Environment Protection and Heritage Council

Decision Regulatory Impact Statement: Televisions and Computers

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Hyder Consulting

PRICEWATERHOUSECOOPERS

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Foreword

Most of Australia's waste televisions and computers are disposed of to landfill. This imposes a risk of leaching of hazardous substances, although current evidence suggest the problem is relatively small in major urban and regional Australian landfills operating under best practice environmental management systems.

Recycling opportunities exist as an alternative to disposal of televisions and computers to landfill. However, collection and reprocessing costs exceed the value of the resources recovered and recycling is currently only commercially viable in Australia where a fee is paid to cover the difference. Thus, existing recycling activities and schemes are being supported through financial contributions from industry, consumers and governments.

This regulatory impact assessment has been prepared to assess the merits of alternative approaches to encourage the recycling of televisions and computers in a nationally consistent manner.

A consistent national approach to recycling potentially offers cost savings relative to individual jurisdictions implementing separate solutions, and would prevent any adverse impacts that result from inconsistencies across borders. Furthermore, both the community and industry have expressed a preference for a recycling scheme that has comprehensive coverage. This ensures a sharing of the costs associated with a national recycling scheme, and helps to minimise any free riding by individual industry members not participating in such a scheme.

A national recycling scheme for televisions and computers cannot be justified solely on resource recovery grounds, with the cost of recycling televisions and computers outweighing the value of the resources recovered; recycling televisions and computers costs approximately $970 per tonne, but the value of the resources recovered is between $300 and $400 per tonne.

Assuming that 70% of televisions and computers are recycled, up from the current 10%, it is estimated that 2.2-2.5 million tonnes could be recycled between 2008/09 and 2030/31. The results of the CBA reveal that, in current dollars, this would:

- cost an additional $837-$995 million; and
- result in the recovery of additional resources valued at between $284-$333 million, landfill externality cost savings of $20-$24 million and direct landfill cost savings of $21-$25 million.

So, if only the directly observable benefits are taken into account, such a recycling scheme will cost the Australian economy between $512 million and $613 million between 2008/09 and 2030/31 in net present value terms.

The analysis demonstrates that the most cost-effective approach will be to exclude smaller manufacturers (those selling fewer than 5000 units per year). Also, the analysis shows that total recycling costs per tonne in rural and regional areas are 55% higher than in metropolitan areas.

Costs that are not recovered by collectors and recyclers from the value of resources will most likely be borne by the consumers of televisions and computers in the form of a fee at point of sale. The CBA illustrated that on a long run financial basis, a national scheme for recycling computer monitors and televisions (i.e. excluding peripherals, such as keyboards, mice and printers) is estimated to result in average incremental costs of $6.10 per unit sold. However, given that the sensitivity analysis revealed that the estimates are not definitive and respond to changes in key assumptions, a range of $5-$10 would be a better way to reflect the possible cost per television or computer monitor sold (this is approximately 1%-4% of the value of a new television or computer monitor). In a national recycling scheme encompassing all televisions, computers and computer products (in the same manner as the preferred option), the additional cost to consumers is estimated to be around $1.80 per unit sold.

The analysis of policy options presented in this regulatory impact statement is challenging. Given that resource costs do not meet the costs of recycling, the necessity or otherwise of a recycling scheme rests upon an assessment of other factors that either offset the net resource cost, or suggest that people are willing to bear the net resource cost.

In this regard, there are other potential impacts associated with a television and computer recycling scheme that are not directly addressed by focusing on net resource use. These include:

- the human health risk from disposing televisions and computers in landfill and of recycling televisions and computers; and

- landfill disposal can take up land space, reduce amenity for neighbourhoods and possibly impose an environmental risk. In theory, landfill charges should cover the full costs that they impose on society, however, there is a risk that landfill charges will only reflect direct costs to landfill operators.

In general, there is uncertainty about the actual level of risk from landfill and it is very difficult to measure and put a value on these risks in economic terms.

In addition to the value of resources recovered from the recycling process it is possible that society is willing to pay for recycling, just for the knowledge that products are being recycled (i.e.: an intrinsic value of recycling).

The approach taken for this regulatory impact statement has been to draw on a 'choice modelling' survey conducted by URS in 2008/09, which valued environmental and health risks and the intrinsic value of television and computer recycling by surveying individuals (2105 respondents across Australia) to estimate their total willingness to pay for television and computer recycling. The estimated benefits therefore include the community's valuation of recycling to manage recovery of material, perceived health and environmental risk and other intrinsic values.

The URS survey results suggest that, of five potential issues presented, consumers viewed the loss of resources from current disposal methods and the potential for risks to human health and the environment as the most important.[1] It is possible that consumers also took into account other factors not expressly identified by URS such as utility from living in a less wasteful society. The survey indicates that the community could potentially derive intrinsic value (in excess of the costs of collection and reprocessing of end of life televisions and computers) from increased recycling, and are willing to pay for substantial increases in recycling.

When the URS estimate of $21 to $30 per item is used to measure willingness to pay, a recycling scheme with a 70% target will generate an incremental benefit of $1.4-$1.7 billion between 2008/09 and 2030/31 (corresponding to sales of 170 million VDUs and 650 million computers and other computer products) compared to $325-$382 million if only the directly observable benefits, such as the resources recovered, are taken into account. When this benefit is included, all the recycling options considered in this analysis are beneficial to society with a net benefit ranging from $517 million to $742 million (in net present value terms) over this period.

A number of stakeholder submissions received in response to the consultation regulatory impact statement queried URS's estimated willingness to pay, (although the majority of stakeholder submissions did not challenge the URS estimate). One submission from the City of Charles Sturt Council advised that they had conducted a survey of 400 individuals to obtain their views on hard waste and their willingness to pay for recycling at the time of disposal. While the Council's survey is not directly comparable to the URS study, around 40% of respondents indicated that they were 'not at all likely' to recycle their television or computer if the recycling charge was $10.

In assessing the overall merit of a television and computer national recycling scheme, it is important to consider not just the estimated benefits and costs, but the uncertainty and risk surrounding the estimates. Whilst the cost of recycling and the value of the recovered resources is observed and therefore can be estimated with accuracy, there is greater uncertainty and risk surrounding the value of environmental and health risks and the intrinsic value of computer and television recycling. The results of the analysis show that the use of the estimate of willingness to pay included in the calculations demonstrate the value of a national recycling scheme to society.

Ultimately, as documented in this regulatory impact statement, the value of a computer and television product stewardship scheme depends on whether decision-makers accept that society is actually willing to pay at least 60% of the estimated willingness to pay. This is the threshold value required to ensure a national recycling scheme that increases community wide recycling to 70% breaks even and results in net community benefits.

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[1] URS (2009), *Willingness to Pay for E-Waste Recycling,* 23 June, p 29

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Appendices

Acronyms

ABARE	Australian Bureau of Agricultural and Resource Economics
ACES	Atlantic Canada Electronic Stewardship
ACS	Australian Customs and Border Protection Service
ACT	Australian Capital Territory
AIIA	Australian Information Industry Association
ANZECC	Australian and New Zealand Environment and Conservation Council
ARF	Advanced Recycling Fee
ATO	Australian Taxation Office
BCR	benefit cost ratio
CBA	cost benefit analysis
COAG	Council of Australian Governments
CPU	central processing unit
CRT	cathode ray tube
DECCW	Department of Environment, Climate Change and Water
DEWHA	Department of the Environment, Water, Heritage and the Arts
DFAT	Department of Foreign Affairs and Trade
EPA	Environmental Protection Agency
EPHC	Environment Protection and Heritage Council
EPR	extended producer responsibility
ESD	ecologically sustainable development
EU	European Union
GATT	General Agreement on Tariffs and Trade
LCD	liquid crystal display
LGA	Local Government Association
MFD	multi function device
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NGO	Non-government organisation
NPV	net present value
NSW	New South Wales
NT	Northern Territory
OBPR	Office of Best Practice Regulation
OECD	Organisation for Economic Co-operation and Development
OLED	organic light emitting diode
PC	personal computer

POP	persistent organic pollutants
PRO	Producer Responsibility Organisation
PSA	Product Stewardship Australia
PSO	Product Stewardship for Oil
PV	present value
PVC	Polyvinyl Chloride
PwC	PricewaterhouseCoopers
QLD	Queensland
ROHS	Reduction of Hazardous Substances
RIS	Regulatory Impact Statement
SA	South Australia
SED	Surface-conduction Electron-emitter Display
TAS	Tasmania
TEC	Total Environment Centre
TV	television
VDU	visual display unit
VIC	Victoria
WA	Western Australia
WEEE	Waste Electrical and Electronic Equipment
WMAA	Waste Management Association of Australia
WTO	World Trade Organisation
WTP	willingness to pay

Executive summary

This document, prepared for the Environment Protection and Heritage Council, is a decision regulatory impact statement for end of life televisions and computers.

This decision regulatory impact statement has been prepared following the release of the consultation regulatory impact statement published by the Environment Protection Heritage Council (EPHC) on 15 July 2009. It extends the analysis in the consultation regulatory impact statement by incorporating feedback from stakeholders along with further consideration of the policy options. The decision regulatory impact statement sets out a recommended approach to address end of life televisions and computers in Australia.

Introduction

In 2007/08, 138,000 tonnes (31.7 million units) of new televisions, computers and computer products[2] were sold in Australia, which is equivalent to 6.5 kg (1.5 new units) per person. In the same year 106,000 tonnes (16.8 million units) reached their end of life, which is close to 5 kg (one unit) per Australian. It is estimated that 84% (by weight) were sent to landfill, with only 10% (by weight) being recycled.[3] Waste volumes are increasing with shorter life spans of product and increasing ownership of electrical products, with the volume of televisions, computers and computer products reaching their end of life expected to grow to 181,000 tonnes (44.0 million units) by 2027/28.

Internationally, programs are being developed or implemented to reduce the environmental impact of end of life electrical and electronic products, otherwise known as e-waste. The European Union and Japan have already implemented legislation requiring the recovery and recycling of televisions and computers whilst other Organisation for Economic Co-operation and Development (OECD) countries are in the process of introducing a range of mechanisms to address this issue.

Australia's consideration of an approach for managing e-waste has been ongoing since the 1990s when national electrical and electronic waste management was put forward as an emerging priority by industry to the Australian and New Zealand Environment and Conservation Council (ANZECC), the precursor to the current EPHC.

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2 In this document computer and computer products are defined as including: computer displays, computer desktops and similar, computer mobile units (e.g. laptops), computer peripherals (e.g. keyboards, mouse, hard drives, scanners, speakers, web cams, power cords, internal power supplies, external power supplies, fans, miscellaneous/other parts), personal or desktop laser and inkjet printers, and multi function devices.

3 The remaining 6% (by weight) were exported.

In 2002 Environment Ministers agreed that national action was required in relation to waste electrical and electronic equipment. On behalf of the EPHC, a multi-jurisdictional working group, known as the Electrical Equipment working group, examined the issue of e-waste and identified televisions and computers as first priorities for action as a result of their higher levels of hazardous components relative to other types of electrical products, and the lost opportunities for conserving non-renewable resources due to products being sent to landfill. In 2008 EPHC committed to the development of a national solution to the problem of end of life televisions and computers.

In parallel with government consideration of the issues, both the television and key players in the computer industries expressed a desire to engage in large scale national action, with national regulatory support to ensure a level playing field in the market.

While each jurisdiction has its own regulations setting out waste minimisation policies, only the Australian Capital Territory (ACT) Government has a ban on disposing television screens and computer monitors in its landfill. Other jurisdictions are considering bans and a number of take-back schemes have been trialled. In addition, a number of local governments across Australia have implemented or are considering bans or charges for disposing of e-waste in landfill. The number of responses to addressing television and computer waste, and more broadly e-waste, in Australia, demonstrates the significance of the issue for government and the community.

Illustrative of the level of concern was the fact that 130 submissions were received relating to the consultation regulatory impact statement, of which all but one submission was in favour of regulatory action to reduce television and computer waste. While some of the submissions discussed extending any regulatory scheme to address other forms of e-waste, the consultation regulatory impact statement and this decision regulatory impact statement focuses only on end of life televisions and computers. While other types of e-waste may also be considered by the EPHC, they would be examined once a decision on the appropriate management for end of life televisions and computers is reached.

In considering the current regulatory environment and the problems being faced regarding end of life televisions and computers, the consultation regulatory impact statement was developed to inform stakeholder feedback and to facilitate consideration of the following questions.

- What is the problem with end of life televisions, computers and computer products?
- Does the problem justify consideration of government intervention?
- If a case for government intervention has been established, what should the objectives of this intervention be?
- What are feasible options for intervention that could wholly or partly achieve these objectives?
- How effective would the feasible options be to meet the identified objectives and provide the greatest net benefit for community?

There is no observable market that provides a valuation of the intrinsic benefits that society might derive from recycling televisions and computers. As a consequence, an economic modelling survey technique known as "Choice modelling" has been used in both the consultation regulatory impact statement and this decision regulatory impact statement to quantify the value placed on these activities by society. Choice modelling is an internationally recognised technique to quantify the "non-market" values people might assign to an activity. While choice modelling has been used in Australia in a wide range of areas, this is the first time it has been applied to a waste issue. The approach used by URS to quantify society's "willingness to pay" (WTP) for recycling of televisions and computers was developed in two stages, described in more detail late in this document and in Appendix C. To ensure that the technique was appropriate and robust for use in this context, the methodology was peer reviewed by the Australian Bureau of Agricultural and Resource Economics.

This decision regulatory impact statement incorporates the feedback received on the consultation regulatory impact statement as well as further comments and inputs from government, including the Office of Best Practice Regulation (OBPR).

The television and computer waste problem

Currently in Australia, each jurisdiction has its own waste minimisation legislation or policies. The broad powers provided to each jurisdiction by waste minimisation legislation means that there is a tangible risk that each jurisdiction will implement a different approach to the television and computer waste problem in the absence of a national approach. Due to this, each jurisdiction has been working through the EPHC towards seeking a national approach to television and computer waste.

Despite some government and private sector action, the recycling rate of televisions and computer products remains low at 10% of the volume reaching end of life (excluding export of used items), with the remainder being landfilled and a minor proportion being exported.

In considering whether there is a case for government intervention to improve recycling or reduce landfill of televisions and computers in Australia, the following problems were identified for stakeholder consideration.

- Conservation of non-renewable resources. Televisions, computers and computer products contain embedded resources that are non-renewable, but that are lost under current disposal methods. A number of materials such as glass, plastics and lead are able to be recycled either in Australia or overseas. As volumes of televisions and computers being sent to landfill increase, the volume of non-renewable resources being lost increases. There are two broad measures of the value placed on these non-renewable resources.
  - *Market value* – consultation with recyclers indicated that the financial value that the market places on recycled television and computer items is on average $300-400 per tonne of recycled product. However, it should be noted that it presently costs about $970 per tonne to collect and reprocess the waste which would result in a direct financial loss from recycling of about $620 per tonne if regulation were to require the waste to be

recycled without a change in technology or current arrangements. Economies of scale and the adoption of new technology, which are used in other countries, could reduce these reprocessing costs, although currently, the use of new technology in Australia is not financially viable due to the low volumes of end of life televisions and computers being recycled. As such, the recycling industry has been reluctant to invest in these new technologies.

  - *Society's intrinsic value of recovering non-renewable resources* – a survey of more than 2,000 Australians conducted by URS has indicated that respondents are most likely to be willing to pay for a guaranteed increase in the recycling rate and capture non-renewable resources. The results of the survey reflect the views of the survey participants and hence need to be interpreted with a degree of caution. The URS study found that society is willing to pay approximately $0.50 per unit sold for each percentage increase in the recycling rate. This equates to $21.14 per unit sold or $963 per tonne sold to reach 50% recycling. To the extent that the URS survey reflects society's willingness to pay then the results indicate that there is likely to be intrinsic value placed on increasing recycling of resources which is over and above the current market value of those recovered wastes. Based on an interpretation of the URS work, this could total $1.6 billion (present value over the period 2008/09 to 2030/31, 2009 dollars) if 70% recycling could be achieved within five to nine years (corresponding to sales of 170 million VDUs and 650 million computers and other computer products). Sensitivity analysis around the range of possible intrinsic values is discussed later in the report.

- Community expectations are not being met. The survey discussed in the above point suggests that community expectations are not being met under current disposal methods. Private costs associated with recycling do not take into account community wide values or concerns about loss of valuable resources.
- Free-rider problem. There have been some trials of television and computer recycling schemes in Australia, however, these have been successful only because of financial and program support from the government (e.g. the Victorian Byteback scheme), or they are brand specific. While key players in both the television and computer industries have expressed interest in setting up recycling schemes, they are unprepared to implement a scheme without full industry participation. There has been difficulty in gaining the support of all (and some smaller) industry players without being able to enforce participation; in short, a free rider problem. From the choice modelling work it is also reasonable to conclude that a further free-rider problem exists in relation to the community wanting all consumers to be involved in recycling, which reflects that community wide benefits can only be guaranteed by a community wide recycling response. In contrast, there are a number of recycling opportunities which individuals can now and could in the future use. Unfortunately, these activities only generate private 'intrinsic' benefits for the individual and actual levels of recycling suggest that only a small proportion of

consumers have been willing to pay a fee to drop off waste television and computer products to a recycler. To allow community wide 'intrinsic' benefits to be realised requires the consumer free-rider problem to be addressed or else it is unlikely that the current situation will improve much beyond current recycling levels of 10% of tonnes reaching end of life each year.

- Landfill externality costs. There may also be a problem with landfilling of televisions and computers because of the toxicity of some of the materials contained in them. Materials such as lead, bromine, mercury and zinc can be dangerous to humans and the environment. While it is difficult to estimate the risk and cost involved with the landfilling of televisions and computers as volumes increase over time, it is likely that if the *status quo* continues the cost will increase.

  Drawing on the Productivity Commission's estimates for leachate and amenity externalities, if the current e-waste disposal pathways are not varied over the coming years the landfill externality costs incurred are between $1.7 million (leachate costs only) and $3.4 million (leachate and amenity costs) over this time (present value, 2009 dollars) where these costs have been estimated out until 2030/31 (which is the timeframe adopted to allow for consistent presentation of the analysis throughout this decision regulatory impact statement). This figure equates to around $75,000 to $150,000 a year.

- Landfill direct costs and opportunity cost of land. In addition to externality costs of landfilling televisions and computers, there are direct costs associated with operating landfills including the opportunity cost of land, and other ongoing operating costs that vary with landfill volumes. While television and computer waste is estimated to comprise less than 0.4% of landfill volumes generated each year, these volumes are projected to more than double if the current situation does not change, indicating that the landfill space required will also increase over coming years. Increasing volumes of waste televisions, computers and computer products in landfills is contradictory to current government policies that seek to minimise landfill disposal. Given the current landfill disposal trends, direct landfill costs are estimated to total $42.5 million over the years up to 2030/31 (present value, 2009 dollars).

In addition to the problems with the current disposal methods, there are a number of policy factors that add to the pressure for Australian governments to address these problems. These policy pressures include:

- Australia is a signatory to the Basel Convention on the Control of the Transboundary Movements of Hazardous Waste and Their Disposal (the Basel Convention) and the Stockholm Convention on Persistent Organic Pollutants (the Stockholm Convention). In particular, Australia is required as a signatory to the Basel Convention to ensure that the generation of hazardous and other wastes (including household wastes), within Australia is reduced to a minimum, taking into account social, technological and economic aspects; ensure adequate disposal facilities are available within Australia; control and reduce international movements of hazardous waste; and ensure that wastes are disposed of in an environmentally sound manner, which protects human health and the environment against any adverse effects of such wastes. The Basel Convention defines waste televisions and

computers as ‘hazardous’. Some televisions and computers contain some of the persistent organic pollutants recently listed in the Stockholm Convention. Both Conventions impose requirements on the way these wastes are managed both domestically and internationally; and

- international pressure from countries that have already implemented television and computer recycling schemes.

Policy objectives

Consistent with the Council of Australian Governments’ *Best Practice Regulation: A Guide for Ministerial Councils and National Standard Setting Bodies (2007)* (the COAG guidelines) the following specific objectives have been agreed.

1 Broader objective – in line with the 1992 COAG endorsed National Strategy for Ecologically Sustainable Development (ESD) strategy, the broader objectives of any government intervention would be to:

   – improve the efficiency with which resources are used;

   – reduce the impact on the environment of waste disposal;

   – enhance community well-being; and

   – provide for equity between generations.

2 In the context of end of life televisions and computers, the objectives then become:

   – to bring the recovery of television and computer waste in line with community expectations regarding resource recovery and recycling in a cost-effective manner that increases well-being;

   – to improve the efficiency with which resources contained in end of life TV and computer products are used;

   – to ensure fair and equitable geographical, industry and product coverage, which addresses the issue of free-riders; and

   – to ensure that any intervention should be complementary to other relevant domestic policies and international obligations, including the Basel Convention which obliges Australia to minimise the domestic production of hazardous and other wastes, taking into consideration social, technological and economic aspects, and to ensure wastes are managed in an environmentally sound manner.

Policy options

Considering the problems identified and objectives established, a set of policy options were identified in the consultation regulatory impact statement. Those options, repeated in this decision regulatory impact statement, seek to address end of life television and computer problems and wholly or partly achieve the stated objectives.

The selection of the options that were set out in the consultation regulatory impact statement involved the following process:

- identification of policy options – a range of possible policy options from doing nothing to improving recycling of televisions and computers were identified. In this process 18 options were identified;
- identification of funding approaches – a range of ten possible funding approaches to fund a policy/scheme for end of life televisions, computers and computer products were identified;
- assessment of policy and funding combinations – a range of policy and funding combinations (180 given there were 18 policy options and ten funding approaches) were identified; and
- most feasible options selected – considering the set of combinations identified, the most feasible set of policy/funding combinations (approximately 65 out of the total 180) were assessed against the following criteria:
  - resource recovery is maximised relative to other options;
  - costs are minimised relative to other options;
  - coverage is maximised relative to other options; and
  - administration is simple relative to other options.

Based on assessment against the above criteria, the EPHC Electrical Equipment working group[4] identified nine options that were considered most likely to achieve objectives and address problems.

The nine options for a change in government intervention along with the base case (which is an option in itself of 'doing nothing') were as follows.

- Base Case: business as usual – under this scenario the current situation does not change. Some jurisdictions implement regulation or schemes but there is no national coordination of government policy. In the private sector, industry participants implement brand-specific schemes that do not cover all consumers or all end of life televisions and computers;
- Options 1 & 2: Co-regulatory state-based Extended Producer Responsibility (EPR) scheme – underpinned by a National

[4] The EPHC Electrical Equipment working group includes the Department of the Environment, Water, Heritage and the Arts (DEWHA), NSW Department of Environment, Climate Change and Water (NSW DECCW), the Victorian Environmental Protection Authority (EPA) and the National Environment Protection Council (NEPC) Service Corporation.

Environmental Protection Measure (NEPM) with an exemption if the importer belongs to an industry scheme. This scheme is assumed to be administered by an industry-run Producer Responsibility Organisation (PRO), and makes use of a regulatory safety net to encourage participation that is administered by state and territory government. Two options for industry involvement were also considered:

  - *Option 1:* television and computer industries are jointly responsible for the collection of all products under a common PRO (including historic and orphan products).
  - *Option 2:* television industry responsible for the collection of end of life televisions (including historic and orphan products). Major computer brand owners responsible for historic waste from their own brand and importers of generic computer parts and equipment are responsible for all non-branded and historic products. There are two PROs.

- Options 3 & 4: Co-regulatory Commonwealth-based EPR – with an exemption if the importer belongs to an industry scheme. This scheme is assumed to be administered by a PRO, and makes use of a regulatory safety net to encourage participation that is administered by the Australian Government. Two options for industry involvement were also considered:
  - *Option 3:* television and computer industries are jointly responsible for the collection of all products under a common PRO (including historic and orphan products).
  - *Option 4*: television industry responsible for the collection of end of life televisions (including historic and orphan products). Major computer brand owners responsible for historic waste from their own brand and importers of generic computer parts and equipment are responsible for all non-branded and historic products. There are two PROs.
- Options 5 & 6: Co-regulatory Commonwealth excise (levy) – with an exemption if the importer belongs to an industry scheme. This scheme is assumed to be administered by a PRO, and makes use of a regulatory safety net to encourage participation that is administered by the Australian Government. Two options for industry involvement were also considered:
  - *Option 5:* television and computer industries are jointly responsible for the collection of all products under a common PRO (including historic and orphan products).
  - *Option 6:* television industry responsible for the collection of end of life televisions (including historic and orphan products). Major computer brand owners responsible for historic waste from their own brand and importers of generic computer parts and equipment are responsible for all non-branded and historic products. There are two PROs.
- Option 7: Mandatory Commonwealth levy with a government-run subsidy scheme for collection/recycling – an Australian Government administered scheme whereby regulations impose a fee to be paid on

all imports, and subsidies are paid to recyclers for collection/recycling of televisions and computers;

- Option 8: Mandatory import license requirement – producers must hold a license to import televisions and computers, which involves membership of an industry scheme to collect and recycle waste items (involving an industry PRO administering the scheme on behalf of importers); and
- Option 9: Mandatory state-based EPR (NEPM) – involves an industry-run PRO administering a collection/recycling scheme on behalf of importers (who are required by regulation to take part in the scheme). Administration of required regulation could be undertaken by the Australian or state or territory governments.

Cost benefit analysis of options

Analysing the costs and benefits of the identified policy options using economic Cost Benefit Analysis (CBA), indicates that the nine television and computer recycling schemes assessed in this decision regulatory impact statement are all likely to result in net economic benefits to society. As the CBA is based on a range of estimates and assumptions, the appraisal results provide a general view about the likely expected economic outcomes that are subject to these assumptions. As with all CBAs, interpreting the cost and benefit estimates should be undertaken with care as the numbers are indicative, rather than definitive. Sensitivity analysis was undertaken to illustrate how the net present value estimates responded to changes in key assumptions and variables.

In the absence of an observable market that provides a valuation of the intrinsic benefits that society might derive from recycling televisions and computers, the URS choice modelling survey of the community's WTP for recycling televisions and computers has been used in the CBA to estimate the value society places on these recycling activities. The URS choice modelling study assessed a household's WTP for a national recycling scheme that would achieve at least 50% recycling. Respondents were informed that an advanced recycling fee reflecting the cost of collecting and recycling televisions and computers would be included in the price of the product, with no payment made at end-of-life. As part of the consultation process, a number of organisations presented the results of consumer surveys on the WTP for television and computer recycling. However, these results were not comparable to the URS WTP estimates as they were based on a drop-off fee, rather than a fee at point of sale, and they did not measure WTP for a national recycling scheme. As such, they only measured the private benefit accruing to the individual respondent and excluded the public benefits accruing to society as a whole.

As part of the decision regulatory impact statement, a sensitivity analysis was undertaken, which among other things, excluded the URS willingness to pay estimates and included only those benefits that are directly observable as outlined in Table 29 on page 130 of this document (i.e. avoided landfill externalities, avoided direct landfill costs and financial/market resource value recovered). If only these directly observable benefits are included, all options produce a negative net present value, indicating that the results of the CBA rely on the stated preference by people that they are willing to pay for guaranteed levels of recycling (as opposed to revealed preference, which draws on evidence of what people have actually done). The sensitivity

analysis excludes the fact that consumers value recycling for a range of other reasons including preserving resources for future generations and living in a less wasteful society. Therefore, only including the directly observable benefits likely underestimates the net present value of the schemes. Nevertheless, it provides a guide as to the potential size of the net cost that would be imposed on society if the choice modelling resulted in a significant overestimate of the true intrinsic value of recycling. Excluding government costs and externalities from the CBA provides an indication of the magnitude of the government subsidy that would be required to ensure that recycling was financially viable in the absence of charges to consumers.

The CBA has used conservative assumptions where possible to avoid inflating the net benefit results in the CBA. For example:

- the direct costs of landfill are based on the Waste Management Association of Australia's submission to the Productivity Commission inquiry into waste and resource efficiency.[5] A more recent study by BDA indicates these costs have increased from $25 to $40 per tonne;[6]
- it was assumed that there were no benefits for recycling below 50% as the URS study did not estimate the WTP for recycling below this level. However, it would be reasonable to expect that consumers would be WTP for recycling below this level;
- it was assumed there were no long term reductions in processing and collection costs even though economies of scale, new technology already available overseas and tendering processes would likely lead to reduced costs; and
- all other possible benefits based on market values were excluded to avoid any risk of double counting, even though an interpretation of the URS study is that the willingness to pay estimates are in addition to the directly observable benefits.

To the extent that the choice modelling results accurately reflect society's WTP, the appraisal results in an overall conclusion that the options have positive economic outcomes, with relativities between options not expected to change with amendments to key assumptions.

Compared to the *status quo*, the CBA results suggest that:

- all nine recycling policy options assessed could result in net benefits;
- there is little differentiation between the schemes in terms of the estimated present value of costs and benefits; and

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[5] Waste Management Association of Australia (2005), *Submission to Waste and Resource Efficiency Inquiry*, 2005, website: www.pc.gov.au/__data/assets/file/0017/21905/sub028.rtf, accessed 9 March 2009

[6] BDA Group 2009, DRAFT, *The full cost of landfill disposal in Australia*, unpublished report prepared for DEWHA, June

- any differentiation has been found to be due to differing ramp up of recycling rates, and varying administration costs.

Given that collection and reprocessing costs exceed the value of resources by $570 to $670 per tonne, there is some risk that the adoption of a national recycling scheme could impose a net cost on society. This would occur if the WTP was overestimated by an order of about 40% (the break-even point). The lower confidence interval willingness to pay estimate of $18.18/unit sold ($828/tonne sold) results in the NPV decreasing to a range of $324-$500 million, which is above the break even point. The upper value of $23.68/unit sold ($1,078/tonne sold) increases the NPV range to $682 to $949 million.

Given the closeness of the options' net benefits, the community was given the opportunity to comment freely on which option might be the preferred option. Hence the approach in the consultation regulatory impact statement was that no individual options were recommended and all options were considered throughout the consultation process.

For each of the nine options assessed, the analysis was required to take into account four threshold levels at which the options would apply (i.e. different thresholds for different sized businesses in terms of units imported) and to take into account whether the options would apply to all televisions and computers collectively, separately, or just visual display units only. In total this represents 144 separate cost benefit assessments.

For simplicity, the results in the body of the report only present the impacts for each of the options assuming:

- that the option will apply to all televisions and computers collectively; and
- a threshold that excludes 95.5% of importers but maintains coverage of 95.3% of total units sold.

The conclusions and relativities of the other options are similar, although specific estimates differ and those results are presented in the appendices. The analysis highlights that increased recycling resulting from the options will involve additional financial cost. It is our expectation that these costs would be offset by benefits, however, it is not possible to be definitive as the benefits are not known with certainty,

Summary of results - all products, threshold 3 (incremental to base case, discounted, 2009 dollars)

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
Costs	$ millions	$902	$858	$873	$837	$994	$944	$983	$995	$902
Observable benefits	$ millions	$344	$325	$344	$325	$382	$363	$382	$382	$344
WTP benefits	$ millions	$1,522	$1,375	$1,522	$1,375	$1,725	$1,553	$1,725	$1,725	$1,522
NPV (including WTP)	$ millions	$620	$517	$649	$538	$731	$609	$742	$729	$620
NPV (excluding WTP)	$ millions	-$559	-$533	-$529	-$512	-$612	-$581	-$601	-$613	-$559
BCR (including WTP)	Number	1.7	1.6	1.7	1.6	1.7	1.6	1.8	1.7	1.7
BCR (excluding WTP)	Number	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4

Note: For the purposes of this analysis the WTP estimates are assumed to include the directly observable benefits, so these were excluded from the CBA. This therefore avoids the potential for double counting.

Consultation

Extensive consultation has been undertaken as part of considering policy proposals for a national recycling scheme. Consultation was undertaken between governments and key stakeholders from 2006 to 2009 to help form an initial view on the impacts of a scheme and determine key design and delivery options. A consultation package, comprising the consultation regulatory impact statement, willingness to pay study and draft code of practice for managing end of life televisions was released on 15 July 2009, providing four weeks of formal response. The EPHC Electrical Equipment working group also held public forums and met with a broad range of interested stakeholders during the four week consultation period.

The working group received 130 written submissions (including 44 form letters) in response to the consultation package and 163 interested parties attended the public consultation sessions.

Fifteen submissions expressed concern about aspects of the analysis. This included:

- the e-waste collection costs incurred by local Government may be understated;[7]
- scepticism that consumers would pay $33 to $50 per e-waste item for recycling;[8]
- take-up rates could be overstated;[9]
- the analysis did not sufficiently draw on information and experience from overseas;[10]
- concern about the appropriateness of a metropolitan focus in the choice modelling and whether it is applicable to regional and rural Australia; and[11]
- the analysis did not sufficiently take account of the carbon costs associated transport and reprocessing of e-waste.[12]

Overall, however, the consultation revealed broad support for the introduction of a single nationally consistent scheme for televisions and computers underpinned by Commonwealth regulation to ensure a level playing field. State-based regulations were strongly rejected. There was strong support for a national scheme that would allow future expansion to cover other forms of e-waste. There was also strong support for a scheme

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[7] Submission 47

[8] Submission 89

[9] Submission 47

[10] Submissions 54 and 72

[11] Submission 56

[12] Submissions 21, 40 and 44

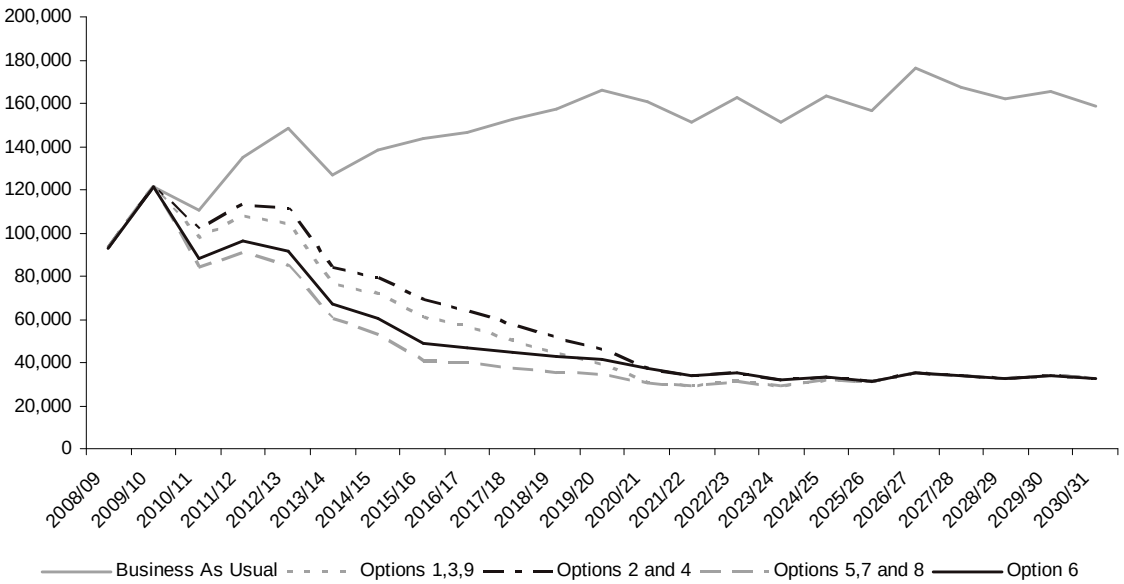
that will achieve the highest possible recycling rates that are realistic and clear, covering all products that are available to be recycled, including orphan and obsolete products. A number of submitters emphasised the importance of putting in place transparent and accountable governance arrangements. There was strong support for a scheme to be up and running by 2011. Local government submissions indicated that the costs of any agreed action should not be shifted onto local government or their rate payers. Industry emphasised the importance of balancing national consistency with the need to avoid increasing the regulatory burden for individual jurisdictions and industry members.

Evaluation and conclusion

In order to determine which option should be recommended as the preferred option, a set of decision criteria was developed by the EPHC Electrical Equipment working group and community consultation was undertaken.

In line with almost all stakeholder views, the analysis in the decision regulatory impact statement highlights that the implementation of any of the options (other than the business as usual or 'do nothing' option) would see the volume of end of life televisions and computers being sent to landfill decline substantially over then next 20 years.

Landfill volumes under the base case and policy options (tonnes) - 2007/08 – 2030/31



Achieving these levels of recycling will ensure that the problems identified in the regulatory impact statement are avoided and this is reflected in the value associated with the community's willingness to pay for recycling end of life televisions and computers. Offsetting this will be the collection and recycling costs associated with different levels of recycling (which constitute around 90% of the costs for each of the options) along with governance and administration costs. It should be noted that:

- collection of end of life televisions and computers from rural and regional areas ($590/tonne) is much more costly than metropolitan areas ($130/tonne) due to lower population density (which results in

lower capture rates per drop-off centre) and higher transport costs (as a result of greater distances to collection facilities). However, these costs are the same for all options.[13] While collection costs could vary by geography, experience from other national schemes suggests that there are a range of other costing approaches that could be used to address concerns about the higher non-metropolitan costs:

  - government subsidies or grants for collection in rural and remote areas;
  - industry using profits from recycling in metropolitan areas to cross-subsidise collection in rural and remote areas;
  - excluding rural and remote areas from the scheme;
  - backloading of trucks delivering goods from metropolitan to rural and remote areas;
  - less frequent collection in rural and remote areas (e.g. once per year); or
  - consolidating collection with other schemes such as DrumMUSTER.

  This issue would need to be addressed at the implementation stage by the Government for mandatory schemes (options 7 and 8). For all other co-regulatory schemes (options 1-6 and 9), resolving this issue would be the responsibility of industry and could be vetted by the Government in deciding whether to approve the industry scheme;

- setting a threshold above 5000 units would be most cost-effective and would significantly reduce the burden on small business, decreasing importer compliance costs from $69-$121 million to $3-$5 million (in present value terms over the appraisal period. This threshold excludes 95.5% of importers from the scheme, but maintains coverage of 95.3% of total units sold in 2008; and
- a consistent national approach may offer some cost savings relative to individual jurisdictions implementing separate solutions and would prevent any adverse impacts that may result from inconsistencies across borders (such as incentives to transport to other states to avoid landfill bans, recycling requirements, or disposal fees.)

In considering which of the options should be adopted, it is acknowledged that the COAG Guidelines note that generally the CBA, and hence the decision regulatory impact statement, will support the option with the highest NPV. To the extent that the URS willingness to pay estimates are considered accurate then this would be Option 7.

We note, however, that the CBA and the estimates contained in the regulatory impact statement are sensitive to the assumptions underpinning

[13] In addition, a weighted average of $270/tonne was included in the CBA based on 69% of the population residing in major cities and 31% residing in rural and remote areas.

the analysis. Given this uncertainty and similarity of the net impacts for a range of the options (such as Options 7, 8, 5, and to a lesser extent Option 3), the highest NPV should not necessarily be the sole selection criteria.

The consultation process explicitly recognised this point and sought feedback on the most appropriate criteria from which to assess the options. That feedback suggested the following criteria.

- it should maximise net benefits to the community;
- it should be legally possible;
- it should involve the minimum necessary time to establish the regulatory instrument;
- it should be simple for government to administer;
- it should be equitable;
- it should be acceptable to key stakeholders and the broader community;
- it should consider the potential impacts of other government processes;
- it should be flexible enough to be expanded to cover other forms of e-waste; and
- it should address the risk of not achieving the outcomes.

Of the options considered, Options 7, 5, 8, and 3 are the highest ranked options (and in that order).

There are a number of potential barriers to the support of Options 7, 5 and 8:

- In relation to Option 7 and 5 however, it is possible that the Henry Review of the Australian tax system will recommend against the use of specific levies towards greater use of reliance on broad based taxes[14] and hence these options may not be consistent with future tax policy.
- In relation to Option 8, while this was clearly preferred by industry and stakeholders, advice from the Australian Government indicates that there may be trade implications and that the establishment of the scheme could be in breach of Article XI of the General Agreement on Tariffs and Trade (GATT) and that it would be difficult to rely on exceptions in Article XX.

While Option 3 (a co-regulatory scheme with a Commonwealth EPR regulatory safety net) has the fourth highest NPV it provides a level of surety against the criteria identified above:

[14] Australian Treasury (2008), 'Architecture of Australia's Tax and Transfer System', pages 283 and 285-6

- the Commonwealth has the Constitutional power to implement the regulatory instrument;
- the regulatory instrument is expected to take 1-2 years to design and implement and it is likely to be the quickest to implement (of the four highest NPV options);
- the Commonwealth EPR can be implemented and administered by a single Australian Government agency and this scheme has the lowest total administration costs;
- the Commonwealth can ensure appropriate coverage to deal with 'orphan' waste;
- stakeholders did not indicate that they were opposed to this option to a significant degree;
- the Commonwealth EPR should not be adversely influenced by other government processes, especially the Henry Review, as the scheme does not propose to include a levy;
- the Commonwealth EPR has the capacity to be designed to allow for future expansion to other forms of e-waste;
- the Commonwealth EPR safety net ensures that there is a scheme even if industry negotiation does not result in a compromise between the television and computer industries.

Acknowledging that there are trade-offs and broader policy implications for many of the options, and taking a balanced view of all of the evaluation criteria, the recommendation in this decision regulatory impact statement is that Option 3 is preferred.

Implementation Issues

The costs of the proposed option will likely be passed on to consumers in the form of a fee at point of sale. Although the preferred option covers all products, due to variations in the weight and value of televisions, computers and computer products, it may be more informative to look at VDUs alone (televisions and computer monitors) as these are larger items which are relatively similar in terms of both weight and value. In this example, the CBA illustrated that the additional cost to consumers of a national recycling scheme covering VDUs alone is estimated to be around $6.10 per VDU sold. However, given that the sensitivity analysis revealed that the estimates are not definitive and respond to changes in key assumptions, a range of $5-$10 would be a better way to reflect the possible cost per television or computer monitor sold. As the value of these products is estimated to range from $230-$645 per unit, the additional costs account for around 1%-4% of the value of a new television or computer monitor. In a national recycling scheme encompassing all televisions, computers and computer products (in the same manner as the preferred option), the additional cost to consumers is estimated to be around $1.80 per unit sold.

It should be noted that these costs are calculated on a per unit basis. However, given that there are significant differences between the units in terms of both weight and value, it may be more equitable to calculate the fee based on weight or value. In addition, these costs are long run marginal

averages and may fluctuate over time, particularly in the short term when up front capital investments are likely to be required. The costs included in the calculation were collection costs, reprocessing costs, PRO administration costs, importer compliance costs, recycler compliance costs and communications costs.[15]

Given the high cost of the proposed option, which will likely be passed on to consumers in the form of a fee at point of sale, and given that the net benefits rest on the achievement of significantly higher recycling levels, it will be paramount to ensure that the increase in waste recycling is achieved. In this regard, the preferred option involves government working with industry and it will be critical for agreement to be reached on the appropriate governance, funding and accountability measures as well as:

- the manner in which the scheme will run, where drop off facilities will be located and whether kerbside collection will be undertaken;
- ensuring rural and remote areas are adequately included;
- the review processes to ensure fees and costs are kept as low as possible, particularly through the use of regular tendering or service contracts;
- ensuring all governance issues are settled such that the scheme can provide universal coverage and does not result in undue impost on participants in the scheme; and
- providing for regular review of the scheme to ensure independent assessment of actual recycling levels and scheme costs.

[15] Communications costs were only included for co-regulatory schemes (options 1 to 6, 9) as these costs were assumed to be incurred by the government in mandatory schemes.

1 Introduction

More than 16 million televisions, computers and computer products reach the end of their useful life each year, with the majority being landfilled and a small proportion recycled.[16] This is predicted to grow to 44 million by 2027/28. This report examines whether problems exist for end of life televisions and computers that may require government intervention. The report also considers policy options to address those problems.

1.1 Purpose of the regulatory impact statement

This document is a decision regulatory impact statement drawing on material previously presented in the consultation regulatory impact statement, stakeholder feedback on that consultation regulatory impact statement and reflects further analysis and advice from the Environment Protection and Heritage Council (EPHC) Electrical Equipment working group.[17] The purpose of this decision regulatory impact statement is to examine the impacts of implementing consistent national arrangements for end of life[18] televisions and computers and to recommend a preferred option(s) based on community consultation and the following set of criteria which was devised by the EPHC Electrical Equipment working group based on written submissions from stakeholders:

- it should maximise net benefits to the community;
- it should be legally possible;
- it should involve the minimum necessary time to establish the regulatory instrument;
- it should be simple for government to administer;
- it should be equitable;
- it should be acceptable to key stakeholders and the broader community;
- it should consider the potential impacts of other government processes;

[16] Note that computers that are reused or placed in storage are not defined as having reached end of life.

[17] The EPHC Electrical Equipment working group includes the Department of the Environment, Water, Heritage and the Arts (DEWHA), NSW Department of Environment, Climate Change and Water (NSW DECCW) and the Victorian Environmental Protection Authority (EPA) and the National Environment Protection Council (NEPC) Service Corporation.

[18] 'End of life'' as defined in this document, relates to televisions, computers and computer products that are either 'recycled' or 'landfilled'. Items that are stored or reused are not considered to have reached their end of life.

- it should be flexible enough to be expanded to cover other forms of e-waste; and
- it should address the risk of not achieving the outcomes.

Televisions and computers are increasingly popular in households and businesses around Australia. In 2007/08 there were there were 7.6 million televisions and computers and a further 22.6 million related computer products ('peripherals' including keyboards, mice, power cords or printers) sold into Australia[19] — a total of 31.7 million units, or 1.5 new units per person. [20] In the same period, it is estimated that 16.8 million televisions, computers and computer products reached the end of their useful life.[21] This suggests that each Australian disposes of nearly one unit each year.

The number of televisions and computers being sold in Australia, and the speed at which they reach obsolescence, has been increasing in recent years, driven by industrial processes, rising incomes and wealth, demographic and lifestyle factors, rapidly improving technologies, the move to digital television and declining real costs due to falling prices of minerals and other raw material inputs.[22] As a result the volume of television and computer products reaching end of life each year is expected to increase at a much higher rate than sales (with sales projected to increase at a rate of 1% per annum compared to year-on-year growth in end of life arisings of 5% per annum).[23] This means that unless current practices are changed, a significant volume will be disposed in Australian landfills, given that recycling rates are currently low, at around 14% (by weight) of computers and computer products reaching end of life each year and less than 1% (by weight) of televisions (10% of all products).[24] Over the next 20 years, it is estimated that if the existing situation is not changed, 3 million tonnes (652 million units) will be accumulated in Australian landfills, compared to only 212,000 tonnes (71 million units) being recycled and recovered over this

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[19] Television and computer sales consisted of: 3.1 million televisions, 4.5 million assembled desktops and laptops, 1.6 million separate computer monitors and 22.6 million other computer products such as keyboards, mice, power cords or printers (known in the industry as 'peripherals').

[20] Sales data was estimated using Department of Foreign Affairs and Trade (DFAT) data on imports. Population sourced from: ABS 2008, *3222.0 Population Projections, Australia*, Table 9 (Jun-2006 to Jun-2101 estimates).

[21] Television and computer products reaching end of life consisted of 1.2 million televisions, 2.1 million fully assembled computers and laptops, 700,000 computer monitors, and 12.9 million other computer components. It was assumed that televisions had an average lifespan of 8 years (constant over the appraisal period). Computers were assumed to have an initial lifespan of 3 years, a reuse lifespan of 3 years and a storage lifespan of 2 years. Computer disposal behaviour was based on the model in Meihardt 2001, 'Computer and Peripherals Material Project', prepared for the Department of Environment and Heritage (now the Department of the Environment, Water, Heritage and the Arts).

[22] R&Z Consulting (2008), Estimating Consumers' Willingness to Pay for End of life Televisions and Computers in Australia, prepared by Dr John Rolfe for the NSW Environmental Protection Agency, August 2008, page 3.

[23] Sales for televisions and computers were estimated using DFAT data on imports. End of life modelling was based on estimated sales, lifespan, weight and disposal pathways.

[24] The amount (tonnes) of televisions recycled was estimated based on surveys of 13 e-waste recyclers. This was converted to number of units based on estimated sales data.

timeframe. This is equivalent to 6% of tonnes reaching end of life over this period.

As indicated by these 20 year projections, if televisions and computers are not recycled when they reach their end of life, they are generally disposed in landfill. The disposal of televisions and computers in landfill is seen as problematic for a number of reasons including potentially hazardous impacts from landfill or inappropriate disposal, and the loss of non-renewable and potentially recoverable resources such as lead and aluminium.[25] In addition, it has been recently identified that the value of recycling includes not only the financial value that the market places on recycled materials, but also non-market values that represent the more 'intrinsic' values society places on increased recycling (e.g. a sense of personal/community duty or wanting to live in a less wasteful society). With landfill of televisions and computers, these values are lost.

These issues and their relative magnitude are primary considerations in this document, along with assessment of the potential role for government in addressing and helping recognise the market and non-market values.

1.2 What is the process to prepare a regulatory impact statement?

The development of regulations at a national level involves a two-step process. Firstly, a consultation regulatory impact statement is prepared. Then, this statement is made publicly available for the purposes of encouraging feedback on the analysis of options, data, efficacy and suggestions on the information provided in the document. Submissions received in the consultation stage are used to inform the development of stage 2, a decision regulatory impact statement, which examines preferred options and other less preferred options.

In preparing the consultation and decision regulatory impact statements the Council of Australian Governments' *Best Practice Regulation:* A Guide *for Ministerial Councils and National Standard Setting Bodies (2007)* (the COAG Guidelines) have been followed.[26] The COAG guidelines provide step by step directions on the method required in order to provide clear justification as to why regulations should be introduced, remade or adjusted.

In order to assess whether government intervention is justified, it is necessary to demonstrate the existence of either a regulatory failure or a problem that the market is not likely to resolve on its own in a satisfactory manner. Within this context, the consultation regulatory impact statement:

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[25] Nixon, H. and Saphores, J-D. M. (2007), *Financing Electronic Waste Recycling – Californian Households' Willingness to Pay Advanced Recycling Fees*, Journal of Environmental Management, 84(4): pages 547-559

[26] Council of Australian Governments (2007), *Best Practice Regulation: A Guide For Ministerial Councils and National Standard Setting Bodies*, October

- provides a background to the television and computer industries;
- discusses pressures that may be impacting on end of life television and computer policies;
- assesses the dimensions of problems related to television and computer waste;
- sets out the possible objectives of a proposed scheme to regulate recycling of television and computer waste; and
- provides an estimate of the likely impacts of a range of alternatives to address the problem using cost benefit analysis (CBA).

Consultation with relevant stakeholders, including business, the community, regulators and all levels of government was undertaken in order to:

- ensure that both those affected by the regulation and the actioning agency have a good understanding of what the problem is;
- provide perspectives and suggestions on alternative options to address the problems from those parties that will be affected by the government actions;
- help regulators assess competing interests;
- provide a check on the regulators' assessment of costs and benefits and whether/how the proposed option will work in practice, thus reducing the risk of unintended consequences if a particular option is adopted;
- identify interactions between different types of regulations; and
- possibly enhance voluntary compliance through greater understanding and acceptance of the proposal, thereby reducing reliance on enforcement and sanctions.[27]

The decision regulatory impact statement incorporates a consultation statement (prepared by the EPHC Electrical Equipment working group) which includes the following information:

- the main parties affected and who has been consulted;
- the views of stakeholders;
- how stakeholders' views have been taken into account; and
- the process used for consultation.[28]

The decision regulatory impact statement also recommends a preferred option and includes:

- how the community is expected to receive a net benefit;

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[27] Commonwealth Government Office of Best Practice Regulation (2007), *Best Practice Regulation Handbook*, August, p 87

[28] Ibid, pp 87-88

- why the preferred option(s) is the best option and the reasons that other options are rejected;
- any areas of uncertainty;
- the main assumptions that support adoption of the preferred option.[29]

Having recommended a preferred option(s) it is necessary to consider issues related to the implementation and enforcement of the option, and explore how the option will be reviewed after it has been in place for some time.[30]

The focus of the current regulatory impact statement is on television and computer waste and more specifically, televisions and computers, defined as follows:

- *television*: a visual display device, such as a cathode ray tube (CRT), liquid crystal display (LCD), surface-conduction electron-emitter display (SED), organic light emitting diode (OLED) or plasma unit, with an internal or external broadcast tuner; and
- *computer*: personal and laptop computers and peripherals.[31]

This decision regulatory impact statement presents preferred options based on the net present value (NPV) results of the CBA, as these options deliver the highest net benefits to society. However, the CBA and the estimates contained in this decision regulatory impact statement are sensitive to the assumptions underpinning the analysis, and given the close proximity of a range of the options (such as Options 7, 8, 5, and to a lesser extent option 3), the highest NPV should not necessarily be the sole selection criteria.

The consultation process explicitly recognised this point and sought feedback on the most appropriate criteria from which to assess the options. That feedback suggested the following criteria:

- it should maximise net benefits to the community;
- it should be legally possible;
- it should involve the minimum necessary time to establish the regulatory instrument;
- it should be simple for government to administer;
- it should be equitable;

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[29] Ibid

[30] Ibid, p 89

[31] In this document computer and computer products are defined as including: computer displays, computer desktops and similar, computer mobile units (e.g. laptops), computer peripherals (e.g. keyboards, mouse, hard drives, scanners, speakers, web cams, power cords, internal power supplies, external power supplies, fans, miscellaneous/other parts), personal or desktop laser and inkjet printers, and multi function devices.

- it should be acceptable to key stakeholders and the broader community;
- it should consider the potential impacts of other government processes;
- it should be flexible enough to be expanded to cover other forms of e-waste; and
- it should address the risk of not achieving the outcomes.

1.3 Basis of data used

Pricewaterhouse Coopers (PwC) has prepared this decision regulatory impact statement in association with Hyder Consulting (Hyder). Hyder has provided technical input in relation to the television and computer industries by preparing the following data for use in this decision regulatory impact statement:

- information on current sales, reuse, storage, recycling and landfill of televisions, computers and visual display units, measured both in units and tonnes. The reports also provide an overview of apparent trends and preliminary forecasts in these categories assuming no new government policies are introduced ('business as usual') between the years 2007/08 and 2030/31;[32]
- a high level assessment of proposed policy options with regards to the likely recycling outcomes under each option and the cost of associated infrastructure required for collection and reprocessing;
- an average collection cost and reprocessing cost per kilogram and per tonne;
- analysis of coverage thresholds; and
- an overview of the projected diversion rates for each of the four product groupings – televisions, computers, visual display units and all television and computer products – under each option.

In addition, the regulatory impact statement also draws on work commissioned by the EPHC at the end of 2008 and completed early in 2009. This work was undertaken by URS, in combination with economists and statistics analysts from ERE Consulting and market research specialists from NWC Research, and involved surveying and modelling households' willingness to pay for increased television and computer recycling.[33]

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[32] A 20 year appraisal period commencing in the first year of the proposed schemes (2010/11) is based on recommendations in the COAG Best Practice Regulation Guidelines. See Commonwealth Government Office of Best Practice Regulation (2007), 'Best Practice Regulation Handbook', August, p 117

[33] URS (2009), *Willingness to Pay for E-Waste Recycling*, report prepared for the Environment Protection and Heritage Council, February. More information on choice modelling can be found in Appendix C.

1.4 Stakeholders consulted

In addition to the data discussed above, and the public and other documents presented in the reference list (Appendix A), the following organisations have contributed in some way to this publication:

- 1300EWASTE;
- Australian Customs and Border Protection Service (ACS);
- Australian Information Industry Association (AIIA) and members of the organisation;
- CLAW Environmental;
- Close the Loop;
- Department of Foreign Affairs and Trade (DFAT);
- E-Cycle Recovery;
- HMR Group Adelaide;
- MRI;
- PGM Refiners;
- Product Stewardship Australia (PSA) and members of the organisation;
- EPHC Electrical Equipment working group;
- SIMS;
- Sustainability Victoria;
- TES-AMM;
- That Guy's Recycling;
- The Eaglehawk Recycle Shop;
- Theiss Environmental;
- TIC Group; and
- Vantage Incorporated.

In response to the consultation regulatory impact statement, 130 written submissions were received from various stakeholder groups including jurisdictional agencies, local governments, AIIA members, PSA members, industry associations, recyclers and non-government organisations (NGOs) . As part of the decision regulatory impact statement, the EPHC Electrical Equipment working group prepared a summary of these written submissions, which is presented in Chapter 8. A list of stakeholders that provided written submissions is presented in Appendix L.

1.5 Structure of this regulatory impact statement

The analysis in this decision regulatory impact statement:

- presents a background to the television and computer industry (Chapter 2);
- discusses policy pressures and current approaches to end of life televisions and computers being undertaken in other Organisation for Economic Co-operation and Development (OECD) countries (Chapter 3);
- identifies the problems related to end of life televisions and computers (Chapter 4);
- outlines the objectives of any potential government intervention (Chapter 5);
- outlines alternative policy options to be considered to wholly or party meet objectives (Chapter 6);
- assesses the costs and benefits of policy options considered most feasible (Chapter 7);
- presents a summary of the stakeholder consultation undertaken including the main parties affected and their views (Chapter 8);
- evaluates the options against a set of criteria devised by the EPHC Electrical Equipment working group based on written submissions from stakeholders to select a preferred option(s) (Chapter 9); and
- considers issues related to how the selected option(s) will be implemented and reviewed (Chapter 10).

This decision regulatory impact statement is also supported by a number of appendices that provide additional detail:

- Appendix A - References
- Appendix B - Customs tariff data and definitions
- Appendix C - Choice modelling
- Appendix D - Policies in Australian jurisdictions
- Appendix E - Analysis of options
- Appendix F – Analysis of coverage thresholds
- Appendix G - CBA assumptions
- Appendix H - Costs for each option
- Appendix I - Benefits for each option
- Appendix J - Summary of CBA results
- Appendix K - Sensitivity analysis
- Appendix L - Stakeholders Consultation

2 The television and computer industries and associated waste

To provide context for the discussion on television and computer waste problems and regulatory options to address these problems, this chapter presents an overview of the television and computer industries. While noting that the television and computer industries are separate industries, this regulatory impact statement has analysed them jointly as a number of problems (discussed in Chapter 4) are shared across the industries.

2.1 What are televisions and computers?

As indicated in Chapter 1, this document uses the following definitions for televisions and computers:

- *television:* a visual display device, such as a cathode ray tube (CRT), liquid crystal display (LCD), surface-conduction electron-emitter display (SED), organic light emitting diode (OLED) or plasma unit, with an internal or external broadcast tuner; and
- *computer:* personal and laptop computers and peripherals.

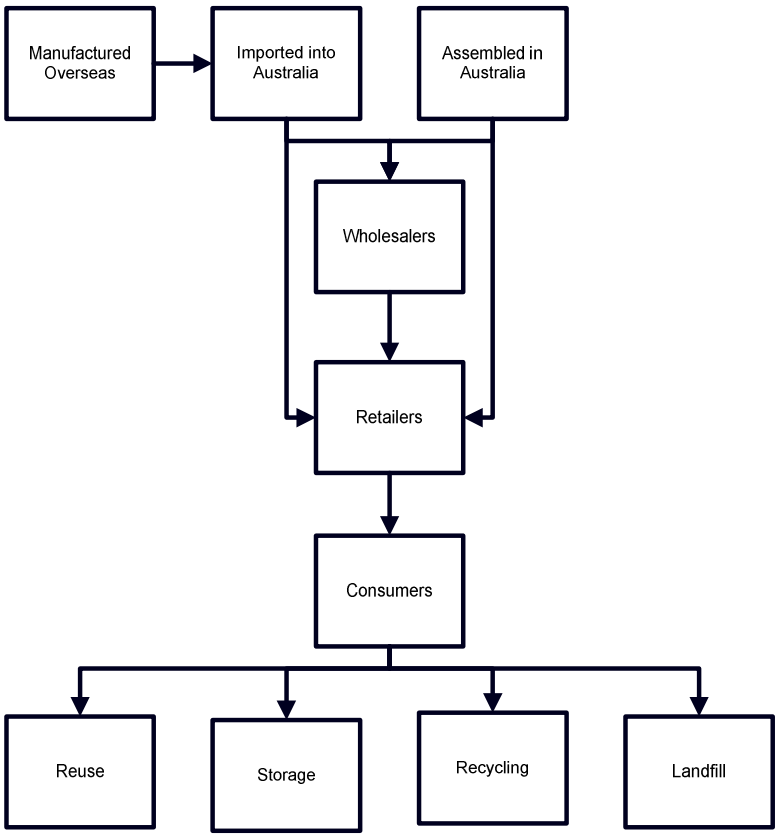
An implication of these definitions is that import, sales and recycling volumes tend to be presented on a unit basis. However, to understand issues such as landfill space and the costs related to collection and recycling, a conversion of units into tonnes to allow comparison and analysis of different products like computers, televisions, monitors, mice, keyboards, speakers and power cords has been required. As a result, this chapter presents a profile of televisions and computers in either tonnes or units.

