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e-Waste

Electronic waste, more commonly known as 'e-waste', includes computers, televisions, stereos, photocopiers, printers, faxes, monitors and mobile phones that have reached end-of-life through being obsolete, broken or used.

This Research Brief examines the issue of e-waste, looking at matters such as the amount of e-waste produced and what happens to it. In particular, it discusses the National Television and Computer Recycling Scheme, which will be progressively rolled out in Australia from 2012.

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Research Brief 2012/No.06

May 2012

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Contents

Key Points

1. Electronic waste, more commonly known as 'e-waste', includes computers, televisions, stereos, photocopiers, printers, faxes, monitors and mobile phones that have reached end-of-life through being obsolete, broken or used. Sometimes the term e-waste also includes electrical waste such as refrigerators, washing machines, dryers, air-conditioners, vacuum cleaners, coffee machines, toasters, irons, etc. In the European Union, waste electrical and electronic equipment is generally known by its acronym, 'WEEE' (Section 2 of this Research Brief).
2. E-waste is one of the fastest growing waste streams in Australia and the world (Sections 1 and 5).
3. There are two key concerns about e-waste – the volume produced and its hazardous nature (Section 3).
4. E-waste can contain small quantities of precious metals, such as silver, gold and platinum, and non-renewable resources, such as tin, nickel, zinc and copper. It may also contain hazardous materials such as mercury, lead, arsenic, beryllium and cadmium, as well as other materials such as plastic and glass (Section 4).
5. In Australia, most e-waste ends up in landfill. When e-waste is sent to landfill, the valuable materials, such as the non-renewable resources, are lost. There is also the possibility that the toxic chemicals will leach out and contaminate the groundwater and soil, and result in health problems (Sections 6 and 8).
6. It is illegal to export hazardous waste, such as e-waste, unless a permit is obtained under the *Hazardous Waste (Regulation of Exports and Imports) Act 1989* (Cth) (Sections 6-7).
7. Many of the materials in e-waste are able to be recovered and reused. To date, however, there has been little recycling of e-waste in Australia. A key reason for this is that the collection of e-waste and the safe and environmentally appropriate extraction of valuable materials from it are expensive (Sections 9-11).
8. Many countries, including Australia, the United States, Japan and parts of Canada and Europe, have chosen to address the problem of e-waste through product stewardship. Product stewardship, as explained in s 3 of Australia's *Product Stewardship Act 2011* (Cth) is "*an approach to reducing the environmental and other impacts of products by encouraging or requiring manufacturers, importers, distributors and other persons to take responsibility for those products*" (Section 12).
9. Australia's National Television and Computer Recycling Scheme, a product stewardship scheme, will enable householders and small business owners to drop off waste televisions, computers, printers and computer products for recycling for free. Collection services will be progressively rolled out from 2012 (Section 12.1).
10. It has been suggested that to address the problems produced by e-waste, it is necessary to not only look at the disposal of products at end-of-life but also at the design of products (Section 13).

For further clarification and analysis of the relevant issues, the reader should consult the Research Brief and refer to the Explanatory Notes to the Bill as well as to the Bill itself.

1 Introduction

E-waste is the one of the fastest growing waste streams in Australia and the world.[1] This Research Brief looks at what is categorised as 'e-waste', how much e-waste is produced, what happens to e-waste, and why it is an issue. Product stewardship schemes in Australia and selected overseas jurisdictions are also described.

2 What is e-waste?

Electronic waste, more commonly known as e-waste, includes computers, televisions, stereos, photocopiers, printers, faxes, monitors and mobile phones that have reached end-of-life through being obsolete, broken or used.[2] It is generated by households, commercial premises, educational facilities and government offices.[3]

Sometimes the term e-waste also includes electrical waste such as refrigerators, washing machines, dryers, air-conditioners, vacuum cleaners, coffee machines, toasters, irons, etc.[4] In the European Union, waste electrical and electronic equipment is generally known by its acronym, WEEE.[5]

3 Why is e-waste an issue?

There are two key concerns about e-waste:

- the *volume* of e-waste produced - most of which ends up in landfill; and
- the *hazardous nature* of some of the materials in e-waste – these can pose a risk to human health and the environment.

