Managing e-waste in Victoria

Starting the conversation

VICTORIA State Government
Environment, Land, Water and Planning

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Ministerial foreword

In our generation we've been lucky to witness new, exciting innovations in manufacturing processes, food products and consumer technology. As a community we have enjoyed and benefitted from these improved products and the greater efficiencies that they bring.

However new products and technology also create new and often complex waste streams that continue to add to our landfill space.

E-waste, which includes televisions, computers and white-goods, is growing three times faster than general municipal waste in Australia, and a continued increase in e-waste volume will increase pressure on our waste management infrastructure and the environment.

The Andrews Government has committed to banning e-waste from landfill in Victoria, to reduce waste going into landfill, increase recovery of valuable resources, and to support jobs and investment in the recycling industry.

E-waste in the wrong hands or in the wrong place can present risks to our environment and community. But managed appropriately, it presents opportunities. Recovery of the valuable components of e-waste will lead to more jobs and more non-renewable resources available for our future generations.

In partnership with the Environment Protection Authority, Sustainability Victoria and the Victorian waste and resource recovery groups, the Department of Environment, Land, Water and Planning is gathering information to help design and implement an e-waste landfill ban.

The Andrews Government welcomes and values the views of all Victorians. Whether you are a consumer of electrical products, an employee of the recycling industry, a local government partner, or indeed an investor seeking new opportunities, I encourage you to have your say about how we manage e-waste in Victoria.

Hon Lisa Neville MP

Minister for Environment, Climate Change and Water

1 Background

Electronic waste, or 'e-waste', covers a range of items we all use and discard at work and at home. It includes televisions, computers, mobile phones, kitchen appliances and white goods, to name just a few. These items can contain both hazardous and valuable materials that can be recovered when they reach the end of their working life.

E-waste is growing up to three times faster than general municipal waste in Australia.[1] It is estimated that just for televisions and computers the amount of e-waste generated in Australia will grow from around 138,000 tonnes in 2012-13 to 223,000 tonnes in 2023-24, an increase of more than 60 percent. This will increase the pressure on existing waste management infrastructure.

The Victorian Government is committed to banning e-waste from landfill in Victoria. In doing this, the Government sees not only the opportunity to reduce waste to landfill and increase resource recovery, but also to support jobs and investment in the recycling industry.[2] Recovering more resources will reduce our impact on our environment and climate change, create jobs, and bolster our economy.

The Victorian Government's goals for waste and resource recovery are outlined in Victoria's *Statewide Waste and Resource Recovery Infrastructure Plan* (SWRRIP).[3] The SWRRIP provides a long-term vision for Victoria's landfills to only receive and treat waste streams from which all materials that can be viably recovered, have been recovered. The commitment to ban e-waste from landfill supports this vision through stimulating the development of alternatives to landfill.

1.1 Purpose of the discussion paper

The Department of Environment, Land, Water and Planning (the department), in partnership with the Environment Protection Authority, Sustainability Victoria and Victoria's waste and resource recovery groups, is in the process of gathering information to inform the design of an approach to banning e-waste from landfill in Victoria. We want to hear your thoughts and learn from your experiences on a range of topics relating to e-waste. These topics include the problems with e-waste, information about the recycling industry and its future role in e-waste recovery, and barriers to recycling e-waste today.

The topics are addressed in the sections below, followed by some questions in the shaded boxes. These questions are to help you form your response, but you are invited to provide information on other issues related to e-waste.

As a member of the Victorian community, you may like to describe your experiences of how you manage used or malfunctioning electronic goods in your home. If you are an e-waste recycler, you may be keen to provide input on the issues with today's resource recovery market, or highlight the existence of successful technology that has not yet reached Australian shores. Or as a representative of a local council, you may like to offer an insight into expectations your community has on waste services, or advice on how your region might be best supported to adapt to an e-waste ban.

Regardless of your involvement with e-waste, we believe you have valuable input that will help inform how we develop Victoria's approach to managing e-waste.

1 *Australian Bureau of Statistics (2006) Environment Snapshot: recycling up, but e-waste a looming issue* accessed via http://www.abs.gov.au/ausstats/abs@.nsf/mediareleasesbytitle/FB2F33C170E4987DCA2572210077D0FA

2 Victorian Labor (2014) *Our Environment, Our Future* accessed via http://www.danielandrews.com.au/wp-content/uploads/2014/11/Our-Environment-Our-Future.pdf

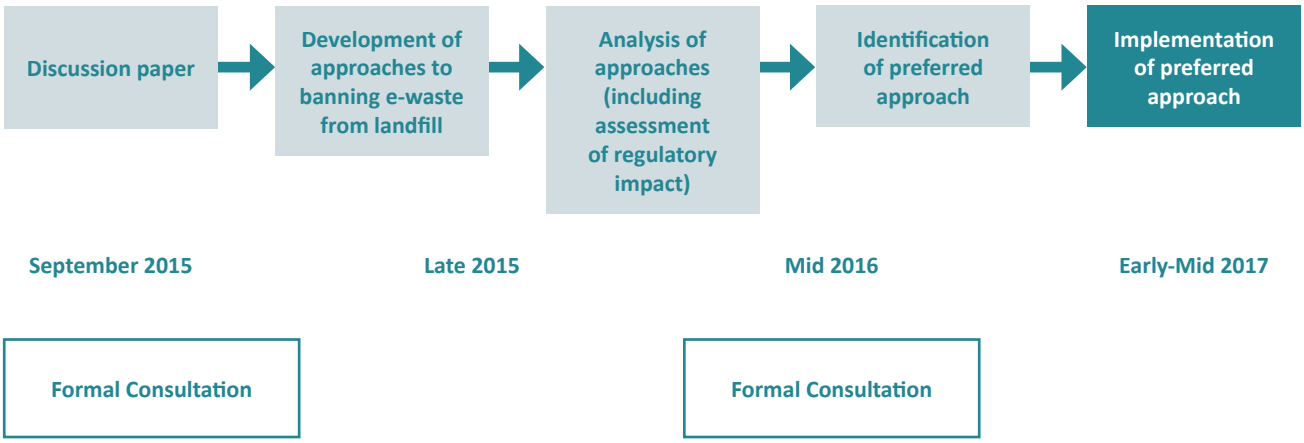
3 Sustainability Victoria (2015) *Statewide Waste and Resource Recovery Infrastructure Plan* accessed via http://www.sustainability.vic.gov.au/our-priorities/waste-and-resource-recovery/2015-2020-priorities/statewide-waste-and-resource-recovery-infrastructure-plan