For the purposes of this decision regulatory impact statement, tariff data and definitions used by the ACS to code televisions and computers have been used. These codes are set out in Appendix B.

2.2 Television and computer industry participants

There are a number of participants in the television and computer industry supply chain, which is depicted in Figure 1.

Figure 1 Television and computer industry supply chain



Note: 'end of life' as defined in this document, relates to televisions and computers and computer products that are either 'recycled' or 'landfilled'. Items that are stored or reused are not considered to have reached their end of life yet.

Some of the key points relating to the supply chain are:

- all television, computer and computer products are manufactured overseas (although some units are assembled in Australia prior to sale); and
- there are only two disposal destinations for televisions and computers that have reached their end of life; they are either recycled or landfilled.

The key elements of the supply chain are described further below.

Description of production

The components for microcomputers (used as personal computers and as servers for other computers and peripherals) are mostly manufactured and assembled overseas. In addition, a significant (12%)[34] but decreasing proportion of desktop personal computers are manufactured overseas but assembled to specifications in Australia ('white box' computers). However, all portable computers are assembled overseas.

IBM, Acer, Lenovo, Hewlett Packard, Dell and Toshiba are major suppliers of computers in Australia.[35] However, there are a large number of small to medium sellers, with the top four companies in the industry only accounting for around 10% of revenue of the computer and associated manufacturing industry.[36]

The AIIA, which is the peak national body representing the technology sector,[37] estimates there are hundreds of companies that import components into Australia and assemble them into computers here. These unbranded products are known as 'white box' computers and currently account for around 12% of domestic retail sales.[38] It is expected that there will continue to be consolidation in the computer industry.

Employment, revenue and exports associated with computers manufactured and assembled in Australia have declined in recent years as import competition becomes stronger and manufacturing has moved overseas. More broadly, manufacturing of electronic products has progressively moved to countries with lower wages and material suppliers in close proximity. From a global perspective, however, this industry is in a growth phase. IBISWorld notes that there is a rapid introduction of new products due to a rapid rate of technological change, which will produce shorter product life cycles. Customer demand for, and acceptance of, new products is also rapidly growing.[39]

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[34] Australian Information Industry Association (2009), *pers. comm,* 14 April

35 Note that major computer manufacturers located in advanced countries, such as the United States, are relocating, or contracting out, production to countries such as China which are offering low manufacturing costs. For example, in early 2005, IBM sold off its PC business to China's Lenovo group. China alone now accounts almost half of the value of all imports of computers into Australia. See IBISWorld Pty Ltd (2009), Computer and Related Manufacturing in Australia, 20 January

[36] IBISWorld Pty Ltd (2009), *Computer and Related Manufacturing in Australia,* 20 January

[37] Australian Information Industry Association (2009), 'About AIIA', available at < http://www.aiia.com.au/pages/aboutaiia.aspx>, accessed 21 April 2009

[38] Australian Information Industry Association (2009), *pers. comm,* 14 April

[39] IBISWorld Pty Ltd (2009), *Computer and Related Manufacturing in Australia,* 20 January

Similar to computers, Australia does not manufacture any televisions domestically. The last Australian manufacturing plant closed in 2006.[40] Unlike computers, however, Australia does not assemble any televisions locally, with all television sets imported from overseas. There is no assembly of imported components in Australia to produce 'white box' products.[41] The major suppliers of television sets within Australia are Sony, Samsung, LG, Panasonic and Sharp. They comprise around 74% of sales by value in Australia,[42] making the television industry more concentrated than the computer industry.

Television production has changed over the years in response to technology, the proposed shift from analogue to digital technologies, and the introduction of high definition televisions, which has allowed clearer pictures to be provided on larger formats.[43] It is estimated that 54% of Australian households are watching digital television,[44] and that high definition receivers account for 36% of all digital receivers.[45] This has resulted in a transition from CRT televisions to larger flat screen LCD, plasma and rear projection televisions.

Description of imports

Televisions and computers are all imported into Australia (noting that 'white box' computer components are all imported but are then assembled as desktop personal computers (PCs) in Australia). Given all items/components are imported, import data provides a useful measure of volumes and values sold each year in Australia for the two industries, and hence is used as the basis of information provided in this document. In comparison, data on retail sales is not publicly available as it is largely the industry itself that prepares and collates this data for internal industry use. Import data has, however, been used to estimate sales levels.

In 2007/08 there were approximately 3.1 million television set sales and 28.6 million computer and computer product sales in Australia, all from imported sources unless they are units assembled in Australia (that are assembled from imported components).

While televisions are imported as 'sets', only 8% of computer imports were fully assembled PCs or laptops. The majority of computer units imported

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[40] Australian Broadcasting Association, (2006), *The World Today – Australia's last television plant closes*, accessed 9 April 2009, available at <http://www.abc.net.au/worldtoday/content/2006/s1554891.htm>

[41] IBISWorld Pty Ltd (2009), *Electronic Component Manufacturing in Australia,* March

[42] Product Stewardship Australia (2009), *Pers. Comm.*, 13 March

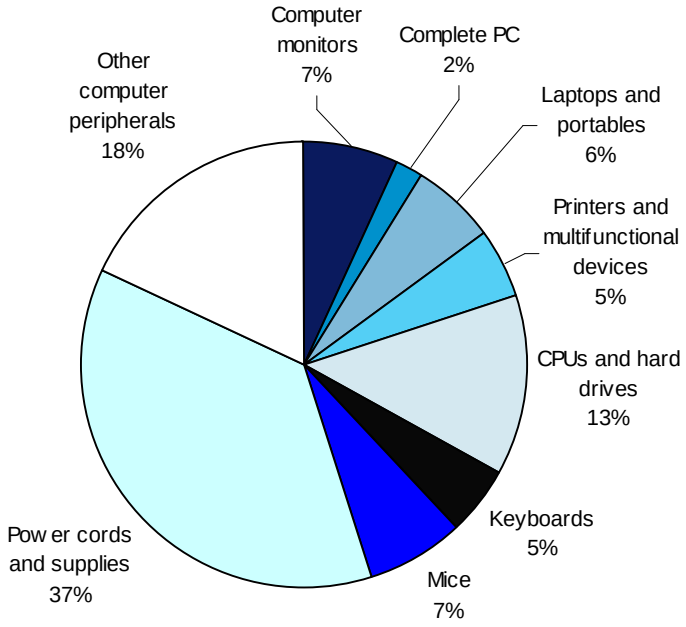
[43] IBISWorld Pty Ltd (2009), *Electronic Component Manufacturing in Australia,* March

[44] Australian Communications and Media Authority 2008, 'Majority of households still turn to digital free-to-air television', available at http://www.acma.gov.au/WEB/STANDARD..PC/pc=PC_311091, accessed 20 April 2009

[45] IBISWorld Pty Ltd (2008), *Household Appliance Wholesaling in Australia*, 10 November, page 6

were components such as printers, keyboards and mice, known in the industry as 'peripherals' (Figure 2).

Figure 2 Computer imports 2007/08 (units)



Source: DFAT data on imports by quantity. Tariff code inclusions are provided in Appendix B.

The import destination and products are shown in Table 1, which illustrate that imports for all products predominantly occur in New South Wales (NSW), to a lesser degree in Victoria and Queensland, and to an even smaller degree in other jurisdictions.

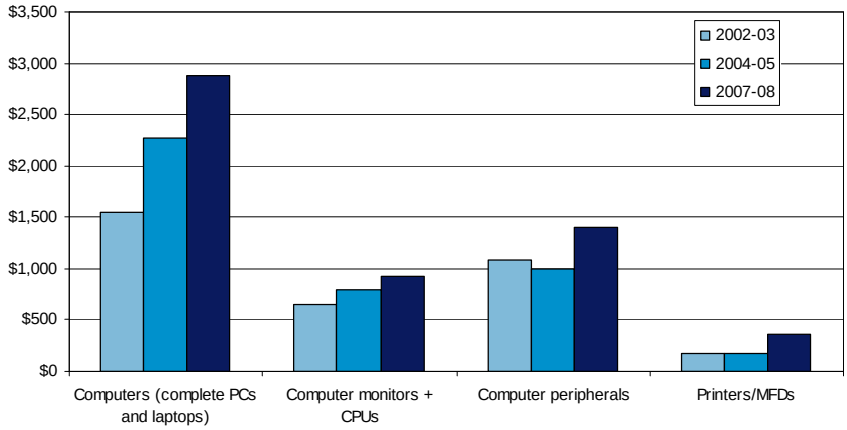
Table 1 Television and computer imports 2007/08 (units)

State	Televisions	Computers (complete PCs and laptops only)	Other computers products
NSW	44.20%	64.78%	63.77%
VIC	28.80%	22.82%	23.50%
QLD	17.15%	6.01%	5.99%
SA	2.27%	0.35%	0.37%
WA	7.51%	6.00%	6.32%
TAS	<0.01%	0.03%	0.04%
NT	0.06%	0.01%	0.01%
ACT	<0.01%	<0.01%	<0.01%

Source: DFAT data on imports by quantity and port of entry. Tariff code inclusions are provided in Appendix B

While there has been a reduction in the average value of computer items imported, the total value of imports has continued to increase (See Figure 3).

Figure 3 Value of computer imports ($ millions)



Source: DFAT data on imports by quantity and value. Tariff code inclusions are provided in Appendix B

With the shift towards larger flat screen LCD, plasma and rear projection televisions, the value of imports is expected to increase in coming years, coinciding with the phasing out of analogue technology in favour of digital by 2013. In terms of computers, Australian consumers spent $2.8 billion on 1.2 million high-definition flat-panel televisions during 2007, which indicates the value of this industry.[46]

Description of sales

As outlined previously, sales (by unit) of computers and computer products are not directly equal to imports due to the assembly of 'white box' computers in Australia from imported components. Table 2 presents Australian sales estimates for 2007/08 based on the collation of import data into:

- televisions only;
- computers and computer products;
- visual display units only (i.e. televisions and computer monitors); and
- all televisions and computers and products.

[46] The Australian Financial Review (2008), (60) 10 June

Table 2 Television and computer sales 2007/08 (million units)

Product grouping	Sales volume
Televisions	3.1
Computers and computer products	28.6
Visual display units	6.7
All television and computers and computer products	**31.7**

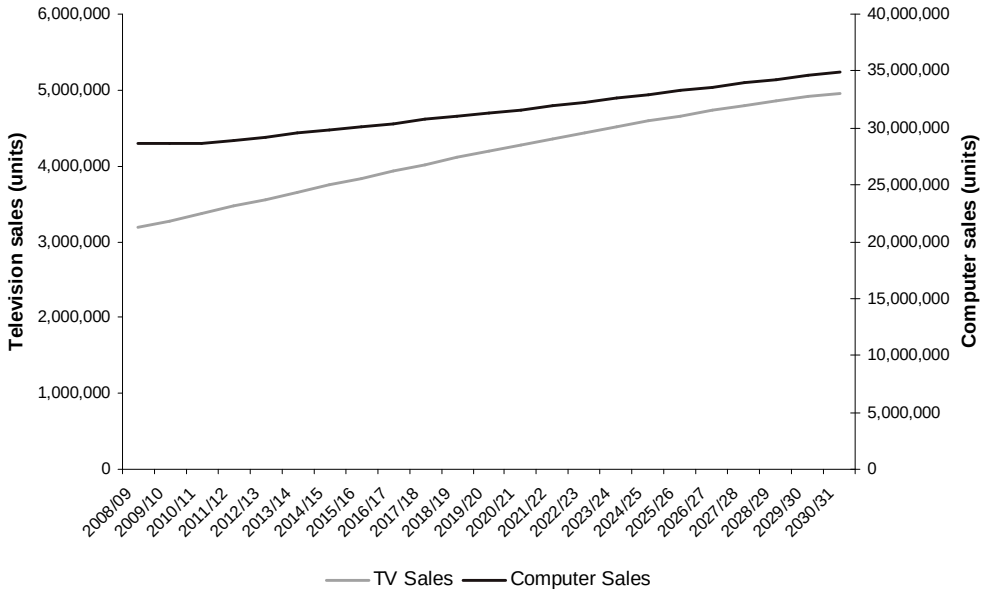
Source: Sales data was estimated using DFAT data on imports. Tariff code inclusions are provided in Appendix B

Sales projections

Sales volumes were projected under a 'business as usual case' (i.e. assuming no government or policy intervention over and above current measures) based on import data, historical trends and reports, and advice from industry association representatives.[47]

It is estimated that both television and computer sales volumes will increase over the next 20 years, as shown in Figure 4.

Figure 4 Television and Computer Sales 2007/08 – 2030/31



Source: Sales projections were made based on current DFAT import data with input from AIIA and PSA on anticipated sales growth.

[47] URS study found the following: each household has 2.87 televisions, 1.58 central processing units, 1.55 monitors and 0.96 laptops. [URS (2009), *Willingness To Pay for E-Waste Recycling*, Unpublished report prepared for the Environment Protection and Heritage Council, February 2009

Sales of computers and computer products are estimated to increase from 28.6 million units in 2007/08 to 33.9 million in 2027/28, while sales of televisions are estimated to increase from 3.1 million to 4.8 million units over the same period.[48]

Description of end of life

At their end of life, televisions, computers and computer products are either landfilled or recycled.

Some of the key factors impacting on the volume of end of life televisions and computers, which is expected to increase year-on-year if the current situation continues, are described below.

1. Sales volumes are expected to increase over the next 20 years. This is due to a number of factors including changes in technology, moves to digital television and consumer preferences (with television sales increasing from 3.1 million to 4.8 million, and computer and computer product sales volumes increasing from 28.6 million to 33.9 million over the next 20 years);[49]

2. End of life volumes are expected to increase faster than sales due to shorter lifecycles. Increased sales are expected to result in an increase in the volume of end of life televisions and computers as well, and in fact, these volumes are expected to increase more significantly than new sales, in particular as a result of the television and computer industries experiencing rapid technological change which is expected to produce shorter product lifecycles; and

Analysis of computer lifespan for this regulatory impact statement, has assumed that the average lifespan for commercial computers that are returned to the leasing company at the end of lease/life is 3 years until 2007/08, reducing to 1.5 years by 2027/28 and then remaining steady. For computers that are bought outright by the commercial operator or are owned by the company at the end of the lease period, it is assumed that the average lifespan is 4.5 years for computers until 2006/07, reducing to 1.5 years by 2027/28 and then remaining steady. For household computers it is assumed that the average lifespan is 10 years for computers until 2007/08 reducing to 5 years by 2027/28 and then remaining steady. The total lifespan for household computers that enter following a period of use within the commercial sector is assumed to be equal to the lifespan of a computer entering the household sector as a new computer.

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48 Historic sales for televisions and computers were estimated using DFAT data on imports. Television sales were assumed to grow at a compound annual growth rate (CAGR) of 3% per annum growth in sales (units) in 2008/09 declining to 1% by 2030/31. This assumption was based on the anticipated initial continuation of historic sales growth over this period as households replace analogue units with digital, followed by a level of saturation in the number of new televisions required being reached. Computers and peripherals were projected to grow as AIIA has indicated that they expect negative or flat growth for 2008/09 and 2009/10, increasing slightly after that period. The assumed growth rates are: 0% 2008/09 and 2009/10, then a steady 1% growth rate from 2010/11 onwards.

49 Historic sales for televisions and computers were estimated using DFAT data on imports.

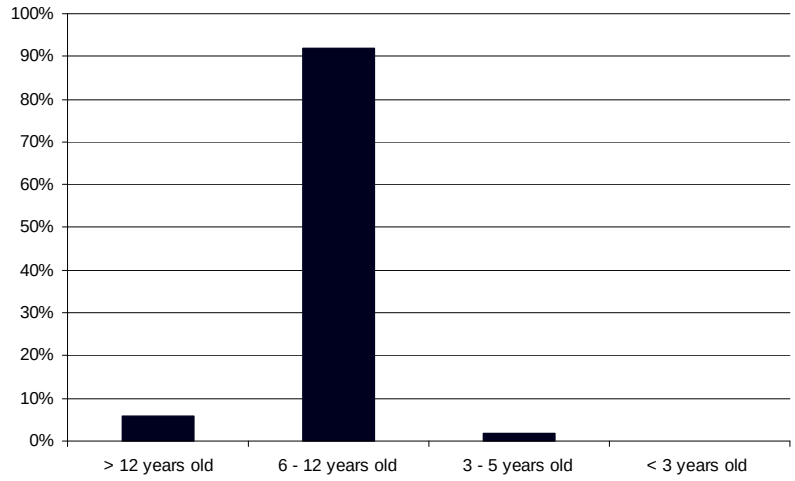
Table 3 Computer and peripherals lifespan model factors used (2007/08 & 2027/28)

Type of Computer	Lifespan (years)
Leased commercial computers	3 (until 2007/08) reducing to 1.5 (by 2027/28) then remaining steady
Bought commercial computers	4.5 (until 2006/07) reducing to 1.5 (by 2027/28) then remaining steady
Household computers	10 (until 2007/08) reducing to 5 (by 2027/28) then remaining steady

Source: Assumptions based on information provided by government and industry representatives

The estimated lifespan of computers is reinforced by data from Byteback (take-back computer scheme) run in Victoria by AIIA since 2005. Byteback data (see Figure 5) indicates that 80% of items received were greater than seven years old, 19% were four to six years old and 1% were one to three years old.

Figure 5 Analysis of computer units received by Byteback scheme, 2005 - 2008[50]



Source: Byteback (2009)

For televisions, industry advice has been used to estimate that the average lifespan has declined from 10 years for a unit purchased in 1995 and will be 7 years for a unit purchased in 2013, declining further to 3 years for a unit purchased in 2028/29. The reduction in lifespan is assumed to be linear over this period.

[50] Australian Information Industry Association (2009), *Byteback*, Presentation given to PwC and Hyder Consulting, 10 March

Table 4 Television disposal model factors used (2008/09)

Year of sale	Lifespan (years)
1995/96	10
2013/14	8
2028/29	3

Source: Industry advice

Significant volumes of redundant CRT televisions are projected. The shift to digital television is not only expected to influence purchases of televisions, but the phasing out of analogue televisions between 2010 and 2013 is likely to generate a significant volume of redundant CRT televisions for disposal/recycling;[51]

Changing product mix is likely to reduce the weight each unit comprises in landfills. Another factor at play is that in the computer industry, the product mix is changing with a shift away from desktops towards portable laptop computers. The proportion of laptops has increased from 14% in 1998/99 to 54% in 2007/08. Laptops are lighter, with a laptop sold in 2007/08 weighting an estimated 2.5 kg compared with a desktop computer (with flat screen monitor) weighing an estimated 14 kg. In addition, there has been a shift from CRT to LCD screens, technological improvements resulting in lighter LCD screens and a trend towards lighter desktop boxes. As a result of these changes, the average weight of computers has declined from an estimated 25.3 kg in 2000/01 to 7.9 kg in 2007/08 and this trend is expected to continue. [52]

Based on consideration of the factors above, unless current practices change, the current trend of around 84% of end of life tonnes being landfilled is not expected to change over the next 20 years. Table 5 estimates how many products are expected to reach end of life in 2007/08, under the current situation.

[51] The shift from analogue to digital technology, particularly the trends towards digital set-top boxes, high definition, digital video disks (DVD) and Blu-ray technology, is allowing clearer pictures to be shown on larger formats, resulting in a shift away from CRT televisions towards flat screen LCD, plasma and rear projection televisions with much larger screen sizes.

[52] Ibid.

Table 5 Television, computer and visual display units' end of life 2007/08 (million units)

Product grouping	Sales volume	End of life volume
Televisions	3.1	1.2
Computers and computer products	28.6	15.7
Visual display units	6.7	3.4
All television and computers and computer products	31.7	16.8

Source: End of life modelling of television and computer products was based on estimated sales, lifespan, product weight and disposal pathways. Sales data was estimated using DFAT data on imports. Input to the development of assumptions for lifespan, weight and disposal pathways was provided by AIIA, PSA and the EPHC Electrical Equipment working group

Description of recycling

Recycling of televisions and computers is defined as 'the reprocessing of materials and products so they can be manufactured into new products'. This definition distinguishes between recycling and reuse, which is defined as 'when existing products and components are used for the same purpose, perhaps after being repaired'.[53]

In previous studies a number of barriers have been identified that mean comprehensive recycling systems have not yet been established, and that in part explains the low level of recycling currently in Australia. Barriers influencing the commercial viability of recycling televisions and computers have included:

- the separation of electronic components;
- low re-sale value of recovered resources;
- commodity price fluctuations; and
- establishing a broad-scale collection network.

The costs and uncertainties involved in the recycling of televisions and computers mean that unless the costs can be recovered by consumers, or the wider community, recycling is unlikely to occur.[54]

Levels of recycling were based on surveys of 13 e-waste recyclers and one e-waste collector who were asked to provide 2007/08 recycling of e-waste split by product type. Table 6 shows estimates of destinations of televisions and computers once they reach end of life.

[53] URS (2009), *Willingness To Pay for E-Waste Recycling*, Unpublished report prepared for the Environment Protection and Heritage Council, February, Appendix A, question 6

[54] URS (2009), *Willingness To Pay for E-Waste Recycling*, Unpublished report prepared for the Environment Protection and Heritage Council, February

Table 6 Television, computer and visual display units end of life destinations 2007/08 (million units)

Product grouping	Sales volume	End of life volume (total)	End of life split by disposal outcome			Diversion rate (Local recycling + overseas / total end of life)	Recycling rate [Local recycling / (local landfill + local recycling)]	Recycling rate as % of sales (local recycling/ sales)
			Exported for reuse[55]	Recycling	Landfill			
Units (millions)								
Televisions	3.1	1.2	0.0	0.01	1.1	1%	1%	0.4%
Computers and computer products	28.6	15.7	0.5	1.5	13.7	13%	10%	5%
Visual display units	6.7	3.4	0.3	0.3	2.8	17%	10%	4%
All television and computers and computer products	31.7	16.8	0.5	1.5	14.9	12%	9%	5%

Source: End of life modelling of television and computer products was based on estimated sales, lifespan, product weight and disposal pathways. Sales data was estimated using DFAT data on imports. Input to the development of assumptions for lifespan, weight and disposal pathways was provided by AIIA, PSA and the EPHC Electrical Equipment working group

Estimated sales, end of life and disposal outcome data was converted into tonnes using estimated weights of television, computer and computer product unit weights. Table 7 shows the end of life destination based on tonnes of televisions and computers. The significant difference in diversion and recycling rates for computer and computer product 'units' (in Table 6) compared to computer and computer product 'tonnes' (Table 7) is because this group of items comprises a number of diverse products with vastly different weights. For example, end of life desktops were estimated to weigh 21 kg, compared to 8 kg for computer monitors, 3 kg for laptops, and 2.6 kg for peripherals.[56]

[55] Note that reuse is the level of computers sent overseas for use.

[56] Estimates based on manufacturer's data and direct weight measurements.

Table 7 Television, computer and visual display units end of life destinations 2007/08 (thousand tonnes)

Product grouping	Sales volume	End of life volume (total)	End of life split by disposal outcome			Diversion rate (Local recycling + overseas / total end of life)	Recycling rate [Local recycling / (local landfill + local recycling)]	Recycling rate as % of sales (local recycling/ sales)
			Exported for reuse[57]	Recycling	Landfill			
Televisions	68.2	27.7	0.0	0.3	27.5	1%	1%	0.4%
Computers and computer products	69.6	78.3	7.4	9.6	61.3	22%	14%	14%
Visual display units	88.5	52.8	2.9	3.6	46.3	12%	7%	4%
All television and computers and computer products	137.8	106.1	7.4	9.9	88.8	16%	10%	7%

Source: End of life modelling of television and computer products was based on estimated sales, lifespan, product weight and disposal pathways. Sales data was estimated using DFAT data on imports. Input to the development of assumptions for lifespan, weight and disposal pathways was provided by AIIA, PSA and the EPHC Electrical Equipment working group

The current recycling rate for computers (14%) is much higher than for televisions (1%) due to the fact that industry and government schemes have traditionally focused on computers. This focus has arisen because:

- the value of computer components has traditionally been higher. While the value of materials within an end of life computer is less than the cost of collecting and dismantling the units, the differential between these two elements is less for computers than it is for televisions. This is due to aspects such as:
  - the leaded glass within CRT televisions and computer monitors is relatively costly to recycle given the precautions that need to be taken to mitigate the risk of contamination because lead is a hazardous material;
  - computers and computer equipment have higher amounts of precious metals such as gold, platinum and silver, which have a higher market value than some other items; and
  - computer equipment that does not contain glass, toner or batteries can be recycled in an automated process.

  It is therefore more financially attractive for recyclers to accept computers than televisions. For this reason, some e-waste recyclers do not accept televisions for recycling, which in turn means that it is more difficult for consumers to find a location to drop off their television for recycling. However, stakeholder consultation undertaken following the consultation regulatory impact statement has revealed

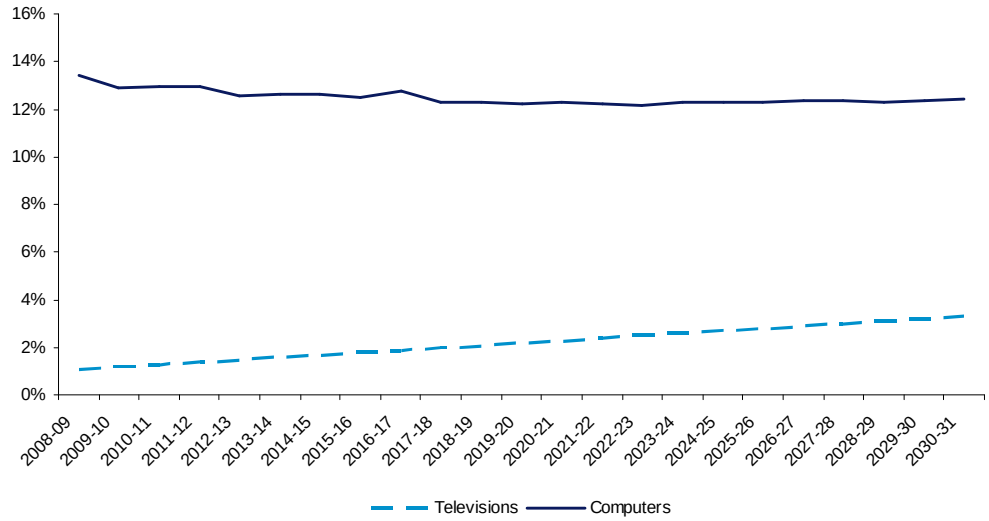
[57] Note that reuse is the level of computers sent overseas for use.

that recyclers are increasingly viewing televisions and computers as interchangeable;

- A large percentage of computers are used in the commercial sector, while televisions are predominantly used in the household sector. Recovering computers from the commercial sector is more attractive for recyclers because:
  - the equipment is newer and a higher proportion can be resold at a profit to offset the recycling costs for the remainder of the computers;
  - many companies are also paying recyclers for assured data destruction for commercial computer equipment; and
  - it is a lower cost proposition to collect commercial quantities from commercial sites than to collect individual items from households. Households on the other hand face high transaction, transport and recycling costs when trying to recycle individual units.

Figure 6 shows the estimated recycling rate over the next 20 years if the current trends continue (i.e. the 'business as usual' case), but taking into account the phasing out of analogue televisions by 2013 and assuming the effects of the current global economic slowdown are cursory in nature.[58]

Figure 6 Recycling rate (tonnes recycled as a proportion of tonnes reaching end of life) 2008/09 – 2030/31



Source: End of life modelling of television and computer products was based on estimated sales, lifespan, product weight and disposal pathways. Sales data was estimated using DFAT data on imports. Input to the development of assumptions for lifespan, weight and disposal pathways was provided by AIIA, PSA and the EPHC Electrical Equipment working group

[58] Treasury forecasts that Australia will experience negative 0.5% GDP growth in 2009/10, but also forecasts that this will rise to positive 2.25% growth by 2010-11. See Australian Government 2009, 'Budget 2009-10: Budget Overview', Appendix H

Table 8 presents disposal methods of televisions and computers as a percentage of the total number of products reaching end of life.

Table 8 Disposal methods of televisions and computers as a percentage of end of life (by units)

Product	Landfill	Recycling	Export for reuse
Televisions	89.9%	1.1%	N/A
Computers and computer products	78.3%	13.6%	8.1%

Source: End of life modelling of television and computer products was based on estimated sales, lifespan, product weight and disposal pathways. Sales data was estimated using DFAT data on imports. Input to the development of assumptions for lifespan, weight and disposal pathways was provided by AIIA, PSA and the EPHC Electrical Equipment working group

2.3 Summary

Televisions, computers and computer products are all imported into Australia (noting that 'white box' computer components are all imported but are then assembled as desktop PCs in Australia), and the trend of offshore manufacturing does not appear likely to change in the future. Unbranded 'white box' computers comprise a small and decreasing proportion of the market.

There appears to be consolidation in the sector brought about by a range of factors and perhaps accelerated by recent financial conditions. This has implications for policies that seek to match recycling programs with incumbent businesses when the actual waste was created by businesses that have been merged, entered the Australian market or ceased operation.

The amount of television and computer waste is growing due in part to changes in technology, moves to digital television, and consumer preferences. There is a lag of three to ten years, on average, between purchases of new televisions and computers and these products entering the waste stream.

Some waste is recycled and this is expected to increase. While it is true that this level of recycling is being undertaken without a comprehensive coordinated government mandate to recycle, much of the current recycling effort is supported in some way by the government, such as the subsidies in Victoria for the Byteback program.

Table 9 provides a summary of the television and computer industry.

Table 9 A summary of the television and computer industry (2007/08)

	Computers and computer products	Televisions
Location of Production	Overseas except for some assembly of desktop PCs	Overseas
Concentration of production	Low although likely to increase as the number of smaller 'white box' assemblers declines	High, no 'white box' assemblers
Number of imports	39.1 million in 2007/08, increasing due to rapidly changing technology decreasing life cycles	3.1 million in 2007/08, increasing due to more televisions per household and shift to digital
Type of product imported	Only 8% assembled PCs or laptops in 2007/08, mostly peripherals	All completed television sets
Value of imports	$5.6 billion increasing even with falling computer prices and decreased concentration in the market	$2.1 billion increasing due to demand for larger flat screen televisions
Sales	69,600 tonnes (28.6 million units) in 2007/08	68,200 tonnes (3.1 million units) in 2007/08
End of life	78,300 tonnes (15.7 million units) in 2007/08	27,700 tonnes (1.2 million) units in 2007/08
Recycling	9,600 tonnes (1.5 million units)	300 tonnes (11,000 units) in 2007/08
% of end of life	14 % of tonnes (10% of units)	1% of tonnes (1% of units)

3 Policy context

There are a number of policy matters that have important implications for end of life televisions and computers. These policy pressures provide important context before proceeding to a discussion of the problems relating to television and computer waste, and also provide context for considering government intervention of current television and computer disposal and recycling practices.

3.1 Australian context

International Obligations

Australia is party to a number of international conventions and agreements which are particularly relevant to the management of end of life televisions and computers both within Australia and internationally, including the Basel Convention on the Control of the Transboundary Movements of Hazardous Waste and Their Disposal (the Basel Convention) and the Stockholm Convention on Persistent Organic Pollutants (the Stockholm Convention).

The Basel Convention, which was opened for signature 22 May 1989, came into force 5 May 1992 and was ratified by 151 countries as at December 2002. Australia has been a party to the Basel Convention since it entered into force in 1992.

The overall goal of the Basel Convention is to protect human health and the environment against the adverse effects resulting from the generation, trans-boundary movement and management of hazardous wastes. Under the Basel Convention the Commonwealth has obligations to:

- minimise generation of hazardous waste within Australia;
- ensure adequate disposal facilities are available within Australia;
- control and reduce international movements of hazardous waste;
- ensure environmentally sound management of wastes; and
- prevent and punish illegal traffic.[59]

In addition to the import and export of end of life televisions and computers, the Basel Convention has implications for the way these items, which are

[59] Department of the Environment, Water, Heritage and the Arts (2009), 'International hazardous waste conventions', available at <http://www.environment.gov.au/settlements/chemicals/hazardous-waste/conventions.html>, accessed: 5 May 2009

classified as hazardous under the Basel Convention, are managed domestically.

Australia has ensured that it is meeting its obligations regarding the import, export and transit of hazardous wastes by implementing the *Hazardous Waste (Regulation of Exports and Imports) Act 1989* (the Act). The main purpose of the Act is to regulate the import and export of hazardous waste to ensure that hazardous waste is disposed of safely so that human beings and the environment, both within and outside Australia, are protected from the harmful effects of the waste. The Act sets out the requirement for a permit before hazardous waste is imported into Australia or exported overseas. The import, export and transit of hazardous waste is permitted by the Act under certain conditions, including the environmentally sound management of the waste to protect both the environment and human health. The Act identifies conditions under which e-waste, such as televisions and computers, might be considered hazardous waste and prohibits the export of such waste unless certain conditions are met, which include whether there is the capacity to deal appropriately with such wastes within Australia and whether the proposed export will ensure that the wastes are dealt with in an environmentally sound manner.[60] In essence, if the equipment is fully functioning and does not have physical damage that impairs its functionality or safety, it is not considered a hazardous waste and, after testing and labelling, can be exported.[61] The Act does not regulate the export and import of materials that are destined for direct re-use.[62]

Advice from e-waste recyclers indicates that a proportion of end of life computers from the commercial sector are exported and sold for reuse in other countries. The estimated levels of export for reuse were modelled as part of the consultation regulatory impact statement. In 2007/08 it was estimated that these exports accounted for approximately 7,000 tonnes or 474,000 units of computers and computer products. The number of units exported for reuse was estimated to increase throughout the analysis period although the tonnes of material that this represented declined in line with reduced unit weights. It does not appear that televisions are exported for reuse.

The export of end of life televisions or computers or their component parts is likely to be regulated under the Act unless the material has been dismantled and sorted and consists only of non-hazardous components, such as electronic assemblies consisting only of metals or alloys. If the exported material is regulated under the Act, the exporter must obtain a permit for the material. In 2006/07, the Department of the Environment, Water, Heritage and the Arts (DEWHA) (then the Department of the Environment and Water Resources) processed 31 applications for permits to export hazardous

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[60] Electrical Equipment Product Stewardship working group (2009), *Pers. Comm.* 9 July 2009

[61] Australian Government (undated), 'Criteria for the export and import of used electronic equipment', available at <http://www.environment.gov.au/settlements/publications/index.html#hazardous>, accessed 28 August 2009

[62] Ibid.

wastes. Of these, three related to the export of end of life computers or computer products as outlined in Table 10.

Table 10 Export permits for material within the scope of the decision regulatory impact statement, 2006-07

Applicant	Quantity (tonnes)	Status as at 30/06/07	Type of waste, disposal operation & destination
Sims Group Ltd	2,000	Granted	Waste glass cullet from cathode ray tubes transported from Sims Recycling Solutions (Australia) to LimburgGlas BV (Sims-Mirec) (The Netherlands)
TES-AMM Australia Pty Ltd	500	Granted	Electronic waste transported from TES-AMM Australia Ltd (Australia) to TES-AMM Singapore Pty Ltd (Singapore)
TIC Group (Third Party Service) Pty Ltd	Pending	Pending	Cathode ray tube glass cullet from TIC Group (Third Party Services) Pty Ltd (Australia) to Young Change Co. Ltd. (Republic of Korea)

Source: Department of the Environment, Water, Heritage and the Arts (then the Department of the Environment and Water Resources) (2007), *Legislation Annual Reports 2006–07: Operation of the Hazardous Waste (Regulation of Exports and Imports) Act 1989*, website: http://www.environment.gov.au/settlements/publications/index.html#hazardous>, accessed 26 August 2009

The Annual Report on the Operation of the *Hazardous Waste (Regulation of Exports and Imports) Act 1989* notes that DEWHA had a continued focus on enforcement and action to combat illegal traffic in hazardous waste in 2006-07. The report notes that enforcement action included seizing illegal shipments of e-waste but did not provide details of these seizures.[63]

As discussed above, in addition to obligations regarding the import, export and transit of hazardous wastes, the Basel Convention also imposes obligations for the management of hazardous waste within Australia, including minimising the production of hazardous waste, providing adequate disposal facilities within Australia, preventing pollution from hazardous waste and minimising the consequences if such pollution occurs. Meeting these obligations requires a complex interplay of responsibilities involving different levels of government, industry and the public. It is uncertain whether these

[63] Department of the Environment, Water, Heritage and the Arts (then the Department of the Environment and Water Resources) (2007), 'Legislation Annual Reports 2006–07: Operation of the Hazardous Waste (Regulation of Exports and Imports) Act 1989', available at <http://www.environment.gov.au/settlements/publications/index.html#hazardous>, accessed 26 August 2009

obligations are being fully met or, where they are being addressed, whether the means employed is the most efficient or effective method. The need to re-examine and address the management of hazardous waste within Australia in order to ensure that Australia is meeting its domestic obligations under the Basel Convention will be considered in the context of the National Waste Policy. The National Waste Policy will identify best practice in waste management and resource recovery and ensure Australia has the right mix of incentives and regulation to provide environmental, social and economic benefits to the Australian community. The policy will seek to complement action to deliver emission reductions, reduce energy and water use, support jobs and invest in future long term economic growth. The National Waste Policy is expected to be considered by Environment Ministers in late 2009.

In addition to the Basel Convention, domestic management of end of life televisions and computers is also affected by Australia's obligations as a signatory to the Stockholm Convention. Scientific understanding of the impacts of substances on the environment and human health continues to change. The listing of nine new persistent organic pollutants (POPs) under the Stockholm Convention which include materials, such as some brominated flame retardants used in many televisions and computers may change the way relevant end of life televisions and computers are managed.

There are some seeming inconsistencies in the way hazardous waste is managed in Australia. Consumer products, such as televisions and computers, that contain hazardous substances; are defined as hazardous wastes under the Basel Convention; and require an export permit may not be defined in domestic regulation as hazardous. The current approach to dealing with waste products that contain hazardous materials has been to deal with them on a product-by-product basis, rather than their combined impact on the environment. There are limits to current understanding of the interaction and long-term impact of some materials being landfilled. There has been little research on what happens over a long period when a diverse mix of materials interacts in a landfill.

Domestic Waste Policy

Each jurisdiction has its own waste minimisation legislation or policies as set out in Appendix D. The broad powers provided to each jurisdiction by waste minimisation legislation – for example the NSW Government's *Waste Avoidance and Resource Recovery Act 2001* – means that there is a tangible risk that each jurisdiction will implement a different approach to the television and computer waste problem in the absence of a national approach (discussed further in Chapter 4). Specific television and computer waste, and broader e-waste responses have already begun to vary in different jurisdictions:

- Australian Capital Territory (ACT) has banned the disposal of computer monitors and television screens in landfill. The ACT

Government charges $15 for the disposal of computers boxes and $22.50 for monitors to cover the costs of recycling;[64]

- South Australia (SA) has implemented an e-waste policy and has recently issued a discussion paper to ban e-waste from landfill. The Environment Protection Authority (EPA) is currently preparing a response to submissions made regarding the waste policy;[65]
- Victoria is trialling Byteback, a free computer collection and recycling trial, and trials have occurred in a number of jurisdictions including New South Wales (see Table 15);
- several recycling organisations accept used televisions and computers, but they may impose fees or charges;[66] and
- a number of local governments have implemented or are considering bans or charges for disposing of e-waste in landfill.[67]

In addition, there have been recent decisions at EPHC to develop a National Waste Policy that could bring together the varied approaches to particular wastes at a national level. This is explored in the Consultation Paper *A National Waste Policy; Managing Waste to 2020*.[68]

It should also be noted that there are currently a number of manufacturers providing recycling services and community e-waste events are offered from time to time to raise awareness of e-waste recycling and encourage participation in recycling. These events may be sponsored by government and/or industry (see Table 15).

3.2 Review of taxation

On 13 May 2008 the Australian Government announced the review of Australia's tax system known as Australia's Future Tax System (the Henry Review). The review will look at the current taxation and superannuation system and make recommendations to position Australia to deal with the demographic, social, economic and environmental challenges of the 21st century.

It is quite possible that the Henry Review may impact the way that government revenue is directed towards policy initiatives and outcomes. For instance, the Australian Government, in its architecture paper to support the

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[64] ACT Government Department of Territory and Municipal Services, *Computer Recycling*, website: http://www.tams.act.gov.au/live/Recycling_and_Waste/factsheets/computers, accessed 31 August 2009

[65] Environment Protection Authority (2008), *Draft Environment Protection (Waste to Resource) Policy and Explanatory Report,* November, Adelaide

[66] CRT Recycling (http://www.crtrecycling.com.au/) based in Adelaide has an environmentally sound treatment facility for end of life CRTs

[67] See, for example, Sydney Morning Herald (2009), *Landfill ban for e-waste*, 1 September

[68] Department of the Environment, Water, Heritage and the Arts (2009) *A National Waste Policy: Managing Waste to 2020*, Consultation Paper, Commonwealth of Australia

Henry Review, indicates in-principle support for broad based taxes and direct funding for government programs rather than specific levies.[69] This approach may have significant implications for the viability of the application of a specific levy (as considered in this decision regulatory impact statement) to address end of life televisions and computers.

3.3 International activity

Globally the issue of television and computer waste recycling has become an important focus for the future. International expectations provide pressure to address the issues discussed in Chapter 4.

Over the last decade, international policy has focused on five key directions to improve economic and social outcomes by reducing the environmental, health and safety footprint of manufactured goods and moving the focus away from end of life treatment of waste:

- identifying, understanding and reducing the potentially hazardous materials contained in manufactured goods, including chemicals and plastics;
- design of products and packaging:
  - with alternate materials that are non hazardous;
  - for disassembly or re-processing; and
  - to reduce energy, water and resource use and greenhouse impacts.
- the development of appropriate disposal techniques, practices and facilities;
- the safe handling of these products at end of life for reprocessing, recycling and remanufacturing and disposal of residuals; and
- systems that reduce or eliminate the risk of cross contamination of the waste stream so that businesses that reprocess, recycle or remanufacture waste are not jeopardised through the liability that accrues from the undetected, unknown or inadvertent supply of such a product, whether the contamination be hazardous chemicals, biological or foreign matter.

The Basel Convention requires Australia to take appropriate measures to ensure that the generation of hazardous and other wastes (including household wastes) is reduced to a minimum taking into account social, technological and economic aspects. Given its status as developed country, this raises the expectation in the international and domestic community that Australia's approach to managing potentially hazardous waste will be consistent with international standards.

[69] Australian Treasury (2008), 'Architecture of Australia's Tax and Transfer System', pages 283 and 285-6

The European Union

The European Union (EU) in February 2003 introduced regulation to member states and two European directives, the EU Waste Electrical and Electronic Equipment (WEEE) and the Restriction of Hazardous Substances (EU RoHS). The WEEE Directive commenced in August 2004 and covers both obligatory recycling schemes and waste reduction strategies. In order to encourage designs that facilitate repair, reuse and recycling, the WEEE Directive established the principle of 'Extended Producer Responsibility' (EPR). Producers are financially responsible for the collection, treatment, recovery and environmentally sound disposal of the end of life televisions and computers. This degree of product stewardship effectively closes the loop on the product life-cycle.[70] The RoHS Directive regulates the use of six hazardous substances (lead, mercury, cadmium, hexavalent chromium, PBBs or PBDEs) in electrical and electronic goods.[71]

A year after the WEEE Directive (the Directive) commenced in the EU, the proportion of end of life televisions and computers products collected and treated under the WEEE Directive was estimated to be:

- IT and telecommunications (excluding CRTs) – 27.8%
- CRT monitors – 35.3%;
- LCD monitors – 40.5%;
- consumer electronics (excluding CRTs) – 40.1%;
- CRT televisions – 29.9%; and
- flat panel televisions – 40.5%.[72]

However, more than four years after the scheme commenced, it was estimated that only around one third of total e-waste was being recycled. This low rate of recycling is reportedly occurring because:

- legislation on electrical and electronic equipment has proven difficult to implement and enforce due to uncertainty as to the scope of the Directive;
- the target of 4 kg per person per year does not properly reflect the situation in each individual Member State;
- the requirements for producers to register and report in each Member State in which they sell increases compliance costs and administrative complexity; and

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[70] Hart, S. (2007), *Capitalism at the Crossroads: Aligning Business, Earth and Humanity*, Wharton School Publishing, Pennsylvania, page 71

[71] Europa (2009), *Summaries of legislation: Waste electrical and electronic equipment,* website: http://europa.eu/scadplus/leg/en/lvb/l21210.htm>, accessed 6 March 2009.

[72] United Nations University (2007), *2008 Review of Directive 2002/96 on Waste Electrical and Electronic Equipment (WEEE) – Final Report*, August, p iv

- there is free riding by distance-sellers, who pass their costs on to registered producers.[73]

The 2008 review of the WEEE Directive concluded that the scheme could be improved by implementing the following changes:

- clarification of the scope of the Directive;
- rearranging the product oriented scope towards a treatment category oriented scope to allow targets to be differentiated based on environmental outcomes; and
- a harmonised approach across the Member States.[74]

As a result, the European Commission proposed a revised WEEE Directive in late 2008 which addressed the perceived shortcomings of the original Directive by:

- clarifying the scope and definitions of the Directive;
- reducing the administrative burden on businesses by harmonising registration and reporting requirements; and
- setting mandatory collection targets equal to 65% of the average weight of electrical and electronic equipment placed on the market over the two previous years in each Member State.[75]

Japan

A lack of landfill capacity (similar to Europe) and densely populated urban environment has influenced Japan's e-waste scheme. The Home Appliance Recycling Law went into effect in April 2001. The law requires manufacturers and importers to collect and recycle their own appliances (including televisions). It consists of an 'old for new' scheme similar to Europe, giving retailers the primary responsibility to provide collection services. The scheme relies on end of life fees paid by consumers to finance the collection, transport, and recycling of products. Computer recycling is covered by the law for Promotion of Effective Utilisation of Resources, implemented in April 2001. Manufacturers are responsible for recycling of the computers, financed through backend user fees on computers purchased prior to 2003.

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[73] Europa (2008,) *Press Release: Environment – Commission proposes revised laws on recycling and use of hazardous substances in electrical and electronic equipment*, website: http://europa.eu/rapid/pressReleasesAction.do?reference=IP/08/1878, accessed 31 August 2009; Commission of the European Communities (2008), *Proposal for a Directive of the European Parliament and of the Council on Waste Electrical and Electronic Equipment (recast) – Impact Assessment*, p 6

[74] United Nations University (2007), *2008 Review of Directive 2002/96 on Waste Electrical and Electronic Equipment (WEEE) – Final Report*, August, pp x-xiii

[75] Europa (2008,) *Press Release: Environment – Commission proposes revised laws on recycling and use of hazardous substances in electrical and electronic equipment*, website: http://europa.eu/rapid/pressReleasesAction.do?reference=IP/08/1878, accessed 31 August 2009; Commission of the European Communities (2008), *Proposal for a Directive of the European Parliament and of the Council on Waste Electrical and Electronic Equipment (recast) – Impact Assessment*, p 6

Computers made post-2003, have an advanced recycling fee (ARF) that consumers pay upon purchase.

The Japanese schemes emphasise recycling goals rather than targets, set at 55% for televisions with CRTs and 20-55% for office-use computers. In 2004, expectations were exceeded when 81% of televisions were recycled.

United States

In the United States, eighteen states have passed laws establishing statewide e-waste recycling programs. All states (excluding California) follow a producer responsibility approach with varying differences in the structures per state. Washington's scheme is one of the more developed, focusing largely on product stewardship. California is the only state to implement an ARF that consumers pay upon purchase.[76]

Under federal regulations introduced in 1996, unbroken CRTs in the possession of collectors or recyclers are not regulated as hazardous unless they have been stored for more than a year. Broken CRTs or CRTs undergoing glass processing are not regulated as hazardous waste as long as they are:

- transported in clearly labeled containers designed to minimize releases;
- stored in such containers unless they are placed inside a building; and
- not stored for more than a year.

In addition, CRT undergoing glass processing must be processed at a temperature which does not allow the lead to volatilize. CRT glass that has been processed and sent to a CRT glass manufacturer or a lead smelter is also unregulated as long as it is kept in storage less than one year.[77]

The US Environmental Protection Agency (EPA) recently set a challenge to electronics retailers and television manufacturers to increase the collection and responsible recycling of discarded televisions. It is part of EPA's 'Plug-In to eCycling program'. This innovative program encourages retailers and manufacturers to become actively involved in television recycling.[78] As part of this initiative:

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[76] Silicon Valley Toxics Coalition (SVTC), (2009), *E-waste and Recycling Laws*, website: www.etoxics.org/site/PageServer?pagename=svtc_ewaste_and_recycling_policy, accessed 5 March 2009

[77] US Environmental Protection Agency (2008), *CRT Recycling Made Easy*, website: http://www.epa.gov/osw/inforesources/news/2006news/09-crt.htm, accessed 29 September 2009

[78] US Environmental Protection Agency (2009), *TV Recycling Challenge,* website: www.epa.gov/epawaste/conserve/materials/ecycling/tv-challenge.htm, accessed 9 March 2009

- over a thousand municipalities offer computer and electronics collections as part of household hazardous waste collections and special events;
- a number of public and private organisations have emerged that accept computers and other electronics for recycling including television repair shops, charitable organisations, electronics recycling companies and electronics retailers;
- many electronics manufacturers are now accepting used household electronics for recycling. In some cases, these services are provided free-of-charge or the consumer pays to mail the product back to the manufacturer. When fees are charged, they are generally in excess of US$7;[79] and
- in 2007 in the United States, approximately 18% (414,000 tonnes) of end of life televisions, computers and computer products were recycled.[80]

Canada

Canada has varying schemes established in its different states. Alberta implemented the first television and computer recycling scheme in Canada in 2004. It involves ARFs ranging from C$5 to C$45 to fund the program costs, consumer drop-off at various collection points and management by a not-for-profit association with a Board of Directors representing many key stakeholder groups.[81] After four years, Alberta has seen over 1,000,000 units (or over 21,000 tonnes) of televisions, monitors, computers and printers collected and recycled through over 220 collection sites throughout the province. The volume collected and recycled has grown at almost 50% per year since the program commenced, reaching 500,000 units in 2007/08.[82] In January 2009, Atlantic Canada Electronics Stewardship (ACES) scheme in Nova Scotia became the most comprehensive in Canada, covering over 40 types of electronics. The ACES program has 33 drop-off centres where residents and businesses can return their electronic products for recycling free of charge.[83]

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[79] US Environmental Protection Agency website, *Basic Information – Recycling Electronics*, website: http://www.epa.gov/osw/conserve/materials/ecycling/basic.htm, accessed 31 August 2009

[80] US Environmental Protection Agency website, *eCycling - Frequent Questions*, website: http://www.epa.gov/osw/conserve/materials/ecycling/faq.htm#howmuch, accessed 31 August 2009

[81] Alberta Recycling Management Authority, website: http://www.albertarecycling.ca, accessed 18 August 2009

[82] Alberta Recycling Management Authority (2008), A *Major Milestone is Achieved by Canada's Oldest Electronics Recycling Program*, website: http://www.albertarecycling.ca/News.aspx?id=100, accessed 31 August 2009

[83] Atlantic Canada Electronics Stewardship (2009), *Electronics Recycling in Nova Scotia*, website: http://www.acestewardship.ca, accessed 9 March 2009

The impact of international activity on Australia

Australia is geographically unique and needs to tailor an approach to e-waste according to its particular circumstances, including recognising that all television products and the majority of computer products are imported into Australia rather then manufactured domestically. As a developed country and a member of the Organisation for Economic Co-operation and Development (OECD) it is also important for Australia to align itself with similar approaches taken by other member countries to ensure it upholds the principles of the OECD by identifying good practice and coordinating domestic and international policies. There is clearly an international trend towards implementing recycling schemes to address the market failures associated with e-waste. If Australia fails to act to address these problems, it risks lagging behind the rest of the world.

It is acknowledged that international pressure alone does not justify government intervention as other countries may have different problems related to end of life televisions and computers than Australia. For example, it may be argued that Australia does not have the same problems as other countries such as Japan and the United States with respect to the opportunity cost of scarce landfill space due to Australia's relatively large land size and low population density. As a result, the remainder of the decision regulatory impact statement focuses on problems specific to Australia and uses Australian parameters to estimate the magnitude of costs and benefits of options to address these problems.

3.4 Summary

In addition to the problems discussed in Chapter 4, there are a number of policy context issues and related pressures that have important implications for end of life television and computers including:

- Australia's obligations as a signatory to the Basel and Stockholm Conventions affect the international and domestic management of television and computer waste;
- Australia has international obligations and expectations which provide pressure to address the issues presented in Chapter 4;
- the Henry Review of the Australian tax system may mean that funding options are limited; and
- a number of international jurisdictions already have schemes addressing waste televisions and computers more specifically, and e-waste more broadly.

4 Television and computer waste is a problem

This chapter discusses the nature and extent of the issues related to television and computer waste, why the market is not able to address the waste and the cost to society if some form of intervention is not undertaken.

4.1 Introduction

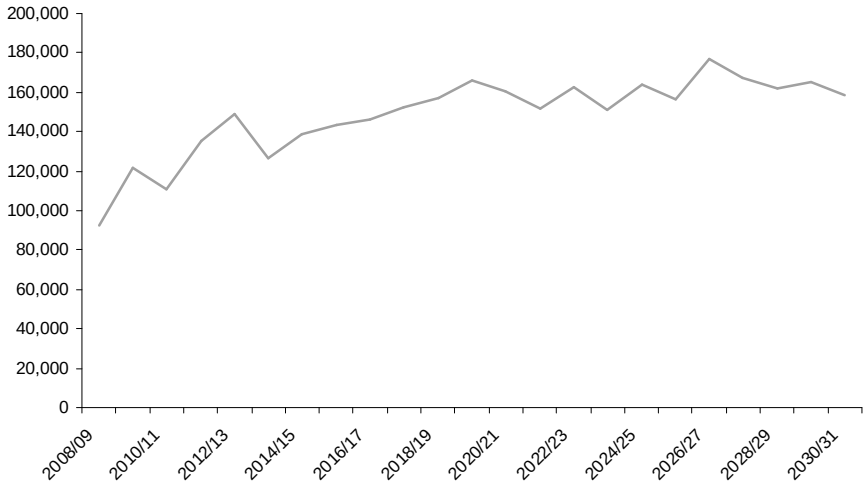
Televisions and computers were identified by EPHC in 2002/03 as a priority for action as a result of their higher levels of hazardous components relative to other types of electrical products, and the lost opportunities for conserving non-renewable resources due to products being sent to landfill. In 2008 the EPHC committed to the development of a national solution to the problem of end of life televisions and computers.

In parallel with government consideration of the issues both the television and key players in the computer industries are keen to engage in large scale national action, with national regulatory support to ensure a level playing field in the market, providing compelling evidence of the significance of the issues.

Additionally, state-based initiatives, including landfill levies, have had limited impact on complex products like televisions and computers (refer to Appendix D for a discussion on state regulation). As a result, the volume of these products being disposed of in landfill is projected to increase significantly over the next 20 years, increasing at a rate of 5% year-on-year from current levels. While televisions and computers comprise a small part of the waste stream (estimated to comprise less than 0.4% landfill volumes generated each year[84]), these products are expected to become an increasing part of the waste stream. Over the next 20 years, it is estimated that if the existing situation is not changed, 3 million tonnes (652 million units) will be accumulated in Australian landfills, compared to only 212,000 tonnes (71 million units) being recycled and recovered over this timeframe. This is equivalent to 6% of tonnes reaching end of life over this period. The landfill trend over the next 20 years if the current situation does not change is presented the Figure 7.

[84] Waste Management Association of Australia (2005), *Submission to Waste and Resource Efficiency Inquiry*, 2005, website: www.pc.gov.au/__data/assets/file/0017/21905/sub028.rtf, accessed 9 March 2009

Figure 7 Landfill volumes projected under the business as usual case (tonnes)



Source: end of life modelling was based on estimated sales, lifespan, product weight and disposal pathways, with input provided by AIIA, PSA and the EPHC Electrical Equipment working group

While television and computer waste is relatively small in volume, it is predicted to grow to 168,000 tonnes by 2027/28. As governments across Australia aim to reduce waste going to landfill, this increase in volume creates policy conflict for the jurisdictions.

This decision regulatory impact statement does not propose to address the whole issue of end of life electrical and electronic products, but rather it is part of a proposed incremental approach. Other types of e-waste may also be considered by the EPHC; however, they would be examined once a decision on the appropriate management for end of life televisions and computers is reached.

The remaining sections of this chapter specify the problems and issues that have prompted consideration of government action. It provides information on the nature and extent of the problems related to end of life televisions, computers and computer products, and also identifies government and private sector actions that have been taken to address the problem in the past.

4.2 Problems of television and computer waste

1. Conservation of non-renewable resources

Televisions, computers and computer products contain embedded resources that are non-renewable, but that are lost under current disposal methods. A number of materials such as glass, plastics and lead are able to be recycled either in Australia or overseas. As volumes of televisions and computers going to landfill increase, the volume of non-renewable resources being lost increases.

There are two elements that measure the value placed on these non-renewable resources and can assist to understand the extent of this problem:

- market value placed on recycled products; and
- society's intrinsic value placed on recovering non-renewable resources.

Profile of non-renewable resources in televisions and computers

Televisions and computers contain a number of embedded resources that are non-renewable because they are not replaceable naturally or by human activities, or are replaced so slowly by natural or artificial processes that for all practical purposes, once used they would not be available again within any reasonable time frame. Non-renewable resources must have a fixed stock or be in limited supply relative to the demand for them.[85] Although glass, plastics and metals are recyclable, they are produced from sand,[86] crude oil and metal ore respectively, which are non-renewable resources.

Table 11 presents the material composition of an average CRT and a flat panel display unit for televisions.

Table 11 Material composition of CRT and flat panel display (FPD) televisions

Material	CRT (grams)	%	FPD (grams)	%
Glass	17,802	67%	6,273	22%
Plastic	4,867	18%	8,594	30%
Copper	971	4%	834	3%
Iron	594	2%	4,127	15%
Aluminium	225	1%	1,776	6%
Steel / other metals	93	0%	5,923	21%
Other	2,118	8%	784	3%
Total	**26,670**	**100%**	**28,301**	**100%**

Source: United Nations University (2007), 2008 Review of Directive 2002/96 on Waste Electrical and Electronic Equipment (WEEE), Final report, United Nations University, Bonn, Germany, August 2007

Table 12 shows the material composition of an average desktop computer.

[85] Neha Khanna, 'On the Economics of Non-Renewable Resources', available at <http://www.eolss.net/ebooks/Sample%20Chapters/C13/E6-29-03-01.pdf>, accessed 6 July 2009.

[86] Although new sand is constantly being added to the environment due to the erosion of rocks, it is often considered to be non-renewable due to the length of time that this process takes. See Social Science Database, 'Is glass or sand renewable resources', available at <http://www.ssdata.org/Earth-Sciences-Geology/Is_glass_or_sand_renewable_resources__205024.html>, accessed 6 July 2009.

Table 12 Composition typical desktop computer (2006)

Material	% weight	Kg	Material	% weight	Kg
Plastics	22.99	6.21	Manganese	0.03	0.00
Lead	6.30	1.70	Silver	0.02	0.00
Aluminium	14.17	3.83	Cadmium	0.01	0.01
Iron	20.47	5.53	Mercury	0.00	0.00
Tin	1.01	0.27	Arsenic	0.00	0.00
Copper	6.93	1.87	Silica	24.88	6.72
Nickel	0.85	0.23	Gold	0.00	0.00
Zinc	2.20	0.60			

Source: University of Sydney, Environmental sustainability considerations for ICT areas – Consumption and Conservation of materials

The majority of these materials can be recovered if recycled. For example, computer equipment received through Byteback is broken down into the components listed in Table 13. Under this program, 99% of the metal from electronic equipment is recovered.

