

Priority waste streams for product stewardship intervention

Submission by Ecotech Services - June 2014



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Conflict of interest statement

Ecotech Services is a Christchurch based company involved with the repair, refurbishment, and recycling of electronic, electrical, and computer equipment. Any future product stewardship scheme for these products may be beneficial to the profitability of the company. However, Ecotech Services firmly believes that product stewardship for all manner of “durable goods” would be a positive step towards environmental protection.

Scope of this submission

This submission will focus on electronic, electrical, and computer equipment (henceforth referred to as electrical products), including any consumable items used by them. For the purposes of this submission, e-waste will refer to discarded electrical products and associated items. This is a necessarily broad definition and covers everything from the ubiquitous power cord to the less common, specialist equipment found in industry, commerce, medicine, and the military.

Cover photographs (from left to right, top to bottom): Stockpiled e-waste (Christchurch, 2004); discarded television (Christchurch 2013); microwave oven circuit board; discarded e-waste (Christchurch 2013); stockpiled e-waste (Christchurch 2004); discarded roadside e-waste (Rotorua 2013); assorted batteries, discarded television (Christchurch (2013); computer monitors. *All images by Alan Liefing.*

Background

Electrical products have undergone immense change since the discovery of electromagnetism about 200 years ago. Early electrical equipment was relatively simple and contained only a small number of different chemical elements and molecules. The equipment was expensive and would be repaired in the event of failure. Technology moved on at a slower pace than what we are now experiencing, and electrical items were not as ubiquitous.

The trade protectionism in place in New Zealand up until the 1980s kept electrical products at a higher price than the global average, and the available selection was quite small. There was a large local manufacturing industry, and parts and service data were readily available. Electrical products were seen as more of an investment than a commodity.

By the late twentieth century, there were huge advances in electrical technology, including the development of the personal computer. The affluent Western countries embraced this technology for commerce, industry and for personal and domestic use. As that century drew to a close, electrical products became commodities, and with high volume and highly mechanised manufacturing in countries with cheap labour, the cost of these products dropped significantly.

Looking at electrical products in our contemporary society we see that they are a part of virtually everything in our lives. Computers, laptops, tablets, cellphones, telephones, alarm clocks, electric toothbrushes, toasters, kettles, whiteware, entertainment products, industrial control equipment, security systems, batteries, recording media are but a few of the technological products that all require recycling at the end of their useful life.

At the same time as electrical products became more ubiquitous the electrical product repair industry went into decline. Industry associations have either been disbanded or amalgamated, most of the small local electrical and television repair shops have closed, nationwide service organisations have closed down, refocused or downsized, and cheap, mass produced products have made the repair of faulty items less likely. This came a very short time after retail stores promoted sales and service because consumers wanted to be assured that their electrical products could be repaired.

Rapid technological changes, the dominance of the retail sector over the repair industry, commodified electrical products mass-produced in highly mechanised factories using cheap labour, inbuilt obsolescence, and a need to “keep up with the Joneses” are all factors that lead to electrical products being readily discarded.

E-waste issues

A number of recent developments and changes over the past decades highlight the problems relating to e-waste disposal. Rapid technological change, stringent electrical safety regulations, high depreciation rates, and high levels of consumerism are just a few of the factors that have caused e-waste to become the fastest growing sector of the waste stream.

Our contemporary society, especially in the commercial and industrial sectors, can be described as having a culture of waste. We have never before seen the level of waste as that now created by durable goods.

There is a large body of literature on the e-waste issue and a huge amount of working policy on e-waste in other countries, so a review of the issue in New Zealand is long overdue. Due to the amount of material available, a comprehensive coverage of the issue is beyond the scope of this submission. This section will outline some of the issues, especially from a New Zealand perspective.



An e-waste stockpile in Christchurch.
Image: Alan Liefing, 2004.

