled batteries on vacated sites, at recycling centres, or scrap metal yards).

A national PSS run by a cross-sector governance group with overarching responsibility for small batteries would enable clear messaging to be developed. This could then be disseminated by central and local government, producers and retailers, media, and the waste sector. In absence of a PSS, national level communications to promote proper behaviour such as not putting batteries in kerbside bins and taping terminals could have positive impacts. It is acknowledged that given the lack of cohesion of collection points across battery and product types, as well as access across the country, efforts made by WasteMINZ to connect consumers to collection points is valuable.

Many items with encapsulated batteries may not be immediately identified by consumers; this may require an additional national campaign that could be disseminated through various channels to raise awareness of common products that contain batteries. Requirements of small batteries that could improve consumer understanding includes clarity for consumers such as clear labelling that communicates to the consumer that small batteries are not suitable for household rubbish collections (as in the EU). Similarly, labelling could be required for products that contain batteries.

Recommendations

- Develop a mandatory PSS for all small batteries (separate, encased, damaged, undamaged) to improve accessibility and cost of end-of-life management and improve clarity of correct behaviours.
- Add information to all public collection points that clearly shows the downstream pathway for the collected batteries. (Collection point operators – TAs, community groups, waste operators, etc.)
- Fund a centralised education/behaviour change campaign advising consumers on how to responsibly dispose of used/damaged batteries and items containing batteries, including risks of improper disposal.
- Develop a toolkit of shareable assets to support any independent consumer campaigns through territorial authorities, community organisations, waste operators or other interested parties.
- Promote conscious consumption by undertaking and publishing independent product reviews of small batteries on the market without paywalls.

- Agree and publish standardised branding and consumer information required to be displayed on public recycling points – e.g. colour schemes, recycling symbols or logos, specific recycling information etc.

5.8 Summary Recommendations

As evidenced in the previous subsections, the relationships between the themes are intrinsically linked and require strong leadership to promote the necessary actions to reduce the significant, systemic issues of small battery consumption and management in New Zealand. Several recommendations applied to multiple themes, and notably a governance group and PSS were recognised as having positive influences on all key themes. While the recommendations were not exhaustive, they provide a good foundation to assist in determining next steps. Many of the issues could be significantly improved through nine key actions, as listed below - showing also which key themes the actions address, key responsibility/ies, and priority (highest, high, or medium).

Table 5-1: Summary Recommendations

Recommendation for improved small batteries management	Responsibility/ Priority	Key Themes Addressed				
		Ownership and responsibility	Legislation, regulation and guidelines	Imports, data and monitoring	Fires, risk and insurance	End-of-life management
Establish a cross-sector governance group with membership that represents the full lifecycle and maintains ongoing stakeholder engagement (including mana whenua) with those involved in managing small batteries	Highest					
Progress a mandatory PSS, including eco-modulation	Governance group					

Clarify government and agency roles and communication	Government ministries and agencies / high
Review legislation, regulatory tools and conventions and update/create as required (to supplement PSS e.g. regulate secondhand market, discourage low-quality products from entering New Zealand, ensure only appropriate waste is being exported for reprocessing, tighten export permit arrangements, improve data collection and controls at import, monitor new product types entering the country)	Government ministries and agencies / medium
Guidance documents that are consistently and widely available across the sector and across the lifecycle, including best practice standard procedures	Governance group / high
Wider, accurate reporting of fires, research and testing of fire prevention and management tools	Government (FENZ), waste sector / medium
Support onshore reprocessing infrastructure through fast track consenting and funding	Government / medium

Nationally consistent education and behaviour change campaign and information toolkit to encourage desired consumer behaviour	Governance group / medium	

:

Appendices

A.1.0 Assumptions Behind Quantification Estimates

A.1.1 Analysis of Stats NZ Data

Through previous Eunomia work, import data had been assessed to identify electrical and electronic products according to their HS codes[98]. HS codes are 10 digits long and are hierarchical, with each additional group of digits increasing the specificity of the product classification.

For example:

84 15 90 0029

84	Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof
8415	Air conditioning machines; comprising a motor driven fan and elements for changing the temperature and humidity, including those machines in which the humidity cannot be separately regulated
841590	Air conditioning machines; with motor driven fan and elements for temperature control, parts thereof
8415900029	Air conditioning machines; with motor driven fan and elements for temperature control, parts, not containing HFCs

HS codes were initially assessed at the 2-digit level for inclusion or exclusion based on whether they are likely to include any electrical or electronic equipment. A list of **excluded** codes is shown in Table A5-2.

Table A5-2: HS codes excluded from analysis

01	Animals; live	46	Manufactures of straw, esparto or other plaiting materials; basketware and wickerwork
02	Meat and edible meat offal	47	Pulp of wood or other fibrous cellulosic material; recovered (waste and scrap) paper or paperboard
03	Fish and crustaceans, molluscs and other aquatic invertebrates	48	Paper and paperboard; articles of paper pulp, of paper or paperboard
04	Dairy produce; birds' eggs; natural honey; edible products of animal origin, not elsewhere specified or included	49	Printed books, newspapers, pictures and other products of the printing industry; manuscripts, typescripts and plans
05	Animal originated products; not elsewhere specified or included	50	Silk
06	Trees and other plants, live; bulbs, roots and the like; cut flowers and ornamental foliage	51	Wool, fine or coarse animal hair; horsehair yarn and woven fabric
07	Vegetables and certain roots and tubers; edible	52	Cotton
08	Fruit and nuts, edible; peel of citrus fruit or melons	53	Vegetable textile fibres; paper yarn and woven fabrics of paper yarn

[98] A tariff, or HS, code is a numerical code used to classify imported goods in New Zealand's customs system, identifying what the product is and determining the applicable duties, taxes, and trade controls.

09	Coffee, tea, mate and spices	54	Man-made filaments; strip and the like of man-made textile materials
10	Cereals	55	Man-made staple fibres
11	Products of the milling industry; malt, starches, inulin, wheat gluten	56	Wadding, felt and nonwovens, special yarns; twine, cordage, ropes and cables and articles thereof
12	Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit, industrial or medicinal plants; straw and fodder	57	Carpets and other textile floor coverings
13	Lac; gums, resins and other vegetable saps and extracts	58	Fabrics; special woven fabrics, tufted textile fabrics, lace, tapestries, trimmings, embroidery
14	Vegetable plaiting materials; vegetable products not elsewhere specified or included	59	Textile fabrics; impregnated, coated, covered or laminated; textile articles of a kind suitable for industrial use
15	Animal or vegetable fats and oils and their cleavage products; prepared animal fats; animal or vegetable waxes	60	Fabrics; knitted or crocheted
16	Meat, fish or crustaceans, molluscs or other aquatic invertebrates; preparations thereof	61	Apparel and clothing accessories; knitted or crocheted
17	Sugars and sugar confectionery	62	Apparel and clothing accessories; not knitted or crocheted
18	Cocoa and cocoa preparations	63	Textiles, made up articles; sets; worn clothing and worn textile articles; rags
19	Preparations of cereals, flour, starch or milk; pastrycooks' products	64	Footwear; gaiters and the like; parts of such articles
20	Preparations of vegetables, fruit, nuts or other parts of plants	65	Headgear and parts thereof
21	Miscellaneous edible preparations	66	Umbrellas, sun umbrellas, walking-sticks, seat sticks, whips, riding crops; and parts thereof
22	Beverages, spirits and vinegar	67	Feathers and down, prepared; and articles made of feather or of down; artificial flowers; articles of human hair
23	Food industries, residues and wastes thereof; prepared animal fodder	68	Stone, plaster, cement, asbestos, mica or similar materials; articles thereof
24	Tobacco and manufactured tobacco substitutes	69	Ceramic products
25	Salt; sulphur; earths, stone; plastering materials, lime and cement	70	Glass and glassware
26	Ores, slag and ash	71	Natural, cultured pearls; precious, semi-precious stones; precious metals, metals clad with precious metal, and articles thereof; imitation jewellery; coin
27	Mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral waxes	72	Iron and steel
28	Inorganic chemicals; organic and inorganic compounds of precious metals; of rare earth metals, of radio-active elements and of isotopes	73	Iron or steel articles
29	Organic chemicals	74	Copper and articles thereof
30	Pharmaceutical products	75	Nickel and articles thereof
31	Fertilizers	76	Aluminium and articles thereof
32	Tanning or dyeing extracts; tannins and their derivatives; dyes, pigments and other colouring matter; paints, varnishes; putty, other mastics; inks	78	Lead and articles thereof
33	Essential oils and resinoids; perfumery, cosmetic or toilet preparations	79	Zinc and articles thereof
34	Soap, organic surface-active agents; washing, lubricating, polishing or scouring preparations; artificial or	80	Tin; articles thereof

	prepared waxes, candles and similar articles, modelling pastes, dental waxes and dental preparations with a basis of plaster		
35	Albuminoidal substances; modified starches; glues; enzymes	81	Metals; n.e.c., cermets and articles thereof
36	Explosives; pyrotechnic products; matches; pyrophoric alloys; certain combustible preparations	82	Tools, implements, cutlery, spoons and forks, of base metal; parts thereof, of base metal
38	Chemical products n.e.c.	83	Metal; miscellaneous products of base metal
39	Plastics and articles thereof	87	Vehicles; other than railway or tramway rolling stock, and parts and accessories thereof
40	Rubber and articles thereof	88	Aircraft, spacecraft, and parts thereof
41	Raw hides and skins (other than furskins) and leather	89	Ships, boats and floating structures
42	Articles of leather; saddlery and harness; travel goods, handbags and similar containers; articles of animal gut (other than silk-worm gut)	96	Miscellaneous manufactured articles
43	Furskins and artificial fur; manufactures thereof	97	Works of art; collectors' pieces and antiques
44	Wood and articles of wood; wood charcoal	98	New Zealand miscellaneous provisions
45	Cork and articles of cork		

A list of **included** HS codes is shown in Table A5-3.

