

E-cigarette Collection Study Report

Executive Summary

E-cigarettes have emerged as a problematic waste for Local Government as they are littered in public places and disposed of through the kerbside bin system, which can cause fires in collection vehicles and at waste management facilities.

WALGA, with \$23,000 funding from the Waste Authority, and in partnership with the City of Stirling, undertook an E-Cigarette Collection Study (Collection Study) to better understand the scope of products currently on the market, resource recovery options and nicotine content. The City of Stirling's Recycling Centre Balcatta hosted the e-cigarette drop off location from November 2023 to August 2024.

As e-cigarettes are likely to contain nicotine, which is a regulated substance, WALGA was granted a research/education permit from the Department of Health to undertake the Collection Study. Any future collection of e-cigarettes will likely require a collection permit from Department of Health.

Perth Chemical Specialists (PCS) were contracted to collect, dismantle and source resource recovery options for the e-cigarettes.

3,250 e-cigarettes were collected. There were 86 identified brands, with 5 brands making up 90% of e-cigarettes.

The Collection Study found that e-cigarettes are highly recoverable, with over 65% of the materials being recyclable and over 34% recoverable through energy recovery or being manufactured into a waste derived fuel. A representative sample of 32 e-cigarettes were tested for nicotine content, with all but one containing nicotine.

While the Collection Study demonstrates that e-cigarettes can be recycled/recovered, national product stewardship is needed to ensure clear and funded end of life pathway for these products. Until a national scheme is in place, State funded options are needed.

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1. Background

Legislation

E-cigarette sale and use has grown rapidly in WA. The Department of Health is responsible for regulating e-cigarettes in WA under the:

- *Tobacco Products Control Act 2006*, which prohibits the supply of e-cigarettes because they are designed to resemble a tobacco product
- *Medicines and Poisons Act 2014*, which prohibits the supply or possession of e-cigarettes containing nicotine, unless supplied through a pharmacy via a prescription from a doctor.

From July 2024, the Australian Government began a staged approach to strengthened [restrictions to e-cigarette](#) importation and sales. However, these reforms allowed for e-cigarettes to be supplied by a pharmacist without a prescription. The State Government then passed [new regulations](#) that require a doctor's prescription to purchase an e-cigarette from a pharmacy in WA, which came into effect on 31 October 2024.

E-cigarettes Waste Issues

E-cigarettes are a problematic waste because they contain:

- A lithium battery (a Dangerous Goods Class 9), which are a fire risk to waste services
- Nicotine, which is either a Schedule 4 – Prescription only Medicine, or a Schedule 7 – Dangerous Poison.

Most waste companies in WA do not currently have the required licences to collect, transport and dispose of e-cigarettes or experience in safely dismantling them.

Perth Chemical Specialists (PCS) identified that lithium batteries can still contain a high charge when e-cigarettes are no longer usable. This complicates the device dismantling which, if undertaken incorrectly, can cause a spark. As many of these products are unregulated, it is unlikely that they meet battery safety standards, which further increases the fire risk.

E-cigarettes are a problematic waste for Local Government, as they are littered in public places and disposed of through the kerbside bin system, which causes fires in collection vehicles and at waste management facilities. These fires pose a significant work health and safety risk, damage waste assets and infrastructure and disrupt services. Local Governments are also under increasing pressure from the community to provide safe e-cigarette disposal options.

2. The Collection Study

Purpose

To better understand the resource recovery options for e-cigarettes, WALGA received \$23,000 funding from the Waste Authority to undertake a collection study of e-cigarettes.

The objectives of the study were to:

- Collect information on:
 - The type of e-cigarette being disposed of (disposable or refillable)

- The types of battery in the units, and consequently if they are in or out of the scope of the B-cycle product stewardship scheme
- The quantity and type of material e-cigarettes are made from (metal, plastic, other) and the recovery pathways for each material type
- The proportion of e-cigarettes that contain nicotine
- Use this information to support and inform advocacy on e-cigarette disposal and the need for a national e-cigarette product stewardship scheme.

Methodology

Collection

The City of Stirling agreed to host the collection point at its HHW facility at the Recycling Centre Balcatta (RCB) for the collection period. This location was determined to be the best option for the public drop off location as it was considered to be secure, well patronised and already collecting Household Hazardous Waste.