E-waste as hazardous waste

E-waste often contains toxic and hazardous substances such as mercury, cadmium, lead, beryllium, and brominated flame retardant plastics as well as materials that release carcinogenic gases if burnt. To prevent this material from causing human illnesses and to prevent it from entering the environment, it is imperative that e-waste is processed in the correct manner rather than allowing it to be discarded through ignorance or through blasé attitudes.

Economic disincentives

New Zealand has one of the freest markets in the world since the 1980s. Over the past three decades, many businesses have closed and any marginally economic business ventures have moved offshore, closed down, or simply not started. Current global ideology of economic growth requires that more new products are sold, rather than existing products being repaired or having a long service life.

Televisions – a good case for product stewardship

In May 2014, it was announced that RCN was experiencing problems with fulfilling the terms of their contract for the Government funded TV Takeback scheme, put in place because of the cessation of analogue television broadcasting. RCN is a major player in the e-waste processing industry in New Zealand, and if the TV Takeback scheme were to be successful that particular organisation would have been able to do it. This is illustrative of the fact that if product stewardship had been in place for analogue televisions the task of recycling at their end of life would have been greatly simplified.

A number of jurisdictions in other countries have had legislation relating to the disposal of televisions, sometimes coupled with CRT computer monitors, for a number of years.

The processing of leaded glass from CRTs is currently very problematic. MRI, an Australian e-waste processor, is not accepting any new shipments of CRT glass. Some of

the states of the US are opposed to the use of CRT glass as a landfill cover material. These two examples are from the last month alone.

Fly tipping

While small scale fly tipping of electrical products has happened for some time, there has been a noticeable increase in recent years, especially for products that have an end of life disposal fee.

The shut-down of the analogue television transmission service has led to an increase in the number of older CRT televisions left on the roadside. A recycling fee, set at \$25 by one e-waste processor, makes it less likely that consumers will opt for this more environmentally benign option.

Compact discs, especially the cheaper types burned on a home computer, are also often seen discarded on roadsides. While not as harmful as other types of e-waste optical media is able to be easily collected and recycled under a product stewardship scheme.



Two discarded televisions seen on a street in Christchurch.
Image: Alan Liefing, 2013

Based on personal observations in the greater Christchurch area it appears that the fly tipping of automotive tyres, another candidate for product stewardship and a product that also has a disposal fee, is on the increase.

Waste burning

With changing legislation and the realisation that it is generally a bad practice from an environmental point of view, the burning of waste has become less likely. However, when it is done the presence of electrical products causes toxic air pollution and toxic ash. Some of the pollutants include carcinogens such as the various dioxins, and heavy metals such as cadmium, mercury, lead, and copper.

E-Day

In 2000 through to 2010, the Government, through the Sustainable Management Fund, financed a series of yearly e-waste collection days. These eDays were staffed by volunteers and over the three years of operation managed to collect 3,220 tonnes of equipment. In 2010 the funding was cut and so they are no longer held. Volunteers are a limited pool of labour that should not have to be used to clean up after others.

eDay was a good stopgap measure, but rather than having to rely on community driven events that are dependant on the vagaries of funding and the goodwill of volunteers in order to reduce the burden on landfills, it is imperative that product stewardship should be instigated to put the onus back on those who have benefited from the discarded goods.

A perverse result of the eDay, which is not reflection on the organisers, was that an e-waste exporter was prosecuted for illegal waste exports. This situation has happened in other countries and if a product stewardship regime was in place it is not likely to happen.

Flouting of the Basel Convention

In 2004, while investigating e-waste recycling and disposal in New Zealand, Ecotech Services discovered that the Basel Convention was being flouted by some companies. E-waste was being exported to China in contravention to the Basel Convention.

It was not until 2006 that the first application was made for exporting of e-waste under the aegis of the Basel Convention, even though New Zealand has been a signatory to it since 1994. This suggests that there was no proactive work done by the Ministry for the Environment or the Customs Department on preventing illegal waste exports.