Table A5-3: HS codes included in analysis

37	Photographic or cinematographic goods	91	Clocks and watches and parts thereof
84	Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof	92	Musical instruments; parts and accessories of such articles
85	Electrical machinery and equipment and parts thereof; sound recorders and reproducers; television image and sound recorders and reproducers, parts and accessories of such articles	93	Arms and ammunition; parts and accessories thereof
86	Railway, tramway locomotives, rolling-stock and parts thereof; railway or tramway track fixtures and fittings and parts thereof; mechanical (including electro-mechanical) traffic signalling equipment of all kinds	94	Furniture; bedding, mattresses, mattress supports, cushions and similar stuffed furnishings; lamps and lighting fittings, n.e.c.; illuminated signs, illuminated name-plates and the like; prefabricated buildings
90	Optical, photographic, cinematographic, measuring, checking, medical or surgical instruments and apparatus; parts and accessories	95	Toys, games and sports requisites; parts and accessories thereof

From these ten 2-digit HS codes that were deemed in scope, all 10-digit HS codes were then assessed and mapped to the 7 categories of electrical and electronic equipment as defined in the proposed TechCollect PSS. This is based on the EU classification system, but with an additional seventh category for small batteries:

1. Temperature exchange equipment
    a. e.g. air conditioning, fridges, freezers
2. Screens, monitors and equipment with screens over 100 cm^2
    a. e.g. laptops, screens, televisions
3. Lamps
    a. e.g. light bulbs, LED bulbs, light fittings
4. Large equipment

    a. e.g. washing machines, dishwashers, ovens, photovoltaic panels

5. Small equipment
    a. e.g. cameras, hair and body care appliances, irons, microwaves, headphones
6. Telecommunication and small IT equipment
    a. e.g. GPS, computers, calculators, mobile phones
7. Batteries
    a. e.g. household batteries

Each 10-digit HS code was then assessed and mapped to a "representative product". As this is the most granular level of product classification, there can be a level of variation that is not necessary for the purpose of this assessment, but the 6-digit coding may not be specific enough. For example, Table A5-4 shows a sample of 10-digit HS codes that can all be mapped to one "representative product" – air conditioning unit.

Table A5-4: Example of 10-digit HS codes relating to the representative product "air conditioning unit"

84 15 90 0029	Air conditioning machines; with motor driven fan and elements for temperature control, parts, not containing HFCs
84 15 90 0021	Air conditioning machines; with motor driven fan and elements for temperature control, parts, containing HFCs, containing R-410A
84 15 90 0011	Air conditioning machines; with motor driven fan and elements for temperature control, parts, containing HFCs, containing difluoromethane (R 32)
84 15 10 1009	Air con machines; with a motor-driven fan & elements for changing temperature & humidity, window/wall/ceiling/floor types, self-contained/split-system, with HFCs, single-phase, of a cooling capacity exceeding 4 kW but not 7 kW, with difluoromethane (R32)

For the purposes of this project, a list of all "representative products" identified across each of the 7 categories was then assessed to identify which types of products would likely contain batteries, and what battery chemistry that was likely to be. It is recognised that some products may have variations within them, but this was not captured during this analysis. A summary of the included and excluded items is listed in Table A5-5.

Table A5-5: Assessment of Products in Import Data

Category	Products likely to contain batteries	Products likely to not contain batteries
1	None	Air conditioning; fridges; freezers; fridge freezers; dehumidifiers; heat pumps; radiators
2	Lithium: Laptops	Screens; televisions
3	Alkaline: Torches	Lighting; light bulbs; LED bulbs; light fittings; luminaires

Category	Products likely to contain batteries	Products likely to not contain batteries
4	Alkaline: Equipment reproducing sound or images (large)	Large medical devices; domestic printers; industrial printers; domestic copiers; industrial copiers; dishwashing machines; washing machines; clothes dryers; vending machines; photovoltaic panels; stoves; grills; coin slot machines
5	Button: Watches Alkaline: Thermometers / thermostats; cameras; weighing scales; radio sets; small alarms; toys; game accessories; equipment reproducing sound or images (small) Lithium: Hand tools; vacuum cleaners; electric shavers; headphones; vapes; speakers	Small medical devices; sewing machines; appliances for hair and body care; irons; microwaves; toasters; musical instruments; radiators; heaters; equipment reproducing sound or images; other small WEEE
6	Button: Calculators Lithium: GPS; computers; mobile phones	Domestic printers; domestic copiers
7	Batteries	Small battery chargers

Import data is limited in the quantification of the products that are listed. The previous work done by Eunomia had aimed to estimate this quantification, filling some gaps:

- In some cases, products imported are recorded in terms of both the financial value, and the quantity imported
- The unit of quantity can vary – in some cases it is the number of items, but often it is recorded in other terms such as weight or volume. In these cases, assumptions around the average weight per item were used to convert from weight to number of units, using aggregated industry data where possible.
- In many cases, the quantity is not recorded at all, only the financial value, so assumptions around the average value of an item were used to convert to number of units, using aggregated industry data where possible.

With each type of item quantified, and the type of battery expected to be contained within it identified, a quantification of the number of batteries imported embedded in such devices could be made. This requires to further assumptions: firstly, that each item does in fact contain a battery (in cases where the product is designed with a removable battery, it may be the case that it does not contain one at the point of import); and that each item contains only one battery.

A.2.0 Issues, Challenges and Barriers Identified During Stakeholder Engagement

At each workshop, key issues were identified by project team members based on the open discussion section of the sessions. These key issues were then assessed for priority relative to each other through a simple Zoom poll where each participant was able to vote each as a) not an issue, b) low priority, c) high priority.

In each workshop, a range of issues were identified and subject to a vote in which the participants identified the issues they felt were the highest priority. The 'top 5' from each workshop has been compiled, as shown in Table A5-6; some were the same across workshops, meaning a total of 33 individual issues have been identified.

It is also worth noting that, while a workshop was held for manufacturers and retailers, the attendees were actually more from the retailer stage of the small battery lifecycle – so these issues represent an interpretation of the issues relating to that stage of the lifecycle, rather than representing the views of those stakeholders themselves.

Table A5-6: Top Five Issues from Workshops

	Issue	Behaviour Change	Manufacturers and Importers	Retailers and Consumers	Collection Points	Waste operators	End of life	Government agencies	Territorial authorities
1	Problems with damaged batteries	■							
2	Lack of national PSS and guidelines	■	■						■
3	Lack of ownership from retailers	■							
4	Confusing and changing legislation	■							
5	Large range of batteries with different chemistries	■							
6	Existing regulation and guidance are outdated		■						
7	Products are incorrectly charged or stored causing fires		■						
8	Lack of clarity about which regulations and standards to follow		■	■					
9	Items being imported without testing		■						
10	End of life management needs to be communicated and promoted more			■					
11	Increasing amount of lower quality batteries and battery-containing products			■				■	

	Issue	Behaviour Change	Manufacturers and Importers	Retailers and Consumers	Collection Points	Waste operators	End of life	Government agencies	Territorial authorities
12	Data on chemistries, quantities, and weights is lacking			■					
13	Increase in products coming from online retailers and lack of data			■				■	
14	Damaged batteries causing fires				■				
15	Damaged batteries require different treatment				■				
16	Battery fires increase cost and accessibility of insurance				■		■		
17	Correct behaviour for drop-off (e.g. taping terminals) needs to be promoted more				■				
18	Limited number of drop-off and collection options nationally				■				
19	Lack of consumer knowledge about disposal					■	■	■	
20	Increasing quantities of Li-ion batteries (compared to other chemistries)					■			
21	Poor knowledge of battery fire management					■			
22	Increasing popularity of battery-containing products (e.g. vapes, e-scooters, e-bikes)					■			
23	Fires escalate quickly					■			
24	Lack of accessibility to suitable disposal options for consumers							■	
25	Lack of end-of-life planning for batteries that are being launched today							■	
26	Substantial and expensive damage to vehicles and facilities from battery-related fires							■	
27	Siloed approach to end-of-life management								■
28	Responsibility for behaviour change/messaging falls on local authorities								■