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1 See, for example, Australian Bureau of Statistics (ABS), 'Feature Article: Solid Waste in Australia', 4613.0 – *Australia's Environment: Issues and Trends*, 2006. All links in this e-Research Brief were accessed in May 2012.

2 See, for example, ABS, 'Feature Article: Solid Waste in Australia'.

> Hyder Consulting notes (p 57), for example, that, "[u]*nlike may other electrical products, product failure is not the primary reason for end of life* [for computers]". Computers may reach-end of-life because of:
> - insufficient hard-drive capacity or speed;
> - software upgrades;
> - availability of a newer model;
> - leasing or depreciation issues;
> - corporate replacement policies;
> - failure of a unit or component.
>
> Source: Hyder Consulting, Waste and Recycling in Australia, Amended Report, prepared for the Department of the Environment, Water, Heritage and the Arts, November 2009, p 57.

3 ABS, 'Feature Article: Solid Waste in Australia'.

4 See e.g. Australia, Department of the Environment, Water, Heritage and the Arts, National Television and Computer Product Stewardship Scheme, *Television and Computer Scheme e-Bulletin*, Issue 1, May 2010, p 2; Clean Up Australia, *E-Waste Fact Sheet*, 2009; and Darren Baguley, 'E-waste Crisis', *Management Today*, 62, March 2010, p 42.

5 European Commission, Eurostat, 'WEEE – Key Statistics and Data', last updated 16 November 2011. In this Research Brief, e-waste refers to electronic waste.

4 What is in e-waste?

E-waste can contain small quantities of precious metals, such as silver, gold and platinum,[6] and non-renewable resources, such as tin, nickel, zinc and copper.[7] It may also contain hazardous materials such as mercury, lead, arsenic, beryllium and cadmium,[8] as well as other materials such as plastics and glass.[9]

5 How much e-waste is produced?

E-waste is the one of the fastest growing waste streams in Australia[10] and the world[11] but it is uncertain exactly how much e-waste is produced.

5.1 International Estimates

In its 2009 report titled *Recycling – From e-waste to resources*, the United Nations Environment Programme (UNEP) stated that "*the available data on e-waste arising is poor and insufficient and estimation techniques are required for extension of known data to regional-global coverage*".[12] The United Nations estimated that in 2007, global e-waste was about 40 million tons per year.[13]

5.2 Australian Estimates

In a report prepared for the Environment Protection and Heritage Council by Hyder Consulting and PricewaterhouseCoopers, it was estimated that 16.8 million televisions, computers and computer products (i.e. keyboards, mice, printers, power cords, etc) (a total of about 106,000 tonnes) reached end-of-life in Australia in 2007-08. The report's authors calculate that this number will rise to about 44 million televisions and computers (181,000 tonnes) per annum by 2027-28.[14]

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6 Hyder Consulting, *Waste and Recycling in Australia: Amended Report*, p 56.

7 *Television and Computer Scheme e-Bulletin*, Issue 1, p 2.

8 Ewaste: ewasteguide.info, 'Hazardous Substances in e-Waste'. See also *Television and Computer Scheme e-Bulletin*, Issue 1, p 2. Cathode ray tube monitors, for example, contain large quantities of lead: United States, Florida Department of Environmental Protection, 'Focus on Televisions and Computer Monitors: Lead (Pb)'.

9 Zero Waste SA, 'What can be recycled from e-waste?' (website).

10 ABS, 'Waste: Waste generated per person', 1370.0 – *Measures of Australia's Progress*, 2010; ABS, 'Environment Snapshot: Recycling up, but e-waste a looming issue', *Media Alert*, 10 November 2006.

11 See for example, CRC for Contamination Assessment and Remediation of the Environment (CRC CARE), 'Asia's e-waste pollution "may spread worldwide"', *Media Release*, 12 September 2011; Bryan Walsh, 'E-Waste Not', *Time*, 8 January 2009, online; European Commission, Eurostat, 'WEEE – Key Statistics and Data'; Xia Huo, Lin Peng, Xijin Xu, Liangkai Zheng, Bo Qiu, Zongli Qi, Bao Zhang, Dai Han & Zhongxian Piao, 'Elevated blood lead levels of children in Guiyu, an electronic waste recycling town in China', *Environmental Health Perspectives*, 115(7), July 2007, pp 1113-1117, p 1113.

