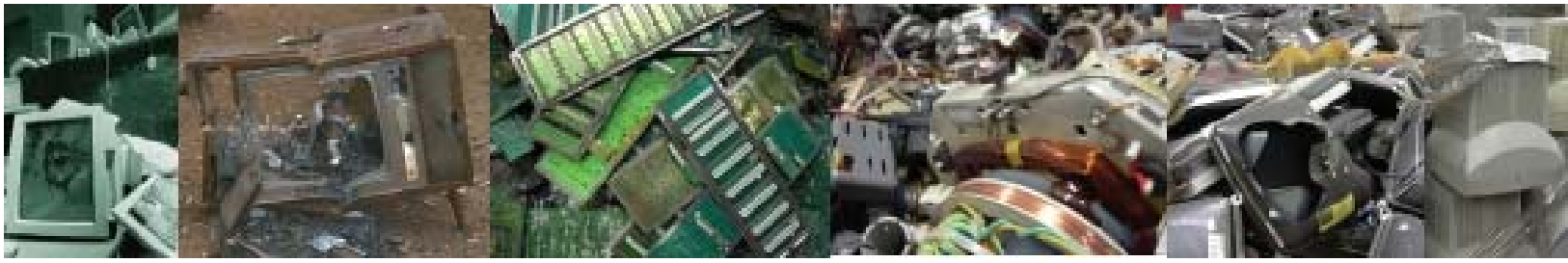
TOTAL ENVIRONMENT CENTRE



TIPPING POINT:

AUSTRALIA'S E-WASTE CRISIS

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Executive Summary

Australia's spiraling electronic waste problem has never been more urgent. Inaction from State and Federal governments on the issue has seen the lack of environmentally responsible recovery options for electronic waste reach crisis point.

Every year millions of computers, televisions, mobile phones, compact fluorescent lamps and other e-waste products reach end-of-life. Without a recovery and recycling pathway, these make their way to landfill, wasting valuable resources and creating a toxic legacy. By the end of 2008, there will be over 168 million electronic waste items in Australian landfills. This includes:

Computers

- an estimated 37 million computers will be in landfill or on their way there by the end of 2008
- another 4 million new computers are sold every year
- only 1.5% computers are recycled

Televisions

- an estimated 17 million televisions will be in landfill or on their way there by the end of 2008
- around 1 million new televisions are sold each year
- an estimated 1.5 million televisions are being sent to landfill each year.
- less than 1% are recycled

Mobile Phones

- an estimated 56 million mobile phones will be in landfill or on there way there by the end of 2008
- mobile phones are replaced on average every 18 months
- less than 4% are recycled

Fluorescent Lamps

- over 70 million fluorescent lights are dumped in landfill every year
- over 17 million compact fluorescent lamps are sold every year
- the Australia-wide phase out of incandescent lights in favour of energy efficient lights will increase this toxic legacy
- around 1% are recycled

Toxic materials in electronic products include, but are not limited to, mercury, lead, arsenic brominated flame retardants, beryllium and cadmium. Rare and non-renewable materials are also wasted when dumped in landfill, many of which are declining in supply.

Australians are amongst the top ten consumers of electronic technology in the world,[1] however Australia has fallen behind the rest of the developed world because it lacks responsible end of life management for these products. Extended producer responsibility (EPR) for end-of-life electronic products has become law in the European Union, Japan, China, South Korea, US and Canadian states, and parts of South America.

The Total Environment Centre calls on Australia's Environment Ministers to act swiftly to:

- Regulate to support the television industry's product stewardship scheme
- Introduce full regulation to mandate producer responsibility for the collection and recycling of all end-of-life computers
- Introduce full regulation to mandate producer responsibility for the collection and recycling of all end-of-life mobile phones
- Introduce full regulation to mandate producer responsibility for the collection and recycling of fluorescent tubes and compact fluorescent lights

[1] Australian Bureau of Statistics, *Australia's Environment Issues and Trends*, 2006 p19.

