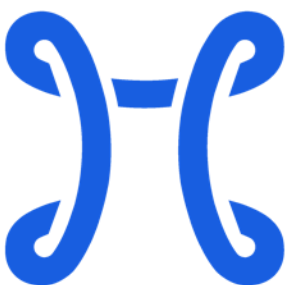


NSW EPA

Vaping Device Use and Recovery Systems  
**Final Report**

June 2022



**Asterisk One**  
SUSTAINABILITY CONSULTANTS

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## Abbreviations

ACCC	Australian Competition and Consumer Commission
ANDS	Alternative nicotine delivery system
AP	Authorised Prescriber
APC	Australian Packaging Covenant
APV	Advanced personal vaporizer
ATGR	Australian Therapeutic Goods Register
AWE	Australian Department of Agriculture, Water and the Environment
BAT	British American Tobacco
CASAA	Consumer Advocates for Smoke-Free Alternatives Association (US)
CDC	US Department of Health Centers for Disease Control
ENDS	Electronic nicotine delivery system
ENNDS	Electronic non-nicotine delivery system
EWPHP	Encyclopedia of World Problems and Human Potential
GMP	Good Manufacturing Practice
JTI	Japan Tobacco International
LED	Light emitting diode
NTCRS	National Television and Computer Recycling Scheme
PG	Propylene glycol
POEO	Protection of the Environment Operations (NSW, Act or Regulation)
RACGP	Royal Australian College of General Practitioners
RDA	Rebuildable dripping atomizer
RDTA	Rebuildable dripping tank atomizer
RTA	Rebuildable tank atomizer
SAS	Special Access Scheme
SUSMP	Standard for the Uniform Scheduling of Medicines and Poisons
TGA	Therapeutic Goods Administration
VG	Vegetable glycerine

## Glossary

<b>Aerosol</b>	Suspension of tiny liquid or solid particles in a gas. Vaping devices produce a liquid aerosol i.e. tiny liquid particles in air. Regular cigarettes produce a solid aerosol i.e. tiny solid particles from the combustion of the tobacco leaf in air.
<b>Atomizer or Coil</b>	The part of an electronic cigarette that heats e-liquid to produce the aerosol that the user inhales.
<b>E-liquid</b>	Liquid solution used in a vaping device, usually containing a mixture of propylene glycol or vegetable glycerine or both, with or without nicotine, and flavourings. Also known as e-juice, juice, vapor juice, or smoke juice.
<b>Electronic nicotine delivery systems (ENDS)</b>	A vaping device that delivers a liquid aerosol containing nicotine. Also known as alternative nicotine delivery systems (ANDS).
<b>Electronic non nicotine delivery systems (ENNDS)</b>	A vaping device that delivers a liquid aerosol that does not contain nicotine.
<b>Elinvar</b>	Alloy of nickel, iron and chromium
<b>Good manufacturing practice (GMP)</b>	A set of principles and procedures that when followed helps ensure that (therapeutic) goods are of high quality. Australian based manufacturers of medicines are required to hold a licence to manufacture, and to must demonstrate compliance with a relevant code of GMP. Overseas manufacturers of medicines supplied to Australia are also required to meet an acceptable standard of GMP.
<b>Poisons Standard</b>	The legal title of the Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP), a federal legislative instrument that consists of decisions regarding the classification of medicines and poisons into Schedules for inclusion in the relevant legislation of Australian States and Territories. The Poisons Standard also includes model provisions about containers and labels, a list of products recommended to be exempt from these provisions, and recommendations about other controls on drugs and poisons. The Poisons Standard aims to promote uniform scheduling of substances and uniform labelling and packaging requirements throughout Australia.
<b>Rebuildable dripping atomizer</b>	Customizable tank atomizer where liquid drips onto a coil.
<b>Rebuildable dripping tank atomizer</b>	Type of rebuildable tank atomizer with a liquid tank below the coil base with a wick that hangs into the tank.
<b>Rebuildable tank atomizer</b>	Customizable tank with a base to which a user can add their own coil(s) of desired resistance.
<b>Sub-ohm tank</b>	A liquid tank and atomizer unit where the resistance of the heating element is less than 1 ohm. Used to produce large clouds of vapour.
<b>Vaping</b>	act of using a vaping device
<b>Vaping device</b>	Device that produces a liquid aerosol that a user inhales. Also known as a vape, electronic cigarette, e-cigarette, or personal vaporiser.



<b>Vaping device - cig-a-like</b>	Vaping device intended to mimic a combustible cigarette that contains battery and enclosed liquid cartridge. Closed system cig-a-likes are intended for single use until either the battery or cartridge depletes fully, and no part is detachable or replaceable. Rechargeable cig-a-likes are devices in which either the battery can be recharged or replaced, or the liquid cartridge can be replaced, or both.
<b>Vaping device - clearomizer</b>	Vaping device that has a transparent liquid tank so the contents can be seen combined with an atomizer.
<b>Vaping device - closed system</b>	A vaping device in which the components are not detachable or replaceable. Can apply to cig-a-likes or non-cig-a-likes.
<b>Vaping device – mechanical mod</b>	Simple type Mods with no electronic circuitry or controls, just a battery unit, connector and fire button. Modifiable in the type of atomizer and/or tank that can be attached.
<b>Vaping device – mod</b>	A vaping device that has a battery unit with modifiable voltage or wattage, and/or that can be combined with a variety of vaporizing units, and that have refillable tanks that allow the substances used in the device to be customized.
<b>Vaping device – open system</b>	Combination of battery unit, atomizer, and liquid tank in which the any or all these components are replaceable or refillable.
<b>Vaping device – regulated mod</b>	Mods that incorporate electronic controls to modify voltage and/or power output, and/or that have safety and other features.
<b>Vaping product – medicinal</b>	Vaping product that contains nicotine in base or salt form, or another active ingredient such as cannabis
<b>Vaping product – non-medical</b>	Vaping products that contain no active ingredients, such as flavour only products



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## Executive Summary

### Vaping and vaping devices

Vaping devices, also referred to as vapes, electronic cigarettes, e-cigarettes, or personal vaporisers, are devices designed to produce an aerosol that the user inhales. Vaping is the act of using a vaping device, i.e. inhaling the liquid aerosol produced by the device. Vaping is different to smoking, which burns tobacco leaf creating smoke.

Most vaping devices have a battery-powered electric element that heats a liquid to produce the aerosol, however there are a wide variety of products that differ in their design, operation and appearance). The liquid typically contains propylene glycol and glycerine, and flavourings (commonly fruit, confectionery, tobacco, or other food and drink flavours), and sometimes nicotine, and is held in a tank or cartridge in the device. Liquids for use in a vaping device or e-cigarette are sometimes referred to as e-liquids. The range of potential flavouring substances is great, although flavours other than tobacco extracts must meet food standards. However, e-liquids, especially those purchased online from overseas, can contain a large range of unspecified and uncontrolled amounts of other substances, some of which are harmful.

Many vaping devices are designed to look like cigarettes, cigars, cigarillos or pipes, whereas others look like everyday items such as pens, highlighters, metallic wands, USB memory sticks or other small electronic devices. Vaping devices generally comprise four parts: a battery, heating element, a vaporising chamber, and a liquid tank. Some devices allow users to control the charge to the heating element to vary the amount of aerosol produced. Some vaping devices are 'closed systems', where the battery, vaporising element, and liquid tank are enclosed within the device, and cannot be removed, replaced or recharged. These devices can only be used once and must then be thrown away. Other vaping devices are 'open systems', where the battery can be replaced or recharged, or the liquid tank can be refilled, or the device has a liquid cartridge that can be replaced.

### Regulation of vaping devices

In Australia, the sale of vaping products is highly regulated. Nicotine vaping products can only be obtained with a prescription from an Australian pharmacy, a registered medical practitioner, or online from an overseas supplier via the Personal Importation Scheme. The aim of this restriction is to prevent adolescents and young adults from using nicotine vaping products while allowing current smokers to access these products for smoking cessation with appropriate medical advice. The Royal Australian College of General Practitioners stipulates that nicotine vaping products are not first line treatment for smoking cessation, but may be a reasonable intervention for people who have been unsuccessful when using other aids. Although many smoking cessation aids have been assessed by Therapeutic Goods Administration (TGA) for safety, quality and efficacy, and approved and registered in the Australian Register of Therapeutic Goods (ARTG), there are no nicotine vaping products currently on the ARTG.

Products supplied in Australia (made or imported for supply) must meet the requirements of the *Therapeutic Goods (Standard for Nicotine Vaping Products) (TGO 110) Order 2021* (TGO 110). These include requirements for labelling – list of ingredients, the nicotine concentration, and warning statements; packaging – must be child-resistant; ingredients – that nicotine base or salt is the only active ingredient, at a concentration of less than or equal to 100 mg/mL, within 90-110% of the concentration stated on the label, and that no prohibited ingredients are added; and record-keeping.

Products imported via the Personal Importation Scheme do not need to meet the labelling or packaging requirements. This has implications for the collection and recycling of used nicotine vaping products – it cannot be assumed that these products are labelled correctly or that they are child-safe.

There are no restrictions on the importation of vaping products or devices that do not contain nicotine, and these may be sold by retailers in all states and territories except WA, where products that resemble tobacco products, including vaping devices, cannot be sold by tobacco or general retailers. Where they can be sold, however, non-nicotine vaping products are subject to the same controls as tobacco products. Products may not be displayed for sale; information that can be provided on products and prices is limited to plain prescribed forms; advertising is prohibited; and the number of points of sale is limited. Vaping products may not be sold from temporary retail outlets, cannot be provided as free samples, or as part of sponsorship or shopper loyalty programs, or as gifts or competition rewards. Victoria, however, allows certified specialist e-cigarette retailers a limited display of products and accessories.

Except for WA and NT, places where vaping devices can be used are also limited in the same way as smoking. They cannot be used in indoor or outdoor smoke free areas or in cars carrying children, or on public transport in NSW and Victoria. In WA and NT, vaping devices can be used in smoke free areas. In all states and territories, the legislation prescribes significant penalties for offences committed in relation to the sale of tobacco-related products.

## Sale and use of vaping devices

Despite this, their use has increased markedly. The National Drug Strategy Household Survey 2019 reported the use of e-cigarettes becoming more common, along with the use of roll-your-own cigarettes. Between 2016 and 2019, the proportion of people aged 14 and over who had ever used e-cigarettes rose from 8.8% to 11.3%. By comparison, the number of persons aged 14 and over who had ever smoked decreased from 37.7% to 36.9%. Among those who had tried e-cigarettes, frequency of use also increased, with those who reported using them at least monthly increasing from 10.3% to 17.9%.

Sales of vaping products also increased dramatically, benefiting from the coronavirus pandemic. Lockdowns found consumers spending more time at home, often bored and anxious, and many turned to vaping products rather than smoking cigarettes or other tobacco products. Open vaping systems saw the biggest increase due to the wider selection of products and flavours on offer. Online sales also increased as this was often the only means of access to these products available to consumers.

Sales of e-vapour products in Australia increased from \$28.3 million in 2015 to \$98.1 million in 2020. Open system devices and liquids accounted for a greater proportion both of total sales (95.9% in 2020). Euromonitor forecasts that by 2025, sales of e-vapour products will reach nearly \$245.9 million, with e-liquids forecast to increase to \$159.5 million. By comparison, closed systems are forecast to only increase to \$4.3 million. However, information on the sales of nicotine products vs non-nicotine products is not readily available.

Brands of vaping products sold in Australia are difficult to track. Although Australian sponsors must report to the TGA on the brand and nicotine concentration of nicotine vapour products they supply, there is no requirement for reporting of sales of non-nicotine vaping products. Data on vaping products obtained from overseas is also not available because although these goods must be declared, value or quantity information is not recorded for consignments less than \$1,000 in value, and even for

consignments of value greater than this, there is no reporting category that captures vaping products. However, anecdotally there are at least 20 different brands of vaping devices available online, and dozens of brands of e-liquids that are produced both locally and overseas.

Data on the number of vaping products used or sold is also not available. Neither the National Drug Strategy Household Survey 2019 nor the Euromonitor report provided data on the number of vaping products used or sold. In addition, there is no data on littering associated with e-cigarettes or vaping products. The NSW Litter Report 2016-2020 does not isolate e-cigarettes or vaping products, and they are not included in the Butt Litter index under 'cigarette accessories'. In mid-2022, vaping devices were added as a category to the Australian Litter Measure, but data is not yet available.

### **Environmental impacts**

Vaping devices are composed of plastic, metal, and electronic components, batteries containing hazardous substances and that can pose a significant fire risk, and toxic metals and liquids, all that when littered can find their way into the environment and cause significant harm. Impact pathways include the leaking or aerosol transport of toxic substances from e-liquids, fires caused by lithium-ion batteries, leaking of corrosive electrolyte from batteries, leaching of toxic heavy metals, and plastic pollution.

### **Safe disposal by consumers**

These same hazardous materials can also cause significant harm to public health, and the health and safety of waste workers if they are not collected and disposed of properly. In addition, they contain many valuable resources that can be recovered. Many online vaping stores provide consumers with basic information on how to dispose of vaping products safely, but information is usually generic because regulations governing the safe disposal of the hazardous materials contained in vaping devices and waste vary widely from place to place. Not all the steps are possible, as not all vaping devices can be easily dismantled or disassembled, and devices designed to be single-use or disposable are actually not easily disposed of. Information on disposal provided usually encompasses several key steps: dismantle the device into separate components, remove the battery if possible, rinse out the liquid tank and its components, rinse out empty e-liquid bottles and re-fillable pods, and recycle materials such as metal, plastic and glass via an appropriate service.

### **Examples of vaping product recovery programs outside Australia**

As a result of the degree of difficulty faced by consumers, accessible, convenient and appropriate means for vaping products to be safely disposed of are needed to keep these out of the environment. There are several examples. Global recycling company Terracycle has joined with some brands to provide recycling programs for their vaping products in New Zealand and Canada. Consumers can drop products at select stores, or mail the items free of charge. Terracycle dismantles, cleans and converts the items into forms suitable for use as raw materials in new products. In the US, Veolia North America demonstrated the feasibility of recycling recalled, returned and off-spec e-cigarettes, processing an estimated 1.13 million kits and recovering 107 tonnes or 99.6% of the total amount of materials collected. The remaining 0.4% - nicotine containing cartridges – were safely disposed of via hazardous waste incineration.

## Recovery programs and technologies in Australia

In Australia, although there are currently no recycling programs specifically for vaping products, there are established technologies and recycling or disposal pathways for their components. A national product stewardship scheme (the National Television and Computer Recycling Scheme or NCTRS) exists for electronic waste (or e-waste), and although the scheme does not accept vaping devices, there are several well-established companies that can collect and process these materials. However, because of the wide range of items not covered by the NCTRS, many local councils in NSW and other states have established collection points at their waste facilities or hold events that collect all types of electrical and electronic items, and fund the recycling or safe disposal of those items not covered by the NCTRS. For example, the City of Sydney specifically mentions that household and personal items including vapes are accepted by their booked pick-up service or at their quarterly recycling events.

Household batteries including those containing lithium such as those found in vaping devices have been collected for many years via household chemical collection programs in most states and territories. These programs are now complemented by a product stewardship scheme for batteries – B-cycle – that commenced in January 2022. Batteries that can be removed from vaping devices are eligible and can currently be taken to any B-cycle collection point for recycling. However, batteries that are embedded in vaping devices are not yet included in the scheme, and advocacy is needed to ensure these types of batteries and their units are included in either B-Cycle or the NCTRS.

Household chemical collection programs in most states also collect a wide range of hazardous materials such as pesticides, flammable, toxic and reactive substances, many analogous to nicotine-containing and other e-liquids. Although these programs do not currently accept vaping waste, most are delivered by contractors with technologies that are appropriate for the processing of items containing vaping liquids.

The Return Unwanted Medicines (or RUM) project provides consumers with a free and convenient way to dispose of expired and unwanted medicines. All prescription medicines can be returned to any community pharmacy at any time, for safe collection and disposal by high temperature incineration. As nicotine-containing vaping products are now only available by prescription in Australia, vaping device components containing nicotine substances should be accepted by RUM, and in Queensland, nicotine vaping products can be taken to a community pharmacy or a local public health unit.

## Product stewardship

Product stewardship acknowledges that those involved in designing, manufacturing, and selling products have a responsibility to ensure those products or materials are managed in a way that reduces their environmental and human health impacts, throughout the life cycle and across the supply chain. In Australia, product stewardship can be industry-led voluntary schemes (e.g. batteries, mobile phones, and tyres), co-regulatory arrangements between industry and government (e.g. the NCTRS, and plastics and packaging – the Australian Packaging Covenant), or mandatory schemes (e.g. used oil). Priorities for future schemes include photovoltaic systems, electrical and electronic products, plastic oil containers, child car seats, clothing textiles, and problematic and unnecessary single use plastics. No More Butts included vaping devices in their nomination for cigarette butts for including in the 2022-23 priority list.

# 1 Introduction

Vaping devices, products and packaging are increasingly being found littered across NSW and appearing in waste collection systems and landfills. Seeking to better understand the impact vaping devices and associated paraphernalia and packaging are having on the NSW environment, specifically from a waste perspective, NSW EPA engaged Asterisk One to undertake a desktop study.

## 1.1 Objectives

The study aimed to investigate and document information about vaping devices including components and composition, environmental impacts, use and markets, recycling processes and technologies, and legislative frameworks for supply and use, import and manufacture, collection and transport, recycling, and product stewardship. The study did not consider health impacts related to the consumption of these products. It is hoped the study may lead to the development of options for appropriately managing these items.

## 1.2 Background

### What are vaping devices?

Vaping devices, also referred to as vapes, electronic cigarettes, e-cigarettes, or personal vaporisers, are devices designed to produce an aerosol that the user inhales. Even though the term vaping implies the inhalation of a vapour i.e. a substance in its gaseous phase, vaping devices actually produce an aerosol, i.e. a suspension of tiny particles of liquid in air. Many devices have a battery-powered electric element that heats a liquid to produce the aerosol, however there are a wide variety of products that differ in their design, operation and appearance (ACT Health 2021).

The liquid typically contains propylene glycol and glycerine, and flavourings (commonly fruit, confectionery, tobacco, or other food and drink flavours), or sometimes nicotine, and is held in a tank or cartridge in the device (Greenhalgh & Scollo 2016). Liquids for use in a vaping device or e-cigarette are sometimes referred to as e-liquids.

Inhaling and exhaling the aerosol from vaping devices simulates the use of regular cigarettes and provides the user with some of the same cues or sensory effects.

Many vaping devices are designed to look like cigarettes, cigars, cigarillos or pipes, whereas others look like everyday items such as pens, highlighters, metallic wands, USB memory sticks or other small electronic devices.

Depending on their shape or style, and type of vapour delivered, these devices can also be referred to as:

- electronic nicotine delivery systems (ENDS)
- electronic non nicotine delivery systems (ENNDS)
- alternative nicotine delivery systems (ANDS)
- e-hookahs
- vape pens

Vaping devices generally comprise four parts: the battery, heating element, a vaporising chamber, and a liquid tank. Some devices allow users to control the charge to the heating element to vary the amount of aerosol and/or the nicotine concentration produced.

