
Standing Council on Environment and Water

Attachment A: Problem statement for packaging

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WRIGHT CORPORATE STRATEGY PTY LTD
Focused Innovation

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Acronyms

ABS	Australian Bureau of Statistics
APC	Australian Packaging Covenant (formerly NPC)
AWT	Alternative Waste Technology
C&I	Commercial and Industrial
CDL	Container Deposit Legislation
COAG	Council of Australian Governments
DECCW	Department of Environment, Climate Change and Water
EPHC	Environment Protection and Heritage Council
EPA	Environment Protection Authority
EP Act	Environmental Protection Act
EPR	Extended producer responsibility
HDPE	High density polyethylene
KAB	Keep Australia Beautiful
LDPE	Low density polyethylene
LGA	Local Government Area
MRF	Material recovery (/reclamation) facility
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NPC	National Packaging Covenant
NSW	New South Wales
OEH	Office of Environment and Heritage, New South Wales (formerly DECCW)

PET	Polyethylene terephthalate
POEO Act	Protection of the Environment Operations Act
PwC	PricewaterhouseCoopers
SCEW	Standing Council on Environment and Water
SOOG	Senior Oversight Officers Group
TZW	Towards Zero Waste
VLAA	Victorian Litter Action Alliance
WA	Western Australia
WARR Act	Waste Avoidance and Resource Recovery Act
WRR Act	Waste Reduction and Recycling Act
WCS	Wright Corporate Strategy
WG	Working Group
WMP	Waste management policy

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Executive summary

Packaging plays a vital role in the consumer goods sector by protecting and preserving raw materials and products as they move through supply chains. Once packaging is partially or wholly removed from a product it is recycled, landfilled or littered.

The purpose of this report is to identify and determine the extent of the problems that create barriers to improving packaging recycling and reducing packaging litter in Australia. The report has been prepared by PwC and Wright Corporate Strategy (WCS) based on advice provided by the Standing Council on Environment and Water (SCEW) Working Group (WG) and Packaging Waste Senior Officers Oversighting Group (SOOG).

In considering whether there is a case for government intervention to improve packaging recycling and reduce packaging litter, the following problems (regulatory and market failures) and impacts have been identified based on PwC analysis of WCS estimates of packaging end of life trends and broader stakeholder consultation.

Regulatory and market failures

Problem 1 – Regulatory failure

Different jurisdictions have different regulatory and policy frameworks/arrangements for resource recovery and litter management. This broad regulatory failure results in overlapping and duplication of costs as well as regulatory inconsistencies.

Problem 2 – Negative externalities

When deciding whether to recycle packaging, individuals are likely to take into account their private costs and benefits, however, these may be different from the costs and benefits to society as a whole. Individual decisions to landfill or litter packaging impose costs on third parties, which are not taken into account by individuals when making their decision.

Problem 3 – Information asymmetry

There is a lack of coordination between local councils with regards to waste and litter management. For example, there are inconsistencies in relation to kerbside recycling coverage and labelling. Information asymmetry causes confusion which acts as a barrier to increased recycling.

Problem 4 – Coordination, transaction costs and free riders

Currently, it is impractical for the market to improve kerbside or away-from-home recycling infrastructure because there is difficulty in coordinating a large group of consumers and businesses, there are high transaction costs associated with waste service providers and there is potential for free riding.

Impacts

The impacts resulting from the problems outlined above include those listed below.

Impact 1 – Duplication of regulatory effort

There is a duplication of regulatory design, implementation and administration costs by jurisdictions.

Impact 2 – Packaging contains embedded resources, some of which are non-renewable, but are lost under current disposal methods

The financial market value of these resources, as well as the value that society places on these resources being recycled and not littered, is not captured.

Impact 3 – Landfilling of packaging results in environmental externalities such as greenhouse gases, leachate and reductions in amenity

Landfilling packaging imposes external costs on third parties, such as greenhouse gases (which impact the entire planet), leachate (which imposes health costs on adjacent communities and habitats) and amenity impacts (which decrease the utility of adjacent communities).

Impact 4 – Opportunity costs relating to the operation of landfills

There are direct costs relating to landfill including infrastructure, maintenance and operation.

Impact 5 – Processing of mixed solid waste and separation of organic waste in lieu of direct landfill disposal can be impeded by packaging contamination

Contamination of the mixed waste stream increases processing costs.

Impact 6 – Packaging litter affects visual amenity and negatively impacts habitats

Packaging litter has a range of negative impacts on society including negative visual amenity, danger to human health, costs of cleaning up litter and danger to wildlife.

1 Introduction

Purpose of this report

The purpose of this report is to determine the nature and extent of the problems relating to packaging and, on this basis, consider why the market is not addressing these issues and to estimate the resulting costs that are currently being borne by society.

The current situation

Packaging makes up a significant proportion of landfill and litter in Australia and is a highly visible part of the waste stream. In 2006/07 Australia generated 43.8 million tonnes of solid waste, recycled 22.7 million tonnes and sent 21.0 million tonnes to landfill, thus achieving a 52% recycling rate. In 2009/10, some 4.4 million tonnes of packaging waste was generated, meaning packaging makes up 10% of Australia's total material discard stream.¹

Recycling of packaging waste overall was 62.5% in 2009/10. This was assisted by the high recycling rate achieved for paper/cardboard and kerbside recycling generally. In recent years there has been a significant increase in the volume of recycling of packaging, which has grown at a rate of nearly 8% per annum, from 1.6 million to 2.8 million tonnes (a 69% total increase). As a proportion of consumption, recycling has increased from 39% to 62.5%. At the same time, disposal to landfill has decreased by nearly 6% per annum, from 2.5 million to 1.7 million tonnes (a 35% total decrease).²

The 37.5% of packaging that is not recycled ends up in landfill or as a key component of litter.³ Packaging currently accounts for 1.7 million tonnes of landfilled waste. Despite the significant increases in the recovery rates of used packaging, packaging continues to be one the most frequently littered items (particularly paper and paperboard, plastic and plastic food containers); packaging accounts for approximately 37% of items and 87% of volume of litter.⁴ Frequently littered packaging items include take away cups, confectionary wrappers, metal bottle tops, cigarette packets and plastic beverage containers.⁵

Definition of packaging

Packaging plays a vital role in the consumer goods sector by protecting and preserving raw materials and products as they move through the supply chain.

The roles of packaging include:

- Protecting products
- Promoting products

¹ DEWHA and EPHC (2010) *National Waste Report*, p 1.

² Australian Packaging Covenant (2011), *2010 Annual Report*.

³ *Ibid.*

⁴ Calculated from Keep Australia Beautiful (2010) *National Litter Index: Annual Report 2009-10*, p 141- 143.

For this study, the following are assumed to be packaging: all metal items, all glass items, paper items (except for junk mail, newspaper, other paper, shopper dockets and tickets), and plastic items (except for lollipop sticks, packaging tape, snack sheeting, spoons/cutlery, straws and wine cask bladders). The following are assumed to be non-packaging: cigarette butts, all miscellaneous items, junk mail, newspaper, other paper, shopper dockets and tickets, lollipop sticks, packaging tape, snack sheeting, spoons/cutlery, straws and wine cask bladders.

Assuming that all glass items and all metal items are packaging and that paper items (except for) and plastic items (except) are packaging.

⁵ *Ibid.*

- Providing consumer information on usage, health, safety and disposal
- Allowing for unitisation of products for wholesale distribution
- Maintaining the integrity of products
- Supporting the efficient handling of products throughout the supply chain.

The materials that might be incorporated into packaging can include:

- | | | |
|---------------------|---------------------|----------|
| ▪ paper | ▪ flexible plastics | ▪ glass |
| ▪ cardboard | ▪ rigid plastics | ▪ metals |
| ▪ liquid paperboard | ▪ expanded plastics | ▪ wood |

When assembled into useful forms that fulfil the various roles of packaging, these materials might be functionally used as packaging in:

- | | | |
|-----------------------|------------|-----------|
| ▪ containers | ▪ wrapping | ▪ cartons |
| ▪ beverage containers | ▪ padding | |

The combination of material choice and the packaging form leads to an extensive suite of items that can reasonably be classed as packaging. Whilst the term packaging strictly relates to the functional role played by the assemblage of materials, it will also often be applied to the individual materials that constitute the assemblage or package.

For the purposes of this study, the Australian Packaging Covenant (APC) definition for packaging is used. The APC defines consumer packaging as ‘all packaging products made of any material or combination of materials, for the containment, protection, marketing and handling of consumer products. This also includes distribution packaging,⁶ which is defined as ‘packaging that contains multiples of products (the same or mixed) intended for direct consumer purchase, including:

- Secondary packaging used to secure or unitise multiples of consumer product, for example, cardboard box, shipper and shrink film overwrap
- Tertiary packaging used to secure or bundle multiples of secondary packaging, for example, pallet wrapping stretch film, shrink film and strapping.⁷

Discussions with APC indicate that there is not a set ‘list’ of items defined as packaging and instead the definition above is applied, for example, when signatories report to the Covenant Council.⁸

⁶ Australian Packaging Covenant (2010) *Australian Packaging Covenant – A commitment by governments and industry to the sustainable design, use and recovery of packaging*, July, Schedule 6.

⁷ *Ibid.*

⁸ PwC discussions with APC, July 2011.

2 The current situation

This chapter presents and describes the current packaging supply chain, summarises recent packaging end of life trends, and describes the current policy context.

Current supply chain

Packaging is inextricably linked to products. This fact has informed the development of the packaging supply chain as illustrated in Figure 1. The phases of the supply chain are described below.

- **Manufacture of packaging** – product or brand owners typically commission the import or local manufacture of packaging by companies such as Amcor, Visy, Impress, National Can Industries, the Detmold Group, Integrated Packaging Australia and VIP Packaging.⁹ Alternatively, imported products will come pre-packaged.¹⁰
- **In use** – products are removed from some or all of their packaging following wholesale or retail sale in order to facilitate consumption.
- **End of life** – packaging materials are discarded at the place of use or consumption, either to the:
 - *Recycling stream* - commercial and domestic premises may have on-site collection facilities, nearby drop-off facilities or local redemption facilities for recycling. Once captured, packaging materials are sorted by type (usually at material recovery/reclamation facilities (MRFs)) before being transported to specific material-type reprocessing facilities.
 - *Waste stream* – packaging is either disposed of in landfill or removed from mixed waste to enable the mechanical-biological-treatment of organic waste. Packaging materials removed from the mixed waste stream can enter any of the end of life streams.
 - *Litter stream* – the intentional or unintentional discard of end of life packaging into the environment.

Covenant signatories involved in the end of life phases (particularly in the recycling and waste phases) include Veolia Environmental Services, Sita Environmental Solutions and Transpacific Cleanaway.¹¹

- **Recycling** – products are re-manufactured into new products (packaging or other) that are sold back into the consumer economy. Signatories to the Covenant involved in this phase include Hive Resource Recovery, SKM Recycling and Visy.¹²

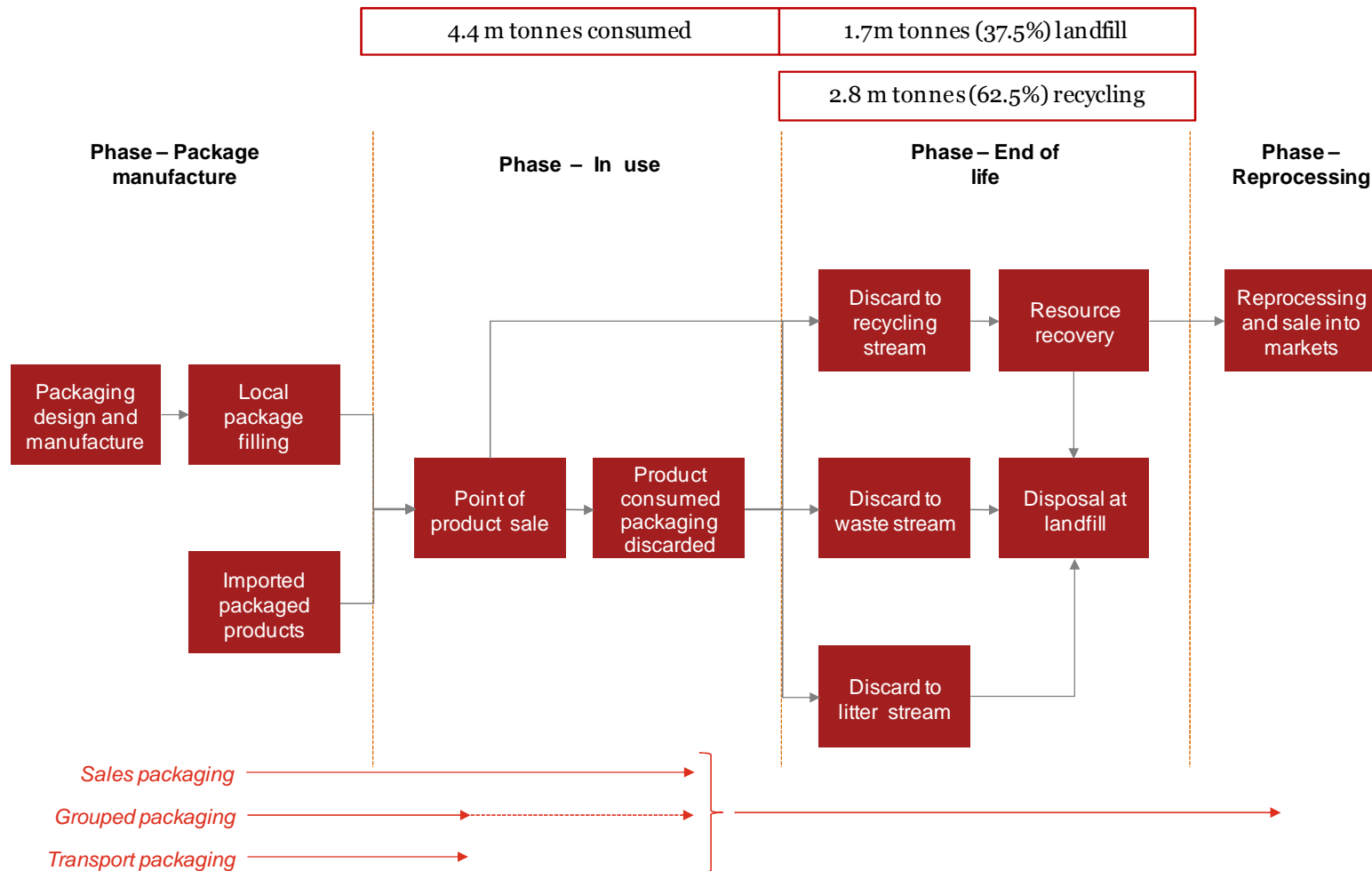
⁹ IbisWorld (2011) *Solid Paperboard Container Manufacturing in Australia*, March, pp 27-32; IbisWorld (2011) *Plastic Blow Moulded Product Manufacturing in Australia*, April, p 24; IbisWorld (2011) *Corrugated Paperboard Container Manufacturing in Australia*, March, p 22; IbisWorld (2011) *Metal Container Manufacturing in Australia*, May, p 26. Australian Packaging Covenant (2011) *APC Compliant Signatories 04.07.2011*.