1.2 Opportunities to participate

This discussion paper is the first opportunity for all Victorians to participate in the development of approaches for meeting the Government's commitment to ban e-waste from landfill. We'll use your feedback received during this first stage to inform the design of approaches (both regulatory and non-regulatory) to banning e-waste from landfill. This first consultation period will be open for six weeks (see section 8 for details on feedback process and dates).

The second stage will involve the assessment of the approaches to banning e-waste from landfill for possible regulatory impacts to Victoria's environment, community and industry. This assessment will result in the release of a regulatory impact statement in mid-2016. The regulatory impact statement will outline preferred approaches and the outcomes of the assessment, along with any draft legislation. You will have another opportunity to provide input during this stage. Figure 1 illustrates the broad process.

Figure 1: Process for designing and implementing the e-waste landfill ban



2 Introduction to e-waste

2.1 What is e-waste?

'Electronic waste', 'waste electrical and electronic equipment' and 'e-waste' are terms used to describe the waste created when we throw out our electronic equipment. Victoria considers any items captured by the following definition to be e-waste:

> *Electrical or electronic equipment with a power cord or battery and its parts that have been discarded by the owner as waste without the intention of re-use.*

This definition captures hundreds of different types of products that become e-waste when discarded. To inform how e-waste is managed, other parts of the world have categorised e-waste based on a range of characteristics, including size, recovery value, hazardous nature and processing technology. We're proposing to use similar categories to those defined in the European Union's Waste Electrical and Electronic Equipment Directive[4] to separate out the different types of e-waste. These are shown in figure 2. Examples of items in each of the categories are provided.

Figure 2 - Main categories of e-waste, as proposed by the department

Large appliances	Small appliances	IT, telecommunications and TV equipment	Lighting equipment
• refrigerators • washing machines • cookers • microwaves • electric fans • air conditioners	• irons • toasters • coffee machines • hair dryer • watches	• computers • laptops • printers • mobile phones • televisions • remotes	• fluorescent lamps • high intensity discharge lamps • compact fluorescent lamps • LEDs

Electrical and electronic tools	Toys, leisure and sports equipment	Other e-waste
• drills • saws • sewing machines • lawn mowers	• electric trains and racing cars • hand-held video game consoles • amplifiers • musical instruments • radios	• medical devices • monitoring and control equipment (smoke detector, thermostats) • automatic dispensers • photovoltaic (solar) panels

Tell us more

Q 1: Is the proposed definition of e-waste clear to you?

Q 2: Are the proposed categories of e-waste clear to you? If not, can you suggest any specific changes to the existing categories, or another method of categorisation?

4 Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE) (2012)

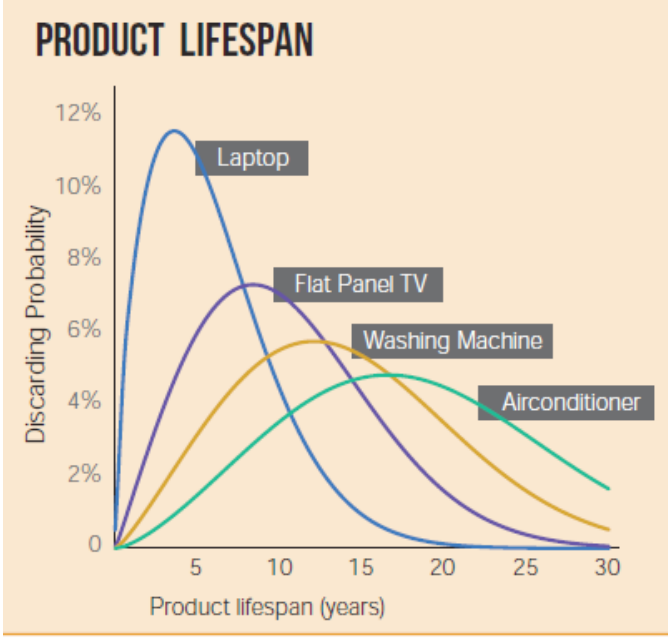
2.2 E-waste in Australia

Australians are high users of technology,[5,6] and also among the largest generators of e-waste in the world. In 2007-08, 106,000 tonnes of televisions, computers and computer products reached end of life in Australia.[7] In 2013-14, this volume reached 131,600 tonnes.[8] Reliable information on other types of e-waste in Australia is more difficult to find, however, information gathered from similar countries indicates these types are also increasing in volume.

Some of the reasons for the increase in e-waste in general are discussed below.

- **Rapid innovation** in both existing and new electronics can create a perceived need or desire in consumers to update and upgrade to a product that may be more efficient, more attractive or more durable than their current model. Consumers are therefore discarding their electronic products at a faster rate to ensure they have the 'latest' product.
- **A decrease in built-in lifespan of electronic products,** as illustrated in figure 3, results in products (or their parts) failing to function over shorter and shorter periods. Consumers tend to purchase replacements rather than repair their existing product. This in turn ensures more rapid turn-over for manufacturers, and subsequently the generation of greater volumes of e-waste.
- **A declining price of electronics** means products are becoming accessible to more people, which increases the number of items that will ultimately be discarded. It also prompts consumers to purchase new products rather than replace their existing product. [9]
- **More complex product design** makes repair and recovery more difficult, and therefore more expensive. Combined with a declining price of new electronics, consumers will more likely decide that replacing their malfunctioning product will be cheaper than repairing their existing product.