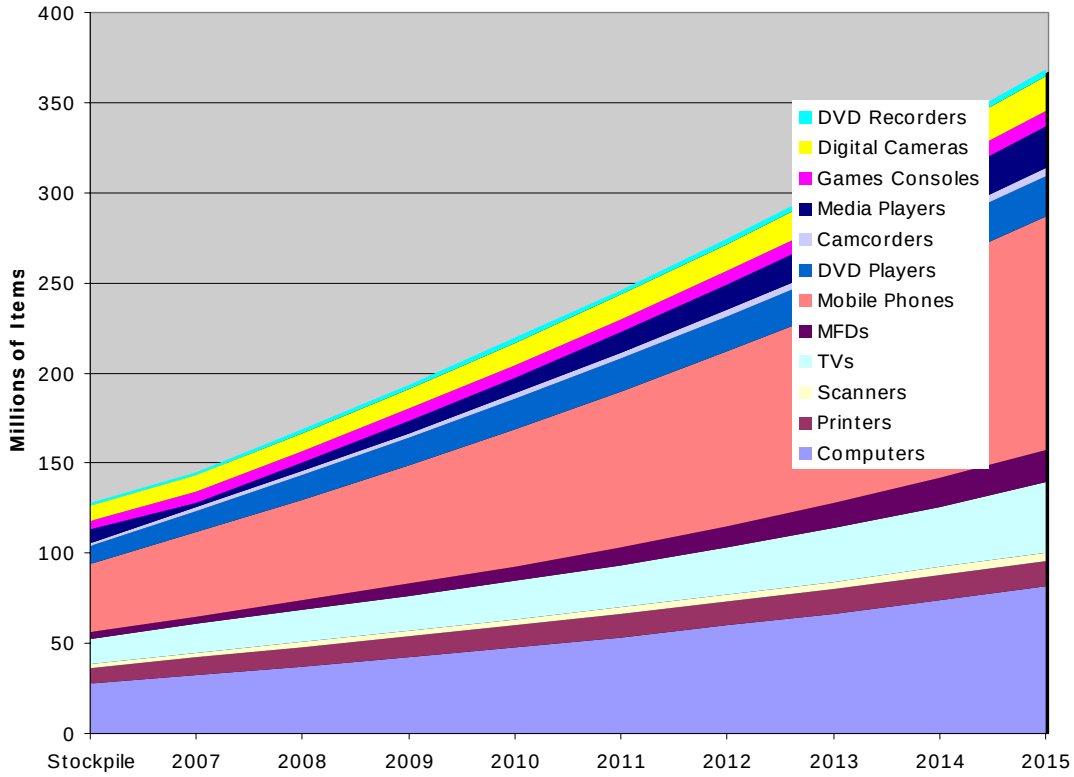
The implementation of these regulations will lead to:

- clear and accessible disposal pathways for end-of-life electronic products
- investments in Australia's recycling infrastructure
- innovation within both the recycling and design sectors
- conservation of non-renewable resources
- reductions in greenhouse emissions
- conservation of precious water supplies
- a reduction in toxic materials being dumped in landfill

1. Australia's e-waste mountain

By the end of 2008 Australia will have around 168 million electronic waste items either in landfill or heading to landfill. With no significant efforts to divert these items from landfill in place, this toxic e-waste mountain continues to grow.

Figure 1: Australia's e-waste stockpiles



1.1 Computers

By the end of 2008 an estimated 37 million computers will be in landfill or on their way to landfill (in storage, awaiting disposal, or close to replacement).[2] With annual sales increasing, it is likely that 42 million computers will be on their way to landfill by 2010.[3] Yet only 1.5% of computers are recycled.[4]

1.2 Televisions

By the end of 2008, an estimated 17 million televisions will be in landfill or on their way to landfill. In Australia, 99% of households have at least 1 television set and 55% of households have a second set.[5] Around 1 million new televisions are purchased each year[6] and an estimated 1.5 million televisions are being sent to landfill each year.[7] Around 19 million televisions will be in or on their way to landfill by 2010. This figure is expected to increase dramatically with the switch to digital television transmission to be completed by 2013. Less than 1% of televisions are recycled every year.

1.3 Mobile Phones

By the end of 2008, an estimated 56 million mobile phones will be in landfill or on their way to landfill by the end of 2008. Almost all Australians own a mobile phone and these are replaced on average every 18 months. Mobile phones contain a variety of toxic materials including cadmium, lead and mercury that have been proven to damage human and environmental health. With a current growth

[2] Based on Meinhardt Infrastructure and Environment, Electronic Waste Recycling Development Strategy for Victoria, March 2004
[3] Assumes the 2006 – 2007 growth rate of 8% remains stable
[4] Meinhardt Infrastructure and Environment, Computer and Peripherals Material Project, October 2001, p. ES2.
[5] Australian Broadcasting Authority, http://www.aba.gov.au/
[6] Australia's Environment Issues and Trends 2006 p19. Australian Bureau of Statistics
[7] Environment Protection and Heritage Council, Statement on End of Life Televisions and Computers, Nov 2008

rate of 6%[8], by 2010 66 million phones will be heading to Australia's landfills. At an average lead content of 0.638g per phone[9] this equates to approximately 42 tonnes of lead without a safe disposal pathway within a year. Less than 4% of mobile phones are recycled.