Table 13 Recyclable components of computers

Material	Recycling through Byteback
Plastics	Plastic represents over 30% of scrap generated from computer equipment. To ensure that the greatest possible amount is recovered and to eliminate environmental impacts, plastic scrap is separated and granulated to reduce it to a size that enables it to be converted into pellets ready for re-use.
Printed Circuit Boards	The recycling of printed circuit boards, connectors and integrated circuits is undertaken at Noranda Recycling in Canada because there is no disposal treatment facility in Australia that is capable of extracting the valuable metals they contain. The international transportation of printed circuit boards to Canada for smelting and refining raises no environmental concerns and is permitted under regulation.
Batteries	Nickel metal hydride, nickel cadmium and lithium batteries are sent to Societe Nouvelle D'Affinage Des Metaux in St. Quentin Fallavier in France for recycling. Lead batteries are recycled here in Australia. Export is allowed under the *Hazardous Waste (Regulation of Exports and Imports) Act 1989 (Cth)* once a permit has been issued.
Cathode Ray Tubes	A cathode ray tube contains approximately 2 to 3 kilograms of lead which is encapsulated in glass. After removal of all non-glass components, the vacuum is released and the CRT broken. The funnel and panel glass is then exported to Mirec Asset Management in the Netherlands under permit, where the leaded glass is recovered for new CRT manufacture by LG Electronics. CRT glass is packaged in a special container that prevents particles from being released into the atmosphere. Export is allowed under the *Hazardous Waste (Regulation of Exports and Imports) Act 1989 (Cth)* once a permit has been issued.
Liquid Crystal Displays	Liquid crystal displays are back-lit with gas discharge lamps which contain mercury. They are sent to a specialised mercury recovery facility.
Glass	All recovered glass from electronic equipment is sold to Pilkington Australia, a glass manufacturer.
Metal	Both ferrous and non-ferrous metals are easily separated from other components by hand and are sent away for smelting here in Australia. In excess of 99% of metal from electronic equipment is recovered, thereby ensuring the conservation of a non-renewable resource.

Material	Recycling through Byteback
Insulated Wiring	Polyvinyl chloride (PVC) -covered wire, such as signal or power cables, are shredded and chopped to a small size and then granulated to separate the insulation from the copper wire. The remaining plastic is then recycled.
Packaging Material	Re-usable packaging material is sold to Amtec, a recycling company in Thomastown, Victoria, and cardboard is sold to Bayside Cartons in Braeside, Victoria.
Power Supplies	Contain metal and plastic components and are sold to Sims Metal for recycling

Source: Byteback (2009), *Frequently asked questions*, website: http://www.bytebackaustralia.com.au/faq, accessed: 12 March 2009

As the inputs used to produce glass, plastics and metals[87] are non-renewable, landfilling end of life televisions and computers results in the removal of scarce, non-renewable materials from the productive economy. For example, it is estimated that if current consumption rates of the following metals found in televisions and computers continue, their supply will be depleted within the next century:

- Tin – 40 years;
- Lead – 42 years;
- Zinc – 46 years;
- Copper – 61 years; and
- Nickel – 90 years.[88]

In addition, the International Energy Agency estimates that the global production of crude oil, which is used to produce the plastics found in televisions and computers, is likely to peak in about ten years. Their assessment of more than 800 oil fields in the world, covering three quarters of global reserves found that most of the biggest fields have already peaked and that the rate of decline in oil production is now running nearly twice the pace that was calculated only two years ago.[89]

When television and computers are disposed of in landfill, these non-renewable resources are lost to future generations, which is contrary to one of the core objectives of the COAG endorsed National Strategy for Ecologically Sustainable Development (ESD), which is to provide for equity between generations.

Stakeholders have revealed that close to 100% of the materials in televisions and computers can be recycled. For example:

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[87] These non-renewable inputs are sand, crude oil and metal ore respectively

88 New Scientist (2007), *How Long Will it Last?*, May 26, pp 38-39

[89] The Independent (2009), *Warning: Oil Supplies are Running Out Fast*, website: http://www.independent.co.uk/news/science/warning-oil-supplies-are-running-out-fast-1766585.html, accessed 19 August 2009

- metals such as copper can be stripped out and sold in secondary markets given that the recovered metals are of a comparable quality to virgin metal ores;
- plastics can be separated into types, granulated and converted into new products;
- heavy metals can be recovered from computer circuit boards and sold in secondary markets; and
- glass can be crushed and reused.[90]

Financial market value placed on recycled products

When end of life televisions, computers and computer products are recycled, they are reprocessed into materials and products so they can be manufactured into new products. For example, recycled metal is separated from the waste televisions and computers to be sold on a secondary market to customers that will then use this metal in other production. These end market customers purchase the recycled materials based on a financial market value.

Consultation with current recyclers indicates that the financial value that the market places on recycled television and computer materials is on average $300-400 per tonne of recycled product.[91] The financial value of material that is recovered during the recycling varies greatly across the product types due to the material composition of the items. The revenue received for this material is also impacted by fluctuations in the market value of the materials that are extracted. Some computer products, such as desktop computer boxes, have a higher financial value due to the presence of precious metals. Other products, such as CRT and plasma visual display units and ink jet printers, have a much lower value. Fluctuations in the market value of materials have been seen in the past year with a dramatic drop in the price of some materials as a result of the global financial crisis. Future product changes such as size and material composition are also expected to have an impact on the financial value of material extracted through computers and television recycling.

It should be noted that it costs about $970 per tonne to collect and reprocess the waste resulting in a financial loss from recycling of about $620 per tonne without a change in technology or current arrangements. However, new technology being implemented in other countries is reducing reprocessing costs. Currently, use of this technology in Australia is not financially viable due to the low volumes of end of life televisions and computers being recycled. As such, the recycling industry has been reluctant to invest in these new technologies.

Society's intrinsic value placed on recovering non-renewable resources

[90] Industry consultation with Renewable Processes, 4 August 2009

[91] Discussions with two e-waste recyclers (June 2009)

One issue with the financial market value discussed above, is that it does not capture that the community also places 'intrinsic' economic values on recovering these non-renewable resources. And, while the market values of the resources are of interest, it is the non-use society values that are of particular importance in understanding the full extent of this problem.

As discussed above, the majority of materials used as inputs to produce the resources embedded in televisions and computers are non-renewable, including glass, crude oil and metal ore. A choice modelling survey undertaken in 2009 of more than 2,000 Australians has indicated that respondents were willing to pay to increase the current recycling rate, and the issue of recovering non-renewable resources was considered of highest importance for survey respondents..[92]

This choice modelling survey (described further in Box 1 below and in Appendix C), indicated that respondents were willing to pay to increase the current recycling rate, and they are willing to pay on average $0.50 per unit for each percentage increase in the recycling rate, which equates to $23 per tonne per percentage increase in recycling.[93] While these values cover more than just resource recovery, these were considered the most significant issues:

- around half of the respondents (52%) were of the opinion that society is generating too much waste, representing a drain on the resources available for future generations;
- the highest percentage (33%) of households ranked as the most important issue in dealing with household waste the 'risk of running out of resources while sending valuable materials to landfill'; and
- most respondents (60%) indicated that they recycle as much as they can and would like to see additional recycling systems put in place for the items that cannot be currently reused or recycled such as televisions and computers that have reached the end of their useful life. [94]

To the extent that survey respondents have realistic perceptions about resource scarcity and other issues associated with e-waste recycling the choice modelling results indicate that society has a relatively high willingness to pay for a comprehensive recycling program for end of life televisions and computers, totalling around $1.6 billion (in present value terms) between 2008/09 and 2030/31 if 70% recycling can be achieved within 5-9 years (corresponding to sales of 170 million VDUs and 650 million computers and other computer products). The willingness to pay is in excess of the financial loss associated with recycling.

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[92] URS (2009), *Willingness To Pay for E-Waste Recycling*, Unpublished report prepared for the Environment Protection and Heritage Council, February 2009, p 25

[93] URS (2009), *Willingness To Pay for E-Waste Recycling*, Unpublished report prepared for the Environment Protection and Heritage Council, February 2009, p 25

[94] URS (2009), *Willingness To Pay for E-Waste Recycling*, Unpublished report prepared for the Environment Protection and Heritage Council, February 2009

2. Community expectations are not being met

The financial costs of collection and recycling incurred by recyclers exceed the financial value of the recovered material resources. As a result the recycling of e-waste is not commercially profitable without a financial contribution beyond the sale of recovered material resources (see Figure 9 below). The true value of recycling to society includes not only household and business collection and transportation costs, but also the social benefits, which are not taken into account in private decision making by commercial entities. The community values recycling for a number of reasons including, but not limited to:

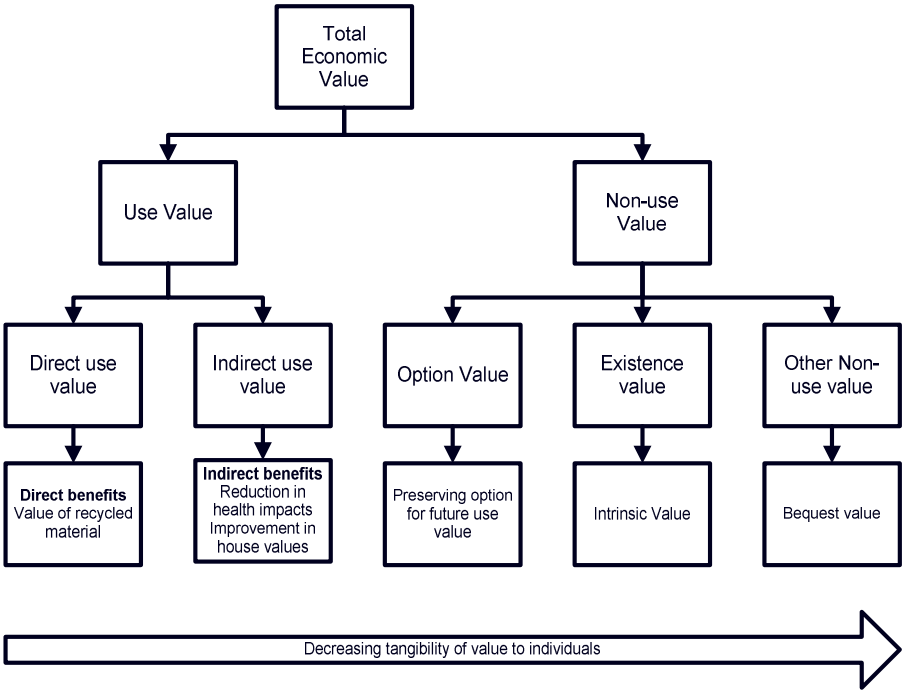
- the risk of running out of resources while sending some valuable materials to landfill (the problem discussed above);
- landfill sites are posing a threat to the natural environment;
- landfill space is running out;
- landfill sites are posing a threat to human health; and
- avoiding having landfill in their neighbourhood.[95]

At question, however, is whether the social benefit outweighs the social cost.

The economic benefit comprises use and non-use values. These are summarised in Figure 8.

[95] Ibid, p 29, Chart 4-8

Figure 8 Categories of Value



Source: Adapted from Serageldin, I. (1999), Very Special Places: The Architecture and Economics of intervening in Historic Cities, The World Bank, Washington

The financial market values of the materials generated from recycling activities are *direct use values*. These benefits accrue directly to individuals.

The reduction in health impacts associated with the removal of hazardous substances from the environment and the positive effect on residential land prices from minimising hazardous waste in landfill operations are examples of *indirect use values*. These are the values that are gained indirectly from the natural resource.

There are also *non-use values*. These arise indirectly either through the knowledge of continued presence of resources in good health or through potential future uses. Non-use values can be divided into existence values (knowledge of their presence), option values (values for use in the future), quasi option values, and bequest values (arising from wanting to preserve the public good for future generations). The values include those listed on the previous page, relating to recovering non-renewable resources, and environmental and health impacts of landfilling.

Stated preference techniques help to quantify non-use values. One way to gain society's preference for non-use values is through choice modelling. A choice modelling study was undertaken in 2009 in order to estimate households' willingness to pay for a national recycling scheme guaranteeing recycling rates in excess of 50%. A summary of this study is presented in Box 1 (next page), with some other higher-level discussion on choice modelling as an approach more broadly and some elements on the URS methodology are presented in Appendix C.

It should be noted that choice modelling relies on stated preference (i.e. what people say they are willing to do) rather than revealed preferences (which draw on evidence of what people have actually done). In addition, some willingness to pay surveys have been found to overestimate people's willingness to pay and research has found that the ordering of the questions can also affect the results.[96] Consequently, caution is required when interpreting the choice modelling and the willingness to pay estimates.

[96] See, for example, Blumenschein, Johannesson, Yokoyama and Freeman (2001), *Hypothetical versus real willingness to pay in the health care sector: results from a field experiment*; Stewart, O'Shea, Donaldson and Shackley (2002) *Do ordering effects matter in willingness-to-pay studies of health care?*; Armantier and Treich (2003)*Social Willingness to Pay, Mortality Risks and Contingent Valuation*

Box 1 Willingness to pay study for television and computer recycling

In 2008, the EPHC tasked a multi-skilled specialist team to conduct a willingness to pay study for television and computer waste. The study was undertaken jointly by ERE Consulting, NWC Research and URS.

The study's objective was to: verify whether people's concern that recycling levels are too low and too much is disposed to landfill, translates into their being willing to pay an amount to achieve a higher level or recycling over and above that provided by current commercial incentives.

In summary, the study involved:

- *modelling technique* – the stated preference technique of choice modelling was used. This involves surveying a sample of the wider community using a questionnaire that includes a set of choices involving trade-offs between various attributes (i.e. in this case respondents were asked to consider the trade-off between: the percentage of waste avoided and material recovered, and an additional cost they would be required to pay on each new television/computer purchased). Choice modelling has its origins in Thurston's research into food preferences in the 1920s and has numerous applications including in commercial settings to understand customer preferences for different product/service attributes, in transport studies to understand route/mode choices and in environmental analyses to estimate non-market environmental benefits and costs such as the value of water resources or the value of open spaces in residential land use;
- *sample characteristics and size* – a sample size of 2,105 respondents was achieved from Sydney, Melbourne, Perth, Brisbane and Adelaide. Quotas were set based on age, gender and income level to ensure an adequate representation from across the different strata of society;
- *method of survey* – an online panel of respondents was surveyed. This panel was pre-selected as being representative of the Australian population;
- *nature of questions asked* – the questionnaire was developed following an iterative process, with pre-testing through focus groups and a pilot survey, allowing for development of the main survey. Questions were asked in the following categories: demographic; attitudes to waste; television and computer ownership; choice modelling; and follow-up questions.
- *advantages of the survey*:
    - integrated comments from the Office of Best Practice Regulation (OBPR) and the Australian Bureau of Agriculture and Resource Economics (ABARE) were incorporated in the survey to ensure the results could be incorporated in this regulatory impact statement;
    - the study is specific to televisions and computers, so is directly relevant for this regulatory impact statement;
    - the main survey was undertaken in January 2009, so incorporates impacts of the current global financial crisis;
- *shortcomings of the survey*:
    - incorporated household but not commercial values;
    - not all states/jurisdictions were incorporated, and only metropolitan areas were considered; and
    - the questionnaire did not discuss peripherals and computer components.

Source: URS (2009), *Willingness to Pay for E-Waste Recycling*, Unpublished report prepared for the Environment Protection and Heritage Council; Research News (2003), *Letter to the editor: Choice Modeling – a not so recent invention*, July

The URS research found that respondents were willing to pay between $0.43 and $0.53 per item for an increase in recycling of 1% above current levels.

Table 14 shows the range of willingness to pay (WTP) for three recycling recovery rates under the assumption that items will be dropped off by households for recycling.[97]

Table 14 Willingness to Pay (WTP) estimates

Recovery level / premium for kerbside	WTP for each % increase in waste recovery ($ over 5 years)	WTP per item ($)
50% recovery	32.03 – 48.34	18.18 – 27.44
70% recovery	45.10 – 68.07	25.60 – 38.64
90% recovery	58.17 – 87.79	33.02 – 49.84
Kerbside premium (all recovery levels)[98]		3.55

Source: URS (2009), Willingness To Pay for E-Waste Recycling, Unpublished report prepared for the Environment Protection and Heritage Council

These results indicate there may be substantial social benefits to recycling of televisions and computers which are not captured under the current situation. As the community values recycling more than the market, if there is no government intervention, then society will not receive benefits which they are estimated to value at between $18 and $27 per item for an increase in the recycling rate to 50% (from an estimated current level of 7%), increasing to $33 to $50 per item for an increase to 90%. As the private cost of recycling does not take into account the willingness to pay, the current level of recycling does not meet community expectations. As indicated above, the value community places on recycling is expected to total $1.6 billion (present value, 2009 dollars) over the next 23 years for an average scheme able to achieve 70% recycling or more (corresponding to sales of 170 million VDUs and 650 million computers and other computer products).

3. The free-rider problem

There are two aspects to the free-rider problem facing end of life televisions and computers:

- consumers are directly responsible for the creation of waste through the consumption of products. In Australia, fees for disposal at landfills appear to indicate that consumers are taking responsibility for the waste that they create. However, these fees are only designed to

[97] Note that the study only tested the willingness to pay for 50%, 70% and 90% recycling rates, meaning that the estimated willingness to pay should not be applied to recycling rates bellow 50%.

[98] Consumers were willing to pay $3.55 per item for a kerbside collection service instead of having to drop off the units at collection facilities.

cover the direct financial costs of operating the landfill and do not take into account other social costs associated with the landfill of end of life televisions and computers including externalities and the lost value of resources. In addition, while there are a number of private recyclers currently operating, they rely on charges from consumers to bridge the gap between collection/reprocessing costs and the value of resources. However, consumers are generally unwilling to pay private recyclers unless all consumers that contributed to the waste are responsible for their fair share of the costs of recycling. Community free riders are those who use televisions and computers until they reach end of life, but do not contribute their fair share of the costs of their recycling; and

- Industry is indirectly responsible for the creation of waste by manufacturing/importing these products which end up being consumed. Industry free riders are those who manufacture/import televisions and computers but do not pay their fair share of the costs of recycling these products. Industry bodies in the television industry (Product Stewardship Australia) and the computer industry (Australian Information Industry Association) have both proposed industry recycling schemes,[99] however, they have found it difficult to gain full coverage of businesses responsible for creating the waste. They have indicated that they will not implement the schemes in the absence of the government providing the schemes with a regulatory underpinning due to concerns about scheme participants facing a competitive disadvantage relative to non-participants.

Community free-riders

As indicated by the URS choice modelling study, the Australian community is estimated to be willing to pay to $0.50 per item sold for each percentage increase in the recycling rate of televisions and computers. This equates to between $21-45 per unit sold, for recycling schemes delivering recycling rates of between 50-90%.[100] However, despite this potentially significant willingness to pay per whole television or computer, the situation has not arisen that consumers are directly paying this to recyclers as a fee for recycling, resulting in the currently low recycling rates. In particular, organisations such as Dell promote and offer fee-based recycling for any branded computer products, however the computer and computer product recycling rate is currently only 14% of end of life tonnes (10% of units). This indicates that a free-rider problem may exist such that individual consumers are reluctant to participate in television and computer recycling schemes that are not universally supported by consumers. The responses to the choice modelling study support the view that a free-rider problem exists as respondents indicated they are willing to pay more per unit if the recycling rate is higher.

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[99] Product Stewardship Australia (2006), *Product Stewardship Agreement for Televisions: An agreement between the Environment Protection and Heritage Council and the television industry;* AIIA and Planet Ark Consulting (2005), *AIIA – E-waste program development phase: Report for discussion and feedback*

[100] URS 2009, p 42, Table 4-13 (only for televisions and computers, does not account for consumers purchasing computer products and peripherals)

The willingness to pay estimates generated from the choice modelling appear somewhat higher than current recycling charges. The model suggests a willingness to pay of about $18-$49. On face value this willingness to pay may appear difficult to reconcile with market charges for recycling:

- Dell charges $10 plus $8.50-$15.50 per item of non-Dell products (Dell products are picked up and recycled for free);[101]
- The ACT Government charges $15 for computers boxes and $22.50 for monitors;[102] and
- Lioncom e-Waste charge $8 for computer boxes and $12-$30 monitors.[103]

This apparent inconsistency can be explained. Market charges for recycling indicate what people are willing to pay for a private benefit, which only accrues to them as an individual. In contrast, the URS willingness to pay estimate provides an indication of what people are potentially willing to pay for a community-wide benefit, which accrues to the community as a whole and internalises the negative externalities associated with end of life televisions and computers.

The URS willingness to pay study indicated that consumers were only willing to pay if there was a national scheme guaranteeing at least 50% recycling as this would eliminate free riders. The URS study quantifies this difference as its focus is solely on the community wide benefits and how much individuals are prepared to pay for those wider benefits.

Industry free-riders

A number of television and computer recycling schemes have already been trialled in Australia and overseas. Australian government supported schemes are described in Table 15, along with two private sector schemes.

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[101] Dell website, *Dell recycling for home and small business*, website: http://supportapj.dell.com/support/topics/topic.aspx/ap/shared/support/recycle/en/home_small_business?c=au&l=en&s=gen, accessed 31 August 2009

[102] ACT Government Department of Territory and Municipal Services, *Computer Recycling*, website: http://www.tams.act.gov.au/live/Recycling_and_Waste/factsheets/computers, accessed 31 August 2009

[103] Lioncom e-waste, *Recycling charges – effective 01 August 2009*, website: http://www.lioncom.com.au/recycling/ChargesAug08.pdf, accessed 31 August 2009

Table 15 Government and private sector television and computer recycling schemes

Name of Scheme	Organisations Involved	Description
Computer Asset Recover Service	Compaq NSW EPA	A pilot take-back and computer recycling scheme was conducted by Compaq and MRI through a grant received under the NSW EPA's Waste Challenge program. The scheme was conducted in the Sydney metropolitan area. It was estimated that 30% of equipment collected in the pilot program would eventually be reused, 40% would be recovered and the remaining 30% would be used in other electronic equipment.[104]
Beyond the Dead TV	Project partners were AEEMA, CESA, EcoRecycle Victoria, MRI Australia, Least Waste and the Centre for Design at RMIT University. Electronic suppliers that participated in the scheme were Hitachi, LG Electronics, Mitsubishi Electric, NEC Australia, Panasonic, Philips, Samsung Electronics, Sanyo, Sharp and Sony.	A pilot product stewardship program in Eastern Metropolitan Melbourne that resulted in more than 3,500 TVs, computer monitors and VCRs being diverted from landfill between September 2001 and September 2002.[105]
Byteback	Sustainability Victoria Australian Information Industry Association (AIIA) and founding partners Apple, Canon, Dell, Epson, Fujitsu, Fuji-Xerox, HP, IBM, Lenovo, and Lexmark.	Byteback is a free take-back program to help people dispose of end of life computer equipment responsibly. The program is funded 56% by the Victorian Government and 44% by the Byteback partners. Individuals and small businesses deposit their unwanted computer equipment at one of the eight locations throughout Victoria. Stakeholders have indicated that this scheme will be phased out in 2009/10.
Dell	Pick up of computer products (free and fee-based service)	Dell offers free pick-up of any Dell branded equipment (with collection charges over 22 kg). In addition, it also offers fee-based recycling of non-Dell computer equipment ranging from $8.50-15.50 per unit depending on the location or if it is dropped-off by the consumer.
Apple	Recycling of computer products	Apple currently offers free recycling for purchases from particular stores in Sydney, Chatswood or Chadstone, or for online purchases of Apple-branded produces. However, take-up of this offer has not been significant to date. Apple also funds around four local community events per year, which are typically organised and promoted by

[104] Commonwealth of Australia (2001), *Developing a Product Stewardship Strategy for Electrical and Electronic Appliances in Australia,* March, Canberra, page 46

[105] RMIT University website 2003, 'Press Release – Launch of report on TV Recycling pilot', available at <http://www.cfd.rmit.edu.au/news/press_releases/launch_of_report_on_tv_recycling_pilot>, accessed 11 August 2009; CESA 2003, 'Beyond the Dead TV – Managing End of life Consumer Electronics in Victoria: A Pilot Product Stewardship Project'

Name of Scheme	Organisations Involved	Description
		local councils. These events result in the recycling of around 750-800 tonnes of computers per year, which is the equivalent of around 16% of the total volume of computer and computer related products recycled in 2007/08. Globally, Apple targets recycling of around 35-40% of the volumes sold seven years earlier.[106]
Toshiba	Computer (notebook) recycling	Toshiba has been recycling notebook computers for more than five years through a partnership with MRI Recycling. It has computer schemes for both businesses and consumers and is considering a television scheme: • Consumer scheme – Toshiba offers drop-in bins in capital city service locations, and offers free recycling of Toshiba notebooks. They charge a fee for non-Toshiba notebooks. Alternatively, and for a fee, they offer a pick-up service below a certain number of kilometres. In addition, they offer recycling for items that consumers post back. • Business scheme –Toshiba offers businesses a range of options ranging from a total recycling packaging including truck pick up, to a cash recovery scheme where the business receives money back depending on the volume recycled and on-sold. Over the past 5 years, Toshiba have recycled 20 tonnes of notebook computers, which is the equivalent of 0.2% of the computers and computer related products estimated to have been recycled in 2007/08.[107]

Source: Apple website 2009: http://www.apple.com/au/environment/recycling/program/au/ index.html; Dell website 2009: http://supportapj.dell.com/support/topics/topic.aspx/ap/ shared/support/ recycle/en/home_small_business?c=au&l=en&s=gen; CESA (2003), *Beyond the Dead TV – Managing End of life Consumer Electronics in Victoria: A Pilot Product Stewardship Project*; Apple stakeholder meeting, 4 August 2009; Toshiba stakeholder meeting, 4 August 2009

As indicated in the table above, the private sector schemes are brand-specific because of the free-rider issue. This means that they are not whole-of-waste solutions for end of life television and computers. In addition, it is not clear how easy it is for households to participate, nor if these results guarantee recycling as opposed to refurbishment or reuse.

Key industry players in both the television and computer industry have expressed interest in setting up recycling schemes.[108] However, particularly in the computer industry, there is a problem with unbranded or orphaned

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[106] Apple stakeholder meeting, 4 August 2009

[107] Toshiba stakeholder meeting, 4 August 2009

[108] Both the computer industry representative body (the Australian Information Industry Association) and the television representative body (Consumer Electronics Suppliers Association) have expressed interest and developed possible product stewardship schemes.

products. Unbranded products are those that do not belong to a major brand because the individual components were imported and assembled in Australia. Orphaned products are those that belong to a company that no longer participates in the industry or no longer exists because it has become insolvent. While major players are interested in setting up a scheme, there is difficulty in obtaining a commitment from the minor players to pay for the scheme and subsequently enforcing that commitment.

Table 16 shows the brands of products collected through the Byteback scheme.

Table 16 Brands of computers collected through Byteback Scheme, 2005 -2008

Source of Computer	Percentage collected by Byteback
Byteback Partners (incl. IBM)	46%
Acer+Gateway, Toshiba & Asus	6%
Other Leading Brands	16%
Unbranded & Unknown	10%
All Other	22%
Total	**100%**

Source: Australian Information Industry Association (2009)

Apple, Brother, Canon, Dell, Epson, Fujitsu, Fuji-Xerox, HP, IBM, Lenovo, and Lexmark voluntarily participate in the Byteback scheme which is funded 56% by the Victorian Government and 46% by the partners. However, as can be shown in Table 16 the majority (54%) of computers collected through Byteback are not members of the scheme and therefore do not contribute financially.[109] This highlights a concern of the ongoing viability of voluntary schemes, particularly if the current government subsidies in support of programs like Byteback are removed or cease.

In the computer industry there has been a major shift in consumer purchasing preferences in recent years. For example, unbranded, unknown brands and orphaned desktop computers comprised 44% of the waste collected by the Byteback scheme in October to December 2008. However, only 18% of current desktop computers sold are from unbranded or unknown brands, indicating there has been a shift in the market, largely due to consumer shift towards branded laptops. This creates issues relating to equity between the current waste stream and future waste streams. While branded products comprise 82% of the current market sales, they only comprise of 56% of the current waste. The additional problem of determining who should be responsible for the waste and the large number of small players importing small quantities of products add to the free-rider problem.

Overall, the free-rider problem has been a significant issue contributing to a lack of industry responses to television and computer waste. In particular, industry bodies such as the AIIA and the PSA have indicated that they are

[109] Australian Information Industry Association (2009), *Byteback*, Presentation given to PwC and Hyder Consulting 10 March 2009

unable to act due to the free-rider problem, and as a result suggest that government intervention recycling schemes will be short lived as industry participants will chose not to participate, and recycling levels will decline.

It is acknowledged that the free rider issue alone does not justify government intervention. However, the free rider problem explains why voluntary schemes are not currently addressing the television and computer waste problem. Consumers are willing to pay for a national scheme with guaranteed recycling rates above 50%, but have not been willing to pay for private recycling schemes with lower charges as it is not guaranteed that everyone will have to pay. Industry have been unwilling to join a voluntary industry scheme due to concerns about free riders.

4. Toxicity and other environmental externalities associated with landfilling of waste

There is limited information available on toxicity levels and other environmental risks posed by landfill in Australia. Specifically, there is no data available on the risk associated with televisions and computers being landfilled in Australia. Internationally, research has been undertaken which has resulted in e-waste being classified as hazardous waste under the Basel Convention As a consequence, there are some international standards and guidelines covering the appropriate management of such waste to minimise the risk to the environment and human health.

Broader waste environmental externality costs

There are significant differences in the estimates of the private cost per tonne of waste to landfill in Australian studies undertaken to date. Some of these differences are due to the size of the landfill, whether a landfill is new or already operating, the value of land, and the management practices employed at the site.[110]

An example of a recent assessment of environmental and other external landfill costs (for all waste types, not specific to e-waste) was presented by the Productivity Commission in its 2006 inquiry into waste management in Australia.[111] The Productivity Commission concluded that there are a number of external costs of landfill management, including:

- greenhouse gas emissions – the methane and carbon dioxide emissions from the landfill contribute to the greenhouse gas effect. Based on US EPA and Australian Greenhouse Office estimates the Productivity Commission calculates the external costs of greenhouse gas emissions for waste at between $5 and $21 per tonne of waste disposed at a properly located, engineered and managed landfill;

[110] BDA Group 2009, DRAFT, *The full cost of landfill disposal in Australia*, unpublished report prepared for DEWHA, June, p 17

[111] Productivity Commission (2006), *Waste Management*, Report no. 38, Canberra, Appendix B

- other gas emissions – other gas emissions produced by landfills, such as benzene and methyl chloroform emissions, can have an adverse effect on human health and the environment. The Productivity Commission estimates these emissions to have an external cost of less than $1. The Productivity Commission concludes that modern landfills have been set up to minimise the risk to human health and the environment and that when the gas is emitted into open air it is expected to be diluted to extremely low concentration;
- leachate – the liquid that is passed through a landfill that may have become contaminated with organic or inorganic compounds and metals can cause damage to human health or environment if it is not contained within the landfill. The Productivity Commission valued the cost of leachate at less than $1 per tonne of waste because the likelihood of exposure in Australian landfills is low. There are also direct costs to local governments from leachate prevention and management; [112] and
- amenity costs – these costs include the loss in amenity of nearby households and businesses. The Productivity Commission estimates that these costs are less than $1 per tonne of waste.

A summary of these Productivity Commission externality values (for waste disposed of in a properly located, engineered and managed landfill) are outlined in Table 17.

Table 17 Externality costs of landfill disposal

External cost	$ per tonne
Greenhouse Gas Emissions	5 – 21
Other gas emissions	1
Leachate	1
Amenity	1
Total external cost from landfill	**8 – 24**

Source: Productivity Commission (2006), Waste Management, *Inquiry Report no. 38*, 20 October, Canberra

Based on the Productivity Commission's estimate of landfill externalities generally for all waste types, if the current landfill trends continue for television and computer waste, then landfill externality costs of $40.8 million will be incurred by Australians over the next 23 years (present value, 2009 dollars).

However, given the specific nature of television and computer waste (i.e. almost all is non-organic), the amount of greenhouse gas is likely to be small and therefore leachate and loss of amenity is expected to be more relevant

[112] R&Z Consulting (2008), *Estimating consumers' willingness to pay for recycling end of life televisions and computers in Australia: A framework for economic analysis,* Unpublished report by Dr John Rolfe, Prepared for the NSW Environment Protection Agency; R&Z Consulting (2009), *Designing a Stated Preference Experiment*, Unpublished report by Dr John Rolfe, prepared for the NSW Environment Protection Agency

for televisions and computers waste of the externality costs identified by the Productivity Commission. Drawing on the Productivity Commission's estimates for leachate and amenity costs, it is estimated that if the current disposal pathways are not varied over the coming 23 years then landfill externality costs totalling $3.4 million will be incurred over this time (present value, 2009 dollars). If only leachates were considered then this cost would reduce further down to $1.7 million (present value, 2009 dollars).

It is also important to note that these externality values are not supported equally by other studies undertaken on landfill externalities, and as such may not be an accurate measure of landfill costs. For example, a 2009 independent analysis by BDA Consulting was recently undertaken to develop further understanding of the direct and externality costs of landfill.[113] The estimates were based on the landfill location (metropolitan or rural), the climate (dry temperate, wet temperate or wet tropical), the quality of controls (best or poor) and the size of the landfill (small, medium or large).The study estimates that the externality costs of landfill (greenhouse emissions, other air emissions, leachate and disamenity) range from $0.50-$24.50 per tonne of waste. However, the analysis does not take into account the externality costs associated with landfilled hazardous substances which include potential pollutants such as lead from vehicle batteries, mercury from compact fluorescent lamps, and brominated flame retardants which are found in many household items including in e-waste. In addition, the CBA assumptions were not updated to reflect the results of the BDA analysis as this report is currently unpublished.

As discussed further below, more detailed understanding of landfill externalities for any waste stream may require a complex and lengthy scientific risk assessment.

Waste environmental externality costs specific to televisions and computers

There are a number of health and environmental risks often identified with the landfilling of televisions, computers and other electrical products, mainly due to the possibility of leaching and evaporation of hazardous substances.[114] These possible risks are discussed below, however it is important to note that there is limited information and data available to understand the extent of environmental problems relating to these items.

While the risk is expected to be low, and hence this problem less significant than others presented in this chapter, it is important that this is not discounted given that there is no conclusive scientific evidence on this issue.

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[113] BDA Group 2009, DRAFT, *The full cost of landfill disposal in Australia*, unpublished report prepared for DEWHA, June

[114] Commonwealth of Australia (2001), *Developing a Product Stewardship Strategy for electrical and electronic appliances in Australia: Discussion Paper*, Canberra, page 39

There are no scientific studies measuring the environmental risks related specifically to emissions from television and computer waste in Australian landfills. There are scientific risk assessments of hazardous substance emissions from landfill sites overseas. However, these are of limited relevance for assessing the risks from television and computer waste in Australia because of the potential for significant differences in, for example, environmental conditions and management practices. Moreover, there appears to be a lack of consensus among these reports on the risks of contamination.

There is scientific evidence that when certain materials (e.g. mercury, lead, persistent organic pollutants) 'leach' from landfill into water or the air that these materials can be ingested by humans or animals. E-waste contains persistent organic pollutants and heavy metals. The performance of these materials in landfill will depend on a number of factors such as whether the landfill equipment is damaged in the process of compaction and the degree to which moisture and biodegradable material is present (creating a greater likelihood of chemical reaction). This makes it difficult to predict the impact from landfill. In Australia and internationally the precautionary principle has lead the adoption of measures such as landfill lining and leachate management and monitoring to manage and mitigate the risks. These measures have only been implemented for a relatively short time and, as the research has not yet been undertaken, there is no current scientific evidence that e-waste in lined landfill poses a health risk. However the US EPA has indicated that it expects in time all landfill will leak (suggesting intergenerational risk).

The nature and scope of health and environmental risks from televisions and computers

Televisions and computers contain a range of hazardous substances, including heavy metals such as lead, mercury, copper and cadmium and chemicals such as brominated flame retardants that are toxic in nature and that can cause harm to humans, animals and the environment. These substances in televisions and computers have different human and environmental impacts and risks depending on the stage of life of these products and the arrangements in place for their management and handling them. In terms of what is known about the potential environmental impacts of television and computer waste, Table 18 outlines the hazardous substances in television and computer CRT monitors for an average unit size. It has been noted that mercury in fluorescent tubes and backlight lamps used in LCD screens; brominated compounds and antimony compounds used as flame retardants in printed circuit boards; bromine in brominated flame retardant plastics or lead contained in cathode ray tubes and imaging lenses may leach into the soil and groundwater when placed into landfill. In addition, Polybrominatediphenylethers (PBDEs) may also evaporate and be transported through the atmosphere.[115]

[115] Commonwealth of Australia (2001), *Developing a Product Stewardship Strategy for electrical and electronic appliances in Australia: Discussion Paper*, Canberra, page 39; Blue Environment (2008), *Code of Practice for Managing End of life Televisions*, p 4

It is well established that some materials contained in many of these products are toxic and can pose a risk to human health and the environment at end of life if not disposed of properly. Consequently, a range of international conventions and agreements have been signed to manage the risks from these materials including:

- Basel Convention and Stockholm Convention on Persistent Organic Pollutants (POPs) – hazardous wastes;
- Rotterdam Convention on Prior Informed Consent Procedure – international trade of hazardous materials; and
- an agreement to a Legally Binding Instrument (LBI) on Mercury.

In addition the export of hazardous materials/waste is subject to the following domestic legislation:

- *Hazardous Waste (Regulation of Exports and Imports) Act 1989; and*
- *Industrial Chemicals (Notification and Assessment) Act 1989*.

Recently, the Persistent Organic Pollutants (POPs) Review Committee of the Stockholm Convention recommended that both the commercial formulations of PentaBDE and OctaBDE and both forms of PBDEs be included in Annex A of the Stockholm Convention, which covers measures to eliminate intentional production and use of chemicals. PentaBDE and OctaBDE were considered appropriate for inclusion because they are likely, as a result of their long-range environmental transport, to lead to significant adverse human health and/or environmental effects such that global action is warranted.

In its 2008 Review of the European Directive on Waste Electrical and Electronic Equipment, the United Nations concluded that, compared to other forms of e-waste, the avoided toxicity effects from recycling e-waste were most significant for LCD monitors due to the high risk of mercury emissions.[116]

[116] The WEEE Directive treatment categories also include large household appliances; cooling and freezing; large household appliances (smaller items); small household appliances; IT and telecom excluding CRTs, CRT monitors, LCD monitors, consumer electronics excluding CRTs, CRT TVs, flat panel TVs, lighting equipment – lamps; electrical and electronic tools; toys, leisure and sports equipment; medical devices, monitoring and control instruments and automatic dispensers. See United Nations University (2007), *2008 Review of Directive 2002/96 on Waste Electrical and Electronic Equipment*, August, p vi

Table 18 Hazardous substances in televisions and computers (based on average unit size)

Substance	Cathode Ray Tube Television (grams)	Cathode Ray Tube Computer monitor (grams)
Lead	1,787.57	786.04
Bromine	20.40	3.97
Zinc	6.41	25.90
Antimony	5.75	3.02
Chlorine	3.78	n/a
Chromium	3.75	3.78

Source: United Nations University (2007), 2008 Review of Directive 2002/96 on Waste Electrical and Electronic Equipment (WEEE), Final report, United Nations University, Bonn, Germany, August 2007

Examples of the impact of these hazardous television and computer waste substances include:

- lead – is toxic to virtually every biological system. For humans, it is harmful by inhalation and if swallowed, and may impair fertility and may cause harm to unborn children. Lead also has high acute and chronic effects on plants, micro-organisms and animals as it accumulates in the environment;[117]
- mercury – affects humans and animals. Mercury, mercury alkalis and inorganic compounds of mercury are toxic by inhalation, skin contact and if swallowed. In humans, mercury can affect the nervous system causing problems with sight, coordination and balance. Mercury accumulates in animals and organisms and therefore animals who regularly use the food chain may be a higher risk for mercury poisoning;[118] and
- chromium VI – affects humans and animals. It may cause cancer by inhalation and cause sensation by skin contact. It is very toxic to aquatic organisms and may cause long-term adverse effects in the aquatic environment.

As outlined in Table 13, some hazardous components including CRT glass and nickel metal hydride, nickel cadmium and lithium batteries are recycled overseas in special facilities. In accordance with the Basel Convention and the *Hazardous Waste (Regulation of Exports and Imports) Act 1989* the export of these components requires a permit. A condition of such an export permit is demonstrating that there is the capacity overseas to deal with these hazardous components in an environmentally sound manner.

For the remaining materials which are recycled domestically, best practice guidance is provided by the following documents:

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[117] Commonwealth of Australia (2001), *Developing a Product Stewardship Strategy for electrical and electronic appliances in Australia: Discussion Paper*, Canberra, page 39; Blue Environment 2008, 'Code of Practice for Managing End of life Televisions', p 40

[118] Ibid, p.41

- *Guidelines for Standard E-waste Containers* – the type of containers to be used for collection and handling in order to minimise breakage, reduce health and safety risks, and optimise handling of materials in bulk;
- *Draft Code of Practice for Managing End of life Televisions* - storage at recycling facilities, tracking of materials entering the recycling facility, transport, import and export, required documentation and infrastructure requirements at recycling facilities. The same principles could be applied to computer recycling; and
- *Australian Dangerous Goods Code* – transport signage and containerisation.[119]

State and territory regulatory frameworks also put in place arrangements to mitigate risks associated with end of life management of televisions and computers, ranging from the way occupational health and safety arrangements are approached through to requirements for landfill that seek to reduce such risks.

In addition, transporters are subjected to a range of regulatory and local government requirements including covering loads and maximum truck weights and must obtain the appropriate licenses and approvals. The *National Environment Protection Measure (Movement of Controlled Waste between States & Territories)* regulates the movement of hazardous wastes across Australian jurisdictions, ensuring that controlled wastes that are to be moved between States and Territories are properly identified, transported and handled in ways that are consistent with environmentally sound practices.[120]

Overseas design standards are expected to reduce the quantity of hazardous materials contained in new televisions and computers over time, thus reducing the contamination risks associated hazardous materials when these products reach end of life and are recycled. For example, the European RoHS Directive, which came into force in July 2006, regulates the use of six hazardous substances (lead, mercury, cadmium, hexavalent chromium, PBBs or PBDEs) in electrical and electronic goods.[121] In addition, CRT monitors including lead are being phased out and replaced by LCD monitors and flat screen televisions.

In summary, televisions and computers contain small amounts of potentially hazardous or toxic materials and are therefore subject to a range international and domestic legislation for safe handling and disposal. The legislation does not prevent the disposal of televisions and computers in landfill. However, little is known about the long term risks of disposing televisions, computers and other similar materials into landfill. There may be

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[119] Blue Environment (2008), *Code of Practice for Managing End of life Televisions*, August

[120] Ibid, p 4

[121] RoHS website, *Home*, website: http://www.rohs.gov.uk/, accessed 4 September 2009

some risk that hazardous substances, such a cadmium and mercury, could eventually leach from landfill into surrounding soil and water, which may pose a risk to human health and the environment. The risks are likely to increase as the volume of hazardous material within landfill increases. Even relatively small risks are worth addressing where cost-effective solution are available.

5. Landfill direct costs and opportunity cost of land

The Australian Government advises that Australia has at least 671 operating landfills, which accepted 48% of all waste generated in 2006/07, and that landfill is likely to remain a significant waste management option in Australia into the future. Taking into account growth in waste generation and resource recovery, modelling by the BDA Group shows that there is likely to be sufficient physical landfill capacity into the future for most of the major centres. However, it cautions that while there is sufficient physical capacity to accommodate currently predicted increases in the amount of residual waste generated, the expansion of existing sites or opening up of new sites may be restricted by decreased community acceptance of landfill as a waste management option. The modelling finds that while physical capacity is a real constraint in some locations, the strongest constraints on landfill capacity are social, environmental and institutional factors, which may be harder to overcome than physical constraints.[122]

In addition to externality costs of landfilling televisions and computers, there are direct costs associated with operating landfills including the opportunity cost of land, and other ongoing operating costs that vary with landfill volumes.

While television and computer waste is estimated to comprise less than 0.4% of landfill volumes generated each year, these volumes are projected to more than double if the current situation does not change, indicating that the landfill space required will also increase over coming years. In addition, the increase of waste televisions, computers and computer products in landfills is contradictory to Australian jurisdiction policies that seek to minimise landfill disposal.

The Waste Management Association of Australia (WMAA) have estimated some of the direct costs of landfills, relating chiefly to the operating and capital costs required to operate a landfill. These are listed below (excluding levies, management costs, profit margin and GST):

- $2 per tonne for land purchase including airspace;
- $2 per tonne for approvals and site development;
- $6.50 per tonne for cell development;
- $10 per tonne for operation including monitoring and fees;
- $2.50 per tonne for capping and rehabilitation; and

[122] BDA Group 2009, DRAFT, *The full cost of landfill disposal in Australia*, unpublished report prepared for DEWHA, June

- $2 per tonne for aftercare.[123]

Given the current landfill disposal trends, and considering the WMAA per tonne estimates, direct landfill costs are estimated to total $42.5 million over the next 23 years (present value, 2009 dollars).

The 2009 BDA analysis of landfill costs (discussed below Table 17) provided updated estimates of the direct costs of landfill taking into account the costs of land, approvals/site development, best practice liner, leachate collection, gas recovery, amenity management, operation, capping/remediation and post-closure maintenance. The direct costs of landfill were estimated to range from $40-$100 per tonne of waste. However, the CBA results were not updated to reflect these estimates as the report is currently unpublished.

Land opportunity costs is a fairly contentious cost linked with landfills, as Australia is a big country. However, despite this, access to well located, suitable land to build a landfill is difficult. A case heard by the NSW Land and Environment Court in 2008 demonstrates the difficultly involved in the allocation of land to a new waste disposal facility.[124] Orange City Council had sought approval to construct a landfill and resource recovery facility near Molong. A local community group appealed the development and Chief Justice Preston ruled in their favour, finding that consent to develop should not be granted unless the consent authority is satisfied that the development will not have an adverse effect on the long term use for sustainable agricultural production. Referring to Section 68, Preston CJ stated: 'to approve a development which is likely to have .... adverse effects on the long term use, for standard agricultural production, of prime crop and pasture land would not be consistent with the principles of Ecological Sustainable Development'. This decision therefore finds that agricultural land has more value, under ecological sustainable development, than waste management (i.e. landfill).[125]

It is acknowledged that Australia does not have the same problems as other countries such as Japan and the United States with respect to the opportunity cost of scarce landfill space because of Australia's relatively large land size and low population density. However, the decision regulatory impact statement uses Australian values of land used for Australian landfills to estimate the magnitude of this problem, so does not consider overseas examples.

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[123] Waste Management Association of Australia (2005), *Submission to Waste and Resource Efficiency Inquiry*, 2005, website: www.pc.gov.au/__data/assets/file/0017/21905/sub028.rtf, accessed 9 March 2009

[124] *Hub Action Group Incorporated v Minister for Planning and Orange City Council* [2008] NSWLEC 116 (17 March 2008)

[125] Department of Environment, Heritage Water and the Arts (2009), *Pers. Comm.* 12 May 2009; Environmental Defender's Officers (2008), *Case note: Hub Action Group Incorporated v Minister for Planning and Orange City Council [2008] NSWLEC 116,* website: http://www.edo.org.au/edonsw/site/pdf/casesum/hub_casenote080404.pdf, accessed 12 May 2009

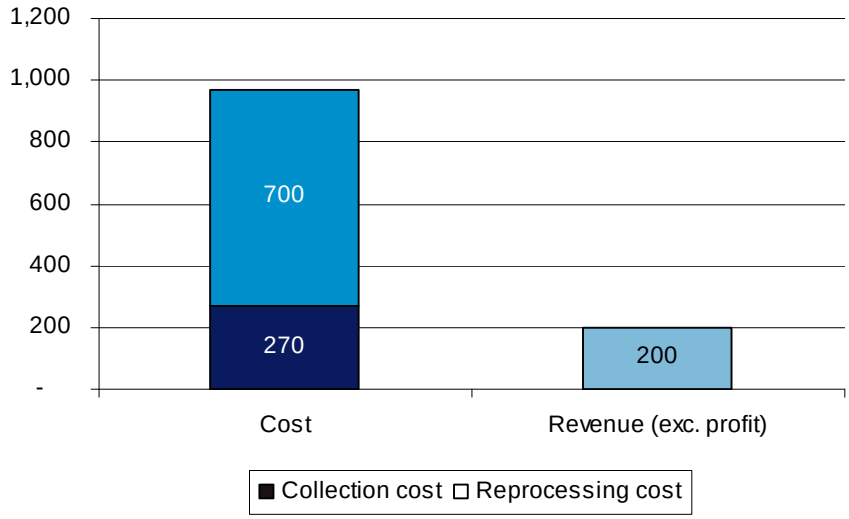
4.3 Current private and public sector intervention, and impacts if there is no change

As discussed in Chapter 3, each jurisdiction in Australia currently has its own waste minimisation legislation or policies. The broad powers provided to each jurisdiction by waste minimisation legislation means that there is a tangible risk that each jurisdiction will implement a different approach to the television and computer waste problem in the absence of a national approach. As a result of this however, each jurisdiction has been working through the EPHC towards seeking a national solution.

In addition, and as discussed briefly in Table 15, some private sector schemes have arisen to deal with the increasing volumes of television and computer waste; in particular by Dell and Apple. These schemes are brand-specific, so are not whole-of-waste solutions to the television and waste problems discussed further below. In addition, it is not clear how easy it is for households to participate, nor if these results guarantee recycling as opposed to refurbishment or reuse.

A further potential reason that private sector intervention is not achieving significant change in recycling levels, is that while some television and computer waste is currently recycled, the financial costs of collection and recycling incurred by recyclers exceed the financial value of the recovered material resources. As a result, the recycling of televisions and computers is not commercially profitable without a financial contribution beyond the sale of recovered material resources, or without government support. An indicative *financial* cost/revenue profile for recycling and collecting a tonne of waste, is presented in Figure 9 below.

Figure 9 Indicative financial market costs and revenues related to processing a tonne of television/computer waste ($ per tonne)



Source of financial costs: based on Hyder (2006) and discussions with e-waste recyclers (2009)
Source of financial revenue: based on discussions with two recyclers (2009)

Notwithstanding the ability to extract some value from recycling products, recyclers are private companies and therefore only take into account private costs and benefits in making their commercial decisions. They do not take into account negative externalities or community benefits. As such, they will only choose to recycle if the revenue that they receive from recycling is greater than the costs they incur in recycling.

While there is some recycling currently occurring (1% of end of life television tonnage excluding exports, and 14% for computers and computer products),[126] higher revenue from recovered resources will be required in order to increase this rate of recycling.

The current situation without coordinated government involvement is not resulting in television, computer and computer product recycling levels that society wants. This indicates that the financial value of the recycled material resources (metals, glass, plastic etc) is not high enough to fund an expansion of recycling beyond its current levels. While there are financially valuable material resources contained within televisions and computers which have reached their end of life, in terms of the environmental value of recovered material resources, it is difficult to reach a market solution to access these material resources. This is due to the following:

[126] Ibid

- it is often more financially costly to collect and recycle the material resources than the financial value of the sale of these material resources;
- entry to the market is difficult due to high fixed costs associated with establishing collection infrastructure and recycling facilities;
- there is information asymmetry in that recyclers do not know when consumers will dispose of these products and there is no coordinated collection system; and
- there are large transaction costs associated with coordinating the collection and recycling of these material resources.

In summary, despite some government and private sector intervention to date, the recycling rate remains low at 14% of end of life tonnes or 9% based on end of life units – with the remainder being landfilled but a minor proportion being exported. As a result, the problems related to television and computer waste described above are arising despite the government and private sector interventions above currently taking place.

4.4 Summary

The problems with television and computer waste, which justify consideration of government intervention include:

- Televisions and computers contain non-renewable resources such as plastics, glass and metals that are lost if television and computer waste is landfilled:
  - Over the next 20 years, it is estimated that if the existing situation is not changed, 3 million tonnes (652 million units) will be accumulated in Australian landfills compared to only 212,000 tonnes (71 million units), or 6% of end of life tonnes, being recycled and recovered over this timeframe;
  - given that the recyclable material in television and computer waste is valued at around $300-$400 per tonne of recycled product and it costs about $970 per tonne to collect and reprocess the waste, there is a financial loss from recycling of about $620 per tonne. However, new technology being implemented in other countries is reducing reprocessing costs. Currently, use of this technology in Australia is not financially viable due to the low volumes of end of life televisions and computers being recycled. As such, the recycling industry has been reluctant to invest in these new technologies; and
  - Society's intrinsic value of recovering non-renewable resources is estimated to be in the order of $1.6 billion over the period 2008/09 to 2030/31, if 70% recycling can be achieved within five to nine years (corresponding to sales of 170 million VDUs and 650 million computers and other computer products). This value captures more than just resource recovery, however the choice modelling survey that produced this result indicates recovery of non-renewable resources was considered the most significant issue by respondents.
- While some television and computer waste is currently recycled, without government support the current recycling activity is unlikely to

be sustained. The private loss from recycling is not recovered from the value of the resource. As the private cost of recycling does not take into account the willingness to pay, the current level of recycling does not meet community expectations. If social benefits outweigh social costs then, without addressing this problem, society's value will be lost when end of life televisions and computers are landfilled.

- Even if the market price was sufficient to encourage recycling, industry and consumers are concerned about fairness of any recycling schemes due to the existence of free-riders. The choice modelling survey indicates that consumers are willing to pay higher amounts per unit if higher recycling rates (in excess of 50%) are achieved, although at issue is whether they are willing to pay enough to ensure that the schemes deliver a net benefit to society. Between 2008/09 and 2030/31, it is estimated that consumers would need to be willing to pay $570 million (in present value terms) at the point of sale of 170 million VDUs and 650 million computers and other computer products.

  Toxicity and landfill externality costs are also important and become increasingly so as the volume of television and computer waste increases. However, given the difficulty estimating environmental externality costs of landfill for general waste or specifically for television and computer waste, it is challenging to provide an accurate measure of landfill costs. Based on the Productivity Commission's estimate of landfill externalities generally for all waste types, if the current landfill trends continue for television and computer waste, then landfill externality costs of around $40.8 million will be incurred by Australians over the next 23 years. If only landfill externality costs related to leachate and loss of amenity are considered (likely more relevant for television and computer waste), then the landfill externality costs incurred by Australians is between $1.7-3.4 million over this same timeframe. This figure equates to around $75,000 to $150,000 a year.

- Landfill direct costs and opportunity cost of land are also expected to increase with increasing end of life televisions and computers. Given the current landfill disposal trends, direct landfill costs are estimated to total $42.5 million over the next 23 years based on WMAA's landfill cost estimates for waste in general.

- Currently most of Australia's waste televisions and computers are disposed of to landfill. This potentially imposes a risk of leaching of hazardous substances from landfill. While the extent of the hazard is unknown, the current evidence would suggest the problem is relatively small. Recycling opportunities exist, as an alternative to disposal of televisions and computers to landfill. However, recycling is currently only financially viable when a fee is paid to cover the difference between collection and reprocessing costs and the value of the resources recovered. Existing recycling schemes are supported by contributions from industry, consumers and or government. Results from a choice modelling survey indicate that consumers have negative perceptions about loss of resources from current disposal methods and the potential for risks to human health and the environment. It also indicates that consumers could potentially derive substantial intrinsic value (in excess of the costs of collection and reprocess of waste televisions and computers) from increased recycling and are

willing to pay for substantial increases in recycling. Industry is also willing to participate in recycling efforts, but has expressed concern about the cost of dealing with orphan (or unbranded) equipment. Both consumers and industry have expressed a preference for a recycling scheme that has comprehensive coverage. This ensures a sharing of the burden and for industry helps to minimise any competitive disadvantage from participation in a recycling scheme.

5 Objectives

Considering the television and computer waste problems identified in Chapter 4, there are a number of objectives for voluntary, co-regulatory or regulatory intervention.

5.1 Introduction

The objectives of any government intervention relating to end of life televisions and computers should be to address the conservation of non-renewable resources; meet community expectations regarding resource recovery and recycling; address market and regulatory failures; and avoid, where possible, any negative environmental impacts associated with waste going to landfill (as outlined in Chapter 4), while being consistent with broader government policy.

5.2 Policy objectives

The nature and extent of the problem suggests that objectives for Government intervention should be focused on maximising recovery of non-renewable resources in line with community expectations, ensuring any regulatory coverage is fair and equitable, and also aiming for any intervention to be an efficient and effective mechanism.

These objectives draw on the 1992 COAG endorsed National Strategy for ESD, which sets out 'the broad strategic and policy framework under which governments will cooperatively make decisions and take actions to pursue ESD [ecologically sustainable development] in Australia'. The strategy is still in effect with relevant core objectives being:

- to enhance individual and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations; and
- to provide for equity within and between generations.

As part of the National Strategy for ESD, a national approach to waste minimisation and management has been agreed. The challenge posed in the National Strategy was:

> *To improve the efficiency with which resources are used and reduce the impact on the environment of waste disposal, and to improve the management of hazardous wastes, avoid their generation and address clean-up issues.*

These objectives are also consistent with the obligations Australia has as a signatory to the Basel and Stockholm Conventions. In particular, Australia is required as a signatory to the Basel Convention to ensure that the generation of hazardous and other wastes (including household wastes), is reduced to a minimum; ensure adequate disposal facilities are domestically available; control and reduce international movements of hazardous waste; and ensure environmentally sound management of wastes.

Consistent with Australia's international obligations and the 1992 ESD strategy, the identified objectives in developing a solution to the effective management of end of life televisions and computers are outlined below in relation to a voluntary, co-regulatory or regulatory scheme.

5.3 Summary of objectives

The following objectives have been identified following consideration of the COAG guidelines that the objective should be clear and broad, but not too broad, in order to permit assessment of relevant alternatives.

1 Broader objective – in line with ESD strategy, the broader objectives of any government intervention would be to:

- improve the efficiency with which resources are used;
- reduce the impact on the environment of waste disposal;
- enhance community well-being; and
- provide for equity between generations.

2 In the context of end of life televisions and computers, the objectives then become:

- to bring the recovery of television and computer waste in line with community expectations regarding resource recovery and recycling in a cost-effective manner that increases well-being;
- to improve the efficiency with which resources contained in end of life TV and computer products are used;
- to ensure fair and equitable geographical, industry and product coverage, which addresses the issue of free-riders; and
- to ensure that any intervention should be complementary to other relevant domestic policies and international obligations, including the Basel Convention which obliges Australia to minimise the domestic production of hazardous and other wastes, taking into consideration social, technological and economic aspects, and to ensure wastes are managed in an environmentally sound manner.

Acknowledging that the above objectives will require implementation, administration and other costs, whilst generating a range of social and environmental benefits, an overriding objective in line with the COAG guidelines, will be to obtain a net benefit (benefits minus costs) for the community. This will be considered in Chapter 7 when alternative approaches to intervention are considered in a cost benefit analysis framework.

6 Options

This chapter identifies a range of possible government interventions that are considered most likely to assist overcoming the television and computer waste problems defined in Chapter 4, and based on achieving objectives established in Chapter 5. The options identified in this chapter will be analysed in further detail using cost benefit analysis in Chapter 7.

6.1 Introduction

This chapter draws on the objectives stated in Chapter 5 to identify regulatory, co-regulatory and non-regulatory options that seek to address problems with end of life television and computers and wholly or partly achieve the stated objectives.[127]

The objective of this chapter within the decision regulatory impact statement is to consider a range of policy options in order to identify those that are most feasible and should be subject to cost benefit analysis in Chapter 7. In order to identify the most feasible options, the following process was undertaken:

- identification of policy options – a range of possible policy options from doing nothing to improving recycling of televisions and computers were identified;
- identification of funding options – a range of possible funding options to fund a policy/scheme for end of life televisions, computers and computer products were identified;
- assessment of policy and funding combinations – a range of policy and funding combinations were identified; and
- most feasible options selected – considering the set of combinations identified, the most feasible set of combinations were assessed against a set of criteria. Based on this, nine options for a change in intervention were identified, which are considered most likely to achieve objectives and address problems. These options are those identified for detailed cost benefit analysis (as described in Chapter 7).