¹⁰ Note that imports of packaging and pre-packaged products are relatively small compared to total packaging generated and used in Australia. Australian Packaging Covenant, *Personal Communication*, 15 June 2011.

¹¹ Australian Packaging Covenant, 2011. *APC Compliant Signatories 04.07.2011*.

¹² *Ibid*

Figure 1 - 2010 packaging supply chain



Source: WCS (2011)

Note: Not all litter is recovered and sent to landfill (i.e. some remains in the environment as litter). Sales packaging – packaging for the sale of a single unit to the end consumer (e.g. a single PET bottle), Grouped packaging – grouping of a number of units for sale to the end consumer (e.g. plastic / cardboard to combine six beer bottles), Transport packaging – protects products during handling and transport (e.g. plastic film holding boxes and crates together).

Recent packaging consumption and recycling trends

The volume of total waste generated in Australia nearly doubled from around 22.7 million tonnes (1,200 kilograms (kg) per person) in 1996-97 to 43.8 million tonnes (2,100 kg per person) in 2006-07.¹³ While total waste generated has grown at nearly 7% per annum since 2003, packaging consumption has grown at less than 1% per annum by weight (from 4.2 million to 4.4 million tonnes- a 6% total increase). The relatively low growth in tonnes of consumption may reflect a number of factors, including light-weighting of plastics, the gradual shift from plastics to lighter flexible pouches and sachets and the shift to smaller steel packaging sizes.¹⁴ Over the same period from 2003 to 2010:

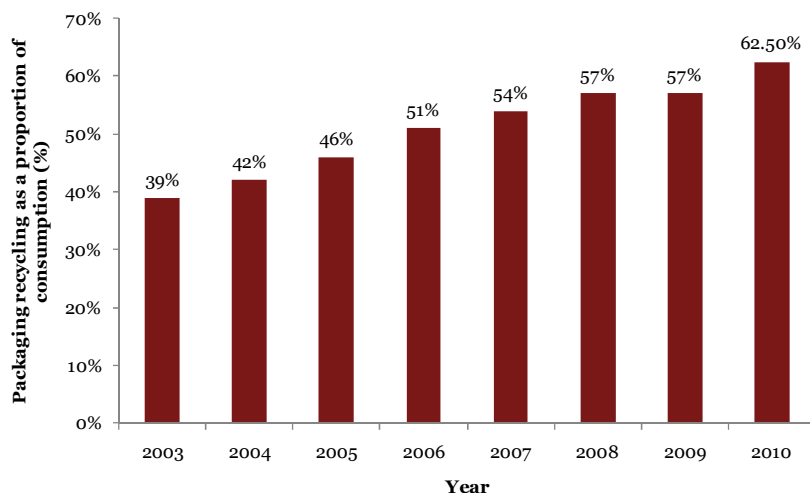
- Recycling has grown at a rate of nearly 8% per annum, from 1.6 million to 2.8 million tonnes (a 69% total increase). As a proportion of consumption, recycling has increased from 39% to 62.5%.
- Disposal to landfill has decreased by nearly 6% per annum, from 2.5 million to 1.7 million tonnes (a 35% total decrease).

Table 1 – Change in total packaging consumption, recycling and landfill: 2003-2010 (tonnes)

Activity	2003	2010	Change (%)
Consumption	4,172,433	4,424,134	6.0%
Recycling	1,635,268	2,763,126	69.0%
Landfill	2,537,165	1,661,008	-34.5%
Total	8,344,866	8,848,268	

Source: Australian Packaging Covenant (2011) *The National Packaging Covenant – 2010 Annual Report*, p 11.

Figure 2 – Packaging recycling as a proportion of consumption: 2005-2010



Source: Australian Packaging Covenant (2011) *The National Packaging Covenant – 2010 Annual Report*, p 11.

¹³ ABS (2010) 1370.0 – *Measures of Australia's Progress*, 2010.

¹⁴ Australian Packaging Covenant (2011) *The National Packaging Covenant – 2010 Annual Report*, p 11, 13.

The main materials used in Australian packaging are paper/cardboard (61%), glass (22%), plastics (13%), steel (3%) and aluminium (1%).¹⁵ The highest recycling rates in 2010 were for paper/cardboard (75.5%) and aluminium cans (67.4%), while the lower recycling rates were for glass (47%), plastics (34.8%) and steel cans (30.3%).¹⁶

The 2010 recycling targets set by the APC, then the National Packaging Covenant (NPC), in 2005 have been met for paper/cardboard and plastics.

Table 2 - Consumption and Recycling of Packaging Materials: 2010

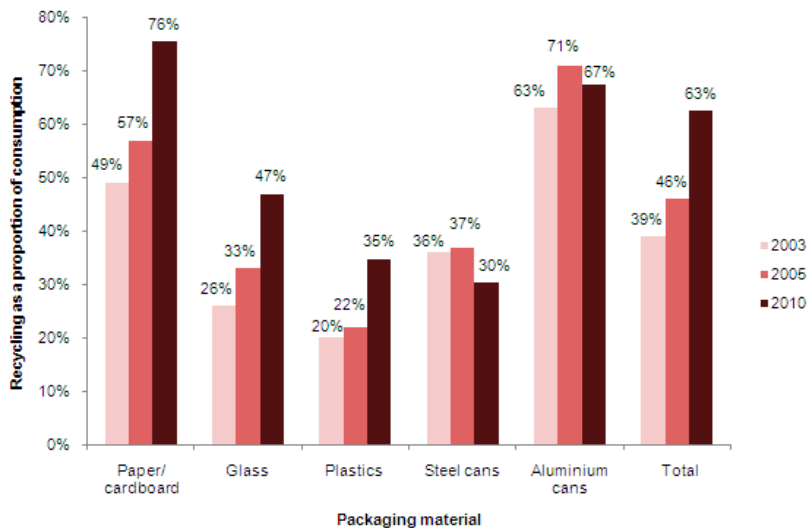
Material	Consumption (tonnes)	Recyclate (tonnes)	Recycling (%)	2010 APC target recycling
Paper/cardboard	2,680,000	2,024,000	75.5%	70%-80%
Glass	991,000	466,000	47.0%	50%-60%
Plastics	565,000	197,000	34.8%	30%-35%
Steel cans	136,000	41,000	30.3%	60%-65%
Aluminium cans	51,600	35,000	67.4%	70%-75%
Totals	4,424,000	2,763,000	62.5%	65%

Source: Australian Packaging Covenant, '2010 Covenant Performance Data', available at <<http://www.packagingcovenant.org.au/page.php?name=covenantperformancedata>>, accessed 4 July 2011.

Note: * Target 1 of the 2005 Covenant, cited in Australian Packaging Covenant (2011) *The National Packaging Covenant – 2010 Annual Report*, p 11.

Between 2003 and 2010, recycling increased from 39% to 62.5%, with sharp increases for recycling of paper/cardboard, glass and plastics. The drivers of, and barriers to, recycling by material is discussed in more detail in Chapter 3.

Figure 3 – Recycling rate by material type over time: 2003-2010



Source: Australian Packaging Covenant (2011) *The National Packaging Covenant – 2010 Annual Report*, p 13.

¹⁵ Australian Packaging Covenant (2011) *The National Packaging Covenant – 2010 Annual Report*, p 11.

¹⁶ *Ibid.*

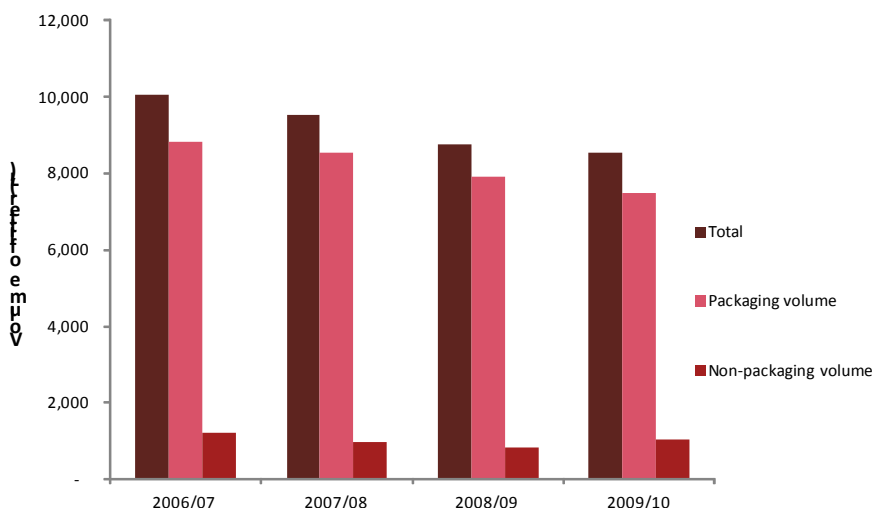
In its *2010 to 2015 Strategic Plan*, the APC established a new overall recycling target of 70% by 2015, and has abandoned targets for individual materials to increase flexibility.¹⁷ The 70% target carries the endorsement of the signatories to the APC – and each is required to develop and commit to an Action Plan to improve recycling of packaging materials. An important feature of the new Strategic Plan is a fresh focus on workplace and public place recycling.¹⁸

Packaging litter

Data collected by Keep Australia Beautiful (KAB) indicates that packaging makes up a significant proportion of the litter stream in Australia, in particular in terms of volume (measured in litres). Whilst packaging makes up a significant portion of litter in terms of volume (estimated at 87%),¹⁹ it makes up an estimated 37% in terms of number of items.²⁰ This is because packaging litter tends to relate to higher volume items such as food and beverage containers. In contrast, cigarette butts make up nearly 50% of items in the litter stream.

The figures below suggest that the volume of packaging litter and non-packaging litter has generally been decreasing over time, although the decrease in packaging volume between 2008/09 and 2009/10 is slight, which may suggest volumes have reached a plateau (based on the KAB survey of 983 sites in metropolitan areas across Australia as a snapshot of litter items on the day of surveying).²¹

Figure 4 – Volume of litter (packaging and non-packaging) over time: 2006/07 to 2009/10



Source: Calculated from Keep Australia Beautiful (2010) *National Litter Index: Annual Report 2009/10*, pp 141- 143.

¹⁷ Australian Packaging Covenant (2010) *Strategic Plan: July 2010 to June 2015*, p 4.

¹⁸ Australian Packaging Covenant (2001) *Personal Communication*, 15 June 2011.

¹⁹ Note that this estimate excludes illegal dumping.

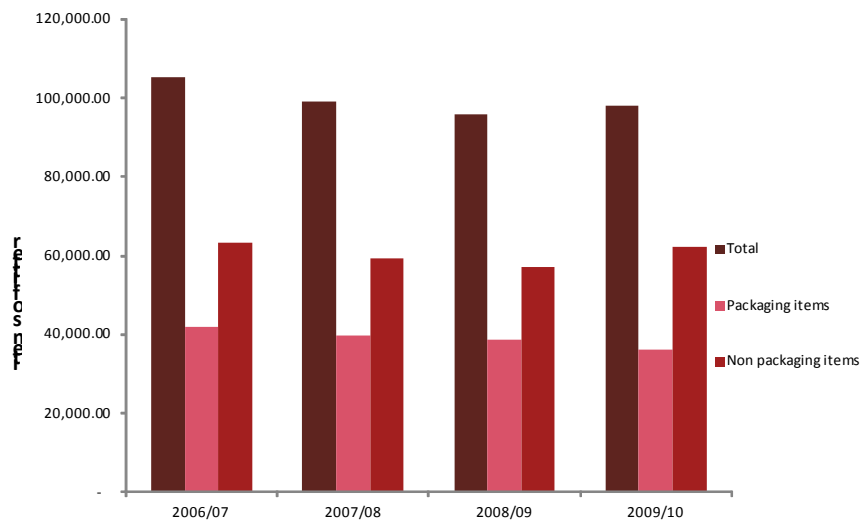
²⁰ Calculated from Keep Australia Beautiful (2010) *National Litter Index: Annual Report 2009-10*, p 141- 143.

²¹ *Ibid.*

For this study, the following are assumed to be packaging: all metal items, all glass items, paper items (except for junk mail, newspaper, other paper, shopper dockets and tickets), and plastic items (except for lollipop sticks, packaging tape, snack sheeting, spoons/cutlery, straws and wine cask bladders). The following are assumed to be non-packaging: cigarette butts, all miscellaneous items, junk mail, newspaper, other paper, shopper dockets and tickets, lollipop sticks, packaging tape, snack sheeting, spoons/cutlery, straws and wine cask bladders.

Assuming that all glass items and all metal items are packaging and that paper items (except for) and plastic items (except) are packaging.

Figure 5 – Items of litter (packaging and non-packaging) over time: 2006/07 to 2009/10



Source: Calculated from Keep Australia Beautiful (2010) *National Litter Index: Annual Report 2009/10*, pp 141- 143.

There is currently no data on the amount of litter nationally by weight, and data collected on litter is not collected for a purpose such as this. For example, parties collecting litter data typically do so to provide:

- Longitudinal data sets on litter composition
- A focus on litter ‘hot spots’, which are not representative of typical sites across Australia
- Data that permits some pictorial appreciation to be developed on the amenity impacts of litter.

Some jurisdictions, such as Victoria, collect local government data on litter. However, this data often only includes litter collected by traps or street sweepers (which includes significant amounts of leaves and debris) or includes illegal dumping.