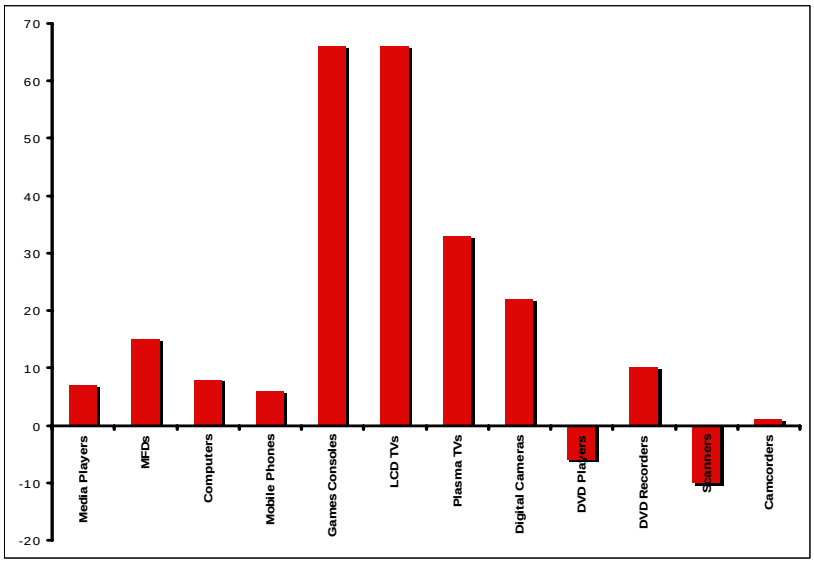
1.4 Fluorescent Lamps

Over 71 million fluorescent lights are currently in use in the commercial sector alone[10] and Australia consumes over 50 million annually. Each tube contains around 30mg of mercury.[11] On top of this, over 17 million compact fluorescent lamps (CFLs) are sold every year.[12] The Federal Government has commenced a national phase out of incandescent lamps, which will dramatically increase the usage of CFLs. 24 million lamps have already been distributed in New South Wales and the ACT since 2003 as a result of the Greenhouse Gas Abatement scheme.[13] Many of these lamps are now reaching end of life. These lamps contain between1 to 5 mg of mercury each.[14] This equates to at least 1300 grams of mercury heading to New South Wales's landfills. It takes only 1 gram to contaminate 4 billion litres of water above internationally acceptable safe levels. [15]

1.5 Other

Digital cameras, mp3 players, printers, games consoles and other digital products add to the growing legacy.

Figure 2: Growth of Australia's Digital Sales 2006 – 2007



[8] Based on sales growth from 2006 - 2007
[9] Maria Leet Socolof David Cooper, Abt Associates Inc. and Patricia Dillon, Dillon Environmental Associates, *Expansion of the ElectronicsEnvironmental Benefits Calculator: Mobile Phone Reuse and Recycling*, Nov 2007
[10] NSW Department of Environment and Conservation, *NSW EPR Priority Statement 2005-06*, p. 23
[11] NSW Department of Environment and Conservation, *NSW EPR Priority Statement 2005-06*, p. 23
[12] Calculated from Woolworths Ltd sales figures as reported in "Woolworths Flicks the Switch on Energy Efficient Light Bulbs" Media Release 19 October 2008
[13] Independent Pricing and Regulatory Tribunal, GGAS Newsletter, Issue 9, September 2008, p. 3.
[14] The Australian Government has proposed a 5mg limit for mercury in CFLs, Department of Water, Heritage and the Environment, *Draft Regulatory Impact Statement: Proposal to Phase Out Inefficient Incandescent Light Bulbs*, p. 70
[15] Universal Metals Pty Ltd, *Mercury Contamination of Australia's Landfills and Trade Waste Water*, August 2006, p. 3

2. Why divert electronic products from landfill?

Electronic products should be diverted from landfill to prevent toxic materials from contaminating ecosystems, to slow the depletion of non-renewable resources, reduce greenhouse emissions and reduce pressure on landfills. A variety of toxic materials can be found in electronics, including lead, mercury, cadmium, brominated flame retardants and beryllium. These can leach out from landfills and damage ecosystems and human health, and create a toxic legacy for future generations. Examples of toxics contained in electronic products and their toxic effects are outlined below.

Toxic Materials Contained in Computers[16]

- Lead in Cathode Ray Tubes in monitors, and used as a solder on circuit boards
- Cadmium in computer batteries and cadmium sulphide in televisions and monitors.
- Cathode ray tubes with lead oxide & sometimes barium
- Brominated flame-retardants used in printed circuit boards, cables and plastic casing.
- Poly Vinyl Chloride (PVC) coated copper cables and plastic computer casings that release highly toxic dioxins & furans when burned
- Mercury switches
- Mercury in back-lamps for LCD screens and some batteries
- Poly Chlorinated Biphenyls (PCBs) present in older capacitors & transformers
- Beryllium in switches, motherboards and electrical conductors
- PVC as casing and in circuit boards, connectors and cables

Toxic Materials Contained in Mobile Phones [17]

- Lead solder
- Cadmium in NiCad batteries
- Mercury for screen illumination
- Chromium to plate metal to prevent corrosion and create a shiny appearance
- Beryllium as an alloy for copper and nickel in springs and electrical contacts
- Antimony an alloying agent in solders and as a flame retardant
- Arsenic used in microelectronic circuitry
- Copper with beryllium used in electronic circuitry
- Nickel used as an alloying agent in steel parts, also in NiCad and NMHi batteries
- Brominated flame retardants to slow combustion
- PVC as casing and in circuit boards, connectors

E-waste dumped in landfill may come in contact with co-disposed acids, and the substances that are soluble in those acids may leach out. Several studies show that electronic circuit boards will leach lead under simulated landfill conditions.[18] An Australian Government test reported that most circuit boards tested exceeded occupational standards set by Worksafe Australia. A value of 1.0 mg/L had been set for lead in leachate, based on the practice of State and Territory governments in controlling disposal of wastes to landfill and all of the circuit boards tested exceeded this value by at least two orders of magnitude.[19] Where landfills are unlined, toxic materials may migrate into ground waters, threatening human and environmental health.[20]