The Department of Health granted a permit which allowed the Recycling Centre Balcatta to receive and store e-cigarettes containing Nicotine under the Schedule 4 of the Medicines and Poisons Act 2014 and Medicines and Poisons Regulations 2016, prior to destruction.

Recycling and Recovery

PCS, a WALGA Preferred Supplier, was contracted to collect, document, dismantle and source recycling and resource recovery options for the e-cigarettes. PCS contracted directly with ChemCentre (who are licenced for the activity) to undertake Nicotine testing.

PCS provided the Balcatta HHW facility with 20L lidded buckets for storage of e-cigarettes prior to transport to the lab. Once received, trained chemists:

- Dismantled each e-cigarette under a fume hood (due to the nicotine content and other potential hazardous substances being present)
- Carefully disconnected the wired in battery, taped the terminals and placed into Kevlar fire resistant bags
- Weighed and recorded the constituent parts (metal casings, battery, liquid-soaked sponge, which contains the 'vape juice' and any plastic components)
- Placed each material type into separate buckets to store prior to material/resource recovery
- Provided samples of the liquid-soaked sponge containing the 'vape juice' to the ChemCentre for nicotine testing.

Promotion

WALGA developed the signage for the collection point (see [Figure 1](#)). To manage public expectation of an ongoing e-cigarette collection service at the RCB, all messaging made it clear it was a temporary collection only. To ensure e-cigarette samples were representative of the types of products circulating in the community, the collection was limited to individuals (not organisations such as schools), who could drop off up to 10 devices per visit.

A cautious approach was taken to promoting the study to ensure demand did not exceed the funds available for the study. This included:

- City of Stirling adding a 'Temporary Collection of E-cigarettes' notice on its HHW Program webpage
- Public awareness through signage at the HHW facility (see [Figure 2](#))
- WALGA informing the Local Government waste educator network of the study so it could advise residents of disposal options.



Figure 1: Drop off signage at Recycling Centre Balcatta.



Figure 2: E-cigarette drop off signage and collection buckets.

3. Results

3,250 individual e-cigarettes were collected over the nine months of the study, of which:

- 3,241 (99.7%) were disposable, and 9 (0.3%) were refillable
- 2925 (90%) came from 5 brands - IGET (75%), Gunnpod (7%), HQD (3%), WAKA (3%) and Vapengin (2%), with a further 81 brands identified and 19 devices unlabelled/unknown
- All had embedded lithium-ion batteries which are wired into the device and not designed to be removed*
- There was variability in the battery, size, shape and quality of construction.

The constituent parts of the collected e-cigarettes comprised:

- 40% lithium-ion battery
- 25% metal
- 22% mixed plastics
- 13% nicotine-soaked sponge.

A representative sample of 32 individual e-cigarettes (comprising various models from 23 brands) were tested to identify the quantity of nicotine contained at end of life:

- Nicotine was present in the remaining vape juice of all but one of the samples, ranging from 5.9 g/L up 66g/L (see [Table 1](#)).

* B-cycle, the National battery product stewardship scheme has previously provided guidance to WALGA that batteries accepted through B-cycle are those designed to be removed easily from devices, not embedded batteries. However, in practice, if batteries can be removed and are under the 5kg per item threshold, these would likely be processed by B-cycle recyclers, along with other loose batteries.

Table 1: Nicotine content for the 23 brands (from 32 individual devices) sampled.

E-cigarette brand	Nicotine content (g/L)
Akin	35
AL FAKHER	5.9
ePod	23
FLOW	36
GunnPod	35-66*
HQD	32-33*
iGet	45-50*
JNR	40
Kuz	38
Lost Mary	39
Mlion	22
NimmBox	39
PRIME	27
Puffmi	38

Puff XXL	15
PUNKApes	32
Pyne Pod	32
RELX	35-37*
SKE	<0.1**
TKCA	58
Vapengin	36
VAPOURLAX	51
VOPK	33

* Denotes multiple models of noted brand were tested.