12 United Nations Environment Programme (UNEP), Solving the E-waste Problem (StEP), *Recycling – From e-waste to resources*, 2009, p 1.

13 UNEP, StEP, *Recycling – From e-waste to resources*, p 1, citing J Huisman et al, *2008 Review of Directive 2002/96 on Waste Electrical and Electronic Equipment (WEEE)*, Bonn, United Nations University, 2007. See also CRC CARE, 'Asia's e-Waste Pollution "May Spread Worldwide"' in which Professor Ming Hung Wong from Hong Kong Baptist University is quoted, saying that 53 million tonnes of e-waste was generated worldwide in 2009.

14 PricewaterhouseCoopers and Hyder Consulting, *Environment Protection and Heritage Council - Decision Regulatory Impact Statement: Televisions and Computers*, October 2009, p iii.

6 What happens to e-waste in Australia?

In Australia, most e-waste currently ends up in landfill.[15] PricewaterhouseCoopers and Hyder Consulting reported that in 2007-08 over 80% of the 106,000 tonnes (i.e. 16.8 million units) of discarded televisions, computers and computer products were sent to landfill. About 10% (by weight) was recycled.[16]

It has been claimed that some Australian e-waste is shipped overseas to be processed in developing countries.[17] This is illegal unless a permit is obtained under the *Hazardous Waste (Regulation of Exports and Imports) Act 1989* (Cth).[18] (This legislation was enacted to comply with Australia's obligations under the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal. The Basel Convention is discussed below.)

A permit to export hazardous waste, such as e-waste, will only be granted if, amongst other things, it can be shown that the waste will be managed in an environmentally sound manner in the country of import and that country consents to the grant of the permit (s 17). In 2009-10, the Department of the Environment, Water, Heritage and the Arts processed 14 permits to export hazardous wastes and 20 permits to import hazardous wastes. Sixteen of the permits were granted, 4 applications were refused and 14 applications were not finalised as at 30 June 2010.[19]

If a person is found guilty of intentionally, recklessly or negligently exporting e-waste without permit, he or she faces imprisonment for up to 2 years or, in the case of a body corporate, a fine of up to 2,500 penalty units ($275,000). The maximum penalty increases to five years for an individual and to 10,000 penalty units ($1,100,000) for a body corporate if the person intentionally or recklessly exports waste without a permit and the contravention injures or damages, or is likely to injure or damage, human beings or the environment (s 40).[20] An executive officer of a body corporate that contravenes s 40 faces a maximum penalty of imprisonment for five years if certain criteria are satisfied (such as the executive officer knew that, or was reckless as to whether, the contravention would occur, and the officer was in a position to influence the conduct of the body in relation to the contravention) (s 40B(3)).

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15 See e.g. ABS, 'Environment Snapshot: Recycling up, but e-waste a looming issue'.

16 PricewaterhouseCoopers and Hyder Consulting, *Environment Protection and Heritage Council - Decision Regulatory Impact Statement: Televisions and Computers*, p iii; *Television and Computer Scheme e-Bulletin*, Issue 1, p 2.

17 See e.g. Kelmeny Fraser, 'Aussies Unwittingly Abet e-Waste Traders', *Sunday Mail*, 29 May 2011, p 24; Ben Cubby, 'Toxic Australian e-Waste Dumped on China', *Sydney Morning Herald*, 22 May 2009, online; Karen Dearne, 'E-waste glut building up', *Australian*, 10 November 2009, p 29. Export of waste is discussed further below.

18 Certain components of e-waste are defined as hazardous under Article 1 and Annex I of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel Convention).