[16] Silicon Valley Toxics Coalition, *Poison PCs, Toxic TVs*, 2004, p. 14 (Sources: Microelectronics and Computer Technology Corporation, 1996 and Electronics Industry Environmental Roadmap)
[17] United Nations Environment Program and Basel Convention, *Guideline on Material Recovery and Recycling of End-of-Life Mobile Phones,* 2006, pp. 19-20
[18] Ibid
[19] Environment Australia, *Hazard Status of Waste Electrical and Electronic Assemblies or Scrap*, Guidance Paper, para 46, 1999
[20] The exception is with lead, which does not tend to migrate in soil, but remains fixed to soil particles.

Mercury from fluorescent lamps pose a particular risk. When lamps are crushed as part of waste transfer processes the elemental form of mercury is easily transferred into local environments. Once in landfill and combined with organics, anaerobic breakdown takes place leading to the production of highly toxic methyl-mercury.

3. Human Health and Environmental Impacts

3.1 Lead

This toxic material has a well documented history of negative health effects including brain damage, which has lead to its removal from paints, and petrols. The creation of a human induced lead cycle has increased the accumulation of lead in water and soils. Health is negatively affected by lead poisoning, disrupting the natural functions of water and soil systems. The introduction of lead to the food chain and the introduction to the atmosphere through lead combustion are the primary causes of health problems in humans.

3.2 Mercury

Mercury has a toxic effect on both human and environmental health. Methyl mercury has been associated with reproductive health issues in males and females, nervous system dysfunctions, and adverse effects on the cardio-vasculuar system.

3.3 Cadmium

Cadmium is cancer causing to humans. Within environmental systems it rapidly degrades soil health causing flow on effects to local ecosystems, it is also released to the atmosphere if burnt.

3.4 Beryllium

In the smelting of mobile phones, beryllium may be released from the molten mass as a fine particulate and can be inhaled by workers. Inhalation of beryllia or beryllium-containing dust, mist or fume may cause a chronic lung disorder called beryllicosis in susceptible persons, and beryllium is a probable human carcinogen.

3.5 Polyvinyl Cholride (PVC)

PVC is made from vinyl chloride monomer which is highly toxic and a known human carcinogen. Though the monomer, when converted to a polymer when turned into plastic is no longer toxic, it still contains a very small amount of the monomer. When PVC is burned it gives off hydrochloric acid and some of the chlorine combines with other material to form very toxic and stable organochlorine compounds such as dioxins. Hazardous chemical additives (like phthalates) can leach when PVC components of electronic products are sent to land fill.

3.6 Chromium

All forms of chromium can be toxic at high levels, but Cr (VI) is the most toxic. At short-term exposure levels above the MCL, chromium causes skin and stomach irritation, or ulceration. Long-term exposure at levels above the MCL can cause dermatitis, damage to the liver, kidney circulation and nerve tissue damage, and death in large doses. Skin contact with liquids containing Cr (VI) may lead to allergic reactions.

3.7 Arsenic

Arsenic is classified as a carcinogen.

3.8 Antimony

Antimony, in short-term exposure levels above safe levels lleads to gastrointestinal disorders, nausea, vomiting, and diarrhea. Antimony, when left on the skin can irritate it. In long-term exposures at unsafe levels, decreased longevity, cardiovascular problems, and altered blood levels of glucose and cholesterol can be expected.

3.9 Brominated Flame Retardants

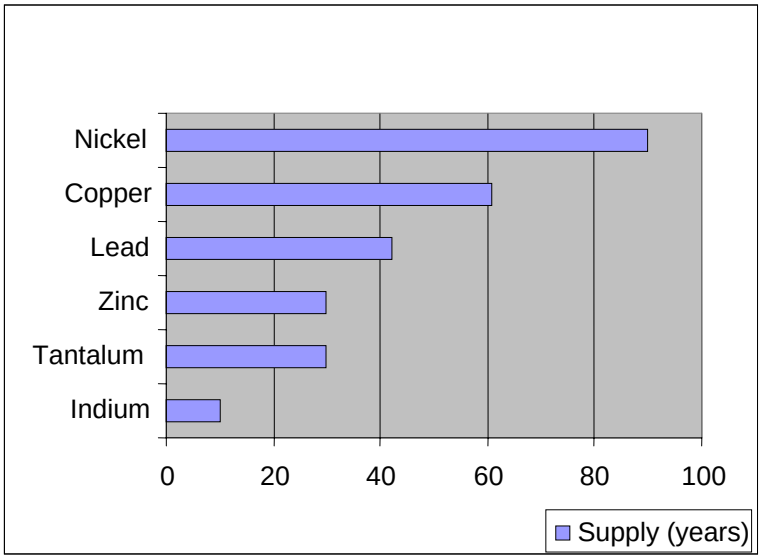
When e-waste is oxidized during smelting, bromine will be released from the incineration of e-waste that contains flame retardants. The released bromine may then recombine with unoxidized carbon

under certain conditions in smelter emissions in the form of brominated dioxins and furans. These are dispersed in the environment and accumulate in fish and other fatty foods. Dioxins and furans are highly toxic and disrupt brain development and hormone systems, particularly in the developing fetus.