Clean Up Australia also collects data on approximately 2% of the litter that is collected at its annual Clean Up Australia Days.²² However, this is only based on the sites that volunteers choose to clean up. Most sites cleaned are rivers, creeks, beaches, coastal sites, parks and bushland.²³ Whereas, other sites where litter is frequently found, such as shops and malls, are not well represented.²⁴

As already described, KAB also surveys litter prone sites in metropolitan areas in Australia. However, there are a range of limitations to this data including that it does not account for population density and surveys the same sites regardless of the level of clean up activity.

In order to estimate an ‘indicative’ estimate of national litter volumes by weight, PwC and WCS have examined existing data and have considered a number of alternative approaches to arrive at an estimate of litter nationally. As an indication for the purposes of consultation, the following estimates have been developed for consideration:

- WCS analysed Sustainability Victoria’s *Victorian Local Government Annual Survey* or *The Victorian Litter Report* which is based on the data that 38 local councils reported in terms of litter collected in 2008/09 from street sweepers (10,234 tonnes) and from traps (2,774 tonnes). Assuming that 66% of the litter

²² Clean Up Australia Day (2010) *Rubbish Report*.

²³ *Ibid*, p 4.

²⁴ *Ibid*.

captured in Victorian traps is packaging,²⁵ and that the amount of litter in any jurisdiction is proportionate to its population (with Victoria accounting for around 32% of the Australian population²⁶) it is estimated the national litter amount of approximately 40,000 tonnes annually.

- Using KAB data, PwC applied the litter per km² results to all urban and residential land across Australia (amount of urban intensive land and rural residential land in Australia²⁷) to develop a base estimate 12,200 tonnes. To this underlying tonnage, a high level estimate of the frequency of pick-ups for litter was assumed (assuming that at least half of the litter could be collected on a fortnightly basis) to derive a high-end estimate of 158,500 tonnes.
- WCS analysis of ‘packaging available to be littered’ estimates that there is around 1 million tonnes of packaging material that could be a source of litter found in the litter stream.²⁸ For example, if 10% of this material was littered, the national estimate of litter would be 100,000 tonnes, which is in the centre of the range of 40,000 to 160,000 tonnes estimates above.

While it is acknowledged that these estimates are high level and indicative only, a means to compare these estimates is to consider that Volunteers at Clean Up Australia Day collected 15,500 tonnes of litter in 2010.²⁹

The table below presents the data used to estimate the amount of urban intensive land and rural residential land in Australia, in the national litter estimate above based on the KAB Data.³⁰

²⁵ Estimates of the composition of litter by weight are not available. This estimate assumes that the weight of litter is proportional to its volume and applies the proportion of packaging litter by volume in the Keep Australia Beautiful data, above, including illegal dumping as non-packaging litter (i.e. 66%). This was used instead of the figure of 87% (i.e. excluding illegal dumping) given that estimates of the composition of litter traps by weight were unavailable and Victorian litter traps also include additional non-litter items such as leaves and branches. It should also be noted that the Victorian EPA advised against the use of their data for the estimate of a national figure for litter.

²⁶ Australian Bureau of Statistics (2011) *3101.0 – Australian Demographic Statistics, Dec 2010*.

²⁷ Bureau of Rural Sciences (2001/02) *Land Use of Australia*, Version 3. *NOTE: Numbers have been rounded.*

²⁸ WCS analysis used APC data which shows that in 2010 there was 4,424,134 tonnes of packaging material was consumed, 2,763,126 tonnes of packaging was recovered for recycling, leaving, and 1,661,008 tonnes of unrecovered packaging that could potentially enter the litter stream. However, taking account of distribution packaging and noting the types of packing reported in the litter stream, up to around 1 million tonnes of packaging might be a source of packaging related litter.

²⁹ Clean Up Australia Day (2010) *Rubbish Report*.

³⁰ Bureau of Rural Sciences (2001/02) *Land Use of Australia*, Version 3. *NOTE: Numbers have been rounded.*

Table 3 – Area by land use

Land Use	Area	Percent
Nature conservation	529,300	6.89%
Other protected areas including Indigenous uses	985,700	12.82%
Minimal use	1,169,700	15.21%
Grazing natural vegetation	4,194,700	54.56%
Production forestry	133,000	1.73%
Plantation forestry	16,900	0.22%
Grazing modified pastures	229,300	2.98%
Dryland cropping	235,900	3.07%
Dryland horticulture	1,200	0.02%
Irrigated pastures and cropping	25,900	3.07%
Irrigated horticulture	4,500	0.06%
Rural residential	9,400	0.12%
Urban intensive uses	14,000	0.18%
Mining	1,400	0.02%
Water	134,900	1.75%
No data	2,300	0.03%
Total	7,688,500	100%

Source: Bureau of Rural Sciences (2001/02) Land Use of Australia, Version 3

Note: Figures have been rounded to the nearest hundred

The relatively wide range of national litter estimates identified before the table above (40,000 to 160,000 tonnes) reflects the fact that there is a large degree of uncertainty regarding how to convert data on specific unrepresentative sites to a national figure, especially in the absence of robust assumptions to convert unit and volume data into weight estimates. The lower and upper bounds of this range represent two indicative approaches to estimate the weight of litter nationally in spite of these challenges. Proportionally, this represents 4% to 16% of all packaging available to be littered (currently 1 million tonnes). As this problem statement is a part of a consultation process, feedback and suggestions of alternative approaches and alternative sources of data will allow for consideration of the appropriateness of the figures presented above.

Policy context and current recycling and litter arrangements

Packaging waste, packaging litter, and waste more generally, are targeted by a number of existing arrangements at all levels of government. The broad trends in waste and litter policy at each level of government are summarised below, and additional detail is provided in Appendix A. It should be noted that the selection of arrangements is not intended to be exhaustive. Additional information can be sourced from the environmental agencies in each jurisdiction.

National policy context

At the national level, there are two primary policy and regulatory mechanisms for addressing packaging impacts, the National Waste Policy and the APC.

The National Waste Policy, which was agreed by all Australian environment ministers in November 2009 and endorsed by COAG in 2010,³¹ outlines a range of interrelated drivers for its commitment to a national approach to waste avoidance, waste management and resource recovery. The aims of the National Waste Policy are to:

- Avoid the generation of waste, reduce the amount of waste (including hazardous waste) for disposal
- Manage waste as a resource
- Ensure that waste treatment, disposal, recovery, and re-use is undertaken in a safe, scientific and environmentally sound manner
- Contribute to the reduction in greenhouse gas emissions, energy conservation and production, water efficiency and the productivity of the land.³²

The National Waste Policy presents 12 strategies related to waste in general. However, given the above drivers and the significance of packaging within the waste and litter streams, Strategy 3 of the National Waste Policy focuses specifically on packaging, aiming to ‘...better manage packaging to improve the use of resources, reduce the environmental impact of packaging design, enhance away from home recycling and reduce litter’.³³ Strategy 3 sits under the key direction of the National Waste Policy relating to taking shared responsibility for reducing the environmental, health and safety footprint of manufactured goods and materials across the manufacture-supply-consumption chain and at end of life. The objective of this key direction is to support businesses and consumers to appropriately manage end-of-life products materials and packaging.

Strategy 1 of the National Waste Policy is to establish national framework legislation to support voluntary, co-regulatory and regulatory product stewardship and extended producer responsibility schemes. On 8 August 2011, the Commonwealth *Product Stewardship Act 2011* commenced. This legislation could potentially support product stewardship and extended producer responsibility schemes relating to packaging recycling and/or litter reduction.

The Australian Packaging Covenant is a key national mechanism under Strategy 3 of National Waste Policy for reducing the environmental impacts of packaging. The Covenant is the voluntary arm of a co-regulatory arrangement to reduce the environmental impacts of packaging in Australia. Responsibility for delivering the Covenant’s objectives is shared between all sectors of the packaging supply chain – raw material suppliers, packaging manufacturers and suppliers, consumers, recyclers and all levels of government. Regulatory underpinning for the Covenant is currently provided by the *National Environment Protection (Used Packaging Materials) Measure*, which protects brand owners from being disadvantaged by taking action to reduce the environmental impact of their packaging.

The new Covenant was endorsed by the EPHC in June 2010 and came into effect from 1 July 2010. In endorsing the Covenant, EPHC agreed that before 2015 it would be assessed for transitioning under the new national Product Stewardship legislation. The new Covenant is the third such agreement. The first Covenant (1999-2005) focussed on building kerbside recycling services. The second Covenant (2005-2010) focussed on developing recycling infrastructure. The new Covenant places an increased emphasis on improving packaging design, increasing recycling away from home and reducing litter.

State/territory policy context – Waste

At the state/territory level there is a degree of commonality in the current arrangements to address waste, including:

³¹ Australian Government (2009) *National Waste Policy: Less Waste, More Resources*.

³² Australian Government (2009) *National Waste Policy: Less Waste, More Resources*, pp 6-7

³³ Australian Government (2009) *National Waste Policy: Less Waste, More Resources*, p 10

- Landfill levies
- Strategy documents
- Landfill performance standards / best practice
- Extended producer responsibility
- Partnership programs with local government and industry.

Each jurisdiction has its own waste minimisation legislation or policies. The broad powers provided to each jurisdiction by waste minimisation legislation – for example the New South Wales (NSW) *Waste Avoidance and Resource Recovery Act 2001* – means that there is a tangible risk that each jurisdiction will implement a different approach to the packaging problem. Specific packaging responses already exist in different jurisdictions including a container deposit scheme in South Australia and a similar scheme to be implemented in the Northern Territory from January 2012.

Local government is responsible for kerbside collection of packaging and other materials for recycling, or the provision of depot drop-off services in more remote/lower density areas. Kerbside and drop-off recycling services have been progressively rolled out across Australia since the 1980s and there is now very broad coverage. The Australian Bureau of Statistics (ABS) conducted a household survey in March 2009 which estimated household recycling and use of municipal kerbside recycling in Australian households by state and territory. ABS estimates that 97.9 % of households recycle and 91.4 % of households use municipal kerbside recycling (See Table 4 below).³⁴

However, material coverage is not uniform. For example:

- Municipal recycling is largely restricted to ‘at home’ consumption. For items that are readily identified by householders as recyclable, such as beverage containers, recovery rates from municipal kerbside/drop-off services are high. Recent studies show that between 68%³⁵ and 76.4%³⁶ of beverage containers consumed at home are recovered for recycling.
- Local councils differ in terms of the products/materials accepted in kerbside recycling bins. Chapter 2 of the National Waste Report outlines the variance in material coverage and provides maps of materials recycled by local government area. While regional and remote areas tend to have restricted coverage, as they are far from recycling infrastructure, some metropolitan local government areas recycle a narrower range of materials than neighbouring areas. In particular, there is disparity in relation to paper/cardboard, glass, steel cans and plastics coded #4-#7 such as:
 - Low density polyethylene (#4) – e.g. garbage bags, squeeze bottles, and stretch and shrink films
 - Polypropylene (#5) – e.g. bottles and caps
 - Polystyrene (#6) – yoghurt and dairy containers.³⁷

Away from home recycling is more diverse as it is provided by private companies and depends on the commerciality of reprocessing a particular material (discussed further in Chapter 4).

³⁴ ABS (2009) *Environmental Issues: Waste Management and Transport Use*, Mar 2009.

³⁵ BDA Group and WCS (2010), *Beverage container investigation*, p 34.

³⁶ Hyder Consulting (2008) *Australian Beverage Packaging Consumption, Recovery and Recycling Quantification Study*, Sep 2008, p 2.

³⁷ Department of the Environment, Water, Heritage and the Arts and the EPHC (2010) *National Waste Report 2010*, Chapters 2-3, p 19-168.

Table 4 – Household use of municipal kerbside recycling in Australia by state and territory

	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	AUS
Proportion of households that recycle (%)	97.9	99.1	96.6	99.3	95.9	98.4	98.7	99.5	97.9
Households that use municipal kerbside recycling (%) ²	92.4	97.4	85.4	88.3	89.0	84.5	82.5	96.8	91.4

Source: ABS (2009) Environmental Issues: Waste Management and Transport Use, Mar 2009, additional datacube, Tables 2 and 5.

Notes:

- Households were asked whether they recycled any of the following items at least once in the 12 months prior to the survey in March 2009: paper, glass, newspapers, glass, cans (steel and aluminium), plastic bottles, plastic bags, motor oil, kitchen or food waste and garden waste
- Households were asked whether they used municipal kerbside recycling at least once in the 12 months prior to the survey
- The survey was conducted in both rural and urban areas in all states and territories of Australia, but excluded people living in very remote parts of Australia. The exclusion of these people has only a minor impact on any aggregate estimates for states and territories with the exception of the Northern Territory where such persons account for about 19% of the population.

State/territory policy context – Litter

Aside from the Australian Packaging Covenant, which has a strategic goal to reduce packaging litter, there are currently no nationally coordinated government litter initiatives. However, all state and territory jurisdictions have legislative or administrative frameworks, underpinned by enforcement activity, to manage litter. Littering offences are relatively common across most jurisdictions, including:

- General littering
- Littering from a vehicle
- Illegal dumping
- Insecure delivery of advertising material
- Dangerous/aggravated littering.

The jurisdictions differ, however, in terms of:

- **The magnitude of the fine** - For example, in Western Australia the maximum fine for littering is \$200 whereas maximum penalties for prosecutions for littering in NSW range from \$2,200 to \$5,500.
- **Authority to report** - For example, in Victoria residents can report people who litter from a car to the Environment Protection Authority. In Queensland, litter laws are enforced by authorised officers from local governments and the Department of Environment and Resource Management (including the Queensland Parks and Wildlife Service).
- **Expenditure** - Assuming that the cost per person for litter services in Victoria is similar to other jurisdictions, it is reasonable to say that the cost of litter services nationally would be approximately \$300 million to \$350 million annually. Arguably without the significant expenditure on litter reduction nationally, the negative visual impact of litter would be significantly greater.

Local governments are involved in the clean up and prevention of litter. In most states, local government officers have the power to issue fines for litter. Some local governments, such as the City of Melbourne, have introduced bylaws or permits to control common litter items such as cigarette butts. Typical local government litter management initiatives and activities include:

- Issuing of fines
- Bin placement and emptying
- Litter patrols
- Street sweeping and manual clean ups

- Installation of butt bins
- Litter prevention education campaigns
- Public place and major event recycling.