Some vaping devices are ‘closed systems’, where the battery, vaporising element, and liquid tank are enclosed within the device, and cannot be removed, replaced or recharged. These devices can only be used once and must then be thrown away. These are often made to look like a normal cigarette.

Other vaping devices are ‘open systems’, where the battery can be replaced or recharged, or the liquid tank can be refilled, or the device has a liquid cartridge that can be replaced.

### **What is vaping?**

Vaping is the act of using a vaping device, i.e. inhaling the liquid aerosol produced by the device. Vaping is different to smoking, which burns tobacco leaf creating smoke. Both the smoke<sup>1</sup> and the liquid aerosol are, however, inhaled into the smoker’s or user’s lungs.

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<sup>1</sup> Smoke is also an aerosol – a suspension in air of tiny solid particles from the combustion of the tobacco leaf

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## 2 Components and composition

### 2.1 Evolution of the electronic cigarette

Since the first commercially successful electronic cigarette was created in 2003 by a pharmacist in China, and developed by the company he worked for into a product they named Ruyan meaning ‘like smoke’ (CASAA, 2020), the design of vaping devices has evolved through several generations (CDC, 2022). Although e-cigarettes have developed over time, examples of every generation remain available.

#### 2.1.1 First generation – Cig-a-likes

First generation electronic cigarettes were designed to look and feel like combustible cigarettes, hence the term ‘cig-a-likes’. There were three versions of these devices: one with three parts, a separate vaporising unit, battery and liquid tank; a device in which the vaporiser and liquid tank were combined; and a disposable device in which all three parts were combined into a single unit. Some non-disposable two- and three-piece devices had rechargeable batteries. The original three-part type is no longer available, but the other two types are still widely sold (Williams and Talbot, 2019).

#### 2.1.2 Second generation – Vape-pens or Clearomizers

Second generation electronic cigarettes have a removable vaporising (or atomizing) unit with a filament encased in a shell screwed into a liquid tank and battery. The liquid tank is usually transparent, and the combination of liquid tank and atomizer is thus referred to as a ‘clearomizer’. These often look like pens or laser pointers, with a button to fire them, and are thus referred to as ‘vape-pens’. Batteries are rechargeable, with larger capacity than cig-a-likes. The battery pen usually has a standard connector that provides compatibility with a wide range of clearomizers. Some mid-size versions of these electronic cigarettes have simple controls that allow the voltage to be adjusted (Martin, 2016).

**Table 1:** Features of the four generations of electronic cigarettes

<b>First generation</b> Disposable electronic cigarettes or cig-a-likes	Designed to be used once Not rechargeable or refillable Discarded when battery or liquid runs out Look and feel like combustible cigarettes
<b>Second generation</b> E-cigarettes with prefilled or refillable cartridge	Rechargeable device designed to be used multiple times Liquid supplied in prefilled or refillable cartridges. Cartridge is attached to a ‘pen’ containing the battery Cartridge and battery pen typically sold separately but sometimes together in ‘starter kits’
<b>Third generation</b> Tanks or Mods (refillable) or Advanced Personal Vaporisers (APVs)	Rechargeable device designed to be used multiple times. Modifiable (hence Mods), allowing users to customise them. Usually larger than cig-a-likes or 2 <sup>nd</sup> generation devices. Most are manual and user must press a button to fire them Mechanical (no control circuitry) or regulated (allow user to modify voltage or wattage) Paired with variety of different atomisers e.g. standard clearomizer, sub-ohm tank, rebuildable atomizer or rebuildable tank atomizer.
<b>Fourth generation</b> Pod Mods (prefilled or refillable)	Rechargeable device with prefilled or refillable ‘pod’ or pod cartridge. Some battery units with ability to modify power output Compact, simple to use, compatible with nicotine salt pods

**Figure 1:** Examples of the four generations of electronic cigarettes



**First generation:**  
A typical cig-a-like. Source: Vapor Look



**Second generation**  
eGo battery clearomizers. Source: eciglopedia.com



**Mods or Tanks.** Source: CDC



**Pod Mods.** Source: CDC

### 2.1.3 Third generation – Mods or Tanks

Third generation electronic cigarettes are known as ‘Mods’ as they have battery units with modifiable voltage or wattage that can be combined with a variety of vaporising units, and have refillable tanks that allow the substances used in the device to be customised. Mechanical Mods are battery units of a very simple type with no electronic circuitry, just a battery unit, connector and fire button. Although these are simple in their design, they are difficult to operate, and are usually only used by experienced vapers. Regulated Mods incorporate electronic controls that allow the user to modify voltage, wattage, and often have safety features such as reverse battery polarity protection, and other features such as an electrical resistance meter or the ability to charge other devices. Mods can be paired with a variety of different atomizers, including standard clearomizers, rebuildable atomizers, or sub-ohm tanks.

### 2.1.4 Fourth generation – Pod Mods or Pod Vapes

Pod Mods are vaping devices with a prefilled or refillable pod-like cartridge combined with a rechargeable battery unit with modifiable power output. Also known as pod-vapes, these devices have a wide variety of shapes, sizes, and colours, and are increasing in popularity because they are compact and simple to use, and work with nicotine-salt liquids. However, because of their small size, batteries don’t last as long, or produce the large clouds of vapour third generation devices can (Vaper Empire, 2020).

## 2.1.5 Sub-ohm tanks

Sub-ohm vaping is a style that produces large clouds of vapour and intense flavour by combining a low-resistance coil (less than 1 ohm) with batteries that provide high power output. There are several different types of sub-ohm tanks. A sub-ohm tank with a disposable coil is like a standard clearomizer, with a tank to store liquid and a coil of less than 1 ohm that can be easily replaced. Rebuildable tank atomizers (RTA) have a liquid tank with a base where a user can add their own coil with the desired resistance. Some can be built with more than one coil. Rebuildable dripping atomizers (RDA) also have a base on which a user can build their own coil, but no liquid tank. Instead, the liquid is dripped onto the coil until it is saturated, and then the user inhales. After several puffs, the coil must be re-saturated. Although these are more difficult to use, they produce the biggest clouds and the most flavour. A rebuildable dripping tank atomiser (RDTA) is a type of RTA with a liquid tank below the coil base with a wick that hangs into the tank. These are less popular (Decadent Vapours, 2021).

Pod systems that cater to sub-ohm vapers are now also available, paired with smaller pocket-sized devices. Only the coil can be changed in a pod system, unlike tanks which can be completely disassembled. Pods are usually only compatible with the device they are made for, although some pods with the same connector as clearomizers (510 adaptor) have been released.

**Figure 2:** Types of sub-ohm tanks. **Source:** Decadent Vapours



## 2.2 Anatomy of vaping devices

Throughout the evolution of the electronic cigarette, some components have remained the same: a power source, usually a battery, either single use or rechargeable; an atomizer or coil, which heats a liquid to produce the aerosol inhaled by the user; and a cartridge or tank to hold the liquid until it is used.

### 2.2.1 Batteries

In modern vaping devices, the battery is usually a rechargeable lithium-ion battery with sufficient power to heat the coil to 200 degrees Celsius in a few seconds. Lithium batteries provide higher voltages (>3 volts) than traditional batteries (1.5 volts) that are necessary for aerosol production (Orellana-Barrios et al. 2015). The battery unit can be made of metal or plastic, and has some circuitry to regulate power output, and a connection that can deliver the charge to the coil. Cig-a-likes had lower voltage batteries with limited power output and if rechargeable, a shorter life between charges. Second generation devices, however, had larger, more powerful batteries. Many Mods have even larger battery units that can provide higher and variable voltage or wattage, and longer time between charges. Pod devices are newer, and typically have smaller batteries, but due to improvements in battery technology, can last longer than some of the older, larger Mods, depending on the way in which they are used. Batteries are replaceable in many devices and in some instances must be purchased separately to the device.

### 2.2.2 Atomizer or coil

In early cig-a-like devices, the coil was a simple filament attached to a thick wire, with a wick, a silicon sheath, and inner and outer fibres, to draw the liquid to the filament and create the aerosol. As devices evolved, the design of the coil also evolved, but most still retain a metal filament with a cotton wick. However, second and third generation atomizers have fewer overall components than cig-a-likes. For example, some do not have a thick wire, usually made of nickel or copper coated in tin or silver, or do not have a silicon sheath, reducing the potential for these elements in aerosols produced by these devices. Another change has been a reduction in the use of tin solder joints, particularly in non-disposable devices, which appeared to be more stable (Williams and Talbot, 2019). In third generation devices, the increase in battery size has seen a corresponding increase in atomizer size and mass of metal.

Atomizers in fourth generation pod-vapes continue to comprise an air tube, filament, wick, thick wire, which is now brazed rather than soldered to the filament, and a connector from atomizer to battery. Filaments and metal air tubes typically contain alloys of nickel, iron or chromium in the form of Elinvar, nichrome or stainless steel. Thick wires are typically nickel, and wicks cotton, but sometimes ceramic or silica. Most connector components are gold plated nickel (Omaiye, et al., 2021).

### 2.2.3 Cartridge or tank

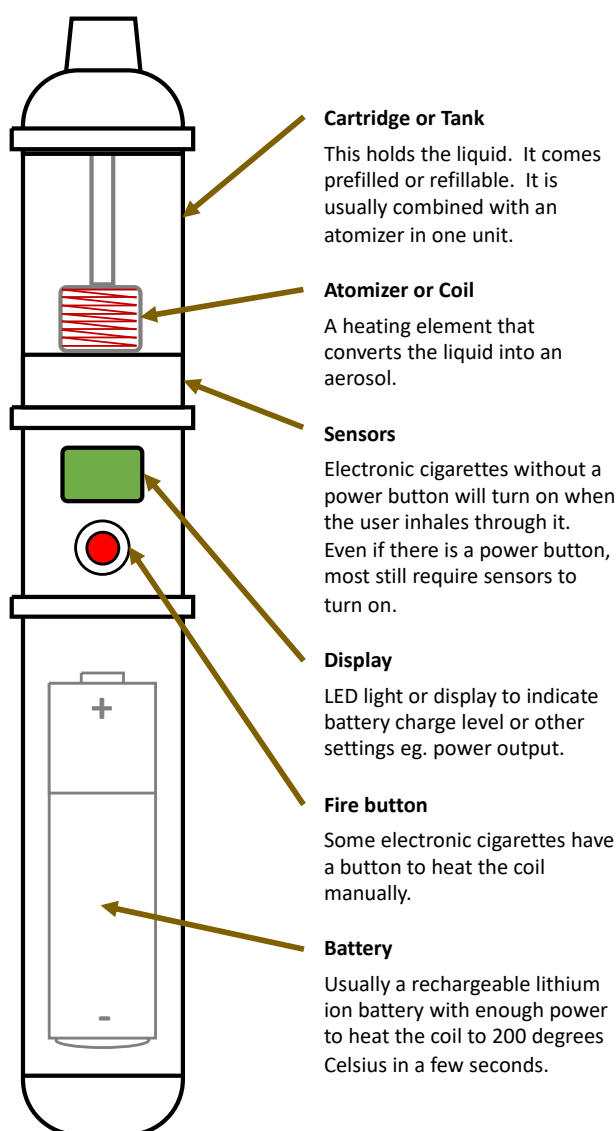
Cartridges or tanks are usually made of plastic or metal but sometimes glass, and enclosed in cig-a-likes, but with a transparent casing so the liquid level can be seen in many second, third and fourth generation devices. Cartridges and pods are usually combined with an atomizer as one unit, and can be pre-filled or refillable, but are usually refillable in third generation devices. The atomizer can usually be replaced in refillable cartridges and pods, but is sometimes disposed of when the cartridge or pod runs out. In third generation devices, the battery unit can be paired with a wide range of tanks and atomizers, including cartridge-coil units, rebuildable tank atomizers, or sub-ohm tanks. Pods in fourth generation devices usually only fit the device that they were made for, but some newer pods have a standard connector.

## 2.2.4 Sensors and controls

Many vaping devices have sensors that detect when a user inhales to automatically turn on the device and activate the heating element. Manual vaping devices have a button that the user must press to activate the heating element. However, most also have sensors that prevent the device from accidentally firing. Many devices of all generations also have LED lights or displays to indicate battery charge level or other settings such as power output. Regulated Mods have a variety of sensors and controls to vary voltage, resistance or power, and provide safety or other features such as the ability to charge other devices. Pods have fewer controls than Mods, but many still allow simple adjustments to power output, have sensors to turn the unit on, and LED displays. The exception to this is Mechanical Mods, which have no electronic circuitry, just a connection between the battery and the atomizer.

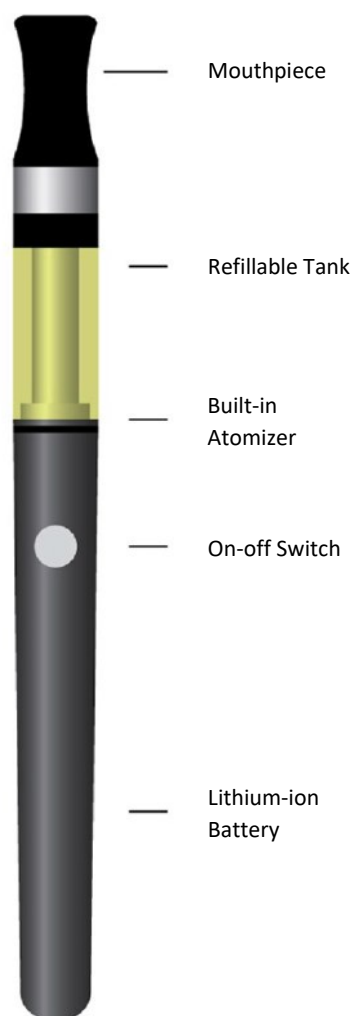
Figure 3: Main components of a vaping device

Generic device



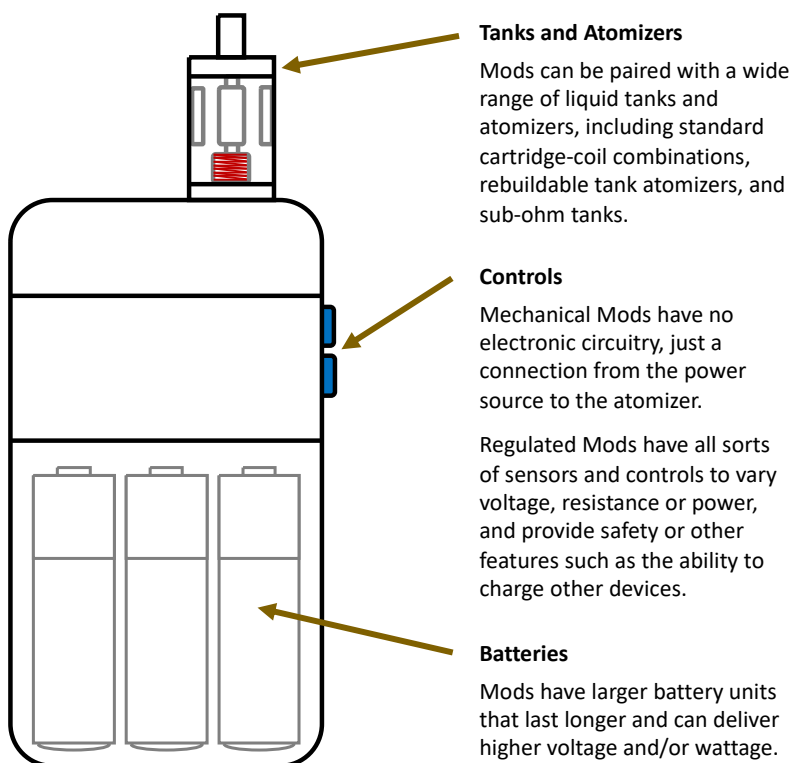
Source: Asterisk One

Refillable Tank Style (2<sup>nd</sup> generation)

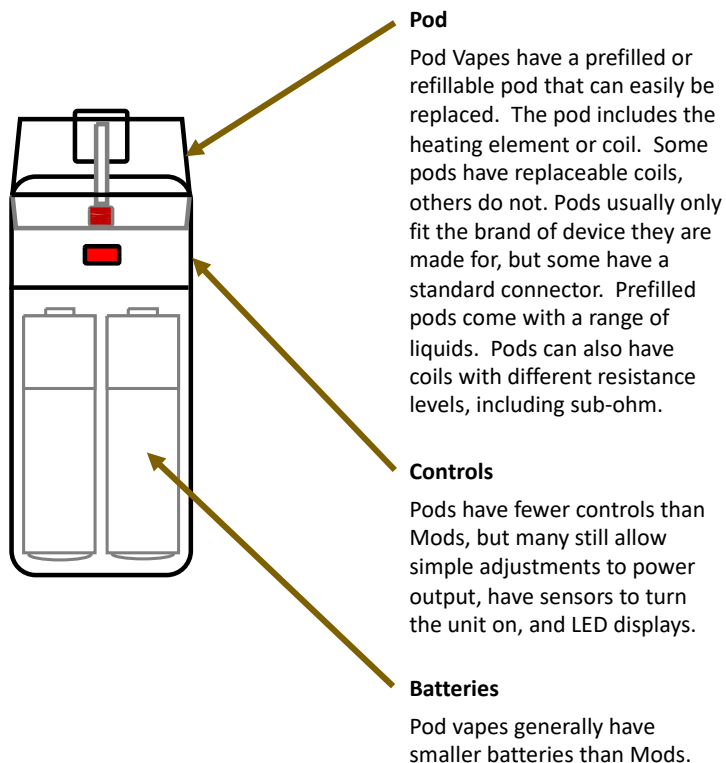


Source: Orellana-Barrios et al., 2015

**Figure 4:** Components of third generation vaping devices – Mods



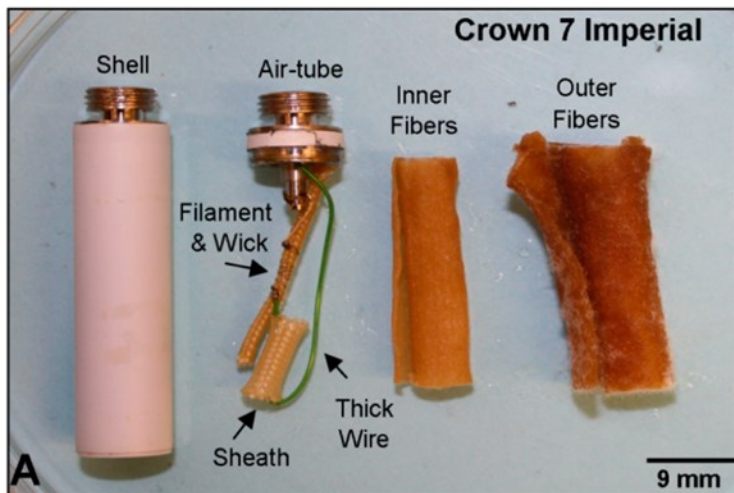
**Figure 5:** Components of fourth generation vaping devices – Pod Vapes



**Figure 6:** Component details for several generations of electronic cigarette

**Components of a 1<sup>st</sup> gen electronic cigarette**

Source: Williams & Talbot, 2019

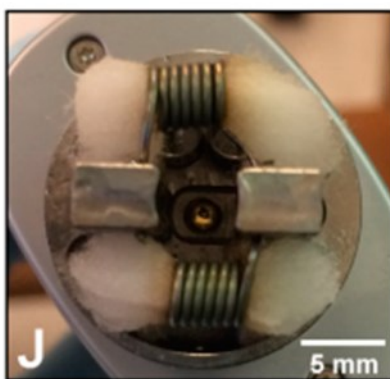


**3<sup>rd</sup> gen Tsunami atomizer**

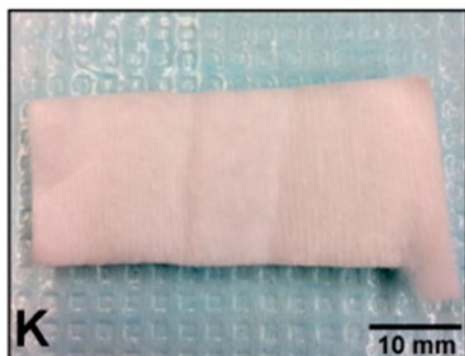
Source: Williams & Talbot, 2019



Profile



Fully built with wicks



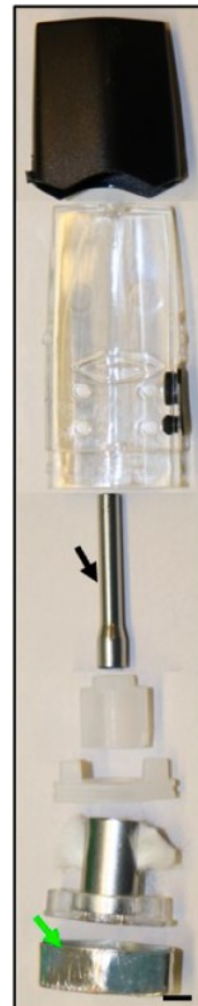
Wick



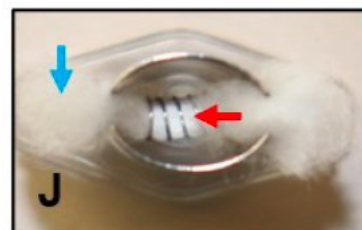
Cap for atomizer

**4<sup>th</sup> gen Refillable SMOK Infinix Pod**

Source: Omaie et al., 2021



From top to bottom: cap, refillable tank, air tube, atomizer, casing.