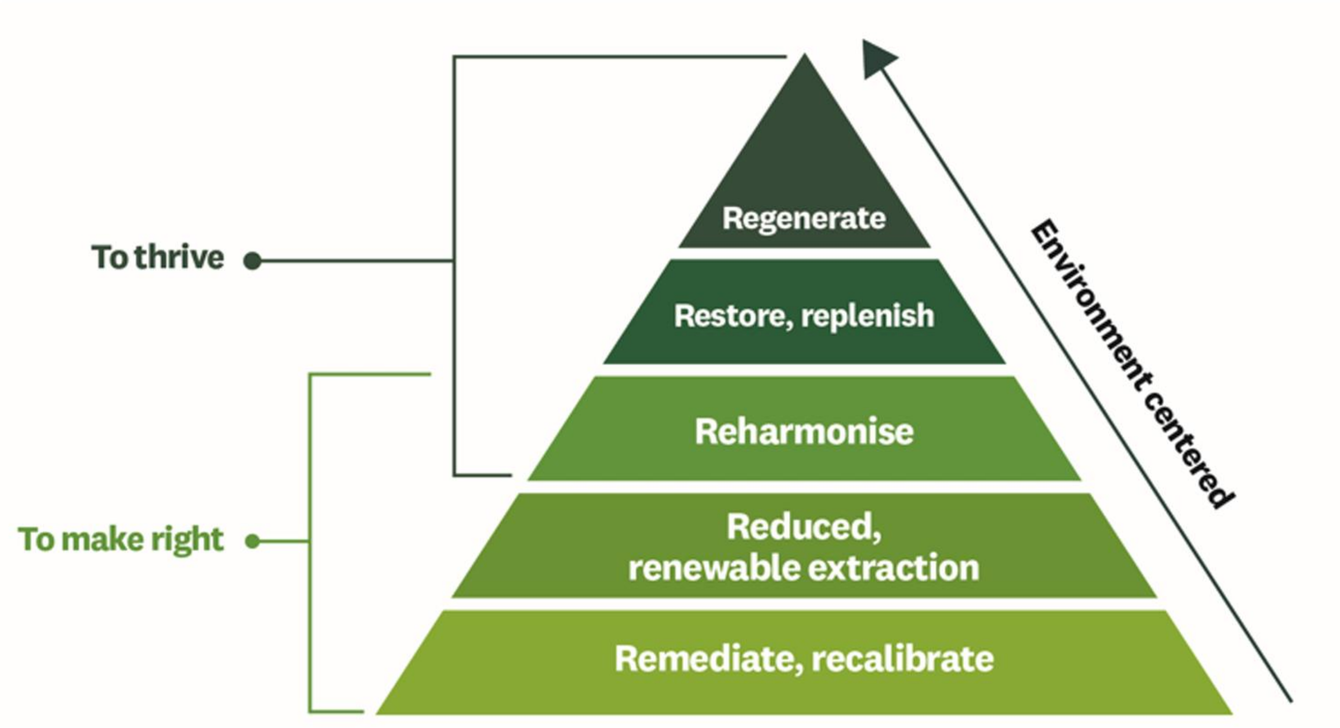
	Issue	Behaviour Change	Manufacturers and Importers	Retailers and Consumers	Collection Points	Waste operators	End of life	Government agencies	Territorial authorities
29	Insufficient processes and guidance for safe handling of end-of-life batteries and battery-related fires								
30	Fires occurring in trucks and facilities								
31	Stockpiling of batteries								
32	Emergency of risks associated with Li-ion batteries – a new consideration for the waste sector								
33	Increased knowledge and new technologies required for end-of-life battery management								

A.3.0 Environment Centred Pyramid

Figure A5-2 presents a pyramid published in Auckland Council's 2024 WMMP that recognises the environment as the core part of their journey to zero waste, rather than the typical waste hierarchy that recognises materials (waste).

Figure A5-2 An Environment Centred Pyramid

Source: Auckland Council Waste Minimisation and Management Plan 2024



Regenerate ecosystems by eliminating the damaging effects of waste, nurturing their natural processes, genealogy and connections, allowing them to flourish alongside human health and wellbeing.

Restore, replenish nutrients to the environment and humans through Zero Waste practices like re-distributing food waste and composting to safeguard the ongoing health and wellbeing of the soil, air and waterways.

Reharmonise human activities with ecological balance. Work in a holistic way that supports the interdependence between humans and the environment that sustains them.

Reduced, renewable extraction of resources to minimise the damage created when we extract too much too quickly, without returning and restoring this back to the environment in a balanced way.

Remediate, recalibrate to address the ecological repercussions of waste. Remediate contaminated areas and recalibrate waste management strategies for long term sustainability.

A.4.0 Additional National Context

A.4.1 Two Case Studies of Para Kore in Practice

The first case study is Para Kore that consider material typical to households and marae (i.e. rubbish, recycling, organics, menstrual products, nappies).[99] The second is the Kai Ika Project that focuses on fish parts and has branched into aluminium cans more recently.[100] Aspects of these studies can be drawn from when planning approaches to recover small batteries within Aotearoa.

Para Kore Marae Incorporated is a not-for-profit organisation that provides a range of support from a te ao Māori perspective informed by mātauranga Māori to minimise and manage waste across the motu (nation). Para Kore officially formed in 2010 after a successful pilot programme with three marae in the Waikato region in 2008. Initially focussed on minimising and managing waste at marae, Para Kore has grown to have an extensive range of resources and support for people interested in zero carbon and zero waste. According to the Para Kore Annual Report 2024, the programme has worked with 66 partners and diverted 915 tonnes of waste since its inception.

Para Kore share their Ngā Pou Rautaki (strategic pillars) in their annual report, as shown below.[101]

[99] https://parakore.maori.nz/
[100] https://kaiika.co.nz/
[101] https://parakore.maori.nz/wp-content/uploads/2024/12/Para-Kore-Annual-Report-2023-24.pdf

Oranga Taiao

Enhance Te Ao Māori Sustainability Education and Practice

Para Kore supports resilience within Māori communities through mātauranga Māori behaviour change programmes and services.

Oranga Marae

Strengthen and Influence Long-Term Partnerships

With whanaungatanga, we nurture collaboration, connectivity and collective action with our partners. To increase positive impact for Māori communities.

Oranga Whānau

Improve Organisational Systems and Processes

We are always learning, reflecting, and providing feedback to improve how we work and how we deliver behaviour change programmes and services.

The Para Kore model is delivered by kaimahi (staff) to support resilience within Māori communities. Kaimahi educate and assign champions to practice waste minimisation and management at marae (meeting grounds), kōhanga (preschools), and kura (schools). Beyond this core model, Para Kore offers resources such as sustainability programmes, events, video resources, and consultancy work. The programmes are available online and in person where funding allows. The programmes include an introduction to sustainability, kai (food) and composting systems, reusable ikura (menstruation) products and kope (nappies), and zero waste schools. In 2024, Para Kore delivered 350 wānanga (education sessions) to 5130 participants.

The Kai Ika Project focuses on the recovery of fish heads, frames, and offal that go to waste. The Kai Ika Project partners with fishery organisations to recover fish parts, as well as marae and community partners to redistribute them. The Kai Ika Project identified that only 35% of a fish is consumed, typically in fillets, and the rest is typically sent to landfill.

Established in September 2016, the project has recovered 600 tonnes of these fish parts since and redistributed them to families and community groups in Tāmaki Makaurau. Heads and frames can be used in cooking and offal is used as fertiliser for kūmara crops in marae gardens, which are also distributed to families when harvested.[102]

Starting in Tāmaki Makaurau, the Project has since expanded to Pōneke (Wellington) and Te Matau a Māui (Hawke's Bay). As well as expanding geographically, the Kai Ika Project has also grown from its initial iteration of collecting and redistributing offcuts of fish to hosting filleting services and knife sharpening and collaborating with partners to host collection points for aluminium cans. These services have various environmental, economic, and social benefits.

Aims shared on the Kai Ika Project website including minimisation of harm to marine environments by fisheries, minimising waste to landfill and improving public awareness of waste minimisation, generating meaningful employment opportunities, increasing social, economic, and cultural benefits, and education about waste minimisation. The website also shares te ao Māori values of kotahitanga, kaitiakitanga, and manaakitanga and how they relate to the Project:

> *"Through kotahitanga (partnership to protect our taonga) The Kai Ika Project promotes kaitiakitanga (guardianship) and manaakitanga (our sacred obligation to care for people). It shows how a simple adjustment in our community's behaviour is having a positive impact on many families as well as the environment – building unity through humility and generosity."*

102 https://kaiika.co.nz/

A.4.2 Waste Disposal Levy

The waste levy is intended to discourage disposal by increasing the cost of sending material to landfill, making the alternatives more financially equitable. Money raised by the levy is to be used for alternative waste management avenues that are higher on the waste hierarchy[103]. The provision for the application of a waste disposal levy (levy) is made in Part 3 of the WMA. Table A5-7 shows the current and future levy rates.

Table A5-7: Waste Disposal Levy Rates Cost per Tonne[104]

Facility Class	Waste types	1 July 2025	1 July 2026	1 July 2027
Municipal landfill (class 1)	Mixed municipal wastes from residential, commercial and industrial sources	$65	$70	$75
Construction and demolition fill (class 2)	Accepts solid waste from construction and demolition activities, including rubble, plasterboard, timber, and other materials	$35	$40	$45
Managed or controlled fill facility (class 3 and 4)	One or more of: • contaminated but non-hazardous soils and other inert materials (e.g., rubble) • soils and other inert materials.	$15	$15	$20

The waste disposal levy is intended to discourage disposal while also creating a fund to support the development of diversion options for a range of materials for which alternative management pathways exist, including small batteries.

Funds from the application of the levy are currently hypothecated. 50% of levy revenue is paid out to local authorities to be applied for the purposes of waste minimisation in accordance with their waste management and minimisation plans. Historically, the majority of the remaining levy has gone into the Waste Minimisation Fund (WMF), which provides the pathway to support the development of landfill diversion options that meet the current operative criteria of the fund[105]. Since 2024, the remainder of the levy revenue has been available for a wider range of activities than previously; to include restoration of freshwater catchments, clean-up of contaminated sites and closed landfills and management of emergency waste[106], alongside the WMF.