Local governments also conduct education programs or partner with local businesses to prevent litter.³⁸

³⁸ EPHC (2008) *Litter Management in Australia*, p 17.

3 Packaging issues and their relative magnitude

There are a number of perspectives from which to view packaging. Table 2 in the previous chapter presents the current recycling levels of each main packaging material type (paper/cardboard, glass, plastics, steel cans and aluminium cans). This chapter presents estimates of recycling levels when the packaging supply chain is broken down by:

1. **Consumption location** - covering *at-home consumption* (essentially contributing to municipal waste) and *away-from-home consumption* (essentially contributing to commercial and industrial (C&I) sector waste and recycling).
2. **Main packaging purpose** - covering *sales packaging*, *grouped packaging* and *transport packaging* (also known as primary, secondary and tertiary packaging).
3. **Types of packaging product** – covering beverage container, non-beverage container and flexible packaging.
4. **Jurisdictions** – states and territories.

The development of the data used in these supply chain analyses is presented in more detail in Appendix B. It is important to note that there are a number of data gaps that limit the ability to disaggregate the supply chain data in different ways (e.g. by jurisdiction) and a number of data limitations that impact on the reliability of estimates, including:

1. **Consumption location:**
 - There is little data on the volume of materials consumed ‘at home’ versus ‘away from home’. The most authoritative available data sources for packaging are the APC data on total consumption and recycling of packaging by material type and National Environment Protection Council (NEPC) Used Packaging Materials National Environment Protection Measure (NEPM) data on municipal (i.e. at home) recycling.
 - C&I packaging recycling data is not necessarily captured in jurisdictional records given there is no regulatory obligation on recycling businesses to report on their activities.
 - It is difficult to estimate away from home recycling based on the difference between the APC data on total recycling (i.e. both home and away from home) and the NEPC NEPM data on municipal recycling (i.e. at home) as the definition of recycling is inconsistent. The APC defines recycling as occurring when material is actually sold and dispatched from a MRF. NEPC data on municipal recycling only requires material to have been separated and collated at the MRF to be counted as recycled. It therefore includes glass that has been stockpiled.
2. **Main packaging purpose:**
 - The lack of data on packaging purpose at various points in the logistics chain prevents precision in making estimates of recycling at various key value points. As such intuitive assumptions have been made based on ‘best available’ information.
3. **Types of packaging products:**
 - The lack of data on packaging products at various points in the logistics chain prevents precision in making estimates of recycling at various key value points. As such intuitive assumptions have been made based on ‘best available’ information.

Jurisdictions:

- Jurisdictional data on municipal recycling is available from NEPC Used Packaging Materials NEPM reporting,³⁹ although disaggregated jurisdictional data on packaging consumption and away from home recycling is not available.
- Packaging consumption will be proportional with population to a certain extent, but will also be influenced by differences in demand between jurisdiction, for example due to differences in tastes, incomes etc.
- C&I packaging recycling data is not necessarily captured in jurisdictional records given there is no regulatory obligation on recycling businesses to report on their activities.
- Municipal landfill data by jurisdiction does not report packaging separately (i.e. only total volumes are available).

Location where packaging is consumed

The location at which packaging is consumed ('at home' or 'away from home') impacts the discard options, for example, due to the proximity/availability of recycling infrastructure. This impact may differ by product and material type. Specific barriers to 'away from home' and public place recycling are discussed below.

Packaging purpose

Recovery of non-beverage containers is relatively low both 'at home' and 'away from home'. 'Away from home' recovery of beverage containers is significantly lower than 'at home'. 'At home' recovery of beverage containers is relatively high.

Table 5, below sets out the summary aggregate picture for the at-home/away-from-home split for the three main classes of packaging in 2010, based on analysis by WCS. This table illustrates that there are substantially lower levels of at-home recycling of non-beverage packaging relative to beverage containers and flexible packaging. In the 'away from home' segment there is lower recycling of beverage containers and non-beverage packaging relative to the recycling of these categories in the 'at home' segment.

It should also be noted that there is a distinction between the amount of materials that is recovered for recycling and the amount of materials that is sold for reprocessing or recycled. As Table 6 below indicates relating to data estimates on recovery and recycling levels for beverage containers only, a significant proportion of the beverage containers that are recovered for recycling are not recycled, particularly 'at home'. Note that the data in Table 6 refers to 2005/06 and 2006/07 figures: absolute figures are not an exact match to the 2010 estimates in Table 5, however, the percentage figures are consistent. In Table 6, of the beverage container materials recovered 'at home' that do not get recycled, glass accounts for 97.3%.⁴⁰ This is indicative of both the low value of mixed glass recovered through kerbside recycling, the costs of sorting and processing, lack of infrastructure and limited development of alternative end markets (such as use of crushed glass as aggregate in road base).

³⁹ See EPHC, 2009-10 Annual Report, available at < http://www.ephc.gov.au/annual_report>, accessed 8 July 2011.

⁴⁰ Hyder Consulting (2008) *Australian Beverage Packaging Consumption, Recovery and Recycling Quantification Study*, Sep 2008, p 2.

Table 5 - Summary of Estimated At-home/Away-from-home Split by Packaging Function (2010)

		At-Home			Away-From-Home		
Class		Consumption (tonnes)	Recyclate (tonnes)	Recycling (%)	Consumption (tonnes)	Recyclate (tonnes)	Recycling (%)
Containers	Beverage	771,000	463,000	60.0%	331,000	74,000	22.3%
	Non-Beverage	251,000	90,000	35.9%	107,000	53,000	50.1%
Flexible Packaging		603,000	422,000	70.0%	2,361,000	1,661,000	70.3%
Total		1,625,000	975,000	60%	2,799,000	1,788,000	64%

Source: WCS (2011). See Appendix B for the methodology to derive this table.

Table 6 – Beverage Container Consumption, Recovery and Recycling (Note: estimates based on 2005/06 and 2006/07 data)

	Consumption (tonnes)	Recovery (tonnes)	Recovery (%)	Recyclate (tonnes)	Recycling (%)
At-Home	674,469	515,457	76.4%	392,173	58.1%
Away-From-Home	248,326	54,365	21.9%	44,121	17.8%

Source: Hyder Consulting, Australian Beverage Packaging, Consumption, Recovery and Recycling Quantification Study 2008.

Packaging materials

Recycling of glass, plastics, and steel cans are relatively low both ‘at home’ and ‘away from home’. Recovery of glass ‘at home’ is high, but the low value of mixed glass fines and lack of alternative markets inhibits recycling. ‘Away from home’ recycling is significantly lower than ‘at home’ recycling for aluminium cans and glass.

The table below estimates recycling by material type and consumption location for 2010 based on the NEPC Used Packaging Materials NEPM Reports⁴¹ and APC data.⁴² It illustrates that recycling of glass, plastics, and steel cans are relatively low in both ‘at home’ and ‘away from home’ locations. ‘Away from home’ recycling is significantly lower than ‘at home’ recycling for aluminium cans and glass. (Note: this is not the case in South Australia where there is a container deposit scheme in place.)

⁴¹ EPHC, 2009-10 Annual Report – Jurisdictional Reports on Implementation and Effectiveness of NEPMs, available at < http://www.ephc.gov.au/annual_report>, accessed 8 July 2011.

⁴² Australian Packaging Covenant (2011) *The National Packaging Covenant – 2010 Annual Report*.

Table 7 - Recycling Performance by Material Type and consumption location (2010)

Material	Consumption (tonnes)	At-Home Recycling (%)	Away-from-Home Recycling (%)	Total Recycling (%)
Paper/ cardboard	2,680,000	75.6%	75.5%	75.5%
Glass	991,000	53.8%	26.6%	47.0%
Plastics	565,000	51.7%	23.1%	34.8%
Steel cans	136,000	37.0%	14.6%	30.3%
Aluminium cans	51,600	77.5%	57.3%	67.4%
Totals	4,424,000	60%	64%	62.5%

Source: WCS (2011). See Appendix B for the methodology to derive this table.

The factors in the table below influence the current recycling levels at particular locations and/or act as a barrier to improved recycling, and therefore contribute to the problems (market failures) identified and quantified in the next chapter.

Table 8 – Summary of key drivers of and barriers to recycling by material (see Appendix B for data calculations)

Material	Drivers of recycling	Barriers to recycling
Paper / cardboard	<ul style="list-style-type: none"> • Manufacture of new paper/cardboard stock from recycled stock is less expensive than manufacture from wood fibre, due to water and energy savings flowing from avoidance of virgin wood fibre pulping. • Visy and Amcor operate their own special collection vehicles and have business relationships with small-scale collectors. • Demand from overseas markets for recovered used paper/cardboard is significant and helps create a competitive market for paper/cardboard recovery. 	<ul style="list-style-type: none"> • Around 14% of recovered paper and cardboard (or 10.2% of consumption) is contaminated material (e.g. pizza boxes are contaminated by food) or fibre unsuitable for manufacture (e.g. waxed board, high wet-strength board and composite packaging).⁴³ • Waxed board cartons and high wet strength board cups and containers are not specifically recycled in Australia as a separate stream. A proportion of liquid paperboard containers are apparently exported for recycling but cups are not generally consolidated and included in export shipments.
Glass	<ul style="list-style-type: none"> • Away-from-home recycling of non-beverage containers appears to be good (63.4%). One explanation for this performance is the impact of high waste disposal levies on business recycling behaviour and the relative weight by volume of non-beverage commercial containers compared with beverage containers. Further, observations by WCS in connection with work being undertaken for Zero Waste SA confirm significant rejection and recycling by food manufacturers/fillers of defective glass containers. These containers become included in the recycling count. • Recycling rate for glass beverage containers at-home (at 55.6%) is moderate to good, possibly due to consumer knowledge of the inclusion of these items in kerbside collection. 	<ul style="list-style-type: none"> • At-home recycling of non-beverage containers lags (at 47.0%) probably due to a consumer preference to discard to waste those jars and bottles containing food remnants – rather than clean and recycle using water. • Away-from-home recycling of beverage containers is relatively low (16.8%), probably due to more disperse collection points and consumer reticence to transport glass beverage containers due to their relative weight and potential for injury from cuts following breakage. • A significant proportion of the beverage containers that are recovered though kerbside services are not recycled. This is indicative of both the low value of contaminated mixed glass and limited alternative end markets (such as use of crushed glass as aggregate in road base). The NSW Office of Environment and Heritage Resource Recovery Unit has suggested that a portion of glass collected through kerbside is stockpiled, waiting for market conditions to improve. (Note: the SCEW Working Group indicates that this is not the case in South Australia where there is a container deposit scheme in place).

⁴³ Australian Packaging Covenant (2011) *The National Packaging Covenant – 2010 Annual Report*, p 14.

Plastics	<ul style="list-style-type: none"> Film plastics are used extensively as grouped packaging and transport packaging. Major retailers have collection systems in place where film plastics are collated as unitised loads are broken down. Companies like Visy collect the collated material for recycling. Markets are solid, but prices are not high and contaminated or mixed loads are unprofitable to sort and recycle. Recycling rate for plastic beverage containers at-home (estimated to be 75.0%) is relatively high, possibly due to consumer knowledge of the inclusion of these items in kerbside collection. 	<ul style="list-style-type: none"> It appears that there is little recycling of film plastics from the municipal or 'at home' sector, in part because it may create blockages/jams at municipal facilities and there is variable infrastructure and capacity. At-home recycling of non-beverage containers is relatively low (estimated to be 30.0%) due to consumer uncertainty about which plastics are suitable for recycling and, for many, even the fact that such containers can be recycled. There is also disparity between local governments regarding which plastics are accepted, particularly in relation to those coded #4-#7. Away-from-home recycling of plastic beverage containers is relatively low (17.0%), potentially due to more dispersed collection points.
Steel cans	<ul style="list-style-type: none"> The material is relatively valuable (\$280/tonne) and sought after by recyclers. 	<ul style="list-style-type: none"> Steel cans are relatively costly to recover and consolidate in comparison to other sources of steel for recycling (<0.1%⁴⁴ as a proportion of total used steel). There may be reluctance at home to handle steel cans (e.g. due to sharp edges) or clean steel cans containing food remnants (e.g. pet food) to facilitate recycling.
Aluminium cans	<ul style="list-style-type: none"> Aluminium cans consumed at home have relatively high recycling due to strong end markets (it is valued at \$1,560/tonnes) and kerbside collections. Many consumers are aware of the importance of recycling aluminium containers, as there are significant energy and water savings from recycling compared to using virgin materials. 	<ul style="list-style-type: none"> A high proportion of beverages packed in aluminium containers are consumed away from home where recycling opportunities are limited and collection is more difficult.⁴⁵ An issue with end market demand for recycled aluminium cans could potentially be that, as a source of recycled aluminium, cans only make up a relatively small proportion of the total aluminium available in Australia (0.1%).⁴⁶

Source: Based on WCS (2011) estimates, consultation with a selection of industry representatives, and Working Group information.

⁴⁴ BDA Group and WCS, *Beverage container investigation*, p 48.

⁴⁵ Hyder Consulting (2009) *Waste and Recycling in Australia*, p 69.

⁴⁶ BDA Group, *Beverage container investigation*, p 48.

Away from home sector

Based on WCS's waste sector knowledge, in the away from home sector, typical barriers that work against businesses implementing recycling services in lieu of general waste services include the following:

- unlike 'at home' where local government provides waste services to households, individual businesses have to contract with waste service providers for their waste and recycling services
- the volume of recyclables generated from each collection point is not sufficient to allow a cost-competitive recycling collection service
- service providers that have access to their own disposal options will commonly price a general waste service below market expectations in an effort to secure waste for the disposal facility, thus lowering the cost of waste services relative to recycling services
- the physical space available in business premises is often not sufficient to permit storage of multiple collection bins for both waste and recyclables
- the internal cleaning contract, service or systems via which wastes are removed from work places within a business (the source where wastes and recyclables become unwanted and discarded) are often not compatible with separate collection of wastes and recyclables
- most MRFs that receive and sort recyclables from the C&I (away from home) sector do not tolerate contamination levels above 5 % and generally demand clean material streams – i.e. they do not encourage mixed or comingled streams, and therefore do not provide a favourable price signal back to the generators that encourages recycling
- fully comingled recyclable services (usually from the C&I sector) require sorting in what the industry calls a 'dirty MRF', where the operator expects to receive wastes requiring landfill disposal included with the comingled recyclables and perhaps anticipates a recovery rate in the order of 60%-75% of the in-feed these facilities are not common in the Australian waste industry, and where they are found, the in-feed pricing is generally only marginally lower than the cost of disposal, meaning that there is not a strong positive signal back into the market to introduce fully comingled recycling services.