Wick (blue arrow) and filament (red arrow)

## 2.2.5 E-Liquids

The liquid used in electronic cigarettes, often known as e-liquid, e-juice, vape juice or vapor liquid comprises a mixture of propylene glycol and vegetable glycerine – both common food additives, together with other chemicals to provide flavouring. Small amounts of water are also added to reduce the potency of flavours and produce a lingering effect to the aerosol. Together the propylene glycol and glycerine comprise about 90% of the liquid, flavourings and water the remaining 10% (Vapresso, 2019).

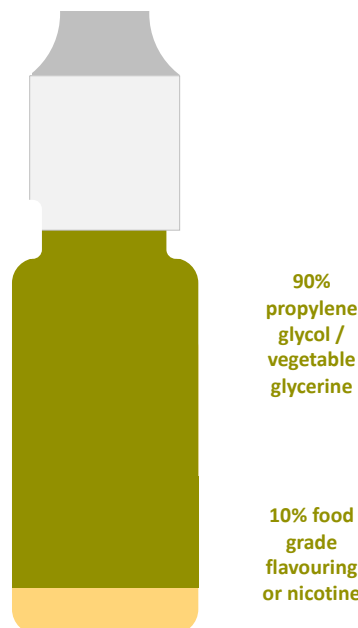
Propylene glycol creates a ‘throat-hit’ sensation similar to smoking (NZ Health, 2019) and carries the flavour, whilst the vegetable glycerine provides a smoother throat sensation and delivers bigger denser clouds of vapour (Vapresso, 2019). The ratio of propylene glycol to vegetable glycerine in e-liquids therefore varies depending on the user’s preference for these different features. However, a large sample of e-liquids available in Australia were found to be labelled as 30% propylene glycol and 70% vegetable glycerine, although the actual concentration rarely matched the labelling, and it appeared the labelling specified the proportions on a per volume basis rather than weight basis (Larcombe et al. 2021). Propylene glycol and glycerine are usually harmless when consumed in small quantities, but their effects when inhaled as an aerosol are currently unknown.

Although the sale of e-liquids containing nicotine without a prescription is illegal in Australia, most premium vape liquids available outside of Australia are likely to contain some form of nicotine, and even those sold in Australia as nicotine-free commonly contain trace amounts, resulting from either accidental contamination or poor-quality control in preparation, although this appears to have improved in recent years (Larcombe et al., 2021). This research in 2021 sampled 65 e-liquids commonly available online and in stores in WA – all labelled as nicotine-free – found nicotine in 6 samples at a maximum concentration of 3.25 mg/L. In an earlier study in 2019, these researchers had found nicotine in six of ten ‘nicotine-free’ liquids sampled at a maximum concentration of 2,900 mg/L.

**Figure 7:** What is vape juice?

### What is e-liquid / e-juice / vape juice?

- Liquid used in electronic cigarettes that when heated creates the aerosol that the user inhales.
- Comprises a mixture of propylene glycol and vegetable glycerine, food grade flavourings, water, and may or may not contain nicotine.
- Propylene glycol creates a throat-hit sensation like smoking and carries the flavour.
- Vegetable glycerine has a smoother throat sensation and delivers bigger and denser clouds of vapour.
- The proportion of propylene glycol and glycerine can vary depending on the user’s preference. Some users mix their own.





Nicotine salts are becoming more common in pod liquids, as these devices are smaller and less powerful and are thus suitable for this form of nicotine. Nicotine salts are a more stable solution created when freebase nicotine is combined with an acid such as benzoic acid that reduces the harshness of the throat-hit of higher strength nicotine liquids. The lower throat irritation nicotine delivery combined with the convenience of pods is seen by the industry as making these ideal for new vapers (Vaper Empire, 2020).

The range of potential flavouring substances is great, although flavours other than tobacco extracts must meet food standards in the Australia New Zealand Food Standards Code 2002. However, e-liquids, especially those purchased online from overseas, can contain a large range of unspecified and uncontrolled amounts of other substances, some of which are harmful. Larcombe et. al 2021 reported a range of flavouring chemicals commonly found in Australian e-liquids including:

- Ethyl maltol – added as a sweetener – reacts with iron and copper (potentially present from coil residue) to produce toxic hydroxypyranone complexes
- Ethyl vanillin – a vanilla flavouring widely used in foods, beverages and cosmetics – reacts with propylene glycol to produce aldehyde propylene glycol acetals that activate airway irritant receptors.
- Menthol – enhances the addictive property of nicotine and inhibits nicotine metabolism
- Benzaldehyde – used for its almond-like flavour – increases systemic nicotine exposure in smokers, is an inhalation irritant, and like ethyl vanillin reacts with propylene glycol to produce aldehyde propylene glycol acetals
- 2-chlorophenol – an acutely toxic chemical used in disinfectants and insecticides, and possibly arising from pesticide or herbicide residues in the canola oil from which glycerol is derived

Research reported by the American Lung Association also found toxic substances in e-liquids including:

- Diacetyl – a chemical used in popcorn flavouring for its buttery taste, that is linked to bronchiolitis obliterans (aka popcorn lung) if inhaled in large concentrations
- Acrolein – a herbicide primarily used to kill weeds, that can cause irreversible lung damage
- Diethylene glycol – a toxic chemical used in antifreeze that is linked to lung disease
- Toxic metals such as Lead, Tin, and Nickel, and cadmium, likely present from coil residue.

## 3 Environmental impacts

As we have seen, there are several basic components to electronic cigarettes, regardless of which generation they come from, and there are several different environmental impacts that arise from their use, inappropriate disposal or littering.

### 3.1 Vaping device materials and substances

The **battery unit and controls** comprise a metal or plastic shell, sometimes include a printed circuit board which is mainly copper embedded in a resin, and gold-plated nickel connectors. **Batteries** are usually lithium ion, which comprise an electrolyte containing lithium hexafluorophosphate salt and a solvent such as ethylene carbonate, a graphite anode, lithium cobalt (or similar) cathode, and copper, aluminium, steel, nickel and other inert components. **Atomizers** comprise a coil made of an alloy of nickel, iron, and chromium, and a wick made of cotton, ceramic or silica. The **liquid tank, cartridge or pod** is usually plastic or glass, and the **mouthpiece** silicone, plastic or metal. The **e-liquid** comprises a mixture of propylene glycol, vegetable glycerine, water, and food grade flavourings, and may contain nicotine or nicotine salts such as nicotine benzoate, nicotine malate, nicotine, salicylate, or nicotine tartrate.

### 3.2 Environmental impact pathways

There are several pathways by which some of these materials can find their way into the environment and cause harm.

#### 3.2.1 Leaking of toxic substances from e-liquids

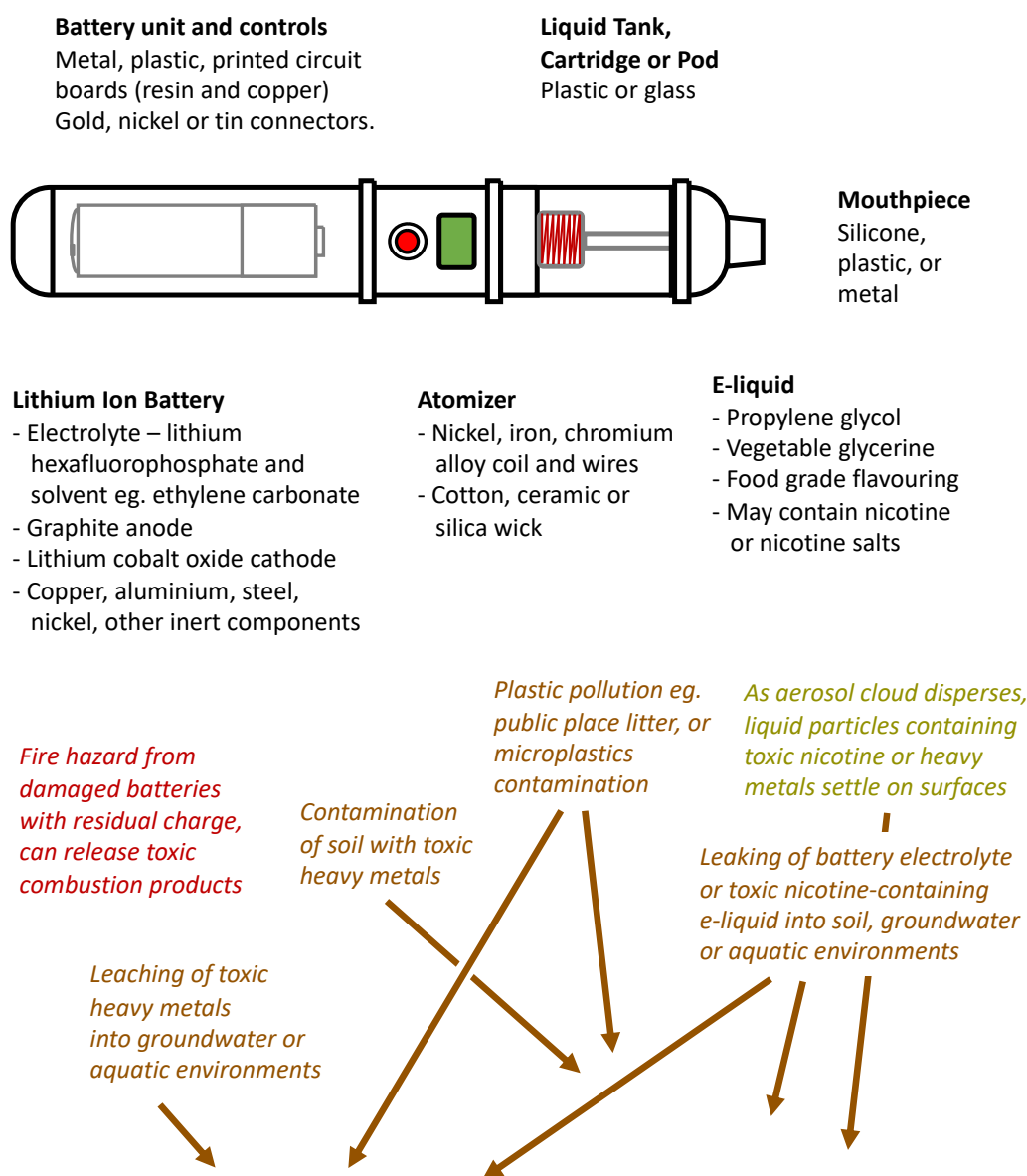
Discarded tanks, cartridges or pods will contain residual amounts of e-liquid, and some may even be only partially empty. The e-liquid can leak out of the container into the environment, and then washed into the soil or aquatic environments. The substances in e-liquids can have a variety of impacts.

Although propylene glycol is used in foods, beverages, and cosmetics at low concentrations, it is toxic to animals at higher concentrations, with an acute oral toxicity (LD50) in rats (8-46 g/kg), mice (25-32 g/kg), and guinea pigs (18-20 g/kg). It should not be allowed to reach large quantities of ground water, sewage, wastewater or soil, as microbial action decomposing propylene glycol in surface waters can consume large quantities of dissolved oxygen and deplete this to below that sufficient for the survival of fish, macro-invertebrates, and other aquatic organisms.

Both nicotine and nicotine salts are acutely toxic, fatal if swallowed or inhaled, fatal in contact with skin, cause skin irritation and serious eye damage, are toxic to aquatic life with long lasting effects, and are hazards for drinking water supplies. They are mobile in soil and water, although nicotine is classified as biodegradable (no information is available for salts). Nicotine is used as an insecticide. Discharge into the environment of any of these substances must be avoided.

The impacts of other substances found in e-liquids are less well known, but several are acutely toxic.

**Figure 8:** Environmental impact pathways arising from vaping devices



### 3.2.2 Aerosol transport of toxic substances

The use of vaping devices creates an aerosol cloud of very fine liquid particles suspended in the air. The liquid particles can contain toxic substances such as nicotine, heavy metals such as chromium and nickel that have leached from the coil into the e-liquid (Beutel et al., 2021). As the cloud disperses and cools the liquid particles settle on surrounding surfaces and can be picked up by humans or animals that touch the surfaces, or leach into the soil, groundwater, or aquatic environments when it rains.

### 3.2.3 Lithium-ion battery fire

Lithium batteries with a charge are hazardous, as they can catch fire if they experience an impact or short-circuit. They should be kept out of water, should be kept away from high temperatures (e.g. out of direct sunlight) and should not be struck, thrown or dropped. When they do catch fire, they can release carbon monoxide and the use of water as a firefighting agent can cause the formation of hydrofluoric acid – an extremely toxic and corrosive substance. If not contained, toxic combustion products can also find their way into aquatic environments.

### 3.2.4 Leaking of electrolyte from batteries

When vaping devices are improperly disposed of (littered), they will generally still contain their battery, which is most commonly a lithium-ion type. With time, the battery casing will degrade, leaking electrolyte into the surrounding soil. Rainwater will potentially carry various pollutants such as heavy metals, additives, electrolyte degradation products but also dissolved gases. The latter, such as hydrogen fluoride (HF), hydrogen chloride (HCl) or sulphur dioxide (SO<sub>2</sub>, in the form of sulphuric acid) not only have a straightforward toxic effect but also alter the properties of receiving waters and solutions in soil. The acidification caused by these corrosive species may have the same effect as “acid rain”, lowering the pH and thus strongly impacting plants and animals. They would also enhance the release of soil-bound heavy metals. Under more acidic conditions the actual toxicity of heavy metals is higher than it would be predicted from the metal concentration alone (Mrozik et al, 2021).

### 3.2.5 Leaching of toxic heavy metals

Metals commonly found in vaping devices include aluminium, chromium, copper, iron, lead, nickel, silver, tin and zinc can leach from damaged or corroded batteries, battery units, coils, and other components into the soil, ground water or aquatic environments. Some of these are toxic or known to be cancer-causing. For example, in leaching tests on vaping devices, lead in leachate exceeded US thresholds for hazardous waste designation by up to ten-fold (Beutel et al., 2021).

### 3.2.6 Plastic pollution

Most vaping devices have several components made of a range of plastic materials. In the absence of hard data on the actual polymers used, we consider that battery cases are likely to be made of high-density polyethylene, polypropylene, or, possibly, of rigid (unplasticized) polyvinyl chloride (PVC), vaping liquid tanks of polyethylene terephthalate (PET) or polycarbonate, and mouthpieces of polypropylene or poly acrylonitrile butadiene styrene (ABS).

Irrespective of materials used, improper disposal (littering) of used vaping devices will create unsightly visual pollution in public places that is likely to be persistent. Most polymers are very stable and resistant to degradation, particularly if they contain antioxidants and UV stabilisers. Because plastic components of vaping devices are relatively thick (as compared to, say, packaging film), they are likely to take a very long time to break down into smaller particles in the environment.

There are four mechanisms by which plastics degrade in the environment: photodegradation, thermooxidative degradation, hydrolytic degradation and biodegradation by microorganisms (Webb et al, 2013). Natural degradation of plastics begins with photodegradation, which leads to thermooxidative degradation. Ultraviolet light from the sun provides the activation energy required to initiate the

incorporation of oxygen atoms into the polymer. This causes the plastic to become brittle and to break into smaller and smaller pieces, until the polymer chains reach sufficiently low molecular weight to be metabolised by microorganisms (ibid). However, before biodegradation can begin, these smaller particles can be washed down into waterways, adding to the ubiquitous presence of microplastics in the environment. The undesirable effects of microplastics, including their bioaccumulation, presence in animal tissue and bloodstream are well known. Recent studies have shown that microplastics can also be taken up by plants, inducing widespread toxic effects on many physiological and biochemical processes in plants, such as delaying or reducing seed germination, inhibiting plant growth, changing root traits, reducing biomass, delaying and reducing fruit yield, interfering with photosynthesis, causing oxidative damage and producing genotoxicity (Hong Yu et al, 2022).

Other environmental effects of plastic components of discarded vaping devices can vary depending on the polymers used. Thus, polyvinyl chloride (PVC), for example, often contains heat stabilisers such as methyltins, which can leach out of the polymer into the environment. A study in Sweden reported that, under some modelling assumptions methyltins leaching from PVC could pose environmental risks in near proximity. The second stage of the same study, however, which involved a more detailed exposure scenario and experimentally determined sorption characteristics concluded that degradation products of methyltins leaching from PVC were of no environmental concern (van Dokkum and Huwer, 2005).

PVC is a special case among the polymers that may be used in vaping devices in that it contains chlorine atoms. There is a dichotomy in the literature about environmental degradation of PVC. While the plastics industry claims that PVC is extremely stable and unlikely to break down at all (Vinyl Council of Australia, undated), environmental groups such as Greenpeace predict dire results of degradation of PVC including emission of toxic substances, such as polychlorinated dibenzodioxins. Given the general mechanisms of the breakdown of plastics in the environment as described above, it is tempting to conclude that some separation of the PVC polymer chain will occur, with attendant dehydrochlorination and formation of some hazardous chlorinated organic compounds.