From 1 July 2025, the WMF has a total pool of $30 million. The Minister for the Environment can update the WMF focus areas and the fund is currently accepting applications for infrastructure projects that divert

[103] As shown in the MfE's Waste and Resource Efficiency Strategy Waste and resource efficiency strategy | Ministry for the Environment
[104] https://environment.govt.nz/what-government-is-doing/areas-of-work/waste/waste-disposal-levy/expansion/
[105] Gazette (2024). Criteria for the Waste Minimisation Fund. Available: https://gazette.govt.nz/notice/id/2024-go4618
[106] Beehive.govt.nz (2024). Waste levy changes to improve environment. Available at: https://www.beehive.govt.nz/release/waste-levy-changes-improve-environment

organic waste from landfill to support New Zealand Emissions Reduction Plan.[107] Funding to support the development of e-waste recycling feasibility studies and e-waste PSS has been provided in the past.[108,109]

A.4.3 National Inventory of Product Stewardship Schemes

The Waste Minimisation Act 2008 (WMA) allows for products to be named as a 'priority product'. Once a product has been named as such, a product stewardship approach must be taken and a scheme developed and accredited[110]. The goal of PSS is to place the full cost of managing end-of-life products with the producers/importers, retailers, and consumers; not the general community and/or councils. The first six priority products named are:

1. Tyres
2. Electrical and electronic products (e-waste, including batteries)
3. Agrichemicals and their containers
4. Refrigerants and other synthetic greenhouse gases
5. Farm plastics
6. Plastic packaging

MfE has taken a 'co-design' approach, which involves industry developing with central government oversight. Progress on the priority products, and parties involved, are summarised in Table A5-8. Of these schemes, it can be seen through the table below that to date only the Tyrewise scheme is operational and regulated. While some schemes are operational, they are currently operating as voluntary schemes.

Table A5-8: Schemes for Priority Products

Product	Lead Agency	Status
Tyres	Auto Stewardship New Zealand, Tyrewise[111]	Operational - regulated
E-waste specifically large batteries	Auto Stewardship New Zealand, Battery Industry Group[112]	Design projects completed
Refrigerants (and other synthetic greenhouse gases)	The Trust for the Destruction of Synthetic Refrigerants, Cool-Safe[113]	Operational – voluntary Regulations being developed

[107] https://environment.govt.nz/what-you-can-do/funding/waste-minimisation-fund/#what-is-being-funded
[108] https://www.beehive.govt.nz/release/clever-solutions-recycling-funded
[109] https://techcollect.nz/2020/07/techcollect-nz-leads-the-charge-in-e-waste-recycling-supported-by-the-ministry-for-the-environment/
[110] The WMA does not require priority product stewardship schemes to be regulated, but it does require them to be developed and accredited according to section 10 of the WMA 2008
[111] http://www.tyrewise.co.nz/
[112] http://www.big.org.nz/
[113] https://coolsafe.org.nz/for-industry/refrigerant-buy-back

Product	Lead Agency	Status
Farm plastics, agrichemicals and their containers	The Agrecovery Foundation[114]	Operational – voluntary Regulations being developed
Electrical and electronic products (e-waste) excluding large batteries	TechCollect New Zealand[115]	Design project completed
Plastic packaging	The Packaging Forum[116] and NZ Food & Grocery Council[117]	Design project completed

Of this list, the PSS that will be directly relevant to small batteries is the electrical and electronic products category. As it stands, the current proposed scheme design includes small batteries as one of the products being addressed by this scheme but in a subsequent stage.

A.4.4 Proposed E-Waste Product Stewardship Schemes

The Battery Industry Group (B.I.G) and TechCollect NZ responded to the 2020 declaration of e-waste as a priority product. The schemes are detailed below.

A.4.4.1 TechCollect New Zealand

The most relevant PSS for small batteries is TechCollect's proposed e-waste PSS. It would initially capture small batteries embedded in eligible products, and in a subsequent implementation tranche capture loose small batteries.

In June 2023, following extensive consultation with industry, TechCollect published recommendations for an e-waste PSS design.[118] This was followed by an application for accreditation submitted in March 2025, which is currently being assessed by MfE.

Key Scheme Elements

The key elements of the proposed e-waste PSS design are as follows:

- The scheme would initially apply to screens, small equipment and small IT and telecommunication equipment. Temperature exchange equipment, large appliances, and small batteries will form a later tranche of the scheme, which is anticipated to be at least several years from the first tranche; although no timeline has been formally defined.
- Liable parties placing in-scope e-products on the New Zealand market, whether imported or manufactured locally, would be required to register with an independent clearing house provider,

[114] http://www.agrecovery.co.nz/
[115] http://www.techcollect.nz/
[116] http://www.packagingforum.org.nz/
[117] http://www.fgc.org.nz/
[118] https://techcollect.nz/Downloads/E-Product-Stewardship-in-Aotearoa-New-Zealand-Report-Two-Scheme-Framing-and-Design-Recommendations.pdf

engage and self-report 'placed on market' (POM) data. This data will be checked and verified with the scheme regulator.

- A scheme manager would be appointed, who would be governed by a board with input from a stakeholder advisory group. It would report to Government (the regulator) on the performance of the scheme.
- The scheme manager would be responsible for:
  - Collecting fees from importers and manufacturers of in-scope products
  - Managing income from fees and applying it to operation of the scheme
  - Establishing and managing a collection network for in-scope products
  - Appointing network transport operators to transport collected material to processors (these transport operators may also operate collection or processing components)
  - Appointing processors to receive collected product, assess it for reuse/repair, disassembly, recycling or safe disposal, and undertake the necessary processing. Processors will be expected to meet appropriate certifications such as R2[119] or AS/NZS 5377:2013[120]. The appointed processors do not have to undertake all operations in-house, but any subcontractors or downstream suppliers will be expected to operate to the same standards, and any exports comply with all permit requirements
  - Monitoring and reporting on the operation of the scheme, including reporting to the governance board, and scheme regulator, and servicing the stakeholder advisory group
  - Running education and communication programmes
  - Running an audit programme covering liable parties and service providers
  - Making recommendations on development of the scheme including supporting legislation or regulation, research and development, future capacity building, product design, and eco-modulation (adjustment of producer fees based on environmental criteria such as recyclability or longevity).
- There would be performance targets agreed with the scheme regulator. The performance targets have not yet been set, but are likely to include:
  - Scheme coverage for collection (termed a 'convenience target')
  - Recycling target for the proportion of collected material that is recycled
  - Availability of reuse/repair options.
- The scheme regulator (i.e. central government, nominally the Ministry for the Environment), would be responsible for
  - Cross-checking self-declared POM data against information recorded by the New Zealand Customs Service and other agencies, such as MBIE and Stats NZ

[119] Responsible Recycling© (R2) – Intertek SAI Global New Zealand
[120] AS/NZS 5377:2013 - Standards Australia

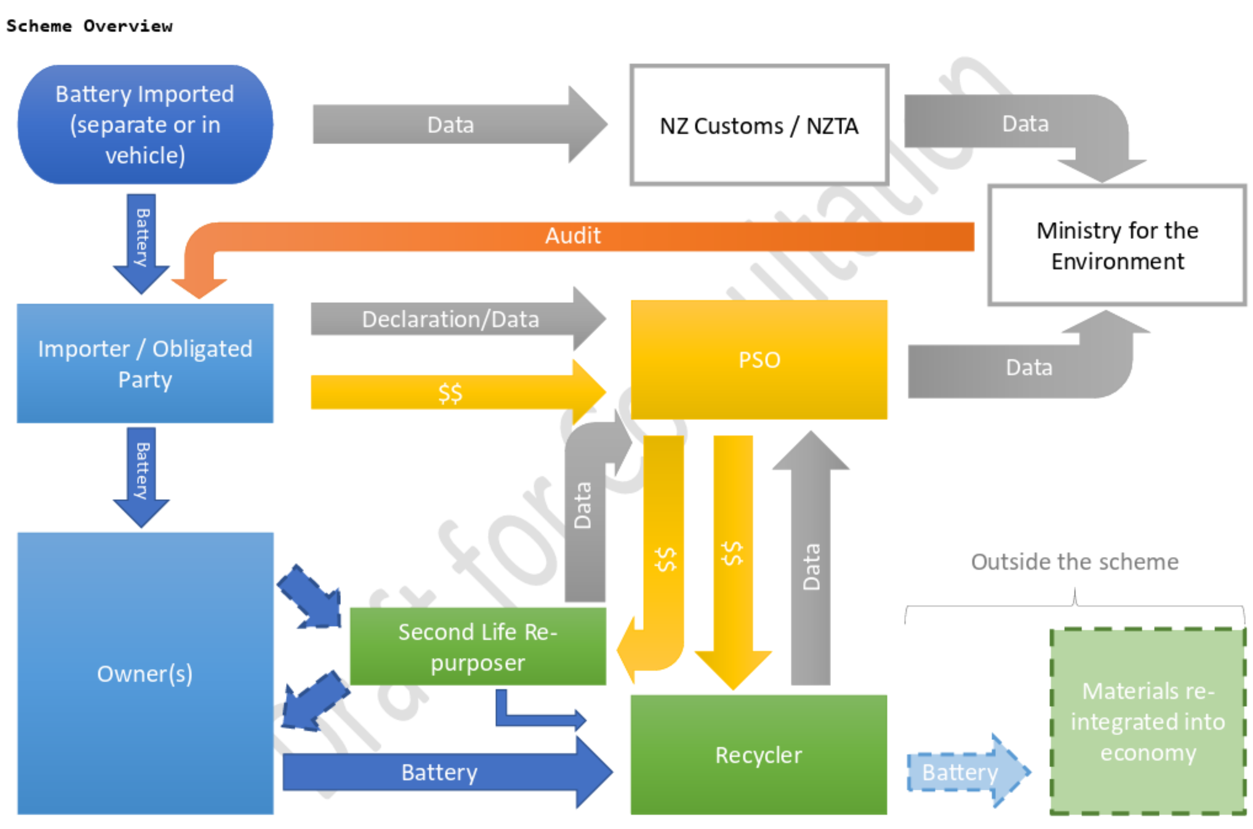
- – Setting targets and reviewing performance against targets by the PSS
- – Undertaking compliance action
- – Reviewing the operation of the scheme including independent audit and supporting legislation and regulation.