Public places

Based on WCS's waste sector knowledge, in the public place and events situation, typical barriers that work against implementing recycling services in addition to general waste services include the following:

- the lack of facilities and infrastructure to enable collection and recycling of all recyclable materials put in recycling bins
- the general public are not uniformly informed or understanding of public place recycling opportunities and practices, so whilst some conform to sorting recyclables to separate collection receptacles, others disregard these practices and contaminate streamed recyclables
- the traditional municipal MRFs do not generally accept waste streams with contamination levels in excess of 10%. Public place recycling bins and special event bins for recyclables typically are found to have contamination rates in excess of 15%-30%, meaning the traditional MRFs are not equipped to receive and process these streams
- public place recycling systems are generally introduced in locations where food and beverages are sold, in an effort to recover the discarded packaging; however, the common occurrence of people discarding unconsumed food and beverages along with the packaging means that the receptacle for discard becomes fouled and the mix of packaging in the bin becomes contaminated with food products, making sorting and recycling exceptionally costly, if it can be undertaken at all.

Main packaging functions

As described earlier, packaging is used to protect and promote products, and to provide consumer information on usage, health, safety, disposal, etc. It is also used to maintain the integrity of products and to support the efficient handling and allow for unitisation of products for distribution.

However, it is not just consumers who generate waste once they consume products. There are three broad categories into which packaging can be classified:

- *Sales packaging or primary packaging* – this is packaging which constitutes a *sales* unit to the final user or consumer at the point of purchase.
- *Grouped packaging or secondary packaging* – this is packaging which constitutes, at the point of purchase, a grouping of a certain number of sales units, whether the latter is sold as such to the final user or consumer or whether it serves only as a means to replenish the shelves at the point of sale. Grouped packaging can be removed from the product without affecting the characteristics of the product.
- *Transport packaging or tertiary packaging* – this is packaging designed to facilitate handling and transport of a number of sales units, unitised or grouped packaging in order to maintain unit integrity, and prevent physical damage during handling and transport. Transport packaging does not include road, rail, ship and air containers.

The broad function served by each packaging material is a key determinant of its travel distance down the logistics chain and its post-consumption fate. There is little data available on just how much of each of the main material types are consumed for the three broad packaging material functions. The function of some packaging materials, however, is clear. Aluminium cans for instance, are used exclusively as sales packaging. Similarly, steel cans and glass are used almost exclusively as sales packaging. Less is known about the relative uses of paper/cardboard and plastics. Both material types are used extensively in grouping products such as beverage containers; plastics are used extensively in transport packaging applications including shrink wrapping of pallet loads; and paper/cardboard is used to a modest extent as transport packaging.

Table 9 sets out an indicative analysis of the use of various packaging materials by function in percentage terms (based on estimated tonnes). This table illustrates the relatively diverse uses of paper/cardboard and plastics in contrast to glass, steel cans and aluminium, which tend to be confined to sales packaging.

Table 9 - Indicative Classification of Packaging Materials by Function (% , 2010)

Material	Packaging Consumption (tonnes)	Estimated Consumption as Transport Packaging	Estimated Consumption as Grouped Packaging	Estimated Consumption as Sales Packaging
Paper / cardboard	2,680,000	15%	60%	25%
Glass.	991,000	0%	0%	100%
Plastics.	565,000	25%	25%	50%
Steel cans.	136,200	0%	0%	100%
Aluminium cans.	51,600	0%	0%	100%
Totals	4,424,000			

Source: WCS (2011). See Appendix B for the methodology to derive this table.

The estimation of consumption by packaging function is made possible by the fact that the properties of certain materials make them more suitable to particular functions. For example, aluminium and glass are only used as sales packaging given their suitability as beverage and non-beverage containers. However, a robust analysis of recycling by packaging function was not possible in the same way. In addition, jurisdictional data on landfill is not disaggregated for packaging, let alone packaging function.

Types of packaging product

There are a range of packaging products.

- **Containers:**
 - **Beverage containers:** Beverage containers are manufactured from rigid or flexible materials including glass, plastics, steel and aluminium. They carry liquids for human consumption.
 - **Non beverage containers:** Non-beverage containers refer to containers used for grocery products such as foods, household and commercial liquids and powders. Common material types include glass, steel and plastics.
- **Flexible packaging:** Flexible packaging refers to non-rigid packaging. The major proportion of flexible packaging is paper/cardboard and film plastics (both are used extensively in grouped and transport packaging).

The APC data set out at Table 2 above is based on the materials used in packaging. However, APC provides no sub-classification by broad product type. Table 10 presents an estimate of the consumption and recycling split by package material type. The estimates were made by drawing on reports and discussions with industry.

Around two thirds of packaging is classified as flexible packaging, with around 70.2% being recycled due to the commerciality of paper and cardboard recycling. The recycling of beverage containers is higher than the recycling of non beverage containers. This is because plastics coded 4-7 were once considered non-recyclable,⁴⁷ and are not accepted for kerbside recycling in all Local Councils potentially due to relatively long term contracts with recycling companies. In addition, beverage containers are targeted by municipal kerbside and drop-off recycling.

Table 10 - Summary Table – Estimated recycling by Product Type (2010)

Material	Consumption (tonnes)	Consumption (% of total)	Recyclate (tonnes)	Recyclate (% of consumption)
All containers	1,460,000	33.0%	681,000	46.6%
Non-beverage containers	358,000	8.1%	144,000	40.1%
Beverage containers	1,102,000	24.9%	537,000	48.7%
Flexible packaging	2,964,000	67.0%	2,082,000	70.2%
All packaging	4,424,000	100.0%	2,763,000	62.5%

Source: WCS (2011). See Appendix B for the methodology to derive this table.

Jurisdictions

Recycling data by jurisdiction is available for municipal recycling (i.e. kerbside and drop-off) only. Disaggregated data by jurisdiction is not available for consumption or away from home recycling:

- C&I packaging recycling data is not necessarily captured in jurisdictional records given there is no regulatory obligation on recycling businesses to report on their activities

⁴⁷ Australian Packaging Covenant (2011) *The National Packaging Covenant – 2010 Annual Report*, p 7.

- Municipal landfill data by jurisdiction does not report packaging separately (i.e. only total volumes are available).

The table below presents total municipal recycling of packaging by jurisdiction based on the NEPC jurisdictional reports on implementation and effectiveness of the Used Packaging NEPM, noting that the NEPC definition of recycling differs from that used by the APC, as described above. Given that estimates of consumption by jurisdiction (which would enable a calculation of the recycling rate) are unavailable population estimates have been provided as a proxy. This illustrates that the recycling performance by jurisdiction is largely consistent with population.

Table 11 – Municipal packaging recycling by jurisdiction (tonnes, 2009/10)

State/territory	Population		Municipal ('at home') recycle	
	Millions	Proportion of total	Tonnes	Proportion of total
New South Wales	7.3	32.4%	444,473	40.2%
Victoria	5.6	24.8%	331,763	30.0%
Queensland	4.5	20.2%	185,314	16.8%
Western Australia	2.3	10.3%	37,503	3.4%
South Australia	1.7	7.3%	80,602	7.3%
Tasmania	0.5	2.3%	N/A	N/A
Australian Capital Territory	0.4	1.6%	20,040	1.8%
Northern Territory	0.2	1.0%	4,610	0.4%
Total	22.5	100.0%	1,104,313	100.0%

Source: ABS (2011) 3101.0 – Australian Demographic Statistics, Dec 2010; EPHC, 2009/10 Annual Report – Jurisdictional Reports on Implementation and Effectiveness of NEPMs, available at <http://www.ephc.gov.au/annual_report>, accessed 8 July 2011.

Note: Totals may not sum due to rounding in the model.

4 Packaging problems

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

Introduction

There is a distinction between the cause of a problem, which is generally a regulatory or market failure, and the magnitude of that problem, which may be a public or private cost.

While consumer packaging delivers health and environmental benefits – for example, by reducing food waste through spoilage and protecting consumer products during transport– it also has adverse environmental and other impacts throughout its lifecycle.

And, while packaging recycling has been increasing, there are issues/problems relating to individual packaging material streams as well as with current disposal methods, which indicate there may be market failures such as information asymmetry and negative externalities. These will be discussed in more detail below. However, at the outset, a distinction needs to be made between the cause of a problem associated with packaging and the effect or valuation of that problem.

Government intervention may be warranted if the problem(s) are a consequence of existing regulation (i.e. a ‘regulatory failure’) or markets are not producing economically efficient outcomes (i.e. a ‘market failure’). However, consideration needs to be given to whether the regulatory and/or market failure(s) is significant enough to justify new government regulation.⁴⁸

The first aspect, a regulatory or market failure, relates to the cause of the problem. The second aspect relates to the magnitude of the problem and requires quantification of the costs of each of the regulatory or market failures. It should be noted that a regulatory or market failure may impose costs on a number of parties, including governments, households and businesses, and sub-sets of these parties such as small businesses. As such, these costs may be private or public costs and do not need to satisfy the market failure classification in the first step. For example, the problems of current packaging disposal methods extend beyond the environmental impacts such as greenhouse gases from the decomposition of organic waste such as paper/cardboard in landfill (a negative externality) to private costs such as the foregone market value of resources.

Step 1: Establish the existence of regulatory or market failures

Government intervention may be warranted to address the problems associated with packaging given the existence of a regulatory failure and market failures (information asymmetry, negative externality and high transaction costs).

Problem 1 – Regulatory failure

Each jurisdiction has its own waste minimisation legislation or policies. In the absence of a national approach, as envisaged under the National Waste Policy, 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 packaging problem. In fact, specific packaging responses have already begun to vary in different jurisdictions including a container deposit scheme in existence in South Australia and a similar scheme soon to be implemented in the Northern Territory. Other jurisdictions have recently expressed support for state-based container deposit schemes, but with a preference for a national approach. Relative to a national approach a

⁴⁸ Australian Government Office of Best Practice Regulation (OBPR) (2010) *Best Practice Regulation Handbook*, p 29-30.

state/territory based approach will result in the duplication of planning, administration and effort, which will impose additional costs on society. In the absence of a strengthened national regulatory approach to packaging, it is likely that more states will seek to legislate a state-based scheme.

Similar arguments regarding duplication of effort can be applied to state policies and programmes to address litter and local government initiatives to address packaging waste and litter, although specific estimates of these cost savings are unavailable.

Market failures

Problem 2 – Negative externalities

When deciding whether to recycle packaging, individuals are likely to take into account their private costs and benefits, however, these may be different from the costs and benefits to society as a whole. For example, a consumer may take into account the additional time and effort required to clean and sort packaging prior to collection for recycling in an ‘at home’ setting, or the additional distance required to transport packaging to a recycling bin relative to placing it in a waste receptacle or littering. However, individual decisions to landfill or litter packaging impose costs on third parties, which are not taken into account by individuals when making their decision. For example:

- Packaging contains embedded resources, some of which are non-renewable, but which are lost under current disposal methods. As a result:
 - Additional resources are used, and greenhouse gases produced, to manufacture goods from virgin materials instead of recycling them
 - Reprocessors (and society as a whole through the multiplier effect)⁴⁹ are not able to capture the financial market value of these resources
 - Households and businesses lose the non-market value of the utility that they would otherwise receive, for example, from knowing that they are living in a less wasteful society or preserving resources and the environment for future generations.
- Landfill of packaging imposes external costs on third parties, such as greenhouse gases (which impact the entire planet), leachate (which imposes health costs on adjacent communities and habitats) and amenity impacts (which decrease the utility of adjacent communities).
- Landfill of packaging results in the alienation of land and results in direct costs for landfill infrastructure, maintenance and operation. There is an opportunity cost because this land and funds could potentially be used for other purposes that are valued more highly by the community.
- Disposal of packaging in the mixed waste stream increases the processing costs for Alternative Waste Technology (AWT) facilities, which must invest in infrastructure to remove contaminants such as glass, rigid plastics and film plastics so that the organic soil conditioning resources that they produce meet standards to be acceptable for land application.
- Packaging that is discarded as litter has a range of negative impacts on society, including negative visual amenity, danger to human health, due to injuries from broken glass, the opportunity costs of cleaning up litter, which could be used to fund things more highly valued by society, and danger to wildlife, for example, from animals getting caught in marine debris.⁵⁰

⁴⁹ The multiplier effect reflects the fact that any additional income will either be spent (at a rate known as the marginal propensity to consume, or MPC) or saved (at a rate known as the marginal propensity to save, or MPS). The proportion that is consumed becomes income for someone else, who also consumes a proportion and saves a portion. This process continues until the entire amount has been saved. For example, with a MPS of 2, the multiplier is 5 ($=1/(1-0.2)$) meaning that each additional dollar of income in the economy is effectively worth 5 times that much as it traces its way through the economy.

⁵⁰ BDA Group and Wright Corporate Strategy (2010) *Beverage Container Investigation – Revised final report*, p 50.

Problem 3 – Information asymmetry

Recycling of packaging is affected by the behaviour of individuals and businesses who will decide what action to take with packaging once it is removed from a product and may also inadvertently contaminate other materials collected for recycling, for example, by putting lawn clippings in with kerbside recycling.

There is a lack of coordination between local councils with regards to waste and litter management. For example there are inconsistencies in relation to kerbside recycling coverage and labelling (further information about variances between local government recycling services is provided in Chapter 2 of the National Waste Report – selected maps of recycling coverage have been reproduced in Appendix A on pages 66-71). For example, there is a disparity between local governments regarding which plastics are accepted, particularly in relation to those coded #4-#7. These were once considered non-recyclable and there are suggestions that some consumers are unaware whether their local council accepts these items, especially given that there is not uniform labelling of recycling bins. It is also likely that a significant number of consumers are unaware that it is necessary to wash steel and plastic containers prior to recycling, or that they do not make the additional effort to wash these items because they do not understand the true value of recycling. Such an argument is also applicable more generally to contamination of collected materials and the disposal of recyclable packaging in general waste as it is more convenient.