4. Resource depletion

Valuable and non-renewable materials contained in electronic waste are being dumped in landfill, worsening rates of resource depletion. These materials should be recovered for reuse. The following graph reflects current reserves of finite materials such as those used in electronic products. [21]

Figure 3: Remaining global supply of materails found in e-waste



Nickel (90 years supply left), is contained in rechargeable batteries for electronic products including mobile phones, laptop computers and cordless tools.

Copper (61 years supply left), used in circuit boards, wiring and computer chips for electronic products.

Lead (42 years supply left), used in monitors, televisions and batteries.

Zinc (30 years supply left), used in cabling, circuit boards, televisions and monitors.

Tantalum (30 years supply left), used in capacitors found in mobile phones, laptop computers and digital cameras.

Indium (10 years supply left), used in flat screen monitors and televisions.

These timeframes highlight the need for diversion of used electronic devices and appliances from landfill and to resource recovery operations. The current rates of electronic product consumption cannot be sustained without massive adjustments to the way electronic waste is currently managed.

[21] Earth's natural wealth: an audit - earth - 23 May 2007 - New Scientist Environment *The calculations have assumed a static rate of growth in the consumption of these materials.

The average computer contains:[22]

Material	% of Total Weight	Use / Location
Plastics[23]	22.9907	Includes organics and oxides (other than silica)
Lead	6.2988	Metal joining, radiation shield/CRT, PWB
Aluminum	14.1723	Structural, conductivity/housing, CRT, PWB, connectors
Germanium	0.0016	Semiconductor/PWB
Gallium	0.0013	Semiconductor/PWB
Iron	20.4712	Structural, magnetivity/(steel) housing, CRT, PWB
Tin	1.0078	Metal joining/PWB, CRT
Copper	6.9287	Conductivity/CRT, PWB, connectors
Barium	0.0315	Vacuum tube/CRT
Nickel	0.8503	Structural, magnetivity/(steel) housing, CRT, PWB
Zinc	2.2046	Battery, phosphor emitter/PWB, CRT
Tantalum	0.0157	Capacitors/PWB, power supply
Indium	0.0016	Transistor, rectifiers/PWB
Vanadium	0.0002	Red phosphor emitter/CRT
Terbium	< 0	Green phosphor activator, dopant/CRT, PWB
Beryllium	0.0157	Thermal conductivity/PWB, connectors
Gold	0.0016	Connectivity, conductivity/PWB, connectors
Europium	0.0002	Phosphor activator/PWB
Titanium	0.0157	Pigment, alloying agent/(aluminum) housing
Ruthenium	0.0016	Resistive circuit/PWB
Cobalt	0.0157	Structural, magnetivity/(steel) housing, CRT, PWB
Palladium	0.0003	Connectivity, conductivity/PWB, connectors
Manganese	0.0315	structural, magnetivity/(steel) housing, CRT, PWB
Silver	0.0189	Conductivity/PWB, connectors
Antinomy	0.0094	Diodes/housing, PWB, CRT
Bismuth	0.0063	Wetting agent in thick film/PWB
Chromium	0.0063	Decorative, hardener/(steel) housing
Cadmium	0.0094	Battery, blue-green phosphor emitter/housing, PWB, CRT
Selenium	0.0016	Rectifiers/PWB
Niobium	0.0002	Welding alloy/housing
Yttrium	0.0002	Red phosphor emitter/CRT
Rhodium	< 0	Thick film conductor/PWB
Platinum	< 0	Thick film conductor/PWB
Mercury	0.0022	Batteries, switches/housing, PWB
Arsenic	0.0013	Doping agents in transistors/PWB
Silica	24.8803	Glass, solid state devices/CRT,PWB

[22] Silicon Valley Toxics Coalition, *Poison PCs, Toxic TVs*, 2004, p. 14 (Sources: Microelectronics and Computer Technology Corporation, 1996 and Electronics Industry Environmental Roadmap)
[23] Plastics contain polybrominated flame retardants and hundreds of additives and stabilizers not listed separately.

Primary Constituents in a mobile phone are:[24]

Material	% of total weight	Use / Location
Plastics	~40%	Case, circuit board
Glass, ceramics	~15%	LCD screen, chips
Copper, compounds	~15%	Circuit board, wires, connectors, batteries
Nickel, compounds	~10%[25]	NiCd or NMH batteries
Potassium hydroxide	~5%	Battery, NiCd, NiMH
Cobalt	~4%	Lithium-ion Battery
Lithium	~4%	Lithium-ion battery
Carbon	~4%	Batteries
Aluminum	~3% [26]	Case, frame, batteries
Steel, ferrous metal	~3%	Case, frame, charger, batteries
Tin	~1%	Circuit board