Figure 3: Lifespan of a range of electronic products[10]



5 Financial Review (2015) *Harvey Norman retail is the best way to ride Australia's housing boom*, accessed via http://www.afr.com/business retail/appliances/harvey-norman-retail-is-the-best-way-to-ride-australias-housing-boom-claims-ubs-20150408-1mggo4

6 Australian Bureau of Statistics (2013) *Electronic and electrical waste* accessed via http://www.abs.gov.au/ausstats/abs@.nsf/Latestproducts/4602.0.55.005Main%20Features52013?opendocument&tabname=Summary&prodno=4602.0.55.005&issue=2013&num=&view

7 PriceWaterhouse Coopers, report prepared for the Environment Protection and Heritage Council (2009) *Decision Regulatory Impact Statement: Televisions and Computers*, accessed via http://www.scew.gov.au/system/files/resources/0c513e54-d968-ac04-758b-3b7613af0d07/files/ps-tv-comp-decision-ris-televisions-and-computers-200911-0.pdf

8 Department of the Environment (2015) *National Television and Computer Recycling Scheme: Enhancements Arising from the Operational Review - Regulation Impact Statement*, provided directly by the Department of the Environment

9 IBIS World (2015) *Electronic & Computer Repair Services in the US: Market Research Report*, accessed via http://www.ibisworld.com/industry/default.aspx?indid=1702

10 Baldé, C.P., Wang, F., Kuehr, R., Huisman, J. (2015) *The global e-waste monitor* – 2014, United Nations University, IAS – SCYCLE, Bonn, Germany accessed via http://i.unu.edu/media/ias.unu.edu-en/news/7916/Global-E-waste-Monitor-2014-small.pdf

3 What are we already doing to manage e-waste?

E-waste recycling has increased over the last decade in Australia. The number of organisations involved in the recovery of e-waste has almost doubled,[11] and the range of programs and policies that support the collection and recycling of e-waste has increased. However, in 2014 less than 10% of the e-waste generated in Australia was collected and recycled through 'official' channels (channels operated by government, large retailers and commercial services).[12]

Currently, recycling of e-waste in Victoria is centred on televisions and computers. Victoria's free computer recycling program, *Byteback*, commenced in 2007 and was one of the first of its kind in Australia.[13] It resulted in the collection and processing of more than 3,750 tonnes of computer waste and supported the design of the Commonwealth's *National Television and Computer Recycling Scheme* (the National Scheme) (see text box for more information). The National Scheme is now the key driver of e-waste recycling in Australia. Since it started, recycling of televisions and computers by households has more than doubled across Australia.[14]

National Television and Computer Recycling Scheme

Commencing in 2012, the National Scheme was developed by the Australian Government to increase the rate of recycling of televisions, computers and computer products (such as keyboards, mice and hard drives) in Australia. It requires television and computer industries to pay for the collection and recycling of a percentage of these items each year. In 2015-16, this percentage is set at 37%. By 2025-26 it will increase to 80%.

The National Scheme is regulated by the Australian Government, under the *Product Stewardship Act 2011* and the *Product Stewardship (Televisions and Computers) Regulations 2011.* As state, territory and local governments continue to play a key role in the management of all other types of e-waste (and waste more broadly), it will be important to ensure that Victoria's approach to e-waste will complement the National Scheme and its legislative underpinning.

11 Flinch (2015) *IBIS World Industry Report OD5420 E-Waste Collection and Processing in Australia*

12 United Nations University (2014) *The global e-waste monitor report 2014: Quantities, flows and resources*, accessed via http://i.unu.edu/media/unu.edu/news/52624/UNU-1stGlobal-E-Waste-Monitor-2014-small.pdf

13 CRN (2007) *AIIA toasts Byteback program launch* accessed via http://www.crn.com.au/(S(tgobyy55fuhxqpvfjefki445))/News/91542,aiia-toasts-byteback-program-launch.aspx

14 Economist Intelligence Unit for ANZRP (2015) *Global e-waste systems: Insights for Australia from other developed countries*, accessed via http://anzrp.com.au/wp-content/uploads/2015/02/Global-e-waste-systems-A-Report-for-ANZRP-by-EIU-FINAL-WEB.pdf

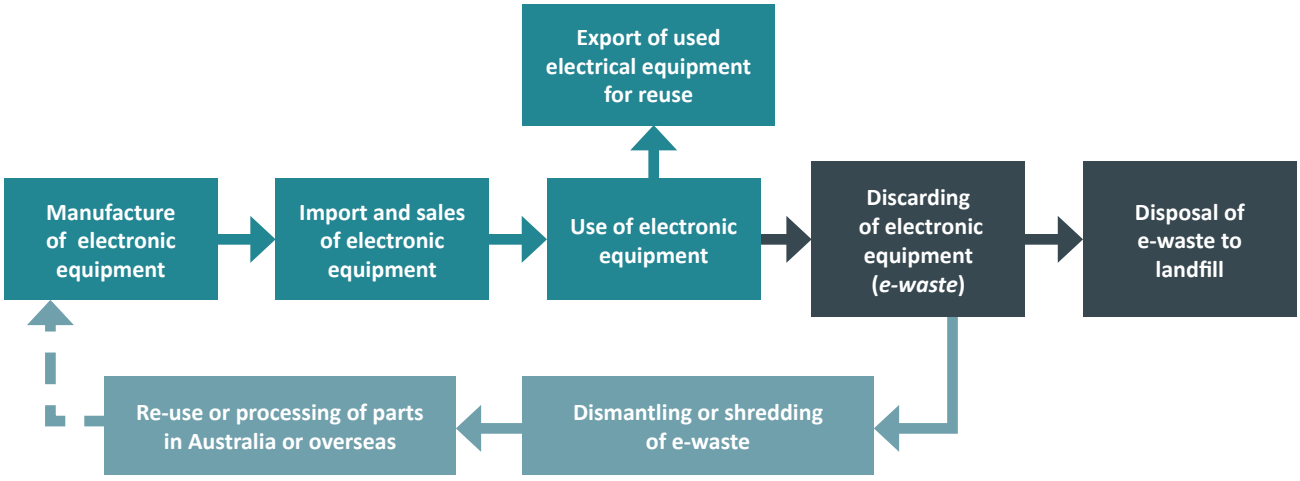
At a state level, South Australia implemented a staged e-waste landfill ban, which began in September 2011. In the first stage, white goods were banned from landfill. Computers, televisions and fluorescent lighting followed a year later, and in the third year, all remaining e-waste was banned. Victoria can apply the experiences and learnings of South Australia, as well as those of other national and international jurisdictions, in determining how we'll approach the landfill ban on e-waste.