The disparity between materials coverage and recycling systems at home and in commercial settings also has an impact on behaviour. For example, confusion about which materials are covered in workplace recycling can lead to high contamination rates for recycling streams and/or recyclable materials being diverted to landfill.

Local government is responsible for kerbside collection of packaging and other materials for recycling, or the provision of depot drop-off services in more remote/lower density areas. However, their responsibility, as defined by state based local government acts, is restricted to households, when they could potentially service small to medium businesses. While this is not a regulatory failure in and of itself, it is a barrier to increased levels of recycling and contributes to the other market failures discussed below.

Problem 4 – Coordination, transaction costs and free riders

Consumers and businesses may place a high value on packaging recycling, which exceeds their private costs, but not have the opportunity to recycle, for example, due to a lack of infrastructure at public places such as shopping centres. Government intervention would not be warranted if they could collectively negotiate a market based solution (i.e. additional infrastructure or services) with waste service providers or other bodies such as centre management at shopping centres. However, this is impractical given:

- The difficulty associated with coordinating large groups of consumers with disparate interests, including the value that they place on recycling
- High transaction costs associated with contract negotiations with waste service providers and other bodies
- The potential for free riders, who may opt out of the contract negotiation but receive the benefits.

The same is true with small businesses, which could benefit from coordinated recycling services, but have high transaction costs and barriers to negotiating a market based solution.

Step 2: Estimate the magnitude of the problems

Households have indicated that they are willing to pay between \$0.7 billion to \$1.0 billion per annum to increase recycling from current levels (62.5%) to 85% and for a 'significant' reduction in packaging litter. Other costs imposed on society by packaging being landfilled and littered are estimated to be between \$220 million to \$375 million per annum.

In considering whether there is a case for government intervention to improve recycling or reduce landfill and litter of packaging in Australia, the following problems were identified for stakeholder consideration. The indicative magnitude of the problem has been estimated based on increasing current recycling levels (62.5% to 85%), acknowledging that:

- A 100% recycling rate is not technically feasible. There are many packages that are not recyclable because the technology is not available, materials are composite or not useable as feedstock to other products, and others that are contaminated by food (e.g. pizza boxes). A recycling rate of 90% is technically feasible, although any recycling rate above around 80% to 85% would likely be prohibitively costly to recover.
- These recycling rates will not be achieved immediately, but will increase gradually over time.

Recycling projections will be undertaken in a rigorous manner as part of the cost benefit analysis of the Consultation Regulation Impact Statement.

In the section below, the key impacts resulting from the problems outlined above are discussed in more detail, to provide more context on the scale of each problem:

Impact 1

Duplication of regulatory effort

The National Waste Policy Regulation Impact Statement in 2009 estimated the potential gains from a national approach, as opposed to state/territory based approach, based on savings from reduced duplication of planning, administration and effort at the jurisdictional level.⁵¹ They followed the approach in the Decision Regulation Impact Statement for Televisions and Computers, as outlined below, which indicates that a state based approach has the potential to result in additional government administration costs in the order of \$3 million per annum.

Similar arguments regarding duplication of effort can be applied to state policies and programmes to address litter and local government initiatives to address packaging waste and litter, although specific estimates of these cost savings are unavailable.

Table 12 – A comparison of State/Territory and Commonwealth Government costs in the Decision Regulatory Impact Statement for Televisions and Computers (2009)

Cost type	Commonwealth based (millions/annum)	State based (millions/annum)
Regulatory design and implementation costs	\$0.35	\$0.4
Direct government administration costs	\$0.6	\$3.5
Total	\$0.95	\$3.9

Source: PwC and Hyder Consulting (2009) *Decision Regulatory Impact Statement: Televisions and Computers*, p 113-114.

Impact 2

Packaging contains embedded resources, some of which are non-renewable, but are lost under current disposal methods

Resource recycling and recovery are generally considered to have a positive impact on the environment through saving resources and avoiding the impacts associated with the extraction of virgin materials for use in manufacturing.⁵² Packaging is comprised of paper/cardboard, plastic, steel, aluminium and glass and recycling of these materials displaces the consumption of the resources used in the virgin production of these materials

⁵¹ The Allen Consulting Group (2009) *National Waste Policy: Regulatory Impact Statement*, p 41; citing PwC and Hyder Consulting (2009) *Decision Regulatory Impact Statement: Televisions and Computers*.

⁵² DEWHA and EPHC (2010) *National Waste Report 2010*, p 163.

(including wood, oil, iron ore, bauxite and sand). With the exception of wood⁵³ all other resources used to manufacture packaging are non-renewable. The production, use and discard of packaging materials consumes both renewable and non-renewable resources and demands significant energy and water for the manufacture, transport and reprocessing of packaging.

There is a market failure because the decisions of individuals to dispose of or discard packaging in the environment instead of recycling it impose costs on third parties. For example, packaging contains embedded resources, some of which are non-renewable, but which are lost under current disposal methods. As a result:

- Reprocessors (and society as a whole through the multiplier effect) are not able to capture the financial market value of these resources
- Households and businesses lose the non-market value of the utility that they would otherwise receive, for example, from knowing that they are living in a less wasteful society or preserving resources and the environment for future generations.

Lifecycle impact

As outlined in Chapter 2, currently some 62.5% of all packaging generated in Australia is captured for recycling and beneficial reuse, leaving 37.5%, or 1.66 million tonnes in 2010, to be discarded for disposal to landfill or lost to the litter stream.

Of the predominant materials used in packaging:

- Paper and cardboard represent the only renewable resource and in 2010 comprised more than 75% of the packaging that was recycled
- Steel, aluminium and glass, represent non-renewable resources that are derived from natural resources that are relatively plentiful, but manufactured using energy sources that are predominantly non-renewable; for these packaging materials 30%, 67% and 47% respectively were recycled in 2010
- Plastics represent a non-renewable resource derived from a very finite natural resource, petroleum, and only 34% of packaging comprised of plastics was recycled in 2010.

The table below presents estimates of the net environmental benefits (in terms of greenhouse gas emission, energy and water savings) resulting from recycling a tonne of packaging material instead of producing it from virgin materials.

Table 13 – Net benefit of recycling 1 tonne of packaging material (2010)

Material	Resource	Greenhouse gases (tonnes CO ₂ e)	Cumulative energy demand (GJ LHV)	Water use (kl)
Paper / cardboard ¹	Wood	0.6	9.3-10.8	25.4-28.3
Glass	Sand	0.6	6.1-6.9	2.3-2.4
Plastics ²	Oil	0.8 – 2.0	38.8-63.0	(22.6) – 71.3
Steel Cans	Iron ore	0.4	8.0	(2.4)
Aluminium cans ¹	Bauxite	15.9 – 17.7	171.1 – 191.4	181.8 - 202.0

Source: NSW Department of Environment, Climate Change and Water (2010) *Environmental Benefits of Recycling*, p 14.

Notes:

1. The range of estimates represents the location of recycling (i.e. kerbside versus C&I)
2. The range of estimates represents the location of recycling and the type of plastic.

⁵³ Quartz sand which is used to produce glass is considered a non-renewable resource in that it is formed from the erosion of rock and quartz is a mineral that has a finite supply. However, the supply of quartz sand is relatively plentiful, meaning that it is sometimes thought of as akin to a renewable resource.

Based on the net benefits per tonne of packaging recycled estimated in the table above and the 2010 landfill volumes implied by Table 2, it is estimated that by increasing recycling to 85% there is the potential to save (per annum):

- Greenhouse gases: 850,000 to 1.1 million tonnes(CO₂e), which represents around 8%-10% of the total 11.1 million tonnes emitted from solid waste⁵⁴
- Energy: 16.5 – 22.0 million GJ
- Water: 17,000 – 36,000 ML.

Market value of recycled packaging materials

The disposal of packaging in landfill means that reprocessors are not able to capture the financial market value of these resources.

The table below estimates the medium-term prices of packaging materials, which range between \$30 and \$1,560 per tonne, depending on the material.

Table 14 – Market value of recycled packaging materials (2011)

Material	Market value (\$ per tonne)
Paper/cardboard	\$181 ¹
Glass	\$30 ²
Aluminium Cans	\$1,560 ³
Streamed plastics	\$560 ⁴
Plastics – mostly sorted	\$530
Plastics – fully mixed	\$372 ⁵
Steel Cans	\$280 ⁶
Liquid paperboard	\$150 ⁷

Source: WCS (2011).

Notes:

1. PPI Asia for OCC and Mixed Grade (Visy) and Paper Fibre Network
2. Owens Illinois and BDA/MMA (2007)
3. LME and Metals Price Archive (Letsrecycle.com)
4. Streamed plastics (assuming 40% PET, 20% high density polyethylene (HDPE), 20% low density polyethylene (LDPE), 20% mixed) – Recycling industry sources
5. Fully mixed plastics (assuming 30% HDPE, 30% PET, 40% mixed) – Recycling industry sources
6. Recycling industry sources
7. Recycling industry sources

Based on the financial market value per tonne of packaging recycled estimated in the table above and increasing recycling from current levels (62.5%) to 85%, it is estimated that the 1 million tonnes of packaging sent to landfill is valued by the market at between \$160 - \$280 million per annum.

Society's value placed on packaging recycling

In addition to the financial market value of resources, households also place a non-market value on recovering resources, for example, because they want to live in a less wasteful society or preserve resources or the environment for future generations.

⁵⁴ DEWHA (2010) *Climate Change and the Resource Recovery and Waste Sectors*, p 4.

In 2010 the EPHC commissioned a study to quantitatively estimate consumers' willingness to pay for improvements to packaging and beverage container waste management. Based on a national sample of 3,432 households from 15 regions within Australia, including eight capital cities and seven regional areas, it was estimated that households are willing to pay, on average:

- \$2.77 per year for every 1% increase in the volume of waste packaging recycled above the current national recycling level
- between \$276 million and \$552 million per annum for a 'noticeable' to 'significant' reduction in litter (discussed further in Impact 6 below).

Assuming current recycling of 62.5% (Table 2), an 80% aggregation factor to account for drop-outs and people in remote areas that were not sampled as part of the study⁵⁵ and 8.4 million households in Australia⁵⁶ it is estimated that households are willing to pay a total of \$415 million per annum to increase recycling from current levels (62.5%) to 85%.

The survey discussed above 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.

Impact 3

Landfilling of packaging results in environmental externalities such as greenhouse gases, leachate and reductions in amenity

Landfill of packaging imposes external costs on third parties, such as greenhouse gases (which impact the entire planet), leachate (which imposes health costs on adjacent communities and habitats) and amenity impacts (which decrease the utility of adjacent communities).

There were at least 665 landfills operating in Australia in 2008, although it is likely that more landfills both operational and closed may exist.⁵⁷ In 2006/07, total waste generated was 43.8 million tonnes, of which 21.1 million tonnes (48%) was disposed of in landfill.⁵⁸ In 2010, 1.7 million tonnes of packaging were disposed of in landfill (Table 1), accounting for around 8% of total landfill.

Landfills can impact on air, water and soil in a number of ways, including:

- Landfill gas – created by the decomposition of organic waste and consists mainly of methane which when released to the air contributes to local smog and global warming
- Leachate – formed when water moves from or through waste, and has the potential to contaminate nearby surface and ground water.⁵⁹

There are also social impacts of landfill on third parties. Landfill may affect the host community, including through noise, odour, dust, increased traffic and exposure to the environmental impacts. In addition, unmanaged litter will create amenity impacts in the immediate vicinity of the landfill. The report *Australian landfill capacities into the Future* found that community objections to landfill are a significant and increasing constraint on the supply of landfills.

⁵⁵ PwC (2010) *Estimating consumers' willingness to pay for improvements to packaging and beverage container waste management*, p 40.

⁵⁶ ABS Catalogue No 4102.0, *Australian Social Trends*.

⁵⁷ Waste Management Association of Australia (2009) *National Landfill Survey, 2007/08* cited in DEWHA and EPHC (2010) *National Waste Report 2010*, Chapter 3L Impacts and opportunities, p 149.

⁵⁸ Hyder (2008) *Waste and Recycling in Australia*, p 7.

⁵⁹ DEWHA and EPHC (2010) *National Waste Report 2010*, Chapter 3: Impacts and opportunities, p 150.

The combination of stringent environmental regulation plus collection of landfill gas and its use for generation displacing fossil fuels has meant that, over time, the externalities of landfill are reducing.⁶⁰ However, in the Waste Management Association of Australia's national landfill survey, they note that there is:

- Inadequate use in small landfills of landfill liners and leachate collections systems to prevent contamination to groundwater. Application of both types of control systems was rated 'low' in survey responses.
- Limited use of landfill gas capture systems to minimise release of greenhouse gas emissions. This applies particularly to small and medium sized landfills for which the survey response rate was 'low'. The survey response for large landfills was just one step higher at 'low to moderate'.⁶¹

Greenhouse gases are created by paper and cardboard, which are organic wastes and can take between 10 to 17 years to break down.⁶² Leachate results from the disposal of aluminium, steel⁶³, and oxo-degradable plastics.⁶⁴ All materials will contribute to disamenity.

The table below presents estimates of the external costs of landfill for large landfills, which constituted more than 70% by weight in the *National Landfill Survey* conducted by the Waste Management Association of Australia.⁶⁵

Table 15 – External costs of landfill disposal for large urban and rural landfills (\$ per tonne, 2009)

External cost type	External cost value (\$/tonne) ¹
Greenhouse gas emissions	(-\$5.3) ² – \$13.5
Other air emissions	\$0.2-\$1.0
Leachate	\$0.0 ³
Disamenity	\$1.0 - \$10.0

Source: BDA (2009) *The full cost of landfill disposal in Australia*, p 76

Note:

1. The range of estimates reflects differences in location (urban versus rural), climate (dry temperate, wet temperate and wet tropical) cost controls (best versus poor).
2. Negative values reflect the capture of landfill gas, which can be used as a fuel.
3. Most modern engineered landfills control leachate through a combination of landfill liners and collection systems and are generally required to be in suitable locations to avoid risks to groundwater.