6.2 Identification of policy options

As a first step in the process of identifying options to address the television and computer waste problems identified in Chapter 4, the following 18

[127] Council of Australian Governments (2007), *Best Practice Regulation A Guide for Ministerial Councils and National Standard Setting Bodies*, October, p 10; Australian Government Office of Best Practice Regulation (2007), *Best Practice Regulation Handbook*, August, page 17

regulatory, co-regulatory and non-regulatory policy options (refer to Table 19) were identified as being capable of wholly or partly achieving the Chapter 5 objectives:

- business as usual – 1. the current situation does not change. Some jurisdictions implement regulation or schemes but there is no national coordination of government policy. In the private sector, industry participants implement brand-specific schemes that do not cover all consumers or all waste televisions and computers;
- non-regulatory options:
  - *2. public education scheme* – to educate the community about the problems relating to television and computer waste and the recycling opportunities available;
  - *collection scheme* – administered by government to increase collection of waste televisions and computers. Could be administered by:
    - 3. local government;
    - 4. state or territory government; or
    - 5. Commonwealth Government; and
  - *6. industry coordinated collection scheme* – to increase collection of waste televisions and computers (voluntary industry participation).
- co-regulatory options:
  - *scheme to incentivise collection and recycling* – that is administered by an industry-run Producer Responsibility Organisation (PRO) – see Box 2 for detail on PRO roles and responsibilities. It is also assumed that such a scheme would make use of a regulatory safety net to encourage participation, which is administered by state government or the Commonwealth Government, which could be:
    - 7. State-based EPR safety net imposed on importers/retailers that do not become members of the industry scheme;
    - 8. Commonwealth-based EPR safety net imposed on importers/retailers that do not become members of the industry scheme; or
    - 9. Commonwealth excise tax safety net imposed on importers/retailers that do not become members of the industry scheme.
- regulatory options:
  - *10. a mandatory import license requirement* – producers must hold a license to import televisions and computers, which involves membership of an industry scheme to collects and recycle waste televisions and computers.
  - *11. a subsidy for collection/recycling* – a Commonwealth administered scheme whereby regulations impose a fee to be paid on all imports, and subsidies are paid to recyclers for collection/recycling of televisions and computers;

- *12. design standards* – sets standards for production of televisions, computers and computer products that could either: (i) assist in ease of recycling/disassembly of waste products, or (ii) reduce hazardous substances to lower landfill externalities;
- *13. mandatory extended producer responsibility scheme* – with an industry-run PRO administering a collection/recycling scheme on behalf of importers (who are required by regulation to take part in the scheme). Administration of required regulation could be undertaken by state government or the Commonwealth Government;
- *14. mandatory extended retailer responsibility scheme* – with an industry-run PRO administering a collection/recycling scheme on behalf of retailers (who are required by regulation to take part in the scheme). Administration of required regulation could be undertaken by state governments or the Commonwealth Government;
- *15. mandatory responsibility on local government* – with local governments required by regulation to administer a collection/recycling scheme for waste televisions and computers;
- *16. deposit refund scheme* – legislation requires retailers to collect a deposit on each new product and provide a refund when the product is returned to a collection site for recycling;
- *17. tradable permits* – recyclers that meet specific requirements set out in regulations the power to generate 'permits' based on their recycling, with importers/recyclers imposed an obligation to purchase a specific number of permits per year based on the amount of equipment they supply; and
- *18. landfill bans* – state-based regulation would require owners and operators of landfill to refuse television and computer waste.

A more detailed description of the options is presented in Appendix E, Table E.1.

An additional option suggested following the consultation regulatory impact statement was storing end of life televisions and computers to enable future recovery of resources as required. However, this was considered to be inferior to options which introduced immediate mandatory recycling for a number of reasons, including:

- benefits are delayed, but additional collection and storage costs are incurred up front and additional costs are incurred for extraction;
- the results of the URS Choice Modelling Study revealed that consumers were only willing to pay for guaranteed recycling levels in excess of 50%; and

- The Code of Practice for Managing End of life Televisions states that television units and component materials should not be stockpiled for potential future use or stored for long periods at the recycling facility.[128]

As a PRO is assumed in a number of the policy options examined in this document, Box 2 provides some detail of the possible roles and responsibilities of an industry PRO.

Box 2 Possible roles and responsibilities of an industry PRO

In consideration of possible television and computer waste schemes in this consultation document, a PRO is assumed to be a not for profit organisation that will play a key role administering and running a scheme.

The goal of a PRO could be to: establish and run an effective collection and recycling scheme for television and computer products on behalf of television and computer manufacturers and importers of these products in Australia.

The roles/responsibilities of PRO in a scheme could be to:

- represent the television and computer industries on producer responsibility issues;
- develop a collection and recycling scheme for televisions, computers and computer products;
- establish a network of permanent collection sites;
- achieve recycling targets and manage the recycling of end of life products through competitive tenders and contracts with e-waste recycling companies;
- ensure that all data relevant is captured relating to key performance indicators; and
- engage in education and awareness raising activities with a range of stakeholders to ensure collection and recycling targets are achieved.

Source: Adapted from 'Draft Product Stewardship Agreement for Televisions', September 2006

6.3 Identification of policy funding approaches

After identifying the 18 possible policy options listed above, the second step in the process of identifying feasible options to address the problems of television and computer waste was to identify a range of feasible approaches to fund the policy options identified above. The following ten funding approaches were identified for consideration against each of the policy options:

- Local governments:
  - 1. landfill charge; and
  - 2. rates.

[128] Blue Environment 2008, *Code of Practice for Managing End of life Televisions*, p 3

- State/territory governments:
  - 3. fee for service (point of sale customer charge); and
  - 4. state and territory consolidated revenue.
- Commonwealth Government:
  - 5. Commonwealth consolidated revenue;
  - 6. point of sale excise;
  - 7. point of import excise; and
  - 8. import license fee.
- Industry:
  - 9. industry association fees; and
  - 10. industry association levy.

These funding approaches are described in more detail in Appendix E, Table E.2.

6.4 Combinations of policy and funding options

Given that each of the policy option could be funded by a range of methods, the next step in analysis of options was to consider how many feasible combinations there are, and to conduct further assessment of each.

As presented in Appendix E, Table E.3, 180 combinations of policy options and funding methods were identified (presented as each individual box in this table). This significant number of possible options is derived from having 18 possible policy options, and then ten possible funding approaches for each of the policy options.

Based on qualitative analysis of each of the 180 possible policy option/funding approach combinations, it was concluded that up to 65 of these combinations were practical (presented in Table E.3 as any box shaded in gray and without a cross). This was based on the following considerations:

- the level of government that administered the scheme would also be responsible for funding the majority of a scheme (e.g. a Commonwealth excise on imports would not feasibly fund a local government collection scheme);
- schemes involving an industry-run PRO would also require government funding if regulation is required (e.g. for government administration and regulatory set up costs);
- industry association fees (not supplemented with an industry levy) would only be sufficient to fund a public education scheme or voluntary industry scheme;
- an industry association levy could be used to fund the administration of co-regulatory schemes or the costs of PROs in mandatory schemes; and

- a deposit refund scheme could be funded by a Commonwealth point of sale excise or a State point of sale customer charge (fee for service).

6.5 Selection of most feasible options

From the 65 combinations of policy options and funding approaches (identified in the step above), a qualitative assessment was undertaken to further refine these combinations to those considered most feasible to address television and computer waste problems and wholly or partly achieve the stated objectives. In order to conduct this qualitative analysis, each of the 18 policy options were assessed against a set of criteria, and then an appropriate funding approach was also considered. The set of criteria used in this step includes:

- Resource recovery is maximised relative to other options – the amount of resources collected and recycled is maximised compared to other options. Considering the objectives in Chapter 5 and the problems in Chapter 4, this objective was considered the most important of these indicators;
- Costs are minimised relative to other options – the cost in which resources are recovered and costs required to implement the scheme are minimised. This is a high level estimate for qualitative assessment, that will be explored further in a CBA framework for selected options;
- Coverage is maximised relative to other options – the option maximises geographical, industry and product coverage compared to other options considered, to ensure that it is fair and equitable; and
- Administration is simple relative to other options – the option is simple to understand, implement, administer, comply with and enforce, and it minimises the number of parties involved in this process. In addition the option is complementary to other policies, and requires minimal change to existing requirements.

Findings of the qualitative analysis of each policy, considering the criteria above, are presented in Table 19.

Table 19 Qualitative analysis of feasible policy options

Policy Option	Who runs	Impact on:				Feasible Funding Options	Decision
		Resource Recovery	Cost	Coverage	Administrative Simplicity		
1. Business as usual	**Current government & private sector involvement**	**Low**. Current low recycling rates are assumed to continue.	**Low.** Only some jurisdictions and some companies involved.	**Low**. Not all companies and consumers are captured/participate.	**Medium.** Industry and consumers must understand different regulation in different jurisdictions. No national regulation.	• Commonwealth or state consolidated revenue; and • Producers currently funding own schemes.	**Considered as 'base case' in CBA**
2. Public Education	**State /Territory governments & industry**	**Low**. Not efficient as a standalone scheme and recovery opportunities are currently inadequate in coverage and scope.	**Low.** Only administration costs of the body administering the scheme.	**Low**. Increases the awareness of some consumers, but imposes no obligations on them.	**High.** Only requires administration of the public education campaign and involves no regulations.	• Commonwealth or state consolidated revenue; • Industry association fees; or • An industry association levy.	No further analysis
3. Local government collection scheme (no targets or policy regulation)	**Local government**	**Low.** Likely that not all councils will implement, local government has no jurisdiction over commercial waste management and there are no enforceable targets.	**Low.** Will be able to set up collection facilities at existing landfill sites.	**Medium.** Likely that not all councils will implement and local government has no jurisdiction over commercial waste management.	**High.** Only requires local government administration and involves no regulations.	• Landfill charge; or • Local council rates.	No further analysis
4. State government collection scheme (no targets or policy regulation)	**State /Territory governments**	**Low.** Includes commercial waste and all council areas, but no enforceable targets	**Medium.** May be able to establish collection facilities at State owned waste transfer stations, but likely that additional infrastructure will be required. Involves higher administration costs than a local government collection scheme due to the increased scale and scope.	**Medium.** All products are covered, but likely that not all states will implement a scheme.	**High**. Only requires state/territory government administration and involves no regulations.	• Fee for service (point of sale customer charge); or • Commonwealth / State consolidated revenue.	No further analysis
5. Commonwealth government collection scheme (no targets or policy regulation)	**Commonwealth Government**	**Low.** There is a lower chance of implementation as waste management has long been the province of state/local government and there are no enforceable targets.	**High.** Compared to a state government collection scheme it is expected that capital costs will be higher due to a lack of existing Commonwealth infrastructure and administration costs will be higher due to the increased scale of the scheme.	**High.** Covers all products and all states.	**Medium.** Commonwealth administration is expected to be more complicated than state/territory administration due to the increased coverage of the scheme and lack of historic involvement in waste management.	• Fee for service (point of sale customer charge); • Commonwealth / State consolidated revenue; • Point of sale excise; or • Point of import excise.	No further analysis

Policy Option	Who runs	Impact on:				Feasible Funding Options	Decision
		Resource Recovery	Cost	Coverage	Administrative Simplicity		
6. Industry coordinated collection scheme (voluntary with no policy regulation)	**Industry PRO**	**Low.** Industry has indicated that they will not participate broadly in a voluntary scheme without a regulatory safety net.	**Low.** Infrastructure costs and the costs of setting up administrative bodies are still incurred even if there is no participation.	**Low.** Industry has indicated that they will not participate broadly in a voluntary scheme without a regulatory safety net.	**High.** Industry has indicated that they will not participate broadly in a voluntary scheme without a regulatory safety net.	• Industry association fees; or • An industry association levy.	No further analysis
7. Co-regulatory Scheme (State administered EPR regulatory safety net, and with industry involvement)	**State /Territory governments & industry PRO**	**High.** Involves enforceable targets and onerous regulatory safety net responsibilities encourage participation.	**High.** Higher administration costs compared to Commonwealth administered scheme. Will require PRO costs.	**High.** Covers all products and the onerous regulatory safety net ensures participation.	**Low.** More onerous administrative burden for industry association/PRO than an industry coordinated collection scheme, but lower ongoing state government administration requirements due to an onerous safety net.	• Fee for service (point of sale customer charge); • Commonwealth / State consolidated revenue; • Point of sale excise; • Point of import excise; or • Industry association levy.	**Identified for further analysis (Options #1 & #2)**
8. Co-regulatory Scheme (Commonwealth administered EPR regulatory safety net, and with industry involvement)	**Commonwealth Government & industry PRO**	**High.** Involves enforceable targets and onerous regulatory safety net responsibilities encourage participation.	**Med.** Lower administration costs compared to State administered scheme, but still likely to be higher than the business as usual cost. Will require PRO costs.	**High.** Covers all products and the onerous regulatory safety net ensures participation.	**Low.** More onerous administrative burden for industry association/PRO than an industry coordinated collection scheme, but lower ongoing state government administration requirements due to an onerous safety net.	• Fee for service (point of sale customer charge); • Commonwealth / State consolidated revenue; • Point of sale excise; • Point of import excise; or • Industry association levy.	**Identified for further analysis (Options #3 & #4)**
9. Co-regulatory Scheme (Commonwealth excise regulatory safety net, and with industry involvement)	**Commonwealth Government & industry PRO**	**High.** Involves enforceable targets and onerous regulatory safety net responsibilities encourage participation.	**High.** Higher infrastructure costs compared to the State/Territories due to the absence of existing ownership. Will require PRO costs.	**High.** Covers all products and the onerous regulatory safety net ensures participation.	**Medium:** More onerous administrative burden for industry association/PRO than an industry coordinated collection scheme, but excise regulations are already in place so administration will be simpler than a co-regulatory scheme with an individual EPR safety net.	• Fee for service (point of sale customer charge); • Commonwealth / State consolidated revenue; • Point of sale excise; • Point of import excise; or • Industry association levy.	**Identified for further analysis (Options #5 & #6)**

Policy Option	Who runs	Impact on:				Feasible Funding Options	Decision
		Resource Recovery	Cost	Coverage	Administrative Simplicity		
10. Mandatory Import Control Scheme (with industry involvement)	**Commonwealth government & industry PRO**	**High**. Enforceable targets and license requirements ensure participation. Investigation of the ozone substance model showed this may be viable enough to assess further in a CBA.	**High.** Higher infrastructure costs compared to the State/Territories due to the absence of existing ownership. Will require PRO costs.	**High.** Covers all products and the onerous regulatory safety net ensures participation. All products and onerous regulatory safety net ensures participation.	**Medium.** More onerous administrative burden for industry association/PRO than an industry coordinated collection scheme and, but the scheme is administration by a single body, so administration will be simpler than a co-regulatory scheme with an individual EPR safety net, which is administered by multiple states and territories.	• Fee for service (point of sale customer charge); • Commonwealth / State consolidated revenue; • Point of sale excise; • Point of import excise; • Import license fee; or • Industry association levy.	**Identified for further analysis (Option #8)**
11. Subsidy scheme for collection/ recycling	**Commonwealth Government**	**High.** Increased revenue from collection and recycling from the subsidy will incentivise increased levels of recycling and may make recycling financially viable for new entrants to the market.	**High.** Incumbent recyclers should be able to use existing infrastructure, but new entrants will incur large up front infrastructure costs. Requires administration of both the collection of the excise and the payment of the subsidy. However, excise regulations are already in place.	**High.** All collectors and recyclers are eligible for the subsidy and all products are covered.	**Medium.** Administration would be similar to the existing Product Stewardship for Oil (PSO) Scheme. A subsidy scheme requires regulations relating to the levels and criteria for the subsidy and imposes compliance costs on recyclers, who must report to the government how much they have recycled and be subjected to audits to determine the veracity of their reporting.	• Fee for service (point of sale customer charge); • Commonwealth / State consolidated revenue; • Point of sale excise; and • Point of import excise.	**Identified for further analysis (Option #7)**
12. Design Standards	**Commonwealth Government**	**Low.** Design standards may make recycling easier, but they do not necessarily result in increased levels of recycling.	**Medium.** Large regulatory design and enforcement costs due to the complexity of design standards. However, there will be no additional costs for collection/transport and a small reduction in reprocessing costs.	**Medium.** Only covers new products.	**Low.** The Australian Customs Service (ACS) will be required to determine whether products comply with the design standards, which requires a high level of expertise.	• Fee for service (point of sale customer charge); • Commonwealth / State consolidated revenue; • Point of sale excise; and • Point of import excise.	No further analysis

Policy Option	Who runs	Impact on:				Feasible Funding Options	Decision
		Resource Recovery	Cost	Coverage	Administrative Simplicity		
13. Mandatory Extended Producer Responsibility (with industry involvement)	**State/ territory governments & industry PRO**	**High.** Mandatory recycling targets are set out in regulations and are enforceable.	**High.** Costs are likely to be similar to co-regulatory schemes. However, administration costs are expected to be higher in a mandatory scheme due to increased enforcement costs. In the co-regulatory schemes it is assumed that the regulatory safety net is sufficient onerous to force all producers into the industry scheme, so no enforcement is required.	**High.** Covers all producers and all products.	**Medium.** Requires Commonwealth Government administration of regulations and recyclers are likely to require a Producer Responsibility Organisation (PRO) to help them meet their obligations.	• Fee for service (point of sale customer charge); • Commonwealth / State consolidated revenue; • Point of sale excise; • Point of import excise; and • Industry association levy.	**Identified for further analysis (Option #9)**
14. Mandatory Extended Retailer Responsibility (with industry involvement)	**Commonwealth Government & industry PRO**	**High.** Mandatory recycling targets are set out in regulations and are enforceable. However, recycling levels are expected to be lower than in a mandatory EPR scheme as enforcement of the targets is more difficult given the large number of retailers.	**High.** Costs are expected to be similar to a mandatory EPR scheme. However, enforcement costs are expected to be higher because there are substantially more retailers than there are producers.	**High.** Covers all retailers and all products.	**Low.** Commonwealth Government administration of the regulations will be more difficult than in a mandatory EPR scheme because of the larger number of retailers who will face obligations under the scheme.	• Fee for service (point of sale customer charge); • Commonwealth / State consolidated revenue; • Point of sale excise; and • Point of import excise.	No further analysis
15. Mandatory Responsibility on Local Government	**State or Commonwealth government**	**Medium.** Mandatory recycling targets are set out in regulations and are enforceable. However, the lack of local govt responsibility for commercial waste may reduce the effectiveness of the scheme.	**High.** Enforcement costs are expected to be higher than in a mandatory EPR because there are substantially more local councils in Australia than there are producers.	**High:** Covers all Local Governments and all products.	**Low.** Commonwealth Government administration of the regulations will be more difficult than in a mandatory EPR scheme because of the larger number of local councils who will face obligations under the scheme.	• Landfill charge; • Rates; • Fee for service (point of sale customer charge); • Commonwealth / State consolidated revenue; • Point of import excise; or • Point of sale excise.	No further analysis
16. Deposit Refund Scheme	**State or Commonwealth government**	**Low.** The scheme only applies to new products and encourages collection instead of recycling.	**Low.** Requires investment in collection facilities, but involves low administration and compliance costs.	**Low.** The deposit is only collected for new products and the refund only applies to products presented at designated collection sites.	**High.** There are likely to be low administration and compliance costs associated with collecting the deposit and paying the deposit. However, there is more variation in the products than in	• Fee for service (point of sale customer charge); or • Point of sale excise.	No further analysis

Policy Option	Who runs	Impact on:				Feasible Funding Options	Decision
		Resource Recovery	Cost	Coverage	Administrative Simplicity		
					traditional deposit refund scheme such (e.g. bottles).		
17. Tradeable Permits Scheme	**State or Commonwealth government**	**Medium.** The scheme will encourage reprocessing if the requirements are met for the permits. However, the scheme may only be effective in easily accessible areas with established recycling.	**High.** There will be substantial administration, enforcement and compliance costs as the scheme will be highly complex.	**High.** Covers all producers and all products.	**High.** The scheme is highly complex and places obligations on both producers and recyclers.	• Fee for service (point of sale customer charge); • Commonwealth / State consolidated revenue; • Point of sale excise; and • Point of import excise.	No further analysis
18. Landfill ban	**State or Commonwealth government**	**Low.** While the scheme discourages disposal at landfill, it does not encourage recycling. In fact, it may encourage illegal dumping	**Low.** The scheme requires sites for storage of products disposed of at landfill and costs associated with cleaning up sites where there has been illegal dumping. However, administration of the scheme only requires monitoring at landfill sites and compliance costs are low.	**Low.** The scheme covers all products but it is easy to avoid the scheme (e.g. illegal dumping)	**High.** Administration of the scheme only requires monitoring at landfill sites	• Landfill charge; • Rates; • Fee for service (point of sale customer charge); • Commonwealth / State consolidated revenue; • Point of sale excise; and • Point of import excise.	No further analysis

As indicated in this table, of the set of 65 feasible combinations identified in the previous step, nine options for government intervention have been identified as being most likely to address television and computer waste problems and wholly or partly achieve the stated objectives. These options are listed below, with more detail provided in Appendix E, Table E.4:

- Co-regulatory schemes:
  - State-based EPR implemented as a National Environmental Protection Measure (NEPM) with an exemption if the importer belongs to an industry scheme:
    - ***Option 1:*** television and computer industries responsible for the collection of all products (including historic and orphan products) under a common PRO.
    - ***Option 2:*** television industry responsible for the collection of end of life televisions (including historic and orphan products), major computer brand owners responsible for historic waste from their own brand and importers of generic computer parts and equipment are responsible for all non-branded and historic products. There are two PROs.
  - Commonwealth-based EPR with an exemption if the importer belongs to an industry scheme:
    - ***Option 3:*** television and computer industries responsible for the collection of all products (including historic and orphan products) under a common PRO.
    - ***Option 4:*** television industry responsible for the collection of end of life televisions (including historic and orphan products), major computer brand owners responsible for historic waste from their own brand and importers of generic computer parts and equipment are responsible for all non-branded and historic products. There are two PROs.
  - Commonwealth excise (levy) with an exemption if the importer belongs to an industry scheme.
    - ***Option 5***: television and computer industries responsible for the collection of all products (including historic and orphan products) under a common PRO.
    - ***Option 6***: television industry responsible for the collection of end of life televisions (including historic and orphan products), major computer brand owners responsible for historic waste from their own brand and importers of generic computer parts and equipment are responsible for all non-branded and historic products. There are two PROs.
- Regulatory schemes:
  - ***Option 7:*** mandatory Commonwealth levy with a government-run subsidy scheme for collection/recycling.
  - ***Option 8:*** mandatory import license requirement.

– ***Option 9:*** mandatory state-based EPR (NEPM).

It should be noted that each option contains four sub-options relating to four product groups included in the analysis:

- televisions only;
- computers and computer products;
- visual display units (VDUs) only; and
- all televisions, computers and computer products.

This separate analysis was conducted because the value of recovered materials from recycling computers has traditionally been higher than for televisions and the cost of collecting non-visual-display units alone is prohibitive. However, recyclers have indicated that they increasingly view television and computers as interchangeable.

Each of these options will be compared against the 'do nothing' option, whereby the status quo is maintained. This is referred to as the business as usual case.

These nine policy change options (and the four product group sub-options) are analysed and compared through a CBA in Chapter 7.

7 Costs and benefits

This chapter presents the results of a rigorous cost benefit analysis, which compares the economic costs and benefits of each policy option identified in Chapter 6. The options are assessed against the *status quo* where there is no government intervention, in order to determine whether they deliver a net benefit to society.

7.1 Introduction

The cost and benefit assessment for each of the nine options takes into account four threshold levels at which the options would apply (i.e. different thresholds for different sized businesses in terms of units imported) and the analysis takes into account whether the options would apply to all televisions and computers collectively, separately, or just visual display units only. In total this represents 144 separate cost benefit assessments.

For simplicity sake however, this chapter presents only the impacts for each of the options assuming that the option will apply to all televisions and computers collectively and assuming a threshold that excludes 95.5% of importers but maintains coverage of 95.3% of total units sold. The conclusions and relativities for the other options are similar, although specific estimates differ – the results for all options and thresholds are presented in the appendices.

The cost benefit analysis has been undertaken consistent with the COAG guidelines for analysis of regulations, where the impacts of proposed government intervention to address the television and computer waste problem are compared to a 'business as usual' scenario, discounted to convert them to their present value (2008/09) for comparative purposes.

This CBA uses Net Present Value (NPV) economic measure of performance which is the difference between the present value (PV) of total incremental costs and the PV of total incremental benefits. Benefit Cost Ratio (BCR) is an additional economic measure presented in this chapter.[129] If the NPV is positive or the BCR is greater than 1, this indicates that the benefits exceed the costs and the policy provides society with a net benefit. However, if the BCR is less than 1 or the NPV is negative, then the costs of the scheme exceed the benefits and the scheme imposes a net cost on society.

Generally, the scheme with the highest BCR or NPV is the preferred option. The COAG guidelines favour the highest NPV as the appropriate standard for choosing a preferred option, in line with adoption of the option that generates the greatest net benefit for the community.

[129] The BCR is the ratio of the PV of economic benefits to the present value of economic costs over the life of the project.

However, the CBA and the estimates contained in the regulatory impact statement are sensitive to the assumptions underpinning the analysis, and given the close proximity of a range of the options (such as Options 7, 8, 5, and to a lesser extent Option 3), the highest NPV should not necessarily be the sole selection criteria.

The consultation process explicitly recognised this point and sought feedback on the most appropriate criteria from which to assess the options. That feedback suggested the following criteria.

- it should maximise net benefits to the community;
- it should be legally possible;
- it should involve the minimum necessary time to establish the regulatory instrument;
- it should be simple for government to administer;
- it should be equitable;
- it should be acceptable to key stakeholders and the broader community;
- it should consider the potential impacts of other government processes;
- it should be flexible enough to be expanded to cover other forms of e-waste; and
- it should address the risk of not achieving the outcomes.

Some of these additional factors are considered in Chapter 9.

7.2 Which options were analysed?

As detailed in Chapter 6, nine options for policy change were selected to be subjected to a CBA. These options for change, and the base case for the appraisal, are:

- Base Case (business as usual): the current situation does not change. Some jurisdictions implement regulation or schemes but there is no national coordination of government policy. In the private sector, industry participants implement brand-specific schemes that do not cover all consumers or all waste televisions and computers;
- Co-regulatory schemes:
- State-based EPR implemented as a NEPM with an exemption if the importer belongs to an industry scheme:
  - ***Option 1:*** joint television and computer recycling scheme.
  - ***Option 2:*** separate television and computer recycling schemes.
- Commonwealth-based EPR with an exemption if the importer belongs to an industry scheme:
  - ***Option 3:*** joint television and computer recycling scheme.
  - ***Option 4:*** separate television and computer recycling schemes.

- Commonwealth excise (levy) with an exemption if the importer belongs to an industry scheme.
  - ***Option 5:*** joint television and computer recycling scheme.
  - ***Option 6:*** separate television and computer recycling schemes.
- Regulatory schemes:
  - ***Option 7:*** Mandatory Commonwealth levy with a government-run subsidy scheme for collection/recycling.
  - ***Option 8:*** Mandatory import license requirement.
  - ***Option 9:*** Mandatory state-based EPR (NEPM).

For each of the nine policy change options, separate product analysis was undertaken to isolate the costs and benefits for each option if it was to apply to:

- televisions only;
- computers and computer products;
- visual display units (VDUs) only; and
- all televisions, computers and computer products.[130]

The appraisal results presented in this chapter assume that a government scheme will require household/business 'drop off' of end of life products.[131] Kerbside schemes are analysed in a sensitivity analysis in Appendix K, Table K.7.

In addition, analysis of coverage thresholds was undertaken to assess the economic outcomes if importers of small quantities of televisions or computers are excluded from any policy intervention. Three thresholds based on the number of units imported were identified and assessed within the CBA framework (see Appendix F for further details on the analysis undertaken). These thresholds significantly decreased the number of importers facing obligations under the schemes, while maintaining significant coverage. For example, when assessing 'all' television and computer waste products, the number of companies captured by the proposed schemes decreased from 10,190 with no threshold to 460 with a threshold of 5,000 units. However, these 460 companies accounted for 95.3% of total units sold in 2008.

[130] Note that projections in the 'all products' category are equal to the sum of projections in the 'televisions' and 'computers' categories. However, the category 'visual display units' is a subset of the 'televisions' and 'computers' categories.

[131] This collection method is known as 'drop-off'. An alternative method of collection is 'kerbside pick-up' where consumers and businesses leave e-waste outside their homes/businesses and it is collected on designated days in a similar fashion to existing local council waste collection services.

Table 20 Selected threshold levels and associated percentage coverage and number of companies – all products (2008 import data)

Indicator	No threshold	Threshold 1	Threshold 2	Threshold 3
Threshold level (no. units per importer required for inclusion in scheme)	0	200	1,000	5,000
Coverage (% of units included in scheme, 2008)	100%	99.6%	98.4%	95.3%
Companies (number included in scheme, 2008)	10,190	1,990	1,020	460

Source: ACS data on import activity

The CBA results for each option, product and threshold are presented in Appendices I to J. However, due to the complexity of the model, the results examined within this chapter relate to the 'all products' category and a threshold of 5,000 units (threshold 3) as this combination produced the most favourable NPV and BCR results.

As the CBA is based on a range of estimates and assumptions, the appraisal results provide a general view about the likely expected economic outcomes that are subject to these assumptions. As with all CBAs, interpreting the cost and benefit estimates should be undertaken with care as the numbers are indicative, rather than definitive. Sensitivity analysis was undertaken to illustrate how the net present value estimates responded to changes in key assumptions and variables. The results are presented in Appendix K.

7.3 General assumptions

General assumptions relating to all options are outlined in Appendix G, Table G.1 and relate to:

- the time period of analysis;
- the discount rate; and
- underlying recycling projections.

The base year of the appraisal is the current year: 2008/09. As part of the consultation regulatory impact statement, the EPHC Electrical Equipment working group advised that it would take two years to design and implement the schemes, which are consequently assumed to commence in 2010/11. In order to analyse each scheme's operation over 20 years (in accordance with the COAG guidelines), the analysis commences in 2008/09, and continues for 20 years after the first year of operation of the scheme (2010/11), until 2030/31. Therefore, the appraisal period spans from 2008/09 to 2030/31.[132]

[132] Commonwealth Government Office of Best Practice Regulation (2007), 'Best Practice Regulation Handbook', August, p 117

As suggested by the COAG guidelines, the benefits and costs were discounted to PV terms (2008/09 and 2009 dollars) using a discount rate of 7%. A sensitivity analysis was conducted using discount rates of 3% and 11% (see Appendix K, Tables K.1 and K.2).[133]

7.4 Sales and recycling projections

Underlying sales and recycling projections are key inputs to the CBA, as they assist in quantifying the varying impact each policy option is likely to have. The majority of costs and benefits incorporated in the CBA are linked in some way to sales and/or recycling levels. For example, collection costs are linked to recycling volumes and consumer surplus from increased recycling is linked to the recycling rate.

Key assumptions used to project sales, products reaching end of life,[134] recycling levels, landfill volumes and export volumes and importer numbers over the period of analysis include:[135]

- a comprehensive network of conveniently located drop-off points to be established under each scheme.[136] These will form part of scheme collection costs;
- this will be accompanied by significant efforts in education and promotions, aimed at both household and commercial equipment owners, to ensure that collection and recycling targets are achieved by 2015/16. For example, Options 5, 7 and 8 are projected to reach a 70% recycling rate in 2015/16 (year 5);
- sales, lifespan and resulting end of life waste levels are equal across all options, as individual policy options are not expected to influence these. The growth in products reaching end of life is projected to outstrip growth in sales as product lifespans decrease in line with rapid technological change;
- recycling and landfill diversion rates are not assumed to vary if different thresholds are applied on importer coverage;[137]
- the amount of material exported for reuse under the options assessed will not vary from the business as usual scenario;
- the volume of televisions and computers recovered and recycled increases over the period of analysis;
- the proposed thresholds for those who are covered under the scheme will not impact the diversion rates achieved under each option;

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[133] Ibid, p 120

[134] A product reaches end of life when it is no longer able to be reused.

[135] These projections were reported both on a unit and tonnage basis.

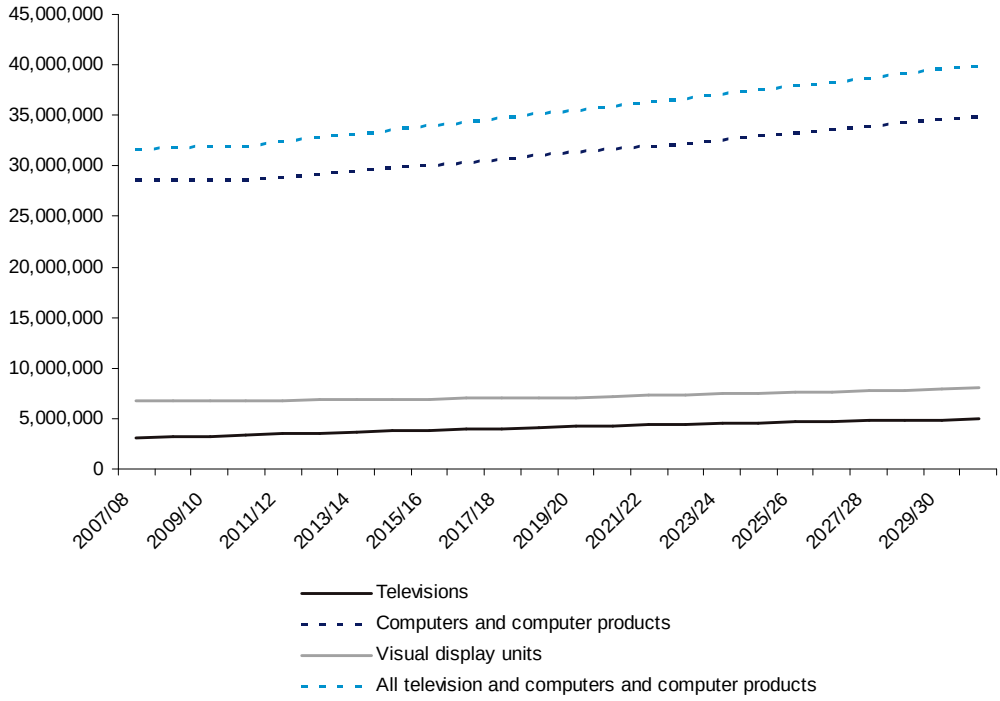
[136] For example, at existing Local Government landfill sites and state and territory government waste transfer stations.

[137] The diversion rate is the sum of the recycling and export volumes divided by the total end of life volumes.

- diversion rates are expected to be higher if a kerbside collection service was established and / or if a landfill ban was put in place;
- the ramp up of recycling rates is assumed to vary between policy options (see beneath Table 21 for further details); and
- projected recycling levels are equivalent for groups of similar options (see beneath Table 21 for further details).

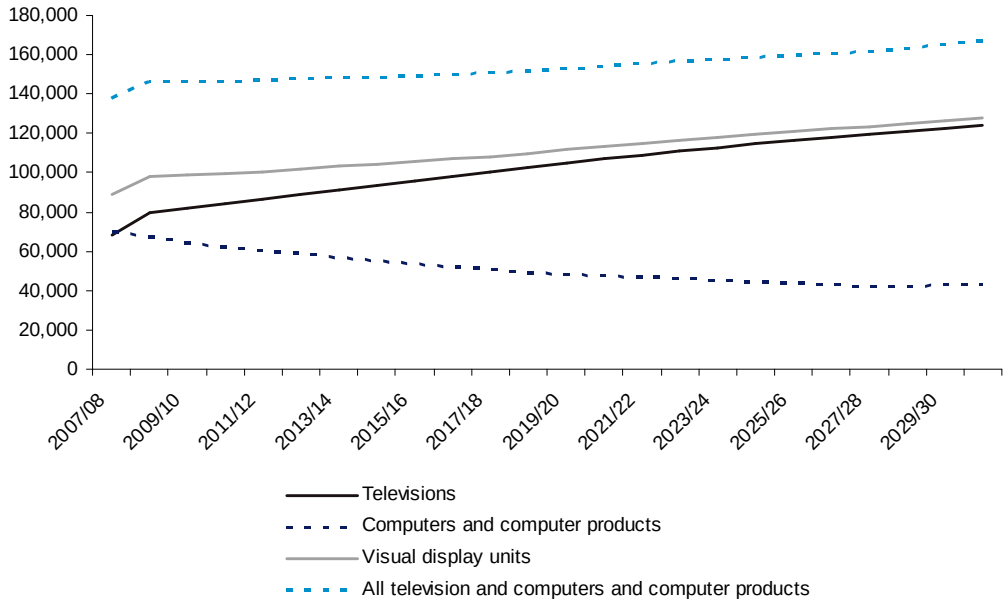
Projected sales trends. Figures 10 and 11 present the projected sales trends assumed in the CBA. As indicated in these figure, sales of new televisions, computers and computer products are not expected to vary between the policy options analysed. It is assumed that none of the options will impact the sales or lifespan of products. As such, total sales, as well as end of life levels for each option are expected to be equal to the business as usual scenario.

Figure 10 Sales volumes for the base case and policy options (units sold) 2007/08 – 2030/31



Source: DFAT data on imports

Figure 11 Sales volumes for the base case and policy options (tonnes sold) 2007/08 – 2030/31

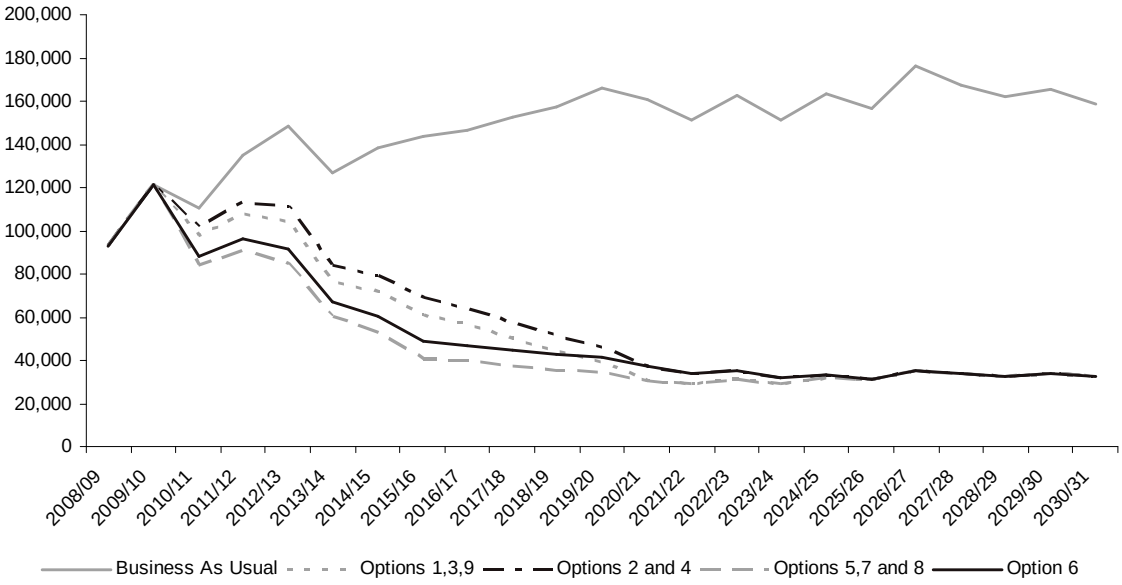


Source: DFAT data on imports

As indicated in the figures above, while computers and computer products comprise the most significant proportion of total television and computer units, on a tonnage basis they contribute a lower proportion. In addition, this proportion is set to decrease over the next 20 years as a result of the reducing weight for these products resulting from technological developments, at a much more significant rate than televisions or visual display units.

Projected landfill trends. Figure 12 shows the estimated landfill levels over the next 23 years under each of the options analysed, and in comparison with the business as usual case.

Figure 12 Landfill volumes under the base case and policy options (tonnes) - 2007/08 – 2030/31



Source: End of life modelling of television and computer products was based on estimated sales, lifespan, product weight and disposal pathways. Sales data was estimated using DFAT data on imports. Input to the development of assumptions for lifespan, weight and disposal pathways was provided by AIIA, PSA and the EPHC Electrical Equipment working group

70% recycling target. As presented in Figure 12 and also in Table 21 below, although recycling under each option examined in the CBA is projected to reach the same rate by 2030/31, the speed at which the recycling rate increases differs between the options. Options 5, 7 and 8 are the quickest to reach 70% recycling, while Options 2 and 4 are the slowest. A 70% recovery rate has been used to allow for comparison of the options, as costing all options against the same recovery rate allows a more meaningful comparison. Instead variations between the options' recycling rates relate to the amount of time and cost to achieve this level. A rate of 70% of end of life tonnes generated each year is considered to be an upper limit of a drop off scheme. In comparison with other recycling schemes:

- National Packaging Covenant – recovery is around 58% and increasing, with a target of 65% to be achieved next year, with potential to continue increasing after that;
- DrumMUSTER – was previously achieving approximately 66% recovery. However as a result of drought impacts, has been difficult to measure against sales in recent years due to significant reduction in sales; and
- Product Stewardship for Oil scheme – in 2007/08, 50% of petroleum based oil sales were recycled under the Product Stewardship for Oil (PSO) scheme. This represents a close to 20% increase on 2001/02

levels in the scheme's first full year of operation (42% of sales in that year).[138]

Table 21 Recycling outcomes - all products, threshold 3

Option	Landfill rate 2015/16 (%)	Recycling rate 2015/16 (%)	Years to reach 70% recycling rate	Total recycled 2008/09 to 2030/31 (million tonnes)
Business as usual case	90%	7%	N/A	0.2
1	39%	59%	8	2.3
2	44%	54%	9	2.2
3	39%	59%	8	2.3
4	44%	54%	9	2.2
5	26%	73%	5	2.5
6	31%	67%	7	2.4
7	26%	73%	5	2.5
8	26%	73%	5	2.5
9	39%	59%	8	2.3

Note: these rates as a proportion of end of life tonnes

A key assumption of the recycling rates above is that all options will have sufficient effort made by the body running the scheme through education, marketing and other promotional activities (such as engagement with community or charity groups to undertake collection drives) to reach diversion rates outlined in the television industry scheme proposal.

The ramp up of recycling rates is assumed to vary between policy options based on the following:

- recycling rates for the schemes will be delayed where options require legislation to be implemented at the state/ territory level (e.g. Options 1, 2 and 9), in line with experience with the National Packaging Covenant of three years or more delay before all states/ territories have legislation in place; and
- where a separate scheme is applied to computer products (Options 2, 4 and 6) there is expected to be lower diversion rates in the first ten years as it is assumed there is limited responsibility under these schemes for unbranded and orphan items to be captured and recycled. Although importers of generic parts and equipment are required to pay an advanced recycling fee to the PRO, this is not

[138] Packaging Covenant and DrumMuster recycling rates provided by the EPHC Electrical Equipment working group. Product Stewardship for Oil recycling rates sourced from PwC 2009, *Second Independent Review of the Product Stewardship (Oil) Act 2000 - Final Report*, February 2009

expected to be sufficient to fund recycling of a substantial volume of unbranded and orphan products.[139]

Projected recycling levels are equivalent for the following groups of similar options:

- Options 1, 3 and 9 –EPR schemes with regulatory underpinning;
- Options 5, 7 and 8 – mandatory Commonwealth Schemes and/or Commonwealth imposed levy. Option 7 is expected to have little difference when compared with a television industry scheme except that it would be run by a government body. As such this option has been assumed to be in line with the diversion rates achieved in the options where the television industry scheme is implemented with no delay to start-up of the program (Options 5 and 8); and
- Options 2 and 4 – separate schemes for televisions and computers based on EPR frameworks.

To ensure comparability, weight projections per unit have been applied to sales, recycling landfill and end of life projections to take into account the fact that:

- televisions, computers, and computer components are all different so units of these products cannot be directly compared;
- the product mix of computers is expected to change in the future, with a substitution away from desktops towards laptops, which are relatively smaller and lighter; and
- over time the materials used in manufacturing are changing, with lighter, less expensive material expected to be used to manufacture televisions and computers in the future.

7.5 Impact identification

As a result of a change to the business as usual case whereby a national scheme is implemented to increase recycling of end of life televisions, computers and computer products, the following impacts are expected. These are all relative to the business as usual case.

Negative impacts included in the CBA (costs):

- consumer collection costs in relation to road transportation of waste are not expected to vary significantly from the business as usual case, though will decrease in terms of less landfill fees being paid;
- industry collection costs are estimated to increase;

[139] Option 6 is projected to achieve 70% recycling in 2016-17 (year 6); options 1, 3 and 9 are projected to achieve 70% recycling in 2018/19 (year 8); and options 2 and 4 are projected to achieve 70% recycling in 2019/20 (year 9).

- reprocessing costs are estimated to increase;
- externality costs associated with transport and production are expected to remain similar to current levels given transport also occurs in the base case (just to landfills), and production of new products will be required in the base case if recycled products are not available in the market;
- regulatory design and implementation costs are expected to increase, but with some efficiency created from a national approach;
- industry PRO administration costs are expected to increase;
- government administration costs are expected to increase;
- importer compliance costs are estimated to increase;
- compliance costs for recyclers are expected to increase;
- scheme communication costs are expected to increase;

Positive impacts included in the CBA (benefits):

- society's intrinsic value of recovering non-renewable resources and other non-market benefits from increasing recycling levels is estimated to increase (consumer surplus);
- recovery of the financial market value placed on recovered television and computer components will increase;
- landfill externality costs are expected to decrease; and
- landfill direct costs and opportunity cost of land are also expected to decrease.

These are discussed in turn below.

7.6 Costs

The costs considered and estimated as part of the CBA are discussed below. Further detail on assumptions relating to estimated costs are provided in Appendix G.

Consumer collection costs. These are costs incurred by consumers and businesses dropping off television and computer waste at designated collection facilities at locations such as landfills, waste transfer stations and local businesses. This largely captures costs to transport waste by car/truck/other method to a collection site, and is also assumed to include a change in landfill fees now avoided. This cost was taken into account as part of the URS Willingness to Pay Survey (i.e. the 'consumer surplus' benefit discussed below is the net of all costs consumers would expect to incur if a scheme is implemented) and so household/business transportation costs were not separately estimated.

Industry collection costs are expected to be incurred by the industry to collect end of life televisions and computers and transport them to reprocessing locations. This may include road transport costs from a collection point to a recycling facility, as well as capital and operating costs for collection sites. These costs are estimated to be $273 per tonne in 2009 dollars, or an average of $1 per unit.[140]

While it is likely that collection cost savings may be expected from achieving economies of scale as a result of increased recycling volumes in the industry (with estimates that savings of 20% could be achieved when collection reaches 70%), the costs incorporated into the CBA are conservative and so do not assume any long term cost saving. Contributing to the conservative nature of this assumption is the trend to lighter televisions and computers. This will mean lower handling cost as the number of units per tonne increases; however this has not been incorporated into the appraisal.[141] Sensitivity analysis was undertaken In Appendix K, Table K.10 to see the effects of economies of scale from increased recycling volumes by assuming that collection cost savings of 20% are achieved when recycling reaches 70%.

Table 22 presents a summary of collection and reprocessing costs by product type.

[140] Estimates based on Hyder (2006), 'Television EPR Scheme Producer Responsibility Organisation Cost Analysis', prepared for NSW DECC.

[141] The URS Willingness to Pay Survey stated that 'alternative schemes are described in terms of…[w]hat it would cost you, compared to the current situation' and respondents were told to 'remember how much money you have to spend and your other financial commitments.' See URS 2009, Appendix A

Table 22 Estimated collection and recycling costs (2009 dollars, weighted averages, rounded)

Product group	Collection costs ($/unit)	Reprocessing costs ($/unit)	Total ($/unit)
Televisions	$6	$18	$24
Computers and computer products	$1	$3	$1
Visual display units	$4	$11	$15
All televisions, computers and computer products	$1	$4	$5
Product group	**Collection costs ($/tonne)**	**Reprocessing costs ($/tonne)**	**Total ($/tonne)**
Televisions	$273	$700	$973
Computers and computer products	$273	$700	$973
Visual display units	$273	$700	$973
All televisions, computers and computer products	$273	$700	$973

Source: Estimates based on Hyder (2006), 'Television EPR Scheme Producer Responsibility Organisation Cost Analysis', prepared for NSW DECC and discussions with e-waste recyclers and estimated product weights based on information from AIIA and PSA.
Note: exclude profit, GST and revenue received for on-selling of materials. Have been rounded.

Reprocessing costs relate to costs incurred by the recycling industry to recycle either one tonne or one unit of waste televisions and computers. In this appraisal, reprocessing costs are estimated to be $700 per tonne of television and computer waste or an average of $4 per unit.[142] Given the labour intensive nature of the recycling industry, the majority of these costs (50-70%) are estimated to be labour costs. Reprocessing costs are presented above in Table 22, alongside collection costs.

While two e-waste recyclers have indicated that there may be some scope for these costs to decrease over time as recycling levels increase and economies of scale are reached, this has not been applied in this appraisal to result in more conservative NPV and BCR results. Based on industry discussions, recycling cost savings over the long term could be 9% saving once recycling reaches 20% and 20% saving (on initial reprocessing costs) once recycling reaches 50%. Sensitivity analysis was undertaken in Appendix K, Table K.11 to see the effects of reprocessing cost savings when recycling increases due to economies of scale. These costs are assumed to exclude profit margin based on discussions with e-waste recyclers. This has been excluded as it could be considered a transfer between parties (consumers of recycled products to reprocessors).

[142] Per tonne estimates are based on Hyder (2006), 'Television EPR Scheme Producer Responsibility Organisation Cost Analysis', prepared for NSW DECC and discussions with e-waste recyclers. Per unit estimates were made using the estimated average per unit weight across currently disposed items.

Externality costs associated with transport and production. These costs relate to externality costs incurred by third parties as a result of transport and production costs generated in the base case and as a result of the policy options assessed. For example, externalities involved with transport and production may include increased carbon emissions from reprocessing or noise from metropolitan road transport. Externalities involved with transport and production have been assumed to essentially net out from the 'business as usual' base case, as television and computer waste is currently transported anyway (in the base case the majority will be transported to a landfill, and with a policy change it is expected they will be transported to a collection/recycling point). In addition processing of metal, plastic, glass, and other components also currently occurs (however in the base case this is expected to be for new products, whereas under a policy change this will be for recycled products). A more detailed assessment of the lifecycle including electricity used during processing, and a change in kilometres driven under the base case, would be required in order to estimate this cost more accurately, which would be difficult given the national scale of this analysis.

Regulatory design and implementation costs. These include government-incurred costs to design the regulation, make regulatory amendments, and then implement any varied legislation/regulation. It is expected to largely incorporate labour time and cost. Regulatory design and implementation is expected to take two years (2008/09 to 2009/10), with costs ranging from $350,000 per year for Commonwealth Options 3,4,5,6 and 8 (due to efficiency from having a single jurisdiction) to $500,000 per year for Option 7 (as two sets of regulations will be required under this option). These cost estimates are fairly high level, however are based on consideration of other recycling schemes and discussions with the EPHC Electrical Equipment working group that has experience implementing such schemes. For example the Australian Tyre Industry Council (ATIC) estimate costs to develop the proposed tyres product stewardship agreement and related NEPM development costs of $400,000 (or approximately $350,000 excluding labour costs).[143]

Industry scheme administration costs. This cost item relates to administrative costs of an industry-run PRO, that will administer the collection and recycling in all schemes but Option 7. Co-regulatory schemes (Options 1 to 6) and mandatory schemes (Options 8 and 9) are assumed to be administered by an industry-coordinated PRO with government administering the regulation, however, Option 7 is assumed to be administered solely by Government. PRO administration costs are estimated to range from $1.25 million per annum for a joint industry scheme to $2.1 million per annum when separate schemes are assumed to be run concurrently for televisions and computers. These are based on estimates for PRO administration costs contained in Hyder (2006) *Television EPR Scheme Producer Responsibility Organisation – Cost Analysis*.

[143] ATIC Business Plan cost item provided by the EPHC Electrical Equipment working group.

Direct government administration costs relate to costs for government to administer the scheme and regulation on an ongoing basis, and also include costs related to chasing industry participants to join the co-regulatory schemes. This has been found to generate significant costs for the National Packaging Covenant, and as a result six hours of labour per new importer has been assumed as contributing to the administration costs, which was applied to estimates for importer numbers each year. Total administration costs are estimated to range from $0.6 million (Options 3 and 4) to $3.5 million per annum (Options 1, 2 and 9), with state-administered schemes being more expensive than Commonwealth-administered schemes due to the duplication of effort of the multiple jurisdictions.

Importer compliance costs are estimated to be $600 per importer for Option 7 based on the recently proposed tyres NEPM scheme,[144] which involves an advanced recycling fee and subsidies for recycling. This includes education, notification, permission, procedural, publication and documentation, purchase and record keeping costs. Other options are assumed to cost $1,000 per importer, as they involve a greater requirement to report against targets. Option 8 is assumed to involve an additional 5% increase in compliance costs due to the licensing requirement of this scheme.

Compliance costs for recyclers are estimated at $20,000 per annum per recycler for Option 7, based on the existing PSO scheme.[145] For recyclers under Option 7, these costs are likely to involve reporting, monitoring and other scheme compliance costs in order to be eligible to receive Government recycling/collection subsidies. There are no recycler compliance costs assumed for other options, as recyclers only face contractual obligations with the PRO.

Communication costs. It is estimated that the cost of a national communications campaign is $8.8 million in the first year of the scheme (2010/11)[146] and the cost of reinforcing the initial scheme in subsequent years will be $500,000 until the end of the appraisal period. These are based on estimates for PRO administration costs contained in the Hyder 2006 *Television EPR Scheme Producer Responsibility Organisation – Cost Analysis*, and are not assumed to vary between the options.

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[144] MMA 2007, 'Tyres National Environmental Protection Measure: Threshold Study', prepared for the National Environment Protection Council, November 2007, p 18

[145] PwC 2009, 'Second Independent Review of the Product Stewardship (Oil) Act 2000', February, prepared for the Department of the Environment, Water, heritage and the Arts

[146] This includes websites, printed collateral material, TV advertisements, radio advertisements, print ads, outdoor media, in store retail advertising, event management and a school education program. See Hyder 2006, pp 16-17

Key drivers of costs

- Collection and reprocessing costs have most significant impact on total costs – as outlined in Table 23, total discounted net costs over the 23 year period range from $837 million (Option 4) to $995 million (Option 8). The main cost drivers for each policy option are reprocessing and collection costs, which account for between 91% and 96% of the total incremental costs under all options (discounted to 2009 dollars). These costs are assumed to increase proportionally in line with increased recycling levels. Other reasons for some schemes having higher or lower costs on a present value basis relates to the ramp up of recycling rates, some schemes taking 5 years to reach a 70% recycling rate resulting in higher reprocessing and collection costs, and some taking 9 years resulting in lower costs when comparing options over the analysis period.
- Differentiation between schemes also occurs due to varying administration costs – while having less of an impact on scheme differentiation than collection and reprocessing costs, there is differentiation in estimation of the administration costs for industry and government run schemes. These cost estimates are unique for each option and not linked to the level of recycling. These administration costs, comprising policy design and implementation, PRO administration, government administration, and communications costs, account for from 3-6% of total costs. As this indicates, these costs have a minor impact on differences in total costs relative to reprocessing and recycling costs.

Funding of cost items. Considering the costs presented in Table 23, there is a range of potential funding scenarios for each. These are discussed in Chapter 10, Section 10.3.

Table 23 Incremental costs, annual and present values over the analysis period ($ millions, all products, threshold 3)

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
Collection	2008/09	-	-	-	-	-	-	-	-	-
	2010/11	$3.2	$2.3	$3.2	$2.3	$6.4	$5.5	$6.4	$6.4	$3.2
	2015/16	$21.3	$19.4	$21.3	$19.4	$26.7	$24.8	$26.7	$26.7	$21.3
	Total (PV)	$234.2	$221.8	$234.2	$221.8	$260.0	$247.5	$260.0	$260.0	$234.2
Reprocessing	2008/09	-	-	-	-	-	-	-	-	-
	2010/11	$8.2	$5.9	$8.2	$5.9	$32.4	$14.1	$32.4	$32.4	$8.2
	2015/16	$54.7	$49.7	$54.7	$49.7	$68.5	$63.5	$68.5	$68.5	$54.7
	Total (PV)	$600.6	$560.6	$600.6	$568.8	$680.6	$634.9	$680.6	$680.6	$600.6
Policy design and implementation	2008/09	$0.5	$0.5	$0.4	$0.4	$0.4	$0.4	$0.5	$0.5	$0.5
	2010/11	-	-	-	-	-	-	-	-	-
	2015/16	-	-	-	-	-	-	-	-	-
	Total (PV)	$0.9	$0.9	$0.7	$0.7	$0.7	$0.7	$1.0	$1.0	$0.9
PRO administration	2008/09	-	-	-	-	-	-	-	-	-
	2010/11	$1.3	$2.1	$1.3	$2.1	$1.3	$2.1	-	$1.3	$1.3
	2015/16	$1.3	$2.1	$1.3	$2.1	$1.3	$2.1	-	$1.3	$1.3
	Total (PV)	$12.7	$21.1	$12.7	$21.1	$12.7	$21.1	-	$12.7	$12.7
Government administration	2008/09	-	-	-	-	-	-	-	-	-
	2010/11	$3.6	$3.6	$0.7	$0.7	$2.2	$2.2	$2.2	$2.3	$3.6
	2015/16	$3.6	$3.6	$0.7	$0.7	$2.2	$2.2	$2.2	$2.3	$3.6
	Total (PV)	$36.3	$36.3	$7.1	$7.1	$22.4	$22.4	$22.6	$23.4	$36.4
Importer compliance	2008/09	-	-	-	-	-	-	-	-	-
	2010/11	$0.5	$0.5	$0.5	$0.5	$0.5	$0.5	$0.3	$0.5	$0.5
	2015/16	$0.5	$0.5	$0.5	$0.5	$0.5	$0.5	$0.3	$0.5	$0.5
	Total (PV)	$5.2	$5.2	$5.2	$5.2	$5.2	$5.2	$3.1	$5.5	$5.2
Recycler compliance	2008/09	-	-	-	-	-	-	-	-	-
	2010/11	-	-	-	-	-	-	$0.3	-	-
	2015/16	-	-	-	-	-	-	$0.3	-	-
	Total (PV)	-	-	-	-	-	-	$3.3	-	-
Communications	2008/09	-	-	-	-	-	-	-	-	-
	2010/11	$8.8	$8.8	$8.8	$8.8	$8.8	$8.8	$8.8	$8.8	$8.8
	2015/16	$0.5	$0.5	$0.5	$0.5	$0.5	$0.5	$0.5	$0.5	$0.5
	Total (PV)	$12.3	$12.3	$12.3	$12.3	$12.3	$12.3	$12.3	$12.3	$12.3
Total	2008/09	$0.5	$0.5	$0.4	$0.4	$0.4	$0.4	$0.5	$0.5	$0.5
	2010/11	$25.4	$23.1	$22.6	$20.2	$51.5	$33.2	$50.4	$51.6	$25.4
	2015/16	$81.9	$75.7	$79.0	$72.9	$99.7	$93.5	$98.6	$99.8	$81.9
	Total (PV)	$902.2	$858.1	$872.8	$837.0	$993.9	$944.1	$983.0	$995.4	$902.3

Note: 2008/09, 2010/11 and 2015/16 values are undiscounted, annual values at a point in time. 2008/09 is the first year of the appraisal period, 2010/11 is the first year of operation of the schemes and 2015/16 is the first year that one of the schemes reaches 70% recycling. These are not readily comparable with each other as they are not discounted to 2009 dollars. The present value lines represented discounted costs for each option.
Note: Table H.3 in Appendix H presents percentage comparisons of each cost item.

Table 24 separates total costs into the parties that directly incur each cost item. It is important to note that this does not have any implications regarding scheme funding (discussed further above Table 23). For example, reprocessing costs are considered to be recycler costs despite some schemes potentially funding some or all of these. Instead, the table below enables government insight into which costs items it could potentially subsidise as part of the scheme definition. This table indicates that, due to the magnitude of collection and reprocessing costs, recyclers are responsible for between $782 million to $944 million (91% to 96%) of the PV of costs depending on the policy option. In contrast, the state governments are responsible for up to $46 million (5%) and the Australian government is responsible for up to $37 million (4%) depending on the scheme.

Table 24 Split of total incremental costs by party responsible ($ millions, all products, threshold 3)

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
Recyclers (collection, reprocessing, compliance costs)	2008/09	-	-	-	-	-	-	-	-	-
	2010/11	$11.3	$8.2	$11.3	$8.2	$38.8	$19.7	$39.0	$38.8	$11.3
	2015/16	$76.1	$69.1	$76.1	$69.1	$95.2	$88.2	$95.5	$95.2	$76.1
	PV	$834.8	$782.3	$834.8	$790.5	$940.6	$882.4	$944.0	$940.6	$834.8
Importers (compliance costs)	2008/09	-	-	-	-	-	-	-	-	-
	2010/11	$0.5	$0.5	$0.5	$0.5	$0.5	$0.5	$0.3	$0.5	$0.5
	2015/16	$0.5	$0.5	$0.5	$0.5	$0.5	$0.5	$0.3	$0.5	$0.5
	PV	$5.2	$5.2	$5.2	$5.2	$5.2	$5.2	$3.1	$5.5	$5.2
PRO (administration costs)	2008/09	-	-	-	-	-	-	-	-	-
	2010/11	$1.3	$2.1	$1.3	$2.1	$1.3	$2.1	-	$1.3	$1.3
	2015/16	$1.3	$2.1	$1.3	$2.1	$1.3	$2.1	-	$1.3	$1.3
	PV	$12.7	$21.1	$12.7	$21.1	$12.7	$21.1	-	$12.7	$12.7
State Government (administration, regulatory and communication costs)	2008/09	$0.5	$0.5	-	-	-	-	-	-	$0.5
	2010/11	$12.4	$12.4	-	-	-	-	-	-	$12.4
	2015/16	$4.1	$4.1	-	-	-	-	-	-	$4.1
	PV	$45.6	$45.6	-	-	-	-	-	-	$45.6
Cth Government (administration, regulatory and communications costs)	2008/09	-	-	$0.4	$0.4	$0.4	$0.4	$0.5	$0.5	-
	2010/11	-	-	$9.5	$9.5	$11.0	$11.0	$11.0	$11.1	-
	2015/16	-	-	$1.2	$1.2	$2.7	$2.7	$2.7	$2.8	-
	PV	$3.9	$3.9	$20.1	$20.1	$35.4	$35.4	$35.9	$36.7	$3.9
Total	2008/09	$0.5	$0.5	$0.4	$0.4	$0.4	$0.4	$0.5	$0.5	$0.5
	2010/11	$25.4	$23.1	$22.6	$20.2	$51.5	$33.2	$50.4	$51.6	$25.4
	2015/16	$81.9	$75.7	$79.0	$72.9	$99.7	$93.5	$98.6	$99.8	$81.9
	PV	$902.2	$858.1	$872.8	$837.0	$993.9	$944.1	$983.0	$995.4	$902.3

Note: 2008/09, 2010/11 and 2015/16 values are undiscounted, annual values at a point in time. These are not readily comparable with each other as they are not discounted to 2009 dollars. The present value lines represented discounted costs for each option. See Appendix H, Table H.4 for percentages

7.7 Benefits

To quantify the potential impacts of any regulatory proposal it is necessary to make a series of assumptions and where possible draw directly on observable quantified data. Unlike the cost analysis above however, not all of the benefits associated with the proposed options are directly observable in existing markets. While the resource value can be observed from current recycling activities – as was set out in section 4.2 – there is an expectation that other benefits are not so readily quantified.