Other nation-wide schemes that focus on preventing e-waste from ending up in landfill include:

- **Mobilemuster**, a mobile phone recycling program, is a not-for-profit program voluntarily funded by mobile phone industry groups. After 16 years of operation it has collected 8.8 million handsets.[15]
- **Cartridges 4 Planet Ark**, a printer cartridge recycling program that has collected 27 million printer cartridges over its 12 years of operation.[16]
- **Australian Battery Recycling Initiative**, a not-for-profit association that links individual local and state battery collection and recycling programs, including Victoria's *Batteryback* ™program.[17]

Figure 4 represents how e-waste is generally managed in Victoria. We have some good information on the flow of e-waste through official channels, including consumer studies that help to understand how Australia manages its e-waste.[18] However, information on e-waste recycled outside of official channels, (such as private companies) and being disposed to landfill, is limited. To complement the information gathered through your participation in this discussion paper, we'll be undertaking more research on flow of e-waste in Victoria.

Figure 4 - Current management of e-waste in Victoria



15 Mobile Muster, accessed via http://www.mobilemuster.com.au/about-us/fast-facts/
16 Cartridges 4 Planet Ark, accessed via http://cartridges.planetark.org/about/
17 Sustainability Victoria, *Batteries* accessed via http://www.sustainability.vic.gov.au/services-and-advice/households/waste-and-recycling/batteries
18 Mostafa Sabbaghi, Behzad Esmaeilian, Ardeshir Raihanian Mashhadi, Sara Behdad, Willie Cade (2015), *An investigation of used electronics return flows: A data-driven approach to capture and predict consumers storage and utilization behavior*, accessed via http://www.sciencedirect.com/science/article/pii/S0956053X14005741

4 What are the problems with e-waste in Victoria?

So what are the problems associated with e-waste in Victoria? E-waste contains both hazardous materials, which can create environmental and human health issues, and valuable materials, the availability of which continue to decline globally. To help us adhere to the principles outlined in section 6.3, including environmental justice, we need to understand these problems. Table 1 briefly describes the key problem areas.

Table 1 - Problems with e-waste in Victoria

Theme	Problem
Environment and human harm	Many electronic products contain hazardous materials[19] such as lead, mercury, arsenic, phosphor, fluids and refrigerants. Left in landfills, (particularly those that do not meet modern standards), or stored inappropriately, these materials can leach into groundwater and soil[20,21] or release into the air, creating long term contamination issues and human health issues.
	The hazardous materials outlined above can pose a health and safety risk to workers in the landfill and recycling industry. These materials can be made more available to human ingestion during the recycling process as well as during disposal to landfill. For example, cathode ray tubes (CRTs) from old televisions can release lead into the air once dismantled. (*See text box for background on CRTs*.)
	The mining, processing and transportation of raw materials used to create electronic products (such as gold, silver and copper, and extract oil for plastic manufacture), generate greenhouse gas emissions.[22]
Resource depletion	A range of non-renewable materials, such as copper, silver, gold, plastic and glass are used in the production of electronic and electrical goods. In most cases, these valuable materials are lost to recovery and future reuse once in landfill. At today's rate of consumption, many of these resources have limited reserves.[23] In some cases, the amount of certain precious metals held in e-waste now outstrip the amount of virgin material available.[24]

19 Health and Safety Executive webpage -*Waste Electrical and Electronic Equipment recycling (WEEE)*, accessed via http://www.hse.gov.uk/waste/waste-electrical.htm

20 Kahhat, R (2012) *Electronic Waste, Environment and Society* in Hieronymi et al (eds) *E-waste Management, From Waste to Resource*, Earthscan, Oxon, UK, pp. 5-23

21 Huisman, J. (2013) *Too Big to Fail, Too Academic to Function: Producer Responsibility in the Global Financial and E-waste Crises* accessed via http://onlinelibrary.wiley.com/doi/10.1111/jiec.12012/pdf

22 Menikpura, S.N.M., Santo, A. and Hotta, Y. (2014) *Assessing the climate co-benefits from Waste Electrical and Electronic Equipment (WEEE) recycling in Japan, Journal of Cleaner Production*, 74, pp183-190 accessed via http://www.sciencedirect.com/science/article/pii/S0959652614002613

23 Whitla, O., Kuehr, R., Wager, P. for Solving the E-waste Problem (2013) *International policy response towards potential supply and demand distortions of scarce metals* accessed via http://www.step-initiative.org/files/step/_documents/StEP_GP_Resource%20scarcity.pdf

24 Green Futures Magazine (2013) *Precious metals needn't go to waste* accessed via http://www.forumforthefuture.org/greenfutures/articles/precious-metals-needn%E2%80%99t-go-waste

Despite these problems, our understanding is that Victoria's e-waste recycling industry is currently limited by a lack of viability. Table 2 describes how.