Most polymers often contain other additives, such as antioxidants, pigments, fillers etc. Antioxidants are usually organic compounds, which, if they leach from the polymer under environmental conditions, will be readily biodegradable. The most common pigment used in plastics is titanium dioxide, which can be washed into waterways and can be potentially harmful to marine life (Goldschmidt Geochemistry Conference, Boston, 2018).

## 4 Legislative frameworks

### 4.1 Supply and use

In Australia, vaping products are regulated by several federal and state laws relating to tobacco, therapeutic goods and poisons, and consumer protection.

#### 4.1.1 Obtaining nicotine vaping products

##### Consumers need a prescription to obtain nicotine vaping products

On 1 October 2021, the entry for nicotine in Schedule 4 to the Poisons Standard (Prescription Only Medicine) was amended so that it captures all nicotine vaping products, including nicotine-containing e-cigarettes, pods, and liquids, as prescription only medicines. The Poisons Standard recommends controls for access to scheduled substances that are implemented and enforced under state and territory laws, and these products are now subject to the same laws that apply to other prescription-only medicines.

Consumers must obtain a prescription to obtain these products both from Australian pharmacies and from overseas, and it is illegal for retailers anywhere in Australia to sell these products, even to consumers with a prescription. However, nicotine replacement therapies (NRT) including sprays, patches, lozenges, chews and gums that do not require a prescription can still be sold from pharmacies and some retail outlets.

The change to the Poisons Standard aims to prevent adolescents and young adults from using nicotine vaping products while allowing current smokers to access these products for smoking cessation with appropriate medical advice. The Royal Australian College of General Practitioners stipulates that nicotine vaping products are not first line treatment for smoking cessation, but may be a reasonable intervention for people who have been unsuccessful when using other aids.

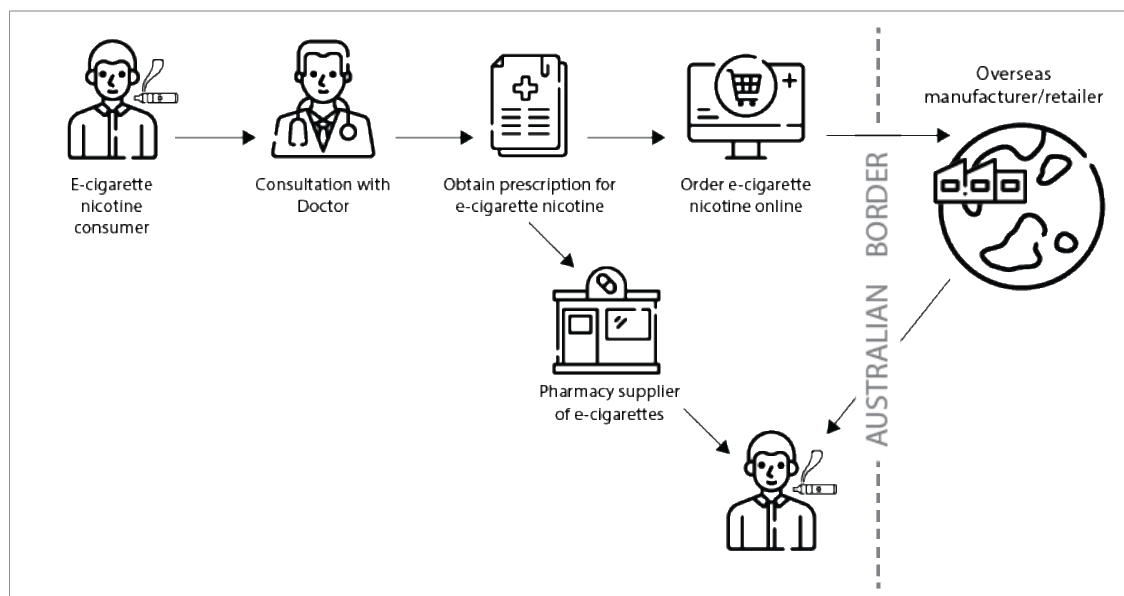
Many smoking cessation aids have been assessed by Therapeutic Goods Administration (TGA) for safety, quality and efficacy, and approved and registered in the Australian Register of Therapeutic Goods (ARTG). However, there are no nicotine vaping products currently on the ARTG, and are ‘unapproved’ products.

##### Means by which consumers can obtain nicotine vaping products

Consumers in Australia have several means by which they can obtain nicotine vaping products:

- from an Australian pharmacy with a prescription from an Authorised Prescriber (AP) – a medical practitioner registered in Australia may apply to the TGA for authorisation to prescribe nicotine vaping products for smoking cessation.
- from a medical practitioner under the Special Access Scheme (SAS) – who may apply to the TGA for approval to access and supply a nicotine vaping product directly to a single patient.
- from overseas via the Personal Importation Scheme – with a prescription from any medical practitioner (does not need to be an Authorised Prescriber). Only 3 months’ supply may be obtained at a time, and no more than 15 months’ supply in a 12-month period.
- In addition, passengers arriving in Australia by ship or plane may bring in personal supplies of nicotine vaping products without a prescription, under the ‘Travellers Exemption’.

**Figure 9:** How consumers can access nicotine vaping products in Australia



Source: TGA

### Safety and quality requirements for nicotine vaping products

The TGA has published a standard, known as the *Therapeutic Goods (Standard for Nicotine Vaping Products) (TGO 110) Order 2021* (TGO 110) that includes minimum safety and quality requirements for nicotine vaping products that are not registered in the ATGR and that are imported into, supplied in, or exported from Australia. The standard aims to support the provision of accurate information about the contents of nicotine vaping products, prevent substances with known health risks or active ingredients not needed for smoking cessation from being added to them, and minimise the risks associated with accidental exposure to nicotine-containing products, particularly to children, which can be fatal.

The standard applies to finished products (i.e. not needing further manufacture) including nicotine base and salt products, both ready for immediate use or designed to be mixed with flavourings or diluents prior to use. It does not apply to nicotine products brought into Australia under the 'Traveller's Exemption', vaping products that do not contain nicotine, or starting materials to be used in further manufacture of nicotine vaping products.

The standard includes requirements for **labelling** – list of ingredients, the nicotine concentration, and warning statements; **packaging** – must be child-resistant; **ingredients** – that nicotine base or salt is the only active ingredient, at a concentration of less than or equal to 100 mg/mL, within 90-110% of the concentration stated on the label, and that no prohibited ingredients are added; and **record-keeping**.

Products supplied in Australia (made or imported for supply) must meet all these requirements, but products imported via the Personal Importation Scheme do not need to meet the labelling or packaging requirements. This has implications for the collection and recycling of used nicotine vaping products – it cannot be assumed that these products are labelled correctly or that they are child-safe.

## Sponsors of nicotine vaping products

Sponsors of a nicotine vaping product – someone who imports, exports or manufactures (for supply in Australia) the product, or arrange for someone else to do any of these things – must maintain records to demonstrate compliance with TGO 110. Sponsors must also submit a report every six months to the TGA listing the brand and nicotine concentration of each nicotine vaping product supplied in the period.

Sponsors are usually the company that has imported the product for supply in Australia. However, pharmacists, health practitioners and wholesalers who import products directly from overseas, or compound or manufacture the product themselves are considered to be the sponsor of a product under TGO 110 and must meet its record-keeping obligations.

## Not all vaping devices are regulated by the TGA

Refillable and reusable vaping devices are not medical devices and are not regulated by the TGA if they are intended to be used only with non-medicinal vaping products (i.e. that contain no active ingredients such as nicotine), or are intended to be used with both medicinal and non-medicinal vaping products. In these circumstances the vaping devices are considered consumer goods regulated by the ACCC and state and territory consumer agencies.

However, they are medical devices if they are intended to be used exclusively with medicinal vaping products containing an active ingredient. Where the active ingredient is nicotine, the device is an exempt medical device that does not need to be included in the ARTG or obtained via an unapproved device pathway, but other requirements of the Australian Regulatory Guidelines for Medical Devices do apply. Where active ingredient(s) other than nicotine vaping products (e.g. cannabis) are used, the device is a standard medical device that must be included in the ARTG and accessed via a pathway for unapproved medical devices.

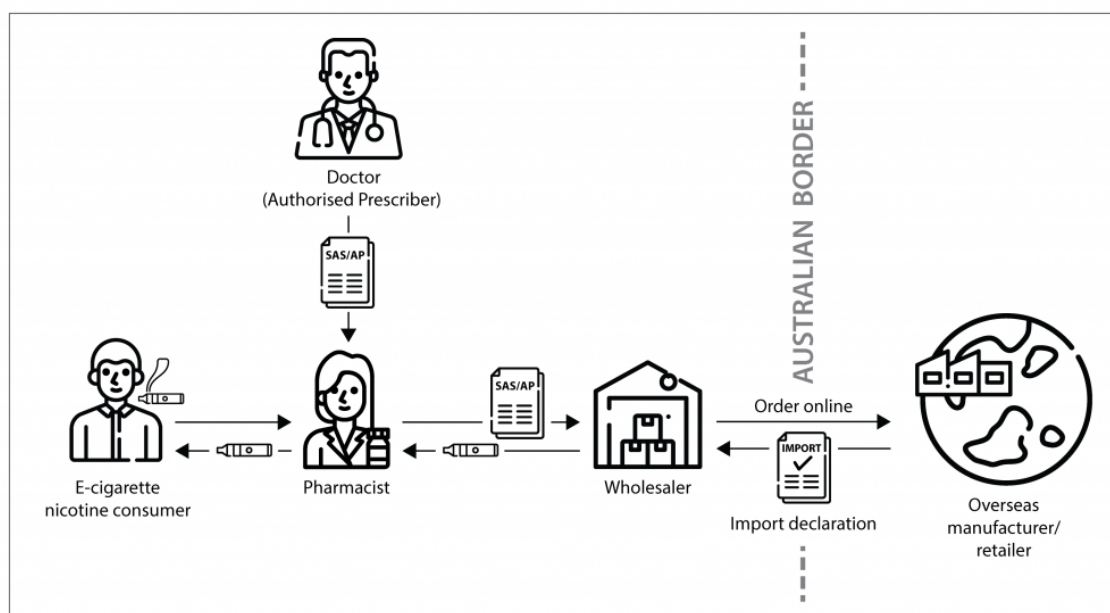
Disposable and non-refillable vaping devices such as disposable cigarettes and disposable non-refillable pods are not considered as medical devices and are not regulated by the TGA. However, when the device contains a medicinal vaping product, the product will be regulated by the TGA, who would take the device elements into consideration when assessing the product for registration on the ARTG.

## The role of pharmacists

Pharmacists may source and hold stock of nicotine vaping products for the purpose of filling prescriptions from Australian or overseas suppliers, and must dispense them only to consumers with a prescription and having sighted evidence of either Authorised Prescriber or Special Access Scheme approval. The TGA publishes a list of Authorised Prescribers who have consented to their details being made available, but there are some who have not consented. As of 3-May-22 there were 739 approved Authorised Prescribers. Pharmacies may also source, stock and supply vaping devices to be used with nicotine vaping products, subject to state and territory restrictions.

Pharmacists may compound a nicotine vaping product for a particular person on prescription, and in this instance the prescriber does not need to be an Authorised Prescriber or have Special Access Scheme approval. Pharmacists who compound nicotine vaping products in this way become the Australian sponsor of the products formed, and must meet all the requirements of TGO 110.



**Figure 10:** Steps in dispensing a prescription for a nicotine vaping product in Australia

Source: TGA

### Importers, manufacturers and wholesalers

Nicotine vaping products can be imported into, or manufactured in, Australia and wholesale supplied through one or more intermediate suppliers. There is no requirement for sponsors to notify the TGA before importing these products, but they must be declared to Australian Border Force. There is no duty payable for consignments worth \$1,000 or less, or for products intended for tobacco use cessation, but the duty is 5% in other cases.

Australian manufacturers of nicotine vaping products must obtain a Good Manufacturing Practice (GMP) licence from the TGA, but such a licence is not required to manufacture at sites outside Australia. Products must meet the requirements of TGO 110.

A wholesale licence for prescription-only medicines from the relevant state or territory health department is needed to wholesale nicotine vaping products.

### Advertising of prescription medicines prohibited

Although the advertising of prescription medicines is generally prohibited, a pharmacy may inform consumers that they dispense nicotine vaping products in specified circumstances. Pharmacists may also inform consumers that they supply vaping devices in a manner specified by state and territory legislation. Health practitioners may not refer to nicotine vaping products in their company, business or trading names or any other promotional material, but may present factual and balanced health information regarding these products with their patients.

## State and territory regulation of nicotine vaping products

As well as the requirements for dispensing prescription-only medicines, each state or territory has tobacco or smoking product or e-cigarette control legislation that is applicable to nicotine vaping products or vaping devices for use with these products, for example:

- The ACT, Northern Territory and Tasmania require pharmacists to obtain a retail licence for tobacco products/e-cigarettes before they can dispense nicotine vaping products or supply vaping devices.
- NSW requires pharmacists to notify NSW Health before they dispense nicotine vaping products or supply vaping devices.
- In WA, only registered pharmacists are permitted to dispense nicotine vaping products and may supply a vaping device for use with these products, as part of a medically supervised smoking cessation program.

### 4.1.2 Obtaining vaping products that do not contain nicotine

All states and territories have now expanded their legislation regarding the sale and use of tobacco-related products so that they now cover vaping products, also described as e-cigarettes or personal vaporising devices, and including e-liquids. A detailed comparison of state and territory restrictions on sale and use of vaping products is provided in Appendix 2. There are no restrictions on the importation of vaping products or devices that do not contain nicotine, and these may be sold by retailers in all states and territories except WA, where products that resemble tobacco products, including vaping devices, cannot be sold by tobacco or general retailers. In SA, the laws restrict the sale of products that resemble cigarettes, but this does not appear to be enforced, and the sale of other vaping products is legal. However, these products cannot be sold to persons under 18 in any state.

In the ACT, NT, SA and Tasmania, vaping products may only be sold by licenced retailers, and in NSW retailers must notify NSW Health before they begin selling them. Sale by vending machine is not permitted in Victoria, Queensland, SA, WA, or the ACT, and in NSW and Tasmania, vending machines can only be located in areas restricted to adults and must be operated by staff, not members of the public.

The sale and display of vaping products is regulated in much the same way as tobacco related products. Products may not be displayed for sale and must be kept out of sight in the store service areas; information that can be provided on products and prices is limited to plain prescribed forms; advertising is prohibited; and the number of points of sale is limited. Vaping products may not be sold from temporary retail outlets such as booths, tents, marquees, trucks, vans or from a person. Vaping products cannot be provided as free samples, as part of sponsorship or shopper loyalty programs, or as prizes, gifts or other competition rewards. Victoria does, however, provide an exemption for certified specialist e-cigarette retailers who are allowed a limited display of products and accessories.

### 4.1.3 Use of vaping products

Except for WA and NT, the places in which vaping devices can be used are also restricted in the same way as smoking. They cannot be used in indoor or outdoor smoke free areas or in cars carrying children (under 16 in NSW, QLD, SA, and NT, under 18 in Victoria, Tasmania and the ACT), or on public transport in NSW and Victoria. However, in WA and NT, vaping devices can be used in smoke free areas. Specific smoke (and vape) free areas prescribed by the relevant legislation are listed in **Table 2** for four states. Individual establishments and workplaces may also make their own rules regarding the use of vaping devices on their premises, including banning their use if desired, even in WA. In all states and territories,

the legislation prescribes significant penalties for offences committed in relation to the sale of tobacco-related products e.g. in NSW up to \$110,000 for individuals and \$220,000 for corporations.

**Table 2:** Designated smoke (and vape) free areas in VIC, QLD, NSW, and SA

NSW	SA
<b>Smoke Free Environment Act 2008</b> <ul style="list-style-type: none"> <li>• All indoor public places</li> <li>• Outdoor public places:</li> <li>• Within 10 metres of children’s play equipment in outdoor public places</li> <li>• Public swimming pools</li> <li>• Spectator areas at sports grounds or other recreational areas used for organised sporting events</li> <li>• Public transport stops and platforms, including ferry wharves and taxi ranks</li> <li>• Within 4 metres of a pedestrian access point to a public building</li> <li>• Commercial outdoor dining areas</li> <li>• In a car with a child under 16 years of age in the vehicle.</li> <li>• Using e-cigarettes on public transport vehicles such as trains, buses, light rail, ferries is also banned under the Passenger Transport (General) Regulation 2017.</li> </ul>	<b>Tobacco and E-Cigarette Products Act 1997</b> <ul style="list-style-type: none"> <li>• Outdoor dining areas</li> <li>• Vehicles when a child under 16 years is present</li> <li>• Enclosed public areas and workplaces</li> <li>• Playgrounds</li> <li>• Public transport waiting areas</li> <li>• Declared smoke-free outdoor areas and events.</li> </ul>
QLD	Victoria
<b>Tobacco and Other Smoking Products Act 1998</b> <ul style="list-style-type: none"> <li>• Public transport waiting points</li> <li>• National Parks</li> <li>• Organised under-18 sporting events</li> <li>• Building entrances</li> <li>• Outdoor pedestrian malls</li> <li>• Skate parks</li> <li>• Public swimming facilities</li> <li>• Children's playground equipment</li> <li>• Outdoor eating and drinking areas</li> <li>• Patrolled beaches</li> <li>• Outdoor swimming areas</li> <li>• Major sporting facilities</li> <li>• Government precincts</li> <li>• Local Government - Public Space</li> <li>• Eating and drinking venues</li> <li>• Education facilities</li> <li>• healthcare facilities</li> <li>• Residential aged care facilities</li> </ul>	<b>Tobacco Act 1987</b> <ul style="list-style-type: none"> <li>• Outdoor dining are as when food is being consumed including cafes, footpath dining, restaurants and pubs, food fairs, community and street festivals.</li> <li>• Enclosed restaurants, cafes and dining areas of hotels</li> <li>• Licensed clubs</li> <li>• Shopping centres</li> <li>• Enclosed workplaces</li> <li>• Motor vehicle, if anyone under 18 is present</li> <li>• Patrolled beaches</li> <li>• Outdoor public children’s playgrounds, skate parks and sporting venues during organized under-age sporting events</li> <li>• Under-age music or dance events</li> <li>• Outdoor areas within public pool complexes</li> <li>• Within the grounds of, and within four metres of entrances to, childcare centres, kindergartens, pre-schools, and primary and secondary schools</li> <li>• Within four metres of entrances to children’s indoor play centres</li> <li>• Within four metres of entrances to public hospitals and registered health centres</li> <li>• Within four metres of entrances to certain Victorian Government buildings</li> <li>• Courts or police stations</li> <li>• Train stations, tram platforms, or tram and bus shelters.</li> </ul>

## 4.2 Littering

Littering of vaping devices is captured by the NSW Protection of the Environment Operations Act 1997 which specifies the following offences:

- littering (including littering from vehicles): depositing litter on land or waters in a public place or an open private place.
- aggravated littering: littering which is reasonably likely to cause or contribute to appreciable danger or harm to any persons, animals, premises or property.