To address this, the analysis has drawn on the URS choice modelling work and tailored a series of assumptions to allow for comparison of options and different products over time. The nature of the URS choice modelling work relies of stated preferences (i.e. what people say they are likely to do) rather than revealed preferences (which draws on evidence of what people have actually done). As such, a degree of caution is required when interpreting the choice modelling and the willingness to pay estimates. Nonetheless, the URS choice modelling survey provides a relevant analysis of the potential value that society places on the intrinsic value of increasing end of life televisions and computers.

The following analysis discusses the potential benefits associated with the options from the point of view that the URS work captures the community's willingness to pay for increased recycling. Acknowledging that there will always be a degree of uncertainty in this type of analysis, the chapter relies on a number of sources of information, presents the results of the willingness to pay using the URS survey and presents the results assuming zero willingness to pay to highlight the importance of the choice modelling survey to the overall impact of the proposals on society.

With the above caveats in mind, the benefits that have been identified to occur as a result of a government backed scheme to increase recycling of televisions and computers are the:

- society's intrinsic value of recovering non-renewable resources and other non-market benefits from increasing recycling levels is estimated to increase (consumer surplus from increased recycling);
- recovery of the financial market value placed on recovered television and computer components will increase;
- avoided landfill externality costs; and
- avoided landfill direct costs and opportunity cost of land.

Positive (or negative) impacts on employment creation have not been incorporated into the CBA. These types of impacts are not readily captured in a CBA framework, given that it is difficult to attribute employment impacts on a particular party. In addition, employment affects are challenging to assess in a 'net' sense, for example workers may simply switch from other sectors of the economy to the recycling industry as a result of these policy options. These affects would be more accurately captured in a computable general equilibrium model of economic impacts.

Again, and for simplicity sake, the results and discussion have been presented in this chapter for only the impacts for each of the options assuming:

- that the option will apply to all televisions and computers collectively; and
- a threshold that excludes 95.5% of importers but maintains coverage of 95.3% of total units sold.

The estimates for the other thresholds and scheme coverage are presented in the appendices.

Key assumptions

Avoiding double counting of benefits. As part of the URS 2009 willingness to pay study, it was identified that the net value of recycling includes the following values identified by the 2,000+ survey respondents:

- risk of running out of resources while sending some valuable materials to landfill;
- landfill sites are posing a threat to the natural environment;
- landfill space is running out;
- landfill sites are posing a threat to human health; and
- avoiding having landfill the neighbourhood.[147]

However, despite the respondents indicating that the above benefits are important issues for them relating to improving recycling of televisions and computers, the benefits the respondents place on increased recycling is not necessarily limited to this list. In contrast, the choice modelling undertaken by URS and its sub-consultants, aimed to capture the value based on any number of range of benefits the respondent chose to value. In addition, the willingness to pay value estimated from this survey process was estimated as a 'lump sum' value per unit for each percentage increase in recycling – which means it is not possible to isolate any further specific values for the point raised above.

In order to avoid double counting, and considering that the willingness to pay value derived in the 2009 survey is a 'lump sum' value, we have assumed a conservative approach that respondents had considered each of the following impacts in estimating their willingness to pay:

- recovery of the financial market value placed on recovered television and computer components will increase;
- avoided landfill externality costs;

[147] URS (2009), *Willingness to Pay for E-Waste Recycling*, 28 February, p 25

- avoided landfill direct costs and opportunity cost of land;[148] and
- change in consumer collection costs.

As a result, these benefit items have not been separately incorporated into the CBA, rather the willingness to pay value (assumed to capture all of these) has been used as the only measure of benefits). In particular this is relevant as it captures not only the 'measurable' benefits such as recovery of resource value, but also 'non-measurable' benefits associated with the intrinsic value placed by respondents on aspects such as the 'feel good factor' of increasing recycling.

The benefits in the table below are presented to indicate the benefits that are traditionally measurable or non-measurable. Care must be taken in assessing this table however, given the parameters used to measure landfill externalities and landfill direct costs are not necessarily accurate measures as they are not specific to television and computer waste and also the approach used to quantify these components vary thus making direct comparison a difficult and potentially spurious exercise. In addition, these cannot necessarily all be incorporated into the CBA given there may be double counting (see discussion below Table 25). Nevertheless, for completeness sake the table is presented.

Even the financial market value for resources is heavily dependent on a range of market and economic factors so is not necessarily an accurate measure over a 20 year time period. In contrast, the willingness to pay survey is a technique to measure all of the benefits as a collective.

[148] Landfill externality and direct costs are considered to be already taken into account in the URS Willingness to Pay Study, as respondents indicated the opportunity cost of land as being an issue, and also because respondents were asked to consider all costs in estimating a willingness to pay value (which is assumed to include landfill fees, which would be used to fund the direct costs of landfill).

Table 25 Incremental benefits ($ millions, all products, threshold 3, discounted 2009 dollars)

	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
Total avoided landfill externalities [1]	*$21.2*	*$20.0*	*$21.2*	*$20.0*	*$23.7*	*$22.4*	*$23.7*	*$23.7*	*$21.2*
Greenhouse gas emissions	$18.6	$17.5	$18.6	$17.5	$20.7	$19.6	$20.7	$20.7	$18.6
Other gas emissions	$0.9	$0.8	$0.9	$0.8	$1.0	$0.9	$1.0	$1.0	$0.9
Leachate	$0.9	$0.8	$0.9	$0.8	$1.0	$0.9	$1.0	$1.0	$0.9
Amenity	$0.9	$0.8	$0.9	$0.8	$1.0	$0.9	$1.0	$1.0	$0.9
Total avoided direct landfill costs	*$22.1*	*$20.8*	*$22.1*	*$20.8*	*$24.6*	*$23.4*	*$24.6*	*$24.6*	*$22.1*
Land purchase including airspace	$1.8	$1.7	$1.8	$1.7	$2.0	$1.9	$2.0	$2.0	$1.8
Approvals and site development	$1.8	$1.7	$1.8	$1.7	$2.0	$1.9	$2.0	$2.0	$1.8
Cell development	$5.7	$5.4	$5.7	$5.4	$6.4	$6.1	$6.4	$6.4	$5.7
Operation including monitoring and fees	$8.8	$8.3	$8.8	$8.3	$9.9	$9.3	$9.9	$9.9	$8.8
Capping and rehabilitation	$2.2	$2.1	$2.2	$2.1	$2.5	$2.3	$2.5	$2.5	$2.2
Aftercare	$1.8	$1.7	$1.8	$1.7	$2.0	$1.9	$2.0	$2.0	$1.8
Financial/market resource value recovered (mid-level estimates) [2]	*$300.3*	*$284.4*	*$300.3*	*$300.3*	*$284.4*	*$333.4*	*$317.4*	*$333.4*	*$333.4*
Willingness to pay	*$1,521.8*	*$1,374.7*	*$1,521.8*	*$1,374.7*	*$1,724.7*	*$1,553.3*	*$1,724.7*	*$1,724.7*	*$1,521.8*

Source: recycling and landfill volumes that form the basis of this table are based on estimated stales, lifespan, weight and disposal pathways. Parameter values are sourced from: (i) Productivity Commission (2006 (landfill externalities); (ii) WMAA 2005 (landfill direct costs); (iii) discussions with 2 e-waste recyclers in June 2009 (financial resource value); and (iv) URS 2009 (remaining consumer surplus)]

[1] Note: Given the specific nature of television and computer waste (i.e. almost all is non-organic), the amount of greenhouse gas is likely to be small and therefore 'leachate' and 'amenity' landfill externality costs are expected to be more relevant for television and computer waste

[2] Note: Consultation with current recyclers indicates that it costs around $970 per tonne to collect and reprocess the waste resulting in a financial loss from recycling of about $620 per tonne.

Willingness to pay value of benefits from increased recycling. To avoid double counting, the willingness to pay value of benefits accruing to society from increased recycling have been the only benefit measure incorporated in the CBA analysis of the nine new policy options. This ensures that all market and non-market benefits are included and not simply estimates of market or 'traded' values.

The willingness to pay study of community expectations and preferences for recycling televisions and computers estimated that households are willing to pay $0.50 per unit recycled for every 1% increase in recycling above current levels, based on survey responses received.

In order to interpret and adapt the results of the URS study into this CBA of policy options, a number of adjustments were required. Two key areas of adjustment that PwC has made (which are described in more detail in Table 26) are:

1 *URS per unit estimates were converted to a per tonne estimate* to ensure a comparable analysis given:

   – URS did not include components and peripherals, and including these on a 'per unit' basis would not reflect that they are significantly smaller and lighter than whole televisions and computers (which were the basis of the URS estimate); and

   – Product weights are expected to change over time, with manufacturing projected to employ cheaper and lighter inputs. This can be captured in 'tonnage' projections more readily than 'unit projections'.

2 *Revised sales projections were applied to the URS parameter values* – the URS report provided five year projected willingness to pay amounts for inclusion in the CBA based on household numbers, and sales per household information provided in the survey. However:

   – the five year projections are based on static household numbers, despite ABS projecting a 1.3% average annual growth in household numbers from 2007/08 to 2025/26, and even higher at 1.6% per annum over the next five years;[149]

   – the five year projections are based on static sales projections of 1.76 items per household over this timeframe, and in addition do not incorporate purchase of computer products and peripherals; and

   – as a result, PwC has incorporated sales projections estimated by Hyder as part of this regulatory impact statement, and based on a detailed analysis of current 2007/08 sales and imports for televisions, computers and computer products.

In addition there were two key elements to the PwC application of choice modelling outputs, that have resulted in the values used being relatively conservative, namely:

1 *The choice modelling values were only applied to sales volumes when the schemes reached 50% recycling levels* – the URS study presented respondents with scenarios of above 50% recycling. As a result, URS suggests that 'results should not be extrapolated for levels of recycling outside the boundaries used in this study.'[150] It is considered reasonable to extrapolate the willingness to pay values at lower rates, but only where a scheme will result in levels of recycling above 50%. However, to ensure the CBA is conservative, PwC has not applied benefits in the years prior to 50% recycling levels being achieved, in line with the URS recommendation; and

2 *A conservative willingness to pay per item sold was used that incorporates a drop-out rate* – URS provided two measures of willingness to pay per item sold, based on the average willingness to pay of $0.50 per item per percentage increase:

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[149] ABS 2004, Catalogue Number 3236.0 2001-2026 household projections

[150] URS 2009, 'Willingness to pay for E-Waste Recycling', prepared for the Environment Protection and Heritage Council, February 2009, p 38

– estimate considering only responses received and not considering the drop-out rate – this results in an estimated household willingness to pay per item of $24.50 at a 50% recycling level; and

– more conservative estimate considering drop-out rate – as 14% of respondents did not complete the survey, URS provided a conservative estimate based on an assumption that respondents that did not complete the survey have a $0 willingness to pay. Considering this produces a weighted value of $21.14 per item sold (for a 50% recycling level).[151]

The above four assumptions, along with other considerations relevant to incorporation of the willingness to pay value in the CBA, are discussed further in Table 26.

Table 26 Adaptations made to choice modelling results

Reasons to adapt willingness to pay results for CBA	*Approach to address within CBA*
The URS study analysed whole televisions, desktops and laptops. ***Policy options explored in this regulatory impact statement aim to address 'whole' and 'units' including components and peripherals[152]***	Whole units and components/peripherals do not provide equivalent resource recovery outcomes as components/peripherals are relatively smaller and lighter. While the URS survey did not explicitly include components and peripherals, it is likely that survey respondents considered components and peripherals as part of a complete computer system. Components and peripherals comprise 80% of end of life television and computer units. However, they only contribute 30% of the weight.[153] Therefore, while we could capture 'whole' computers reaching end of life, there are a large number of peripherals that we would assume consumers would be willing to pay for, but which are not sold as part of a complete system. By converting the willingness to pay to a per tonne basis, we have assumed that consumers' willingness to pay for a component or peripheral is equal to its weight relative to the complete system. A shortfall of this approach is that as televisions and computers have different unit weights, it is possible that combining them will distort the estimated benefits. However, the willingness to pay for televisions and computers was combined in the URS study, so it was not possible to separate them when converting them to a per tonne basis. Instead, a weighted average was used. An alternative method to estimate a relative willingness to pay for peripherals and other computer products is according to 'relative value' as opposed to 'weight'. However, given the significant range in

[151] Ibid

[152] However, this consultation regulatory impact statement separately analyses televisions, visual display units and computers and its definition of computer also includes components/peripherals such as keyboards, mice, hard drives, scanners, speakers, web cams, power cords, power supplies, fans, printers and multi function devices (MFDs).

[153] Television weights were calculated from data in Tables 23 and 24 (pages 49 and 50) of United Nations (2008) 'Review of Directive 2002/96 on Waste Electrical and Electronic Equipment'. The average weight of laptops, desktops with CRT monitors and desktops with LCD monitors was estimated based on manufacturer's data and actual weight measurements. The proportion of laptops and desktops with each type of monitor was estimated based on DFAT import data on laptops and computer displays.

Reasons to adapt willingness to pay results for CBA	*Approach to address within CBA*
	value for different television and computer items (for example a television could be valued anywhere from $100-$5,000), it is considered too difficult to estimate an average value across each product group that would accurately capture possible variation in willingness to pay values. In addition, as the value placed on resource recovery is likely to be in consideration of weight that may be recovered or removed from landfill, tonnes are considered a relevant conversion factor for this analysis.
Incorporating choice modelling outputs into a CBA requires results to be in a uniform 'unit' or 'value'	To incorporate the URS study results, the estimate of **$21.14 per unit sold (for 50% recycling)** was converted to **a per tonne per percentage estimate of $963 per tonne sold** based on assumptions relating to 'whole', 'unit', component and peripheral tonnage in 2008/09 (see Figure 9), and a weighted average weight of 'whole' televisions, desktops and laptops (22 kg/unit).[154] The resulting value per tonne was then applied to annual sales projections to estimated year-by-year change. It is acknowledged that this 'per tonne' approach is different to the 'per unit' and '5-year total' approach taken by URS. However it was considered the only way to enable comparable analysis given the inclusion of peripherals in the decision regulatory impact statement and expected changes in product weight over time. In fact, the weight of 22 kg/unit used to covert the value to a 'per tonne' basis is conservative as: • it represents televisions and computers currently reaching end of life; • new units sold in 2008/09 are estimated to weigh 14.8 kg/unit; • unit weights are expected to decrease further. If this lower weight (14.8 kg/unit) was used the willingness to pay value increases to **$1,430/tonne sold**, or close to a 50% increase in the willingness to pay value used by PwC of $963 per tonne. The figure of $1,430 per tonne applied as a sensitivity analysis. Additionally, as the more conservative value incorporating the 14% drop-out rate was incorporated, this adds a further conservative element. Sensitivity analysis of the effect of applying the less conservative willingness to pay of $24.50 per item sold (i.e. not considering the drop-out rate) is presented in Appendix K, Table K.12.
It is important to understand if all costs and benefits are incorporated in the CBA when the choice modelling inputs are incorporated.	As part of the URS study, survey respondents were asked to consider what it would cost them 'compared to the current situation', and told to 'remember how much money you have to spend and your other financial commitments' when estimating their stated preference. For this reason consumer collection costs were not considered separately in the appraisal to avoid double counting of cost savings.[155]

[154] Calculated using the formula: = (41.7%*25.96kg)+(58.3%*19.11kg)

[155] The URS Willingness to Pay Survey stated that 'alternative schemes are described in terms of…[w]hat it would cost you, compared to the current situation' and respondents were told to 'remember how much money you have to spend and your other financial commitments.' See URS 2009, 'Draft Report: Willingness to pay for E-Waste Recycling', prepared for the Environment Protection and Heritage Council, February, Appendix A

Reasons to adapt willingness to pay results for CBA	*Approach to address within CBA*
Point of sale fee was implicated as the payment method during the URS survey.[156]	***Given a range of schemes and funding options are being considered in this regulatory impact statement, this analysis required the use of the willingness to pay results regardless of the scheme funding method to enable comparison. As a number of the schemes are likely to require a passing of costs (e.g. an import fee) onto consumers, it was considered that the point of sale mechanism is relevant for the majority of schemes. Of note, the URS focus groups used to define the survey indicated that a number of respondents supported the government funding of schemes,[157] which encompasses Options 1,2 and 9.***
The URS survey was only conducted on a metropolitan basis, and did not include Tasmania, ACT or the NT	This analysis assumed that the willingness to pay results are representative across all states/territories and regions in Australia.
The willingness to pay values are applicable for schemes delivering more than 50% recycling as scenarios below this percentage were not presented in the survey[158]	***PwC considers it would be reasonable to assume the willingness to pay results are representative across all recycling rates above the current levels (i.e. as all of the nine policy change options target recycling rates of above 50% and reach this level of recycling within 3 to 5 years, the WTP could reasonably be applied from the first year of the scheme).*** However, in order to present conservative estimates, PwC has only applied choice modelling values to sales volumes when the schemes reached 50% recycling levels, in line with URS recommendations. Sensitivity analysis has been undertaken of the results if the benefits are applied from the first year of the scheme (see Appendix K, Table K.12).
URS assumed a straight-line relationship between willingness to pay and recycling	***It is expected that the willingness to pay would be less at the margins. However, URS's scope of work did not allow for such analysis. Therefore, there was assumed to be a straight line relationship between the WTP and the units of waste recovered.[159]***
URS results indicated that it was only Sydney and Perth with a significant kerbside premium, however, a weighted kerbside value was used from willingness to pay results, which increased the average value	***As the approach used by URS to determine the willingness to pay values involved weighted averages, these values were also assumed in the CBA.***

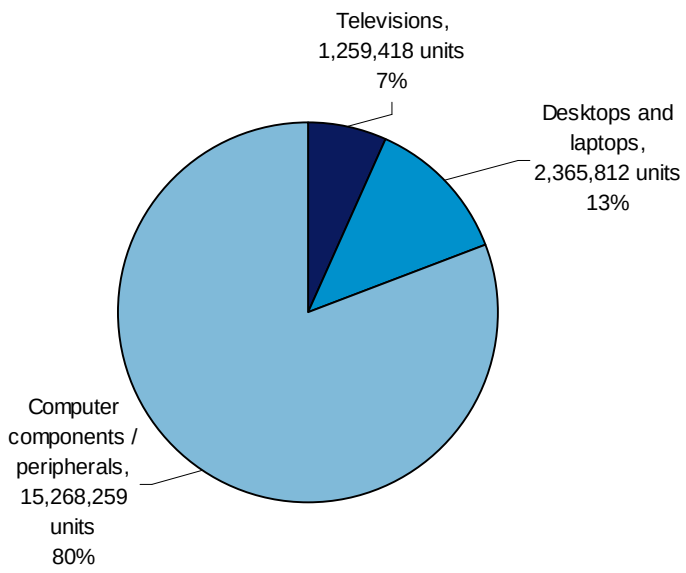
[156] Respondents were instructed to 'remember that if you choose a new recycling scheme, you will have to pay an additional cost for each new computer and TV that you purchase. Your payment will help fund the new recycling scheme (URS 2009, 'Draft Report: Willingness to pay for E-Waste Recycling', prepared for the Environment Protection and Heritage Council, February, Appendix A). The consensus from focus groups was that 'user pay' was a good principle and that the practicalities of payment collection made the product levy at point of sale quite attractive (URS 2009, *pers. comm.*, 24 March 2009)

[157] Of the 15% of respondents who always chose the *status quo* in the URS Willingness to Pay study, 27% indicated that they thought the government should pay and 39% objected to paying, including 12% who chose both (URS 2009, *pers. comm.*, 24 March 2009)

[158] URS (2009), *Willingness to Pay for E-waste Recycling*, 28 February 2009, p16

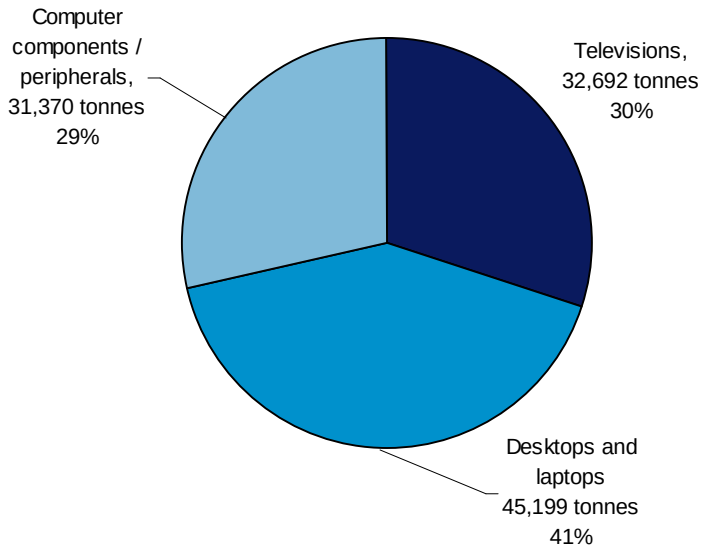
[159] URS 2009, *pers. comm.,* 24 March 2009

Figure 13 Estimated products reaching end of life in 2008/09 (units)



Source: End of life modelling of television and computer products was based on estimated sales, lifespan, product weight and disposal pathways. Sales data was estimated using DFAT data on imports. Input to the development of assumptions for lifespan, weight and disposal pathways was provided by AIIA, PSA and the EPHC Electrical Equipment working group

Figure 14 Estimated products reaching end of life in 2008/09 (tonnes)



Source: as per figure above (Figure 13)

Key drivers

As illustrated in Table 27, the total net present value of benefits for the 'all products' category with a minimum threshold of 5,000 units ranges from $1.4 billion (Options 2 and 4) to 1.7 billion (Options 5,7 and 8).

This result is driven principally by the recycling rate assumed for a particular year, as URS provided varying values per unit purchased dependent on how high the recycling rate is. In addition, it is driven by sales projections as this formed the basis to apply the willingness to pay parameter to. A summary of benefits for each option is presented below.

Table 27 Incremental benefits - all products, threshold 3 ($ millions)

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
Benefits from increased recycling ($ millions)	2008/09	-	-	-	-	-	-	-	-	-
	2010/11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2015/16	170.1	155.4	170.1	155.4	209.1	194.2	209.1	209.1	170.1
	Total (NPV)	1,521.8	1,374.7	1,521.8	1,374.7	1,724.7	1,553.3	1,724.7	1,724.7	1,521.8

Note: 2008/09, 2010/11 and 2015/16 values are undiscounted, annual values at a point in time. These are not readily comparable with each other as they are not discounted to 2009 dollars. The present value lines represented discounted costs for each option.

The results for the different options rely on the accuracy of the estimated willingness to pay derived from the URS choice modelling survey. A number of stakeholder submissions received in response to the consultation regulatory impact statement queried URS's estimated willingness to pay, (although the majority of stakeholder submissions did not challenge the URS estimate) Stakeholder comments on the willingness to pay estimates are presented in Box 3 (Chapter 8, Section 8.3).

One submission from the City of Charles Sturt Council (submission 7) advised that they had conducted a survey of 400 individuals to obtain their views on hard waste and their willingness to pay for recycling at the time of disposal. While the Council's survey is not directly comparable to the URS study,[160] the reported willingness of 60% of people to pay a $10 charge when dropping off 'e-waste' for recycling is consistent with the estimated long run fee likely to be borne by consumers of televisions and computers ($5-10 per VDU sold. See Chapter 10, Section 10,5).

[160] There are at least two major differences between the URS and City of Charles Sturt Council surveys: the URS survey scenarios looked at advance payment on purchase of equipment, rather than Charles Sturt Council's focus on payment at time of disposal (this advance payment approach was chosen by URS as it was clear from focus group discussions that participants preferred to pay up front (i.e. at point of sale) rather than at time of recycling (i.e. at the end of life)); and the URS study focussed on public and private benefits (i.e. focusing on how much someone is willing to pay to address community wide recycling levels) whereas the Council survey addressed only private benefits (i.e. focusing on the amount an individual would pay to manage their own waste).

7.8 Results

As noted above, the COAG guidelines favour highest NPV, as this assists in selection of the option that generates the greatest net benefit for the community. BCR is usually useful when there are budget constraints and the most 'effective' spend for each dollar spent.

Given the closeness of the options it was preferred that the community be given the opportunity to comment freely on which option might be the preferred, hence the approach in the consultation regulatory impact statement was that *no individual options were recommended and all were to be considered through the consultation process*.

The CBA results suggest all options will deliver a net benefit to society, with the NPVs ranging from $517 million (Option 2) to $742 million (Option 7) and the BCRs ranging from 1.6 (Options 2, 4 and 6) to 1.8 (Option 7).

Table 28 Summary of results - all products, threshold 3 (incremental to base case, discounted, 2009 dollars)

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
Costs	$ millions	$902	$858	$873	$837	$994	$944	$983	$995	$902
Benefits	$ millions	$1,522	$1,375	$1,522	$1,375	$1,725	$1,553	$1,725	$1,725	$1,522
NPV	$ millions	$620	$517	$649	$538	$731	$609	$742	$729	$620
BCR	Number	1.7	1.6	1.7	1.6	1.7	1.6	1.8	1.7	1.7

Note: results are presented on an incremental basis to the 'business as usual' base case.

In assessing the overall merit of an e-waste recycling scheme it is important to consider not just the estimated benefits and costs, but the uncertainty and risk surrounding the estimates. Whilst the cost of recycling and the value of the recovered resources is observed and therefore can be estimated with accuracy, there is greater uncertainty and risk surrounding the value of environmental and health risks and the intrinsic value of television and computer recycling as estimated by the choice modeling survey.

To provide an indication of how reliant the CBA results are on the accuracy of the estimated willingness to pay, a sensitivity analysis was undertaken which, among other things, excluded the URS willingness to pay estimates and included only those benefits that are directly observable as outlined in Table 25 (i.e. avoided landfill externalities, avoided direct landfill costs and financial/market resource value recovered). If only these directly observable benefits are included, all options produce a negative net present value, indicating that the results of the CBA rely on the stated preference by consumers that they are willing to pay for guaranteed levels of recycling (as opposed to their revealed preference, which draws upon evidence of their actual behaviour). However, this sensitivity analysis excludes the fact that consumers value recycling for a range of other reasons including preserving resources for future generations and living in a less wasteful society.[161] Therefore, only including the directly observable benefits likely

[161] URS 2009, 'Willingness to Pay for E-Waste Recycling', p 28

underestimates the net present value of the schemes. Nevertheless, it provides a guide as the potential size of the net cost that would be imposed on society if the choice modelling resulted in a significant overestimate of the true intrinsic value of recycling.

Table 29 Summary of results with only directly observable benefits included - all products, threshold 3 (incremental to base case, discounted, 2009 dollars)

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
Costs	$ millions	$902	$858	$873	$837	$994	$944	$983	$995	$902
Benefits	$ millions	$344	$325	$344	$325	$382	$363	$382	$382	$344
NPV	$ millions	-$559	-$533	-$529	-$512	-$612	-$581	-$601	-$613	-$559
BCR	Number	0.38	0.38	0.39	0.39	0.38	0.38	0.39	0.38	0.38

Note: results are presented on an incremental basis to the 'business as usual' base case.

Excluding government costs and externalities from the CBA provides an indication of the magnitude of the government subsidy that would be required to ensure that recycling was financially viable in the absence of charges to consumers. Government costs are not likely to be passed on to industry or consumers and industry is not likely to take the reduced externality costs of landfill into account when making decisions regarding the quantity to recycle. Table 30 presents the results of the CBA excluding government costs (policy design/implementation, government administration costs and communications in mandatory schemes) and excluding externality benefits (landfill externality savings and the avoided direct costs of landfill).[162] It illustrates that between 2008/09 and 2030/31, the NPV to industry is estimated to range between negative $537 million and $638 million. If government were to subsidise industry to ensure the projected recycling outcomes were achieved, the subsidy would cost government an additional $23 million to $28 million per year.

Table 30 Summary of results with only directly observable industry costs and benefits included - all products, threshold 3 (incremental to base case, discounted, 2009 dollars)

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
Costs	$ millions	$865	$821	$865	$829	$971	$921	$947	$971	$865
Benefits	$ millions	$300	$284	$300	$284	$333	$317	$333	$333	$300
NPV	$ millions	-$565	-$537	-$565	-$545	-$637	-$604	-$614	-$638	-$565
BCR	Number	0.35	0.35	0.35	0.34	0.34	0.34	0.35	0.34	0.35

Note: results are presented on an incremental basis to the 'business as usual' base case.

Another way to consider the impacts of the proposed options is to estimate the threshold WTP value that would be needed in order to ensure that the community enjoyed a net benefit. In effect this is measured by the break even point, which is the level that the WTP can be reduced to while still

[162] The costs that were included are collection costs, reprocessing costs, PRO administration costs, importer compliance costs, recycler compliance costs and communications costs (for co-regulatory schemes only). The benefit that was included to offset these costs was the financial market value of recovered resources.

delivering a positive NPV. The break even WTP value for each option is presented in Table 31 below. Assuming that no value is attributable to recycling levels below 50% enables the break even point to be compared with the URS WTP values used elsewhere in the report. This analysis demonstrates that the willingness to pay can be reduced up to 40% and still deliver a net benefit to society.

Table 31 Present value of cost associated with the options and different levels of recycling ($ and $/unit)

	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
Total incremental scheme costs (PV)	$902.2	$858.1	$872.8	$837.0	$993.9	$944.1	$983.0	$995.4	$902.3
Breakeven willingness to pay to cover scheme costs	$12.53-$17.55	$13.20-$18.47	$12.12-$16.97	$12.87-$18.02	$12.18-$17.05	$12.85-$17.99	$12.05-$16.87	$12.20-$17.08	$12.53-$17.55
Willingness to pay observed in URS survey and applied in the CBA	$21.14-$29.77	$21.14-$29.77	$21.14-$29.77	$21.14-$29.77	$21.14-$29.77	$21.14-$29.77	$21.14-$29.77	$21.14-$29.77	$21.14-$29.77

Note: It is assumed that there is no WTP until recycling reaches 50%. WTP is assumed to increase proportionally in line with the recycling rate.

In order to enable further comparison of the options given there is not significant variation in results, Table 32 presents incremental scheme costs and benefits based on the number of units sold. (Note these do not relate to cost parameters used in the CBA such as reprocessing costs, rather these are outputs of the modelling that are presented based on the number of new televisions and computers sold). This table indicates that a VDU scheme with a minimum threshold of 2,000 units (threshold 3) would result in:

- incremental scheme costs (incremental to the business as usual case) of between $3.80 to $4.40 per new VDU sold – this table also reflects that unit 'scheme costs' are expected to increase over time as recycling increases relative to sales growth; and
- incremental scheme benefits of between $6.10 and $7.50 per unit sold on average over the period of analysis.[163]

The scheme costs per unit sold have been presented as it could be indicative of a charge per unit sold that would be required to cover all incremental scheme and recycling costs. In practice, a charge to cover scheme costs could also be based on the 'value of units' (i.e. a percentage of sales value) in order to differentiate between higher value televisions and computers and lower value units (e.g. peripherals). This is explored further in Chapter 10, Section 10.3.

[163] This per unit analysis draws on per tonne estimates derived from the CBA, which have been converted to a 'per unit sold' basis for comparative purposes. In addition, the per unit costs and benefits are currently based on 2007/08 unit weights and will require further analysis in the decision regulatory impact statement to achieve greater accuracy based on projected weights.

Table 32 Incremental costs and benefits ($ millions, VDUs, threshold 3)

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
Incremental costs ($ millions)	2008/09	$0.47	$0.47	$0.35	$0.35	$0.35	$0.35	$0.50	$0.50	$0.47
	2010/11	$22.23	$21.97	$19.35	$19.08	$45.38	$27.94	$44.45	$45.47	$22.23
	2015/16	$56.93	$55.99	$54.04	$53.10	$69.49	$68.55	$68.59	$69.59	$56.93
	2030/31	$101.64	$102.47	$98.75	$99.59	$100.26	$101.09	$99.46	$100.35	$101.64
	PV	$668.01	$660.13	$638.57	$635.87	$733.38	$715.68	$724.68	$734.62	$668.03
Incremental benefits ($ millions)	2008/09	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	2010/11	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	2015/16	$114.90	$110.93	$114.90	$110.93	$144.29	$140.24	$144.29	$144.29	$114.90
	2030/31	$197.50	$197.50	$197.50	$197.50	$197.50	$197.50	$197.50	$197.50	$197.50
	PV	$1,032.21	$1,021.01	$1,032.21	$1,021.01	$1,241.35	$1,223.74	$1,241.35	$1,241.35	$1,032.21
Sales (million units)	2008/09	6.75	6.75	6.75	6.75	6.75	6.75	6.75	6.75	6.75
	2010/11	6.76	6.76	6.76	6.76	6.76	6.76	6.76	6.76	6.76
	2015/16	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94
	2030/31	$8.00	$8.00	$8.00	$8.00	$8.00	$8.00	$8.00	$8.00	$8.00
	Total	166.19	166.19	166.19	166.19	166.19	166.19	166.19	166.19	166.19
Unit Costs ($/unit)	2008/09	$0.07	$0.07	$0.05	$0.05	$0.05	$0.05	$0.07	$0.07	$0.07
	2010/11	$3.29	$3.25	$2.86	$2.82	$6.71	$4.13	$6.57	$6.73	$3.29
	2015/16	$8.21	$8.07	$7.79	$7.66	$10.02	$9.88	$9.89	$10.03	$8.21
	2030/31	$12.71	$12.82	$12.35	$12.45	$12.54	$12.64	$12.44	$12.55	$12.71
	PV	$4.02	$3.97	$3.84	$3.83	$4.41	$4.31	$4.36	$4.42	$4.02
Unit Benefits ($/unit)	2008/09	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	2010/11	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	2015/16	$16.57	$15.99	$16.57	$15.99	$20.80	$20.22	$20.80	$20.80	$16.57
	2030/31	$24.70	$24.70	$24.70	$24.70	$24.70	$24.70	$24.70	$24.70	$24.70
	PV	$6.21	$6.14	$6.21	$6.14	$7.47	$7.36	$7.47	$7.47	$6.21

Note: VDUs were used instead of all products because the unit costs for all products were diluted by the large number of component and peripheral sales, which were estimated to constitute 80% of total sales by units in 2008/09.
Note: these do not relate to cost parameters used in the CBA such as reprocessing costs, rather these are outputs of the modelling that are presented based on the number of new televisions and computers sold.

7.9 Sensitivity analysis

Sensitivity analysis was undertaken to test how responsive and sensitive the CBA results are to changes in key assumptions. Sensitivity analysis was undertaken with respect to changes in:

- discount rate;
- willingness to pay values;
- PRO cost savings from administering a joint scheme for all products;
- the proportion of kerbside pickup;
- the scheme ramp up period; and
- weight assumptions used to convert the willingness to pay estimate to a per tonne basis.

Results of the sensitivity analysis undertaken are presented in Appendix K. They illustrate that even if there are changes in key assumptions:

- the NPV is expected to be positive for all options; and

- the relativities between the options do not change significantly.

Discount rate. The OBPR recommended using rates of 3% and 11% to test the sensitivity of the results to the 7% discount rate. Using the lower sensitivity of 3% increases the range of the NPV from $517 million (Option 2) - $742 million (Option 7) in the core analysis to $1,363 million (Option 4)-$1,565 million (Option 8) in the sensitivity analysis, while using the upper sensitivity of 11% decreases the NPV range to $283-$453 million. This is due to the fact that the options involve high up front costs, with benefits occurring later in the appraisal period. The higher the discount rate, the less weight is given to future streams of costs and benefits and the more weight is given to immediate costs and benefits (and vice versa).

PRO administration costs. In the core appraisal, it is assumed that a single PRO will benefit from a 40% cost saving from administering a joint scheme instead of two PROs administering separate schemes (Options 1, 3, 5, 7, 8 and 9). Changing this 40% assumption to either 30% or 50% has almost no effect on the BCR as the vast majority of costs captured in the CBA are related to collection and reprocessing.

Kerbside versus drop-off. If the options employed a kerbside pick up service instead of requiring households to drop off television and computer waste at collection facilities, the range of the NPVs stayed roughly the same, changing to $414-598 million. Consumers collection costs are expected to decrease (as captured by their higher willingness to pay), and communications costs are estimated to be $5.9 million in the first year.[164] Industry collection costs are estimated to be $188 per tonne.[165]

Willingness to pay values. The URS Willingness to Pay Study contained lower confidence interval, average and upper confidence interval estimates of WTP. It also assumed that the 13.7% of respondents that dropped out of the survey (i.e. did not finish) had $0 WTP. The average WTP was estimated to be $24.50 for 50% recycling.[166] Taking into account the 13.7% of respondents that dropped out reduces the WTP estimate to $21.14 and this more conservative estimate was used in the core analysis. The lower confidence interval estimate of $18.18/unit sold ($828/tonne sold) results in the NPV decreasing to a range of $324-$500 million. However, the upper value of $23.68/unit sold ($1,078/tonne sold) increases the NPV range to $682 to $949 million.

Weight assumption to estimate consumer surplus. In converting the URS per unit WTP estimates to a per tonne basis, the core appraisal assumed that in 2008/09 an end of life television weighs 26 kg and an end of life

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[164] Hyder 2006, 'Television EPR Scheme Producer Responsibility Organisation – Cost Analysis', prepared for the NSW Department of Environment and Conservation and Product Stewardship Australia.

[165] Estimates were based on Hyder (2006), 'Television EPR Scheme Producer Responsibility Organisation Cost Analysis', prepared for the NSW Department of Environment and Climate Change (NSW DECC), ABS Census data, data from the Byteback program and surveys of thirteen e-waste recyclers and one e-waste collector

[166] URS (2009), *Willingness to Pay for E-Waste Recycling*, 28 February , p 36

computer (desktops and laptops only) weighs 19 kg. However, in 2008/09 the weight of new televisions and computers was 25 kg and 7.5 kg respectively. Adjusting the CBA with the lower weight of 'new products' instead of 'end of life products,' the willingness to pay increases to $1,430 per tonne sold and the range of the NPVs increases to $1,184-$1,579 million.

7.10 Other considerations

In addition to CBA, the COAG guidelines recommend conducting qualitative analysis of costs and benefits where quantification is not possible.[167]

In line with the COAG guidelines, a range of trade, industry, administration and consumer aspects have been considered in an attempt to further understand the potential impact of the nine policy change options examined in this report.

The factors considered are sourced from the EPHC Electrical Equipment working group and the COAG Guidelines and include:

- Trade and market issues:
  - potential impacts on trade of televisions and computers;
  - potential impacts on the television and computer recycling industries; and
  - potential impacts on international competitiveness.
- Distribution of impacts:
  - impact on television and computer consumers; and
  - potential impact on (small) business.
- Potential impact on existing administrative and legislative frameworks.

Some factors suggested for consideration in the COAG Guidelines are discussed in subsequent chapters:

- Evaluation and selection (Chapter 9):
  - the potential impact of international regimes;
  - equity between government jurisdiction administering schemes; and
  - administrative simplicity;
- Implementation and review (Chapter 10)
  - potential impacts on regional, rural and remote areas; and

[167] Commonwealth Government Office of Best Practice Regulation 2007, 'Best Practice Regulation Handbook', August, pp 68, 78

– implications from scheme funding methods.

The factors are discussed in turn.

Trade and market issues

Potential impacts on trade of televisions and computers

All televisions, computers and computer peripherals are imported into Australia, and so trade impacts are likely to be captured uniformly in each of the nine new policy options being implemented. Other than Option 8, it is not considered that there will be any trade and market issues relating to televisions and computers as a result of any of the policy options considered. The Australian Government indicates that the establishment of a license in Option 8 could be in breach of Article XI of GATT and that it would be difficult to rely on exceptions in Article XX. This is discussed in more detail in Chapter 9, Section 9.2.

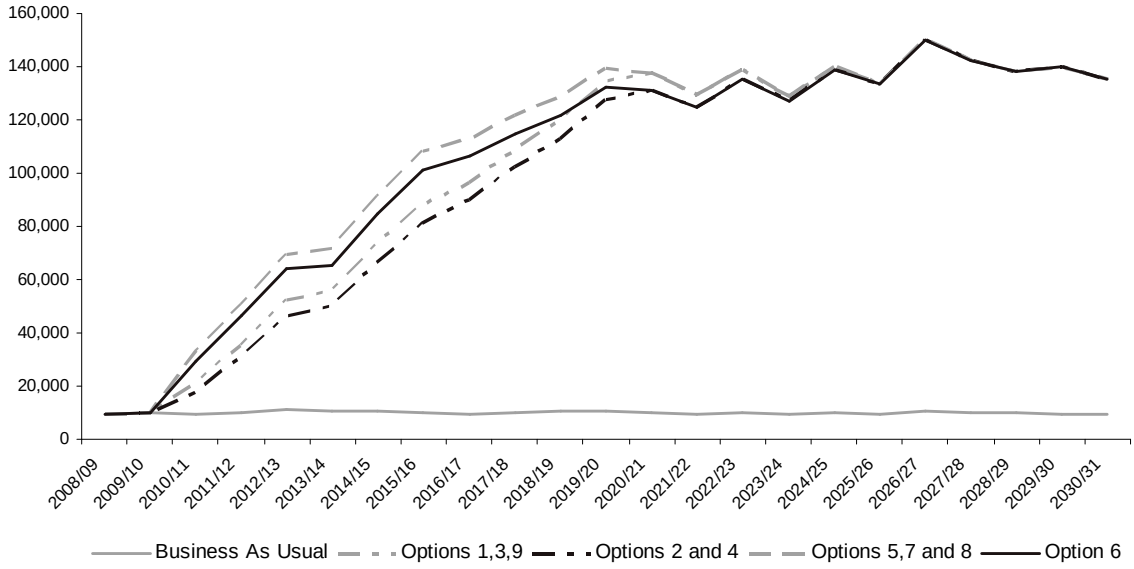
Potential impacts on the television and computer recycling industries

Over the analysis period from 2008/09 to 2030/31, recycling of televisions and computers is expected to grow from 9,700 to 135,000 tonnes per annum (representing a 12% year-on-year growth) under the nine recycling policy options. This indicates cumulative recycling volumes averaging 2.4 million tonnes over the time period from 2008/09 to 2030/31.

Despite recycling reaching the same levels in the final year under each scheme, it has been considered that the options will differ in terms of recycling rate ramp up. The recycling outcomes broadly support mandatory Commonwealth schemes (Options 7 and 8) and co-regulation with a Commonwealth excise regulatory safety net (Option 5), which reach a rate of 70% recycling within 5 years of commencement. Recycling outcomes are inferior where there are separate schemes for televisions and computers (Options 2, 4, 6). For example, compared to Option 5, Option 6 results in an additional 70,408 tonnes of television and computer waste being disposed of in landfill between 2008/09 and 2030/31. This is due to the fact that a separate computer industry scheme is assumed to incorporate limited responsibility for unbranded and orphan products (see Appendix G for scheme assumptions). These products are currently estimated to account for 20% of computer products reaching end of life.

Table 21 in Chapter 7, and Figure 15 below illustrate that although recycling under each option examined in the CBA is projected to reach the same rate by 2030/31, the speed at which the recycling rate increases differs between the options. Options 5, 7 and 8 are the quickest to reach 70% recycling, while Options 2 and 4 are the slowest.

Figure 15 Projected recycling levels - tonnes, all products, threshold 3



In terms of broader impacts on the television and computer recycling industry, as a result of implementing a policy option discussed in this decision regulatory impact statement, it is likely that increased recycling volumes will encourage market entry, with increased levels of competition providing a number of advantages including decreased prices. In addition, as recycling is largely a labour intensive disassembly process, there is expected to be a correlation between increased recycling levels and job growth. However this job growth is expected to result in substitution from other industries. The net employment impact for the economy as a whole has not been estimated in this decision regulatory impact statement.

Potential impacts on international competitiveness

All new televisions and computers are imported to Australia, and it is understood that an insignificant volume of new products are re-exported for sale overseas. In addition, exports of end of life televisions and computers comprise a relatively small proportion of total end of life arisings (6% for 2007/08). As a result, it is expected that any policy for television and computer waste will not have a significant impact on Australia's international competitiveness in the television and computer industries.

Distribution of impacts

Potential impacts on television and computer consumers

Potential impacts on consumers from implementation of a television and computer waste scheme could include higher prices for televisions and computers resulting from importers passing on recycling fees or increased compliance costs in their prices.

The choice modelling undertaken by URS in 2009 asked respondents to indicate how much they would be willing to pay in terms of an 'additional cost on each new television / computer purchased' for recycling schemes where the 'percentage of waste avoided and material recovered' ranged between 50% to 90%.[168] As survey respondents provided their willingness to pay on this basis, the consumer preferences determined in this study indicate that consumers are willing to pay higher prices for their television and computers if it will result in increased recycling of television and computer waste, and as such by definition consumers will still receive a net benefit as a result of a television and computer waste scheme if the cost of that scheme is less than the willingness to pay.

Potential impact on (small) business

The businesses that are potentially impacted by the proposed schemes are importers and recyclers. As illustrated in the CBA, importer compliance costs are estimated to range from $600 per importer (Option 7) to $1,050 per importer (Option 8). With no threshold, total compliance costs for involved businesses range from $69 million to $121 million dependent on the option (in present value terms over the period of analysis from 2008/09 to 2030/31). With a minimum threshold of 5,000 units, the number of companies captured by the scheme falls from 10,194 to 460 (95.5% reduction) and compliance costs fall by 95.5%, to between $3 million and $5 million (in present value terms over the analysis period), representing a reduction of $66-116 million.

This finding indicates that with the use of a regulatory threshold, the impact of the scheme, in particular on small businesses can be reduced significantly. In contrast, the absence of a threshold is likely to impose a burden on small businesses as the 9,734 companies exempted from the scheme under threshold 3 are only responsible for 4.7% of imports, but are responsible for 95.5% of compliance costs, when the schemes are analysed on a 'no threshold' basis.

[168] URS (2009), *Willingness to Pay for E-Waste Recycling*, 28 February, Appendix A

Table 33 Importer compliance costs at varying threshold levels (all products)

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
Importer compliance (no threshold)	2008/09	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	2010/11	$10.51	$10.51	$10.51	$10.51	$10.51	$10.51	$6.31	$11.04	$10.51
	2015/16	$11.07	$11.07	$11.07	$11.07	$11.07	$11.07	$6.64	$11.62	$11.07
	NPV	$115.34	$115.34	$115.34	$115.34	$115.34	$115.34	$69.20	$121.11	$115.34
Importer compliance (threshold 3)	2008/09	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	2010/11	$0.47	$0.47	$0.47	$0.47	$0.47	$0.47	$0.28	$0.50	$0.47
	2015/16	$0.50	$0.50	$0.50	$0.50	$0.50	$0.50	$0.30	$0.52	$0.50
	NPV	$5.20	$5.20	$5.20	$5.20	$5.20	$5.20	$3.12	$5.46	$5.20
Total	**2008/09**	**$0.47**	**$0.47**	**$0.35**	**$0.35**	**$0.35**	**$0.35**	**$0.50**	**$0.50**	**$0.47**
	2010/11	**$25.44**	**$23.09**	**$22.56**	**$20.21**	**$51.50**	**$33.23**	**$50.37**	**$51.63**	**$25.45**
	2015/16	**$81.89**	**$75.75**	**$79.01**	**$72.87**	**$99.67**	**$93.52**	**$98.56**	**$99.79**	**$81.90**
	NPV	**$902.18**	**$858.14**	**$872.81**	**$836.97**	**$993.85**	**$944.10**	**$982.97**	**$995.42**	**$902.30**

Note: 2008/09, 2010/11 and 2015/16 values are undiscounted, annual values at a point in time. These are not readily comparable with each other as they are not discounted to 2009 dollars. The present value lines represented discounted costs for each option

Table 34 Importer compliance costs as a proportion of total costs and at varying threshold levels (all products)

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
Importer compliance as a proportion of total costs (no threshold) (%)	2008/09	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2010/11	41%	46%	47%	52%	20%	32%	13%	21%	41%
	2015/16	14%	15%	14%	15%	11%	12%	7%	12%	14%
	NPV	13%	13%	13%	14%	12%	12%	7%	12%	13%
Importer compliance as a proportion of total costs (threshold 3) (%)	2008/09	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2010/11	2%	2%	2%	2%	1%	1%	1%	1%	2%
	2015/16	1%	1%	1%	1%	1%	1%	0%	1%	1%
	NPV	1%	1%	1%	1%	1%	1%	0%	1%	1%

Note: 2008/09, 2010/11 and 2015/16 values are undiscounted, annual values at a point in time. These are not readily comparable with each other as they are not discounted to 2009 dollars. The present value lines represented discounted costs for each option

In terms of other businesses involved in the scheme, recycler compliance costs are only expected under Option 7, which will impose obligations such as reporting requirements in order to receive subsidies. While these costs amount to $20,000 per recycler per annum, they only account for 0.5% of total reprocessing costs.

Table 35 Recycler compliance costs - all products ($ millions)

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
Recycler compliance	2008/09	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	2010/11	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.28	$0.00	$0.00
	2015/16	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.32	$0.00	$0.00
	NPV	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$3.35	$0.00	$0.00
Reprocessing	2008/09	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	2010/11	$8.15	$5.87	$8.15	$5.87	$32.36	$14.15	$32.36	$32.36	$8.15
	2015/16	$54.72	$49.70	$54.72	$49.70	$68.50	$63.48	$68.50	$68.50	$54.72
	NPV	$600.62	$560.55	$600.62	$568.76	$680.64	$634.87	$680.64	$680.64	$600.62

Note: 2008/09, 2010/11 and 2015/16 values are undiscounted, annual values at a point in time. These are not readily comparable with each other as they are not discounted to 2009 dollars. The present value lines represented discounted costs for each option

Potential impacts on existing administrative and legislative frameworks

All of the policy options examined in this paper will involve drafting of new legislation or regulations, or potentially amendment to existing laws such as excise and customs duty legislation Options 5-7. However, the policies appear to be consistent with the fact that:

- a number of jurisdictions have regulations setting out waste minimisation policies;
- the ACT Government has specifically banned CRT televisions from landfill; and
- SA has recently issued a discussion paper to ban e-waste from landfill.[169]

7.11 Summary

The cost benefit analysis suggests that there is a range of possible impacts associated with the options. The results of the analysis are driven by the value placed on the 'intrinsic' benefit associated with increasing the level of recycling of television and computer waste. Should actual recycling levels not increase as per the analysis suggests or should society's observed willingness to pay differ from the estimated value then the expected benefits could be lower. Moreover if the scheme is evaluated on the basis of the directly observable benefits (i.e. no value is placed on the willingness to pay for 'intrinsic benefits') then the scheme is expected to impose a net cost on society.

This highlights that the forward projections contained in the regulatory impact statement should be interpreted with care. Whilst the focus on whether to implement a scheme depends on the accuracy of the willingness to pay

[169] All states and territories have waste minimisation policies. The ACT has banned the disposal of computer monitors and television screens in landfill and SA has recently issued a discussion paper to ban e-waste from landfill.

estimates, analysis reveals that the difference between each of the options in terms of net economic benefits or costs is marginal – even if the sensitivity analysis suggest that the actual impact will differ. In short, the options are broadly on par which simply reflects that, while there is some differentiation between options in terms of ramp up of recycling (which affects all benefits and the largest cost item: collection and reprocessing costs), there is not a significant deviation in final total net benefits.

Some of the key findings of the qualitative analysis of a range of trade, industry, administration and consumer aspects where quantification was not possible include:

- it is not considered that there will be any significant trade and market issues for any option other than potentially for Option 8 or that any policy will have a significant impact on Australia's international competitiveness in the television and computer industries;
- consumers may face higher prices for televisions and computers resulting from importers passing on recycling fees or increased compliance costs in their prices;
- importer compliance costs can be significantly reduced by implementing a regulatory threshold;
- recycler compliance costs are only expected under Option 7; and
- all policy options appear to be consistent with existing administrative and legislative frameworks.

8 Consultation

This chapter of the regulatory impact statement outlines the consultation process and provides a summary of the feedback provided during consultation by those who will be affected by the proposed action.

This chapter, which presents feedback received through the stakeholder consultation process, was prepared by the EPHC Electrical Equipment working group. Outcomes of the consultation process as advised by the EPHC Electrical Equipment working group have been directly factored into other chapters in this document, in particular Chapters 7, 9 and 10.

8.1 Introduction

The consultation regulatory impact statement was released as part of a consultation package on the EPHC website for public comment on 15 July 2009. Documents released by the EPHC to facilitate public consultation on a national recycling and collection scheme for televisions and computers included:

- Consultation Regulatory Impact Statement (RIS): Televisions and Computers;
- Willingness To Pay For E-Waste Recycling – Final Report (Choice Modelling study); and
- Draft Code of Practice for Managing End of life Televisions.

Prior to the release of the public consultation package, consultation was undertaken between governments and key stakeholders from 2006 to 2009. This included discussions between government officials and the television and computer industry associations regarding:

- potential market impacts should there be no regulatory underpinning of voluntary industry schemes; and
- the design and delivery of the proposed industry schemes.

In addition, a national roundtable was held in May 2009 which was attended by key industry members, e-waste recyclers and environmental group representatives to discuss progress on the development of a national recycling scheme for televisions and computers.

In July and August 2009, following the release of the public consultation package, the EPHC Electrical Equipment working group conducted public consultation sessions in Adelaide, Perth, Sydney and Melbourne. A total of 163 interested parties attended the public consultation sessions. In addition, one-on-one sessions were conducted with a broad range of interested stakeholders, including television and computer industry members, recyclers, local government and environmental organisations. The working group also consulted with representatives of the recycling industry in Queensland via teleconference.

The closing date for submissions was 13 August 2009. A total of 130 public submissions were received. According to the EPHC Electrical Equipment working group, all responses were given due consideration. A list of stakeholders providing submissions in response to the consultation regulatory impact statement is provided in Appendix L.

The objective of the public consultation was to obtain stakeholders views on all aspects of the consultation regulatory impact statement, including the statement of the problem, objectives, options proposed for addressing the management of end of life televisions and computers and the CBA.

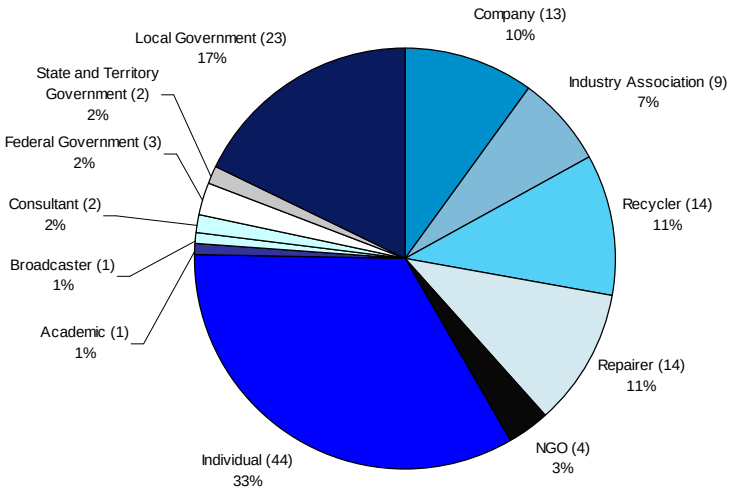
Since the period for comments on the public consultation package closed, the EPHC Electrical Equipment working group has continued to engage with key industry stakeholders, including both members and non-members of the television and computer industry associations, to develop robust, transparent and equitable industry proposals for addressing end of life televisions and computers. This additional consultation has helped to inform the decision regulatory impact statement.

8.2 Stakeholder representation

The 130 submissions received were from a range of stakeholders. The EPHC Electrical Equipment working group is of the opinion that the submissions provide a good sample of key stakeholder views. A breakdown of submitters by broad sectors is illustrated in Figure 16 below. Of the 44 individual submissions received, 41 were a form letter received as part of a campaign organised by Environment Victoria.

Submissions are available as part of the release of this decision regulatory impact statement.

Figure 16 Written submissions received in response to the Consultation regulatory impact statement by broad sector



8.3 Consultation feedback

The EPHC Electrical Equipment working group indicated that the key themes raised in the submissions were:

- almost unanimous support for the introduction of a single nationally consistent scheme for televisions and computers which provides a regulatory level playing field to address the issue of 'industry free riders;
- a clear preference that a national recycling scheme should be underpinned by Australian Government regulation.
- options that rely on state-based regulations were strongly rejected;
- the importance of balancing national consistency with the need to avoid increasing the regulatory burden for individual jurisdictions and industry members;
- strong support for a scheme that will achieve the highest possible recycling rates that are realistic and clear, covering all products that are available to be recycled;
- a number of submissions drew attention to the importance of putting in place transparent and accountable governance arrangements for both government and industry PROs;
- strong support for a national scheme that would allow future expansion to cover other forms of electrical and electronic waste;
- strong support for a scheme that covers historic and orphan (obsolete) products and that the responsibility of managing that waste should rest with the manufacturers not the government;
- almost all local government submissions indicated that the costs of any agreed action should not be shifted onto local government or their rate payers;
- strong support for options that can be set up in the shortest timeframe possible, with support for a scheme to be up and running by 2011;
- almost unanimous support for Environment Ministers to agree to implement a national scheme underpinned by national regulation at the next meeting of the EPHC in November 2009.

Individual submissions received through the consultation process raised a number of concerns:

- a belief that consumers lack an awareness of television and computer waste recycling processes and the fact that it is not a cash positive activity (submissions 32, 40, 49, 51, 79 and 129);
- consumers demonstrate a reluctance to transport waste to recycling collection facilities resulting in television and computer waste being dumped on kerbsides despite active promotion of the availability of collection facilities and provision of free recycling (submissions 31,32 and 66);
- the consultation regulatory impact statement included insufficient information on overseas schemes and overseas proposals (submissions 54 and 72);

- the analysis should take account of the carbon costs from transport and reprocessing of end of life televisions and computer as this may favour use of Australian facilities relative to reprocessing overseas (submissions 21,40 and 44);
- there was a need to support any regulatory proposal with appropriate codes of practice to safeguard community safety and ensure safe handling (submission 37);
- questioned consumers willingness to pay of $18 to $50 per end of life television and computer item for disposal and recycling as experience with trial collections did not reflect the willingness to pay results from the choice modelling survey (submission 89);
- television and computer waste collection costs incurred by local government may be understated and that any proposed scheme should address the provision of funds to cover these costs (submission 47);
- the analysis of the options for take-up rates could be overstated, potentially resulting in the cost savings from economies of scale being overstated (submission 47); and
- the appropriateness of a metropolitan focus in the choice modelling and whether it is applicable to regional and rural Australia (submission 56).

Only one submission did not support government intervention on this issue, arguing that the consultation package did not meet the COAG requirements for community consultation and policy development, and recommending that the deficiencies in the consultation package be addressed and a second public consultation be undertaken before EPHC Ministers make a decision.

The City of Charles Sturt Council in South Australia (submission 7) commissioned Harrison Research to undertake a telephone survey of 400 individuals to obtain their views on hard waste. The results found that in terms of willingness to pay 18% of respondents would not drop off e-waste for recycling at a drop off point if it was free. If there was a $10 charge 40% would not drop off e-waste for recycling and at a $20 charge 65% would not drop off e-waste for recycling. The survey found that at a $20 charge less than 5% of individuals would consider themselves likely to drop off e-waste for recycling.

Box 3 Stakeholder comments on the estimated willingness to pay

Western Australian Local Government Association (submission 19)

"The survey was very clear in the language used and the methodology for its creation appears to be robust."