Minor Constituents - ***typically less than 1%, more than 0.1%***

Material	Location
Bromine	Circuit board
Cadmium	NiCd battery
Chromium	Case, frame
Lead	Circuit board
Liquid crystal polymer	LCD screen
Manganese	Circuit board
Silver	Circuit board, keypad
Tantalum	Circuit board
Titanium	Case, frame
Tungsten	Circuit board
Zinc	Circuit board

Micro or Trace Constituents – ***typically less than 0.1%***

Material	Location
Antimony	Case
Arsenic	Gallium arsenide LED
Barium	Circuit board
Beryllium	Connectors
Bismuth	Circuit board
Calcium	Circuit board
Fluorine	Lithium-ion Battery
Gallium	Gallium arsenide LED
Gold	Connectors, circuit board
Magnesium	Case
Palladium	Circuit board
Ruthenium	Circuit board
Strontium	Circuit board
Sulfur	Circuit board
Yttrium	Circuit board
Zirconium	Circuit board

[24] United Nations Environment Program and Basel Convention, *Guideline on Material Recovery and Recycling of End-of-Life Mobile Phones,* 2006, pp. 12-13
[25] Only if these battery types are used, otherwise minor or micro constituent
[26] If aluminum case used, amount would be much larger, ~20%

5. Australia's Electronic Waste Recycling Capacity

Australia produces over 60 000 tonnes of electronic waste each year (not including the pre-existing backlog of products in storage, awaiting disposal).[27] This represents an immense opportunity for the resource recovery industry which currently remains untapped. Without regulation requiring recycling, e-waste resource recovery infrastructure in Australia will remain marginal and the industry immature.

Australia currently has 6 e-waste recycling operators including the recently opened purpose built e-waste recycling plant in Western Sydney operated by SIMS. This facility has the capacity to recycle 20 000 tonnes of e-waste per year, the largest in the country.[28] Without e-waste regulation, however, the plant is limited to operating well below its full capacity.

5.1 Regulated Extended Producer Responsibility (EPR) Schemes as a solution

Extended producer responsibility schemes have been implemented for electronic waste in many parts of the world since 1994. EPR schemes require manufacturers of products to take responsibility for the collection and recycling of these after the consumer has used them. EPR not only provides environmentally responsible reuse, remanufacturing and recycling, it also encourages innovation within the design process, ultimately leading to more efficient design and resource use.

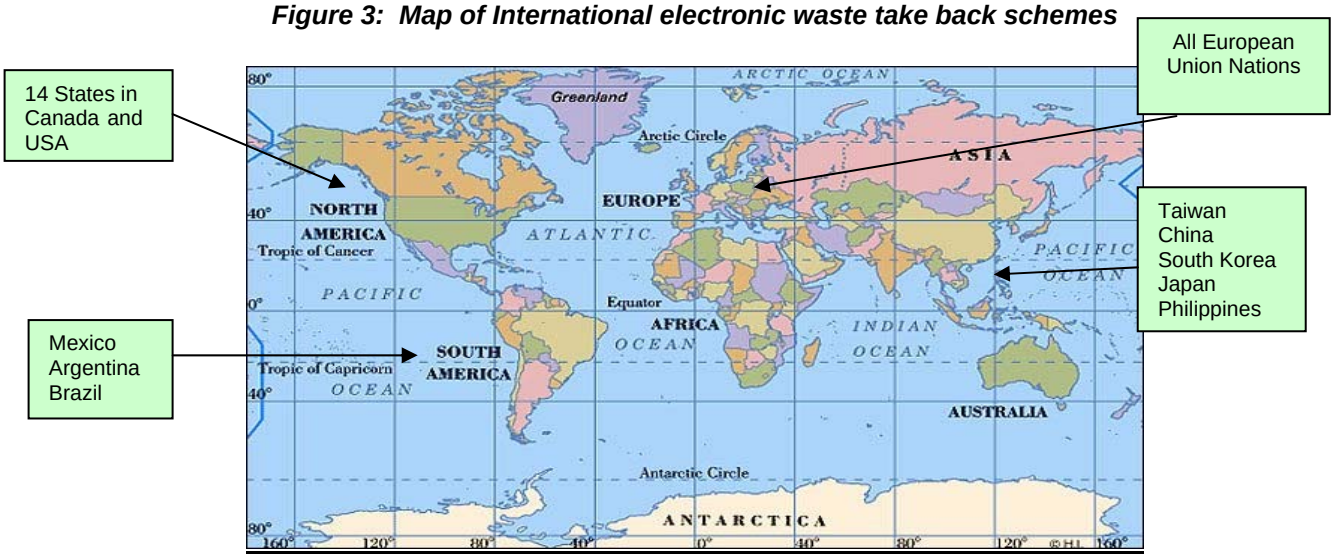
There are several types of EPR schemes, including small advanced recycling fees on products that fund collection and recycling by an industry's producer responsibility organisation (PRO), refundable deposits or voluntary schemes by industries funded from non-transparent levies. Voluntary take-back schemes initiated by industry with no government regulation have a poor track record and often fail to capture many end-of-life products.[29] For example, the Australian Mobile Telecommunications Industry has introduced a scheme called Mobile Muster that captures only 4 percent of phones disposed. Industry participation is low with only 20% of suppliers taking part in the scheme. [30] This low coverage makes it difficult for the general public to access the service. The scheme does not publish audits in full, which allows 'green washing' that projects a false positive spin that promotes the voluntary scheme without substantiation. Such low participation and collection rates ensure that downstream benefits of improved recycling infrastructure, increased resource recovery and decreased toxics in landfill are not met. In short, voluntary programs do not lead to best practice and will not trigger the key paradigm shift required in Australia.