Product stewardship can be used as a tool to ensure compliance to New Zealand's international obligations.

Comparison to other toxic wastes

There are a number of chemicals and materials that have been used historically and now have stringent regulations on their disposal in New Zealand. Examples include asbestos, agricultural chemicals, ozone depleting substances, and polychlorinated biphenyls (PCBs). The trend in developed countries is to place some e-waste items in the same category as these substances, and this should also be done in New Zealand.

Complexity

Some e-waste is characterised by a high degree of complexity in terms of its assembly and in the substances used.

A laptop computer, for example, consists of a number of assemblies which collectively contain thousands of individual components. Each component is made up of one or more chemical elements or molecules. To efficiently recycle a laptop is difficult without having specialist equipment.

Landfill acceptance criteria

At present, since there are no actual bans of specific materials, e-waste can be discarded to landfill. Even if there were such bans, and they are in place in some other countries, it would need policing since banned material could easily be hidden or camouflaged.

Having landfill bans is likely to assist any potential product stewardship scheme.

Wastage

In some cases, e-waste is quite usable yet it is readily discarded. Some examples are: computer mice that just need cleaning, IEC 320 power cords that are still safe and functional, usable network cables, appliances that only need minor repair, and items that can easily be repurposed for another function.

Because disposal to landfill is relatively cheap, economic expediency sometimes leads to profligate waste. As an example, durable goods such as headphones are supplied to train passengers and then discarded after a single use.

Climate change

Anthropogenic climate change can be considered to be the most important issue facing our society. It is denied by some but the scientific evidence for it is compelling and given the possibly catastrophic effects on the environment we must act as if it is a possibility.

In a 2003 study, it was calculated that consumption of fossil fuel during the manufacture of a desktop computer was ten times the weight of the finished product. (Kuehr and Williams, 2003) If a product stewardship system is in place, the life of a computer can be extended by methods such as repairing or refurbishing it, repurposing parts for other functions and recycling the materials back into a new computer at the end of its useful life.

As well as carbon dioxide, the very powerful climate forcing agent of nitrogen trifluoride is used in the manufacture of any electrical product containing integrated circuits (the silicon chip). Although escaping into the atmosphere in small amounts, it is about 17,000 times more powerful than carbon dioxide as a greenhouse gas.

Low temperature incineration of e-waste, which may only happen on a very small scale in New Zealand, but is practiced to a larger degree in other countries, will produce a range of greenhouse gases (as well as gases affecting human health).

Submission

(For ease of appraisal of this submission the numbering used here follows that used by the Ministry in the Environment Priority waste stream for product stewardship intervention discussion document.)

Consultation theme 1: Product stewardship priorities

1a In addition to the criterion proposed in the discussion document of risk of harm, resource efficiency opportunities, ineffectiveness of voluntary measure, industry readiness and being currently produced, Ecotech Services recommends that *product complexity* and the effect upon anthropogenic *climate change* should also be criteria for determining whether a product should be subject to product stewardship.

Product complexity would be judged on the type of materials used (i.e relatively homogenous materials such as steel versus complex molecules or admixtures), and the number of components making up the product. Both of these factors influence the ability to repair, refurbish, or recycle the product.

Anthropogenic climate change is considered to be an extremely important environmental issue. It will need addressing on a number of fronts and one of these can be through reducing e-waste. Manufacturing products that are both more durable to begin with, and able to be efficiently recycled at the end of their useful life, will reduce greenhouse gas emissions.

1b The Ministry for the Environment discussion document gives e-waste the following assessment:

- | | |
|-----------------------------------|--------------|
| • Risk of harm | - very high |
| • Resource efficiency opportunity | - very high |
| • Voluntary measure insufficient | - definitely |
| • Industry readiness | - definitely |
| • Current products | - probably |

Ecotech Services agrees with this assessment except that given for current products. It is likely that the complete range of current products making up e-waste can be subjected to product stewardship and as such should be given the assessment of *definitely*.