INFOACTIV GROUP PTY LTD (submission 40)

"Given that we have now accessed and surveyed up to 20,000 households across Australia, we have considerable anecdotal and quantitative data to support the prevalence of the following consumer attitudes to eWaste:

1 Consumers are generally not aware of how and where they can recycle product

2 Consumers do not understand that there is a cost to recycling, with many assuming that the event host is "making money" from the product collected

3 Consumers are not willing to pay for recycling at point of disposal (consumers were advised of cost of recycling and stated they were not willing to pay, that in the absence of events such as these, they would simply take it to a collection facility for disposal into landfill; note, a small proportion of consumers were even expecting payment for handing in product on the day)."

National Association of Retail Grocers of Australia Pty Ltd (submission 54)

"The WTP survey itself has a number of substantive defects which would make any conclusions drawn from it unreliable as a basis for policy. In particular the survey and the way it was conducted does not meet the requirements of the Code of Professional Behaviour for market and social research which applies to such surveys and breaches the international ICC/ESOMAR Code in relation to survey honesty. Article 2(a) of that Code states that 'market research shall not abuse the trust of respondents or exploit their lack of experience and knowledge.' The WPT survey is a clear breach of that requirement, as in fact it exploits the community lack of knowledge of environmental matters. It even goes so far as to add to the prevailing waste misperceptions by providing background data that misrepresents both the general waste and e-waste issue. Given this basic defect in the research, its use as a basis for policy is questionable."

South East Resource Recovery Regional Organisation of Councils (submission 56)

"Whilst appreciating the benefits of the Choice modelling paper which comes with the consultation papers, SERRROC also undertook a short survey of those whom it collected e-waste material from in its pilot project in June this year. Because the rate of arrival of residents in our pilot was every 45 seconds, the proposed extensive survey did not eventuate as planned and therefore the results cannot be judged as academically sound. However, its use here is in pointing to behaviour and attitudes about finances involved in recycling e-waste for people in regional areas when compared to that of the metropolitan focus of the Choice modelling. In essence it is hard to imagine the charges for each percent of increased recycling levels derived from the Choice modelling would be what local residents in regional and rural Australia would be willing to pay."

"The Choice modelling process undertaken in this process to assess the social values held by the community with respect to effective disposal costs, might need to be tweaked to acknowledge the different circumstances of rural and regional people from those of the actual research who were limited to urban residents."

Metropolitan Waste Management Group (submission 57)

"It could be argued that there is an inherent risk present with using a choice modelling methodology that has not previously been used to assess behaviour related to waste and recycling. Historically surveys on recycling behaviour (e.g. participation surveys) can result in many more respondents stating they will participate than actually do participate. Similarly with other environmental behaviour research (such as LOHAS), around 90% of respondents may state they wish to take action to positively impact environmental issues, but only around 10% actually do take action. It could be that the willingness to pay that is stated in the survey may be higher than will be realised as the actual willingness to pay at the point of purchase."

Municipal Association of Victoria (submission 60)

"The Willingness to Pay Study provides a useful approach to quantifying community attitudes and whether they are prepared to pay for these attitudes."

"*Appears to be a rigorous and well-founded cost-benefit analysis"*

Fuji Xerox (submission 72)

"The conclusion in respect of the level of willingness to pay we find surprising having assumed from industry anecdote that there is a high level of price sensitivity attaching to consumers willingness to pay when product is actually tendered for recycling."

Department of Innovation, Industry, Science and Research (submission 87)

"The Consultation RIS provides a reasonable methodology for assessing the costs and benefits (although we question the magnitude of the benefits) of the nine options identified."

Dell Australia (submission 89)

"Based on its experience with consumer collections in Australia, and in countries all over the world, Dell does not believe that consumers actually would pay such high prices ($33 to $50 per item) to achieve such high collection rates."

8.4 Consultation feedback on the options

The EPHC Electrical Equipment working group indicated that all submissions except one favoured some sort of regulatory action, either through regulatory underpinning of an industry run scheme, or a fully mandatory scheme. Of the 130 submissions received a total of 49 submissions specifically stated a preferred option, with 27 of these submissions stating preferences for multiple options. Likewise, 21 submissions specifically stated they did not support certain options, with 17 submissions indicating multiple options they did not support.

Of the 49 submissions supporting particular options, almost all supported federal government regulation over state-based regulation. Stakeholders expressed concern that State-based NEPMs take too long to implement due to regulatory requirements in every jurisdiction adding layers of complication and cost, particularly to companies that operate at a national level throughout Australia. Also, State-based regulatory options have limited

administrative economies and efficiencies, which may cause difficulties in expanding the scheme to other types of electrical and electronic waste. Only two submissions supported a State-based scheme, either co-regulatory or mandatory.

Of the 49 submissions which stated a preference or multiple preferences for options, a majority supported Option 8. This option received support from all stakeholder groups, including a majority of submissions from the television and computer industries. Submitters viewed this particular option as providing the greatest capacity to capture all free-riders at the point of import and ensure industry participation in collection and recycling of end of life televisions and computers. Option 8 was considered by those who supported it to be able to provide the highest level of diversion from landfill.

The second most supported option, by those indicating a preferred option, was Option 7. This option was particularly supported by submissions from local government. This option was preferred on the basis that the implementation timeframe was considered to be shortest when compared with other options being considered, and the scheme would give equitable national coverage. However, this option had the highest 'not supported' rating of all options underpinned by the Australian Government. It was particularly opposed by a majority of the television and computer industry submissions, which indicated that the option would provide no incentive to the industry to improve product design or take greater responsibility for their products.

Options 3 and 4 received the third most preferences. Of these, local government expressed a preference for Option 3 where one scheme accounts for both televisions and computers to allow for administrative simplicity, while industry members preferred Option 4 (individual schemes for TVs and computers) due to potential impacts on the television and computer industries should governments choose to undertake a uniform approach. The co-regulatory Commonwealth EPR scheme was considered to provide regulatory coverage to ensure industry compliance with regulation while allowing industry members the option to choose a model suitable to their individual business requirements.

8.5 Criteria for further analysis of the options

During the consultation forums, stakeholders were asked to comment on possible criteria for undertaking further analysis of the options identified in the consultation regulatory impact statement with the aim of determining a preferred option for the decision regulatory impact statement. Based on an analysis of the submissions and further work by the EPHC Electrical Equipment working group, a set of clearly defined criteria for assessing all options was developed. These criteria are outlined in Chapter 9 and take into consideration the concerns raised by stakeholders and outlined in written submissions, including the consideration of a minimum time to establish a regulatory instrument/s, administrative efficiency and simplicity, equity and flexibility to be expanded to cover other forms of e-waste.

8.6 Implementation issues

The public consultation forums and submissions provided many valuable comments in relation to the development and implementation of a recycling scheme for end of life televisions and computers. Many of the comments focused on implementation issues and these comments have either been incorporated into Chapter 10, or will be taken into account when further analysis is undertaken prior to implementation of an option.

9 Evaluation and selection

This chapter recommends which options should be implemented based on a set of decision criteria developed by the EPHC Electrical Equipment working group and community consultation undertaken following public release of the consultation regulatory impact statement.

In considering which of the options should be adopted, it is acknowledged that the COAG Guidelines note that generally the CBA, and hence the decision regulatory impact statement, will support the option with the highest net present value (or NPV as set out in the table above). In this instance this would be Option 7.

The CBA however, and the estimates contained in the regulatory impact statement are sensitive to the assumptions underpinning the analysis, and given the close proximity of a range of the options (such as Options 7, 8, 5, and to a lesser extent Option 3), the highest NPV should not necessarily be the sole selection criteria.

The consultation process explicitly recognised this point and sought feedback on the most appropriate criteria from which to assess the options. That feedback suggested the following criteria.

- it should maximise net benefits to the community;
- it should be legally possible;
- it should involve the minimum necessary time to establish the regulatory instrument;
- it should be simple for government to administer;
- it should be equitable;
- it should be acceptable to key stakeholders and the broader community;
- it should consider the potential impacts of the Henry Review;
- it should be flexible enough to be expanded to cover other forms of e-waste; and
- it should address the risk of not achieving the outcomes.

Assessing the proposed options against these criteria will allow decision makers to identify the trade offs and risks associated with selecting a particular option.

9.1 Net benefits to the community

While the results of the CBA are presented in Table 36 the important point to note is the relativities of the respective options. In this regard, the four highest ranking options in terms of NPV are:

1 Mandatory Commonwealth levy and government-run subsidy scheme (Option 7);

2 Co-regulatory industry scheme with a Commonwealth excise safety net (Option 5);

3 Mandatory import license requirement (Option 8); and

4 Co-regulatory industry scheme with a Commonwealth EPR safety net (Option 3).

Table 36 Rank of the Net Present Value (NPV) of Options to Address Problems Associated With End of Life Televisions and Computers ($2009)

Option			NPV Rank
1	State-based EPR implemented as a National Environmental Protection Measure (NEPM) with an exemption if the importer belongs to an industry scheme	Television and computer industries responsible for the collection of all products (including historic and orphan products).	5
2		Television industry responsible for the collection of all products (including historic and generic), major computer brand owners responsible for historic waste from their own brand and importers of generic computer parts and equipment are responsible for all non-branded and historic products	9
3	Commonwealth-based EPR with an exemption if the importer belongs to an industry scheme	Television and computer industries responsible for the collection of all products (including historic and orphan products).	4
4		Television industry responsible for the collection of all products (including historic and generic), major computer brand owners responsible for historic waste from their own brand and importers of generic computer parts and equipment are responsible for all non-branded and historic products	8
5	Commonwealth excise (levy) with an exemption if the importer belongs to an industry scheme.	Television and computer industries responsible for the collection of all products (including historic and orphan products).	2
6		Television industry responsible for the collection of all products (including historic and generic), major computer brand owners responsible for historic waste from their own brand and importers of generic computer parts and equipment are responsible for all non-branded and historic products	7
7	Mandatory Commonwealth levy with a government-run subsidy scheme for collection/recycling.		1
8	Mandatory import license requirement.		3
9	Mandatory state-based EPR (NEPM).		6

9.2 Legally possible

As part of this decision regulatory impact statement, the Australian Government sought legal advice from the Department of Foreign Affairs and Trade (DFAT) in relation to the legality of the proposed options. A summary of this advice was prepared by the EPHC Electrical Equipment working group and has been directly factored into this section.

The advice raised two legal issues relating to the import license (Option 8):

1 imposing of a licensing fee under the Australian Constitution; and

2 World Trade Organisation (WTO) and GATT obligations.

Australian Government advice on the constitutionality of imposing a license fee

The Australian Government advised that a licence fee satisfies the description of being a compulsory levy by the Commonwealth imposed for public purposes and enforceable by law. Legislation imposing a licensing fee (tax for legal and constitutional purposes) may probably be supported by the taxation power (s.51(ii) of the Constitution).

The Commonwealth may also be able to use a range of other powers to enact a comprehensive licensing regime in relation to all importers and most manufacturers. Specifically, s51(1) (interstate trade and commerce) would allow the Commonwealth to regulate all importers, and that provision, together with s.51(xx) (trading, financial and foreign corporations), would authorise the regulation of most domestic manufacturers. It may also be possible for the Commonwealth to complement a regulatory regime under s.51(xxix) (external affairs) through investigating the Basel Convention.

In order to comply with s.55 of the Constitution, it would be necessary to enact a Taxation Imposition Act separate from the Scheme Administration Act. Further, under s.55, a tax on the importation of products would be a duty of customs, and a tax on the manufacture of products would be a duty of excise. It follows that it may be necessary, in order to ensure equity and future domestic manufacturers do not gain an advantage in the market, to have two Imposition Acts to implement the scheme. Hence, three separate pieces of legislation may be required. In addition, amendments may be required to the excise tariff and customs tariff regulations.

Australian Government advice on WTO and GATT obligations

Pursuant to Article III of GATT, Australia must, in its internal taxation and regulation, treat imported products no less favourably than equivalent domestically-produced products (the national treatment principle).

Article II of GATT similarly requires that any customs duties (or other duties or charges) imposed on imported products must be equivalent to a charge imposed on domestic products. This essentially requires that both imported products and domestic products be treated equally in terms of the internal taxes and charges applied to such products so as to comply with the national treatment principle.

Provided any levy under the scheme is not applied in order to protect domestic products and does not exceed the amount of any internal charges on domestic products, the levy would be consistent with Articles II and III.

While it is recognised that there is currently no domestic production of televisions, the scheme should, nevertheless, still be designed from the outset in a way that would enable Australia to meet its WTO obligations should a domestic producer enter the market.

Article XI of GATT prohibits import restrictions in a form other than duties, taxes or other charges. The legal advice sought by the Australian Government advised that the proposed licence condition requiring that an importer be a member of an approved television product stewardship

scheme administered by PSA or approved by EPHC would be prohibited by Article XI. This is because it would constitute an import restriction that is not in a form approved under Article XI.

Article XX provides for exceptions to GATT obligations but there is a high threshold to be met and it would be difficult to successfully rely on these exceptions.

Given this advice, the Australian Government believes that Option 8, as it is currently described in this decision regulatory impact statement, may be prohibited under the GATT. This option would need to be amended to remove the condition requiring an importer to be a member of a scheme in order for Australia to meet its international trade obligations. However, it should be noted that Article XI relates to 'a product of the country' and since Australia does not produce televisions or computers it may be argued that the license does not relate to a 'product of Australia'. While there is uncertainty, this still calls into question Option 8.

Australian Government advice on the legality of other options

The Australian Government advised that all other options examined in the decision regulatory impact statement would be legally possible:

- *Options 1, 2 and 9* – The NEPM would be made pursuant to the *National Environment Protection Council Act 1994* (Cth) as prescribed under section 14(1);
- *Options 3 and 4* – The Australian Government indicated that it may be possible to use a combination of the trade and commerce power and the corporation's power. Minor gaps (e.g. sole traders) could be addressed by State mirror legislation. It may also be able to draw on external affairs powers; and
- *Options 5, 6 and 7* - Legislation imposing a levy (tax for legal and constitutional purposes) may be supported by the taxation power (s.51(ii) of the Constitution). In order to comply with s.55 of the Constitution, it would be necessary to enact a taxation imposition act separate from the scheme administration act. Hence, two separate pieces of legislation may be required. In addition, amendments may be required to the excise tariff and customs tariff regulations.

9.3 Minimum time to establish the regulatory instrument

Minimising the time taken to establish the regulatory instrument underpinning the proposed options is a high priority for the government and other stakeholders given that the pending phase out of analogue televisions by 2013 could result in a significant increase in the number of televisions entering the waste stream and significant up front costs will be imposed while benefits will take longer to realise. [170]

The CBA assumed that each proposed option would uniformly take two years to design and implement. However, there is a risk that the time to implement the regulatory instruments could exceed this assumption for certain options depending on:

- the level of industry negotiation required to agree on the particulars of an industry scheme;
- the level of government negotiation required to establish harmonised legislation;
- the type of legislation; and
- the number of legislative changes required.

Industry and government negotiation

All options except for Options 7 and 9 involve industry schemes, requiring negotiation between industry participants to establish the particulars of the scheme including recycling targets and product coverage. Where there are separate television and computer schemes (Options 2, 4 and 6), the level of negotiation is expected to be low given that the largest television and computer industry associations have already proposed co-regulatory schemes for their respective industries. However, the level of negotiation required to establish a joint television and computer scheme is expected to be high given that the fundamental disagreement between the industries regarding whether historic and orphan products should be included in the scheme. No industry negotiation is required for the mandatory schemes (Options 7 and 9).

NEPM schemes (Options 1,2 and 9) are expected to require significant negotiation between government jurisdictions and industry to develop an agreement given that a NEPM requires the support of two thirds of the NEPC, which is made up of a minister of the Australian Government and each State and Territory. For example, the original National Packaging Agreement (Mark I) expired in July 2004 and difficult negotiations meant that

[170] In the written submission in response to the consultation regulatory impact statement, 16 stakeholders indicated a preference for this criterion including 3 recyclers, 4 PSA members, 1 AIIA member, 1 industry association member, 1 member of the community, 4 Local Governments and 2 jurisdictions.

the new agreement (Mark II) did not come into force until July 2005. Covenant Mark II is due to expire on 30 June 2010 and negotiations are currently underway through the Covenant Council and the Environment EPHC to extend it again beyond that point. Option 9 is also expected to involve substantial negotiations between government jurisdictions to develop harmonised legislation for a mandatory EPR NEPM.

Legislative changes

The time to establish the regulatory instrument for each of the proposed options will depend on both the type of legislation and the number of legislative changes required.

Options 1, 2 and 9 are underpinned by NEPM legislation. Once the NEPM is made, it must be incorporated into the legislative and/or administrative frameworks of each participating jurisdiction. In some cases the NEPM may be adopted without the need for new legislation. For example the National Used Packaging NEPM was implemented in Victoria by an order published in the Government Gazette pursuant to sections 16A and 17A of the *Environment Protection Act 1970*. However, there is uncertainty regarding how long states and territories will take to implement the NEPM. For example, the Used Packaging NEPM was made in July 2005, but was only introduced in Queensland in December 2005, in Victoria in March 2006, in NSW in September 2006, in the ACT in November 2006, in South Australia in March 2007 and in Western Australia in April 2007.[171] Furthermore, there is uncertainty as to whether all states and territories will implement the NEPM. For example, the Northern Territory has not signed the National Packaging Covenant or implemented the Used Packaging NEPM.

Despite the implementation experience with the Used Packaging NEPM, the Australian Government advises that the average time for NEPM development across all seven NEPMs implemented to date is two years. For example, the Ambient Air Quality NEPM took two years to implement. On 21 June 1996 the NEPC resolved to make a national environment protection measure for ambient air quality for the six pollutants. The Ambient Air Quality NEPM was gazetted on 8 July 1998.

The Australian Government estimates a Commonwealth-based EPR (Options 3 and 4) would take approximately 1-2 years to implement based on the timeframe required to implement the Fuel Quality Management Scheme and dependent on Parliamentary timelines.

- Fuel Quality Management Scheme - 1 year to implement legislation:
  - In December 1999, the Commonwealth Government determined that, in order to compliment mandatory new vehicle

[171] National Packaging Covenant (2008), *National Packaging Covenant – Mid Term Review Jurisdiction NEPM (UPM) Enforcement Report*', website: http://www.packagingcovenant.org.au/documents/File/Jurisdictional_NEPM_UPM___Enforcement_Report_FINAL.pdf>, accessed 12 August 2009

emission standards, further measures were required to ensure a nationally consistent approach to the regulation of fuel quality in Australia.

  - The Fuel Quality Standards Act 2000 (Cth) received royal assent on 21 December 2000.

Options 5 and 6 require amendment of the excise and customs duty legislation. For example, as part of the Product Stewardship for Oil (PSO) Scheme, the *Excise Tariff Amendment (Product Stewardship for Waste Oil) Act 2000, the Customs Tariff Amendment (Product Stewardship for Waste Oil) Act 2000* were necessary to establish the product stewardship levy, which consists of an excise for domestically produced lubricating oil and a customs duty for imported lubricating oil.

The Australian Government estimates a co-regulatory Commonwealth Levy (Options 5 and 6) would take approximately 3 years to implement. This is based on the timeframe required to implement the Product Stewardship for Oil (PSO) scheme in consideration that pending amendments through the seamless economy policy initiative will need to ensure any new measure is harmonised with business practice across other sectors:

- PSO – 2 years to implement
  - On 31 May 1999 the PM announced the establishment of a comprehensive product stewardship system for waste oil in Australia
  - In 2000 the *Product Stewardship (Oil) Act* (Cth) received royal assent
  - The PSO made operational in January 2001.
- Seamless economy - completion of the implementation of the seamless economy for business regulation is due in 2010.

Option 7 requires the same amendments to existing excise and customs duty legislation as Options 5 and 6, but also requires legislation to establish the general framework of the scheme and benefit entitlements, regulations to prescribe the benefit rates and legislation to set out eligibility criteria and administrative mechanisms used to pay the benefit to collectors and recyclers. For example, additional legislation required in the PSO scheme included:

- *Product Stewardship (Oil) Act 2000* - establishes the general framework of the scheme and benefit entitlements;
- *Product Stewardship (Oil) Regulations 2000* - prescribes the product stewardship benefit rates; and
- *Product Grants and Benefits Administration Act 2000* - sets out the eligibility criteria and administrative mechanisms to pay benefits to recyclers.

It is estimated that Option 7 would take approximately 3 years to implement based on the timeframe required to implement the PSO scheme.

The Australian Government estimates a mandatory Commonwealth import license (Option 8) would take approximately 5 years to implement based on

the timeframe required to implement the Ozone Protection and Synthetic Greenhouse Gas Management scheme:

- In 2000 changes were proposed to the *Ozone Protection and Synthetic Greenhouse Gas Management Act 1989* (Cth)
- The product stewardship requirement was fully operational on 15 April 2005.

This timeframe includes transition arrangements of 6 months notice from Ministerial decision before registration under the new arrangements commence and includes consideration that the Australian Government would be required, at minimum, to draft the following legislations:

1 Taxation Imposition Act (importers)

2 Taxation Imposition Act (manufacturers)

3 Scheme Administration Act

4 amendments to the excise tariff regulations

5 amendments to the customs tariff regulations

9.4 Government administration should be simple

The simplicity of government administration, was identified as a high priority by both the government and stakeholders, who were of the view that the preferred option should not be complex to enforce, monitoring and reporting should be efficient and administration should be cost efficient and effective.[172]

In relation to Government administration costs, Table 37 illustrates that the Commonwealth-administrated schemes (Options 3 to 8) are administratively more cost effective than State-administered schemes. This is due to the fact that these schemes are administered by a single entity, resulting in efficiencies from reduced reporting requirements and duplication of effort. Some Commonwealth-administered options involve reliance on multiple Australian Government agencies to assist with the implementation and administration of the option:

- Options 5, 6 and 7 rely on a collaborative approach between Treasury, the Australian Tax Office (ATO) and DEWHA; and
- Option 8 relies on the cooperation of ACS, DFAT and DEWHA.

[172] In the written submission in response to the consultation regulatory impact statement, 21 stakeholders indicated a preference for this criterion including 2 recyclers, 6 PSA members, 6 AIIA member, 1 industry association member , 4 Local Governments, 2 jurisdictions and 2 non-government organisations (NGOs).

In contrast, Option 3 can be implemented by DEWHA alone, without reliance on any third parties.

The ACS noted in their written submission that administration costs associated with the introduction and collection of a levy at the border (Options 5, 6 and 7) can be significant given that the collected funds are required to be transferred to meet Australian Government fiscal responsibilities. This may require system enhancement, additional staffing resources and a financial management administration matrix.

In addition, ACS has advised that the Australian Government has endorsed a revised intervention strategy for compliance and enforcement at the Australian border, based on a differentiated risk treatment model. This orients ACS resources towards higher priority concerns and goods presenting the greatest risk to the health, welfare and safety of the community.

Considering this strategy, ACS suggest that televisions and computers are high volume, low risk goods, which require minimal intervention. It indicates that its role in the compliance spectrum for such goods normally consists of a 'data provision capacity to undertake post-importation compliance audits or to actively engage the importers in a domestically based certification or registration scheme'. As a result, ACS indicate a preference for either a NEPM or a Commonwealth EPR, as it involves post-importation administration with ACS providing importation data to enable compliance to be assured.

Considering the provision of import data for any of the options, it is important to note that ACS indicate there would be an infrastructure cost for the upgrading of systems utilised and the provision of the data on a cost recovery basis, advising an estimated cost of less than $1 million for televisions and computers.[173]

Government administration of the co-regulatory schemes (Options 1 to 6) is expected to be simple given that the regulatory safety nets will be designed to be sufficiently onerous to ensure that importers join the industry scheme, which will be administered by a PRO. However, these options permit multiple industry schemes to operate in tandem as long as they are accredited and approved by government. It is likely that a number of industry and/or industry associations may seek approval to set up standalone schemes. This could result in multiple PROs reporting to the government, thus increasing government's administrative burden. Although, this can be avoided if government chooses to approve one or a small number of PROs and rigorous accreditation arrangements are applied.

In terms of PRO administration, the options assuming separate television and computer industry schemes and hence two separate PRO bodies (Options 2, 4 and 6), are expected to have higher PRO administration costs than those with single-bodies (Options 1, 3, 5, 8 and 9). Option 7 does not

[173] Australian Customs and Border Protection 2009, Appendix L, Submission 130

involve any PRO costs as it is assumed to only be administered by the government, with no industry scheme administration.

Mandatory schemes (Options 7, 8 and 9) are administered by the government instead of an industry PRO, involving a higher administrative burden to government than the co-regulatory schemes:

- Option 7 requires the administration of both the levy and payment of the benefits. In the Product Stewardship for Oil (PSO) scheme, the ATO collects the excise for domestically produced lubricating oil and administers the payment of the benefits and the ACS collects the customs duty for imported products.
- Option 8 requires administration of an import licensing system. This would require both ACS and DEWHA to administer the scheme. Under the *Ozone Protection and Synthetic Greenhouse Gas Management Act* 1998, the Australian Refrigeration Council is an accredited PRO and administers refrigerant handling licences on behalf of the Australian Government, reducing the government's administrative burden.[174] However, legal advice sought by the Australian Government advised that an import license requiring television and computer importers to join an industry PRO would be prohibited under Article XI of GATT.
- Option 9 involves administration of an EPR scheme by each state and territory, which is less efficient that Commonwealth administration.

The administration costs projected for the industry PRO, the State Government and Commonwealth Government are outlined in Table 37. They reveal that total administration costs are expected to be lowest for Options 3 and 7 and highest for the state-administered schemes (Options 1,2 and 9).

[174] Australian Refrigeration Council Ltd, *Welcome to Australian Refrigeration Council Ltd (ARC),* website: http://www.arctick.org/index.php, accessed 27 August 2009

Table 37 Split of total incremental costs by party responsible ($ millions, all products, threshold 3)

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
PRO (administration costs)	2008/09	-	-	-	-	-	-	-	-	-
	2010/11	$1.3	$2.1	$1.3	$2.1	$1.3	$2.1	-	$1.3	$1.3
	2015/16	$1.3	$2.1	$1.3	$2.1	$1.3	$2.1	-	$1.3	$1.3
	PV	$12.7	$21.1	$12.7	$21.1	$12.7	$21.1	-	$12.7	$12.7
State Government (administration, regulatory and communication costs)	2008/09	$0.5	$0.5	-	-	-	-	-	-	$0.5
	2010/11	$12.4	$12.4	-	-	-	-	-	-	$12.4
	2015/16	$4.1	$4.1	-	-	-	-	-	-	$4.1
	PV	$45.6	$45.6	-	-	-	-	-	-	$45.6
Cth Government (administration, regulatory and communications costs)	2008/09	-	-	$0.4	$0.4	$0.4	$0.4	$0.5	$0.5	-
	2010/11	$0.3	-	$9.5	$9.5	$11.0	$11.0	$11.0	$11.1	$0.3
	2015/16	$0.3	-	$1.2	$1.2	$2.7	$2.7	$2.7	$2.8	$0.3
	PV	$3.9	$3.9	$20.1	$20.1	$35.4	$35.4	$35.9	$36.7	$3.9
Total	2008/09	$0.5	$0.5	$0.4	$0.4	$0.4	$0.4	$0.5	$0.5	$0.5
	2010/11	$14.0	$14.8	$10.8	$11.6	$12.3	$13.1	$11.0	$12.4	$14.0
	2015/16	$5.7	$6.5	$2.5	$3.3	$4.0	$4.8	$2.7	$4.1	$5.7
	PV	$62.2	$70.6	$32.8	$41.2	$48.0	$56.5	$35.9	$49.4	$62.3

Note: 2008/09, 2010/11 and 2015/16 values are undiscounted, annual values at a point in time. These are not readily comparable with each other as they are not discounted to 2009 dollars. The present value lines represented discounted costs for each option. See Appendix H, Table H.4 for percentages

As outlined in Appendix G, Table G.6, importer compliance costs are assumed to be the same for all options except for Options 7 and 8. Importer compliance costs are expected to be higher for Option 8 due to the fact that importers are required to comply with both the licensing scheme and the industry scheme. Based on the Tyre NEPM threshold study, compliance costs are expected to be lower for Option 7 due to the absence of recycling targets.[175] However, as illustrated in Table 38, total compliance costs are higher as it is the only option that places reporting obligations on recyclers to receive recycling subsidies.

Table 38 Implementation, compliance and enforcement costs (all products, threshold 3, $ millions)

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
Compliance costs	2008/09	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	2010/11	$0.47	$0.47	$0.47	$0.47	$0.47	$0.47	$0.56	$0.50	$0.47
	2015/16	$0.50	$0.50	$0.50	$0.50	$0.50	$0.50	$0.62	$0.52	$0.50
	NPV	$5.20	$5.20	$5.20	$5.20	$5.20	$5.20	$6.47	$5.46	$5.20

As part of this decision regulatory impact statement, the Australian Government provided updated regulatory design, implementation and administration costs for all options, that the Australian Government would be involved in, the total of which are presented in Table 39. These updated costs did not include the regulatory design, implementation and administration costs to individual state and territories. These estimates were

[175] MMA (2007), *Tyres National Environmental Protection Measure: Threshold Study*, p 18

only provided for 4 years and are not expected to significantly affect the results of the CBA as collection and reprocessing costs account for between 91% and 96% of total incremental costs for each option.

Table 39 reveals that the ranking of Commonwealth administration costs for the first 4 years is only expected to change for Options 7 and 8, with administration of Option 7 expected to be cheaper than in the CBA (although still substantial).

Table 39: Commonwealth regulatory design, implementation and administration costs - Years 1 to 4

Options	Year 1	Year 2	Year 3	Year 4	Total
Options 1&2					
Commonwealth costs in CBA	$0	$0	$321,698	$321,698	$643,396
Updated Commonwealth costs	$330,602	$219,528	$235,090	$241,862	$1,027,082
Options 3&4					
Commonwealth costs in CBA	$350,000	$350,000	$640,698	$640,698	$1,981,396
Updated Commonwealth costs	$944,724	$921,040	$903,784	$719,631	$3,489,179
Options 5&6					
Commonwealth costs in CBA	$350,000	$350,000	$2,146,218	$2,146,218	$4,992,436
Updated Commonwealth costs	$1,220,272	$1,219,488	$1,038,770	$1,332,806	$4,811,336
Option 7					
Commonwealth costs in CBA	$500,000	$500,000	$2,232,818	$2,232,818	$5,465,636
Updated Commonwealth costs	$1,195,272	$1,194,488	$1,038,770	$1,340,061	$4,768,591
Option 8					
Commonwealth costs in CBA	$350,000	$350,000	$1,610,948	$1,610,948	$3,921,896
Updated Commonwealth costs	$1,073,352	$1,130,091	$1,168,300	$1,783,001	$5,154,744
Option 9					
Commonwealth costs in CBA	$0	$0	$321,698	$321,698	$643,396
Updated Commonwealth costs	$330,602	$219,528	$235,090	$241,862	$1,027,082

The Australian Government also indicated that based on experience with the Product Stewardship Oil Program, they could potentially incur costs of $28 million over the 4 years for transitional assistance grants to assist with the establishment of collection facilities and upgrading of infrastructure in mandatory Commonwealth schemes (Options 7 and 8). However, they also indicated that an equivalent cost could be incurred by industry under a co-regulatory scheme (Options 1 to 6) and by the states in a mandatory state-administered scheme (Option 9).

Infrastructure costs are already included in the CBA, so the estimates of transitional assistance grants are only relevant to the issue of funding.

9.5 Equity

Stakeholders indicated that ensuring equity in the proposed schemes was a high priority, including:

- ensuring equity between industry players and across industries;
- the ability to capture free riders;
- the impact of the application of the threshold on industry players; and
- ensuring that the administrative burden is equitable on jurisdictions.[176]

If no regulatory threshold is applied, all importers are equally incentivised to either become part of an industry-coordinated scheme, or will be equally subject to a mandatory government scheme. However, if a threshold is introduced, importers falling below the threshold would be advantaged relative to other scheme participants that incur compliance costs and/or payment of a fee to assist in scheme funding. Even so, the relatively low market share of these importers means that this is likely to have an insignificant effect on the entire market. For example, with a minimum threshold of 5,000 units, 9,734 out of 10,194 importers would not face obligations under a scheme. However, these companies only account for 4.7% of total unit sales in the market, as of 2008. A further point is that this impact occurs regardless of which of the options is adopted, as it is linked to a policy decision on a regulatory threshold as opposed to a decision about a specific scheme.

An additional consideration that does differentiate between the possible new policy options relates to Options 2, 4 and 6, which treat branded computer importers differently to importers of generic parts and equipment. Broadly speaking, these schemes have been modelled on an industry proposal that major computer brand owners take responsibility for historic and new waste from their own brand, paying the PRO after their products have physically been recycled. In contrast, it is proposed that importers of generic parts and equipment are responsible for all non-branded and orphan equipment and must pay an advanced recycling fee to the PRO as soon as their product is imported (with no responsibility for historical, unbranded waste to be captured). This approach could create inequities within the market as the generic and branded companies are subject to different mechanisms, and there may be compliance and other cost differences as a result.

Government administration of state-based television and computer schemes (Options 1, 2 and 9) may result in inequitable costs being incurred between the states and territories. This is because the vast majority of imports occur in NSW and to a lesser extent in Victoria, Queensland and Western Australia. This is not reflective of the final destination of television and computer sales in Australia, which are expected to be more in line with the population distribution. This has implications if scheme costs are shared on the basis of import volumes, as the proportion of imports and end of life arising is not aligned.

[176] In the written submission in response to the consultation regulatory impact statement, 21 stakeholders indicated a preference for this criterion including 2 recyclers, 6 PSA members, 6 AIIA member, 3 industry association members , 3 Local Governments, 1 jurisdiction and 2 NGOs.

Table 40 Television and computer imports 2007/08 (units)

State/territory	Television imports	Computer imports (complete PCs & laptops only)	Other computers product imports
NSW	44.20%	64.78%	63.77%
VIC	28.80%	22.82%	23.50%
QLD	17.15%	6.01%	5.99%
SA	2.27%	0.35%	0.37%
WA	7.51%	6.00%	6.32%
TAS	<0.01%	0.03%	0.04%
NT	0.06%	0.01%	0.01%
ACT	<0.01%	<0.01%	<0.01%

Source: DFAT, ACS and NSW DECC

The co-regulatory options (Options 1 to 6) will be administered by an industry body which will most likely represent the interests of the largest producers of televisions and computers. As such, there is the potential for the PRO to act in a way which is not in the interests of smaller industry members. For example, it could set a flat industry levy at such a level that it is prohibitively expensive for smaller members and forces them to leave the industry. The co-regulatory options also permit standalone schemes to operate if they receive EPHC approval. It is likely that only larger companies will have sufficient scale to cover the costs of a standalone scheme, meaning that smaller companies are likely to remain in the original industry scheme. However, it is possible for smaller players to coordinate and form their own stand alone scheme.

Standalone schemes have the potential to result in the following inequitable outcomes:

- higher industry association fees for those companies remaining in the original industry scheme to cover high fixed costs ,such as communications, and less efficient administration, due to the reduced scale of operations of the PRO. Although competitive pressure between the schemes is likely to make the fees more reflective of costs, overall PRO administration costs in the industry will be higher due to duplication of effort by the multiple PROs and the reduced scale of operations of each PRO.
- the standalone schemes may be able to free ride on the original industry scheme by using their collection infrastructure and reaping the benefits of their communications campaigns;
- the standalone schemes have a financial incentive to focus on collection and recycling in metropolitan areas as travel distances are reduced and there are economies of scale due to the accumulation of a large number of units. However, it should be noted that the government has the ability to comprehensively specify the requirements of the standalone scheme at the approval stage.

However, it should be noted that these issues could be addressed through the government scheme approval process, which should require approval of

aspects of the scheme including the governance and fee structure. The government can also review the scheme on a regular (perhaps annual) basis;

In contrast to the co-regulatory schemes, Options 7, 8 and 9 are mandatory schemes applying equally to all products and all importers.

9.6 Acceptability to key stakeholders and the broader community

Acceptability to stakeholders and the broader community was identified as a high priority by the EPHC Electrical Equipment working group, primarily in relation to the television and computer industries and jurisdictions including the Commonwealth and states/territories, but also in relation to local governments, recyclers and NGOs.

In response to the consultation regulatory impact statement, 130 written submissions were received from jurisdictional agencies, industry associations, AIIA members, PSA members, recyclers, NGOs and consumers. Acceptance of the proposal by these key stakeholders is important as it is likely to enhance voluntary compliance thus reducing the reliance on enforcement and sanctions.[177]

There was a clear and consistent message made through the written submissions that a national (Commonwealth) approach was supported to address the issues surrounding end of life televisions and computers. As illustrated in Figure 17, stakeholders preferred Option 8, but also favoured Option 7 and Option 5. However, a significant proportion of stakeholders were opposed to Option 7 (Figure 18).

[177] Commonwealth Government Office of Best Practice Regulation (2007), *Best Practice Regulation Handbook*, August, p 87

Figure 17 Summary of stakeholder preferences (1st or 2nd preference indicated in written submissions)

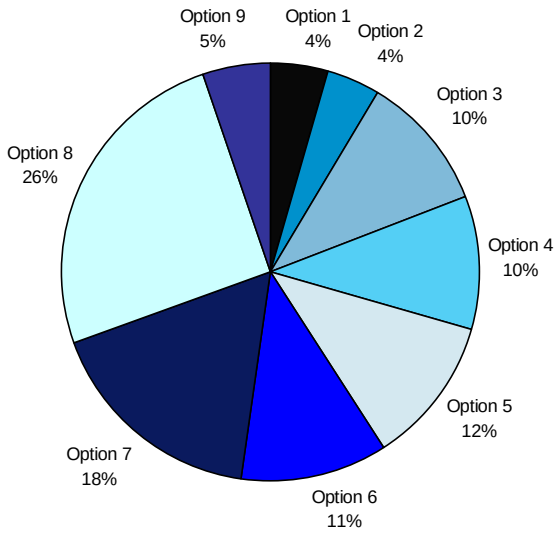
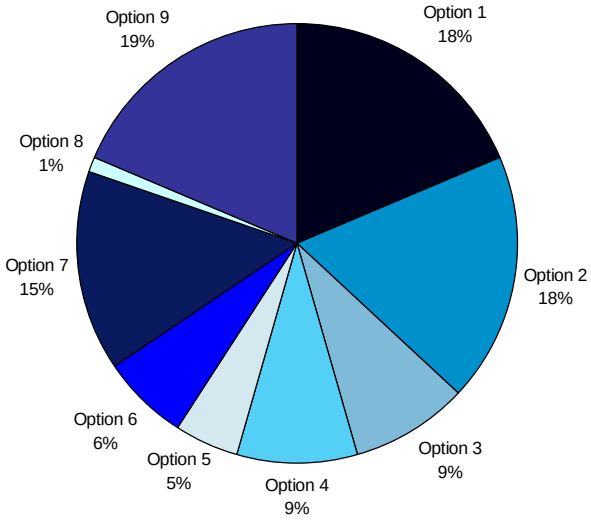


Figure 18 Summary of options opposed by stakeholders



The industry association (AIIA and PSA) members and government preferred options 8, 6, 4 and 5. However, a significant proportion of these key stakeholders were opposed to Option 4.

Figure 19 Summary of industry association (AIIA and PSA) members and government preferences

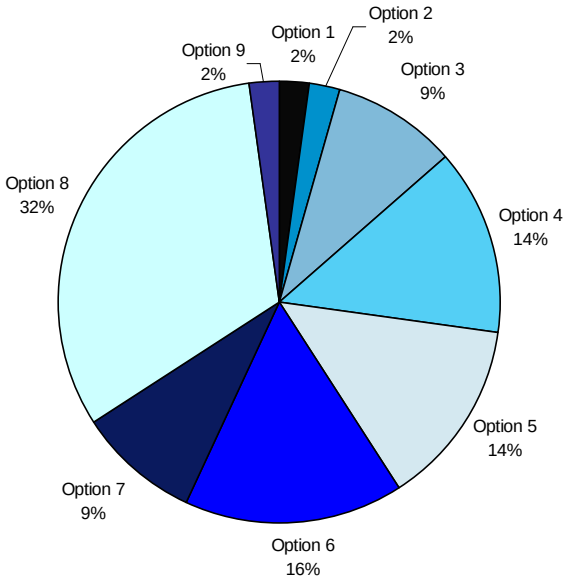
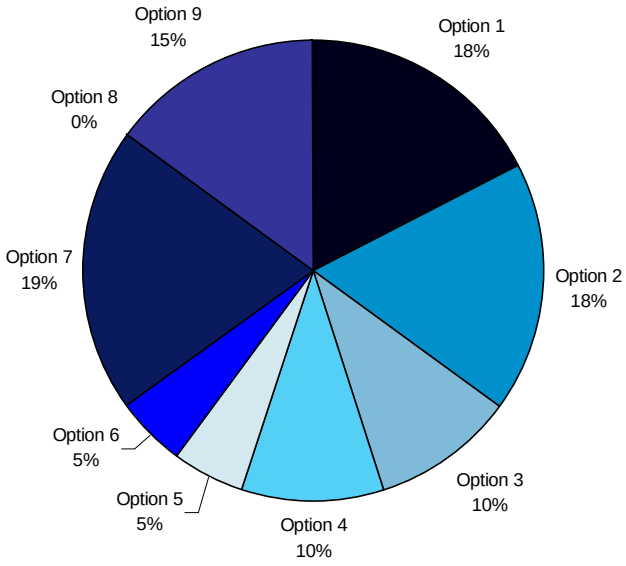


Figure 20 Summary of options opposed by the industry associations (AIIA and PSA) members and government



There were discernible patterns in the preferences of different groups of stakeholders including jurisdictional agencies, Local Governments, industry associations, AIIA members, PSA members, recyclers and NGOs.

Industry – producers, importers and retailers

Members of the industry associations (AIIA and PSA) generally preferred Option 8. However, some members were also supportive of Commonwealth co-regulatory options 3 to 6. AIIA members also expressed a preference for separate television and computer schemes as their proposed industry scheme differs from the proposed television industry scheme in terms of its treatment of importers of generic parts and equipment and also because there is no responsibility for historic, unbranded waste.

Industry – recyclers

Recyclers supported Options 7 and 8 and to a lesser extent Options 3 and 6. There was no option that they indicated that they were particularly opposed to.

Community/consumers – consumers of new and used products

NGOs varied in relation to which options they preferred. NGOs did not indicate that they were opposed to any options.

Government

The EPHC Electrical Equipment working group received advice that the Australian Government is generally not supportive of the introduction of any new tax, regardless of whether the tax would be used to generate funds for a government run scheme (Option 7) or as a regulatory safety net to encourage companies to join an industry scheme (Options 5 and 6). The Australian Government has in principle support for broad based taxes and direct funding for government programs rather than specific levies. The Australian Government also raised concern about the potential size of the levy to be introduced through legislation where a business is exempt from paying a penalty if they belong to an industry recycling scheme (Options 5 and 6). This could introduce unnecessary costs to the economy, since if the penalty is much higher than the costs of the industry recycling scheme, there would be an incentive for the operators of the recycling scheme to increase their membership fees arbitrarily provided they are below the penalty value.[178] However, it should be noted that this issue could be addressed through the government scheme approval process, which should require approval of aspects of the scheme including the governance and fee structure. The government can also review the scheme on a regular (perhaps annual) basis.

In relation to Options 5 and 6, there are also likely to be concerns at the Australian Government level regarding the introduction of a new revenue raising measure which, in essence, does not raise any revenue.

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[178] DEWA (2009), *pers. comm,* 27 August

9.7 The potential impacts of other government processes

The potential impacts of other government processes was identified as important by stakeholders.[179] However, given the breadth of this criterion, which could include any government process, the decision regulatory impact statement focuses on the Henry Review of the Australian tax system, which will potentially have the most significant impact on the proposed options.

On 13 May 2008 the Australian Government announced the review of Australia's tax system. The review will look at the current tax system and make recommendations to position Australia to deal with the demographic, social, economic and environmental challenges of the 21st century.

To support the review the Australian Treasury released an architecture paper that set out a series of challenges and a philosophy for reform (also referred to as the Henry Review).[180] Of particular interest to this decision regulatory impact statement scheme, the Australian Treasury noted that:

> *Taxes may also be linked to the environment because they are used to fund environmental programs, but these taxes are not strictly corrective or 'environmental' taxes. The tax and public spending should be assessed independently. An example is the Product Stewardship Oil Levy…*
>
> *In some cases, the costs of particular government programs are offset by imposing a tax on a related good or service. This is different from a user charge – where the government charges directly for the cost of providing a particular good or service. This sort of tax is often perceived to be equitable due to the alignment between those who pay the tax and those who benefit from it.*
>
> *In practice, the revenue raised from a tax may not be perfectly correlated with the program's funding requirements…*
>
> *To the extent that these revenues do not match the benefits received, they involve cross-subsidies to different consumers.[181] In other cases, the revenue raised may exceed the funding needs of the program — which can result in over-spending on that program.*

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[179] In the written submission in response to the consultation regulatory impact statement, 4 stakeholders indicated a preference for this criterion including 3 PSA members, 1 AIIA member, and 1 non-government organisation (NGOs).

[180] Australian Treasury (2008), *Architecture of Australia's Tax and Transfer System*, Canberra, August.

[181] Treasury gave an example of aviation fuel excises charged by the Civil Aviation Safety Authority on domestic trips for the purpose of cost recovery; however industry changes meant that the excise was not meeting the required funding levels. In these cases, Treasury indicates that the shortfall is often met out of consolidated revenue where the user is cross-subsidised

> *Compared to funding goods out of general revenue, there may be efficiency costs associated with raising revenue in this way. For example, the administration and efficiency costs of collecting an additional $1 of revenue from a tax on a specific product could be higher than the cost of raising that revenue from a broad-based tax.*[182]

The implication from this passage is that this review, which will provide recommendations to the Australian Government, is likely to support, at least in principle, a move away from specific levies to greater reliance on broad based taxes and direct funding for government programs.[183] This may have significant implications for Options 5 and 7, which have levies as a funding mechanism.

9.8 Flexibility to be expanded to cover other forms of e-waste

Some stakeholders consulted as part the consultation process expressed that they desired the scheme to be able to easily incorporate additional electrical and electronic products and requested that this was considered in the selection process.[184] The flexibility element is not addressed where there are separate television and computer schemes, as is the case with Options 2, 4 and 6.

9.9 Risk of not achieving the outcomes

The key driver of benefits in the CBA is the level of recycling, however, there are inherent risks that the projected levels of recycling will not be reached and these risks differ between the options. Co-regulatory schemes (Options 1 to 6) involve negotiated targets and do not include any regulation specific to maintaining the recycling targets. Failure to reach a target in an industry scheme may give the PRO cause to expel the company from the scheme so that they are captured by the regulatory safety net. However, government have no recourse if companies fail to meet their targets and the PRO cannot expel every company from the scheme. Option 8 suffers from the same downside risk as the mandatory license simply obligates companies to join the industry scheme. Options 7 and 9 provide more certainty as they are mandatory government run schemes. In Option 7, the level of the benefits can be adjusted by the government to ensure that high levels of recycling

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[182] Australian Treasury (2008), *Architecture of Australia's Tax and Transfer System*, Canberra, August., pp 283 and 285-6

183 PricewaterhouseCoopers (2009), *Second Independent Review of the Product Stewardship (Oil) Act 2000', Department of Environment, Water, Heritage and the Arts*, Canberra, p 95

[184] In the written submission in response to the consultation regulatory impact statement, 12 stakeholders indicated a preference for this criterion including 2 recyclers, 3 PSA members, 2 AIIA members, 1 industry association member, 1 Local Government and 3 NGOs.

are achieved. Option 9 involves penalties (such as fines) for a failure to reach mandatory recycling targets.

This is important as the URS estimate of consumers' willingness to pay for a recycling scheme was contingent on achieving at least 50% recycling and increased in line with the level of recycling.

9.10 Conclusion

A summary of the outcomes of the evaluation of the proposed options against a range of selection criteria is presented in Tables 40 and 41. The preferred options with the highest NPVs (and hence the highest net benefit to society) are (in order from highest to lowest) Options 7, 5, 8 and 3. The NPVs for these options are all positive and are relatively close. However, there are policy implications and concerns associated with the selection of any of these options, as summarised in Table 41:

- Options 7 and 5 have the highest NPVs. However, they may be suboptimal from a taxation perspective and potentially could be negatively impacted by the outcomes of the Henry Review. The Australian Government is expected to support a move away from specific levies to greater reliance on broad based taxes and direct funding for government programs. Furthermore, Options 5 and 7 rely on the cooperation of multiple Australian Government Agencies to implement and administer the schemes. In addition:
  - Option 7 was not supported by industry or the government; and
  - Option 5 requires a high level of industry negotiation and there is a risk that there will not be agreement on an industry scheme given that there is a fundamental difference between the proposed television and computer industry schemes.
- Option 8 is preferred by industry and other stakeholders in general. However, the scheme may have significant trade related issues. Legal advice sought by the Australian Government has indicated that this option would be prohibited by Article XI of GATT and it would be difficult to rely on the exceptions in Article XX. Given this advice the Australian Government considers that Option 8 could be prohibited under GATT. Furthermore, this option imposes additional compliance costs on importers due to the need to comply with both the industry scheme and the import license regime. Also, multiple Australian Government agencies would be required to implement and administer this option.

While Option 3 (a co-regulatory scheme with a Commonwealth EPR regulatory safety net) has the fourth highest NPV it provides a level of surety against the criteria.

- the Commonwealth has the Constitutional power to implement the regulatory instrument;
- the regulatory instrument is expected to take 1-2 years to design and implement and it is likely to be the quickest to implement (of the four highest NPV options);

- the Commonwealth EPR can be implemented and administered by a single Australian Government agency and this scheme has the lowest total administration costs;
- the Commonwealth can ensure appropriate coverage to deal with 'orphan' waste;
- stakeholders did not indicate that they were opposed to this option to a significant degree;
- the Commonwealth EPR should not be adversely influenced by other government processes, especially the Henry Review, as the scheme does not propose to include a levy;
- the Commonwealth EPR has the capacity to be designed to allow for future expansion to other forms of electrical and e-waste;
- the Commonwealth EPR safety net ensures that there is a scheme even if industry negotiation does not result in a compromise between the television and computer industries.

The aim of the regulatory requirements under Option 3 will be to encourage television and computer producers and/or importers to join an industry scheme approved by the EPHC. This approach is likely to be similar to that used in the Used Packaging NEPM, where individual companies would be required to put in place comprehensive recycling arrangements for their own products (including orphan and historical waste), with an exemption if they join an approved scheme but will be done using Commonwealth legislation, rather than state powers. Import data will be used to identify those to be covered by the scheme.

The industry will cover the cost of developing and implementing the product stewardship scheme, including collection infrastructure, recycling, awareness and education programs and governance activities.

Acknowledging that there are trade-offs and broader policy implications for many of the options, and taking a balanced view of all of the evaluation criteria, the recommendation in this decision regulatory impact statement is that Option 3 is preferred.

Table 41 Tradeoffs involved with selecting either Option 3, 5, 7 or 8 as the preferred option

Option 3	Option 5	Option 7	Option 8
NPV of $649 million (present value, $2009)	NPV of $731 (present value, $2009)	NPV of $742 million (present value, $2009)	NPV of $729 million (present value, $2009)
No significant risks	Risk that this option will be impacted by the Henry Review	Risk that this option will be impacted by the Henry Review	Risk that this option may not be legally possible as it likely to contravene Article XI of the GATT.
A high level of industry negotiation required as there is a fundamental disagreement between the television and computer industries regarding whether historic and orphan products should be included.	A high level of industry negotiation required as there is a fundamental disagreement between the television and computer industries regarding whether historic and orphan products should be included.	No industry negotiation as it is a mandatory scheme	A high level of industry negotiation required as there is a fundamental disagreement between the television and computer industries regarding whether historic and orphan products should be included.
Regulatory instrument expected to take 1-2 years to design and implement.	Regulatory instrument expected to take 3 years to design and implement	Regulatory instrument expected to take 3 years to design and implement	Regulatory instrument expected to take 5 years to design and implement
Total administration costs expected to be $33 million (present value, $2009). Government administration is expected to be simple given that the regulatory safety net will be designed to be sufficiently onerous to ensure that importers join the industry scheme. However, this option permits multiple standalone scheme to operate in tandem which has the potential to produce inefficiencies due to reduced scale.	Total administration costs expected to be $48 million (present value, $2009). Government administration is expected to be simple given that the regulatory safety net will be designed to be sufficiently onerous to ensure that importers join the industry scheme. However, this option permits multiple standalone scheme to operate in tandem which has the potential to produce inefficiencies in administration due to reduced scale and duplication of effort.	Total administration costs expected to be $36 million (present value, $2009). However, this option requires administration of both the levy and benefit payments	Total administration costs expected to be $36 million (present value, $2009) $49 million. The government is only required to administer the license as it is compulsory to join the industry scheme. However, this option permits multiple standalone scheme to operate in tandem which has the potential to produce inefficiencies in administration due to reduced scale and duplication of effort.
Multiple standalone schemes may result in inequitable outcomes including higher industry fees for smaller companies, free riding and a focus on metropolitan areas. However, the government has the ability to address these issues at the approval stage.	Multiple standalone schemes may result in inequitable outcomes including higher industry fees for smaller companies, free riding and a focus on metropolitan areas. However, the government has the ability to address these issues at the approval stage.	No equity issues as the scheme is mandatory and applies to all products.	Multiple standalone schemes may result in inequitable outcomes including higher industry fees for smaller companies, free riding and a focus on metropolitan areas. However, the government has the ability to address these issues at the approval stage.
Stakeholders in general did not indicate preference or opposition for this option.	Compared with other options, this option did not receive significant stakeholder support	This option was supported by some recyclers and local government, but was generally not supported by industry	This option received support from all stakeholder groups and had only one stakeholder (a recycler) not support it
Co-regulatory industry scheme, so the targets are not mandatory and the government has no recourse if the PRO does not reach its targets.	Co-regulatory industry scheme, so the targets are not mandatory and the government has no recourse if the PRO does not reach its targets.	Mandatory government run scheme which can set benefits at such a level as to ensure sufficient levels of recycling.	Industry scheme so the targets are not mandatory and the government has no recourse if the PRO does not reach its targets.

Table 42 Summary of the results of the evaluation of the proposed options against a range of selection criteria

		Options								
Criteria		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Net benefits to the community	Rank of NPV	5	**9**	4	8	2	7	**1**	3	6
Legally possible	Contravenes GATT/WTO	No	No	No	No	No	No	No	**Yes**	No
Minimum time to establish the regulatory instrument	Industry negotiation	**High**	Low	**High**	Low	**High**	Low	**None**	**High**	**None**
	Government negotiation	**Yes**	**Yes**	No	No	No	No	No	No	**Yes**
	Years to implement	2	2	1-2	1-2	3	3	3	5	2
Government administration should be simple	Rank of total administration costs (lowest to highest)	7	9	1	3	4	6	2	5	8
	Government administrative simplicity	Medium	Medium	High	High	High	High	**Low**	High	**Low**
Equitable	Equity issues?	No	**Yes**	No	**Yes**	No	**Yes**	No	No	No
Acceptability to key stakeholder and the general community	Rank of stakeholder preference	**8**	**8**	5	5	3	4	2	**1**	7
	Rank of stakeholder opposition	2	2	5	5	8	7	4	**9**	**1**
	Rank of industry association and government preference	**7**	**7**	5	3	3	2	5	**1**	**7**
	Rank of industry association and government opposition	2	2	5	5	7	7	**1**	**9**	4
The potential impacts of the Henry Review	Potentially impacted by the Henry Review?	No	No	No	No	Yes	Yes	Yes	No	No
Flexibility to be expanded to cover other forms of e-waste	Flexibility to be expanded to cover other forms of e-waste?	Yes	No	Yes	No	Yes	No	Yes	Yes	Yes

10 Implementation and review

This chapter identifies a range of implementation and review issues that will need to be considered prior to the implementation of the preferred option from this decision regulatory impact statement. It is expected that decisions on more detailed aspects of implementation will be made on the basis of additional analysis (e.g. financial analysis) undertaken following the policy decision made pursuant to the current decision regulatory impact statement.

The issues which are likely to require further analysis to resolve prior to implementation of the preferred option include:

- collection infrastructure;
- collection in rural and remote areas;
- funding;
- thresholds; and
- recycling targets.

10.1 Collection infrastructure

For all the policy and funding options considered in this decision regulatory impact statement, the collection of end of life televisions and computers is assumed to be achieved through the provision of drop-off centres for residents and businesses as opposed to kerbside pick up. The total estimated cost of collection is estimated to be $273/tonne and includes the provision of infrastructure at drop-off facilities and transport services.

Drop-off centres

The collection infrastructure assumed in the decision regulatory impact statement for all policy and funding options is for the provision of drop-off centres for residents and businesses at staffed landfills, waste transfer stations and local businesses located in both metropolitan and regional areas. At these drop-off centres televisions and computers are delivered by consumers (residents and businesses) and dropped off into large bins located at dedicated undercover areas within each centre.

Under this option, the televisions and computers are accepted at secure and covered locations that are staffed on a part-time basis. As part of the CBA it has been assumed that:

- products are accepted throughout the year;

- multiple facilities are located within metropolitan areas while regional and remote areas are serviced by a single facility located at the main town centre. Each metropolitan facility can cover a radius of 10 km;[185].
- the annual costs of renting a covered and secure drop-off area is $12,000 for each drop-off centre
- one part-time staff is present at each drop-off centre at a cost of $7500 per year; and
- 22.5 foot hook lift bins (roll-on roll-off boxes) with a swinging tail gate are utilised to minimise equipment breakages.[186]

The number of facilities currently in place, and the capacity of these facilities to incorporate a covered area for drop off of televisions and computers, will need to be considered in developing the detailed implementation of this option. However, the capacity of infrastructure is not expected to be problematic given that existing infrastructure will be used where possible and recycling rates will ramp up over time.

Together, site rental (36%) and drop-off supervision (23%) represent $162/tonne of the total collection costs of $273/tonne. These costs could potentially be charged by the site owner to the scheme administrator or PRO.

Some savings in rental and supervision costs may be achievable at some sites, particularly at those owned and operated by cooperating government authorities. For example, it is understood that under Victoria's Byteback scheme, drop off areas and supervision were provided at no charge by the owners/operators of the participating drop-off centres.

The capacity to achieve cost savings through the free, or low-cost, provision of space and/or supervision at participating drop-off centres will depend on the extent of owner's willingness to participate in the collection program. This will likely depend on the type of organisation that owns the facilities. Across Australia, waste facilities are owned by local government authorities, regional bodies (e.g. regional organisations of councils), state-owned corporations, or private companies. The extent of public versus privately owned facilities varies across states, and between metropolitan and regional areas. In Sydney for example, most public waste transfer stations and landfills are owned by WSN Environmental Solutions, a state-owned corporation. In regional areas in most states, a higher proportion of waste facilities are owned by local government. At these facilities there may be greater potential to achieve rental and supervision cost savings than at privately owned facilities.

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[185] Assumptions are included within Hyder (2006), *Television EPR Scheme, Producer responsibility organisation – Cost Analysis*

[186] Hyder (2006), *Television EPR Scheme, Producer responsibility organisation – Cost Analysis*, p 20

Alternative collection systems or sites for televisions and computers to be received for recycling include retailers, kerbside collection (either on-call or at regular intervals) and through charities. Each of these is discussed briefly below. These collection alternatives were not included in the CBA[187] and would therefore need to be investigated further before implementing the preferred option.

Retailers

Retailers, particularly large retail chains that have a broad coverage across Australia, may be able to provide a take-back service for televisions and computers. This may be a more convenient option for consumers as they can drop off their unwanted television or computer item(s) while visiting the store for an existing transaction. However, the store would need to have space to receive and store the items and staff time would be required to receive and transport the items to the storage space and to coordinate the collection and transport of these items to the reprocessor. There would also be safety concerns such as manual handling and product breakage that would need to be considered. The system may be most effective where it is able to be incorporated within an existing centralised distribution system. For example, where a large retail chain receives material from a distribution centre on a regular basis. This would allow the scheme to take advantage of back-loading opportunities and to collect items in a central location prior to transferring them to the reprocessing site. The limited amount of storage space at retail outlets would be a major limiting factor to this collection option. As such, this is envisaged as complementary to a drop-off system rather than as a standalone system.

Kerbside collection

Kerbside collection, either on-call or at a regular interval, is another alternative to the drop-off collection system. The two kerbside options are envisaged to be similar to existing hard waste or bulky-goods collection services that are provided by many local councils. These options would be more efficiently provided in metropolitan areas and regional centres, and may not be feasible in many remote areas. A range of issues would need to be dealt with in undertaking a large-scale kerbside collection of television and computer equipment, such as scavenging of items or parts, breakage or vandalism of items after they have been put out for collection, and education of residents and businesses (for example, to notify them of the timing of collection, items that can be received through the service and booking system if applicable).