Littering is subject to a tiered range of fines under the POEO Act.

## 4.3 Collection, transport, processing of waste vaping products

### 4.3.1 Collection

Facilities intended to collect vaping devices must be designed and operated to accept and temporarily store these materials, some of which are or must be treated as hazardous. Under current Work Health and Safety and Dangerous Goods legislation in Australian jurisdictions, facility operators must:

- Manage the risk of storing and handling hazardous chemicals, ensuring controls remain effective
- Maintain a register of hazardous chemicals
- Obtain and make available the applicable Safety Data Sheets
- Provide information, training, instruction and supervision
- Label containers of hazardous chemicals correctly
- Control ignition sources and the accumulation of flammable and combustible substances
- Provide fire protection, firefighting, and emergency equipment
- Provide appropriate personal protective equipment
- Prepare an emergency management plan, and maintain readiness to respond to emergencies

Risk assessments to identify hazards and implement appropriate controls to manage the risks of storing and handling hazardous chemicals must be undertaken with reference to relevant codes of practice and Australian Standards, which for vaping devices include:

- AS/NZS 3833:2007 The storage and handling of mixed classes of dangerous goods in packages and intermediate bulk containers
- AS/NZS 4452:1997 The storage and handling of toxic substances
- SafeWork NSW, Managing risks of hazardous chemicals in the workplace, July 2014
- SafeWork NSW, Placarding for storage of hazardous chemicals

A range of guidance documents have been prepared for operators of facilities that accept hazardous wastes. For example, the NSW EPA has published a Handbook that outlines minimum requirements for CRC operators; the NSW EPA has also published guidance for small-item drop-off stations suitable for household batteries, fluorescent tubes, smoke detectors and mobile phones in use by many NSW local councils; Sustainability Victoria provides guidelines for operators of permanent sites that are part of the Detox Your Home program; and B-cycle has published a Risk assessment and safety plan for accredited battery collection points under this scheme.

## 4.3.2 Transport

### Dangerous goods and hazardous substances

Transport of hazardous wastes in Australia is also legislated by state and territory Work Health and Safety and Dangerous Goods legislation, which in turn references the Australian Code for the Transport of Dangerous Goods (the Code). The Code outlines the requirements for transporting dangerous goods by road or rail. Vaping devices are captured by the Code when they contain lithium-ion batteries, which are classed as miscellaneous dangerous goods (Class 9), or nicotine substances, which are classed as Toxic substances (Class 6.1). The legislation and Code outline requirements for induction, information and training, safety data sheets, consignment documentation, packaging and containment, separation and segregation, labelling, loading, placarding, and emergency response.

### Waste Tracking

Transport of hazardous wastes must also be tracked. In NSW this is regulated by the Protection of the Environment Operations (Waste) Regulation 2014 (POEO Waste Regulation). Transporters must use an online waste tracking system to record movements of waste within NSW and from interstate to NSW. Transporters of more than 200 kilograms of trackable waste must also hold a Waste Transport Licence. Movement of waste from NSW to other states or territories is governed by similar legislation applicable to the state or territory in which the facility receiving the waste is located.

## 4.3.3 Processing

Facilities in NSW involved in the recovery of hazardous and other waste, or storing more than 5 tonnes of hazardous waste are regulated by the Protection of the Environment Operations Act 1997, and must hold an Environment Protection Licence issued by the NSW EPA. Like collection facilities they must also meet the requirements of relevant Work Health and Safety and Dangerous Goods legislation. They are also required to report waste received as part of waste tracking requirements of the POEO Waste Regulation. Generally, premises undertaking waste and resource recovery activities also require development approval under the NSW Environmental Planning and Assessment Act 1979, issued by either the applicable local council or state agency.

## 4.4 Product stewardship

Product stewardship acknowledges that those involved in designing, manufacturing, and selling products have a responsibility to ensure those products or materials are managed in a way that reduces their environmental and human health impacts, throughout the life cycle and across the supply chain. It aims to drive environmentally beneficial outcomes through good design and clean manufacturing, including the use of components and materials that are easier to recover, reuse and recycle. Product stewardship goes beyond extended producer responsibility (EPR), which involves producers taking responsibility for managing the environmental impact of their products only at the post-consumer state of their life cycle.

## National arrangements

In Australia, these schemes can be industry-led voluntary schemes (e.g. batteries, mobile phones, and tyres), co-regulatory arrangements between industry and government (e.g. TVs and computers – the NTCRS, and plastics and packaging – the Australian Packaging Covenant or APC), or mandatory schemes (e.g. used oil).

Product stewardship is regulated by the Recycling and Waste Reduction Act 2020 (RaWR Act 2020), which outlines processes for identifying priority products and materials and establishing applicable schemes. The current (2021-22) priority list includes several products that have been listed for some time: photovoltaic systems (listed since 2016-17), electrical and electronic products (since 2016-17), plastic oil containers (2016-17), child car seats (2020); and several products that were listed in 2021-22: clothing textiles and problematic and unnecessary single use plastics (AWE, 2022). Batteries and plastic microbeads were removed from the list as B-cycle was due to commence in January 2022, and microbeads have been successfully phased out of rinse-off cosmetic, personal care and cleaning products.

Assessment of nominated products for inclusion in the 2022-23 list has now commenced, and will include consultation with the Product Stewardship Centre of Excellence, state and territory governments and industry groups when required. In January 2022, environmental organisation and registered charity No More Butts nominated cigarette butt filters and all other tobacco and non-tobacco smoking products including but not limited to: smoking-related packaging and nicotine and non-nicotine vaping devices and products for inclusion in the Minister’s Priority List for 2022-23 (No More Butts, 2022)

## NSW product stewardship

In NSW, the Plastic Reduction and Circular Economy Act 2021 (PRCE Act) allows for product stewardship requirements and targets to be established for the entire life cycle of a regulated product. If a product becomes regulated under the PRCE Act, brand owners of the regulated products can be required to:

- meet product stewardship requirements and/or targets
- prepare an action plan, submitted in an approved form and approved by the EPA before a regulated product is supplied in or into NSW
- provide an annual report to the EPA, using an approved form
- prepare, store and make certain records available to the EPA on request
- comply with directions from the EPA, including a stop notice or request for an independent audit of their records
- provide a financial assurance to secure or guarantee funding for implementing actions needed to meet product stewardship requirements or targets.

## 5 Use and markets

### 5.1 Use of e-vapour products

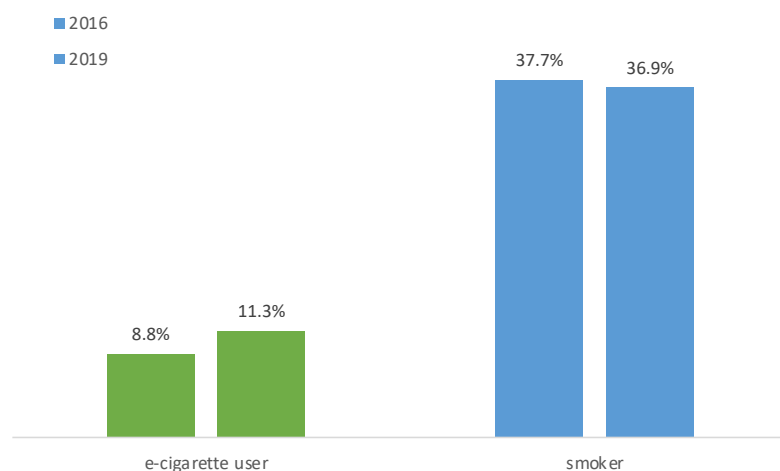
#### 5.1.1 Use of e-cigarettes vs smokers

The National Drug Strategy Household Survey 2019 reported the use of e-cigarettes becoming more common, along with the use of roll-your-own cigarettes. Between 2016 and 2019, the proportion of people aged 14 and over who had ever used e-cigarettes rose from 8.8% to 11.3%. Use of e-cigarettes increased between 2016 and 2019 in all age groups except those aged 70+, with statistically significant increases in every age group except 14-17, 30-39, and 70+. The rise among young adults was particularly notable, increasing by 35.9% in those aged 18-24, and by 37.8% in those aged 25-29. Nearly 2 in 3 (64%) current smokers<sup>2</sup>, and 1 in 5 (20%) non-smokers<sup>3</sup> aged 18-24 reported having tried e-cigarettes.

The increases in use of e-cigarettes were most significant with existing smokers, where lifetime use increased markedly in all age groups except 30-39 (which saw a non-significant increase), and 70+. However, use of e-cigarettes also increased in non-smokers across all age groups, except for 14-17 (where a small non-significant decrease was observed) and 70+ (the percentage remained the same).

This contrasted to smoking status, where the number of persons aged 14 and over who had ever smoked 100 combustible cigarettes or more in their lifetime decreased in the 14-17, 18-24, 25-29, 30-39 and 40-49 age groups, and overall, the proportion of persons who had ever smoked decreased from 37.7% to 36.9%.

**Figure 11:** Proportion of persons who had ever used an e-cigarette or smoked, 2016 to 2019

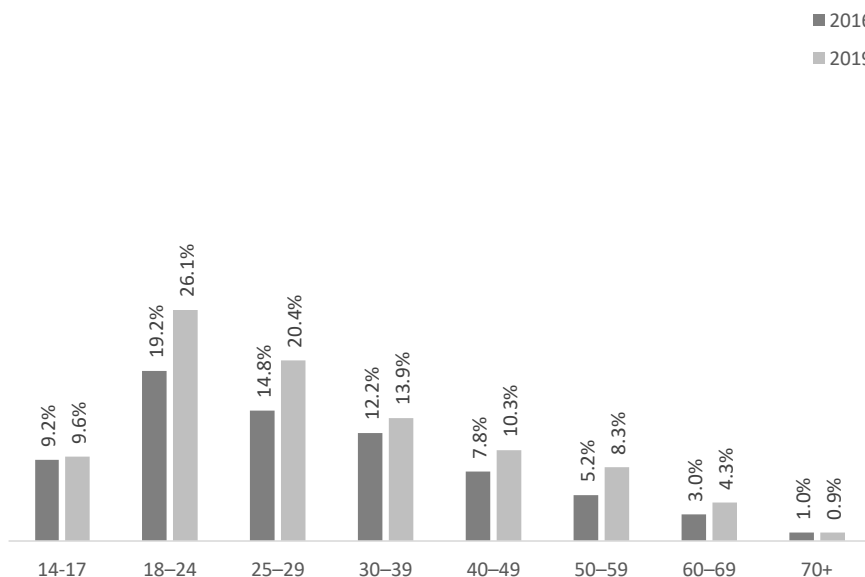


**Source:** National Drug Strategy Household Survey 2019

<sup>2</sup> Includes people who reported smoking combustible cigarettes daily, weekly or less than weekly.

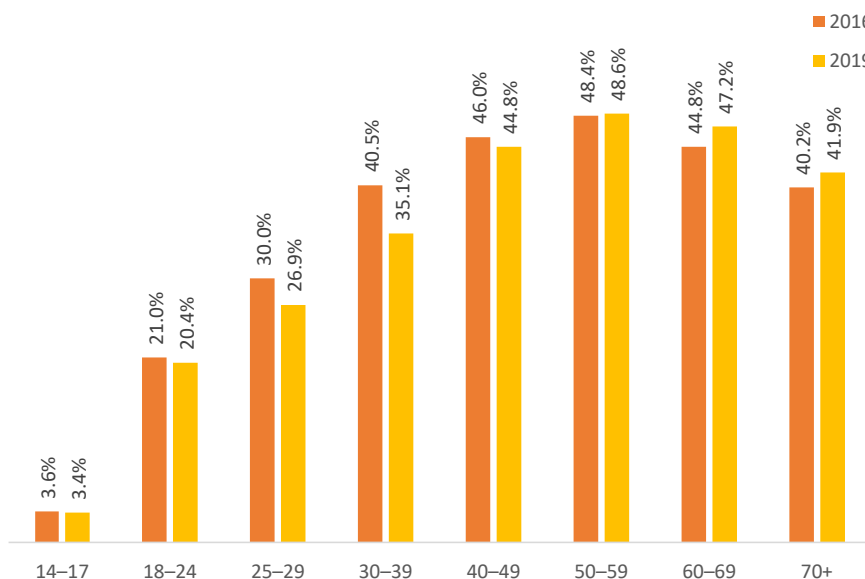
<sup>3</sup> includes those who have never smoked more than 100 combustible cigarettes, and those who have smoked this amount of combustible tobacco and report no longer smoking.

**Figure 12:** Lifetime use of e-cigarettes, proportion of persons 14+ by age group, 2016 to 2019



Source: National Drug Strategy Household Survey 2019

**Figure 13:** Proportion of persons 14+ who had smoked 100 cigarettes or more, 2016 to 2019



Source: National Drug Strategy Household Survey 2019

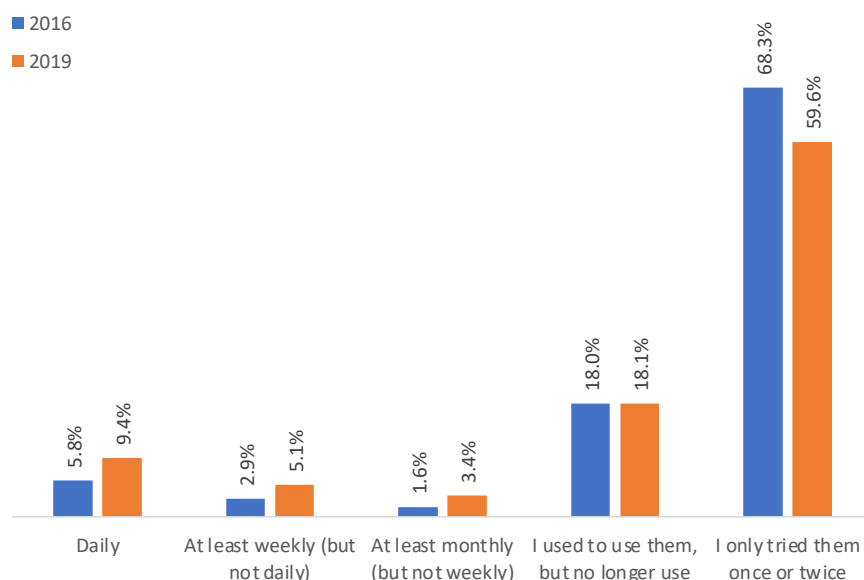
### 5.1.2 Frequency of use

Among those who had tried e-cigarettes, frequency of use also increased. Between 2016 and 2019, daily use increased by 62%, weekly (but not daily) use by 76%, and monthly (but not weekly) use by 113%. Overall, more people reported using them at least monthly (up from 10.3% in 2016 to 17.9% in 2019). The proportion who had only tried them once or twice decreased from 68% to 60%.



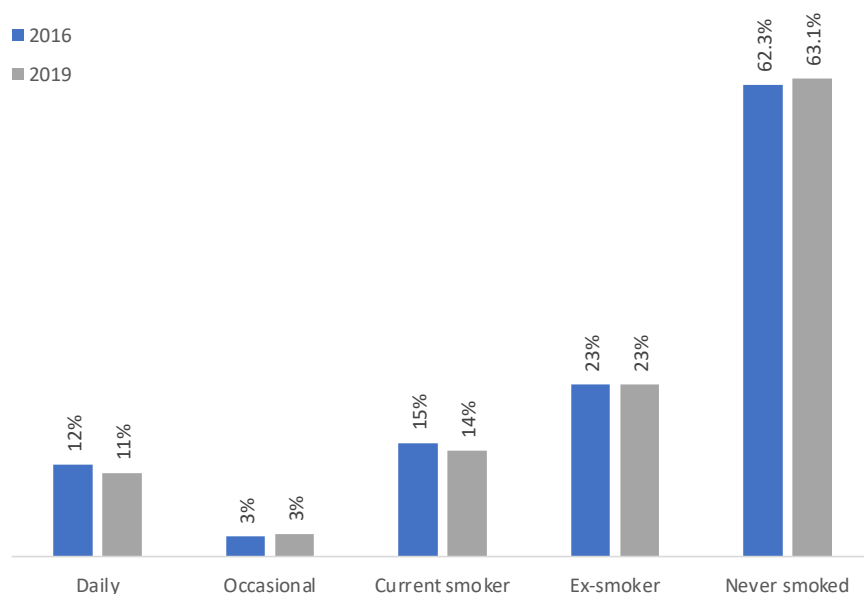
This again contrasted with smokers, where the proportion of persons aged 14+ who smoked daily decreased from 12% to 11% between 2016 and 2019, and the proportion of persons who had smoked 100 cigarettes or more in their lifetime also decreased from 15% to 14%.

**Figure 14:** Frequency of use, people aged 14 and over who had tried e-cigarettes, 2016 to 2019



Source: National Drug Strategy Household Survey 2019

**Figure 15:** Tobacco smoking status, proportion of persons people aged 14+, 2016 to 2019

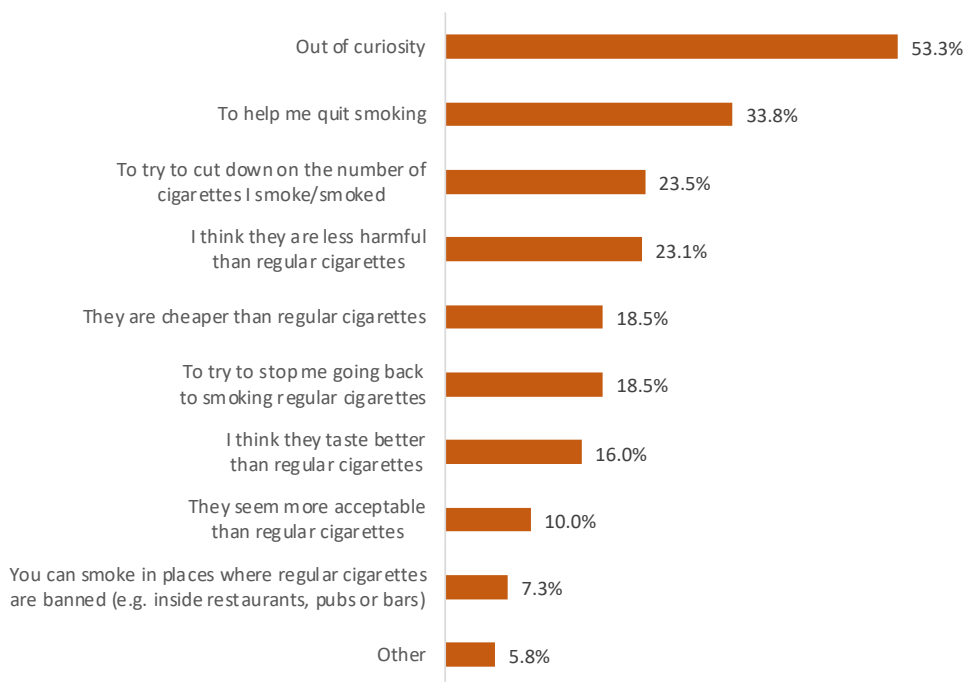


Source: National Drug Strategy Household Survey 2019

### 5.1.3 Reasons for using e-cigarettes

The most common reasons for using e-cigarettes among those who had ever used them were out of curiosity and to help them quit smoking. Over half of people who had ever used them reported doing so out of curiosity, and this was the major reason reported by every age group under 40: 14-17 (73%), 18-24 (72%), 25-29 (65%), and 30-39 (52%). The major reason reported by all age groups 40+ was to help them quit smoking. Other reasons reported including to reduce the number of cigarettes smoked, because e-cigarettes are perceived to be less harmful, because they are cheaper or taste better than regular cigarettes, and stop a return to smoking regular cigarettes.