19 Australia, Department of the Environment, Water, Heritage and the Arts, *Annual Report 2009-10*, p 142.

20 A penalty unit is $110: *Crimes Act 1914* (Cth).

Basel Convention

The key objective of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel Convention) is to "*protect human health and the environment against the adverse effects of hazardous wastes*".[21]

Amongst other things, the Convention prohibits a party from allowing exports of waste to a State when it has reason to believe that it will not be managed in an environmentally sound manner.[22] Thus, for example, "*if the proposed destination does not have the appropriate technology to recycle electronic equipment in an environmentally sound manner, the State of export must not allow a shipment described as used computers for recycling to be shipped there*".[23]

To date, one hundred and seventy-nine nations, including Australia, are party to the Basel Convention, which entered into force in 1992. The United States has signed, but not ratified, the Convention.[24]

7 Why is e-waste shipped to other countries?

The safe and environmentally appropriate extraction of valuable materials, such as gold, copper and lead, from e-waste can be expensive.[25] In some instances, e-waste has been shipped to developing countries, such as those in Africa, and China and India, for dismantling because occupational health and safety standards, labour costs and environmental standards are often lower there than in other countries. In developing countries, e-waste recycling is often undertaken in unsafe conditions and the e-waste debris is disposed of inappropriately. The environment in these areas is often contaminated and local residents can suffer ill-effects from the recycling processes and the pollution.[26] Amongst others, the Basel Action Network[27] and the Silicon Valley Toxics Coalition[28] suggest that it is better to send e-waste to landfill rather than to a developing country for recycling if "*the recycling results in toxic worker exposures, and the open dumping or burning of toxic residues …*".[29]

In some instances, e-waste is legally shipped to other countries because there are no appropriate facilities to recycle the waste in Australia. Byteback (a trial e-waste recycling program running in Victoria) is, for example, permitted to export printed circuit boards, connectors and integrated circuits to Canada where a suitable facility for smelting and refining them is available.[30]

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21 Basel Convention, Introduction, p 5.

22 Basel Convention, Art 4(2)(e).

23 UNEP, *Basel Convention: Controlling Transboundary Movements of Hazardous Wastes* (leaflet).

24 UNEP, 'Basel Convention: Parties to the Basel Convention' (webpage).

25 Byron Shire Council, 'Electronic Waste' (webpage).

26 UNEP, 'Meeting the Challenge of e-Waste in Africa' (leaflet); 'China's Electronic Waste Village', *Time Magazine*, 8 January 2009; Nilanjana Bhowmick, 'Is India's e-Waste Problem Spiraling Out of Control?', *Time World*, 23 May 2011; StEP, *Annual Report 2008*, pp 13, 24.

27 The Basel Action Network is a non-government organisation whose objective is to prevent the trade of toxic products from rich nations to poor ones: Basel Action Network, 'About the Basel Action Network – BAN' (webpage).

28 The Silicon Valley Toxics Coalition (SVTC) is a research and advocacy organisation focussing on high tech industries. It aims to promote human health and a better environment by holding high tech industries to account and have them shift to more environmentally sustainable models: SVTC, 'SVTC's Mission for a Sustainable Future' (webpage).

29 BAN and SVTC, *Exporting Harm: The high-tech trashing of Asia*, February 2002, p 7.

30 Byteback, 'About Byteback: How materials are recycled' (webpage).

8 What happens when e-waste is disposed of in landfill?

When e-waste is sent to landfill, the valuable materials, such as the non-renewable resources, are lost. There is also the possibility that the toxic chemicals will leach out and contaminate the groundwater and soil, and may result in health problems.[31] While space for landfill is not currently a pressing issue in Australia, the space taken up by e-waste is likely to be a greater concern in the future.