Kerbside collection was included as a sensitivity analysis in the CBA based on the assumptions that:

- collections involve the use of dedicated 19 ft Pantech vehicles (enclosed lorries). The cost of a Pantech vehicle is estimated to be

[187] Note that kerbside collection was modelled as a sensitivity analysis

$80,000 with an annual allowance of 7.5% for vehicle maintenance. The vehicle has an average operating diesel consumption of 10 litres per hour with a fuel cost of $1.40 per litre. The vehicle has a volumetric capacity of 20 m^3. Kerbside collections crews consist of a driver and two labourers with annualised salaries of $50,000 and $40,000 respectively.

- metropolitan collection teams are capable of carrying out two runs per day while rural collection teams are capable of carrying out one run per day;
- collections are run throughout the year and are co-ordinated according to Council areas;
- loads are sent to facilities located within the metropolitan area; and
- loads sent from rural centres to reprocessing facilities require an additional 350% cartage/fuel loading to cover additional transportation requirements.[188]

Based on the above parameters, kerbside collection costs were found to be in the order of $300/tonne (excluding GST) in metropolitan areas and $820/tonne in regional areas, with an Australian average of $460 per tonne.[189] Kerbside collection is more expensive than drop-off, but provides more certainty regarding collection levels given that it is more convenient for consumers. The URS willingness to pay study estimated that consumers were willing to pay an additional $5 million per year for kerbside collection.[190]

It should be noted that local government involvement is voluntary, but there is an opportunity for them to be involved in kerbside collection by virtue of their current involvement in waste management.

Charities

Charities may also provide an alternative collection option for televisions and computers. It is noted that they already play a valuable part in the reuse of these items through existing collection and resale systems. Their involvement in the collection of items for recycling would need to be considered in more detail. It may be the case that charities are reluctant to be involved as a drop-off location as it may provide the wrong message in that they do not want to receive items that are not in working condition. In receiving items at existing charity store locations the issues noted for retailers such as storage space, staffing requirements and transport/logistics would apply. A more extensive role for charity or community organisations to

[188] Hyder (2006*), Television EPR Scheme, Producer responsibility organisation – Cost Analysis*, p 19

[189] Estimates based on Hyder (2006), *Television EPR Scheme, Producer responsibility organisation – Cost Analysis*, p 20

[190] URS (2009), *Willingness to Pay for E-Waste Recycling – Final Report*, p 42

promote recycling of televisions and computers may be possible if they are paid or reimbursed for their efforts. For example, if a benefit is paid by the scheme to charities on a per item basis they may be able organise collection drives as a fundraising opportunity.

10.2 Collection in rural and remote areas

Under a national end of life television and computer recovery program it is envisaged that private companies will be contracted to provide collection equipment such as rental bins at drop-off centres and freight services to collect and transport material to reprocessors for disassembly. Together, equipment provision (4%) and freight (37%) account for around $111/tonne (41%) of the total estimated collection costs of $273/tonne.

Collection of end of life televisions and computers from rural and regional areas is much more costly than metropolitan areas due to lower population density (which results in lower capture rates per drop-off centre) and higher transport costs (as a result of greater distances to collection facilities). In the CBA, it was assumed that in metropolitan areas, each drop-off centre would cover a 10km radius, resulting in a spatial coverage of 315 square kms. This would see the establishment of 39 drop-off centres in Sydney and 24 in Melbourne. In contrast, it is expected that regional centres would only have a single facility located in or near the main population centre and that loads sent from rural centres to reprocessing facilities require an additional 350% cartage/fuel loading to cover addition transportation requirements. As a result, it is estimated that the costs of collection in metropolitan areas will be $130 per tonne (excluding GST) while collection costs in rural and remote areas will be nearly five times higher at $590 per tonne (excluding GST).[191] Given that 69% of the Australian population reside in major cities and 31% reside in rural and remote areas,[192] the weighted average collection costs in Australia to be included in the CBA were estimated to be $273 per tonne.

In rolling out a national collection and recycling program for end of life televisions and computers the location of drop-off facilities in regional areas will need to be carefully planned with the objectives of maximising capture rates and minimising transport costs. This is especially relevant in states and territories with lower population densities (Western Australia, South Australia and Northern Territory) compared to the eastern states, where the population is concentrated along the eastern seaboard with strong (road) transport connections.

In regional and remote areas the potential to utilise existing waste facilities for the collection/recycling program will require careful consideration, as the type and scale of facilities varies widely. In remote areas many transfer stations and landfills are not staffed and are hence unsuitable for

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[191] Estimates based on Hyder (2006), *Television EPR Scheme, Producer responsibility organisation – Cost Analysis*, pp 20-22

[192] ABS (2007) *2006 Census of Population and Housing – Australia and Remoteness Area – Counting: Persons, Place of Usual Residence*

participation in the program. Some also do not have suitable covered areas for locating collection bins, and would hence need to be upgraded were they to be included in the program.

In general transport costs are optimised when materials can be transported in baled or compacted form. Televisions and computers collected at drop-off centres are not suitable for compaction due to the hazardous components present and the loss in product quality that would occur from breakage. Following disassembly however, many of the sorted materials recovered from end of life televisions and computers can be economically transported in baled or compacted form. It may be suitable therefore to locate reprocessing facilities in regional centres to achieve cost savings compared to transporting unsorted material over long distances to facilities in metropolitan centres. For example, the Local Government Association of Queensland indicated that all items collected in Queensland are transported to Brisbane for recycling. There is the potential to set up a recycling hub in Townsville, but this would require additional infrastructure.

Collection issues in rural and remote areas are expected to be the same for all options examined in this decision regulatory impact statement and therefore does not differentiate between the options. While collection costs could vary by geography, experience from other national schemes suggests that there are a range of other costing approaches that could be used to address concerns about the higher non-metropolitan costs:

- government subsidies or grants for collection in rural and remote areas;
- industry using profits from recycling in metropolitan areas to cross-subsidise collection in rural and remote areas;
- excluding rural and remote areas from the scheme
- backloading of trucks delivering goods from metropolitan to rural and remote areas;
- less frequent collection in rural and remote areas (e.g. once per year); or
- consolidating collection with other schemes such as DrumMUSTER.

This issue would need to be addressed at the implementation stage by the Government for mandatory schemes (options 7 and 8). For all other co-regulatory schemes (options 1-6 and 9), resolving this issue would be the responsibility of industry and could be vetted by the Government in deciding whether to approve the industry scheme.

10.3 Funding

The CBA examined the total costs of each of the schemes to society, but did not examine how these costs would be funded. There is a range of funding options for each cost item identified in the CBA:

- *collection and recycling costs* – currently incurred by the recycling industry. There is potential the schemes could wholly or party fund

these costs. For example, under Option 7, these costs could be funded from an import excise payable on imports to the Australian Government. For all other options, which incorporate an industry PRO that will manage the recycling of end of life products through competitive tenders and contracts with e-waste recycling companies, it may be industry levies payable to the PRO by importers of new television and computer products, that could wholly or partly fund these costs. In Option 8, the license fee is expected to be designed to only cover the costs of administration of the license in the same way as the current Ozone Protection and Synthetic Greenhouse Gas Management licensing scheme. In Option 5, the excise is expected to be sufficiently high to ensure that importers are incentivised to join the industry scheme and is therefore not expected to fund collection and recycling costs. Collection and recycling costs may be passed onto consumers of new televisions and computers either through a visible/invisible 'advanced recycling fee' at point of sale;

- *PRO administration* – Option 7 does not incur this cost as there is no PRO administering the scheme. For the other options, funding of these costs is likely to be similar to collection and reprocessing costs (i.e. it may be industry levies payable to the PRO by importers that could wholly or partly fund these costs). Similarly, these costs may be passed onto consumers of new televisions and computers either through a visible/invisible fee at point of sale;
- *scheme communication costs* – if the PRO manages scheme communication and public education, it is likely these costs will be funded in the same manner as PRO administration costs. However, if the Government manages public education then it is likely this cost will be funded from consolidated revenue. The Australian Government has advised that there may be difficulties associated with using a tax to fund non-direct items such as scheme communication costs;
- *transitional assistance grants for infrastructure* – funding is expected to be the same as for scheme communication costs. The Australian Government has advised that there may be difficulties associated with using a tax to fund non-direct items such as infrastructure grants;
- *policy design and implementation, and other government administration costs* – it is likely that these costs will be funded from consolidated revenue from either the State or Commonwealth Government dependent on which level of government is administering the scheme. For Option 7, there is a possibility scheme administration could be funded from the excise fee payable on imports, however if the scheme is similar to PSO scheme, then the scheme is not operated on a cost recovery basis – rather the levy is captured in consolidated revenue and costs are also sourced from consolidated revenue regardless if there is a shortfall or surplus in funds; and
- *importer and recycler compliance* – these costs would be expected to be incurred by either the importers or recyclers participating in the scheme. If these costs are passed on to either consumers of new products or consumers of recycled materials, it is likely that this will be in an invisible manner via pricing of products.

The preferred option identified in Chapter 9 (Option 3) is expected to be funded by industry association fees/levies and consolidated revenue. Prior to the implementation of this option, supplementary financial analysis will need

to be undertaken to determine whether the proposed level of industry association fees/levy should receive government approval.

Issues to determine the appropriate level of a Commonwealth levy

In the PSO scheme, the Commonwealth levy and excise are charged on a per unit basis (per litre of lubricating oil) as this is essentially a homogenous product. However, charging an excise or levy on a per unit basis in a television and computer recycling scheme will be problematic as there are a breadth of products covered by the scheme which are not equivalent. For example, the scheme covers products such as power cords, mice and speakers, but at the same time covers complete televisions and computers. It would be inequitable to charge the same levy for these units as they have greatly different weights and values. For example, in 2007/08 it is estimated that:

- the average weight of a desktop computer is 21 kg, compared to 8 kg for computer monitors, 3 kg for laptops, and 2.6 kg for peripherals.[193]
- that average value of products covered by the proposed schemes range from $13 for speakers to $926 for CPUs (Table 42).

[193] Estimates based on manufacturer's data and direct weight measurements.

Table 42 The average free on board (FOB) value of imports - 2007/08

Product	Product Category	Average FOB value per unit
Television - Analogue	TV & VDU	$510
Television - Digital	TV & VDU	$634
Computer display - flat panel	Computer & VDU	$227
Computer display - CRT type	Computer & VDU	$375
Computer desktops and similar - CPU	Computer	$926
Computer desktops and similar - Complete PC	Computer	$777
Computer mobile units - Laptops and portables	Computer	$899
Computer peripherals - Keyboards	Computer	$23
Computer peripherals - Mouse	Computer	$15
Computer peripherals - Hard drives	Computer	$129
Computer peripherals - Scanners	Computer	$282
Computer peripherals - Speakers	Computer	$13
Computer peripherals - Web cam	Computer	$33
Computer peripherals - Power cords	Computer	$17
Computer peripherals - Internal power supplies	Computer	$82
Computer peripherals - External power supplies	Computer	$30
Computer peripherals - Fans	Computer	$36
Computer peripherals - Misc.	Computer	$86
Printer	Computer	$289
MFD	Computer	$193

Source: DFAT STARS Database; consistent with ABS Cat No 5368.0, December 2008 data

10.4 Issues to determine the appropriate level of the industry association fee or levy

Although the industry fees/levy will be determined by industry, the government will have to approve the scheme. A flat fee/levy is likely to discriminate against smaller players, so costs are likely to be shared according to market share. This can be determined based on units sold, weight sold or value sold, which involve the same implementation issues as discussed above in relation to a Commonwealth levy/excise.

10.5 Impact on the price paid by consumers

The potential impacts on consumers from implementation of a television and computer recycling scheme could include higher prices resulting from importers passing on recycling fees or increased compliance costs in their prices.

These costs would be passed on to the consumer at the point of sale, not at the point of recycling. The potential cost to consumers has yet to be fully determined, however it is expected to be priced on a sliding scale depending on the weight and type of product (i.e. a large plasma television will have a higher recycling cost than a keyboard for a computer). Increasing

economies of scale, introduction of new recycling technology and larger volumes of recycled product, as well as increased competition for recycling, is expected to drive recycling costs (and accordingly, costs to the consumer) down over a period of 5-10 years.

Some guidance as to the likely cost to the consumers is provided by comparing the costs from the CBA to the projected sales over the appraisal period. However, it should be noted that these costs are economic costs, not financial costs. As such they do not include profit margin or GST and are long run marginal averages. The economic costs included in the calculation were collection costs, reprocessing costs, policy design/implementation, PRO administration costs, government administration costs, importer compliance costs, recycler compliance costs and communications costs.

Although the preferred option covers all products, due to variations in the weight and value of televisions, computers and computer products, it may be more informative to look at VDUs alone (televisions and computer monitors) as these are larger items which are relatively similar in terms of both weight and value.

In this example, the additional economic cost to consumers of a national recycling scheme covering VDUs alone is estimated to average $4.20 per VDU sold.

Table 42 Unit costs (non-incremental), VDUs, threshold 3

	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
Sales (millions)	166.2	166.2	166.2	166.2	166.2	166.2	166.2	166.2	166.2
Total Costs ($ millions)	$714.2	$713.0	$686.3	$683.6	$781.1	$763.4	$771.6	$782.3	$715.6
Unit costs ($/sale)	$4.30	$4.29	$4.13	$4.11	$4.70	$4.59	$4.64	$4.71	$4.31

If all television, computers and computer products are included in the scheme (in the same manner as the preferred option), the additional economic cost to the consumer for all products is estimated to average $1.30 per unit sold.

Table 43 Unit costs (non-incremental), all products, threshold 3

	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
Sales (millions)	818.3	818.3	818.3	818.3	818.3	818.3	818.3	818.3	818.3
Total Costs ($ millions)	$1,020.5	$984.7	$991.1	$955.3	$1,112.2	$1,062.4	$1,101.3	$1,113.7	$1,020.6
Unit costs ($/sale)	$1.25	$1.20	$1.21	$1.17	$1.36	$1.30	$1.35	$1.36	$1.25

The unit costs outlined above relate to the total economic costs of the proposed schemes and are not incremental to the base case. As such, the costs:

- include government costs (policy design/implementation, government administration costs and communications costs in mandatory schemes), which are not likely to be passed on to consumers; and
- exclude industry profit margin and GST.

In addition, the industry costs to be passed on to consumers are likely to be offset by the financial market value of recovered resources.

If a financial analysis is undertaken on a scheme covering VDUs alone (televisions and computers) in which government costs are excluded, a profit margin of 30% is assumed,[194] GST is included and the financial market value of recovered resources are included, the additional financial cost to the consumer for each VDU sale is estimated to average $6.10 per unit (Table 44).[195] However, given that the sensitivity analysis revealed that the estimates are not definitive and respond to changes in key assumptions, a range of $5-$10 would be a better way to reflect the possible cost per television or computer monitor sold. As the value of these products is estimated to range from $230-$645 per unit, the additional costs account for around 1%-4% of the value of a new television or computer monitor.

It should be noted that these financial costs are long run marginal averages and may fluctuate over time, particularly in the short term when up front capital investments are likely to be required. The costs included in the calculation were collection costs, reprocessing costs, PRO administration costs, importer compliance costs, recycler compliance costs and communications costs.[196]

Table 44 Industry unit costs adjusted for the recovered value of resources (non-incremental), VDUs, threshold 3

	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
Sales (millions)	166.2	166.2	166.2	166.2	166.2	166.2	166.2	166.2	166.2
Total Costs ($ millions)	$677	$670	$677	$675	$757	$739	$735	$757	$677
Resource value ($ millions)	$218	$214	$218	$214	$241	$237	$241	$241	$218
Unit costs adjusted for the resource value ($/sale)	$4.08	$4.03	$4.08	$4.06	$4.56	$4.45	$4.42	$4.56	$4.08
Adjusted unit costs including 30% profit and GST ($/sale)	$5.83	$5.76	$5.83	$5.81	$6.51	$6.36	$6.32	$6.51	$5.83

[194] The assumption of 30% profit margin is based on surveys of major reprocessors.

[195] This is higher than the economic cost of $4.20 per VDU applying to the same type of scheme. The decrease in total costs due to the exclusion of government costs and the inclusion of revenue from recovered resources is more than offset by the inclusion of a 30% profit margin and 10% GST.

[196] Communications costs were only included for coregulatory schemes (options 1 to 6, 9) as these costs were assumed to be incurred by the government in mandatory schemes.

Table 45 Industry unit costs adjusted for the recovered value of resources (non-incremental), all products, threshold 3

	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
Sales (millions)	818.3	818.3	818.3	818.3	818.3	818.3	818.3	818.3	818.3
Total Costs ($ millions)	$983	$939	$983	$947	$1,089	$1,039	$1,065	$1,089	$983
Resource value ($ millions)	$300	$284	$300	$284	$333	$317	$333	$333	$300
Unit costs adjusted for the resource value ($/sale)	$1.20	$1.15	$1.20	$1.16	$1.33	$1.27	$1.30	$1.33	$1.20
Adjusted unit costs including 30% profit and GST ($/sale)	$1.72	$1.64	$1.72	$1.66	$1.90	$1.82	$1.86	$1.90	$1.72

10.6 Thresholds

Three thresholds based on the number of units imported were identified and assessed within the CBA framework (see Appendix F for further details on the coverage threshold analysis undertaken). Table 43 presents the NPV results of the CBA with different thresholds and illustrates the significant impact that these thresholds can have on the magnitude of the net benefits to society. For example, the NPV of a computer only scheme with no threshold is only marginally positive. As outlined in Table 46, the largest NPV results were produced by threshold 3, which excluded 95.5% of importers from the scheme, but maintained coverage of 95.3% of total units sold in 2008. This was based on the assumption that recycling levels did not change according to which threshold was employed. Further analysis is recommended to test the validity of this assumption. In addition, the financial implications of the different threshold levels have not been explored.

Table 46 NPV of the preferred option at different thresholds (present value, $2009)

		Option 3
TVs	No threshold	$386
	Threshold 1	$392
	Threshold 2	$392
	Threshold 3	$393
Computers	No threshold	$37
	Threshold 1	$145
	Threshold 2	$157
	Threshold 3	$164
VDUs	No threshold	$369
	Threshold 1	$388
	Threshold 2	$392
	Threshold 3	$394
All	No threshold	$517

	Threshold 1	$629
	Threshold 2	$642
	Threshold 3	$649

The thresholds applied in the CBA are based on the number of units imported, with separate thresholds for televisions, computers and computer related products, VDUs and all products. However, the units are not equivalent even within product categories as units differ both in terms of weight and value. For example the 'computers' category contains both speakers, which are valued at $13, and laptops, which are valued at $899 (Table 43). As a result, prior to implementation of a scheme it may be necessary to explore the financial impact of having thresholds based on the weight or value of products as opposed to the number of units.

10.7 Recycling targets

Implementation of recycling targets requires analysis of both the level that recycling targets are set at and enforcement of the recycling targets. The recycling targets for Option 3 are set by industry negotiation. However, the achievability of these recycling targets will need to be examined by the government before approval of any industry schemes. This may involve benchmarking against similar domestic or international schemes. The government will also need to examine how the industry targets will be enforced. As the scheme stands, the government has no recourse if the PRO fails to meet its recycling targets. However, the government could potentially make approval of any scheme conditional on sufficient safeguards being in place to ensure that recycling targets will be met.

10.8 Cost fluctuations

A range of factors have the ability to impact the costs associated with the proposed scheme The government will need to take these factors into account in order to ensure that costs are minimised and risks are mitigated:

- Product innovation and consumer behaviour: As has occurred historically, product innovation will continue to change the size and material composition of televisions and computers. There are numerous past examples including: the shift from analogue to digital television; the introduction of high definition screens with the concurrent phasing out of CRT screens; lightweighting of desktop portable computers; and the shift in consumer preference to laptop computers and, more recently, the advent of netbooks. Such changes in products and ease at which products can be disassembled has a direct impact on the cost of recovery and the financial value of material extracted.
- Design for end of life: Design considerations for end of life management of televisions and computers are key influencing factor in the capacity to recover resources. Many major computer brand companies for example have implemented environmental design programs that factor in resource recovery at end of life. This is less so with white box or unbranded computers.

- Reprocessing technology development: At reprocessing facilities end of life televisions and computers are disassembled into their constituent materials and components to meet market specifications. This is usually undertaken manually where each collected item is disassembled to extract hazardous constituents, valuable components or subassemblies prior to being transported for recycling, either locally or overseas. Manual disassembly is highly labour, and hence cost, intensive. Reprocessing costs are estimated to be around $700/tonne of which about 50-70% is labour. Technologies are also available to undertake mechanical processing of whole units without disassembly (following removal of hazardous components).[197] This usually involves shredding followed by a series of separation technologies to separate material into commodity streams. Due mainly to labour cost savings, these technologies can be cost effective if handling large quantities. From a resource recovery perspective they may however generate lower value products compared to manual disassembly. They are generally more suitable for processing large quantities of old or low value products that are not well designed for manual disassembly. However, as reprocessing technologies develop further, the capacity to recover resources on a more cost effective basis through automated processes will increase.
- Integration with other collection and recovery programs**:** The capacity to recover resources from end of life televisions and computers could be further enhanced through increased resource recovery focus on the broader e-waste stream. Integration of televisions and computers collection/recycling with a larger range of e-waste products will increase the scale and hence the cost effectiveness of recovery programs.
- Alternative waste technology**:** The implementation of alternative waste treatment facilities in major population centres in Australia may provide further opportunity to separate and recycle televisions and computer units, in particular computer peripherals currently disposed of in mixed waste streams.
- Commodity price fluctuations**:** As for the entire recycling sector, commodity price fluctuations will influence the capacity to recover resources from end of life televisions and computers. This has been highlighted by the recent volatility in commodity prices over the past 18 months.

[197] Rifer, Brody-Heine, Peters and Linnell (2009), *Closing the Loop, Electronics Design to Enhance Reuse/Recycling Value*, conducted by the Green Electronics Council in collaboration with the National Center for Electronics Recycling and Resource Recycling, Inc, January 2009

Appendices

Appendix A References

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Appendix B Customs tariff data and definitions

The import tariff codes and their relationship with the presentation of results in the four categories throughout this report – televisions, computers, visual display units and televisions and computers are set out in the following table.

Table B.1 Television and Computer Imports Codes

Import tariff code (10-digit)	Description		Televisions	Computers	Visual display units	Televisions and computers
8528.72.00/ various	Televisions		✓		✓	✓
8528.73.00.35			✓		✓	✓
8528.51.00.32	Computer displays	Flat panel		✓	✓	✓
8528.41.00.10		CRT type		✓	✓	✓
8471.50.00.69	Computer desktops and similar	CPU		✓		✓
8471.41.00.27						
8471.49.00.67		Complete PC		✓	✓	✓
8471.30.00.20	Computer mobile units	Laptops and portable		✓		✓
8471.60.00.55	Computer peripherals	Keyboards		✓		✓
8471.60.00.92		Mouse		✓		✓
8471.70.00.74		Hard drives		✓		✓
8471.60.00.95		Scanners		✓		✓
8518.29.90.23		Speakers		✓		✓
8525.80.10.15		Web cams		✓		✓
8544.42.19.02		Power cords		✓		✓
8504.40.30.59		Internal power supplies		✓		✓
8504.40.90.80		External power supplies		✓		✓
8414.59.90.52		Fans		✓		✓
8473.30.00.62		Miscellaneous/ other parts		✓		✓
8443.32.00.71	Personal or desktop laser and inkjet printers	Ink-jet		✓		✓
8443.32.00.72		Dot matrix		✓		✓
8443.32.00.74		Laser		✓		✓
8443.31.00.61	Multi function device (MFD)	Ink-jet		✓		✓
8443.31.00.62		Dot matrix		✓		✓
8443.31.00.64		Laser		✓		✓

Appendix C Choice modelling

Valuing the Environment

The use of CBA as a robust tool to inform government decision making has long been accepted by policy analysts and economists. CBA is primarily concerned with the efficiency with which resources are used and allocated, and seeks to capture all changes in resource use across the community that affect the overall welfare of society. The purpose of such an analysis is to determine whether a proposed policy will deliver benefits to society that exceeds any costs that are imposed. Where the proposed policy impacts goods and services traded in markets, the value of impacts can be estimated from market data such as prevailing prices, costs and quantities. However, many environmental impacts associated with waste management are not captured in market transactions and so it is not possible to estimate their value directly.

The COAG Guidelines[198] acknowledge that it is not always possible to value environmental and social costs and benefits in dollars. While the Guidelines provide some guidance on the valuation of non-market aspects, this is very limited. However, support for the application of choice modelling for valuing multidimensional environmental problems to assist decision-makers in appropriately managing the environment has been growing steadily in recent years both within Australia and internationally. A 2006 report by the OECD recommended choice modelling as the most pertinent stated preference methodology for valuing an environmental problem that is relatively complex, such as the management of end of life televisions and computers, It also noted that choice modelling provided decision-makers with a clear understanding of how changes to the environment are valued.[199] In addition, in April 2008 the Australian Government commissioned a consultancy focused on identifying tools and methods by which to better demonstrate social and environmental benefits to society, along with values and beliefs held by the community. Choice modelling emerged as the preferred mechanism for demonstrating community values and beliefs.[200]

Choice Modelling has been used in Australia to value the environmental impacts of a diverse range of complex scenarios. For example, Choice Modelling was used to measure the recreational benefits of greater species protection of River Red Gums in Victoria, which was compared with foregone agricultural and timber profits.[201]

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[198] Council of Australian Governments (2007), *Best Practice Regulation: A Guide For Ministerial Councils and National Standard Setting Bodies*, October

[199] OECD (2006) *Cost-Benefit Analysis and the Environment: Recent Developments*, France

[200] BDA Group (2008), *Analysis of Social and Environmental Valuation Methodologies for Waste Management*, unpublished report prepared for DEWHA

[201] Victorian Environmental Assessment Council (2007) *Economic Evaluation of Forest Environmental Attributes – VEAC Non-use Values Project*, website: www.veac.vic.gov.au/eefea.htm, accessed 18 September 2009

Overview of choice modelling

Choice modelling is one method used by economists to obtain people's stated preference for different options in a hypothetical setting. It involves an experiment that aims to replicate a market setting, where people are confronted with a plausible scenario involving the choice of various products that are characterised by specific attributes and an acquisition price. A choice modelling survey presents a sequence of different choices to respondents. The choices involve a range of different environmental outcomes at different costs. From the choices people make, an estimate of the extent of their willingness to pay for additional costs to achieve some environmental improvement can be quantified.

It is this "willingness to pay" that can be directly included in the CBA of a policy initiative. WTP is the value society places on the social and environmental impacts expressed in monetary terms.

As choice modelling asks for respondents to state their preference given a hypothetical situation, it is able to be used to value products or outcomes that do not currently exist in the market place.

It should be noted that choice modelling relies on stated preference (i.e. what people say they are willing to do) rather than revealed preferences (which draws on evidence of what people have actually done). In addition, some willingness to pay surveys have been found to overestimate people's willingness to pay and research has found that the ordering of the questions can also affect the results.[202] Consequently, caution is required when interpreting the choice modelling and the willingness to pay estimates.

Choice modelling of television and computer recycling

In scoping the requirements for assessing recycling of televisions and computers, the New South Wales government commissioned a work by Professor John Rolfe from the University of NSW, which confirmed that choice modelling was an appropriate approach to valuing the non-market aspects of recycling televisions and computers and provided advice on the design of a choice modelling study on televisions and computers.[203]

The choice modelling study to determine the community's willingness to pay for recycling end of life televisions and computers was undertaken by URS in

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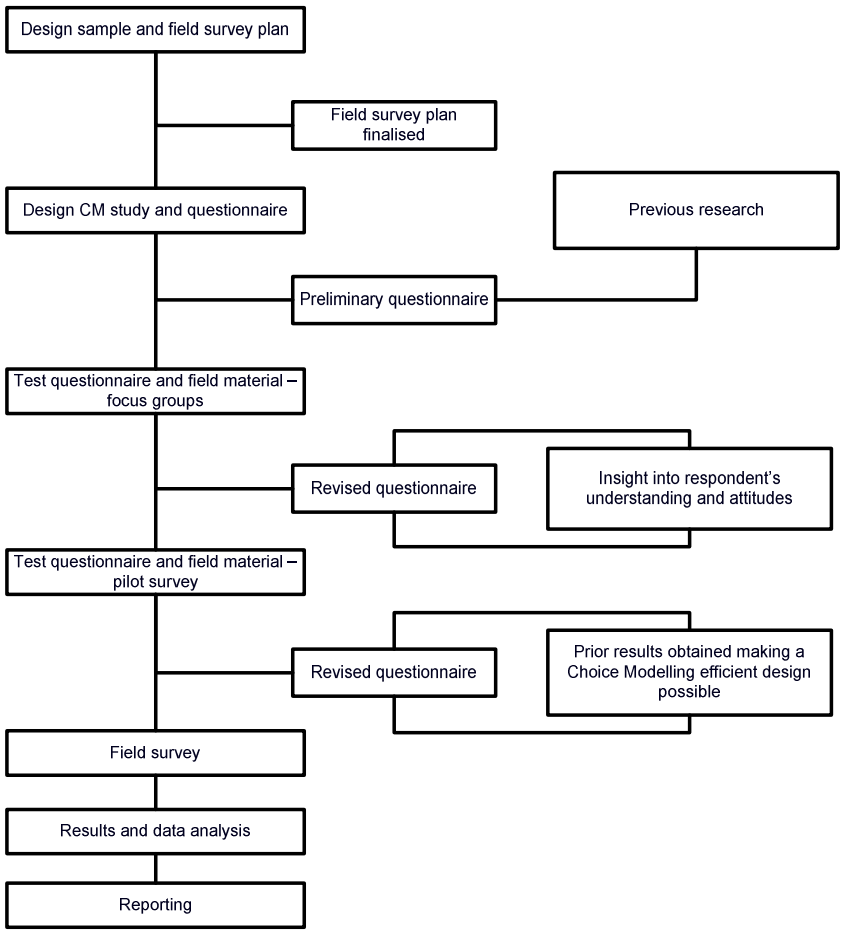
[202] See, for example, Blumenschein, Johannesson, Yokoyama and Freeman (2001), *Hypothetical versus real willingness to pay in the health care sector: results from a field experiment*; Stewart, O'Shea, Donaldson and Shackley (2002) *Do ordering effects matter in willingness-to-pay studies of health care?*; Armantier and Treich (2003)*Social Willingness to Pay, Mortality Risks and Contingent Valuation*

[203] R&Z Consulting (2008) *Estimating Consumers' Willingness to Pay for Recycling End of Life Televisions and Computers in Australia: A Framework for Economic Analysis*, prepared for the NSW Department of Environment and Climate Change; R&Z Consulting (2008) *Estimating Consumers' Willingness to Pay for Recycling End of Life Televisions and Computers in Australia: Designing a Stated Preference Experiment*, prepared for the NSW Department of Environment and Climate Change;

2009.[204] A total of 2,105 households were surveyed to test the hypothesis that the community has willingness to pay for increased levels of television and computer recycling, but that due to market failures, this demand is not being met. The study was designed to provide a quantitative measure in dollar terms of the market failure. A number of steps were undertaken to design and refine a questionnaire. These steps are outlined in Figure C.1.

Figure C.1 Choice Modelling Methodology



To ensure that the households survey were sufficiently informed of the issues related to end of life televisions and computers, URS established six focus groups, as well as a pilot survey of 305 households. The Office of Best Practice Regulation (OBPR) and the Australian Bureau of Agricultural Resource Economics (ABARE), a federal agency specialising in economic analysis, were consulted with regard to the draft survey to ensure its validity.

[204] URS (2009) *Willingness to Pay for E-Waste Recycling*, July

The choice modelling survey itself included separate attributes for the collection method (drop-off and kerbside), recycling rate (50%, 70% and 90%) and the cost. The survey did not differentiate between televisions and computers as the focus groups had indicated that households did not see any difference between them from a recycling perspective. The cost was also presented in terms of an upfront fee on new products, rather than other funding mechanisms such as a point of disposal charge, since the focus groups had indicated that this was the most appropriate place to collect funds and avoid dumping. Each attribute also included a “no change” option.

The choice modelling survey found that the community has a willingness to pay for recycling end of life televisions and computers. The study indicated that people are willing to pay $0.50 on a new item for each 1% increase in the recycling rate. Thus, assuming the current recycling rate is 10%, then people are willing to pay $20 for a new television or computer to achieve a 50% recycling rate or $30 per new item to achieve a 70% recycling rate. The survey also found that people are willing to pay an additional $3.55 per item for a kerbside collection system over a drop-off system.

A final peer review of the draft choice modelling survey was undertaken by ABARE, who concluded that the use of the choice modelling technique and the design of the related survey were valid and appropriate for the intended analysis.

Further detail on the methodology and results can be found in the 2009 Willingness to Pay for E-waste Recycling report or in Box 1.

Appendix D Policies in Australian jurisdictions

Australian jurisdictions each have legislation and / or policies related to waste reduction and efficiency of use and this provides an additional policy argument as to why recycling of televisions and computers should be regulated. Policies include:

- NSW – the waste regulatory framework is administered under two principal pieces of legislation:
  - *Protection of the Environment Operations Act 1997* – aims to promote pollution prevention, the elimination of harmful wastes, the reduction in the use of materials and the re-use, recovery and recycling of materials. The main feature of the legislation is that it establishes the waste and environment levy and enables the Government to set out explicit protection of the Environment policies (PEPs), which establish environmental standards, goals, protocols and guidelines. They are also the means of adopting Australia-wide environment protection measures set by the National Environment Protection Council.[205]
  - *Waste Avoidance and Resource Recovery Act 2001* – used to establish programs to help reduce waste generation and recover resources. It develops a waste hierarchy that ensures that resource management options are considered against the priorities of:
    - Avoidance – to reduce the amount of waste generated;
    - Resource recovery – reuse, recycling, reprocessing and energy recovery; and
    - Disposal – management of all disposal options in the most environmentally responsible manner.[206]
- Victoria: *Environment Protection Act 1970* – includes functions to protect the environment from the impact of wastes and sets out the waste hierarchy. The State Environment Protection Policy (Waste Minimisation) establishes a framework that promotes the adoption by the industry of processes, practices and technologies that minimise the generation of industrial waste

[205] NSW Government Department of Environment and Climate Change (2008), 'About POEO legislation', available at http://www.environment.nsw.gov.au/legislation/aboutpoeo.htm#major, accessed 16 April 2009

[206] NSW Government Department of Environment and Climate Change (2009), 'Waste avoidance and resource recovery in NSW', available at http://www.environment.nsw.gov.au/warr/index.htm/ , accessed 16 April 2009; NSW Government Department of Environment and Climate Change (2009), 'The waste management and resource recovery framework', < http://www.environment.nsw.gov.au/waste/> , accessed 16 April 2009

- Queensland: *Environmental Protection Act 1994* aims to protect Queensland's environment while allowing for development that improves quality of life. The Environment Protection (Waste Management) Policy 2000 aims to:
  - promote efficiency in the use of resources
  - promote the maximum use of wastes as a resource
  - helps achieve continuous improvement in the standard of waste management activities
  - provides for the preparation of industry waste reduction programs that incorporate the waste management hierarchy, the 'polluter pays' principle, the 'user pays' principle, and the product stewardship principal
- Western Australia: *Environmental Protection Act 1986*, provides a basis for the Environment Protection Authority to prepare environmental protection policies, to undertake environmental impact assessment of proposals and to recommend the making of regulations which can address the management of wastes and the protection of the environmental impacts of those wastes. In addition the passage of the *Waste Avoidance and Resource Recovery Act 2007* established the Waste Authority, which is required to develop a State-wide, long term waste strategy for waste avoidance and resource recovery including the setting of targets for waste reduction and resource recovery and the diversion of waste from landfill.[207]
- South Australia: *Environment Protection Act 1993*, incorporates the principles of ecologically sustainable development requiring the economic and environmental considerations be integral to address issues such as pollution, waste, contamination and environmental harm generally. South Australia's Strategic Plan 2007 aims to encourage sustainability and includes a target of reducing waste to landfill by 25% by 2014. South Australia's Waste Strategy 2005-2010 aims to:
  - Foster sustainable behaviour
  - Redirect waste away from landfill
  - Establish effective recycling systems and reprocessing infrastructure
  - Enact policies to encourage avoidance, reduction, re-use and recycling of televisions and computers
  - Encourage cooperation.[208]

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[207] WA Department of Environment and Conservation website, 'Waste Management', available at http://www.dec.wa.gov.au/pollution-prevention/waste-management/index.html, accessed 16 April 2009

[208] Environment Protection Authority,(2009), *'Zero Waste SA, 'Waste and Resource Recovery'*, available at http://www.epa.sa.gov.au/waste.html, accessed 16 April 2009; Zero Waste SA website, 'Waste Strategy', available at < http://www.zerowaste.sa.gov.au/About.mvc/Wastestrategy, accessed 16 April 2009

The South Australian government has implemented an e-waste policy and has recently issues a discussion paper to ban e-waste from landfill.

- Tasmania: *Environmental Management and Pollution Control Act 1994*– sets out the objectives of the resource management and planning system of Tasmania, which include to prevent environmental degradation and adverse risks to human and ecosystem health by promoting pollution prevention, clean production technology, reuse and recycling of materials and waste minimization programmes.[209]
  - Best practice standards for landfill are contained in the Landfill Sustainability Guide 2004
- Northern Territory: *Waste Management and Pollution Control Act 1998* – has a strategy for waste management and pollution control which aims to encourage industry to develop waste management plans and conduct voluntary waste audits.
- Australian Capital Territory: have an Electrical and Electronic Waste Product Stewardship Framework consistent with a "No Waste by 2010" strategy. The aim of the strategy is to eliminate waste going to landfill by 2010 by encouraging producer responsibility, encourage consumers to make sound purchasing decision, promoting cost effective methods for recovering resources and facilitating the conversion of waste into commercially viable products.

[209] Government of Tasmania (1994), *Environmental Management and Pollution Control Act* 1994 (Tas), Schedule 2

Appendix E Analysis of options

This appendix presents detail about each of the options analysed in this regulatory impact statement to assist in determining the options assessed within the detailed CBA. It discusses each of the broad steps undertaken in the analysis of options.

Step 1: Identify possible policy options for end of life televisions and computers

The initial list of possible policy options identified as part of the regulatory impact statement is presented in table below. One of these does not represent a change in the current situation (the business as usual case), whereas the others are all possible policy options for a change in government intervention.

Table E.1 Initial list of policy options identified

Regulation	Option		Description
Current	1	Business as usual	The current situation does not change. Some jurisdictions implement regulation or schemes but there is no national coordination of government policy. In the private sector, industry participants implement brand-specific schemes.
Non-regulatory	2	Public Education	Government or industry runs public information campaigns to educate the public about how to access existing recycling opportunities.
	3	Local Government Collection Scheme	Recycling scheme organised at the Local Government level. Local Government provides collection infrastructure, but there are no targets or policy regulations.
	4	State Government Collection Scheme	Recycling scheme organised at the Local Government level. State government provides collection infrastructure and may use existing Local Government infrastructure, but there are no targets or policy regulations.
	5	Cth Government Collection Scheme	Recycling scheme organised at the Commonwealth Government level. Commonwealth Government provides collection infrastructure and may use existing State and Local Government infrastructure, but there are no targets or policy regulations.
	6	Voluntary Industry Scheme	Voluntary schemes administered by the television and computer industries. There are collection and recycling targets, but inclusion in the scheme is voluntary and there are no regulations to enforce the targets.
Co-regulatory	7	Co-regulatory Industry Scheme with a State-based Individual Producer Responsibility Safety Net	State/Territory Regulations would impose mandatory requirements on importers to have an Action Plan and demonstrate that they had achieved performance targets for collection, recycling and reporting with an exemption if the company joins an approved voluntary industry schemes.
	8	Co-regulatory Industry Scheme with a Commonwealth-based Individual Producer Responsibility Safety Net	Commonwealth regulations would impose mandatory requirements on importers to have an Action Plan and demonstrate that they had achieved performance targets for collection, recycling and reporting with an exemption if the company joins an approved voluntary industry scheme. The aim would be to make the regulation onerous to encourage all companies to join the industry scheme
	9	Co-regulatory Industry Scheme with a Commonwealth Excise safety net.	This option would place a Commonwealth Excise Tax on each product supplied to the market with an exemption for products supplied by companies that participate in an approved voluntary industry scheme. The aim would be to drive companies into the industry scheme by setting the excise tax at a higher amount than the cost of participating in the scheme. This is not intended to create an alternative funding source for recycling or to compete with the industry scheme.
Regulatory Options	10	Mandatory Import License Requirement	Producers must hold a license to import televisions and computers. To be licensed, a producer must pay a license fee and an on-going administration fee for each unit imported to the Commonwealth, report the amount imported to the Commonwealth and belong to an approved industry scheme (i.e. option 5)
	11	Design Standards	Regulatory design standards make recycling easier and more efficient per item,
	12	Mandatory extended producer responsibility	Producers would be financially and physically responsible for ensuring that current end of life product is collected and recycled, regardless or brand, age or condition. The amount they would need to collect and recycle would be based on their market share. To determine market share and compliance, each regulated producer would need to report the amount of product they supplied to the market

Regulation	Option		Description
			and the amount they collected and recycled. Targets would be consulted with relevant industries, but not negotiated as under the Industry Agreements above (policy options 5 to 8)
	13	Mandatory extended retailer responsibility	Same as above (policy option 10) except that the responsibility would fall on retailers based on their market share.
	14	Mandatory Responsibility on Local Governments	A mandatory physical and financial responsibility for collection and recycling is placed on local government
	15	Deposit Refund Scheme	Legislation requiring retailers to collect a deposit on each new product and provide a refund when the product is returned to a collection site for recycling.
	16	Tradeable Permits Scheme	This option would involve giving recyclers that meet specific requirements set out in regulations the power to generate “permits” based on the number of pieces of equipment they recycle. Regulations would also impose an obligation on producers to purchase a specific number of permits per year based on the amount of equipment they supply to the market.
	17	Landfill ban	State-based regulation would require owners and operators of landfill to refuse to accept televisions and computers.
	18	Subsidy for collection recycling	Regulations set out the criteria and levels of subsidies paid to recyclers for collection and recycling of televisions and computers.

Step 2: Identify possible funding options for a television and computer waste scheme

The initial list of possible funding options identified is presented in table below.

Table E.2 Initial list of funding options identified

	Funding Option		Description
Local Government	1	Landfill charge	Consumers and businesses are charged per unit/tonne of television and computer waste that is disposed of at Local Government landfills
	2	Rates	Charged by Councils on an annual basis to cover the cost of providing services and facilities to residents and businesses in the Local Government area.
State / Territory Government	3	Fee for service (point of sale customer charge)	Under s 90 of the Constitution, only the Commonwealth can impose an excise/tax. States can impose a 'disposal fee' if it is collected at point of sale, is related to the cost of recycling the particular piece of equipment and is used to recycle that particular piece of equipment. A fee for service cannot be used to provide general funding for recycling.
	4	State consolidated revenue	All revenues raised or received by the Executive Government of a State/Territory
Commonwealth Government	5	Commonwealth consolidated revenue	All revenues raised or received by the Executive Government of the Commonwealth, which can be appropriated for the purposes of the Commonwealth subject to the Constitution.[210]
	6	Point of sale excise	A Commonwealth Excise (tax) imposed at point of sale. Unlike a fee for service, this doesn't have to relate to the cost of recycling a particular piece of equipment and can be used to provide general funding for recycling.
	7	Point of import excise	A Commonwealth Excise (tax) imposed at point of import. Unlike a fee for service, this doesn't have to relate to the cost of recycling a particular piece of equipment and can be used to provide general funding for recycling.
	8	Import license fees	Importers are required to pay a fee to obtain a license permitting them to import goods into Australia.
Industry	9	Industry association fees	An annual subscription fee payable by members of the industry association. Industry association fees can be used to fund any activity of the industry association.
	10	Industry association levy	An industry association levy is raised for a special purpose and may not be used to fund other activities of the industry association.

[210] *Commonwealth of Australia Constitution Act*, s 81

Step 3: Identify range of policy and funding combinations, then determine most feasible set of combinations

The table below presents the combination of policy and funding options in the above two tables, and the combinations that were identified.

Table E.3 Combinations of policy and funding options identified

					FUNDING OPTIONS								
				Who funds	Local Government		State/Territory Govt	Commonwealth Government				Industry	
		Policy Description	**Who runs**	**Funding Description**	Landfill charge	Rates	Fee for service (Point of Sale customer charge)	Cth/(state) consolidated revenue	Point of sale excise	Point of import excise	License fee	Industry Association fees	Industry Association levy
POLICY OPTIONS		Business as usual	Current situation										
	Non-regulatory	Public education	State Gvt, Cth Gvt or industry										
		Local govt collection scheme (no targets or policy regulation)	Local Gvt										
		State govt collection scheme (no targets or policy regulation)	State/Territory Gvt										
		Cth govt collection scheme (no targets or policy regulation)	Cth Gvt										
		Industry coordinated collection scheme (voluntary with no policy regulation)	Industry										
	Co-reg	Co-regulatory Industry Scheme (Individual EPR)	Cth or State Gvt										
		Co-regulatory Industry Scheme (Cth excise)	Cth Gvt										
	Mandatory	Mandatory Scheme (Import Control)	Cth Gvt										
		Subsidy scheme for collection/ recycling	Cth or State Gvt										
		Design Standards	Cth Gvt										
		Mandatory Extended Producer Responsibility	Cth or State Gvt										
		Mandatory Extended Retailer Responsibility	Cth or State Gvt										
		Mandatory Responsibility on Local Government	Cth or State Gvt										
		Deposit Refund Scheme	Cth or State Gvt										
		Tradeable Permits	Cth or State Gvt										
		Landfill ban	Cth or State Gvt										

Note: coloured cells indicate 'feasible' set of funding and policy options. Cells filled with an 'x' indicate policy and funding options not considered further due to feasibility.

Step 4: Identify options considered most likely to achieve objectives and address problems

The next step was to consider which options will achieve objectives and address problems. In order to do this, each policy option above was assessed in order to identify those for detailed CBA analysis. A table presenting this process and its outcomes is provided in Chapter 6. The table below presents the options identified for detailed CBA analysis.

Table.4 Options that will be subjected to Cost Benefit Analysis

No.	Policy & funding option	Option (affects scheme objectives)	Description	Product group
	Business as usual	N/A	Future if continue on current basis - i.e. some voluntary local/state Govt efforts but not coordinated (e.g. Byteback)	i) TVs only ii) Computers only iii) Visual display units from TVs & computers iv) All TVs and computers
1& 2	Co-reg: state-based EPR (NEPM) with exemption if belong to an industry scheme	Option 1: Joint scheme applying to all products	- Voluntary Industry Scheme, with industry responsible for collection of all products (including historic and orphan) and targets. [Collection targets - Year 1: No target, Year 2: 40%, Year 3: 55%, Year 4: 70%, Year 5: 80%, Following years: 80%] [Recycling targets - Year 1: at least 60% of the average weight of a TV recovered for recycling, Year 2: 60%, Year 3: 70%, Year 4: 80%, Following years: 85%] - NEPM measure with consistent state regulations that requires producers who refuse to join the voluntary industry scheme to have an approved action plan and demonstrate that they achieve performance targets - Policy Administration by State Government - Scheme administration by the industry PRO - Industry levy paid to PRO to fund scheme (likely passed on to consumers...but at discretion of industry). Policy development, monitoring and enforcement of regulations and reporting of enforcement actions funded from State consolidated revenue	i) TVs only ii) Computers only iii) Visual display units from TVs & computers iv) All TVs and computers
		Option 2: Separate scheme applying to computers	- Computer Industry same as Option 1....except that industry is not responsible for collection of all products. Instead is a voluntary Industry Scheme with split responsibility: (i) Major brand owners take responsibility for historic waste from their own brand (pay PRO after their brand is recycled) (ii) Importers of generic parts and equipment are responsible for all non-branded and orphan equipment (pay advanced recycling fee to PRO on import) – an estimated 20% of end of life units pa is not likely to be collected/recycled as historical unbranded units are not captured - analysis should indicate costs for branded verses non-branded producers. - Targets assumed as per Option 1	i) Computers only ii) Visual display units from computers
3 & 4	Co-reg: Cmwth-based EPR with exemption if belong to an industry scheme	Option 3: Joint scheme applying to all products	- Voluntary Industry Scheme, with industry responsible for collection of all products (including historic and orphan) and collection targets [Collection targets - Year 1: No target, Year 2: 40%, Year 3: 55%, Year 4: 70%, Year 5: 80%, Following years: 80%] [Recycling targets - Year 1: at least 60% of the average weight of a TV recovered for recycling, Year 2: 60%, Year 3: 70%, Year 4: 80%, Following years: 85%] - Similar approach as NEPM option above, but with Cth regulations that require producers who refuse to join the voluntary industry scheme to have an approved action plan and demonstrate that they achieve performance targets	i) TVs only ii) Computers only iii) Visual display units from TVs & computers iv) All TVs and computers

No.	Policy & funding option	Option (affects scheme objectives)	Description	Product group
			- Policy Administration by Cth Government - Scheme administration by the industry PRO - Industry levy paid to PRO to fund scheme. Policy development and regulations funded from Cth consolidated revenue	
		Option 4: Separate scheme applying to computers	- Computer Industry same as Option 3....except that industry is not responsible for collection of all products. Instead is a voluntary Industry Scheme with split responsibility: (i) Major brand owners take responsibility for historic waste from their own brand (pay PRO after their brand is recycled) (ii) Importers of generic parts and equipment are responsible for all non-branded and orphan equipment (pay advanced recycling fee to PRO on import) – an estimated 20% of end of life units pa is not likely to be collected/recycled as historical unbranded units are not captured - Targets assumed as per Option 3	i) Computers only ii) Visual display units from computers
5 & 6	Co-reg: Cmwth levy with exemption if belong to an industry scheme	Option 5: Joint scheme applying to all products	- Voluntary Industry Scheme, with industry responsible for collection of all products (including historic and orphan) and collection targets. [Collection targets - Year 1: No target, Year 2: 40%, Year 3: 55%, Year 4: 70%, Year 5: 80%, Following years: 80%] [Recycling targets - Year 1: at least 60% of the average weight of a TV recovered for recycling, Year 2: 60%, Year 3: 70%, Year 4: 80%, Following years: 85%] - Cth Excise Regulatory Safety Net requires producers who refuse to join the voluntary industry scheme to pay an excise - Policy Administration by Cth Government - Scheme administration by the industry PRO - Industry levy paid to PRO to fund scheme. Policy development and regulations funded from Cth consolidated revenue offset by any funds generated from the levy. - Note: this is not a revenue generation exercise. The intention is to drive all producers into the scheme and collect no funds via the levy.	i) TVs only ii) Computers only iii) Visual display units from TVs & computers iv) All TVs and computers
		Option 6: Separate scheme applying to computers	- Computer Industry same as Option 5....except that industry is not responsible for collection of all products. Instead is a voluntary Industry Scheme with split responsibility: (i) Major brand owners take responsibility for historic waste from their own brand (pay PRO after their brand is recycled) (ii) Importers of generic parts and equipment are responsible for all non-branded and orphan equipment (pay advanced recycling fee to PRO on import) – lower diversion rate for first 10 years is expected as historical unbranded units are not captured - Targets assumed as per Option 5	i) Computers only ii) Visual display units from computers iii) Visual display units from TVs & computers iv) All TVs and computers
7	Mandatory: Cmwth levy with government-run scheme (Oil scheme approach)	Option 7: Mandatory so all involved	- scheme involves paying a subsidy per item collected/recycled - Policy Administration by Cth Government, including regulation regarding the levels/criteria for the subsidy - Scheme Administration by Cth Government - Funding from Cth Excise at point where product first enters the market (i.e. point of import) - Funds would cover all government administration costs, as well as subsidy for recycling. - Levy would be set on a single item, such as the visual display unit (including laptops, etc.), but the funds generated would be used to recycle all equipment and peripherals, not just the visual display unit.	i) TVs only ii) Computers only iii) Visual display units from TVs & computers iv) All TVs and computers

No.	Policy & funding option	Option (affects scheme objectives)	Description	Product group
8	Mandatory: Import license requirement (all companies required to have license, pay fee, report info, belong to a scheme).	Option 8: Mandatory so all involved	- Cth advice that an import control safety net would require licensing (i.e. effectively results in mandatory industry involvement) - Mandatory Industry Scheme, with industry responsible for collection of all products (including historic and orphan) and collection targets[Collection targets - Year 1: No target, Year 2: 40%, Year 3: 55%, Year 4: 70%, Year 5: 80%, Following years: 80%] [Recycling targets - Year 1: at least 60% of the average weight of a TV recovered for recycling, Year 2: 60%, Year 3: 70%, Year 4: 80%, Following years: 85%] - Producers must hold a license to import product. To be licensed, a producer must pay a license fee and an on-going administration fee for each unit imported to the Cmwlth, report the amount imported to the Cmwlth and belong to an approved scheme. Membership in the scheme would involve paying a levy for each item imported (over and above the amount paid to the Cmwlth) and report the amount imported to the scheme. - Policy Administration – Commonwealth Government (funded from license fee and ongoing fee per unit, i.e. no impost on consolidated revenue) - Enforcement - Australian Customs Service (ACS) - Scheme administration by the industry PRO (funded by the industry levy paid to the PRO)	i) TVs only ii) Computers only iii) Visual display units from TVs & computers iv) All TVs and computers
9	Mandatory: state-based EPR (NEPM) (all companies required to report info and join a scheme. Schemes regulated and required to report)	Option 9: Mandatory so all involved	- Mandatory Industry Scheme, with industry responsible for collection of all products (including historic and orphan) and collection targets[Collection targets - Year 1: No target, Year 2: 40%, Year 3: 55%, Year 4: 70%, Year 5: 80%, Following years: 80%] [Recycling targets - Year 1: at least 60% of the average weight of a TV recovered for recycling, Year 2: 60%, Year 3: 70%, Year 4: 80%, Following years: 85%] - NEPM measure with consistent state regulations that regulates and enforces penalty for not achieving requirements - Policy Administration by State Government - Scheme administration by industry PRO (i.e. industry levy paid to PRO to fund scheme administration) - Policy development and regulations funded from State consolidated revenue	i) TVs only ii) Computers only iii) Visual display units from TVs & computers iv) All TVs and computers

Appendix F Analysis of coverage thresholds

Table F.1 shows the threshold level (number of units) and resulting percentage coverage (% of units imported by companies) and number of companies included in the scheme) at the three different threshold levels selected for analysis. The coverage and number of companies is based on application of the thresholds to 2008 Customs data.[211]

Table F.1 Selected threshold levels and associated percentage coverage and number of companies

	No threshold	Threshold 1 (units)			Threshold 2 (units)			Threshold 3 (units)		
	Companies (number, 2008)	Threshold level (units)	Coverage (% of units, 2008)	Companies (number, 2008)	Threshold level (units)	Coverage (% of units, 2008)	Companies (number, 2008)	Threshold level (units)	Coverage (% of units, 2008)	Companies (number, 2008)
Televisions	458	400	99.6%	79	2,000	98.5%	45	5,000	97.5%	37
Computers	9,999	200	99.5%	1,945	1,000	98.3%	997	4,000	95.7%	503
VDUs	1,874	100	99.6%	493	500	98.6%	202	2,000	96.9%	94
All products	10,194	200	99.6%	1,985	1,000	98.4%	1,023	5,000	95.3%	460

Source: ACS

Based on the threshold levels given in Table G.1 and 2007 Customs data, the number of companies who would have dropped out of the scheme between 2007 and 2008 and the number of companies who would have entered the scheme in 2008 (e.g. who weren't included in the scheme in 2007) are presented in Table G.2.

Table F.2 Impact of the chosen threshold level on companies included, drop out of companies and new companies included, by number of companies

	Drop out of importing companies (imported in 2007 but not in 2008)				Entrance of new importers into the market (imported in 2008, but not in 2007)			
	No Threshold	Threshold 1	Threshold 2	Threshold 3	No threshold	Threshold 1	Threshold 2	Threshold 3
Television	379	46	19	11	329	26	13	11
Computers	4,648	834	485	230	5,054	852	391	182
VDUs	1,102	106	56	33	1,287	347	107	33
All products	4,810	855	494	208	5,175	862	393	152

Source: ACS

[211] Customs data was provided for 'companies' and for 'individuals'. Customs were not able to provide data for these individuals to enable the threshold analysis at the product group level. However, across all import codes individuals imported on average 4-5% of total units. The remaining import threshold analysis therefore excluded any units imported by individuals.

Appendix G CBA assumptions

The tables in this appendix show the assumptions and parameters that have formed the basis for the CBA presented in this regulatory impact statement.

Table G.1 CBA assumptions and parameters – General assumptions

Assumption	Unit	Value	Source
Discount Rate	%	7% (sensitivities at 3%, 11%)	The COAG guidelines
Timeframe	Years	• Base year is 2008/09 • Scheme assumed to start in 2010/11 after 2 years of design and implementation	EPHC Electrical Equipment working group
Time period of analysis	Years	Scheme analysed over 20 years from the first year of operation of the scheme i.e. 2010/11 to 2030/31	The COAG guidelines
Sensitivity	%	To be conducted on key parameters including: • Discount rates of 3% and 10% (currently 7%) • PRO cost savings of 30% and 50% from administering both schemes • Willingness to pay of $18.18/unit sold and $23.68/unit sold (currently $21.14/unit sold) representing the upper and lower confidence intervals respectively • 100% kerbside pickup (currently 100% drop off collection) • Television and computer (desktops and laptops only) weights of 25kg and 7.5kg respectively for 'new products' (currently 25.96 and 19.11 kg respectively for 'end of life products'	• The COAG guidelines • EPHC Electrical Equipment working group • URS Willingness to Pay Study • URS Willingness to Pay Study • Manufacturer's data and direct weight measurements of new televisions and computers
Import/end of life/collection/recycling volumes	Units/tonnes/no. importers	This data is the key input in the CBA and varies for each year, product and option.	• Australian Customs Service data on importers of television and computers over two years from 2007 to 2008 • EPHC Electrical Equipment working group • Australian e-waste recyclers • Television and computer industry representatives • Import data sourced from Department of Foreign Affairs and Trade on television imports from 1998/99 to 2007/08 and on computer imports for the period 1999/00 to 2007/08 • Tables 23 and 24 (pages 49 and 50) of United Nations University (2007) Review of Directive 2002/96 on Waste Electrical and Electronic Equipment

Assumption	Unit	Value	Source
			• Previous Hyder research on televisions and computers

Table G.2 CBA assumptions and parameters –Collection Cost Assumptions

Cost Assumptions	Unit	Value	Source	Note
1) Proportion of Collection by Method				
Drop-off	%	100%	• Product Stewardship Australia 2006, 'Draft Product Stewardship Agreement for Televisions: An Agreement between the Environment Protection Heritage Council and the Television Industry' • AIIA and Planet Ark Consulting 2005, 'AIIA – E-waste Program Development Phase: Report for Discussion and Feedback'	• Sensitivity analysis was conducted assuming 100% kerbside collection, • To understand the difference between the options it is feasible to use either of these collection method assumptions in the core appraisal as the relativities between the options should not change
Kerbside	%	0%		
2) Household collection costs (including transport from household to waste transfer station/drop-off point)				
Drop-off	$/unit	N/A	URS Willingness to Pay Study	• Household collection costs are already taken into account in the URS Willingness to Pay Study. The survey stated that 'alternative schemes are described in terms of…[w]hat it would cost you, compared to the current situation' and respondents were told to 'remember how much money you have to spend and your other financial commitments.' (Appendix A). In the absence of one of the proposed schemes, households would have to transport television and computer waste to landfill, so their willingness to pay is incremental to the cost of transportation to collection facilities. • It is implied that commercial entities would have the same willingness to pay as households.
Kerbside	$/unit	N/A	URS Willingness to Pay Study	

Cost Assumptions	Unit	Value	Source	Note
3) Industry collection costs (including capital costs, operating costs and transport from collection point to recycling facility)				
Possible cost savings from economies of scale (not incorporated in appraisal)	%	20%	Advice the EPHC Electrical Equipment working group	Cost savings due to economies of scale are assumed to be achieved when recycling reaches 70% Not incorporated in core appraisal, but applied as a sensitivity analysis
Television • Drop-off • Kerbside	• $/unit • $/tonne • $/unit • $/tonne	• $6.14 (weighted average) • $272.94 • N/A • $461.30	Estimates were based on Hyder (2006), 'Television EPR Scheme Producer Responsibility Organisation Cost Analysis', prepared for the NSW Department of Environment and Climate Change (NSW DECC), ABS Census data, data from the Byteback program and surveys of thirteen e-waste recyclers and one e-waste collector	• It was not possible to split operating costs and one-off capital costs and therefore included them together.[212] • Average unit weights are weighted averages based on the number of units sold into the Australian market in 2007/08 and the weights of each type of unit • Collection cost parameters exclude GST • Estimates on a $/tonne basis will account for changes in unit weights of televisions/computers over time and the shift from desktops to laptops. Therefore, it was unnecessary for them to provide $/unit estimates for kerbside collection
Computers • Drop-off • Kerbside	• $/unit • S/tonne • $/unit • $/tonne	• $0.68 ($2.02 for complete desktops/laptops, $1.53 for monitors and $0.32 for peripherals) • $272.94 • N/A • $461.30		
VDUs • Drop-off • Kerbside	• $/unit • $/tonne • $/unit	• $3.64 • $272.94 • N/A		

[212] Collection costs for 'drop-off' are comprised of equipment rental (22.5 cubic metre hook lift bins) at waste facilities such as local government landfill sites and state government waste transfer stations; a cartage and fuel surcharge per load (with a heavier weighting for rural transport); staff salary at the site and facility rental for a covered area/site. The fact that it is not possible to separate capital expenditure and operating costs for collection is not expected to have an impact on the NPV as the policy options will utilise existing infrastructure meaning that no capital investment will be required. However, there will be some lumpiness with 'kerbside collection' capital expenditure as it is assumed that a new vehicle will be required every 7 years. Currently, the kerbside collection vehicle costs have been annualised. It is acknowledged that this will affect the discounted value of costs and will therefore affect the NPV estimates. The impact of this assumption can be explored further in the Decision regulatory impact statement.