Based on the assumption that all packaging in landfill contributes to disamenity costs, only paper and cardboard produce greenhouse gas emissions and only steel and aluminium produce leachate, increasing recycling from to 85% is estimated to reduce the externality costs of landfill by between negative \$3.6 million and \$12.5 million per annum.

⁶⁰ BDA Group (2009) *The full cost of landfill disposal in Australia*, p 18.

⁶¹ Wright Corporate Strategy (2010) *Review of the Application of Landfill Standards*, p 8.

⁶² Warneken (2007) *The Potential Greenhouse Gas Liability from Landfill in Australia: An examination of the Climate Change Risk from Landfill Emissions to 2050*, p 10 cited in DEWHA and EPHC (2010) *National Waste Report 2010*, Chapter 3: Impacts and opportunities, p 150.

⁶³ DEWHA and EPHC (2010) *National Waste Report 2010*, Chapter 3: Impacts and opportunities, p 151.

⁶⁴ See, for example, UK Department for Environment, Food and Rural Affairs (2010) *Assessing the Environmental Impacts of Ox-degradable plastics across their life cycle*.

⁶⁵ Waste Management Association of Australia (2009) *National Landfill Survey 2007/08* cited in DEWHA and EPHC (2010) *National Waste Report 2010*, Chapter 3: Impacts and opportunities, p155-156.

Impact 4

There are opportunity costs relating to the operation of landfills

In addition to externality costs of landfilling packaging, there are avoidable direct costs associated with operating landfills including the opportunity cost of land, and other ongoing operating costs that vary with landfill volumes. Consequently, if packaging resources can be efficiently diverted from landfill, this will lead to cost savings.

The private costs of landfill include land purchase, the approval process, equipment and buildings, construction costs such as excavation and lining of landfill bases to minimise leaching, on-sight gas recovery and flaring, fencing and other measures to prevent waste from being blown into neighbouring properties, operational costs like fuels and materials, monitoring and reporting, capping landfills and landscaping, rehabilitation and aftercare and employees and contractors.⁶⁶

The table below presents estimates of the direct costs of landfill for small, medium and large landfills with either poor controls or 'best practice' controls.

Table 16 – Private costs of landfill disposal (\$/tonne, 2009)

	Best practice controls	Poor controls
Small	\$100	\$74
Medium	\$60	\$44
Large	\$40	\$30

Source: BDA (2009) *The full cost of landfill disposal in Australia*, Attachment C

Given that large landfills constituted more than 70% by weight in the *National Landfill Survey* conducted by the Waste Management Association of Australia,⁶⁷ private costs of landfill are expected to range from \$30 to \$40 per tonne. Increasing packaging recycling from 62.5 % to 85 % is estimated to reduce the private costs of landfill by between \$30 million and \$40 million per annum.

In addition to the direct private costs of landfill, disposal of wastes does have potential to alienate otherwise useable land for long periods of time, depriving society from the productive use of that land during the life and stabilisation periods of the landfill. The extent and duration of alienation will be directly related to the mix of wastes disposed in a landfill, the landfill practices and the nature of the land prior to the landfill operations commencing.

In 2009, Hyder Consulting were commissioned to review Australian landfill capacities into the future. They noted that local politics is a significant constraint and resistance to local landfill development is evident in many land proposals.⁶⁸ Based on the Waste Management Association of Australia's national landfill survey, they estimated that there is currently around 310 million tonnes of landfill capacity in Australia and additional expected capacity of over 60 million tonnes.

⁶⁶ DEWHA and EPHC (2010) *National Waste Report 2010*, Chapter 3: Impacts and opportunities, p 157.

⁶⁷ Waste Management Association of Australia (2009) *National Landfill Survey 2007/08* cited in DEWHA and EPHC (2010) *National Waste Report 2010*, Chapter 3: Impacts and opportunities, pp155-156.

⁶⁸ Hyder (2008) *Australian landfill capacities into the future*, p 5.

Table 17 – Estimated landfill capacities used in the Hyder analysis (Mt, 2008)

	Current approved capacity		Additional expected capacity	
	Putrescible	Inert	Putrescible	Inert
Adelaide	43	0		
ACT	1.4	0	5.2	
Brisbane	26	8.0		
Cairns	0	0.23		
Darwin	1.5	0	7.5	
Geelong	2.8	0.6		
Gold Coast	7.0	0.23		
Hobart	3.3	0	9.5	
Launceston	0.76	0	2.9	
Melbourne E & SE	13	11		
Melbourne N & W	95	6.1		
Newcastle	1.4	0.16	12	
Perth	24	11		
Sydney	40	4.7		
Toowoomba	0.34	Unavailable	1.1	
Townsville	5.6	0		
Wollongong	0.2	0.04	3.3	20

Source: Hyder (2008) *Australian landfill capacities into the future*, Table 5, p 11.

Based on the table above and projected consumption and recovery rates, Hyder also estimated the expected depletion of approved landfill airspace at major Australian population centres. Of note is that landfill space is expected to run out within 10 years in 8 to 11 of these major population centres. In respect of the landfill disposal of packaging, the bulk of the 1.66 million tonnes of packaging disposed to landfill in 2010 (which accounts for around 8% of total landfill) will have been in landfills servicing the main population centres of Australia, which are likely to have a moderate potential to alienate otherwise useable land.⁶⁹ This is problematic given the difficulty of the approvals process for new landfills and local community opposition.

⁶⁹ This is a result of the fact that a number of the major landfills servicing the major cities in Australia involve filling of previously mined and alienated sites, rather than being at virgin sites which remove productive land from potential use.

Table 18 – Expected depletion of approved landfill airspace at major Australian population centres

	Rapid consumption	Slow consumption
Adelaide	>2030	>2030
ACT	2013	2015
Brisbane	2025	>2030
Cairns	2009	2009
Darwin	2017	2020
Geelong	2021	>2030
Gold Coast	2018	2021
Hobart	2021	2030
Launceston	2014	2016
Melbourne E & SE	2021	>2030
Melbourne N & W	>2030	>2030
Newcastle	2015	2016
Perth	2017	2020
Sydney	2017*	2020
Toowoomba	Unavailable	Unavailable
Townsville	>2030	>2030
Wollongong	2010	2010

Source: Hyder (2008) *Australian landfill capacities into the future*, Table 5, p 11.

Note: WCS estimates that landfill capacity for Sydney waste is available for 15 years.

Impact 5

Processing of mixed solid waste and separation of organic waste in lieu of direct landfill disposal can be impeded by packaging contamination, which results in increased processing costs

Beneficial processing of mixed waste in AWT facilities is progressively being introduced into Australia as an alternative to landfill disposal. The primary target product class from this beneficial processing is a suite of organic soil conditioning resources that can be used to enhance agricultural production and reduce dependence on imported synthetic fertilisers.

In 2009/10 0.5 million tonnes of mixed waste was processed in AWTs and this is forecast to grow to around 2.0 million tonnes within five years.

Recent regulatory changes in NSW relating to the quality standards for these compost-like products has focused on the limits of glass, rigid plastics and film plastics that these products can contain to be acceptable for land application. These packaging fragments form part of the in-feed waste stream and are challenging to remove from the product lines.

It is estimated that if all mixed waste AWTs operating in 2009/10 were retrofitted with suitable equipment and operated so as to remove these contaminants to a standard sufficient to meet the NSW guidelines, this would cost the community in the vicinity of \$32 million, and for all future mixed waste AWTs to meet the guidelines, the cost impost is estimated to amount to an extra \$90 million per annum within five years.

These additional costs are estimated to amount to between \$55 and \$75 per tonne. If all packaging contaminants were largely absent from the mixed waste stream, for example because there was 85% diversion away from landfill, these cost savings could be \$28 million to \$38 million per annum.

This would also support Strategies 7, 9 and 10 of the National Waste Policy, which aim to reduce biodegradable waste sent to landfill, address emissions from landfills and improve waste avoidance, reuse and recycling from the C&I waste stream.⁷⁰

Impact 6

Packaging litter affects visual amenity and negatively impacts habitats.

Packaging litter has a range of negative impacts on society, including:

- Negative visual amenity
- Danger to human health, for example, due to injuries from broken glass
- Opportunity costs of cleaning up litter, which could be used to fund things more highly valued by society
- Danger to wildlife, for example, from animals getting caught in or ingesting marine debris.⁷¹

As already described, packaging accounts for 87% of the national litter stream on a volume basis and 34% on an item count basis.⁷²

Though packaging accounts for around one third of litter on an item basis, it is highly visible in the litter stream. Many packaging litter items such as beverage containers, food wrappers and packaging are sizeable, colourful and therefore, highly visible.

In 2010 PwC found that households were willing to pay between \$276 - \$552 million per annum for a 'noticeable' to 'significant' reduction in litter.⁷³ By using these estimates as an indicative guide, it is reasonable to believe the Australian households consider the visual impacts of litter to be significant.

Willingness to pay estimates incorporate a wide range of use and no-use values, including those identified above and values placed on preserving the environment for future generations and living in a less wasteful society. However, some of these values can also be estimated directly for the purposes of comparison.

Governments also offer a range of services that contribute to litter prevention. For example, in Victoria in 2008/09 there were 19,498 litter bins provided in metropolitan areas at a cost of \$9.7 million and 18,186 bins provided in non-metropolitan areas at a cost of \$7.1 million.

It was estimated that in 2008/09 the total cost of providing municipal litter services, street sweeping and litter clean up services in Victoria was \$74 million or \$13.90 per person. The largest portion of this was for street sweeping which accounted for 67%.⁷⁴ Assuming that the cost per person for litter services in Victoria is similar to other jurisdictions, it is reasonable to say that the cost of litter services nationally would be approximately \$300 million to \$350 million annually. Arguably without the significant spend on litter reduction nationally, the negative visual impact of litter would be significantly greater.

⁷⁰ DSEWPAC, *National waste policy*, available at <<http://www.environment.gov.au/wastepolicy/index.html>>, accessed 5 July 2011.

⁷¹ BDA Group and Wright Corporate Strategy (2010) *beverage Container Investigation – Revised final report*, p 50.

⁷² Calculated from Keep Australia Beautiful (2010) *National Litter Index: Annual Report 2009-10*, p 141- 143.

⁷³ PwC, 2010. *Estimating consumers' willingness to pay for improvements to packaging and beverage container waste management*, p iii,

⁷⁴ Sustainability Victoria, 2010. *Victorian Local Government Annual Survey 2008-09*, p 46.

5 Conclusion

Development of options to address the problems associated with resource recovery, landfill and littering of packaging, and cost benefit analysis of these options to determine whether government intervention is likely to deliver a net benefit to society, is justified by the preceding analysis, given that there are regulatory and market failures and the impacts and costs resulting from the regulatory and market failures are significant.

There are regulatory and market failures

There are a number of problems associated with the landfill and litter of packaging, which may be classified as either regulatory or market failures, including the following:

- **Problem 1 - Regulatory failure:** Different jurisdictions have different regulatory and policy frameworks/arrangements for resource recovery and litter management. This broad regulatory failure results in overlapping and duplication of costs as well as regulatory inconsistencies.
- **Problem 2 - Negative externalities:** Individual decisions to landfill or litter packaging impose market and non-market costs on third parties, which are not taken into account by individuals when making their disposal decision. Private costs and benefits are not equivalent to the costs and benefits to society as a whole.
- **Problem 3 - Information asymmetry:** A number of households are unaware of which materials are able to be recycled by their local council, and both households and businesses are unaware of the true value of recycling and/or the impact of contamination of materials on the ability to recycle packaging. This increases packaging to landfill and litter relative to recycling and imposes costs on third parties (i.e. a negative externality).
- **Problem 4 - Coordination, transaction costs and free riders:** Consumer negotiation of a market based solution with waste service providers and other bodies is impractical due to the difficulties of coordinating large groups of consumers with disparate interests, high transaction costs associated with contract negotiations and the potential for free-riders, who may opt out of the contract negotiation but receive the benefits. This increases packaging to landfill and litter relative to recycling and imposes costs on third parties (i.e. a negative externality).

The impacts and costs resulting from the regulatory and market failures are significant

The scale of the impacts imposed on society when packaging is landfilled⁷⁵ and littered as opposed to being recycled, include:

- **Impact 1: Regulatory failure-** Duplication of regulatory design, implementation and administration costs by jurisdictions: \$3 million (2010).⁷⁶
- **Impact 2: Packaging contains embedded resources which are lost under current disposal methods-** The financial market value of lost resources: \$160 million to \$280 million (2010).⁷⁷ Households have indicated that they are willing to pay between \$0.7 billion to \$1.0 billion per annum to increase recycling from current levels (62.5) to 85% and for a 'significant' reduction (20%) in packaging litter

⁷⁵ Note that the indicative magnitude of the problems has been estimated based on increasing current recycling levels (62.5%), acknowledging that a 100% recycling rate is not technically feasible, recycling rates above 85% are likely to be prohibitively expensive and, in reality, these recycling rates will be achieved gradually over time.

⁷⁶ Estimate based on The Allen Consulting Group (2009) *National Waste Policy: Regulatory Impact Statement*, p 41; citing PwC and Hyder Consulting (2009) *Decision Regulatory Impact Statement: Televisions and Computers*.

⁷⁷ Estimate is derived from Table 14.

- **Impact 3: Landfilling results in environmental externalities such as greenhouse gases, leachate and reductions in amenity-** Negative \$3.6 million⁷⁸ to \$12.5 million (2010).⁷⁹
- **Impact 4: There are opportunity costs relating to operation of landfills-** There are also direct costs of landfill (infrastructure, maintenance and operation): \$30 million to \$40 million (2010).⁸⁰
- **Impact 5: Process of mixed solid waste and separation of organic waste in lieu of direct landfill disposal can be impeded by packaging contamination-** Contamination of the mixed waste stream (alternative waste technology infrastructure): \$28 million to \$38 million (2010).⁸¹
- **Impact 6: Packaging litter affects visual amenity and negatively impacts habitats-** There are also direct costs of litter services: \$300 million to \$350 million (2010).⁸²

⁷⁸ The negative cost estimate reflects that landfill gas can be captured and used as an alternative fuel, which offsets greenhouse gas emissions.

⁷⁹ Estimate is derived from Table 15.

⁸⁰ Estimate is derived from Table 16.

⁸¹ Based on estimates by WCS (2011). See Chapter 4: Packaging problems.