9 What benefits are there in recycling e-waste?

Many of the materials in e-waste are able to be recovered[32] and reused. Amongst other things, the metals can be collected and smelted for reuse, and the plastic can be separated and reused.[33] It is commonly pointed out that this recovery and reuse of valuable materials leads to savings of energy, lower emissions of greenhouse gases and less pollution because fewer minerals need to be extracted from the earth to manufacture new products.[34]

10 Why are e-waste recycling rates low?

While a high proportion of the materials in e-waste can be recovered, there has, to date, been little recycling of e-waste in Australia (currently, for example, only about 17% of computers, computer peripherals and televisions are recycled[35]). A key reason for this is that the collection of e-waste and the safe and environmentally appropriate extraction of valuable materials, such as gold, copper and lead, from it are expensive.[36] As a result, "*the value of the recovered materials is less than the cost of collecting and processing e-waste*".[37] A pilot program run in Melbourne in 2001-02 found that the total cost (net of revenue from the sale of recycled components) was around $22 per television.[38] Brisbane City Council provides an e-waste recycling service, but makes a financial loss on it.[39] Dell (a technology company)

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31 Clean Up Australia, *E-Waste Fact Sheet*, 2009; Byteback, 'Why recycle unused computers and related equipment?' (webpage). It has been reported that e-waste is the source of 70% of the toxic chemicals found in landfill: Darren Baguley, 'E-waste Crisis', p 42. The Department of Environment, Water, Heritage and the Arts' *National Waste Report 2010*` (p 151) notes that the effects of the potentially hazardous components of e-waste "*in leachate and migration into the surrounding environment are not well understood*".

32 URS, *Final Report: Willingness to pay for e-waste recycling*, prepared for the Environment Protection and Heritage Council, 23 June 2009, p 1.

33 Byteback, 'Why Recycle Unused Computers and Related Equipment?'.

34 See e.g. United States, Environmental Protection Agency, 'Wastes – Resource Conservation – Common Wastes & Materials – eCycling: Frequent Questions'. See also, Byteback, 'Why Recycle Unused Computers and Related Equipment?' (webpage).

35 Australia, Department of Sustainability, Environment, Water, Population and Communities, 'The Role of Recyclers in the National Television and Computer Recycling Scheme' (Fact Sheet), last updated 24 November 2011.

36 Byron Shire Council, 'Electronic Waste' (webpage). See also, Penny Langfield, 'Brisbane Zeroes in on e-Waste', *Government News*, 23 July 2010, online.

37 URS, *Final Report: Willingness to pay for e-waste recycling*, p 1.

38 URS, *Final Report: Willingness to pay for e-waste recycling*, p 3. Note, however, the Australian Information Industry Association chief executive Ian Birks was reported as saying that under the (then proposed) national scheme to collect and recycle televisions and computers it would probably cost less than $2 to recycle each computer and television: Karen Dearne, 'E-waste glut building up'.

39 Penny Langfield, 'Brisbane Zeroes in on e-Waste'. The Brisbane City Council collected and distributed 2,341 tonnes of e-waste for reuse and recycling between 2006 and 2011: Brisbane City Council, 'Living in Brisbane Newsletter', November 2011, p 6.

provides free recycling for its products but charges a fee to recycle other brands.[40] The National Television and Computer Recycling Scheme (discussed below) is funded by industry.

Another reason for the low recycling rate for e-waste may be a lack of awareness among some in the general public of available programs. Even though MobileMuster has been collecting and recycling mobile phone components since 1999 and recognition of the program has increased from 46% in March 2005, it was still only at 82% in November 2011.[41]

Additionally, many people probably do not hand over their mobile phones (and probably their computers) for recycling because they perceive them to still be worth something, or they want to keep them as a back up, or because they think they may need the information they contain.[42] It has been estimated that over 22 million unused mobile phones are being stored in Australia.[43]

MobileMuster

MobileMuster aims to prevent mobile phones being dumped in landfill. It is managed by the Australian Mobile Telecommunications Association on behalf of certain of its members who voluntarily pay a levy on handsets imported into Australia based on a formula that reflects their market shares.

Between its commencement in November 1998 and 30 December 2011, MobileMuster collected more than 886 tonnes of mobile phone components. In 2010-11, it collected 106 tonnes of mobile phone components, which is about 839,000 handsets and batteries, plus accessories.