- Repairers and resellers would operate outside the scheme; although, because there are likely to be targets around the availability of reuse options, collectors that are part of the network will probably be required to either offer reuse services themselves or have a relationship with a reuse/repair provider.

A.4.4.2 Auto Stewardship New Zealand

Auto Stewardship New Zealand is a working group that is leading the efforts on large battery standards, reuse, recycling & stewardship in New Zealand. In 2021 the Batteries Industry Group B.I.G, the previous working group for large battery standards, had a proposed design for large batteries scheme that went out for consultation. The proposed scheme design is summarised in Figure A5-3.

Figure A5-3: Proposed Large Battery Scheme Design[121]



The scheme works by tracking large batteries from the moment they enter New Zealand through to their end-of-life. Importers report battery data to the product stewardship organisation (PSO); which

[121] B.I.G. Proposed-Scheme-Design. 2021. Available at: https://big.org.nz/wp-content/uploads/2021/02/B.I.G.-Proposed-Scheme-Design-Stakeholder-Information.pdf

calculates their fees, monitors battery movements, and pays accredited operators for second-life processing or recycling, ensuring batteries are responsibly managed at every stage.

Large batteries are different to small batteries, as large batteries will tend to come in smaller quantities and involve higher risk in end-of-life management. However, both small and large batteries come with risks to the environment and to health and safety. A seamless approach that covers large batteries and small batteries will be needed manage all battery types in New Zealand responsibly.

As of 2025, MfE has stated that "Due to the complex nature of this product category and industry changes since the public consultation, further work is required prior to obtaining decisions from Cabinet on regulations for large batteries."[122] The scheme is currently not operational and there is no indication of when this can be expected to come into action.

A.4.5 Dangerous Goods Regulatory System

Other regulatory systems that are relevant to the transport of dangerous goods are shown in Table A5-9.

[122] MfE. Priority product stewardship. 2025. Available at: https://environment.govt.nz/what-government-is-doing/areas-of-work/waste/product-stewardship/priority-product-stewardship/

Table A5-9: Dangerous Goods Regulatory Systems[123]

Dangerous Goods (DGs) Regulatory Systems Map			
	UN Recommendations on the Transport of Dangerous Goods – Model Regulations Classifies DGs for transport regarding their nature/hazard and sets requirements (labelling, packing, segregation, documentation) for safe transport across all modes		
	Air	**Maritime**	**Land**
International Framework	**ICAO Technical Instructions** Regulates DGs at governmental aviation level IATA Dangerous Goods Regulations Regulates DGs at industry aviation level	**IMO International Maritime Dangerous Goods Code** Regulates DGs at international maritime level	

[123] Ministry of Transport (2020) Dangerous Goods Regulatory System Map. Retrieved from https://www.transport.govt.nz/assets/Uploads/Report/DangerousGoodsRegulatorySystemMap.pdf , p.8

Domestic Dangerous Goods Framework	Transport Acts	**Civil Aviation Act 1990**	**Maritime Transport Act 1994**	**Land Transport Act 1998**
		Empowers the Minister to make civil aviation rules and offences regulations on DGs Grants powers to aviation security officers on DGs Creates an offence for passengers to carry DGs in breach of the rules	Empowers the Minister to make maritime rules and offences regulations on DGs Empowers authorised people to open packages and containers and test contents to check DGs compliance Creates an offence to knowingly breach a requirement in the Act or in regulations or rules for carrying DGs	Empowers the Minister to make land transport rules and offences regulations on DGs Empowers the NZTA to appoint DGs enforcement officers Creates an offence of obstructing a DGs enforcement officer Provides a range of powers relating to inspecting vehicles, premises and railway lines to ensure DGs rules compliance **Railways Act 2005** Provides that rail participants must comply with the DGs provisions of the Land Transport Act 1998 Provides that the DGs rules under the Land Transport Act 1998 apply to rail

Rules, Circulars and Standards	**Civil Aviation Rule Part 92**: Carriage of Dangerous Goods Regulates transport of DGs by air and incorporates ICAO Technical Instructions **Advisory circulars – AC 92 (1-3)** Information on standards, practices and procedures to comply with Civil Aviation Rule Part 92: Carriage of Dangerous Goods	**Maritime Rules Part 24A: Carriage of Cargoes – Dangerous Goods** Regulates the transport of DGs by sea and incorporates the IMDG Code	**Land Transport Rule: Dangerous Goods 2005** Regulates the transport of DGs by land **Land Transport (Driver Licensing) Rule 1999** Regulates the course certificates apply to DG endorsement / training requirements **NZ Standard 5433:2020 Transport of dangerous goods on land** Provides detailed technical information to meet the requirements of Transport Rule: Dangerous Goods 2005
Offences Regulations	**Civil Aviation (Offences) Regulations 2006** Contain 33 DGs offences	**Maritime (Offences) Regulations 1998** Contain 34 DGs offences (these misalign with duties under Part 24A and may be unenforceable) **Marine Protection (Offences) Regulations 1998** Contain 146 harmful substances-	**Land Transport (Offences and Penalties) Regulations 1999** Contain 48 DGs offences

		related offences (22 offences misalign with duties in the Marine Protection Rules and may be unenforceable)
Overlapping HSNO and HSWA Frameworks	**Hazardous Substances and New Organisms Act 1996 (HSNO)**[124] Regulates hazardous substances (including most DGs) across their whole life-cycle (including during transport) to protect the environment and people's health and safety **Hazardous Substances (Classification) Notice 2017** Sets the classification system for classes and subclasses of hazardous substances, linked to their hazardous properties **Health and Safety at Work Act 2015 (HSWA)** Regulates to protect people against harm to their health, safety and welfare from risks (including from hazardous substances) arising from work **Health and Safety at Work (Hazardous Substances) Regulations 2017** Regulates to manage risks to people from work-related activities involving hazardous substances (including most DGs) **Health and Safety at Work (Major Hazard Facilities) Regulations 2016** Designate major hazard facilities, set hazardous substances thresholds and the duties of facility operators	

[124] Dangerous Goods (except radioactive, infections and some miscellaneous substances) must first be approved under HSNO before being imported or manufactured

A.4.6 E-Waste Collection and Recycling Sites

Figure A5-4 refers to maps of all the key collection and recycling locations in New Zealand for small batteries. There are a range of drop off points and recyclers in New Zealand where other e-waste (sometimes, but not always including small batteries) can be taken. The 2021 report by TechCollect[125] highlights these groups as shown in Table A5-10.

Table A5-10 E-Waste Collection and Recycling Sites

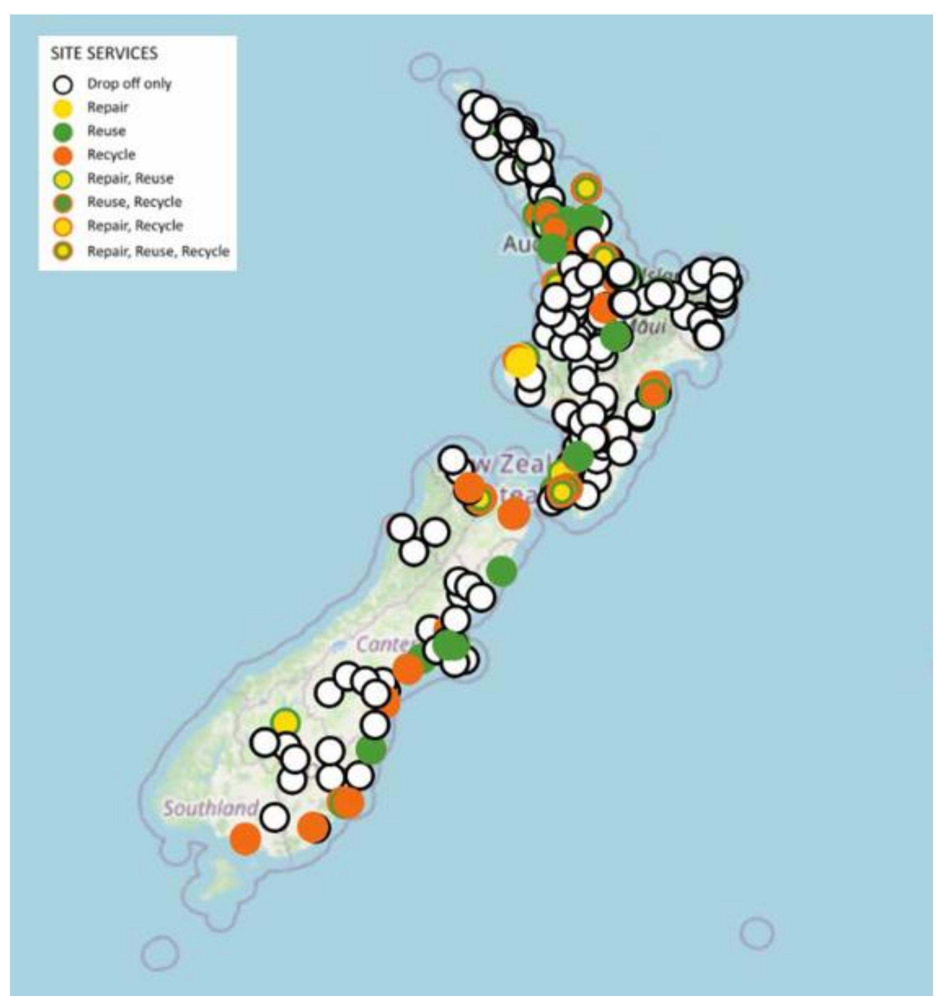
Site type	Definition	Number of sites
Community recycling centres	TA-owned/run operation that is called a community recycling centre. It matches the site types of resource recovery centre and transfer station.	4
Community resource recovery	Community-run organisation that provides resource recovery. It includes disability enterprises.	21
TA offices	Territorial authority office.	1
IT services	Information technology (IT)-related service organisation.	2
Landfill	Landfill site that accepts e-waste from the public. Territorial authority or privately owned.	5
Second hand shops	Opportunity (Op) or charity shop that accepts e-products/e-waste. The purpose is usually to sell for reuse, however some have the capacity to repair items before reuse, and/or run a repair cafe.	39
Private businesses	Private business that offers e-waste services that does not match any of the other site types.	31
Recyclers	Organisation that recycles e-waste. These organisations are run by a territorial authority, community enterprise, IT service organisation or a private business.	92
Repair shops	Organisation whose main related service is e-product repair and/or refurbishment.	4
Resource Recovery Centre	Territorial authority-run resource recovery centre providing facilities to the general public.	18
Retailers	Retail outlet that provides services for e-waste	6
Telecom companies	Telecom service company that provides services for e-waste	8