**Figure 16:** Reasons for using e-cigarettes, proportion of people who had ever used them, 2019



**Source:** National Drug Strategy Household Survey 2019

### 5.1.4 Data on number of vaping products used or sold

#### Number of items sold or used

Neither the National Drug Strategy Household Survey 2019 or the Euromonitor report purchased for this research provided data on the number of vaping products used or sold.

#### Littering

Exhaustive searches do not offer data points for littering associated with e-cigarettes or vaping products. The NSW Litter Report 2016-2020 does not isolate e-cigarettes or vaping products. In the Butt Litter Index vaping products are not included in 'cigarette accessories'. In mid-2022, vaping devices were added as a category to the Australian Litter Measure, but data is not yet available.

## 5.2 Markets

### 5.2.1 E-cigarette brands

Almost all (90%) e-cigarette products sold globally are made in China, where there are almost 1,000 manufacturers.<sup>1</sup> There are over 500 e-cigarette sellers marketing products under varied brand names, and it is estimated that 30–50% of sales of global e-cigarettes are conducted online. An estimated 35 million people were regular dual or sole users of e-cigarettes and vapour products (including heated tobacco products) in 2016, projected to grow to 55 million by 2021. In 2018, the market for e-cigarettes globally was estimated to be worth more than 13 billion US dollars, and is predicted to continue its rapid growth over the coming years (see estimates here). North America is by far the largest e-cigarette market, followed by Western Europe, Eastern Europe, Asia Pacific, and then the rest of the world (Tobacco in Australia, 2019).

Although the e-cigarette market was initially highly fragmented and dominated by small start-up companies, transnational tobacco companies, seeking to diversify their product lines to include alternative products perceived to do less harm, have invested heavily in e-cigarettes, and now own many of the most prominent brands.

From 1 October 2021, the distribution of nicotine e-liquids through traditional retailers was prohibited, and these products are now only available through prescription. Information on the sales of nicotine products vs non-nicotine products was not available. Sales of smokeless tobacco and heated tobacco products are negligible as retail sales of both are prohibited, although they are permitted for personal use. Consumers therefore rely heavily on imported products through online channels, which are not easily monitored (Euromonitor email correspondence, May 2022). Euromonitor reported that the market for smokeless tobacco, e-vapour, and heated tobacco products (refer to **Table 3**) is small, with a per capita spend of only USD2.60 in 2021, making it far smaller than other markets such as New Zealand or those in North America or Western Europe. This means brands of e-cigarettes are difficult to track. Some examples of vaping device brands available online in Australia are indicated in **Figure 17**. In addition, there are dozens of e-liquid brands, produced both locally and overseas.

Vaping product brands are difficult to track because nicotine vapour products can only be dispensed in Australia by pharmacies on presentation of a valid prescription from an Authorised Prescriber, but consumers may obtain these from overseas with a valid prescription from any medical practitioner. In addition, there are strict state and territory restrictions on the advertising and sale of non-nicotine vapour products. This has also resulted in many consumers obtaining these products online from overseas.

**Table 3:** Euromonitor definitions of smokeless tobacco, e-vapour, and heated tobacco products

<b>Smokeless tobacco</b>	Products with tobacco but without combustion, used either in the mouth or nose, by chewing, inhaling or sucking, traditionally snuff and chewing tobacco.
<b>E-vapour</b>	Products that produce an aerosol by heating, rather than combustion, and that do not contain tobacco, but use liquids that may contain nicotine.
<b>Heated tobacco</b>	products that heat but do not burn tobacco to produce a vapour rather than smoke.

**Figure 17:** Examples of brands of vaping devices available online in Australia



Although Australian sponsors must report to the Therapeutic Goods Administration on the brand and nicotine concentration of nicotine vapour products they supply, there is no requirement for reporting of sales of non-nicotine vaping products. Data on vaping products obtained from overseas is also not available because although these goods must be declared, value or quantity information is not recorded for consignments less than \$1,000 in value, and even for consignments of value greater than this, there is no reporting category for imported products that separately captures vaping products – they fall under a generic other category.

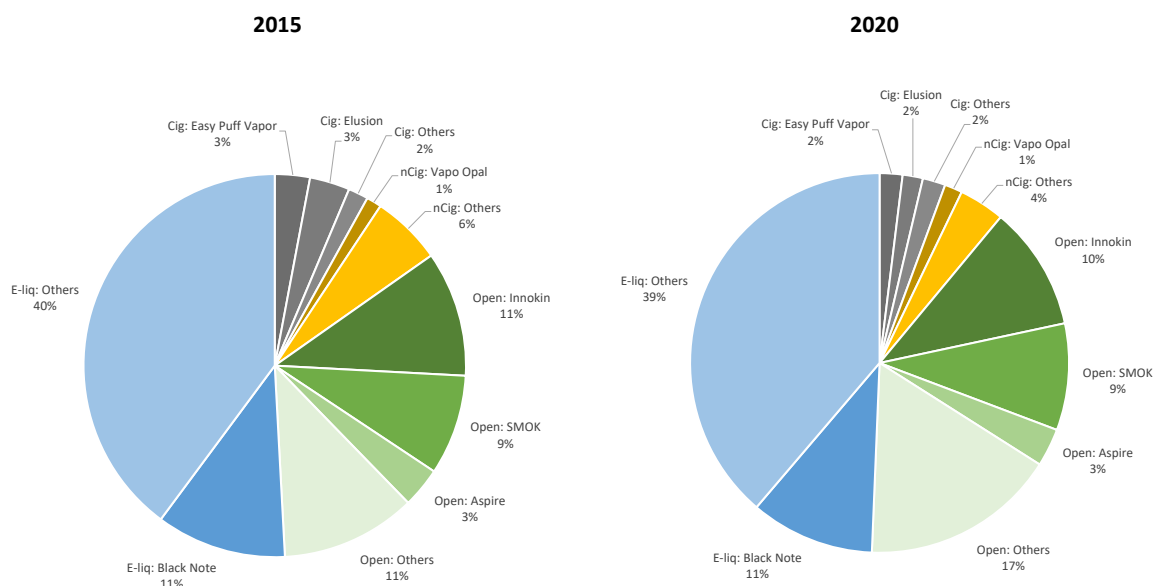
The report and data purchased from Euromonitor on smokeless tobacco did not contain brand share data for Australia, however, in place of this data, Euromonitor provided brand share data for sales of e-vapour products in New Zealand. This indicated eight major local brands, including Easy Puff and Elusion for Cig-a-likes, Vapo Opal for non-Cig-a-likes, Innokin, SMOK, and Aspire for open system charging and vaporising devices, and Black Note for e-liquids. Between 2015 and 2020, Easy Puff and Elusion lost ground to other Cig-a-likes, but Vapo Opal gained ground against other non-Cig-a-likes, although closed systems share overall shrank from 15.3% of the total market for e-vapour products to 11.0%.

In contrast, the share of the total market of open system charging and vaporising devices grew from 33.9% to 39.6%, whilst the share of e-liquids remained much the same. The increase in market share of devices was filled by brands other than the existing Innokin, SMOK and Aspire. Black Note held on to their share of the e-liquids market.

**Table 4:** Global brand owners for local brands in New Zealand

Local Brand Name	Global Brand Owner
Easy Puff Vapor	Global Innovation Ltd
Elusion	Elusion New Zealand Holdings Ltd
Vapo Opal	VEC Ltd
Innokin	Shenzhen Innokin Technology Co Ltd
SMOK	Shenzhen IVPS Technology Co Ltd
Aspire	Shenzhen Eigate Technology Co Ltd
Black Note	Black Note Inc

**Figure 18:** Brand share of e-vapour products sold in New Zealand



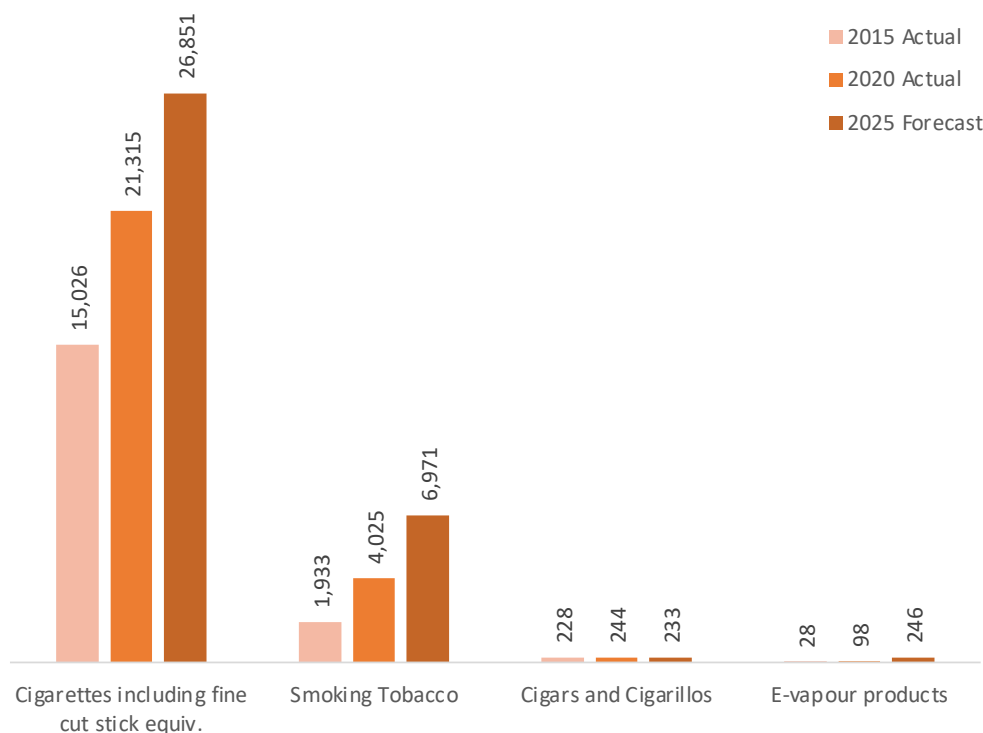
Source: Euromonitor

### 5.2.2 Sales of tobacco products in Australia

Despite the difficulty in determining brand shares in Australia, data on the sales of e-vapour products was provided by Euromonitor, who reported that these products continued to see double-digit current value growth in 2020, with sales benefiting from coronavirus pandemic. Lockdowns found consumers spending more time at home, often bored and anxious, leading many to turn to vaping products rather than smoking cigarettes or other tobacco products. Open vaping systems saw the biggest increase due to the wider selection of products and flavours on offer. Online sales also increased as this often the only means of access to these products available to consumers.

In 2015, E-vapour products only comprised 0.2% of total sales of tobacco related products. This increased to 0.4% in 2020 and is forecast to increase to 0.7% in 2025. Annual growth averaged 16.7% from 2015 to 2020 and is forecast to be 20.2% between 2020 and 2025. In contrast, sales of cigarettes are forecast to grow by only 4.7% from 2020 to 2025, down from 5.6% between 2015 to 2020. Sales of smoking tobacco, which grew by 13.3% each year from 2015 to 2020, will also continue to grow, but only by 11.6% per year. Sales of cigars and cigarillos will continue to decline. Sales of e-vapour products are forecast to exceed cigars and cigarillos by 2025. Total sales of all tobacco related products are forecast to almost double in the 10 years from 2015 to 2025, from \$17.2 billion to \$34.3 billion. However, sales of e-vapour products will increase almost tenfold, up from \$28.3 million to \$246 million. Despite this growth, they will still comprise a very small portion of the tobacco related market in Australia.

**Figure 19:** Sales of tobacco related products in Australia \$ million



Source: Euromonitor

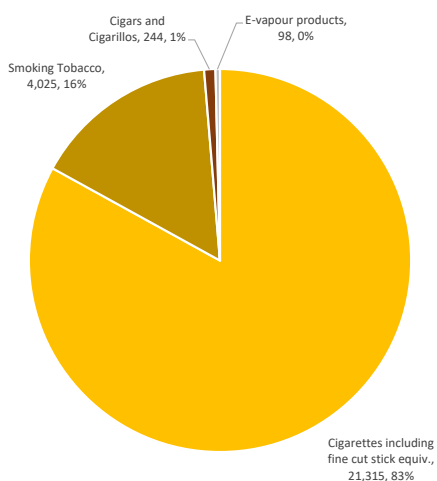
**Table 5:** Sales of tobacco related products in Australia

Category	2015 Actual		2020 Actual		2025 Forecast	
	\$ million	% of total	\$ million	% of total	\$ million	% of total
Cigarettes including fine cut stick equiv.	15,026.0	87.3%	21,314.6	83.0%	26,850.8	78.3%
Cigars and Cigarillos	227.9	1.3%	244.3	1.0%	233.1	0.7%
Smoking Tobacco	1,932.6	11.2%	4,024.9	15.7%	6,970.6	20.3%
E-vapour products	28.3	0.2%	98.0	0.4%	245.9	0.7%
<b>Total</b>	<b>17,214.8</b>	<b>100%</b>	<b>25,681.8</b>	<b>100%</b>	<b>34,300.4</b>	<b>100%</b>

**Table 6:** Growth in sales of tobacco related products in Australia

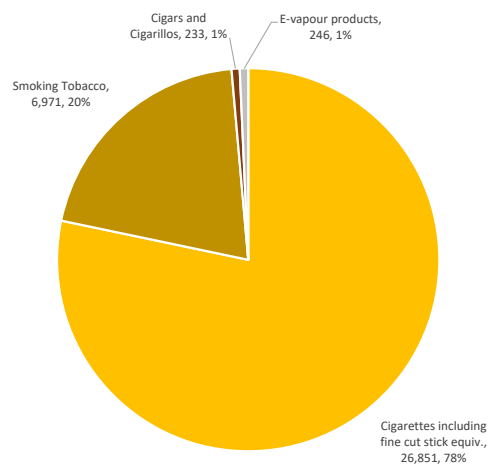
Category	Combined annual growth rate	
	2015 to 2020	2020 to 2025
Cigarettes including fine cut stick equiv.	5.60%	4.70%
Cigars and Cigarillos	-1.30%	-0.90%
Smoking Tobacco	13.30%	11.60%
E-vapour products	16.7%	20.2%

**Figure 20:** Actual sales by tobacco related product 2020



Source: Euromonitor

**Figure 21:** Forecast sales by tobacco related product 2025



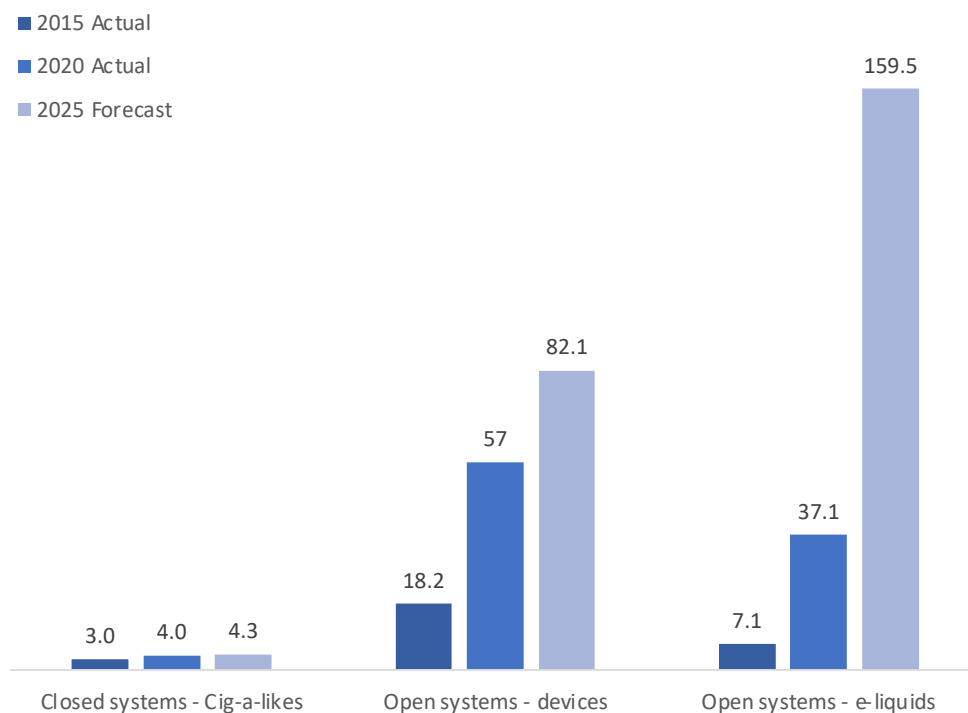
Source: Euromonitor

### 5.2.3 Sales of e-vapour products in Australia and New Zealand

In 2015, closed systems – in Australia these are only Cig-a-likes, including single use Cig-a-likes, rechargeable Cig-a-likes including starter kits, and Cig-a-like cartridges – comprised 10.6% of total sales of e-vapour products. Open systems including charging and vaporising devices and e-liquids, comprised the remaining 89.4%. Between 2020 and 2025, however, growth in open systems is forecast to far exceed that of closed systems. In this period, closed systems are forecast to grow on average only 1.5% per year, devices on average by 7.6% per year, and e-liquids by 33.9% per year. In 2015, e-liquids accounted for 25.1% of sales, and 37.8% in 2020. This is forecast to grow to 64.9% of sales by 2025. In comparison, although sales of charging and vaporising devices comprised 64.3% of sales in 2015, and 58.1% of sales in 2020, they are forecast to be only 33.4% of sales in 2025.

Although there are several sources of international data on sales of e-vapour products, e.g. Tobacco in Australia cites Technavio (Greenhalg & Scollo, 2019), there is limited data for the Australian market because of the legal restrictions and small market size, as previously mentioned. In addition, there are anecdotal reports of an illicit trade in vaping products, particularly those containing nicotine, operating outside the legal channels that facilitate data collection. It is possible that the types of products in this illicit trade are different to those found more commonly in the trackable market.