Table 2 –Viability issues with e-waste recycling

Issue	Description
Cost of recycling	In Victoria, the cost of recycling most types of e-waste can be greater than the revenues generated from the recovered materials, often making disposal to landfill a cheaper option for managing e-waste. For instance, recycling televisions and computers costs between $500 and $1000 a tonne.[25] This comprises costs for: • collection and storage infrastructure • transportation in appropriate vehicles, with specific standards • dismantling (mostly manual) • management and disposal of residual waste (higher costs for hazardous materials) Conversely, sending e-waste to landfill costs between $150 and $250 a tonne.
Lack of 'pull market'	The costs of many raw materials are lower than their recovered counterparts, as the environmental costs associated with extraction of the raw materials is not always factored in. As such, it is generally cheaper to use raw materials to manufacture electronic products than to recover materials from e-waste and use them in the manufacture. The market price of these recovered materials therefore does not cover the costs of the recovery process. Nor does it cover the costs required to support or subsidise collection services.
Instability in e-waste volumes	Lack of sufficient and consistent volumes of e-waste available for recycling has created uncertainty for the industry,[26] resulting in a reluctance to invest in e-waste recycling, a lag in implementation of new and improved processing technologies, and an insecure environment for jobs in e-waste recovery.
Illegal dumping and export of e-waste	These cheaper pathways for e-waste undermine the financial viability of the e-waste recycling industry. Illegal dumping also creates additional burden on community as costs for clean-up and disposal of any dumped waste are generally incurred by local government and charitable recycling organisations.

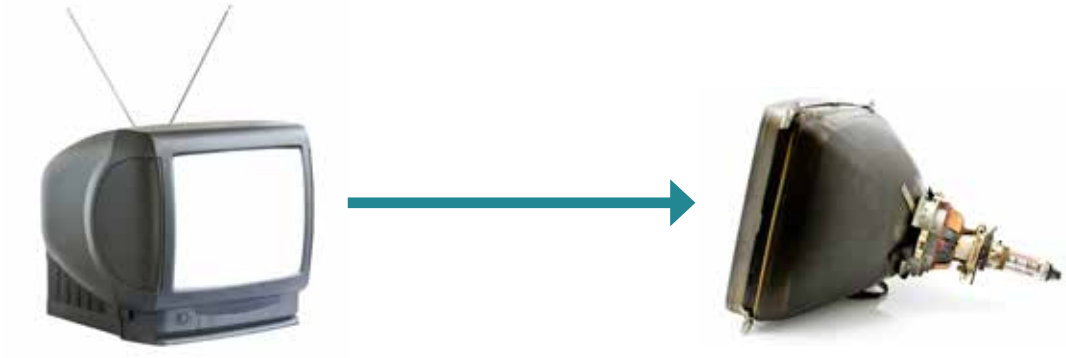
Note that the recovery of metals from some e-waste types such as white goods (e.g. refrigerators, washing machines) is an exception in that it is a viable process in Victoria. However, recovery of its non-metallic components is not viable and tends to be disposed to landfill.

25 This estimate depends on where and what type of processing is occurring.

26 Australian Government (2014) *The National Television and Computer Recycling Scheme – Operational Review* accessed via http://www.environment.gov.au/system/files/pages/1de81785-ce48-4671-8182-9f1d9490b5ce/files/operational-review-national-television-and-computer-recycling-scheme.pdf

Cathode ray tubes (CRT) were used in televisions and computer screens before the introduction of liquid-crystal displays and plasma displays. They are made from glass which as has been impregnated with two to four kilograms of lead. If CRTs are not stored and managed appropriately, lead may be released into the surrounding environment, creating a range of negative impacts to the environment and human health.

CRT television **CRT**



In other Australian states there have been reports of illegal dumping and stockpiles of CRT glass. The limited processing options in Australia for CRT glass have contributed to the problems that recyclers have had in managing this component of e-waste.

Tell us more:

Q 3: What specific issues do you believe we need to address by banning e-waste from landfill?

Q 4: What do you see are current and future impacts of e-waste on the environment or human health? Can you provide examples?

Q 5: What do you see as potential impacts (both positive and negative) from recovering e-waste?

Q 6: Do you believe there are particular reasons for not recovering e-waste?

Q 7: Do you believe there are other issues with the e-waste recycling market, or with specific stages of the e-waste recycling market?

Q 8: Are you aware of other barriers to achieving a sustainable e-waste recycling market?

Q 9: Do you think e-waste and its components are undervalued in Australia?

5 What can we achieve by banning e-waste?

The Victorian Government believes the challenges associated with e-waste also present opportunities. With your participation, the commitment to banning e-waste from landfill will be designed to achieve a range of positive outcomes for the Victorian environment, community and industry. Specifically, through the implementation of the commitment, the Government aims to:

- **Increase community awareness** of e-waste, its impacts, risks and opportunities. A community that understands the value of both the electronic goods they purchase and the impacts of these goods once discarded, will help to sustain a healthy e-waste recovery industry. Studies show that the Australian community is very willing to pay to recycle, and strongly supports the recovery of non-renewable resources.[27] The e-waste commitment should also highlight the benefits of reusing, refurbishing and repairing used electronic goods.
- **Increase recovery of e-waste** by ensuring greater volumes of e-waste are channelled through resource recovery processes. Current practices show that at least 95% of a computer,[28] 75% of a washing machine and 84% of an air conditioner[29] can be recovered. Achieving these levels of recovery more consistently would reduce our reliance on the raw materials, water and energy used to produce electronic goods, and therefore reduce pressure on the Earth's natural resources.[30]
- **Provide certainty for industry** by setting a clear direction for e-waste in Victoria. Permanently diverting e-waste from landfill will ideally create a steadier stream of feedstock, drive lower costs through improved economies of scale, and increase stability in the e-waste recycling sector. This in turn should enable more informed planning and facilitate more opportunities for new ventures and prospective investors.
- **Create more jobs** in the waste and resource recovery sector. Studies show that the resource recovery industry employs 9.2 people for every 10,000 tonnes of waste, compared with 2.8 people per 10,000 tonnes of landfilled waste.[31] The more e-waste available for recycling, the greater the need for employees to service the industry. The commitment will particularly benefit community or social enterprises that play an important role as providers of meaningful employment opportunities for those that face significant barriers to employment.[32,33]
- **Improve recycling technology** by encouraging investment into the trial and introduction of new and improved technology, and into best practice recycling operations. Currently, Victoria's recycling capacity is based on manual processes, however, an increase in availability of e-waste through the government's commitment will likely stimulate innovation in recycling technologies to achieve greater efficiencies. This is demonstrated by the EU's Waste Electrical and Electronic Equipment Directive, which has resulted in significant investment in recycling technology.[34] State of the art facilities are now proving to be robust business investments, and include such innovations as 'Blubox'. (*See text box*.)