[125] https://techcollect.nz/Downloads/E-Product-Stewardship-in-Aotearoa-New-Zealand-Report-Two-Scheme-Framing-and-Design-Recommendations.pdf

Site type	Definition	Number of sites
Transfer stations	Site for the collection and sorting of rubbish and recycling, including e-waste that is open to the general public.	125
Waste companies	A private waste company site that is not classified as a transfer station or landfill.	3

New Zealand's e-waste and small-battery collection network is growing but highly varied, reflecting a mix of TA-run facilities, community enterprises, private recyclers, retailers, and repair operators. The TechCollect 2021[126] map of collection and recycling sites for E-waste shows where these drop-off and processing sites are located, with transfer stations and recyclers making up the largest share. Much like the Wasteminz map for small batteries, there are geographical gaps on the west coast of the South Island and east coast of the North Island.

Figure A5-4 Tech Collect 2021 E-Waste Collection and Recycling Sites



[126] TechCollect NZ. 2021. National Network Assessment Report: E-Product and E-Waste Management Services In Aotearoa New Zealand. Available at: https://techcollect.nz/Downloads/National-Network-Assessment-Report-–-E-product-and-e-waste-management-services-in-Aotearoa-New-Zealand_WEB.pdf

A.4.7 Communications to Consumers

Communication material released by TAs, operators of drop-off points, FENZ, and media outlets are integral to improving how batteries are managed by consumers, especially at end-of-use. Without national cohesion through a PSS or similar, the challenge of a national behaviour change campaign is compounded, and results in cost burdens on these aforementioned stakeholders. Although some behaviours (i.e. taping terminals, not using kerbside bins) are safer in all regions and could be targeted. This section and Section 3.6 (the issue of consumer education and behaviour) illustrate that although each group is playing their part, they are not connected. Having national legislation, such as PSS, for small batteries could enhance communication to consumers as directions would be cohesive and consistent, and responsible end-of-use management could be more accessible.

While the main purpose of media outlets is to inform the public about news and events; TAs, drop-off point operators, and FENZ share the purpose of encouraging correct behaviours to increase proper management of end-of-use batteries.

A.4.7.1 Territorial Authorities

TAs are responsible for the social, environmental, economic, and cultural wellbeing of people that reside in their district. Under the Waste Minimisation Act 2008, TAs have the responsibility to promote effective and efficient waste management and minimisation. This may include offering e-waste collection points or drop-off events and communicating with residents about how to minimise and manage end-of-use small batteries appropriately.

The resource *Best Practice Communications for Waste Minimisation* released by MfE in 2023 provides guidance for building best practice communications to households.[127] While the resource doesn't mention e-waste specifically, it provides information about identifying behaviours, understanding barriers, and selecting relevant strategies, and provides some high-level best practice tips, including:

- Focus on a single key message
- Have a clear call to action
- Clear, simple, concise language
- Positive and casual tone of voice
- Use images that are relevant to the audience or context
- Use icons that are easily recognisable.

The main behaviours that TA communications currently set to correct are putting batteries in kerbside bins and dropping batteries off to designed drop-off points with exposed terminals. TAs communicate with residents about small battery end-of-use management through different channels. Messaging from councils includes both proactive (e.g. a guide for recovery options) and reactive (e.g. campaigns about battery fires) approaches.

This section will look at the various channels Christchurch City, Dunedin City, Whakatāne District, and Auckland Councils use to engage with their communities.

[127] https://environment.govt.nz/assets/publications/Waste/Best-practice-communications-for-waste-minimisation.pdf

The most recent waste management and minimisation plan (WMMP) for Ōtautahi Christchurch was released in 2020.[128] One action area that the plan mentions is the battery recycling scheme where batteries can be dropped off for free at seven locations within the district for export.

In the past 12 months the council can report two battery-related fires in collection trucks, and 30 battery-related fires across recycling, organic processing, and transfer station facilities.

Christchurch City Council provides information to residents about batteries through their call centre, website, and through flyers.

- Christchurch City Council accepts questions over the phone on 03 941 8999 or 0800 800 169 or on the form on their website.[129]
- The council website promotes 'other recycling schemes' to capture material at end-of-use/life beyond their kerbside suite and other offerings.[130] This page allows users to expand content based on waste stream (batteries, clothing, computers and e-waste, etc.). It also hosts a flyer with helpful imagery, similar to the flyer shown in Figure A5-5. This flyer is also available at libraries, service centres, and provided at events.
- The council also offers a battery recycling scheme. On the webpage they explain why batteries should be recovered appropriately, what is and isn't accepted, what happens to the batteries, a list of drop-off points, and an interactive map for residents.[131]
- A recent campaign that focussed on batteries was via a flyer that was delivered with Christchurch residents' rates bill in September 2025. This flyer provides multiple places to access information further information (website link and QR code), simple imagery, and the clear directive "don't bin your batteries". This campaign is likely in response to small-battery related fires experienced in waste trucks and at waste facilities.

---

[128] https://ccc.govt.nz/assets/Documents/The-Council/Plans-Strategies-Policies-Bylaws/Plans/Waste-Management-and-Minimisation-Plan-2020.pdf
[129] https://ccc.govt.nz/contact-us/contact-us-form
[130] https://ccc.govt.nz/services/rubbish-and-recycling/learning-resources/recyclingschemes
[131] https://ccc.govt.nz/services/rubbish-and-recycling/learning-resources/batteryrecycling

Figure A5-5: Christchurch City Council Don't Bin Your Batteries Flyer

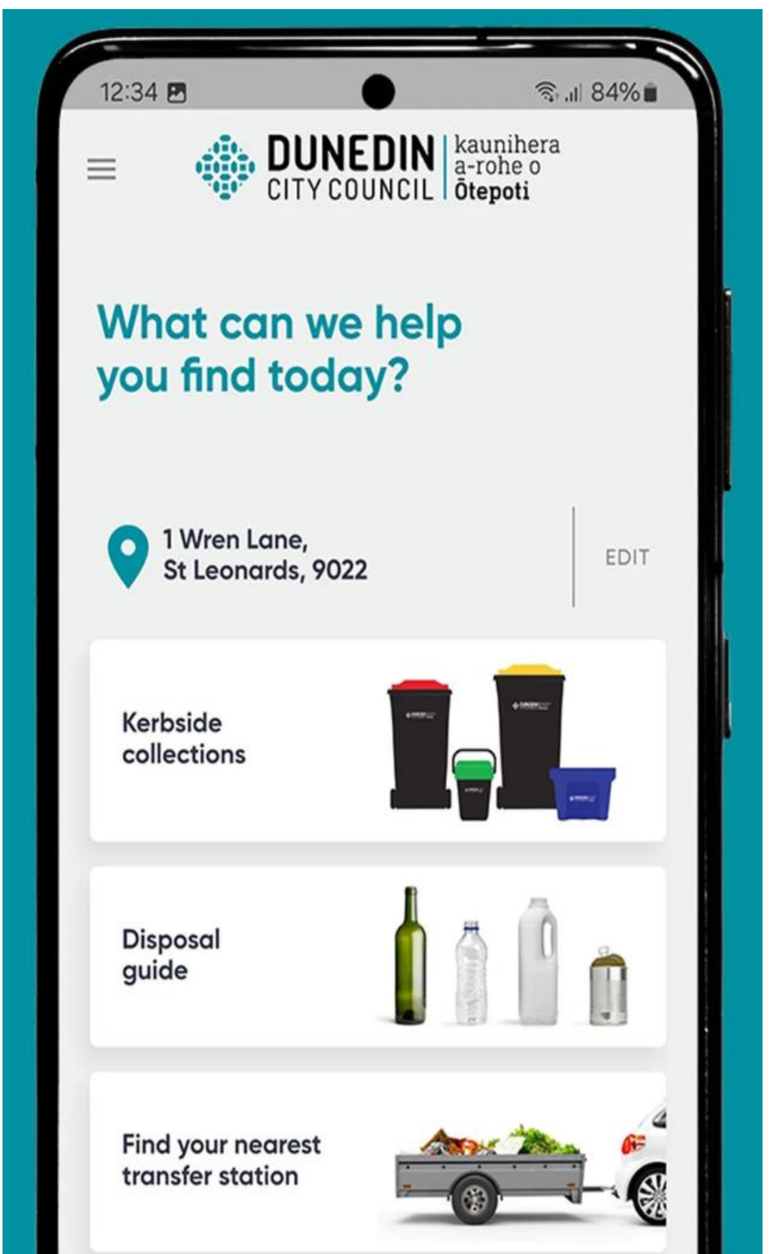
Dunedin City Council released their most recent WMMP for Ōtepoti Dunedin in 2025.[132] Although the plan doesn't specifically mention batteries or e-waste it considers the circular economy, advocating to central government for things like right to repair and PSS. According to the Otago Waste Assessment from 2023, there are non-council waste services that collect e-waste.[133] This assessment also talks to the changes in lifestyle and consumption and recognises e-waste as a greatly increasing waste stream. The council offers free drop-off for household batteries at the resource recovery park and are in the process of setting up other collection points at retailers.