**Figure 22:** Sales of e-vapour products in Australia \$ million



Source: Euromonitor

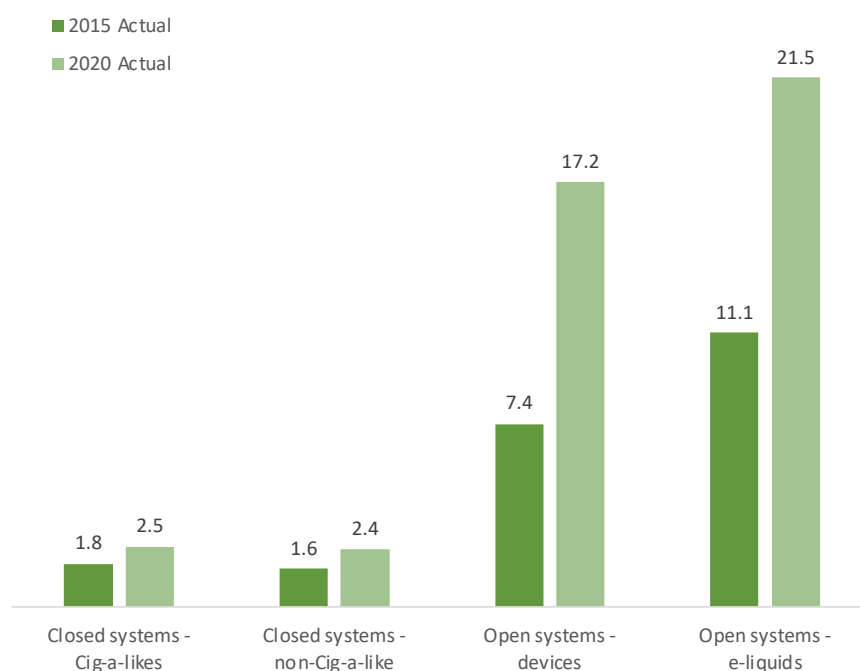


**Table 7:** Sales of e-vapour products in Australia

Category	2015 Actual		2020 Actual		2025 Forecast	
	\$ million	% of total	\$ million	% of total	\$ million	% of total
Closed systems - Cig-a-likes	3.0	10.6%	4.0	4.1%	4.3	1.7%
Open systems - devices	18.2	64.3%	57	58.1%	82.1	33.4%
Open systems - e-liquids	7.1	25.1%	37.1	37.8%	159.5	64.9%
<b>Total</b>	<b>28.3</b>	<b>100%</b>	<b>98.1</b>	<b>100%</b>	<b>245.9</b>	<b>100%</b>

Although the New Zealand market for e-vapour products is smaller than that in Australia, it is more mature, with more widespread use and lower growth. Between 2015 and 2020, sales of e-vapour products increased by only 14.7% overall, compared to 28.2% in Australia. Total sales in New Zealand in 2020 were \$43.6 million<sup>4</sup> compared to \$ 98.1 million in Australia. This corresponds to a 2020 per capita spend of \$9.30 in New Zealand, but just \$3.80 in Australia.

Like Australia, in New Zealand closed systems have a smaller share of the market, in 2020 11.0% compared to 4.1% in Australia, although sales of non-Cig-a-likes account for 5.4% in New Zealand, compared to a negligible proportion in Australia. However, e-liquids accounted for almost 50% of sales in New Zealand in 2020, compared to just 37.8% in Australia. Growth in sales of open system devices in New Zealand between 2015 and 2020 was just 18.3% compared to 25.6% in Australia, and growth sales of e-liquids was just 14.0% in New Zealand compared to 39.2% in Australia.

**Figure 23:** Sales of e-vapour products in New Zealand \$ million

<sup>4</sup> Dollar amounts are Australian dollars unless otherwise specified.

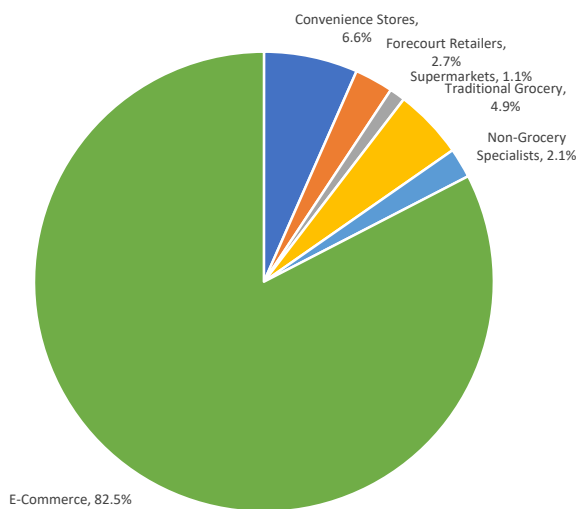
**Table 8:** Sales of e-vapour products in New Zealand

Category	2015 Actual		2020 Actual		Average annual growth 2015 to 2020
	\$ million	% of total	\$ million	% of total	
Closed systems - Cig-a-likes	1.8	8.1%	2.5	5.6%	6.8%
Closed systems - non-Cig-a-like	1.6	7.2%	2.4	5.4%	8.3%
Open systems - devices	7.4	33.9%	17.2	39.6%	18.3%
Open systems - e-liquids	11.1	50.8%	21.5	49.4%	14.0%
<b>Total</b>	<b>21.9</b>	<b>100.0%</b>	<b>43.5</b>	<b>100.0%</b>	<b>14.7%</b>

### 5.2.4 Distribution of e-vapour products

E-commerce accounted for 82.5% of e-vapour product sales in 2020, followed by convenience stores 6.6%, traditional grocery 4.9% and forecourt retailers 2.7%. Non-grocery specialists accounted for only 2.1% and supermarkets only 1.1%. Since 2015, sales via e-commerce, convenience stores, and forecourt retailers have increased slightly, declined via traditional grocery and non-grocery specialists, and stayed the same via supermarkets.

**Figure 24:** Distribution of e-vapour products in Australia 2020



**Table 9:** Distribution of e-vapour products in Australia

Outlet	2015	2020
Convenience Stores	5.2%	6.6%
Forecourt Retailers	2.1%	2.7%
Supermarkets	1.1%	1.1%
Traditional Grocery	7.3%	4.9%
Non-Grocery Specialists	3.1%	2.1%
E-Commerce	81.2%	82.5%

Source: Euromonitor

## 6 Vaping device recycling and disposal

As a leading Australian online vape store points out to its customers, disposing of vaping-related devices and waste is not quite as simple as dropping it in the nearest, most convenient and appropriate receptacle (Vaper Empire, 2020). As previous sections in this report have described, vaping devices are composed of plastic, metal, and electronic components, batteries containing hazardous substances that can pose a significant fire risk, and toxic metals and liquids, all of which can cause significant harm to public health, the health and safety of waste workers, and to the environment.

### 6.1 Guidance on disposal for consumers

Many online vaping stores provide consumers with basic information on how to dispose of vaping products safely, but information is usually generic because regulations governing the safe disposal of the hazardous materials contained in vaping devices and waste vary widely from place to place. For example, e-waste is banned from landfill in both South Australia and Victoria, but this is not currently the case in New South Wales. In addition, the steps involved in safely disposing of these items are complex and likely to be done by only a few consumers. Not all the steps are possible, as not all vaping devices can be easily dismantled or disassembled, and those devices designed to be single-use or disposable are actually not easily disposed of. Information on disposal provided usually encompasses several key steps:

- **Dismantle the vaping device into its separate components.** This is easiest with devices that are designed to be customized, and are thus easy to separate. Vape kits are slightly more difficult depending on whether they have a built-in or removable battery, and pre-filled or refillable tanks or pods. Disposable vapes and pre-filled pods are the most difficult, as they are generally not designed to be disassembled and thus cannot be separated into their base component materials – plastic, metal, and cotton. For these products consumers are usually directed to specific instructions accompanying the device, which may or may not exist.
- **Remove the battery if possible,** and dispose of it separately and safely via a battery recycling service, if this is available, otherwise via hazardous waste. Batteries must not be placed in regular garbage bins (either domestic premises or public place bins) because of the risk of fire or release of hazardous substances. If the battery cannot be removed, it may be possible for the whole battery unit to be disposed of safely via an e-waste disposal service, in a similar way to the way embedded batteries in other devices such as laptops and mobile phones can be disposed of.
- **Rinse out the liquid tank with water to remove any traces of the e-liquid.** Although tanks are made of a combination of a plastic or resin drip tip, a glass sleeve to hold the e-liquid, rubber seals, metal coil, and metal or plastic casing, even when clean most of these components cannot be recycled via regular services (e.g. yellow recycling bin) because they are too small for the equipment that sorts these materials, and must be disposed of separately. The glass is usually Pyrex and cannot be recycled in the same way as other types of glass, and also must be disposed of separately. Metal components can be disposed of as scrap metal, but again not in a regular recycle bin, only via a separate scrap metal service.

As liquid tanks in disposable vapes and pre-filled pods cannot be disassembled or rinsed, they may contain traces of potentially toxic e-liquid and thus cannot be disposed of with general waste, and responsible consumers are usually left with little choice but to store these items.

- **Recycle e-liquid bottles and re-fillable pods.** These are usually made of plastic, although some can be made of glass, and usually recyclable. This is indicated by a marking on the bottle. Again, these must be rinsed thoroughly with water to remove any trace of e-liquid, but then the bottle can be recycled via a regular service. The pipette is made of a mixture of plastic, rubber and glass, however, and once rinsed clean must be placed in the garbage bin not the recycle bin.

## 6.2 Recycling and disposal pathways

### 6.2.1 Vaping products

As a result of the degree of difficulty faced by consumers in disposing of vape waste, to keep these products out of the environment, there is a need for accessible, convenient and appropriate means for these to be safely recycled and disposed of. Several examples are described below.

#### New Zealand

In New Zealand, for example, one brand – Vapo – has joined with multinational recycling company Terracycle to provide a recycling program specifically for their Vapo and alt. branded products including bottles, devices and pods. New Zealand consumers can return used products to Vapo stores or mail the products free-of-charge (Vapo Australia, 2022). Terracycle does not publish detailed information regarding exactly how these items are recycled, but provide general information on their recycling process, which include sorting and aggregation, cleaning, and conversion into forms suitable for use as raw materials in new products (Terracycle, 2022).

#### Canada

In Canada, Terracycle launched a national Smoke-Free Recycling Program in late 2021. Consumers can drop items into receptacles in selected stores or send by mail several specific brands of products including HEET sticks and VEEV devices, and all brands of empty vaporiser cartridges and pods. Terracycle plans to use the cartridges and pods collected to conduct research and develop appropriate recycling processes for these items. When sending by mail, consumers can use any type of box they have available, print dispatch labels appropriate for shipping e.g. appropriate for lithium-ion batteries, and send the items free of charge. Items do not need to be cleaned, but Terracycle asks that as much remaining product be removed as possible.

#### United States

In the United States, Veolia North America published a case study regarding the collection and safe recycling and disposal of recalled, returned and off-spec e-cigarettes. Working with a reverse logistics firm to develop packaging guidance, Veolia assisted in the transport of shipments of e-cigarette kits, then disassembled the components. Each kit was separated into battery, battery charger, cord, nicotine cartridges, plastic housings and electronic circuit boards. In the case study period, 9 truckloads, or an estimated 1.13 million e-cigarette kits were recycled in accordance with environmental regulations, or in the case of the nicotine containing cartridges, sent to a hazardous waste incinerator. This enabled the recovery of 31 tonnes of plastic, 18 tonnes of wire, 23 tonnes of lithium-ion batteries, 23 tonnes of chargers, 12 tonnes of electronic circuit boards, and the safe disposal of less than 0.4 tonnes of nicotine containing cartridges (Veolia, 2022).

## Australia

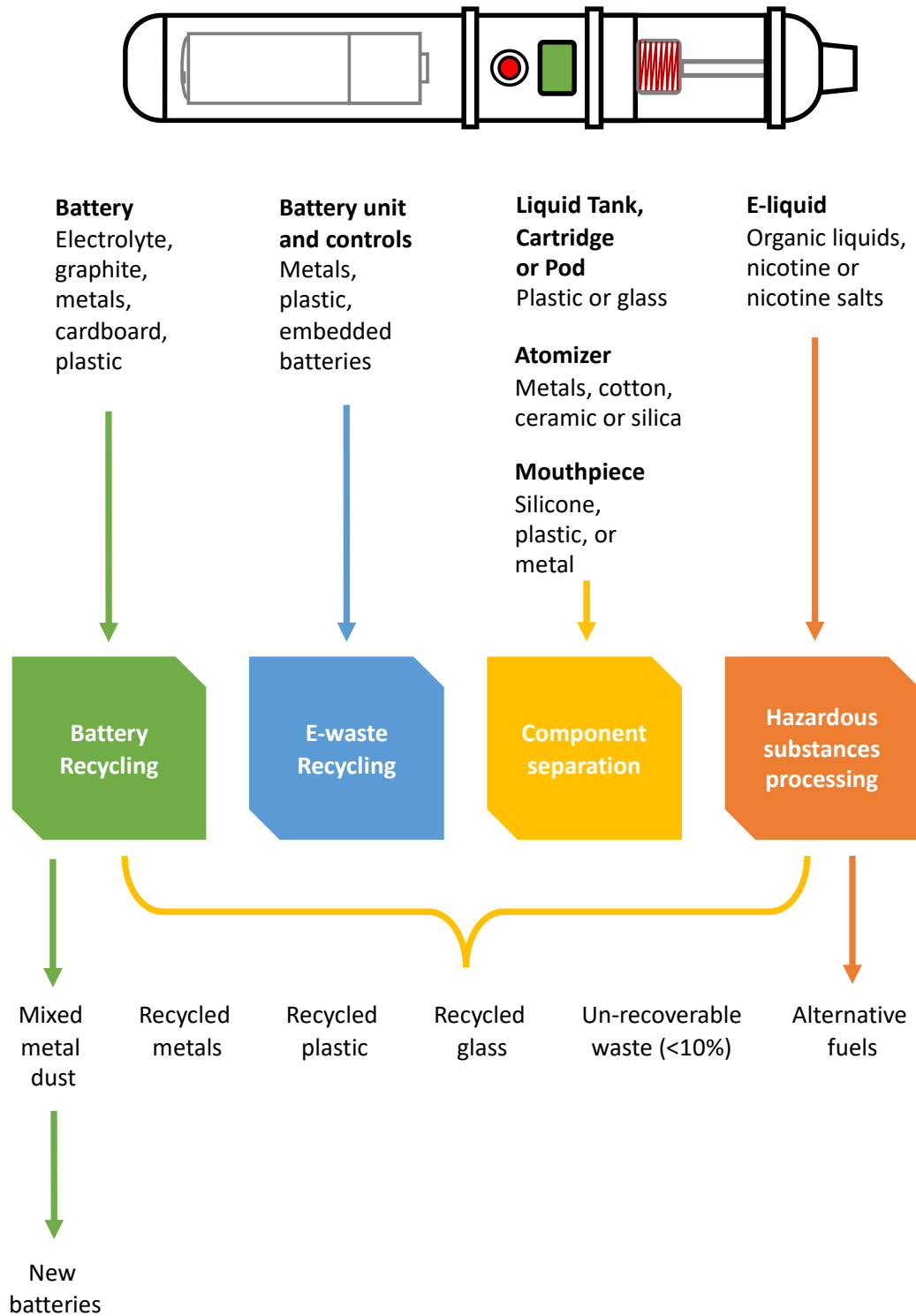
In Australia, although there are currently no recycling programs specifically for vaping products, there are established technologies and recycling or disposal pathways for their components. Household batteries including those containing lithium such as those found in vaping devices have been collected for many years via household chemical collection programs in most states and territories. These programs are now complemented by a product stewardship scheme for batteries – B-cycle – that commenced in January 2022. Household chemical collection programs in most states also collect a wide range of hazardous materials such as liquid and solid pesticides, flammable, toxic and reactive substances, many analogous to nicotine-containing and other e-liquids. Although these programs do not currently accept vaping waste, most are delivered by contractors with technologies that are appropriate for the processing of items containing vaping liquids. A national product stewardship scheme exists for electronic waste (or e-waste), and although the scheme does not accept vaping devices, there are several well-established companies that can collect and process these materials. The processing, recycling and disposal technologies for these three components are summarised in **Figure 25**, and described in more detail in the subsequent sections.

### Are single-use or disposable vapes intractable?

Intractable waste is unwanted materials or structures which are problematic because they are one or all the following: highly dangerous, toxic, long-living, expensive to store or convert to other forms, and whose satisfactory disposal defies current technologies (EWPHP, 2020).

Although not designed to be customizable, re-fillable, or dismantled by the user, single use or disposable vapes can be disassembled much like many other electronic items. Some time and effort are involved, but these items are not intractable as there are simple processes such as disassembly and cleaning that can facilitate the safe recycling or disposal of their component parts.

**Figure 25:** Recycling and disposal pathways for vaping device components



## 6.2.2 Batteries

### Collection

In NSW, household batteries have been collected by the NSW EPA's Household Chemical CleanOut program since 2003, and by the Community Recycling Centres (CRCs) Program since 2014. The CleanOut program collects a wide range of household problem wastes via events held in most local council areas across the state, with about 70 events each year in greater metropolitan Sydney (including Central Coast, Hunter, Illawarra and Shoalhaven), and a further 30-40 events in regional NSW. CRCs are a network of 97 permanent facilities across the state designed to collect a limited range of high-volume lower toxicity type materials including household batteries. Facilities are hosted and operated by local councils, and EPA coordinates and funds collection and disposal of the materials. Many local councils also provide their own household battery collection service for residents, with collection points in community centres, libraries, administration centres and other council-run facilities. Aldi Stores has provided a battery recycling scheme for many years, although this scheme is limited to AAA, AA, C, D, and 9V battery types.

Bunnings Stores now also operate a national battery recycling program, and all their stores have battery recycling units, making it convenient for customers and tradespeople to drop-off used batteries to be recycled. Bunnings recycling units can accept household single use and rechargeable batteries, such as AA, AAA, C, D, 9V, 6V, power tool batteries, button cell batteries, other handheld sized batteries that fit into the collection unit slot. However, lead-acid batteries, car batteries, or products with embedded batteries are not accepted. Bunnings require battery terminals to be taped before they are dropped into the unit, and provide simple guidance to customers on the best way to do this (Bunnings, 2022).

**Figure 26:** Bunnings battery recycling unit and guidance for taping batteries



Source: Bunnings

## Battery stewardship

Australia's official battery stewardship scheme – B-cycle, commenced in January 2022. The scheme is authorised by the Australian Competition and Consumer Commission (ACCC), endorsed and supported by all Australian Governments, and administered by the Battery Stewardship Council. Through a levy on all batteries imported into Australia, the scheme provides rebates for parties involved in the collection, sorting and disposal of batteries. Both loose batteries imported without a product, and proprietary batteries imported with a product that can be removed by the consumer are eligible. However, batteries that currently have a viable recycling market such as lead-acid batteries, or that are covered by alternative product stewardship scheme such as laptop batteries covered by the National Television and Computer Recycling Scheme (NTCRS), are not eligible. Batteries imported within a product that cannot be easily removed by a consumer e.g. smart watch, wireless speakers or headphones, electric shavers, are not yet included in the scheme, and action by industry is required to determine which product stewardship scheme is the most appropriate to handle these products (Battery Stewardship Council, 2021). Thus batteries that can be removed from vaping devices are eligible, and can currently be taken to any B-cycle collection point for recycling. However, batteries that are embedded in vaping devices are not yet included in the scheme, and advocacy is needed to ensure these types of batteries and their units are included in either B-Cycle or the NTCRS.