27 URS, report prepared for Environment Protection and Heritage Council (2009) *Willingness to pay for e-waste recycling*
28 Robinson (2009) *E-waste: An assessment of global production and environmental impacts*, Science of the Total Environment, 408, pp. 183-191
29 Menikpura, S.N.M., Santo, A. and Hotta, Y. (2014) *Assessing the climate co-benefits from Waste Electrical and Electronic Equipment (WEEE) recycling in Japan*, Journal of Cleaner Production, 74, pp183-190 accessed via http://www.sciencedirect.com/science/article/pii/S0959652614002613
30 BIO Intelligence Service (2006) *Synthesis report*, final version accessed via http://circa.europa.eu/Public/irc/env/weee_2008/library
31 Access Economics prepared for the Department of the Environment, Water, Heritage and the Arts (2009) *Employment in waste management and recycling*
32 Community Recycling Network (2013) *A baseline study of Australia's community recycling enterprises (CRE): Final Report June 2012* accessed via http://www.communityrecycling.com.au/resources/uploadedFiles/1340002419239-5594.pdf
33 Commission Staff Working Paper accompanying the Proposal for a Directive of the European Parliament and of the Council on waste electrical and electronic equipment (WEEE) (recast) Impact Assessment Commission of the European Communities (2008). via http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52008SC2933&from=EN
34 Ibid

BLUBOX: processing lamps and flat screen televisions

After over 20,000 hours of research and development,[35] Switzerland's BluBox Trading has developed BluBox™, a fully automated system that processes *flat panel displays and lamps containing mercury*. The system allows e-waste streams to be processed without exposing staff to the hazardous components. It is used extensively throughout Europe, United States and Asia, and will soon be operating in Australia. With support from the Victorian Government, PGM Refiners Pty Ltd will be operating the first BluBox™ later in 2015.[36]

The types of outcomes a landfill ban along with other (complementary) measures can achieve is demonstrated by the State of Oregon in the United States of America. (*See text box.*)

State of Oregon, USA

In 2007, Oregon's *Electronics Recycling Law 2007* established a product stewardship program for e-waste recycling, 'Oregon E-Cycles'. The law requires electronics manufacturers to provide free recycling for computers, monitors and televisions. In 2010, a landfill ban for the same items came into effect. Since operations began in 2009, the combination of the two policies has led to:

- 36% increase in tonnes of e-waste recycling[37]
- reductions in recovery costs through efficiencies in scale
- an additional 61 jobs created in the refurbishment and recycling of televisions, computers and monitors[38]
- a reduction of 31,000 tonnes of carbon dioxide equivalents[39]

Tell us more:

Q 10: Do you believe that banning e-waste from landfill will achieve these outcomes?

Q 11: Are there other outcomes you believe the commitment should, or is likely to, achieve?

35 http://www.blubox.ch/company

36 Community Sustainability Infrastructure Fund, accessed via http://www.sustainability.vic.gov.au/services-and-advice/funding/recent-allocated-funding/community-sustainability-infrastructure-fund

37 Oregon Department of Environmental Quality (2014) *Oregon E-Cycles Biennial Report – January 2014*, accessed via http://www.deq.state.or.us/lq/pubs/docs/ORECyclesBiennialReportLeg2014.pdf

38 Alcorn Consulting, Eco Stewardship Strategies, PRR and Full Circle Environmental for the King County Solid Waste Division, Washington (2010) *Preliminary Analysis of E-cycle Programs in Washington and Oregon*, accessed via http://www.deq.state.or.us/lq/pubs/docs/oerp/PreliminaryAnalysisECycleProgramsWAORpdf.pdf

39 Oregon Department of Environmental Quality (2014) *Oregon E-Cycles Biennial Report – January 2014*, accessed via http://www.deq.state.or.us/lq/pubs/docs/ORECyclesBiennialReportLeg2014.pdf

6 Designing the approach to e-waste in Victoria

In order to effectively address the problems of e-waste in Victoria, we will need a coordinated approach to create the appropriate regulatory tool/s as well as any appropriate complementary measures. There are a few key elements to banning e-waste that we need to consider.

6.1 Establishing e-waste criteria

As illustrated in figure 2, e-waste covers many types of discarded electronic goods, each defined by a range of characteristics. These characteristics, along with other relevant information, will help us determine the 'what' (the types of e-waste addressed through the ban), the 'how' (the specific measures that need to be developed), the 'when' (the timing of the ban) and the 'who' (the key stakeholders and their roles and responsibilities in the ban).

We're aiming to establish a set of criteria that will be applied to the various e-waste types to help determine the approach that best meets the needs of the Victorian environment, industry and community. Criteria might include (but are not limited to):

- current or future market value of specific components of e-waste
- level of known risk to the environment and human health
- trends already observed overseas
- availability of existing processing technology
- actual or projected volumes

Tell us more:
Q 12: What criteria do you think will be useful to help us determine how the different types of e-waste are managed in Victoria?