The most effective take back schemes require some level of government regulation. Regulation can include - refund/deposit schemes;[31] advance recycling fee schemes;[32] materials levies for hazardous materials; and minimum standards for the use of recovered or recycled materials.

EPR schemes have been introduced for electronic waste in Europe, North and South America and Asia with government regulation. Regulation creates a level playing field for industry by ensuring that all producers take part. This eliminates any competitive advantage enjoyed by producers who refuse to take responsibility for the environmental impacts of their products. The map on the following page shows which countries have implemented regulations for electronic waste.

[27] SIMS Recycling estimates NSW's annual e-waste production at 20 000 tonnes (pers. comm.), extrapolated by basis of population this equates to over 60 000 tonnes nationally
[28] SIMS, Media Release, November 10th, 2008
[29] OECD, Voluntary Approaches for Environmental Policy: An Assessment, 2000
[30] Busted! The Mobile Muster Myth Exposes. Mobile Phone Recycling Survey TEC July 2007
[31] Such as South Australia's container deposit scheme.
[32] Such as Australia's Product Stewardship for Oil Scheme

Figure 3: Map of International electronic waste take back schemes



Case Study 1 – Television Industry's take back scheme

In response to a growing culture of corporate responsibility, the Australian television industry has recognised the need for an extended producer responsibility scheme to ensure the recovery of its products.

Each year 1.5 million televisions are disposed of to landfill each year. With the switch to a digital network set to continue through to 2013, this disposal rate is expected to rise steeply. TVs contribute to increased content of lead and mercury in landfill. An average CRT television contains around 3.5kg of lead,[33] and a smaller amount of the more toxic mercury. Less than 1% of televisions are currently recycled in Australia. If just 1.25 million of these televisions were recycled this would result in the conservation of 23,000 tonnes of CO_2-e, 520 mega litres of water, 400,000 gigajoules of energy and 160,000 cubic metres of landfill space.[34]

In 2001, the Australian television industry began developing an extended producer responsibility scheme for its own post-consumer products. In 2003, the Consumer Electronics Suppliers Association, with support from Eco-Recycle Victoria, completed a pilot product stewardship project in Victoria. In 2004, the industry established Product Stewardship Australia (PSA), a not-for-profit, industry-led organisation working on permanent solutions to recover and recycle consumer electronics in an environmentally sound manner. This was partly in response to a commitment from the Environment Protection and Heritage Council (EPHC), comprising all of Australia's Environment Ministers, to the introduction of an extended producer responsibility response to electronic waste management. To date, PSA has recruited the support of 12 television producers, which combined supply around 80% of televisions sold within Australia.[35]

In 2004 the EPHC agreed to investigate the needed regulation to underpin the TV industry's voluntary product stewardship scheme.[36] This would ensure that no TV manufacturers gain competitive advantage against responsible companies by failing to participate. However, after three years later there is still no sign of action by governments. After contributing considerable resources to this process over five years, the television industry is on the verge of walking away from the table.

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[33] Microelectronics and Computer Technology Corporation (MCC). 1996. Electronics Industry Environmental Roadmap. Austin, TX: MCC.
[34] Environment Protection and Heritage Council, *Statement on End of Life Televisions*, Nov 2008
[35] PSA website http://www.productstewardship.asn.au
[36] Industry Discussion Paper on Co-Regulatory Frameworks for Product Stewardsip 2004. Environment Protection and Heritage Council.

Case Study 2 – Australia's Computer Industry Response to the problem of e-waste

Australian governments have been engaging the computer industry on the need for a product stewardship scheme since 2001.

Australians disposed of around 1.6 million computers to landfill last year, another 1.8 million were put into storage, on top of an estimated 5.3 million already in storage.[37]The lack of a take-back scheme for computers has led to 5600 tonnes of lead being dumped in Australia's landfills.[38] Only 1.5% of computers are currently recycled in Australia.

In 2004, the Australian Information Industry Association (AIIA) and the NSW Government completed a pilot collection scheme for computers in NSW. In 2005, several computer companies launched a limited take-back scheme, ByteBack, with support from the Victorian Government.

To date ByteBack has collected 1125 tonnes of electronic waste and operates six collection points across Victoria, as well as running a range of collection events. ByteBack could be the foundation of a national computer take-back scheme but only 11 major computer companies participate while 40 other companies have chosen not to participate. This is a participation rate of just over 25%[39]. Less than 2% of the annual e-waste production is currently captured by ByteBack.[40] Currently, the Victorian Government subsidises the collection of non-participating brands. If non-participants continue to hold out and government regulation is not forthcoming, ByteBack is scheduled to end by March 2009.