More than 90% of the materials in mobile phones (plastics, metals, ceramics and glass) are able to be recovered and used for new products. The circuit boards, for example, contain gold and silver that can be used for jewellery and other applications. MobileMuster notes that "[o]*ne tonne of mobile phone circuit boards can yield the same amount of precious metals as 110 tonnes of gold ore, 123 tonnes of silver bearing ore and 11 tonnes of copper sulphide ore*".[44]

Further, the capacity in Australia for e-waste recycling is limited. In 2009, it was reportedly about 30,000 tonnes per annum. It was, however, expected that the e-waste recycling industry will increase its capacity when the National Television and Computer Recycling Scheme became operational.[45]

11 What can recycled e-waste be used for?

Recycled e-waste can be used to make new electronic products or other objects.[46] The 2010 Vancouver Winter Olympic and Paralympic medals, for example, were made, in part, from metals extracted e-waste.[47]

40 URS, *Final Report: Willingness to pay for e-waste recycling*, p 3.
41 MobileMuster, Quick Facts (webpage).
42 MobileMuster, *Australia: A nation of hoarders*, p 2.
43 MobileMuster, Quick Facts (webpage).
44 MobileMuster, Quick Facts (webpage).
45 Karen Dearne, 'E-waste glut building up', *Australian*.
46 Jewellery, for example, was mentioned above. See also, MobileMuster, Quick Facts.
47 Recycling for Charities, '2010 Olympics Will Use Recycled E-Waste for Medals', posted 29 October 2009.

12 Product stewardship

Many countries, including Australia, the United States, Japan and parts of Canada and Europe, have chosen to address the problem of e-waste through product stewardship. Some of these are discussed below.

Product stewardship, as explained in s 3 of Australia's *Product Stewardship Act 2011* (Cth) is "*an approach to reducing the environmental and other impacts of products by encouraging or requiring manufacturers, importers, distributors and other persons to take responsibility for those products*".

In its 2006 *Waste Management* report, the Productivity Commission expressed its reservations about extended producer responsibility[48] and product stewardship. The Productivity Commission pointed out that such schemes "*tend to be costly*" and that they are unlikely to deliver a net benefit unless:[49]

- *there are considerable benefits to the community from avoiding the product's inappropriate disposal, for example because it is hazardous;*
- *the relevant parties can be readily identified and held accountable; and*
- *compliance with the requirements can be readily measured and enforced*.

12.1 Australia - National Television and Computer Recycling Scheme

In November 2009, the Environment Protection and Heritage Council[50] agreed to a national policy on waste and resource management for the period from 2010 to 2020 (National Waste Policy: Less Waste, More Resources).[51] One of the "*priority strategies*" in the policy requires the Australian Government to establish a national legislative framework (the National Product Stewardship Framework) to "*support voluntary, co-regulatory and regulatory product stewardship and extended producer responsibility schemes to provide for the impacts of a product being responsibly managed during and at end of life*".[52]

The *Product Stewardship Act 2011* (Cth), which aims to reduce the impact of products on the environment and on human health and safety, commenced on 8 August 2011. The Product Stewardship (Televisions and Computers) Regulations 2011 (Cth), the first of a number of product-specific regulations,[53] commenced on 8 November 2011. Together, these statutes

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48 The Organisation for Economic Co-operation and Development (OECD) defines extended producer responsibility as "*an environmental policy approach in which a producer's responsibility for a product is extended to the post-consumer stage of a product's life cycle*": OECD, *Extended Producer Responsibility: A Guidance Manual for Governments*, Paris, 2001, p 9, cited in Productivity Commission, 'Waste Management', *Productivity Commission Inquiry Report*, No 38, 2006, p 260. The Productivity Commission notes (p 55) that the terms "*extended producer responsibility*" and "*product stewardship*" are sometimes used interchangeably.

49 Productivity Commission, 'Waste Management', p 288.

50 The members of the Environment Protection and Heritage Council (EPHC) are ministers from the Commonwealth, State and Territory Governments, the New Zealand Government and the Papua New Guinea Government.

51 EPHC, 'Historic agreement sets waste agenda to 2020 for less waste and more resources', *Communiqué*, 19th Meeting of EPHC, 5 November 2009, pp 1, 4.

52 Australia, Department of the Environment, Water, Heritage and the Arts, *National Waste Policy: Less Waste, More Resources*, November 2009, 9.