Since April 2023, the council has only recorded three battery-related fires, with all minor and extinguished safely.

- Dunedin City Council customer service staff are available to answer questions about end-of-life small batteries. They can be reached at the customer service centre, by calling +64 3 477 4000, or emailing dcc@dcc.govt.nz.
- The landing page for recycling and rubbish collections provides an overview of things residents need to know about the kerbside collection suite and what can and can't be collected. It classifies batteries as "risky items" and encourages residents to take these to the Green Island Resource Recovery Park Rummage shop.[134]
- The council also provides a free app for residents that provides more information about kerbside collections. The app has a disposal guide where residents can search for items (e.g. batteries, vapes) to determine how to dispose of them appropriately.[135] A screenshot of the app is shown in Figure A5-6.
- The council website has a page about e-waste and batteries.[136] The page raises the issue of consumption and e-waste as a significantly increasing waste stream. The Council shares actions it takes including advocating for product stewardship and collecting household batteries for free through the Rummage shop. Drop-off points for existing take-back schemes are also included.
- The council is yet to have an e-waste specific campaign, although has shared some artwork that has been part of hazardous waste campaigns that were presented as print media and radio advertisements.

[132] https://www.dunedin.govt.nz/__data/assets/pdf_file/0004/1254514/waste-management-and-minimisation-plan-2025.pdf
[133] https://www.qldc.govt.nz/media/ucxpllxh/3a-otago-region-waste-assessment-2023_final.pdf
[134] https://www.dunedin.govt.nz/services/rubbish-and-recycling/recycling-and-rubbish
[135] https://www.dunedin.govt.nz/services/rubbish-and-recycling/kerbside-faq/faqs-july-1/new-dcc-kerbside-collection-app
[136] https://www.dunedin.govt.nz/services/rubbish-and-recycling/e-waste

Figure A5-6: Dunedin Kerbside App and Battery Artwork



Whakatāne District Council released their current WMMP in 2021. The plan mentions product stewardship for e-waste and that the council will advocate for it, as well as the circular economy.

The council offers drop-off points around the district as well as drop-off day events. Whakatāne District Council installed a DCU ('Dangerous Cargo Unit')[137] from Phoenix Recycling Group in October 2024.[138]

In the last twelve months, one truck fire was experienced that was extinguished safely; however the cause was not determined.

The council provides information to residents about batteries through their call centre and website, as well as the campaign "Think Before You Toss" that spans the council website, the flyer in Figure A5-7, and educational videos filmed in both English and te reo Māori.

- Residents can contact the council for information about batteries through info@whakatane.govt.nz, an online enquiry, visiting one of two service centres, or by calling 07 306 0500.[139]
- News on the council website includes an article called "Think before you toss. Never bin your batteries". The article shares battery drop-off centres including RRC, Waste Zero Whakatāne, and retailers. It also explores the effects of incorrect disposal as well as the benefits of proper recovery.[140]
- The Think Before You Toss flyer has artwork of a sad anthropomorphic bin with the catchy slogan of the campaign, as well as the clear message to "never bin your batteries". Other images are simple and easy to understand. The flyer presents dangers of incorrect battery disposal, places that can handle them responsibly and what they accept, as well as detail on how to tape battery terminals to reduce risks.
- The Think Before You Toss videos have been distributed across social media channels (Facebook, Instagram) since May 2025.[141] The videos are informative and engaging.
- The Council hosted a 'Battery Take Back' day in June 2025, promoted by the local radio station and social media channels, held from 9am – 1pm with around 50 attendees, collecting approximately 50kg of household batteries and 600kg of large batteries (e.g. from cars).[142]

[137] https://www.phoenixrecycling.co.nz/battery-recycling-units
[138] Private correspondence with Tasha Thompson, Solid Waste Minimisation Coordinator, Whakatāne District Council
[139] https://www.whakatane.govt.nz/contact-us
[140] https://www.whakatane.govt.nz/about-council/news/think-you-toss-never-bin-your-batteries
[141] https://www.instagram.com/reel/DJvtzBSoWzf/?utm_source=ig_web_copy_link&igsh=MzRlODBiNWFlZA==
[142] https://www.instagram.com/p/DKfvYFZStzn/?utm_source=ig_web_copy_link&igsh=MzRlODBiNWFlZA==

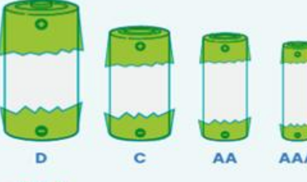
Figure A5-7: 'Think before you toss' flyer

Top tips for safely disposing of waste batteries:

- Opt for rechargeable batteries over single-use ones whenever possible to reduce waste.
- Instead of throwing away unwanted battery-powered items, consider selling or donating them if they're still working.
- Never dispose of batteries in your regular rubbish bin or mix them with other recyclables.
- If you can safely remove a battery from a device, make sure to dispose of it separately using a battery collection service.

Why tape before you recycle?
He aha e tēpa ai te pūhiko i mua i te hangarua?

Batteries can cause fires if their terminals touch or they touch other metal objects. Button batteries can easily spark due to the large battery terminal and can cause internal burns if swallowed by children or pets. Prevent this by taping the terminals of used batteries with tape (clear tape preferred).



Whakatāne District Council
14 Commerce Street, Whakatāne
P 07 306 0500 **E** info@whakatane.govt.nz
W whakatane.govt.nz

Murupara Library and Service Centre
48 Pine Drive, Murupara
P 07 366 5896

Think before you toss

Never bin your batteries.

Throwing batteries in the bin is a fire risk and can harm people and the planet.

The dangers of used batteries
Ngā mōreareatanga o ngā pūhiko tawhito

Used batteries thrown away in general waste or mixed with other recyclables like paper, metal, or plastic can be hazardous.

During the collection process, batteries hidden in rubbish or recycling may be accidentally crushed, compacted, punctured, shredded, or exposed to liquids. When this occurs, certain types of batteries can overheat or catch fire, leading to potential harm, extensive damage, and disruption to waste services.

Even if no fire occurs, damaged batteries contain harmful chemicals and materials that can pose serious environmental risks if not disposed of properly.

For more information, scan the QR code or go to **whakatane.govt.nz/battery-recycling**

Remember these three simple steps to keep our collection truck drivers safe.

DON'T TOSS THEM
in general waste and recycling bins

TAPE THEM
using clear sticky tape (preferred), non-conductive electrical or duct tape.

TAKE THEM
to your nearest recycle drop-off point.
60 Te Tahi Street, Whakatāne
Harakeke Road, Murupara

Where can I recycle my used batteries?
Kei hea au e hangarua ana i ngā pūhiko tawhito?

There are several safe and free ways to recycle household batteries.

Drop-off points:

- **Whakatāne Resource Recovery Centre** (60 Te Tahi Street, Whakatāne) – two dedicated battery recycling units.
- **Murupara Resource Recovery Centre** – batteries are collected and transferred to Whakatāne for safe recycling.
- **Other locations** – Waste Zero Whakatāne stall at the first Whakatāne Sunday Market each month, Bunnings, and Supercheap Auto (for car batteries only).

What battery types are accepted?
He aha ngā momo pūhiko ka hangarua?

Small household batteries, commonly used in everyday devices around the home, can be saved and dropped off free of charge, at our Resource Recovery Centre in Whakatāne and Murupara.

Larger household batteries can be left on the crate next to the battery recycling unit in the recycling drop-off area.

E-waste
Electronic devices like tvs, laptops, smartphones, tablets and power tools are classified as electronic waste (e-waste). We recycle smartphones and power tool batteries. However, other electronic waste, such as TVs, laptops, and tablets, are not recycled at the Resource Recovery Centres and should be taken to CReW (charges apply) or Noel Leeming for recycling.

Auckland Council released the current WMMP for Tāmaki Makaurau in 2025.[143] The plan raises the challenge of lithium batteries that are increasingly entering the market and how they are prone to catching fire inside waste trucks and facilities. It acknowledges that while batteries are within the e-waste scope set out by central government as a priority product, the design and implementation of a scheme that captures lithium batteries is not imminent.

Small batteries can be dropped off at community recycling centres as well as industry-led drop-off points. Occasionally local boards may fund drop-off days for their communities.