The inability of ByteBack to attract some of the biggest brands reflects the fragmentation of this industry and the need for government action. In 2006, the EPHC recognised that the lack of voluntary participation is a problem and committed to consider regulation throughout 2007,[41] but there has been little progress.

Case Study 3 Compact Fluorescent Lamps

Over 71 million fluorescent tubes are currently in use in the commercial sector alone.[42] On top of this, over 17 million compact fluorescent lamps are sold every year.[43] The Federal Government has commenced a national phase out of incandescent lamps, which will dramatically increase the usage of compact fluorescent lamps. 24 million lamps have already been distributed in New South Wales and the ACT since 2003 as a result of the Greenhouse Gas Abatement scheme.[44] Many of these lamps are now reaching end of life. These lamps contain between1 to 5 mg of mercury each. This equates to at least 1300 grams of mercury heading to New South Wales's landfills. It takes only 1 gram to

[37] Australian Bureau of Statistics, *Australia's Environment Issues and Trends*, 2006 p19.
[38] 3.5kg lead in a CRT television or Monitor multiplied by 1.6 million computers being sent to landfill annually.
[39] A free computer collection and recycling trial. Byte Back Presentation November 2008
[40] Utilising a total e-waste recycling demand of 63 000 tonnes nationally.
[41] Environment Protection and Heritage Council Communiqué 24 November 2006
[42] NSW Department of Environment and Conservation, *NSW EPR Priority Statement 2005-06*, p. 23
[43] Calculated from Woolworths Ltd sales figures as reported in "Woolworths Flicks the Switch on Energy Efficient Light Bulbs" Media Release 19 October 2008

contaminate 4 billion litres of water above internationally acceptable safe levels.

When mixed with organics in landfill elemental mercury converts to highly toxic methyl mercury[45] creating a toxic legacy within Australian landfills. In addition to this, as these lamps are mostly incorrectly disposed off through domestic rubbish and recycling streams, they are often crushed in the collection process, further contaminating wastes. This also poses an occupational health and safety risk for waste workers.

The New South Wales Department of Environment and Climate Change has consistently recognised the need for an EPR scheme and improved recovery for fluorescent lights through its Extended Producer Responsibility Priority Statements, but has failed to translate this into action.[46] In June 2007 the Environment Protection and Heritage Council recognised the need for improved waste management options for compact fluorescent lamps, committing to an investigation into improved practices.[47] The findings of this investigation have not been publicly released.

5.2 Australia's inaction unacceptable and out-of step with expert advice and community values

Australian Environment Ministers have made numerous commitments to the development of product stewardship schemes for electronic waste for many years.[48] However, to date, not one scheme for e-waste has been implemented. During this time, many millions of end-of-life televisions, computers, mobile phones, fluorescent lights and other electronic devices have been dumped in landfill.

The New South Government has an even poorer track record. In 2001 the Waste Avoidance and Resource Recovery Act came into force, providing ministerial powers for the implementation of regulated EPR schemes in the absence of voluntary national schemes.

In 2004, the NSW Department of Environment and Conservation (DEC) identified electronic products as 'wastes of concern' with computers, televisions and NiCad batteries as wastes for 'priority focus'.[49] In 2005, the DEC initiated Expert Reference Group on Extended Producer Responsibility (EPR) was charged with advising the Minister on products for regulation. The Expert Reference Group represents the views of local governments, consumers, producers, recyclers, environment groups and producer responsibility organisations. It recommended that the Minister initiate regulatory action for computers if no voluntary scheme was forthcoming by the end of 2005. It also recommended that the Minister mandate an EPR scheme for mobile phones if a robust agreement was not reached by April 2006. Neither of these goals was achieved, yet the NSW Government failed to act.

There have been no regulated schemes implemented by the NSW Government 7 years after legislation was passed to do so.

[45] Universal Metals Pty Ltd, *Mercury Contamination of Australia's Landfills and Trade Waste Water*, August 2006
[46] Department of Environment and Conservation, Extended Producer Responsibility Priority Statement 2004; and NSW Department of Environment and Conservation, *Extended Producer Responsibility Priority Statement 2005-06*
[47] Environment Protection and Heritage Council Communiqué 2 July 2007
[48] In 2001, the Australian Government released: Environment Australia, AEEMA and CESA, *Developing a Product Stewardship Strategy for Electrical and Electronic Appliances in Australia*, March 2001
[49] Department of Environment and Conservation *Extended Producer Responsibility Priority Statement 2004*, p. 3.

6. Recommendations

State and Federal governments urgently need to:

- regulate to support the television industry's product stewardship scheme
- introduce full regulation to mandate producer responsibility for the collection and recycling of all end-of-life computers
- introduce full regulation to mandate producer responsibility for the collection and recycling of all end-of-life mobile phones
- introduce full regulation to mandate producer responsibility for the collection and recycling of fluorescent tubes and compact fluorescent lights

The implementation of these regulations will lead to:

- clear and accessible disposal pathways for end-of-life electronic products
- investments in Australia's recycling infrastructure
- innovation within both the recycling and design sectors
- conservation of non-renewable resources
- reductions in greenhouse emissions
- conservation of precious water supplies
- a reduction in toxic materials being dumped in landfill