53 Claire Smith & Rebecca Hawke, 'New Product Stewardship Legislation – Extending manufacturer and importer responsibility for e-waste', *Keeping Good Companies* 63(7), August 2011, pp 426-429.

establish a product stewardship framework for televisions, computers and computer products.

As part of this framework, the National Television and Computer Recycling Scheme, which "*will be funded and implemented by importers and manufacturers of television and computer products and regulated by the Australian Government*", will enable householders and small business owners to drop off waste televisions, computers, printers and computer products for recycling for free. Collection services will be progressively rolled out from 2012.[54]

The Regulations (r 1.03 and Schedule 2) set targets for the percentage of televisions, computers and computer products (such as keyboards mice and hard drives) to be recycled each year – 30% of waste in 2012-13, rising progressively to 80% of waste in 2021-22.[55]

12.2 Japan[56]

Japan introduced a product stewardship scheme for electrical and electronic appliances in the early 2000s. Key reasons for developing the scheme included:

- the limited space Japan has for landfill;
- the loss of resources if e-waste is sent to landfill; and
- the inability of local governments to safely and effectively process e-waste.

Consumers are financially responsible for disposal of their goods, with the disposal fee being paid at the time of purchase (in part, to avoid illegal dumping of waste covered by the product stewardship scheme). Some goods are able to be dropped off at post offices (e.g., televisions) while collection may be arranged for other goods or they may need to be returned to the relevant retailer.

12.3 European Union

The European Union (EU) has two relevant directives:

Waste Electrical and Electronic Equipment (WEEE) Directive (WEEE Directive) (Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 on waste electrical and electronic equipment (WEEE))	The primary objective of the WEEE Directive is the prevention of WEEE. It also seeks to reduce the amount of WEEE disposed of (Article 1). The Directive establishes producer responsibility. Producers have to finance the collection (from collection points), treatment, recovery and disposal of WEEE. Among other things, it requires Member states to encourage producers and manufacturers to consider the dismantling and recovery of materials in their design of electrical and electronic equipment.
Restriction of Hazardous Substances (RoHS)	The RoHS Directive is related to the WEEE

54 Australia, Department of Sustainability, Environment, Water, Population and Communities, *National Television and Computer Recycling Scheme Bulletin*, Issue 9, November 2011, p 1.

55 See also, Australia, Department of Sustainability, Environment, Water, Population and Communities, *National Television and Computer Recycling Scheme: Recycling Targets* (fact sheet).

56 Institute for Sustainable Futures, University of Technology, Sydney, *Briefing Paper – Product Stewardship Schemes in Asia: China, South Korea, Japan, and Taiwan*, 2009, pp 17-19.

Directive (RoHS Directive) (Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment)	Directive. It regulates the use of particular toxic substances (e.g., lead, mercury, cadmium, and hexavalent chromium) in new electrical and electronic equipment. One of the aims of the RoHS Directive is to ban the following products from being placed on the EU market: "*new electrical and electronic equipment containing more than agreed levels of lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE) flame retardants*".[57]

12.4 Canada

Some Canadian provinces have introduced product stewardship programs for e-waste.[58] In Alberta, for example, an environmental fee of between CAD$5 and CAD$45 is charged at the time of purchase of certain electronic products and consumers are able to drop their designated e-waste at any of the 300 or so recycling collection points.[59]

13 How can the problems of e-waste be reduced?

It has been suggested that to address the problems produced by e-waste, it is necessary to look not only at the disposal of products at end-of-life, but also at the design of products.[60] Currently, for example, many households would have more than one phone charger as most mobile phones use different chargers. A universal phone charger that fits "*all future handsets, regardless of make and model*"[61] would mean that a new charger would not need to be purchased with each new mobile phone, thus reducing the future volume of e-waste.

Helen Lewis, Adjunct Professor at the Director at the Centre for Design at RMIT, was quoted in "*E-waste"* saying:[62]

> *Products can be better designed so that they last longer, are more environmentally responsible and so that they can be more easily dismantled and recycled at the end of their life.*

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57 Australia, Department of the Environment, Water, Heritage and the Arts, and the Environment Protection and Heritage Council, *National Waste Report 2010*, March 2010, p 13.