Cost Assumptions	Unit	Value	Source	Note
	• $/tonne	• $461.30		
All • Drop-off • Kerbside	• $/unit • $/tonne • $/unit • $/tonne	• $1.21 (weighted average) • $272.94 • N/A • $461.30		
4) Government Infrastructure Costs				
Drop-off	• $/unit • $/tonne	N/A	N/A	It is assumed that new sites will not be developed just for television and computer waste. It is assumed that hook lift bins will be rented at existing landfill sites and waste transfer stations.
Kerbside	• $/unit • $/tonne			
5) Government Collection Costs				
Drop-off	• $/unit • $/tonne	• $0 • $0	PwC	As consumers will drop off television and computer waste at collection facilities and importers will transport television and computer waste from collection facilities to reprocessing facilities, so there are no Government transport costs
Kerbside	• $/unit • $/tonne	• N/A • $461.30	Estimates were based on Hyder (2006), 'Television EPR Scheme Producer Responsibility Organisation Cost Analysis', prepared for the NSW Department of Environment and Climate Change (NSW DECC), ABS Census data, data from the Byteback program and surveys of thirteen e-waste recyclers and one e-waste collector	• This will capture the cost impact of a policy including kerbside collection • It is assumed that government kerbside collection costs will be the same as those estimated for industry, as the industry estimate does not include a site rental component

Table G.3 CBA assumptions and parameters – Recycling Cost Assumptions

Cost Assumptions	Unit	Value	Source	Note
1) Reprocessing costs (including capital and operating costs of recycling operations)[213]				
Possible cost savings from economies of scale (not captured in appraisal)	%	8.5% saving when recycling reaches 20% 20% saving when recycling reaches 50%		Cost savings due to economies of scale are assumed to be achieved as throughput increases. Not incorporated in appraisal, but applied as a sensitivity analysis
Television	• $/unit • $/tonne	• $18.17 • $700	Estimates were based on Hyder (2006), 'Television EPR Scheme Producer Responsibility Organisation Cost Analysis', prepared for the NSW Department of Environment and Climate Change (NSW DECC) and confirmed in consultation with recyclers.	Per tonne reprocessing cost estimate excludes profit, GST and collection costs. An estimated cost per unit is provided here for reference only as these have not been used within the CBA model. The estimated cost per unit for each product category is based on the $700/tonne reprocessing cost and the estimated average weight of a unit disposed of in 2008/09 for each product category (TV – 26.0kg; Computers – 4.3kg; Visual display units – 16.0kg; All products – 5.8kg).
Computer	• $/unit • $/tonne	• $3.04 • $700		
VDUs	• $/unit • $/tonne	• $11.18 • $700		
All	• $/unit • $/tonne	• $4.05 • $700		

[213] In contrast to the collection cost estimates, a 'bottom up' approach was not employed. Instead the three largest e-waste recyclers were contacted and asked for their feedback on a cost estimate that include both capital and operating expenditure but excluded profit, GST and collection cost. It is acknowledged that there may be some 'lumpiness' in capital expenditure due to the requirement of new entrants to purchase plant and equipment and for existing players to expand capacity, however there is significant existing infrastructure that will be used in initial years meaning that capital expenditure is expected to be gradual over time. In addition, any new investment in plant/equipment is expected to involve periodic loan repayments which will smooth the lumpy capital expenditure. One reprocessor noted that capital expenditure would be offset with a reduction in labour cost and the overall cost would therefore remain steady. This assumption can be explored further in the Decision regulatory impact statement.

Table G.4 CBA assumptions and parameters – Regulation Design/Implementation Cost Assumptions

Cost Assumptions	Unit	Value	Source	Note
Years to design and implement	Years	2	EPHC Electrical Equipment working group	Schemes commence 2010/11
Options 1 and 2 - Co-reg: State-based EPR (NEPM) • Direct Costs (Cth) • Staff Costs (Jurisdictions) • Efficiencies from designing and implementing uniform state regulations • Total	• $/2 years • $/2 years • % • $/year	• $350,000 • $145,000 • 50% • $465,000	• Tyres NEPM • EPHC Electrical Equipment working group • =($350,000 + (8*$145,000/2))/ 2	• A NEPM is already in place, but each jurisdiction will incur costs to design and implement policy-specific regulations and industry agreements • Direct costs include line items such as project team travel costs, consultation roadshow costs, consultancy fees for regulatory impact statement development and teleconferences, but do not account for the time spent on the project by jurisdictional officers • Tyres NEPM data was supplied by the EPHC Electrical Equipment working group
Options 3 and 4 - Co-reg: Cth-based EPR • Direct Costs (Cth) • Staff Costs (Cth) • Total	• $/2 years • $/2 years • $/year	• $400,000 • $300,000 • $350,000	• Tyres NEPM • EPHC Electrical Equipment working group • =($400,000+$300,000)/2	• Compared to State-based NEPM, there is only one jurisdiction, creating efficiencies. However, these options would require the drafting of a NEPM-style Cth regulation • Direct costs include line items such as project team travel costs, consultation roadshow costs, consultancy fees for regulatory impact statement development and teleconferences, but do not account for the time spent on the project by Cth officers • Tyres NEPM data was supplied by the EPHC Electrical Equipment working group
Options 5 and 6: Co-reg with Cth Levy	$/year	$350,000	It is assumed that the costs are the same as the Cth-based EPR	The Cth would need to amend the excise legislation, setting the criteria and amount of the levy
Option 7: Cth levy and subsidy • Direct Costs (Cth) • Staff Costs (Cth) • Total	• $/2years • $/2 years • $/year	• $400,000 • $300,000 • $500,000	• Tyres NEPM • EPHC Electrical Equipment working group • =($400,000+(2*$300,000))/2	• In addition to the costs above, this option also needs regulations for the subsidy (i.e. amount, criteria). • It is assumed that the Cth would incur twice the staff costs because there are two sets of regulations • Tyres NEPM data was supplied by the EPHC Electrical Equipment working group
Option 8: Mandatory Import License	$/year	• $350,000	It is assumed that the costs are the same as the Cth-based EPR and Cth Excise options	• Cth legislation will need to be drafted.
Option 9: Mandatory State-based EPR (NEPM)	$/year	• $465,000	It is assumed that there are the same design/implementation costs for the co-regulatory and mandatory schemes	

Table G.5 CBA assumptions and parameters – Administration Cost Assumptions

Cost Assumptions	Unit	Value	Source	Note
1) PRO administration costs				
Separate scheme for televisions	$/year	$1,042,000	Hyder 2006, 'Television EPR Scheme Producer Responsibility Organisation – Cost Analysis', prepared for the NSW Department of Environment and Conservation and Product Stewardship Australia.	• There is no PRO for option 7 (Mandatory Cth levy and subsidy) as it involves Government subsidies not recycling targets
Separate scheme for computers	$/year	$1,042,000	It is assumed that Computer PRO costs are the same as TV PRO costs.	
Savings from administering both	$	40%	EPHC Electrical Equipment working group	
Joint scheme for all products	$/year	$1,250,400	=(1,042,000+1,042,000)*(1-40%)	Options 1,3,5,8,9
2) Government administration of regulations				
a) Co-regulation				
Options 1 and 2: State-based EPR (NEPM) • Scheme administration • Hours to chase to join industry scheme • Salary per year (gross) • Salary per hour (gross) • Salary per hour (net) • Cost per importer	• $/year • Hours/new importer • $/year • $/hour • $/hour • $/importer	• $3,528,198 • 6 • $155,000 • $78.58 • $55.01 • $330.05	• EPHC Electrical Equipment working group • EPHC Electrical Equipment working group • EPHC Electrical Equipment working group	• It is assumed that there are 52.25 weeks per year and 37.75 hours per week • It is assumed that the taxation rate is 30%
Options 3 and 4: Cth-Based EPR • Scheme administration • Hours to chase to join industry scheme • Salary per year (gross) • Salary per hour (gross) • Salary per hour (net) • Cost per importer	• $/year • Hours/new importer • $/year • $/hour • $/hour • $/importer	• $640,698 • 6 • $180,000 • $91.26 • $63.88 • $383.28	• EPHC Electrical Equipment working group • EPHC Electrical Equipment working group • EPHC Electrical Equipment working group	A gross salary of $129,000 was estimated by DEWHA and on-costs were calculated using the 2009-10 NPP Standard Departmental Staff Costing Template

Cost Assumptions	Unit	Value	Source	Note
Options 5 and 6: Cth Levy • Scheme administration • Hours to chase to join industry scheme • Salary per year (gross) • Salary per hour (gross) • Salary per hour (net) • Cost per importer	• $/year • Hours/new importer • $/year • $/hour • $/hour • $/importer	• $2,1462,18 • 6 • $180,000 • $91.26 • $63.88 • $383.28	• EPHC Electrical Equipment working group • EPHC Electrical Equipment working group • EPHC Electrical Equipment working group	A gross salary of $129,000 was estimated by DEWHA and on-costs were calculated using the 2009-10 NPP Standard Departmental Staff Costing Template
b) Mandatory				
Option 7: Cth Levy with Subsidy (PSO)	$/year	• $2,232,818	EPHC Electrical Equipment working group	• There is no PRO as the scheme involves Government subsidies not recycling targets • The Cth Government does not need to chase importers to enforce the scheme as it is a subsidy scheme
Option 8: Import Control • Scheme administration • Proportion of importers that require enforcement action • Hours to chase to enforce • Salary per year (gross) • Salary per hour (gross) • Salary per hour (net) • Cost per importer	• $/year • % • Hours/new importer • $/year • $/hour • $/hour • $/importer	• $1,610,948 • 40% • 6 • $180,000 • $91.26 • $63.88 • $383.28	• EPHC Electrical Equipment working group	A gross salary of $129,000 was estimated by DEWHA and on-costs were calculated using the 2009-10 NPP Standard Departmental Staff Costing Template

Cost Assumptions	Unit	Value	Source	Note
Option 9: Mandatory State-based EPR: • Scheme administration • Proportion of total importers that require enforcement action • Hours to chase to join industry scheme • Salary per year (gross) • Salary per hour (gross) • Salary per hour (net) • Cost per importer	• $/year • % • Hours/ importer • $/hour • $/hour • $/hour • $/importer	• $3,528,198 • 40% • 6 • $155,000 • $78.58 • $55.01 • $330.05	• EPHC Electrical Equipment working group	Scheme administration costs are assumed to be the same as for the co-regulatory scheme (options 1 and 2)
3) Communications Costs				
All Options	$/year	• $8,801,310 (2008/09) • $500,000.00 2009/10 onwards) • $5,905,333 (kerb side pick up)	• Hyder 2006, 'Television EPR Scheme Producer Responsibility Organisation – Cost Analysis', prepared for the NSW Department of Environment and Conservation and Product Stewardship Australia.	It is assumed that following a significant national education and promotions campaign in year 1, communications costs will reduce to $500,000 thereafter to reinforce the initial campaign.

Table G.6 CBA assumptions and parameters – Compliance Cost Assumptions

Cost Assumptions	Unit	Value	Source	Note
1) Importer Compliance Costs				
a) Co-regulation				
Options 1 & 2 - State-based EPR (NEPM)	$/importer	• $1,000	• MMA 2007, 'Tyres National Environmental Protection Measure: Threshold Study', p 18 • Preliminary estimate	It is assumed that importer compliance costs are higher than in Option 7 as importers also need to report against recycling targets
Options 3 & 4 - Cth-based EPR	$/importer	• $1,000	• MMA 2007, 'Tyres National Environmental Protection Measure: Threshold Study', p 18 • Preliminary estimate	It is assumed that importer compliance costs are higher than in Option 7 as importers also need to report against recycling targets
Options 5 & 6 - Cth Excise	$/importer	• $1,000	• MMA 2007, 'Tyres National Environmental Protection Measure: Threshold Study', p 18 • Preliminary estimate	It is assumed that importer compliance costs are higher than in Option 7 as importers also need to report against recycling targets

Cost Assumptions	Unit	Value	Source	Note
b) Mandatory				
Option 7 - Commonwealth Levy with Government-run Scheme	$/importer	$600	MMA 2007, 'Tyres National Environmental Protection Measure: Threshold Study', p 18	The Tyres threshold analysis is most applicable to Option 7, as the Tyres NEPM involves an Advanced Recycling Fee (ARF), which is a similar mechanism to a Cth levy.
Option 8 - Import Control • Scheme Compliance • License Requirement	$/importer	• $1,000 • 5% increase to scheme compliance	• MMA 2007, 'Tyres National Environmental Protection Measure: Threshold Study', p 18 – Preliminary estimate	In addition to the compliance costs incurred in the Cth co-regulatory schemes (options 3 to 6) there is also a cost associated with complying with the license requirement.
Option 9 - Mandatory State-based EPR	$/importer	$1000	Tyres Threshold study (p. 18…no. tyres method)	It is assumption that importer compliance costs are the same as in the Cth co-regulatory scheme (options 3 to 6)
2) Recycler Compliance Costs				
a) Co-regulation				
Options 1 & 2 - State-based EPR (NEPM)	$/recycler	• $0	It is assumed that recyclers do not have any compliance costs as they only have a contractual obligation.	
Options 3 & 4 - Cth-based EPR	$/recycler	• $0	It is assumed that recyclers do not have any compliance costs as they only have a contractual obligation.	
Options 5 & 6 - Cth Excise	$/recycler	• $0	It is assumed that recyclers do not have any compliance costs as they only have a contractual obligation.	
b) Mandatory				
Option 7 - Commonwealth Levy with Government-run Scheme • Recycler compliance • No. of recyclers • Time between new entrant	• $/recycler • Recyclers • years	• $20,000 • 13 • 3	• PSO (2nd Independent Review) – PwC survey 2008 • Survey of 13 e-waste recyclers	• The PSO Review survey is most applicable to Option 7, as it relates chiefly to applying for subsidies monitored by the Cth • If there is a new entrant every 3 years, there will be 20 recyclers by 2030/31
Option 8 - Import Control	$/recycler	• $0	It is assumed that recyclers do not have any compliance costs as they only have a contractual obligation.	
Option 9 - Mandatory State-based EPR	$/recycler	• $0	It is assumed that recyclers do not have any compliance costs as they only have a contractual obligation.	

Table G.7 CBA assumptions and parameters – Benefit Assumptions

Benefit Assumptions	Unit	Value	Source	Note
1) Consumer surplus from increased recycling				
WTP for a 1% increase in recycling • WTP for 50% recycling excluding respondents that dropped out • Proportion of respondents that dropped out • WTP of drop outs • WTP including drop outs • Television sales • Computer sales (desktops and laptops only) • Average weight of televisions • Average weight of computers (desktops and laptops only) • Weighted average weight of televisions and computers (desktops and laptops only)	• $ per unit per 1% increase in recycling above current levels • $/unit • % • $ per unit per 1% increase in recycling above current levels • $/unit sold • $/tonne sold % of units % of units kgs/unit kgs/unit kgs/unit	• $0.50 • $24.50 • 13.7% • $0 • $21.14 • $962.55 o 41.70% o 58.30% o 25.96 kg/unit o 19.11 kg/unit o 21.96 kg/unit	• URS Willingness to Pay Study • URS Willingness to Pay Study • URS Willingness to Pay Study • URS Willingness to Pay Study • URS Willingness to Pay Study • =(21.14/21.96)*1000 o DFAT, ACS o United Nations University (2007), manufacturer's data and actual weight measurements o =(41.70%*25.96)+(58.30%*19.11)	• This WTP value captures the following benefits: ▪ Risk of running out of resources while sending some valuable materials to landfill ▪ Landfill sites pose a threat to the natural environment ▪ Threat to human health from landfill ▪ Landfill space is running out ▪ Avoid having landfill in my neighbourhood • The results are only true if recycling levels increase to between 50-90% as this was the range examined in the study. Sensitivity analysis was undertaken on using a linear extrapolation of the WTP for recycling levels below 50%. • Sensitivity analysis was undertaken to exclude the 13.7% of respondents that dropped out of the survey (i.e. did not complete). This increased the average WTP to $24.50 per unit sold, which was converted to an estimate of 1,116/tonne sold. o The estimate of willingness to pay per tonne is based on average estimated weights of 2008-09 end of life televisions and computers. This will take into account the reduced unit weights over time and consequent decrease in recoverable resources. Sensitivity analysis was undertaken on using the 2008/09 estimated average weights of new televisions and computers.
Kerbside premium	• $/unit • $/tonne • $/5 years • $/year	• $3.55 • $165.22 • $2,320,000 • $4,640,000	• =(3.55/21.49)*1000 • URS Willingness to Pay Study • =2,320,000/5	• Households are WTP for kerbside collection regardless of the recycling levels • Sensitivity analysis was undertaken to increase kerbside collection from 0% to 100%.

Benefit Assumptions	Unit	Value	Source	Note
2) Avoided cost of landfill				
Baseline cost e.g. land	$/tonne	$25	Waste Management Association of Australia submission to the 2006 Productivity Commission Waste and Resource Efficiency Inquiry	The direct landfill costs estimated were land purchase including airspace, approvals and site development, cell development, operation including monitoring and fees, capping and rehabilitation, and aftercare. Landfill fees, which are used to fund the direct costs of landfill, were taken into account by the respondents to the URS study who were asked to consider all their costs in determining their incremental WTP. In addition, one of the benefits explicitly mentioned in the URS study is that landfill costs are running out. Therefore, including an estimate of the baseline costs of landfill would involve double counting of estimates. As such, this benefit is excluded.
Externality cost	$/tonne	N/A	Productivity Commission	The Productivity Commission estimated the externality costs of landfill to be $24/tonne.[214] However, this estimate should not be included as it would involve double counting. It is assumed that respondents to the URS WTP study had full knowledge of the types and values of externalities associated with landfill and that they took these externality costs into account in determining their incremental willingness to pay for increased recycling of televisions and computers.

[214] Productivity Commission 2006, 'Waste Management', Productivity Commission Inquiry Report No. 38, 20 October 2006

Appendix H Costs for each option

Table H.1 Present value of total costs per option ($ millions, discounted, 2009 dollars)

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
TVs	No threshold	$614	$610	$585	$585	$654	$654	$644	$654	$614
	Threshold 1	$608	$604	$579	$579	$647	$647	$641	$649	$608
	Threshold 2	$608	$604	$578	$578	$647	$647	$641	$648	$608
	Threshold 3	$608	$604	$578	$578	$656	$656	$640	$648	$608
Computers	No threshold	$477	$428	$451	$406	$517	$460	$444	$519	$473
	Threshold 1	$372	$323	$343	$298	$409	$352	$390	$411	$371
	Threshold 2	$359	$311	$330	$286	$396	$340	$384	$398	$359
	Threshold 3	$353	$304	$324	$279	$390	$333	$381	$391	$353
VDUs	No threshold	$692	$684	$663	$661	$753	$735	$736	$758	$690
	Threshold 1	$674	$666	$644	$642	$739	$721	$727	$740	$673
	Threshold 2	$669	$662	$640	$637	$735	$717	$725	$736	$669
	Threshold 3	$668	$660	$639	$636	$733	$716	$725	$735	$668
All	No threshold	$1,031	$987	$1,005	$969	$1,126	$1,076	$1,049	$1,128	$1,027
	Threshold 1	$922	$878	$893	$857	$1,014	$964	$993	$1,016	$922
	Threshold 2	$909	$865	$880	$844	$1,001	$952	$987	$1,003	$910
	Threshold 3	$902	$858	$873	$837	$994	$944	$983	$995	$902

Table H.2 Ranking of total costs per option

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
TVs	No threshold	56	54	43	43	74	74	65	76	55
	Threshold 1	52	47	41	41	69	69	63	73	53
	Threshold 2	50	46	39	39	67	67	62	72	51
	Threshold 3	48	45	37	37	77	77	61	71	49
Computers	No threshold	34	29	31	26	35	32	30	36	33
	Threshold 1	18	6	11	*3*	27	12	22	28	17
	Threshold 2	15	5	8	2	24	10	20	25	16
	Threshold 3	13	4	7	1	21	9	19	23	14
VDUs	No threshold	92	90	82	80	107	102	104	108	91
	Threshold 1	89	83	66	64	105	95	98	106	88
	Threshold 2	87	81	60	58	101	94	97	103	86
	Threshold 3	84	79	59	57	99	93	96	100	85
All	No threshold	140	130	136	127	143	142	141	144	139
	Threshold 1	123	115	117	111	137	126	131	138	122
	Threshold 2	120	113	116	110	134	125	129	135	121
	Threshold 3	118	112	114	109	132	124	128	133	119

Table H.3 Percentage split of total costs per option

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
Collection	2008/09	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	2010/11	12.5%	9.9%	14.1%	11.3%	12.4%	16.6%	12.7%	12.4%	12.5%
	2015/16	26.1%	25.6%	27.0%	26.6%	26.8%	26.5%	27.1%	26.8%	26.1%
	Total (PV)	26.0%	25.8%	26.8%	26.5%	26.2%	26.2%	26.4%	26.1%	26.0%
Reprocessing	2008/09	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	2010/11	32.0%	25.4%	36.1%	29.0%	62.8%	42.6%	64.3%	62.7%	32.0%
	2015/16	66.8%	65.6%	69.3%	68.2%	68.7%	67.9%	69.5%	68.6%	66.8%
	Total (PV)	66.6%	65.3%	68.8%	68.0%	68.5%	67.2%	69.2%	68.4%	66.6%
Policy design and implementation	2008/09	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	2010/11	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	2015/16	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Total (PV)	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
PRO administration	2008/09	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	2010/11	4.9%	9.0%	5.5%	10.3%	2.4%	6.3%	0.0%	2.4%	4.9%
	2015/16	1.5%	2.8%	1.6%	2.9%	1.3%	2.2%	0.0%	1.3%	1.5%
	Total (PV)	1.4%	2.5%	1.5%	2.5%	1.3%	2.2%	0.0%	1.3%	1.4%
Government administration	2008/09	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	2010/11	14.1%	15.5%	3.1%	3.5%	4.3%	6.6%	4.4%	4.5%	14.1%
	2015/16	4.4%	4.7%	0.9%	1.0%	2.2%	2.4%	2.3%	2.3%	4.4%
	Total (PV)	4.0%	4.2%	0.8%	0.9%	2.3%	2.4%	2.3%	2.4%	4.0%
Importer compliance	2008/09	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	2010/11	1.9%	2.1%	2.1%	2.3%	0.9%	1.4%	0.6%	1.0%	1.9%
	2015/16	0.6%	0.7%	0.6%	0.7%	0.5%	0.5%	0.3%	0.5%	0.6%
	Total (PV)	0.6%	0.6%	0.6%	0.6%	0.5%	0.6%	0.3%	0.5%	0.6%
Recycler compliance	2008/09	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	2010/11	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	0.0%	0.0%
	2015/16	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%
	Total (PV)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%
Communications	2008/09	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	2010/11	34.6%	38.1%	39.0%	43.5%	17.1%	26.5%	17.5%	17.0%	34.6%

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
	2015/16	0.6%	0.7%	0.6%	0.7%	0.5%	0.5%	0.5%	0.5%	0.6%
	Total (PV)	1.4%	1.4%	1.4%	1.5%	1.2%	1.3%	1.3%	1.2%	1.4%

Table H.4 Responsibility for cost, annual and present values over analysis period (%, all products, threshold 3)

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
Recyclers (collection, reprocessing, compliance)	2008/09	44.5%	35.3%	50.2%	40.3%	75.3%	59.2%	77.5%	75.1%	44.5%
	2010/11	92.9%	91.2%	96.3%	94.8%	95.5%	94.3%	96.9%	95.4%	92.9%
	2015/16	92.5%	91.2%	95.6%	94.5%	94.6%	93.5%	96.0%	94.5%	92.5%
	PV	-	-	-	-	-	-	-	-	-
Importers (compliance)	2008/09	1.9%	2.1%	2.1%	2.3%	0.9%	1.4%	0.6%	1.0%	1.9%
	2010/11	0.6%	0.7%	0.6%	0.7%	0.5%	0.5%	0.3%	0.5%	0.6%
	2015/16	0.6%	0.6%	0.6%	0.6%	0.5%	0.6%	0.3%	0.5%	0.6%
	PV	-	-	-	-	-	-	-	-	-
PRO (admin)	2008/09	4.9%	9.0%	5.5%	10.3%	2.4%	6.3%	-	-	-
	2010/11	1.5%	2.8%	1.6%	2.9%	1.3%	2.2%	-	-	-
	2015/16	1.4%	2.5%	1.5%	2.5%	1.3%	2.2%	-	-	-
	PV	100.0%	100.0%	-	-	-	-	-	-	100.0%
State Government (regulations, administration and communications)	2008/09	48.7%	53.6%	-	-	-	-	-	-	48.7%
	2010/11	5.0%	5.4%	-	-	-	-	-	-	5.0%
	2015/16	5.1%	5.3%	-	-	-	-	-	-	5.1%
	PV	-	-	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	-
Cth Government (regulations, administration and communications)	2008/09	-	-	42.1%	47.0%	21.4%	33.1%	21.9%	21.5%	-
	2010/11	-	-	1.5%	1.7%	2.7%	2.9%	2.8%	2.8%	-
	2015/16	0.4%	0.5%	2.3%	2.4%	3.6%	3.7%	3.7%	3.7%	0.4%
	PV	44.5%	35.3%	50.2%	40.3%	75.3%	59.2%	77.5%	75.1%	44.5%

Appendix I Benefits for each option

Table I.1 Present value of total benefits per option ($ millions, discounted, 2009 dollars)

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
TVs	No threshold	$971	$971	$971	$971	$1,158	$1,158	$1,158	$1,158	$971
	Threshold 1	$971	$971	$971	$971	$1,158	$1,158	$1,158	$1,158	$971
	Threshold 2	$971	$971	$971	$971	$1,158	$1,158	$1,158	$1,158	$971
	Threshold 3	$971	$971	$971	$971	$1,158	$1,158	$1,158	$1,158	$971
Computers	No threshold	$488	$406	$488	$406	$560	$465	$560	$560	$488
	Threshold 1	$488	$406	$488	$406	$560	$465	$560	$560	$488
	Threshold 2	$488	$406	$488	$406	$560	$465	$560	$560	$488
	Threshold 3	$488	$406	$488	$406	$560	$465	$560	$560	$488
VDUs	No threshold	$1,032	$1,021	$1,032	$1,021	$1,241	$1,224	$1,241	$1,241	$1,032
	Threshold 1	$1,032	$1,021	$1,032	$1,021	$1,241	$1,224	$1,241	$1,241	$1,032
	Threshold 2	$1,032	$1,021	$1,032	$1,021	$1,241	$1,224	$1,241	$1,241	$1,032
	Threshold 3	$1,032	$1,021	$1,032	$1,021	$1,241	$1,224	$1,241	$1,241	$1,032
All	No threshold	$1,522	$1,375	$1,522	$1,375	$1,725	$1,553	$1,725	$1,725	$1,522
	Threshold 1	$1,522	$1,375	$1,522	$1,375	$1,725	$1,553	$1,725	$1,725	$1,522
	Threshold 2	$1,522	$1,375	$1,522	$1,375	$1,725	$1,553	$1,725	$1,725	$1,522
	Threshold 3	$1,522	$1,375	$1,522	$1,375	$1,725	$1,553	$1,725	$1,725	$1,522

Table I.2 Ranking of total benefits per option

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
TVs	No threshold	89	89	89	89	53	53	53	53	89
	Threshold 1	89	89	89	89	53	53	53	53	89
	Threshold 2	89	89	89	89	53	53	53	53	89
	Threshold 3	89	89	89	89	53	53	53	53	89
Computers	No threshold	121	137	121	137	109	133	109	109	121
	Threshold 1	121	137	121	137	109	133	109	109	121
	Threshold 2	121	137	121	137	109	133	109	109	121
	Threshold 3	121	137	121	137	109	133	109	109	121
VDUs	No threshold	69	81	69	81	37	49	37	37	69
	Threshold 1	69	81	69	81	37	49	37	37	69
	Threshold 2	69	81	69	81	37	49	37	37	69
	Threshold 3	69	81	69	81	37	49	37	37	69
All	No threshold	17	29	17	29	1	13	1	1	17
	Threshold 1	17	29	17	29	1	13	1	1	17
	Threshold 2	17	29	17	29	1	13	1	1	17
	Threshold 3	17	29	17	29	1	13	1	1	17

Appendix J Summary of CBA results

TableJ.1 Net present value per option - benefits net of costs ($ millions, discounted, 2009 dollars)

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
TVs	No threshold	$357	$360	$386	$386	$504	$504	$514	$504	$357
	Threshold 1	$363	$366	$392	$392	$511	$511	$517	$509	$363
	Threshold 2	$363	$367	$392	$392	$511	$511	$518	$510	$363
	Threshold 3	$363	$367	$393	$393	$502	$502	$518	$510	$363
Computers	No threshold	$11	-$22	$37	$0	$43	$5	$116	$41	$14
	Threshold 1	$116	$83	$145	$108	$151	$113	$169	$149	$116
	Threshold 2	$128	$95	$157	$120	$164	$125	$176	$162	$128
	Threshold 3	$134	$102	$164	$127	$170	$132	$179	$169	$134
VDUs	No threshold	$340	$337	$369	$360	$489	$489	$505	$483	$342
	Threshold 1	$359	$355	$388	$379	$502	$502	$514	$501	$359
	Threshold 2	$363	$359	$392	$384	$506	$507	$516	$505	$363
	Threshold 3	$364	$361	$394	$385	$508	$508	$517	$507	$364
All	No threshold	$491	$388	$517	$406	$599	$477	$676	$597	$495
	Threshold 1	$600	$497	$629	$517	$710	$589	$731	$708	$600
	Threshold 2	$612	$509	$642	$530	$723	$602	$738	$722	$612
	Threshold 3	$620	$517	$649	$538	$731	$609	$742	$729	$620

Table J.2 Ranking of NPVs (benefits net of costs)

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
TVs	No threshold	104	98	78	78	52	52	35	54	103
	Threshold 1	95	86	74	74	39	39	30	43	96
	Threshold 2	91	85	71	71	37	37	28	42	92
	Threshold 3	89	84	69	69	57	57	27	41	90
Computers	No threshold	141	144	139	143	137	142	131	138	140
	Threshold 1	130	136	120	133	118	132	112	119	129
	Threshold 2	124	135	117	128	115	127	110	116	125
	Threshold 3	121	134	114	126	111	123	109	113	122
VDUs	No threshold	107	108	83	99	64	63	51	65	106
	Threshold 1	102	105	76	82	56	55	36	59	101
	Threshold 2	94	100	73	81	49	48	34	50	93
	Threshold 3	87	97	68	80	46	45	32	47	88
All	No threshold	62	77	31	67	22	66	10	23	61
	Threshold 1	21	60	13	29	8	24	3	9	20
	Threshold 2	16	44	12	26	6	19	2	7	17
	Threshold 3	14	33	11	25	4	18	1	5	15

Table J.3 Summary of BCRs

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
TVs	No threshold	1.58	1.59	1.66	1.66	1.77	1.77	1.80	1.77	1.58
	Threshold 1	1.60	1.61	1.68	1.68	1.79	1.79	1.81	1.79	1.60
	Threshold 2	1.60	1.61	1.68	1.68	1.79	1.79	1.81	1.79	1.60
	Threshold 3	1.60	1.61	1.68	1.68	1.76	1.76	1.81	1.79	1.60
Computers	No threshold	1.02	0.95	1.08	1.00	1.08	1.01	1.26	1.08	1.03
	Threshold 1	1.31	1.26	1.42	1.36	1.37	1.32	1.43	1.36	1.31
	Threshold 2	1.36	1.31	1.48	1.42	1.41	1.37	1.46	1.41	1.36
	Threshold 3	1.38	1.33	1.51	1.45	1.44	1.40	1.47	1.43	1.38
VDUs	No threshold	1.49	1.49	1.56	1.55	1.65	1.66	1.69	1.64	1.50
	Threshold 1	1.53	1.53	1.60	1.59	1.68	1.70	1.71	1.68	1.53
	Threshold 2	1.54	1.54	1.61	1.60	1.69	1.71	1.71	1.69	1.54
	Threshold 3	1.55	1.55	1.62	1.61	1.69	1.71	1.71	1.69	1.55
All	No threshold	1.48	1.39	1.51	1.42	1.53	1.44	1.64	1.53	1.48
	Threshold 1	1.65	1.57	1.70	1.60	1.70	1.61	1.74	1.70	1.65
	Threshold 2	1.67	1.59	1.73	1.63	1.72	1.63	1.75	1.72	1.67
	Threshold 3	1.69	1.60	1.74	1.64	1.74	1.65	1.75	1.73	1.69

Table J.4 Ranking of BCRs

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
TVs	No threshold	85	82	53	53	12	12	4	14	84
	Threshold 1	79	69	48	48	7	7	3	11	80
	Threshold 2	77	68	45	45	5	5	2	10	78
	Threshold 3	75	67	43	43	15	15	1	9	76
Computers	No threshold	141	144	138	143	137	142	135	139	140
	Threshold 1	133	136	115	127	124	131	113	126	132
	Threshold 2	128	134	106	116	118	125	109	119	129
	Threshold 3	122	130	101	110	112	120	108	114	123
VDUs	No threshold	104	103	87	89	57	52	41	61	102
	Threshold 1	97	95	72	81	42	34	29	47	96
	Threshold 2	94	92	65	74	37	30	27	40	93
	Threshold 3	90	88	64	70	35	28	26	36	91
All	No threshold	107	121	100	117	98	111	59	99	105
	Threshold 1	56	86	31	71	32	66	20	33	55
	Threshold 2	50	83	23	63	24	62	18	25	51
	Threshold 3	38	73	19	60	21	58	17	22	39

Table J.5 Incremental costs and benefits ($ millions, VDUs, threshold 3)

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
Total costs ($ millions)	2008/09	$0.47	$0.47	$0.35	$0.35	$0.35	$0.35	$0.50	$0.50	$0.47
	2010/11	$22.23	$21.97	$19.35	$19.08	$45.38	$27.94	$44.45	$45.47	$22.23
	2015/16	$56.93	$55.99	$54.04	$53.10	$69.49	$68.55	$68.59	$69.59	$56.93
	2030/31	$101.64	$102.47	$98.75	$99.59	$100.26	$101.09	$99.46	$100.35	$101.64
	Total (PV)	$668.01	$660.13	$638.57	$635.87	$733.38	$715.68	$724.68	$734.62	$668.03
incremental benefits ($ millions)	2008/09	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	2010/11	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	2015/16	$114.90	$110.93	$114.90	$110.93	$144.29	$140.24	$144.29	$144.29	$114.90
	2030/31	$197.50	$197.50	$197.50	$197.50	$197.50	$197.50	$197.50	$197.50	$197.50
	Total (PV)	$1,032.21	$1,021.01	$1,032.21	$1,021.01	$1,241.35	$1,223.74	$1,241.35	$1,241.35	$1,032.21
Sales (million units)	2008/09	6.75	6.75	6.75	6.75	6.75	6.75	6.75	6.75	6.75
	2010/11	6.76	6.76	6.76	6.76	6.76	6.76	6.76	6.76	6.76
	2015/16	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94	6.94
	2030/31	$8.00	$8.00	$8.00	$8.00	$8.00	$8.00	$8.00	$8.00	$8.00
	Total (PV)	166.19	166.19	166.19	166.19	166.19	166.19	166.19	166.19	166.19
Unit Costs ($/unit)	2008/09	$0.07	$0.07	$0.05	$0.05	$0.05	$0.05	$0.07	$0.07	$0.07
	2010/11	$3.29	$3.25	$2.86	$2.82	$6.71	$4.13	$6.57	$6.73	$3.29
	2015/16	$8.21	$8.07	$7.79	$7.66	$10.02	$9.88	$9.89	$10.03	$8.21
	2030/31	$12.71	$12.82	$12.35	$12.45	$12.54	$12.64	$12.44	$12.55	$12.71
	Total (PV)	$4.02	$3.97	$3.84	$3.83	$4.41	$4.31	$4.36	$4.42	$4.02
Unit Benefits ($/unit)	2008/09	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	2010/11	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	2015/16	$16.57	$15.99	$16.57	$15.99	$20.80	$20.22	$20.80	$20.80	$16.57
	2030/31	$24.70	$24.70	$24.70	$24.70	$24.70	$24.70	$24.70	$24.70	$24.70
	Total (PV)	$6.21	$6.14	$6.21	$6.14	$7.47	$7.36	$7.47	$7.47	$6.21

Appendix K Sensitivity analysis

Table K.1 NPVs assuming a discount rate of 3% ($ millions, discounted, 2009 dollars)

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
TVs	No threshold	$668	$673	$711	$711	$859	$859	$874	$858	$669
	Threshold 1	$677	$682	$721	$721	$869	$869	$879	$867	$677
	Threshold 2	$678	$682	$721	$721	$870	$870	$879	$868	$678
	Threshold 3	$678	$683	$722	$722	$855	$855	$879	$868	$678
Computers	No threshold	$68	$22	$107	$55	$115	$62	$223	$112	$74
	Threshold 1	$226	$179	$269	$217	$277	$223	$304	$274	$226
	Threshold 2	$244	$198	$287	$235	$295	$242	$314	$293	$244
	Threshold 3	$254	$207	$297	$245	$305	$251	$319	$303	$254
VDUs	No threshold	$652	$644	$694	$680	$848	$842	$873	$840	$655
	Threshold 1	$680	$672	$723	$709	$869	$863	$886	$868	$681
	Threshold 2	$686	$678	$729	$715	$875	$869	$889	$873	$686
	Threshold 3	$688	$680	$732	$717	$877	$871	$890	$876	$688
All	No threshold	$903	$764	$942	$793	$1,047	$889	$1,162	$1,044	$909
	Threshold 1	$1,066	$927	$1,109	$961	$1,215	$1,056	$1,246	$1,212	$1,067
	Threshold 2	$1,085	$946	$1,128	$980	$1,234	$1,075	$1,255	$1,231	$1,085
	Threshold 3	$1,096	$957	$1,140	$991	$1,245	$1,086	$1,261	$1,243	$1,096

Table K.2 NPVs assuming a discount rate of 11% ($ millions, discounted, 2009 dollars)

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
TVs	No threshold	$192	$195	$213	$213	$308	$308	$315	$307	$192
	Threshold 1	$196	$199	$217	$217	$312	$312	$317	$311	$196
	Threshold 2	$196	$200	$218	$218	$313	$313	$317	$312	$196
	Threshold 3	$196	$200	$218	$218	$306	$306	$317	$312	$196
Computers	No threshold	-$18	-$41	$1	-$26	$5	-$23	$56	$3	-$15
	Threshold 1	$57	$34	$78	$51	$82	$54	$95	$80	$57
	Threshold 2	$66	$43	$87	$60	$91	$63	$99	$89	$66
	Threshold 3	$70	$47	$91	$64	$95	$68	$102	$94	$70
VDUs	No threshold	$176	$175	$197	$192	$290	$294	$302	$286	$177
	Threshold 1	$189	$189	$210	$205	$300	$303	$308	$299	$190
	Threshold 2	$192	$192	$213	$208	$303	$306	$310	$302	$192
	Threshold 3	$193	$193	$214	$209	$304	$307	$310	$303	$193
All	No threshold	$269	$192	$288	$203	$351	$257	$406	$350	$272
	Threshold 1	$347	$269	$368	$283	$430	$336	$445	$429	$347
	Threshold 2	$356	$278	$377	$292	$440	$345	$450	$438	$356
	Threshold 3	$361	$283	$382	$297	$445	$350	$453	$444	$361

Table K.3 NPVs assuming PRO costs savings of 30% from administering both schemes ($ millions, discounted, 2009 dollars)

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
TVs	No threshold	$357	$360	$386	$386	$504	$504	$514	$504	$357
	Threshold 1	$363	$366	$392	$392	$511	$511	$517	$509	$363
	Threshold 2	$363	$367	$392	$392	$511	$511	$518	$510	$363
	Threshold 3	$363	$367	$393	$393	$502	$502	$518	$510	$363
Computers	No threshold	$11	-$22	$37	$0	$43	$5	$116	$41	$14
	Threshold 1	$116	$83	$145	$108	$151	$113	$169	$149	$116
	Threshold 2	$128	$95	$157	$120	$164	$125	$176	$162	$128
	Threshold 3	$134	$102	$164	$127	$170	$132	$179	$169	$134
VDUs	No threshold	$338	$337	$367	$360	$486	$489	$505	$481	$340
	Threshold 1	$357	$355	$386	$379	$500	$502	$514	$499	$357
	Threshold 2	$361	$359	$390	$384	$504	$507	$516	$503	$361
	Threshold 3	$362	$361	$392	$385	$506	$508	$517	$505	$362
All	No threshold	$489	$388	$515	$406	$597	$477	$676	$595	$493
	Threshold 1	$598	$497	$627	$517	$708	$589	$731	$706	$598
	Threshold 2	$610	$509	$639	$530	$721	$602	$738	$719	$610
	Threshold 3	$618	$517	$647	$538	$729	$609	$742	$727	$617

Table K.4 NPVs assuming PRO cost savings of 50% from administering both schemes ($ millions, discounted, 2009 dollars)

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
TVs	No threshold	$357	$360	$386	$386	$504	$504	$514	$504	$357
	Threshold 1	$363	$366	$392	$392	$511	$511	$517	$509	$363
	Threshold 2	$363	$367	$392	$392	$511	$511	$518	$510	$363
	Threshold 3	$363	$367	$393	$393	$502	$502	$518	$510	$363
Computers	No threshold	$11	-$22	$37	$0	$43	$5	$116	$41	$14
	Threshold 1	$116	$83	$145	$108	$151	$113	$169	$149	$116
	Threshold 2	$128	$95	$157	$120	$164	$125	$176	$162	$128
	Threshold 3	$134	$102	$164	$127	$170	$132	$179	$169	$134
VDUs	No threshold	$342	$337	$371	$360	$491	$489	$505	$485	$344
	Threshold 1	$361	$355	$390	$379	$504	$502	$514	$504	$361
	Threshold 2	$365	$359	$394	$384	$509	$507	$516	$507	$365
	Threshold 3	$366	$361	$396	$385	$510	$508	$517	$509	$366
All	No threshold	$493	$388	$519	$406	$601	$477	$676	$599	$497
	Threshold 1	$602	$497	$631	$517	$713	$589	$731	$711	$602
	Threshold 2	$614	$509	$644	$530	$726	$602	$738	$724	$614
	Threshold 3	$622	$517	$651	$538	$733	$609	$742	$731	$622

Table K.5 NPVs assuming a willingness to pay of $18.18/unit ($ millions, discounted, 2009 dollars)

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
TVs	No threshold	$221	$224	$250	$250	$342	$342	$352	$342	$221
	Threshold 1	$227	$230	$256	$256	$349	$349	$355	$347	$227
	Threshold 2	$227	$231	$257	$257	$349	$349	$355	$348	$227
	Threshold 3	$227	$231	$257	$257	$340	$340	$355	$348	$227
Computers	No threshold	-$58	-$79	-$31	-$57	-$35	-$60	$37	-$37	-$54
	Threshold 1	$48	$26	$77	$51	$73	$48	$91	$71	$48
	Threshold 2	$60	$39	$89	$63	$85	$60	$97	$84	$60
	Threshold 3	$66	$45	$96	$70	$92	$67	$101	$90	$66
VDUs	No threshold	$196	$194	$224	$217	$315	$317	$331	$309	$197
	Threshold 1	$214	$212	$243	$236	$328	$331	$340	$328	$215
	Threshold 2	$218	$216	$248	$241	$333	$335	$342	$331	$218
	Threshold 3	$220	$218	$249	$242	$334	$337	$343	$333	$220
All	No threshold	$278	$195	$304	$213	$357	$260	$434	$355	$282
	Threshold 1	$387	$304	$416	$325	$469	$371	$490	$467	$387
	Threshold 2	$399	$317	$429	$338	$482	$384	$496	$480	$399
	Threshold 3	$407	$324	$436	$345	$489	$392	$500	$488	$406

Table K.6 NPVs assuming a willingness to pay of $23.68/unit/% ($ millions, discounted, 2009 dollars)

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
TVs	No threshold	$473	$477	$502	$502	$644	$644	$654	$643	$474
	Threshold 1	$479	$483	$509	$509	$650	$650	$656	$649	$479
	Threshold 2	$480	$483	$509	$509	$650	$650	$657	$649	$480
	Threshold 3	$480	$484	$509	$509	$641	$641	$657	$649	$480
Computers	No threshold	$69	$27	$96	$49	$111	$61	$183	$108	$73
	Threshold 1	$174	$132	$203	$156	$218	$169	$237	$216	$175
	Threshold 2	$187	$144	$216	$169	$231	$181	$243	$229	$187
	Threshold 3	$193	$150	$222	$175	$237	$188	$246	$236	$193
VDUs	No threshold	$464	$459	$493	$483	$638	$636	$654	$632	$466
	Threshold 1	$483	$478	$512	$502	$651	$649	$663	$651	$483
	Threshold 2	$487	$482	$516	$506	$656	$654	$665	$654	$487
	Threshold 3	$488	$484	$518	$508	$657	$655	$666	$656	$488
All	No threshold	$674	$553	$700	$571	$806	$664	$883	$804	$678
	Threshold 1	$783	$662	$812	$683	$918	$776	$939	$916	$783
	Threshold 2	$795	$674	$824	$696	$931	$788	$945	$929	$795
	Threshold 3	$802	$682	$832	$703	$938	$796	$949	$936	$802

Table K.7 NPVs assuming 100% kerbside pickup ($ millions, discounted, 2009 dollars)

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
TVs	No threshold	$284	$303	$313	$313	$428	$428	$438	$427	$285
	Threshold 1	$290	$309	$320	$320	$434	$434	$441	$433	$290
	Threshold 2	$291	$310	$320	$320	$435	$435	$441	$434	$291
	Threshold 3	$291	$310	$320	$320	$425	$425	$441	$434	$291
Computers	No threshold	-$13	-$31	$14	-$18	$16	-$17	$88	$14	-$9
	Threshold 1	$93	$74	$122	$90	$124	$91	$142	$122	$93
	Threshold 2	$105	$87	$134	$102	$136	$103	$148	$134	$105
	Threshold 3	$111	$93	$140	$109	$143	$110	$152	$141	$111
VDUs	No threshold	$252	$268	$281	$274	$394	$397	$411	$389	$254
	Threshold 1	$271	$287	$300	$294	$408	$410	$420	$407	$271
	Threshold 2	$275	$291	$304	$298	$412	$415	$422	$411	$275
	Threshold 3	$276	$292	$306	$299	$414	$416	$423	$413	$276
All	No threshold	$361	$288	$388	$282	$455	$339	$532	$453	$366
	Threshold 1	$470	$397	$499	$394	$567	$450	$588	$565	$471
	Threshold 2	$483	$410	$512	$406	$580	$463	$594	$578	$483
	Threshold 3	$490	$417	$520	$414	$587	$471	$598	$585	$490

Table K.8 NPVs assuming that televisions weigh 25.00 kg and computers (desktops and laptops only) weigh 7.47 kg ($ millions, discounted, 2009 dollars)

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
TVs	No threshold	$828	$832	$857	$857	$1,067	$1,067	$1,077	$1,066	$829
	Threshold 1	$834	$838	$864	$864	$1,073	$1,073	$1,080	$1,072	$834
	Threshold 2	$835	$838	$864	$864	$1,074	$1,074	$1,080	$1,073	$835
	Threshold 3	$835	$839	$864	$864	$1,064	$1,064	$1,080	$1,073	$835
Computers	No threshold	$247	$175	$274	$197	$315	$231	$387	$313	$251
	Threshold 1	$353	$280	$382	$305	$423	$339	$441	$421	$353
	Threshold 2	$365	$293	$394	$318	$436	$351	$448	$434	$365
	Threshold 3	$371	$299	$401	$324	$442	$358	$451	$440	$371
VDUs	No threshold	$842	$833	$870	$856	$1,092	$1,083	$1,108	$1,086	$843
	Threshold 1	$860	$851	$889	$875	$1,105	$1,097	$1,117	$1,105	$861
	Threshold 2	$864	$855	$894	$880	$1,110	$1,101	$1,119	$1,108	$864
	Threshold 3	$866	$857	$895	$881	$1,111	$1,103	$1,120	$1,110	$866
All	No threshold	$1,230	$1,056	$1,256	$1,074	$1,437	$1,232	$1,513	$1,435	$1,234
	Threshold 1	$1,339	$1,165	$1,368	$1,185	$1,548	$1,343	$1,569	$1,546	$1,339
	Threshold 2	$1,352	$1,177	$1,381	$1,198	$1,561	$1,356	$1,576	$1,559	$1,352
	Threshold 3	$1,359	$1,184	$1,388	$1,206	$1,569	$1,364	$1,580	$1,567	$1,359

Table K.9: NPVs assuming linear willingness to pay before recycling reaches 50% ($ millions, discounted, 2009 dollars)

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
TVs	No threshold	$555	$559	$584	$584	$642	$642	$652	$642	$556
	Threshold 1	$561	$565	$591	$591	$649	$649	$655	$647	$561
	Threshold 2	$562	$565	$591	$591	$649	$649	$655	$648	$562
	Threshold 3	$562	$565	$591	$591	$640	$640	$656	$648	$562
Computers	No threshold	$122	$96	$149	$118	$151	$131	$224	$149	$126
	Threshold 1	$228	$201	$257	$226	$259	$239	$277	$257	$228
	Threshold 2	$240	$214	$269	$238	$272	$251	$284	$270	$240
	Threshold 3	$246	$220	$276	$245	$278	$258	$287	$277	$246
VDUs	No threshold	$575	$558	$603	$581	$653	$645	$669	$648	$576
	Threshold 1	$593	$576	$622	$600	$667	$659	$679	$666	$594
	Threshold 2	$597	$580	$627	$604	$671	$663	$680	$670	$597
	Threshold 3	$599	$582	$628	$606	$672	$665	$681	$671	$599
All	No threshold	$750	$702	$776	$720	$848	$804	$925	$846	$754
	Threshold 1	$859	$811	$887	$831	$959	$915	$980	$957	$859
	Threshold 2	$871	$823	$900	$844	$972	$928	$987	$971	$871
	Threshold 3	$878	$830	$908	$852	$980	$936	$991	$978	$878

Table K.10 NPVs assuming collection cost savings of 20% when recycling reaches 70% due to economies of scale ($ millions, discounted, 2009 dollars)

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
TVs	No threshold	$384	$387	$413	$412	$536	$532	$546	$535	$385
	Threshold 1	$390	$393	$420	$419	$542	$538	$549	$541	$390
	Threshold 2	$391	$394	$420	$419	$543	$539	$549	$542	$391
	Threshold 3	$391	$394	$420	$419	$533	$529	$549	$542	$391
Computers	No threshold	$26	-$8	$53	$14	$62	$19	$135	$60	$30
	Threshold 1	$132	$97	$161	$121	$170	$127	$189	$168	$132
	Threshold 2	$144	$109	$173	$134	$183	$140	$195	$181	$144
	Threshold 3	$150	$115	$180	$140	$189	$146	$198	$188	$150
VDUs	No threshold	$371	$366	$399	$389	$524	$519	$540	$519	$372
	Threshold 1	$389	$385	$418	$409	$538	$533	$549	$537	$390
	Threshold 2	$393	$389	$423	$413	$542	$537	$551	$541	$393
	Threshold 3	$395	$390	$424	$414	$543	$538	$552	$542	$395
All	No threshold	$534	$428	$561	$446	$650	$519	$726	$647	$538
	Threshold 1	$643	$537	$672	$558	$761	$631	$782	$759	$643
	Threshold 2	$656	$550	$685	$571	$774	$644	$789	$772	$656
	Threshold 3	$663	$557	$692	$578	$782	$651	$792	$780	$663

Table K.11 NPVs assuming reprocessing cost savings due to economies of scale ($ millions, discounted, 2009 dollars)

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
TVs	No threshold	$435	$436	$464	$463	$591	$590	$601	$590	$435
	Threshold 1	$441	$442	$470	$469	$597	$596	$604	$596	$441
	Threshold 2	$441	$443	$471	$470	$598	$597	$604	$596	$441
	Threshold 3	$441	$443	$471	$470	$588	$587	$604	$597	$441
Computers	No threshold	$59	$19	$86	$42	$100	$53	$172	$97	$63
	Threshold 1	$165	$124	$194	$150	$207	$161	$226	$205	$165
	Threshold 2	$177	$137	$206	$163	$220	$174	$232	$218	$177
	Threshold 3	$183	$143	$213	$169	$226	$180	$235	$225	$183
VDUs	No threshold	$428	$420	$457	$446	$588	$584	$604	$583	$430
	Threshold 1	$447	$439	$476	$465	$602	$598	$613	$601	$447
	Threshold 2	$451	$443	$480	$469	$606	$602	$615	$605	$451
	Threshold 3	$452	$445	$482	$471	$607	$604	$616	$606	$452
All	No threshold	$618	$505	$644	$526	$742	$612	$819	$740	$622
	Threshold 1	$727	$614	$756	$637	$853	$723	$874	$851	$727
	Threshold 2	$739	$626	$769	$650	$866	$736	$881	$865	$739
	Threshold 3	$747	$634	$776	$658	$874	$744	$885	$872	$747

Note: Reprocessing costs are estimated to be $700/tonne, comprised of $500/tonne for labour and $200 for overheads. When reprocessing reaches 20%, overheads are assumed to reduce to $140/tonne (total reprocessing costs of $640/tonne) and when reprocessing reaches 70%, overheads are assumed to reduce to $60/tonne (total reprocessing costs of $560/tonne).

Table K.12.NPVs excluding survey drop outs - WTP of $24.50 per unit sold ($ millions, discounted, 2009 dollars)

		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
TVs	No threshold	$511	$515	$540	$540	$689	$689	$698	$688	$511
	Threshold 1	$517	$521	$546	$546	$695	$695	$701	$694	$517
	Threshold 2	$517	$521	$547	$547	$695	$695	$702	$694	$517
	Threshold 3	$517	$521	$547	$547	$686	$686	$702	$694	$517
Computers	No threshold	$88	$42	$114	$64	$132	$79	$205	$130	$92
	Threshold 1	$193	$148	$222	$172	$240	$187	$258	$238	$194
	Threshold 2	$206	$160	$235	$185	$253	$199	$265	$251	$206
	Threshold 3	$212	$166	$241	$191	$259	$206	$268	$258	$212
VDUs	No threshold	$504	$499	$533	$523	$686	$683	$702	$680	$506
	Threshold 1	$523	$518	$552	$542	$700	$697	$711	$699	$523
	Threshold 2	$527	$522	$556	$546	$704	$701	$713	$703	$527
	Threshold 3	$528	$523	$558	$547	$705	$703	$714	$704	$528
All	No threshold	$733	$606	$759	$624	$873	$724	$950	$871	$737
	Threshold 1	$842	$715	$871	$736	$985	$836	$1,005	$983	$842
	Threshold 2	$854	$728	$883	$749	$998	$849	$1,012	$996	$854
	Threshold 3	$862	$735	$891	$756	$1,005	$856	$1,016	$1,003	$861

Appendix L Stakeholders Consultation

In response to the consultation regulatory impact statement and supporting documents, 130 written submissions were received. This appendix provides a list of stakeholder that provided written submissions in response to the consultation regulatory impact statement.

Table L.5 Submissions Received Following the Public Consultation Period

No.	Proponent
1	Ros Gold
2	E-waste Action Australia
3	Advanced Recycling Technologies
4	Allambie TV Service
5	Statewide Recycling
6	Panasonic Australia
7	City of Charles Sturt
8	Australian Computer Society
9	NSW Department of the Environment Climate Change Energy and Water
10	vStandard TV CO
11	TES-AMM Australia
12	Sharp Corporation of Australia
13	Scandia Electronics
14	Local Government Association of Tasmania (LGAT)
15	Close the Loop Ltd
16	District Council of Mount Barker
17	Blue Mountains city Council
18	Maroondah City Council
19	WA Local Government Association
20	The Flinders Ranges Council
21	Renewable Processes
22	SANYO Oceania Pty Ltd
23	Albany TV Services
24	Roger Perry
25	Tailormade Specialized Recycling Pty Ltd
26	Southern Councils Group
27	Recyclers of SA Inc
28	Confidential
29	Camden Council

30	Television Replacements Sales
31	Northern Beaches Greens
32	City of West Torrens
33	Narta International Pty Ltd
34	Consumer Electronics Suppliers Association
35	Special Broadcasting Service (SBS)
36	City of Greater Dandenong
37	KESAB environmental solutions
38	Jones TV
39	QUINFOTECH
40	Infoactiv Group Pty Ltd
41	Sims Recycling Solutions
42	Australian Mobile Telecommunications Association (AMTA)
43	URS Australia Pty Ltd
44	eGarbo
45	TIC Group Pty Ltd
46	Jim Stewart Audio and Video Services
47	Product Stewardship Australia (PSA)
48	Adelaide Hills Region Waste Management Authority (AHRWMA)
49	City of Salisbury
50	GO Company Pty Ltd
51	City of Marion
52	Local Government and Shires Associations of NSW
53	Moreland City Council
54	National Association of Retail Grocers (NARGA)
55	Norbers TV Service
56	South East Resource Recovery Regional Organisation of Councils (SERRROC)
57	Metropolitan Waste Management Group
58	Cardinia Shire
59	Electronic Service Centres Association (ESCA)
60	Municipal Association of Victoria
61	Epson Australia
62	Veolia Environmental Services
63	Dick Smith (Wholesale)
64	City of Darebin
65	Sony Australia

66	Eastern Metropolitan Regional Council (WA)
67	Wongthaggi Radio and TV Service
68	PGM Refiners
69	PVCOOL
70	University of Melbourne
71	AC/DC Service Manuals
72	Fuji Xerox
73	LGA Queensland
74	City of Whittlesea
75	Lyan Enterprises
76	IBM Australia
77	Boomerang Alliance
78	Friends of the Earth
79	Star Components
80	Tracey Spiel
81	Nathan Phelan
82	Col Brokenshire
83	Australian Battery Recycling Initiative
84	Gaby Jung
85	Erin Cole
86	Peter Flanagan
87	Department of Innovation, Industry, Science and Research (DIISR)
88	Lexmark International
89	Dell Australia
90	Australian Information Industry Association (AIIA)
91	Standards Australia
92	Carla Wilson
93	Benjamin Lakos
94	Janet Massey
95	Wendy Allison
96	David Owen
97	Emily Gardner
98	Jason Kimberley
99	Will Harper
100	Helen Black
101	Penelope Milstein

102	Lincoln Kern
103	Pat Long
104	Donna Shiel
105	Alicia Stafford
106	Alicia McCarthy
107	Mia Trujillo
108	Confidential
109	Environment Victoria and others
110	Shore Regional Organisation of Councils (SHOROC) Inc
111	Martha Ansara
112	Vince Chaplin
113	Maria Miranda
114	Alister Ferguson
115	Tim Dodd
116	Erik Hermo
117	Misha Byrne
118	Ron de Pyper
119	Kim Zegenhagen
120	Bruce Hogben
121	Bem Carew
122	Darren Williams
123	Peter Krohn
124	Vince Sellaro
125	Julie Brown
126	Bruce Grime
127	Pat Boydell
128	Trevor Kirk
129	Rod Mead
130	Australian Customs and Border Protection Service

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