## Battery processing

A primary objective of B-cycle is to build battery collection and recycling capability and capacity within Australia. Currently there are two processors – Envirostream (Melbourne, Victoria), and Ecocycle (St Marys, NSW). Both use a similar range of separation, metallurgical and chemical processes to sort batteries and convert them into commodities or other products, recovering around 95% of the materials in a spent battery. Metal casings can be used by foundries to produce a wide range of metal products; precious metals are used as inputs to new batteries and electronic components; zinc and manganese can be extracted for use as ingredients in fertiliser; and zinc oxide can be used in products such as paint, tyres, and medical creams. The active components of lithium-ion batteries, including graphite, cobalt, nickel and lithium are used to produce 'mixed metal dust' – a valuable commodity used in the manufacture of cathode materials for new lithium-ion batteries (Envirostream, 2022).



Figure 27: Battery processing



Source: Envirostream

### 6.2.3 Hazardous waste

Parts of vaping devices that come into contact with e-liquid, and thus potentially with nicotine-containing substances, include tanks, cartridges and pods, coils and wicks, and e-liquid bottles. Without emptying and cleaning, these components could potentially contain residual amounts, or in the case of tanks and bottles, substantial amounts of e-liquid, and as a result need to be considered as toxic substances.

#### Collection

As mentioned, the NSW EPAs CleanOut program holds events across the state specifically designed to safely collect and dispose of a wide range of household problem wastes including toxic substances such as pesticides and poisons. This program is funded by the EPA, hosted by local councils, and delivered by a contractor – currently Cleanaway.

The Return Unwanted Medicines (or RUM) project is a national not-for-profit company funded by the Australian Government that provides consumers with a free and convenient way to dispose of expired and unwanted medicines. Anyone can return household medicines to any community pharmacy at any time, for safe collection and disposal by high temperature incineration. All prescription medicines can be returned. As nicotine-containing vaping products are now only available by prescription in Australia, it appears that vaping device components containing nicotine substances should be accepted by RUM.

In Queensland, electronic cigarettes or electronic cigarette products containing nicotine can be safely disposed of at a community pharmacy or a local public health unit (Queensland Health, 2021).

#### Toxic substance processing

Although tanks, cartridges, pods, and e-liquid bottles explicitly known to have held nicotine containing substance can be classed as prescription medicines that can be returned via RUM, the uncertainty surrounding the actual contents of e-liquids labelled as containing zero nicotine means there is the possibility these components may contain traces of nicotine-containing substances. As a result, as mentioned, these should be treated as toxic liquids.

There are established processes and technologies used for these types of substances, which comprise sorting, shredding, washing, recovery and recycling or disposal of the packaging material (metal, glass or plastic), and use of the recovered liquids as an alternative fuel. Cleanaway, the current contractor for the CleanOut program, operates a unit called HazPak II at St Marys in NSW that shreds liquid-containing packages. Cleanaway also operates HazPak I, a similar unit that crushes rather than shredding packages, that is located in Laverton, Victoria. Liquid generated by the de-packaging process is used as an alternative fuel for either high temperature incineration or for cement kilns. Geocycle, a subsidiary of Cement Australia located in Dandenong, Victoria, accepts and blends the liquids into a form suitable for cement kiln use. Geocycle also operates a de-packaging unit.

**Figure 28:** Cleanaway HazPak II located at St Marys, NSW



Source: Cleanaway

**Figure 29:** Geocycle de-packaging unit and blended fuel storage tanks



Source: Geocycle

## 6.2.4 E-waste

### Collection

The battery unit, sensors and controls can be classified as electronic waste (or e-waste) as they contain elements including circuitry and connections designed to carry an electric circuit. These items are not currently covered by the NTCRS, like many other electrical and electronic items as indicated in **Table 10**. However, because of the wide range of items not covered by the NTCRS, many local councils in NSW and other states have established collection points at their waste facilities or hold events that collect all types of electrical and electronic items, and fund the recycling or safe disposal of those items not covered by the NTCRS themselves. For example, the City of Sydney specifically mentions that household and personal items including vapes are accepted by their booked pick-up service or at their quarterly recycling events (City of Sydney, 2022).

**Table 10:** Items accepted and not accepted by the NTCRS

E-waste accepted under the NTCRS	E-waste not accepted under the NTCRS
Televisions – any type and of any age	Mobile Phones
Desktop Computers	Fixed-Line Telephone Handsets and Base Stations
Laptops	Batteries
Notebooks and Tablets	DVD Players or Recorders (Except For Computer DVD Drives)
Computer Monitors	Radios
TV and Computer-Related Cables and Power Adapters	Stereo Systems
Remote Controls	Cassette Players
Peripherals, such as	CD Players (Except For Computer CD Drives)
<ul style="list-style-type: none"> <li>• Mice</li> <li>• Keyboards</li> <li>• Webcams</li> <li>• Tablets</li> <li>• Joysticks</li> </ul>	Dedicated Game Consoles (E.g. Microsoft Xbox, Nintendo Gameboy and Wii, Sony PlayStation)
Other Input Devices	Cameras or Video Cameras (Except Webcams)
USB Hubs	Microphones and Headphones Not Designed for PCs
Printers of Any Kind	Calculators and Adding Machines
Scanners	Stand-Alone Fax Machines
Multifunction Devices (e.g. All-In-One Printer/Fax/Scanner)	Alarm Clocks
PC Sound Systems	Lamps or Lighting Systems
PC Speakers	Power Tools
PC Microphones and Headsets	Microwaves
Computer Components, Such As	Refrigerators
CPUs	Electric Kettles
Hard Drives (Internal or External)	Ovens or Hobs
Floppy Disk Drives	
Motherboards	
Video, Game and Soundcards	
Power Supplies	
Monitors	
DVD and CD Drives	

Vapes are not generally mentioned by other agencies involved in facilitating the collection and recycling of e-waste. Neither the City of Melbourne nor Sustainability Victoria refer to vaping devices in describing their services for either e-waste collection, or the Detox Your Home household chemical collection program. For ways to recycle e-waste, Sustainability Victoria refers to Planet Ark's Recycling Near You online resource, which does not mention vaping devices in either the entry for Medicines or Electrical items. There is an opportunity to provide better information to consumers on the potential recycling pathways for vaping devices via these resources.

### E-waste processing

There are many organisations collecting and processing e-waste in Australia. Products are dismantled, shredded, and sorted into various parts and materials including glass, metals, plastics, batteries, printed circuit boards, and ink cartridges and toners. Some processes, such as Scipher's BluBox are integrated closed systems that can effectively process a range of items including flat screen TVs, smart phones, computers and light globes, achieving a recovery rate of greater than 95% (Scipher, 2022). The parts and materials generated by these initial processes are then used as raw materials for other items. There is currently infrastructure and end-markets in Australia for glass, ink and toner cartridges, batteries, and some metals, but many plastics, some metals, and computer parts such as printed circuit boards must be sent overseas for further processing and recycling (TechCollect, 2022).

**Figure 30:** Scipher's BluBox, Dandenong, Victoria



Source: Scipher

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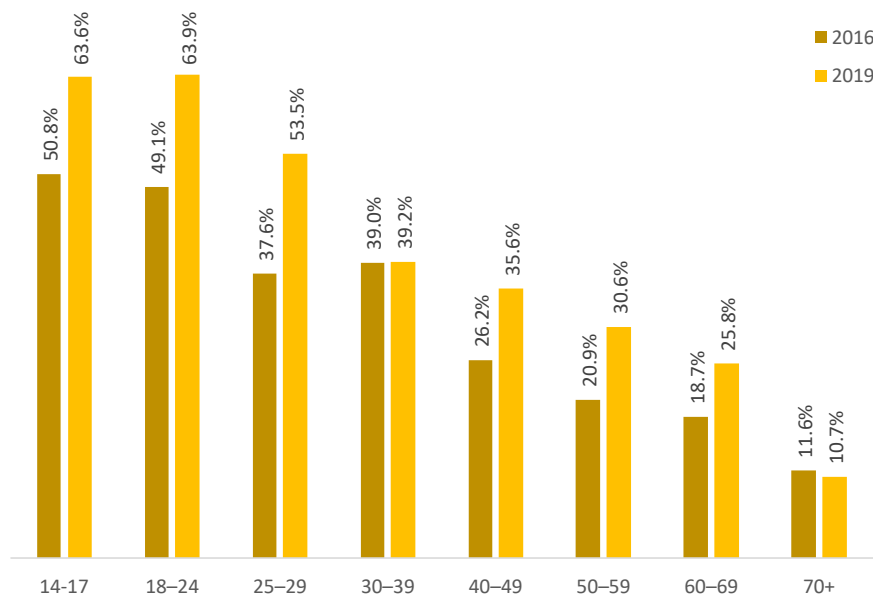
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## Appendix 1 – Supplementary data on use and markets

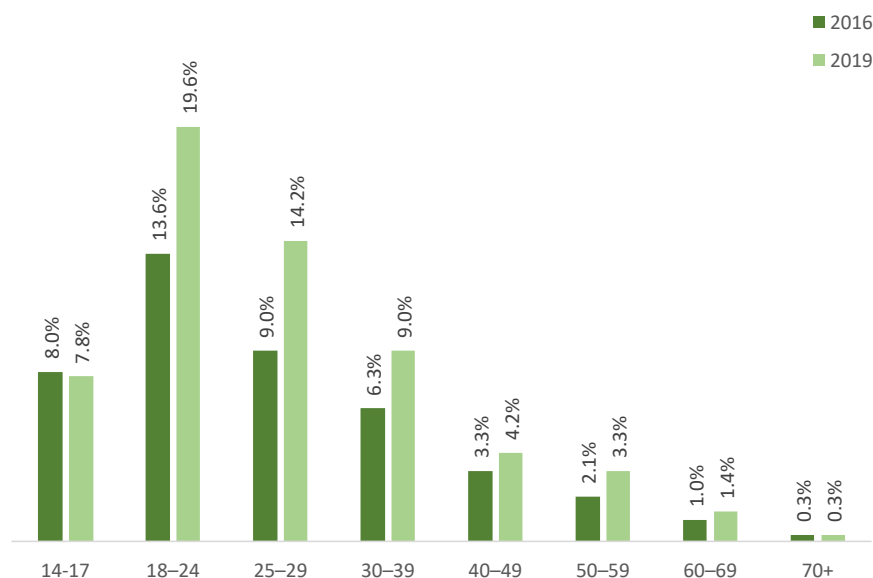
### Use of e-cigarettes by smokers and non-smokers

**Figure 31:** Lifetime use of e-cigarettes, proportion of smokers by age group, 2016 to 2019



Source: National Drug Strategy Household Survey 2019

**Figure 32:** Lifetime use of e-cigarettes, proportion of non-smokers by age group, 2016 to 2019

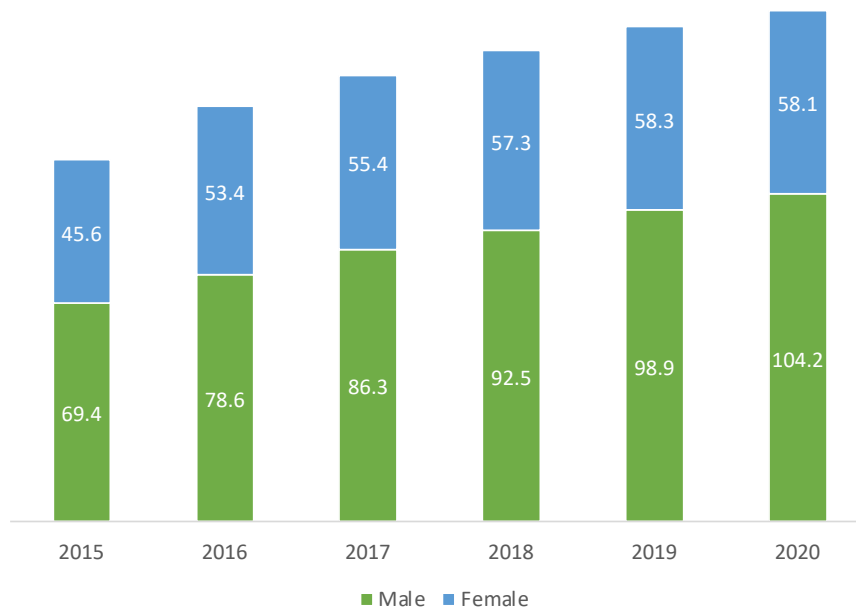


Source: National Drug Strategy Household Survey 2019

### Number of adults using e-vapour products

Between 2015 and 2020, the number of adults using e-vapour products in Australia increased from 115,100 to 162,200 (Euromonitor International, 2020). Year on year growth in the number of adults using vaping devices is slowing, however, down from 13.3% between 2015 to 2016 to just 3.2% between 2019 and 2020. The number of female users decreased between 2019 to 2020, but the number of males continued to increase. By 2020, nearly two thirds (64%) of adult vapers were male, up from 60% in 2015.

**Figure 33:** Number of adults using e-vapour products 2015 to 2020 (thousands)



Source: Euromonitor

## Appendix 2 – State and territory legislation

Where	NSW	VIC	QLD	TAS
<b>Sale</b>				
<b>Sale of products without nicotine</b>	Legal but must not make therapeutic claim	Legal but must not make therapeutic claim	Legal but must not make therapeutic claim	Legal but must not make therapeutic claim
<b>Vending machines</b>	Only in areas restricted to 18+ Operated only by staff or token available from staff	Prohibited	Not permitted	Only in areas restricted to 18+ Cannot be operated by member of the public.
<b>Licence required</b>	No Retailers and pharmacies must notify NSW Health	No	No	Yes Sales information must be reported
<b>Other restrictions</b>	Only from a single point of sale in each retail outlet	No sale from display stand, booth, tent, marquee, van or truck, retail outlet at sporting, music or arts related event, or a person. Certified specialist e-cigarette retailing premises will be permitted a limited display of e-cigarettes and e-cigarette accessories such as e-liquids.	No sale from temporary retail store. One point of sale only Kept only on sellers' side of counter Business name cannot contain any reference to price of smoking products including e-cigarettes	Products kept only in store service area.
<b>Display</b>	Products or ads not to be seen by public from inside or outside premises	Products or ads must not be visible from anywhere inside or outside a retail shop Only one plain prescribed A4 sign may be used.	Must be kept out of sight of customers, concealed by opaque covering.	Products must not be displayed. Only prescribed product and price information can be displayed.
<b>Promotion</b>	No free samples, sponsorship or shopper loyalty programs	No free samples, sponsorship or shopper loyalty programs	No free samples, sponsorship or shopper loyalty programs	No free samples, sponsorship or shopper loyalty programs Advertising prohibited
<b>Youth</b>	Sale to minors is an offence Police have powers to seize vaping devices from under 18s	Sale to minors is an offence	Sale to minors is an offence No purchase for minors Authorised persons have power to seize vaping devices from under 18s	Sale to minors is an offence No purchase for minors Nominated officer has power to seize vaping devices from under 18s
<b>Use</b>				
<b>Public places</b>	Not allowed in indoor or outdoor smoke free areas or on public transport No smoking signs apply to e-cigarettes	Not allowed in in indoor or outdoor smoke free areas or on public transport	Not allowed in in indoor or outdoor smoke free areas	Not allowed in in indoor or outdoor smoke free areas
<b>Cars</b>	No use in cars with children under 16	No use in cars with children under 18	No use in cars with children under 16	No use in cars with children under 18



Where	SA	WA	NT	ACT
<b>Sale</b>				
<b>Sale of products without nicotine</b>	Sale of products that resemble cigarettes is illegal but unenforced. Sale of other vaping products legal.	Not permitted	Permitted	Legal but must not make therapeutic claim
<b>Vending machines</b>	Not permitted	Not permitted	-	Not permitted
<b>Licence required</b>	Retail Tobacco and E-cigarette Merchant's Licence	No	Tobacco Retail Licence	Tobacco Licence
<b>Other restrictions on sale</b>	No internet sales No sales from temporary outlets or sales trays.	-	-	Cannot be displayed in a retail outlet. Cannot be sold from more than one point of sale
<b>Display</b>	Cannot be displayed, advertised or promoted	No restrictions, vaping devices cannot be sold.	May not be displayed, as per tobacco products	Cannot be displayed, advertised or promoted in retail outlets
<b>Promotion</b>	No free samples, prizes, gifts or other benefits through sponsorship, competitions and rewards	No restrictions, vaping devices cannot be sold.	May not be advertised as for tobacco products	May not be advertised, or promoted at the point of sale.
<b>Youth</b>	Sale to minors is an offence	No restrictions	Sale to minors is illegal Purchase for minors is an offence.	Sale to minors is an offence
<b>Use</b>				
<b>Public places</b>	Not allowed in smoke free areas	Can be used in smoke free areas. Individual establishments may make their own rules regarding use.	Can be used in smoke free areas. Individual establishments may make their own rules regarding use.	Not allowed in indoor or outdoor smoke free areas Individual establishments may make their own rules regarding use including bans.
<b>Cars</b>	No use in cars with children under 16	No restrictions	No use in cars with children under 16	No use in cars with children

Where	NSW	VIC	QLD	TAS
<b>Legislation</b>				
<b>Non-nicotine vaping products</b>	Public Health Tobacco Act 2008 Public Health (Tobacco) Regulation 2016 Smoke-free Environment Act 2000 (NSW) Smoke-free Environment Amendment Act 2018 Passenger Transport (General) Regulation 2017	Tobacco Act 1987	Tobacco and Other Smoking Products Act 1998	Tobacco Control Laws Public Health Act 1997
<b>Nicotine vaping products</b>	Poisons and Therapeutic goods Act 1996 No. 31 Poisons and Therapeutic Goods Regulation 2008	Drugs, Poisons and Controlled Substances Act 1981 Drugs, Poisons and Controlled Substances Regulations 2017	Medicines and Poisons Act 2019 (MPA) Therapeutic Goods Act 2019 (TG Act (Qld)) Medicines and Poisons (Medicines) Regulation 2021 Medicines and Poisons (Poisons and Prohibited Substances) Regulation 2021	Tasmanian Poisons Act 1971 Poisons Regulations 2018

Where	SA	WA	NT	ACT
<b>Legislation</b>				
<b>Non-nicotine vaping products</b>	Tobacco and E-Cigarette Products Act 1997 Tobacco and E-Cigarette Products Regulations Act 2019 Tobacco and E-Cigarette Products (E-Cigarette Liquid) Variation Regulations 2021	Tobacco Products Control Act 2006	Tobacco Control Act 2002 Medicines, Poisons and Therapeutic Goods Act 2012 Tobacco Control Regulations 2002	Smoke-free Public Places Act 2003 Tobacco and Other Smoking Products Act 1927
<b>Nicotine vaping products</b>	Controlled Substances Act 1984 Controlled Substances (Poisons) Regulations 2011	Medicines and Poisons Act 2014 Medicines and Poisons Regulations 2016,	Medicines, Poisons and Therapeutic Goods Act 2012	Medicines, Poisons and Therapeutic Goods Act 2008.