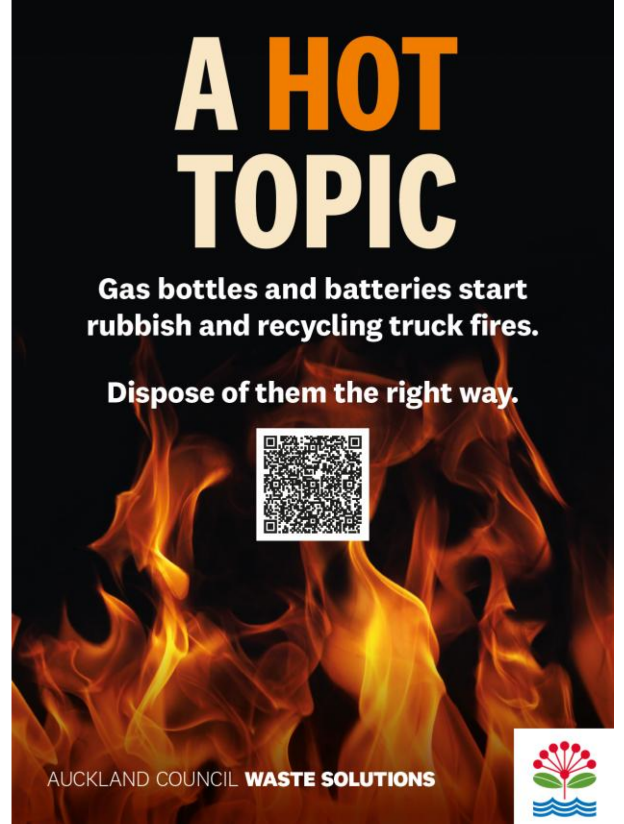
In the last 12 months, Auckland Council has experienced 18 lithium battery-related fires.

Auckland Council provide information to residents about batteries from their call centre, website, magazine, and targeted campaigns:

- Customer service representatives can be reached on 09 301 01 01 and provide information about where to take small batteries at end-of-use.
- The 'How to Get Rid of Unwanted Items' website is an accessible way for residents to search for end-of-use items (including small batteries) and find out places that can take them.[144]
- OurAuckland is an online publication that hosts information about news and events. The most recent article about small battery fires is from May 2025 and discusses the outcome of the Auckland District Court hearing between Auckland Council and Sims Metal Industries after the 2023 blaze at their Favona site.[145]
- Auckland Council have run several campaigns since 2023 that focused on behaviours to prevent fires in waste trucks and at facilities. While these campaigns are reactive and focus on battery fires, the council has also promoted the 'How to Get Rid of Unwanted Items' website mentioned previously in this list. The campaigns take place on street furniture, billboards, banners, radio, Facebook, Instagram, TikTok, Spotify, and YouTube. Artwork from two of the fire specific campaigns are shown in Figure A5-8. The imagery is emotive and gives across a sense of urgency, there are directives "dispose of them the right way" and "check it before you chuck it", and places to find more information (website, QR code).

[143] https://www.aucklandcouncil.govt.nz/content/dam/ac/docs/plans/environmental-strategy/waste-minimisation-management-plan-towards-zero-waste.pdf
[144] https://www.aucklandcouncil.govt.nz/en/rubbish-recycling/get-rid-unwanted-items.html
[145] https://ourauckland.aucklandcouncil.govt.nz/news/2025/05/ac-v-simsmetal/

Figure A5-8 Auckland Council Campaign Artwork



A.4.7.2 Drop-Off Points

It is crucial for drop-off points to present clear information to customers to ensure that the right material is received in the right way. Two examples are Xtreme Zero Waste, a community recycling centre in Raglan, and Bunnings, a hardware store that has around 50 stores across New Zealand.

A.4.7.2.1 Xtreme Zero Waste

Xtreme Zero Waste was established in 2000 at a landfill site in Raglan. The site currently accepts all small batteries for free and have a bunker for safe storage onsite.[146] On the battery disposal landing page, Xtreme Zero Waste share that battery fires are a serious risk, and that the number of these violent battery fires across New Zealand is increasing. The webpage shares information with external links to articles, as well as cites recommendations from FENZ. Information is presented with simple checkmark emoji that is simple to understand as shown in Figure 5-9.

Figure 5-9: Xtreme Zero Waste Checkmark List

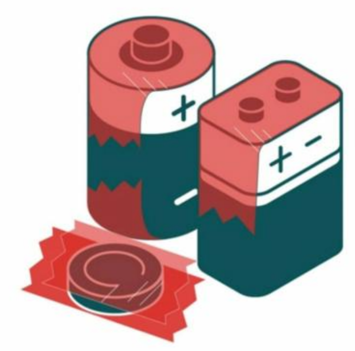
✅ All batteries are free to drop off at Xtreme Zero Waste. We have a bunker for storing batteries and vapes safely before transporting to battery recyclers. Only deep cycle solar batteries have fee.

❌ Li-ion devices should never be placed in any household or public rubbish or recycling bins as batteries can cause fires during collection, transporting and processing.

A.4.7.2.2 Bunnings

Bunnings provide free battery drop-off points at every store across the country.[147] Batteries accepted are household and power tool batteries, and fit within the small battery scope defined in Section 1.3.1, but are limited to the size of the entry slot of the collection bins. The webpage presents the pros of battery recycling as valuable material recovery and taking part in the circular economy. It advises customers of what can and can’t be recycled, raises that contamination in the bins is a hazard, and advises customers to tape terminals as shown in Figure 5-10.

Figure 5-10: Bunnings Battery Taping Imagery



[146] https://xtremezerowaste.org.nz/lithium-ion-battery-disposal/
[147] https://www.bunnings.co.nz/diy-advice/home-improvement/sustainability-recycling/where-and-how-to-recycle-batteries?srsltid=AfmBOor7YMD9qz8-OcP3mX3DuBjMUL4gOF3iBExcEYuCSH_YSP4qiKNh

A.4.7.3 FENZ Lithium Battery Fire Campaign

In 2023, FENZ launched a safety campaign aimed to educate about and prevent lithium battery fires. The campaign was distributed on social and digital platforms, outdoor advertising (e.g. bus stops and street posters), and targeted locations such as e-scooter parking and charging stations. FENZ identified that the public did not necessarily associate items such as e-mobility and vapes with fires, so aimed to establish that link with attention-grabbing images such as the vape below with visible smoke, sparks, and flames.[148]

Figure 5-11: FENZ Lithium Battery Fire Campaign

A.4.7.4 Media Outlets

Battery articles in the media are nothing new, although the content of them is. Previous articles focussed on what rechargeable batteries are best or the batteries with the longest lifespan, however as evidenced in previous sections, particularly in Section 3.4, fires caused by lithium batteries are increasing significantly over time, and so has their portrayal in the media.

Given the level of harm experienced and the visibility to the public, local and national media outlets have been covering stories about lithium battery fires in waste trucks and at facilities. Often TA staff will comment on articles or appear in interviews to share information about the fires. Some articles are completely focused on reporting an incident, while some are focused on preventing behaviour that led to the incident by proper disposal.

Stuff published an article in 2022 titled *Cheat Sheet: What you Need to Know About Lithium-ion Batteries and Fire Risk*.[149] The article sets the scene with some statistics about house fires caused by batteries in New Zealand, then sets about answering helpful questions in a 'frequently asked question' style.

---

[148] https://portal.fireandemergency.nz/notices-news-and-events/news/fire-and-emergencys-lithium-ion-battery-safety-campaign-launches/
[149] https://www.stuff.co.nz/national/300667681/cheat-sheet-what-you-need-to-know-about-lithiumion-batteries-and-fire-risk

More recently, in 2022, Stuff published *Councils are Banning Putting Batteries in the Bin, So What on Earth Should You Do With Them?*.[150] This article interviews staff from Phoenix Recycling Group about what happens to material from batteries when they're recycled, as well as diversion achieved by several battery recovery initiatives.

The Spinoff published the article *Building Batteries That Go Beyond Lithium* in 2019.[151] At the time of writing, the main issues with lithium batteries appeared to be lack of recovery and the environmental impact of mining. An exploration of potential alternative battery chemistries to lithium is included in this report in Section 4.0.

In May 2025, the publication also published an article titled *Why Batteries Keep Causing Fires and How the Problem Can be Fixed.* The article discusses the fire risk when batteries go into inappropriate waste management systems.[152] The article uses data from Christchurch City Council and Auckland Council about the number of fires experienced in their districts (five and 20 at the time of writing respectively). It also references other articles about the growing problem and interviews staff from WasteMINZ, FENZ, Waste Management NZ Ltd, and Bunnings. The article touches on other issues, such as the expense to replace vehicles and infrastructure and the increasing cost of insurance due to the risk of fires.

RNZ published an article in April 2025 titled *Auckland Council Urging Correct Disposal of Lithium-ion Batteries After Glenfield Fire.*[153] The article covers the fire that occurred at the Abilities Group recycling plant on the North Shore of Auckland. It mentions that the fire burned the plant to the ground as well as equipment. The general manager of Waste Solutions was interviewed and spoke about the increasing use of Li-ion batteries by consumers and how it is resulting in an increasing number of fires. The general manager shared that it is a priority to have better regulation for small battery disposal and PSS across the country.

[150] https://www.stuff.co.nz/nz-news/360635983/councils-are-banning-putting-batteries-bin-so-what-earth-should-you-do-them
[151] https://thespinoff.co.nz/science/09-03-2019/building-batteries-that-go-beyond-lithium
[152] https://thespinoff.co.nz/society/07-05-2025/why-batteries-keep-causing-fires-and-how-the-problem-can-be-fixed
[153] https://www.rnz.co.nz/news/national/559308/auckland-council-urging-correct-disposal-of-lithium-ion-batteries-after-glenfield-fire

eunomia