6.2 Timing

A well-timed implementation of a landfill ban is crucial to its success. Certain aspects of the approach, such as communication materials, may need to be developed well before the specific regulatory tool/s takes effect. Certain technologies may also need to be established in advance.

It may be that the most appropriate approach is to roll out the ban in stages. As an example, South Australia took three years to fully implement their state-wide e-waste landfill ban. The ban was designed in phases that were based on type of e-waste to be banned, and region in which the ban took effect. As with South Australia, we will need to determine if and how the ban in Victoria should be phased.

Tell us more:
Q 13: Do you think some regions will require more time to prepare for a landfill ban than others?

Q 14: What changes, if any, will need to occur in your region before e-waste can be banned from landfill and managed appropriately?

Q 15: Do you think banning e-waste from landfill in Victoria will need to take a phased approach? If so, what do you think should be key considerations in determining how the phasing occurs?

6.3 Principles to guide the design

In the design of the landfill ban, the Government commits to adhering to some key principles. These principles will ensure the commitment will be fair, reasonable, and aimed at achieving the desired outcomes. They are outlined in table 3.

Table 3 - Principles for designing the landfill ban

Principle	The Government will ensure that…
Environment protection	that greater environmental outcomes are achieved through the recovery of materials and reduction in e-waste going to landfill.
Benefits outweigh the costs	the ban provides a net benefit to the Victorian community and environment, and that the costs and benefits (and who will bear or accrue them respectively) are specified.
Proportionality	the requirements and expected impacts of the ban are proportionate to the problem of e-waste in Victoria.
Adequate timing and lead-in	enough time is allowed for the implementation of the ban and for necessary development of alternatives to landfill.
Minimise regulatory burden	the impact of the ban, particularly on small business, is explicitly considered during the design.
Consult widely	a broad range of stakeholders are consulted before and during the development and implementation of the ban.
Occupational health and safety	issues of occupational health and safety are prioritised in the development of the ban.
Minimise unintended consequences	alternatives to disposing e-waste to landfill are well supported, available and accessible.
Environmental justice	the environmental benefits and impacts will be distributed proportionately (including across rural and regional Victoria), and affected communities will be able to participate in decision-making.
Reflect the wastes hierarchy	the principle of wastes hierarchy is reflected in the design of the ban and complementary measures. Where possible, options will be prioritised in line with the following order of preference: a) Avoidance b) Reuse c) Recycling d) Recovery of energy e) Treatment f) Containment g) Disposal

Tell us more:
Q 16: Do you believe there are other principles that must be considered in the development of Victoria's approach to ban e-waste from landfill?

6.4 Choosing the right tools

The successful implementation of a landfill ban cannot be achieved through regulation alone; there will be a need for a range of tools, both regulatory and non-regulatory, to ensure risks to the environment and human health are identified and mitigated. Table 4 lists a sample of the tools that *may* be used to form an approach to banning e-waste from landfill in Victoria. This list is by no means exhaustive - it serves only to illustrate the breadth of options that we must consider when designing the approach to banning e-waste. The tools we ultimately use will be defined by the specific details and requirements of the ban.

Table 4 - Types of tools and examples that may be used to form an approach to the ban

Type of tool	Examples
Legislation	• Regulation that bans landfills from accepting specific streams of e-waste • Licensing requirements for the processing of e-waste • Amending landfill licences to prohibit the acceptance of specific streams of e-waste • Regulation that bans the hazardous components of e-waste from going to landfill
Technical guidance	• E-waste processing standards • Ensuring occupational health and safety standards are clear for e-waste processors • Expert technical advice
Community education	• Advertising campaign • School education program • Website information • Mobile phone app
Training and capacity building	• Local government training package • Customised training for social enterprises • Guidance on industry compliance requirements
Infrastructure	• Collection infrastructure at transfer stations • Specific regional infrastructure • Residential or commercial collection events
Technology	• Desktop analysis of new and upcoming technologies • Trials of new technologies • Business development assistance

Tell us more:

Q 17: What other tools do you think we will need to consider when designing Victoria's approach to banning e-waste from landfill? Be as specific as you can and consider details such as:

- Types of infrastructure that might be required
- Types of existing technologies available, both in Australia and overseas
- Opportunities for invention and development of new technologies
- Investment required
- Guidance that industry might need or want
- Information that community might need or want
- Level of government support and intervention
- …and any other details that might be useful

Q 18: How do you think community could be supported to ensure e-waste continues to be recovered and recycled?

6.5 Other considerations

Landfill bans and their results can be complex. Careful design will be paramount to avoid unintended consequences. Potential issues that the Government is aware of are discussed below.

- **Illegal dumping and inappropriate storage:** We will need to ensure affordable alternatives to landfill are available and accessible when designing the approach. A lack of these alternatives can lead to waste being disposed of or stored in areas that do not have adequate environmental management systems in place, such as a national park or a private backyard. Responsibility for the clean-up and management of this waste can often fall to local and state governments, and charitable recycling organisations.
- **'Informal' recycling operations:** In the design of the approach, we will need to consider the opportunities small-scale enterprises may see in the landfill ban. Sometimes referred to as 'informal recyclers', these enterprises may undertake recycling activities in their backyard or private factories without obtaining approvals and licences (when required) or appropriate environment and health protection measures. Apart from the risks they present to the environment and community, they can often incur lower operational costs and offer more competitive rates than recyclers required by law to manage their impact to the environment through defined measures.
- **Exporting to countries with lower standards of environmental practices:** As a party to the Basel Convention, Australia agrees not to export hazardous wastes intended for recovery, recycling or final disposal unless it can be shown that the wastes will be managed in an environmentally sound manner in the country of import.[40] This is reinforced in the requirements for the National Scheme. In the design of the approach, the department will need to factor in appropriate monitoring to ensure a new exporting trend does not set in as a result of an e-waste landfill ban.
  We will also need to work with the Commonwealth to monitor the electronic equipment exported for 'reuse'. While lawful export for reuse is a beneficial outcome, 'reuse' is sometimes used falsely to bypass the Basel Convention and export equipment that has a very limited reuse life. This results in the need for management of e-waste in countries that do not have the appropriate recycling or disposal options.