The additional criteria as outlined in Section 1a should attract the following assessment:

- | | |
|----------------------|--------------|
| • Product complexity | - definitely |
| • Climate change | - probably |

These assessments are for e-waste in general and it should be noted that the assessment will vary across the complete range of e-waste items. For example, a power cord contains a small number of materials and assemblies, but a computer controlled industrial plasma cutting machine is very complex.

1c Ecotech Services agrees with the need for electrical products to be subjected to regulatory interventions for the reasons outlined elsewhere in this submission.

While the perceived problems with it are yet to be realised, nanotechnology (electrical products as well as all others) should also be considered to be priority products. The possible benefits of nanotechnology are very high making it a very attractive technology.

1d (see the discussion under 1a above)

Consultation theme 2: Priority product declaration

2a E-waste should be declared to be a priority product by the Minister for the Environment for reasons outlined elsewhere in this submission.

2b Electrical products should be declared as priority product as soon as practicable.

E-waste, created by the disposal of electrical products, is an increasing sector of the waste stream, and since much of it contains hazardous and toxic material it is imperative that the issue is addressed.

The public perception of the state of New Zealand's environment and whether New Zealand can be conceded to be "clean and green" has been dropping since at least 2000 (Cullen *et al.*, 2013). Assuming that environmental protection is considered to be desirable, and this is the case given the rise in environmental lobby groups and of green politics, the trend indicates that government policy in general is not delivering the desired outcomes for the public.

In comparing the environmental performance of New Zealand from a policy perspective on a global scale, the country the country has slipped somewhat. In Yale University's authoritative *Environmental Performance Index*, New Zealand has gone from being ranked at number one in 2006 down to 16 in 2014 (Hsu *et al.*, 2014).

E-waste disposal is only but one environmental issue amongst many others. However, since it does get mentioned in the popular press on a fairly regular basis this means that addressing this issue would go part of the way in improving public perception of the state of the environment, and make an incremental improvement in the country's environmental performance.

The current regulatory framework may already have sufficient scope for implementing product stewardship (Gertsakis, 2011).

2c Costs as a result of declaring electrical products as priority product will fall on manufacturers, importers, and on consumers. This is more desirable than having it become a burden on local government and on future generations.

Product stewardship will be an economic boon for the electronics service industry and for the small number of e-waste processing organisations in New Zealand

2d E-waste, by definition, is powered by electricity. This is a useful criteria for defining what products are included in any new policy but since virtually all materials used in electrical products are non-biodegradable and all contain recoverable materials – and often contain hazardous and toxic material – they should all be declared to be priority products.

Conclusion

As a method to improve both local and global environmental protection, product stewardship is an ideal system for electrical products. From an economic perspective it may lead to a small increase in New Zealand's GDP, although the sales price of some new products may have to increase.

The culture of waste and the use of the economic bottom line in decision-making are the major factors in creating the e-waste problem. Product stewardship is a means of reversing this culture of waste, and one of the product stewardship tools is through the use of economic incentives and disincentives.

Ecotech Services believes that there will be positive economic and environmental outcomes by declaring electrical products as priority products under the Waste Minimisation Act 2008.

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Further reading

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About the author

Alan Liefing has predominantly worked in the electronics and computer industry since 1981. Since the 1990s he has been aware of the increasing environmental burden created by modern technology and in 2002 he formed Ecotech Services, a technology services company addressing the environmental effects of e-waste.

Alan has a New Zealand Certificate in Engineering (Electronics and Computer Technology) and a Bachelor of Environmental Management. As well as following global e-waste developments for over ten years Alan has done volunteer work for the e-waste processor Molten Media and for the now defunct eDay e-waste collection events.

Links to some of these resources, as well as additional material including an electronic copy of this submission, can be found via <http://www.ecotechservices.co.nz/product-stewardship>.



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