58 Canada, Environment Canada, 'Inventory of Programs' (webpage), last modified 29 September 2011; Robert Fishlock & Michelle Chaisson, 'E-waste Product Stewardship in Canada', Blakes, 24 March 2009.

59 Canada, Environment Canada, 'Electronic Waste Recycling Program' (webpage), last modified 23 September 2011; Alberta Recycling Management Authority, 'Electronics Recycling Program' (webpage).

60 See e.g. *Waste Electrical and Electronic Equipment (WEEE) Directive*, para 12.

61 AAP, 'Mobile 'hoarders' causing e-waste glut', *Sydney Morning Herald*, 16 February 2010

62 Tanya Ha, 'E-waste', *ABC Science*, 6 November 2003.

It is possible that with better design and increased levels of safe and environmentally appropriate recycling, e-waste may come to be seen as a resource rather than an issue of concern.

Key Documents and Links

Commonwealth Legislation

- *Product Stewardship Act 2011* (Cth); Product Stewardship (Televisions and Computers) Regulations 2011 (Cth)
- *Hazardous Waste (Regulation of Exports and Imports) Act 1989* (Cth); Hazardous Waste (Regulation of Exports and Imports) Regulations 1996 (Cth)

Australia, Department of Sustainability, Environment, Water, Population and Community

- National Waste Policy: Product Stewardship (webpage)

Australian Bureau of Statistics

- 'Waste: Waste generated per person', 1370.0 – *Measures of Australia's Progress*, 2010
- 'Feature Article: Solid Waste in Australia', 4613.0 – *Australia's Environment: Issues and Trends*, 2006
- 'Environment Snapshot: Recycling up, but e-waste a looming issue', *Media Alert*, 10 November 2006

Recycling Programs

- Byteback (computer equipment in Victoria)
- MobileMuster (mobile phones)
- National Television and Computer Recycling Scheme

Reports

- Hyder Consulting, *Waste and Recycling in Australia, Amended Report*, prepared for the Department of the Environment, Water, Heritage and the Arts, November 2009
- PricewaterhouseCoopers and Hyder Consulting, *Environment Protection and Heritage Council - Decision Regulatory Impact Statement: Televisions and Computers*, October 2009
- URS, *Final Report: Willingness to pay for e-waste recycling*, prepared for the Environment Protection and Heritage Council, 23 June 2009

Overseas Jurisdictions

- **Canada**, Environment Canada, 'Inventory of Programs' (webpage)
- Institute for Sustainable Futures, University of Technology Sydney, *Briefing Paper – Product Stewardship Schemes in Asia: **China**, **South Korea**, **Japan**, and **Taiwan***, prepared for the Department of the Environment, Water, Heritage and the Arts, 2009
- Martin Stewardship & Management Strategies Pty Ltd and Perchards Ltd, *Final Report – Product Stewardship in **North America** and **Europe***, prepared for the Department of the Environment, Water, Heritage and the Arts, 2009
- **United States**, Interagency Task Force on Electronics Stewardship, *National Strategy for Electronics Stewardship*, 2011

Newspaper Articles

- Kelmeny Fraser, 'Aussies Unwittingly Abet e-Waste Traders', *Sunday Mail*, 29 May 2011, p 24
- Karen Dearne, 'E-waste glut building up', *Australian*, 10 November 2009, p 29
- Ben Cubby, 'Toxic Australian e-Waste Dumped on China', *Sydney Morning Herald*, 22 May 2009, online

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RBR 2012/02	The Heavy Vehicle National Law and the National Heavy Vehicle Regulator: Heavy Vehicle National Law Bill 2011 (Qld)	Feb 2012
RBR 2012/03	Shield Laws for Journalists	Feb 2012
RBR 2012/04	Review of Queensland's Marine Mammal Legislation	Apr 2012
RBR 2012/05	The Future for Manufactured Homes in Residential Parks in Queensland	May 2012
RBR 2012/06	e-Waste	May 2012