Tell us more:

Q 19: What unintended consequences do you think the landfill ban could cause? Please provide as much detail as possible and refer to any research or case studies that might help to support your feedback

Q 20: How do you think the design of the approach to banning e-waste could be designed to mitigate these unintended consequences?

40 United Nations Environment Programme (1992) Basel Convention on control of transboundary movements of hazardous wastes and their disposal, accessed via http://www.basel.int/Portals/4/Basel%20Convention/docs/text/BaselConventionText-e.pdf

7 What other state and national work do we need to consider?

When developing and implementing the e-waste ban, we also need to be cognisant of a range of other significant and related government processes and reforms, and their potential impacts. In Victoria, these include the inquiry into Victoria's Environment Protection Authority, and the reviews of the *Climate Change Act 2010* and the *Environment Protection (Schedule Premises and Exemption) Regulations 2007.*

In addition, Commonwealth's *Product Stewardship (Televisions and Computers) Regulations 2011*, which support the National Scheme, will be reviewed in 2016. The outcomes of this review will be a key consideration in the design of Victoria's approach to banning e-waste from landfill.

Tell us more:
Q 21: Are you aware of any policy developments or reviews, both interstate and nationally, that may be useful in the design and implementation of the e-waste commitment?

8 So tell us more

This is a great opportunity to tell us what you know about e-waste, including its problems and its opportunities. We are keen to hear what you have to say.

So, **develop your feedback submission**. In your submission, ensure you:

- Are clear and succinct (and legible if you're handwriting) – we want to understand your key points of discussion.
- Clearly annotate sensitive sections – we will not publish sensitive or commercial-in-confidence sections upon request.
- Include your full name and contact details – we may use this information to follow up anything relating to your submission.

Submit your feedback via one of the following methods:

Method	Description
Online questionnaire	Go to www.delwp.vic.gov.au/environment-and-wildlife/e-waste, and complete the online questionnaire. Don't forget to press 'submit' when you're done.
Individual or company feedback document	Prepare your feedback document. Go to www.delwp.vic.gov.au/environment-and-wildlife/e-waste, download and print the submission coversheet. Send your feedback document and submission coversheet: **Email**: wastepolicy@delwp.vic.gov.au **Post**: Waste and Resource Efficiency team Sustainability Policy Department of Environment, Land, Water and Planning Level 1, 8 Nicholson St East Melbourne Vic 3002

Note the following important dates:

1 November 2015	Opportunities for submissions close
2 November - 28 November 2015	Collation and analysis of submissions
7 December 2015	All submissions published on DELWP's website

9 Contact us

For more information, contact the Waste and Resource Efficiency team at the Department of Environment, Land, Water and Planning via our email: wastepolicy@delwp.vic.gov.au.

Appendix: Summary of questions

What is e-waste?

Q 1: Is the proposed definition of e-waste clear to you?

Q 2: Are the proposed categories of e-waste clear to you? If not, can you suggest any specific changes to the existing categories, or another method of categorisation?

What are the problems with e-waste?

Q 3: What specific issues do you believe we need to address by banning e-waste from landfill?

Q 4: What do you see are current and future impacts of e-waste on the environment or human health? Can you provide examples?

Q 5: What do you see as potential impacts (both positive and negative) from recovering e-waste?

Q 6: Do you believe there are particular reasons for not recovering e-waste?

Q 7: Do you believe there are other issues with the e-waste recycling market, or with specific stages of the e-waste recycling market?

Q 8: Are you aware of other barriers to achieving a sustainable e-waste recycling market?

Q 9: Do you think e-waste and its components are undervalued in Australia?

What are the outcomes government wants to achieve?

Q 10: Do you believe that banning e-waste from landfill will achieve these outcomes?

Q 11: Are there other outcomes you believe the commitment should, or is likely to, achieve?

Designing the approach- establishing e-waste criteria

Q 12: What criteria do you think will be useful to help us determine how the different types of e-waste are managed in Victoria?

Designing the approach- timing

Q 13: Do you think some regions will require more time to prepare for a landfill ban than others?

Q 14: What changes, if any, will need to occur in your region before e-waste can be banned from landfill and managed appropriately?

Q 15: Do you think banning e-waste from landfill in Victoria will need to take a phased approach? If so, what do you think should be key considerations in determining how the phasing occurs?

Designing the approach - principles to guide the design

Q 16: Do you believe there are other principles that must be considered in the development of Victoria's approach to ban e-waste from landfill?

Designing the approach - choosing the right tools

Q 17: What other tools do you think the government should consider when designing Victoria's approach to banning e-waste from landfill? Be as specific as you can and consider details such as:

- Types of infrastructure that might be required
- Types of existing technologies available, both in Australia and overseas
- Opportunities for invention and development of new technologies
- Investment required
- Time required to implement
- Guidance that industry might need or want
- Information that community might need or want
- Level of government support and intervention
- …and any other details that might be useful

Q 18: How do you think community could be supported to ensure e-waste continues to be recovered and recycled?

Designing the approach – other considerations

Q 19: What unintended consequences do you think the landfill ban could cause? Please provide as much detail as possible and refer to any research or case studies that might help to support your feedback.

Q 20: How do you think the design of the approach to banning e-waste could be designed to mitigate these unintended consequences?

What other state and national work do we need to consider?

Q 21: Are you aware of any policy developments or reviews, both interstate and nationally, that may be useful in the design and implementation of the e-waste commitment?

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