** A result below instrument recording limit of 0.1g/L

Table 2 summarises the resource recovery pathways PCS utilised for the e-cigarette materials. 65.3% of materials were recycled (metals and batteries) and 34.7% of materials went for resource recovery (80% become waste derived fuel and 20% through energy recovery).

Table 2: E-cigarette constituent parts proportions and recovery pathways

Parts	Weight (kg)	Percentage of total	Resource recovery pathways	
Lithium-ion batteries	79	40.3%	Battery recycler - Victoria	65.3% material recovery
Metals	49	25.0%	Metal recycler or community arts project for upcycling - Perth	
Non-recyclable mixed plastics	43	21.9%	Energy recovery - Kwinana	34.7% resource recovery
Liquid-soaked sponge (potentially containing nicotine)	25	12.8%	80% waste derived fuel - Victoria 20% energy recovery- Kwinana	
TOTAL	196			

4. Findings

The study found that:

- E-cigarettes are highly recoverable, with over 65% recyclable materials and nearly 35% usable in energy recovery or as a waste derived fuel
- Although the materials have recovery pathways, the safe dismantling process is labour intensive which comes at a high cost per item. It is anticipated the costs would be lower when more products are collected and there is investment in processing infrastructure.

- Nearly all e-cigarettes tested contained nicotine above 0.1g/L, even after the device was no longer usable.

5. Recommendations

The Collection Study has demonstrated that e-cigarettes can be safely collected, dismantled and recycled. However, without an alternative disposal option, e-cigarettes will continue to be disposed of in public places and in kerbside bins, causing fires which put lives at risk, damage waste collection vehicles, management facilities and disrupt waste services.

WALGA recommends that the State Government:

1. Work with other jurisdictions, Local Government and the waste and pharmaceuticals industry to develop and implement a national e-cigarette stewardship scheme as soon as possible
2. Work with WALGA, the waste and pharmaceuticals industry to establish and fund a WA collection scheme, including a time-limited amnesty for illegal e-cigarettes as an interim measure until a national stewardship scheme is in place.

National e-cigarette stewardship scheme

A national agreement and funding model is needed to ensure all e-cigarette manufacturers contribute to the recovery of their devices at end of life.

An extension of the [Return Unwanted Medications Project](#) (RUM Project) could be an appropriate and expedient option to progress such a scheme. As pharmacies (via doctor's prescription in WA), are the only legal source of e-cigarettes, WALGA considers that leveraging the existing RUM Project is a potential solution to allow consumer take back. The RUM Project is funded by the Australian Government, with most pharmacies across Australia acting as collection points for unwanted or expired prescription medications. Through an initial discussion with WALGA, a RUM Project representative expressed interest in considering the inclusion of e-cigarettes into the scheme.

Interim collection scheme

A safe collection arrangement for e-cigarettes is needed until the supply of these products is fully regulated, enforced and a product stewardship scheme is in place. The collection arrangement would include a time limited amnesty for those e-cigarettes purchased outside the regulated environment as well as those purchased from pharmacies.

Pharmacies, as the only legal supplier of these products would be a logical and suitable collection point. These locations would be provided with appropriate storage containers for e-cigarettes and serviced by an appropriately qualified contractor for the recycling/disposal of the product. Any disposal arrangement will likely require approval and licencing from the Department of Health.



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This project is supported by the Government of Western Australia
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6. Appendix

Extracts from PCS report with photos of the constituent parts.

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**100% of Batteries
Lithium-ion**

Lithium batteries have all wires removed and are individually wrapped in electrical tape to avoid the possibility of shorting out. They are then placed inside a Kevlar bag. Lithium batteries are sent to a battery recycler.










VAPE COLLECTION REPORT
Perth Chemical Specialists Pty. Ltd. **PCS**




Hard and soft plastics are removed from the easily recyclable components. These components are sent to the Kwinana Waste to Energy Plant where they undergo thermal destruction and produce energy to off-set the use of fossil fuels.



Metal casings are easily recyclable through any metal recycling facility, we are also looking for options to re-use through a community arts program or similar.

VAPE COLLECTION REPORT
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Liquid soaked (Potentially nicotine containing) sponges are bagged and consolidated with other toxic material that is sent for complete thermal destruction via energy recovery.