⁸² Estimate is derived on page 48.

Appendices

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Appendix A Policy context and current recycling and litter arrangements

All three levels of government in Australia play a role in managing the environment, with relative roles defined by the heads of power in the Australian Constitution. The Commonwealth's responsibilities include taking a national role in considering the environment by enacting policies regarding large environmental and pollution issues. All responsibilities not explicitly allocated to the Commonwealth Government in the Constitution are given to state or territory governments. State and territory governments are responsible for enacting policies that protect the environment on a state level, as well as waste management and recycling. Local governments, whose power is controlled by Acts of state or territory parliaments such as the local government Acts have responsibility for aspects such as delivery of domestic waste management services, including kerbside recycling, green waste collection, waste education, litter abatement and management, plus management of transfer stations and landfills.⁸³

Waste and litter regulations, policies, programmes and initiatives at each level of government in Australia are outlined below.

National

Waste

The National Waste Policy, which was agreed to by all Australian environment ministers in November 2009 and endorsed by the Council of Australian Governments (COAG), sets out a coherent approach to Australia's waste management and resource recovery to 2020.⁸⁴ All jurisdictions seek to deliver on the National Waste Policy through their own endeavours and through national collaboration.

The objectives of the National Waste Policy are to:

- Avoid the generation of waste, reduce the amount of waste (including hazardous waste) for disposal
- Manage waste as a resource
- Ensure that waste treatment, disposal, recovery and re-use is undertaken in a safe, scientific and environmentally sound manner
- Contribute to the reduction in greenhouse gas emissions, energy conservation and production, water efficiency and the productivity of land.

The policy contains sixteen priority strategies, including better packaging management.⁸⁵ Strategy 3 of the National Waste Policy states: 'The Australian Government, in collaboration with state and territory governments, industry and the community, will better manage packaging to improve the use of resources, reduce the environmental impact of packaging design, enhance away from home recycling and reduce litter.'⁸⁶

Strategy 1 of the National Waste Policy is to establish national framework legislation to support voluntary, co-regulatory and regulatory product stewardship and extended producer responsibility schemes. On 22 June 2011, the Australian Parliament passed the *Product Stewardship Bill 2010*. This legislation could potentially

⁸³ MAV and EPA Victoria (2001), Local Governments Role in Waste Management and Recycling, Local Government Case Studies in Environmental Management: Case Study Number 9, available at <[http://www.mav.asn.au/CA256C320013CB4B/Lookup/CaseStudyNumber9/\\$file/WasteManagement.pdf](http://www.mav.asn.au/CA256C320013CB4B/Lookup/CaseStudyNumber9/$file/WasteManagement.pdf)>, accessed 22 July 2011.

⁸⁴ DSEWPac, *National waste policy*, available at <<http://www.environment.gov.au/wastepolicy/index.html>>, accessed 5 July 2011.

⁸⁵ DSEWPac, *About the National Waste Policy*, available at <<http://www.environment.gov.au/wastepolicy/about/index.html#aims>>, accessed 5 July 2011.

⁸⁶ DEWHA and EPHC (2009) *National Waste Policy: Less Waste, More Resources*, November, p 15.

support product stewardship and extended producer responsibility schemes relating to packaging recycling and/or litter reduction.

Other strategies under the National Waste Policy are relevant to the packaging waste and litter issues. Strategies 2, 7, 9 and 10 aim to: improve the sustainability of government operations (2), reduce biodegradable waste sent to landfill (7), address emissions from landfills (9), and improve waste avoidance, reuse and recycling from the C&I waste stream (10).

The National Packaging Covenant (NPC or ‘The Covenant’), now the Australian Packaging Covenant (APC), commenced in July 1999, being the voluntary component of a co-regulatory arrangement for managing the environmental impacts of packaging in Australia. In other words, participation in the Covenant is voluntary, brand owners can choose to join the covenant or comply with the state-based regulations based on the *National Environment Protection (Used Packaging Materials) Measure* (NEPM). Companies who join the Covenant and fail to comply with the Covenant requirements can be regulated under the NEPM in the state or territories in which the company’s head office is based. The NEPM is enforced by the relevant regulatory authorities in each of the states and territories.

The first Covenant expired in July 2005. A new Covenant was subsequently released which broadened the previous Covenant by including a requirement for specific actions and quantifiable targets such as increasing the recycling of post-consumer packaging from 48% (2005) to 65% by 2010; increasing the recycling (currently) non-recyclable⁸⁷ material from 10% (2003) to 25% by 2010; and no new packaging to landfill.

The most recent version of the Covenant, the Australian Packaging Covenant, came into effect on 1 July 2010. The performance of the Covenant will be evaluated by the Covenant Council in 2015. The Australian Packaging Covenant includes a series of performance goals, outlined below:

- Design: Optimise packaging to use resources efficiently and reduce environmental impact without compromising quality and safety
- Recycling: efficiently collect and recycle packaging
- Product stewardship: demonstrate commitment by all signatories⁸⁸

Key achievements of the Covenant over the last decade include:

- Expansion of recycling infrastructure, particularly through investment in glass and paper projects
- Educational litter campaigns in all states
- Development of away-from-home recycling services in shopping centres, fast food outlets, airports, sporting venues and entertainment venues
- Development of recycling collection services to small business and C&I sites
- Financial support for the National Litter Index
- Contribution to research funding, for example, recycled glass as a road base additive and fine recycled glass powder for use as a silicon based fertilizer.⁸⁹

The Covenant will be reviewed within its first five years with the possibility of transitioning the Covenant under national product stewardship framework legislation – a key deliverable of the National Waste Policy.

⁸⁷ Either due to their design, lack of collection/processing infrastructure, or lack of markets.

⁸⁸ Australians Packaging Covenant (2011) *Australian Packaging Covenant*, p 1.

⁸⁹ Australian Packaging Covenant (2011) *The National Packaging Covenant – 2010 Annual Report*, pp 7-10.

Litter

Aside from the Australian Packaging Covenant, which has a strategic goal to reduce packaging litter, there are currently no nationally coordinated government litter initiatives. The Environment Protection and Heritage Council (EPHC), comprising all of Australia's environment ministers, decided not to proceed with a national litter strategy in November 2008.

The Commonwealth Government does not have any direct responsibility for managing litter. However, the Commonwealth has provided funding to non-government organisations such as KAB for the National Litter Index and Branded Litter Study.

State and territory

Waste

An examination of key waste management strategies and policies in place at the state and territory level highlight a number of similarities:

- Landfill levies – many states have a levy applied on a dollar per tonne basis to waste disposed of to landfill. Some states vary the levy based on source sector of the waste or by geographic area.
- Strategy documents – all states/ territories have a current waste strategy or are in the process of developing such a document. In most cases, these documents include targets for diversion of waste from landfill and other areas such as reductions in littering or overall waste generation.
- Landfill performance standards/ best practice – many states have landfill performance standards and/or guidelines for best practice landfill operations. In some cases the current standards were developed in the 1990s.
- Extended producer responsibility – many of the states have developed a list of priority products.
- Partnership programs with local government and industry – a wide range of programs are being implemented to assist local government in their programs and to encourage industry to reduce waste and increase recycling.⁹⁰

New South Wales

The waste regulatory framework is administered under two principal pieces of legislation:

- *Protection of the Environment Operations Act 1997* (POEO Act) – aims to protect, restore and enhance the quality of the environment in NSW. The POEO Act is the key piece of environmental legislation in NSW which is administered by the Office of Environment and Heritage (OEH) and covers a broad range of environmental law including; air emissions, noise pollution, water pollution, general environmental offences and waste.

In relation to waste, the POEO Act specifically sets out the following aims: to use mechanisms that promote pollution prevention, the elimination of harmful wastes, the reduction in the use of materials and the re-use, recovery and recycling of materials. Within the POEO Act, 'waste' is defined for regulatory purposes and offence and penalty provisions are established to ensure that waste is managed in a manner that ensures the protection of the environment. The other key feature of the legislation is that it provides the power for OEH to charge the waste and environment levy (sometimes called a contribution) on all waste received at scheduled waste disposal facilities (i.e. landfill). Scheduled facilities are those listed in Schedule 1 to the Act and are required to hold an Environment Protection Licence.

- *Waste Avoidance and Resource Recovery Act 2001* (WARR Act) – is 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:

⁹⁰ Hyder Consulting (2009) *Waste and Recycling in Australia*, p 83.

- Avoidance – to reduce the amount of waste generated
- Resource recovery – reuse, recycling, reprocessing and energy recovery
- Disposal – management of all disposal options in the most environmentally responsible manner.⁹¹

The WARR Act allows for extended producer responsibility (EPR) schemes to be introduced in NSW. An annual priority statement is released by the Office of Environment and Heritage.⁹²

The WARR Act also requires the development of a NSW Waste Avoidance and Resource Recovery Strategy (WARR Strategy). The first was developed in 2003 and revised in 2007. The Waste Strategy 2007 continues to recognise the importance of the waste hierarchy to guide effective resource management and acknowledges that different materials require different approaches.⁹³

The strategy provides targets for waste reduction and diversion and sets the programs and policies to achieve these targets. The target areas include:

- Preventing and avoiding waste
- Increasing recovery and use of secondary materials
- Reducing toxicity in products and materials
- Reducing litter and illegal dumping.

Specific targets for 2014 include:

- Increasing municipal recycling to 66% by 2014 (was 33% in 2004/05)
- Increasing commercial and industrial waste recycling to 63% by 2014 (was 38% in 2004/05)
- Increasing construction and demolition waste recycling to 76% by 2014 (was 62% in 2004/05).⁹⁴

The *Protection of the Environment Operations (Waste) Regulation 2005*:

- sets out general provisions for the storage, management and transportation of all waste, regardless of Environment Protection Licensing
- outlines the details of the contributions payable by scheduled waste facilities for each tonne of waste received at the facility or generated in a particular area
- exempts certain occupiers or types of waste from these contributions
- allows rebates to be claimed in relation to certain types of waste
- provides for certain reporting and record-keeping requirements in relation to scheduled waste facilities and scheduled landfill sites
- exempts certain waste streams from the full waste tracking and recordkeeping requirements
- makes requirements relating to the transport of certain waste to interstate destinations
- allows the Environment Protection Authority (EPA) to approve the immobilisation of contaminants in waste

⁹¹ PwC & Hyder (2009) *TV & Computers RIS*.

⁹² *Ibid.*

⁹³ NSW Department of Environment and Climate Change (2007) *NSW Waste Avoidance and Resource Recovery Strategy*, p 6.

⁹⁴ NSW Department of Environment, Climate Change & Water (2010) *Waste Avoidance and Resource Recovery Strategy Progress Report, Volume 2*, p 5.

- makes special requirements relating to asbestos and clinical waste
- makes it an offence to apply, or to cause or permit the application of, residue waste to land that is used for the purpose of growing vegetation, subject to any exemptions.⁹⁵

The Waste Regulation also enables OEH to grant exemptions for the beneficial and fit-for-purpose re-use of waste or waste-derived materials when they are applied to land or used as a fuel. This mechanism enables OEH to exempt a person seeking to reuse wastes that pose a minimal risk of harm to the environment and human health, from the regulatory requirements that would otherwise apply to the use of that waste (e.g. licensing, payment of the levy, tracking etc). These exemptions, known as 'Resource Recovery Exemptions' provide regulatory certainty to producers and consumers of waste-derived materials and a gateway for the reuse of bona-fide wastes. Resource Recovery Exemptions are issued under clause 51 and 51A of the Protection of the Environment Operations (Waste) Regulation 2005.

Victoria

The *Environment Protection Act 1970* includes functions to protect the environment from the impact of wastes and sets out the waste hierarchy. In 2002 the *Environment Protection Act 1970* was amended by the *Environment Protection (Resource Efficiency) Act* to allow the Environment Protection Authority (EPA) scope to develop waste management policies (WMPs).⁹⁶ Victoria uses a WMP to enact the Packaging Materials NEPM.

Landfill levies are paid on all waste disposed to licensed landfills in Victoria. Levy funds are used for environment protection activities, including fostering the sustainable resource use and waste management best practice.

The Victorian Towards Zero Waste (TZW) Strategy sets the strategic direction for solid waste management in Victoria.⁹⁷ The strategy's vision is for Victoria to be well advanced along the pathway of becoming a low waste society by 2014. The targets and strategies of Towards Zero Waste cover all aspects of solid waste management in Victoria (excluding prescribed industrial waste), ranging from households to businesses and schools, and are aligned with the objectives of the Environmental Sustainability Framework.

It seeks to minimise waste generation and maximise recovery of materials. It has targets to 2014 and covers solid waste from all sectors. The TZW Strategy also outlines the priority materials and products for each sector. Consumer packaging is a priority product that has been identified for the municipal sector.⁹⁸ Key features of the Strategy include:

- Partnerships between councils, industry and Sustainability Victoria, to extract more valuable resources from household, commercial and industrial bins and maximize the collections of paper, glass, plastic, metals and garden waste
- Increasing recycling of product packaging – for example aluminium cans, bottles, paper and cardboard
- Developing product take-back schemes where manufacturers take responsibility for recycling electronic products like computers, TVs and mobile phones
- Increasing provision of away from home recycling facilities - e.g. more recycling bins in public places like sporting grounds.

The strategy also sets key targets:

- Increasing the amount of household waste recycled from 35% to 65 % by 2014

⁹⁵ NSW Office of Environment and Heritage, *OEH Regulation Summaries*, available at < <http://www.environment.nsw.gov.au/legislation/DECCRegulationsummaries.htm#poeow>>, accessed 6 July 2011.

⁹⁶ EPA Victoria, *Environment Protection 1970*, available at < http://www.epa.vic.gov.au/about_us/legislation/epa.asp> , accessed 7 July 2011.

⁹⁷ Sustainability Victoria, *Towards Zero Waste*, available at < <http://www.sustainability.vic.gov.au/www/html/1344-towards-zero-waste.asp>>, accessed 8 July 2011.

⁹⁸ *Ibid.*

- Increasing the amount of all waste recycled in Victoria from 53% to 75% by 2014
- Reducing littering behaviour by 25 % by 2014.⁹⁹

In order to help meet the targets set out in the Victorian Government's TZW Strategy, the Metropolitan Waste Resource Recovery Strategic Plan was developed.¹⁰⁰ The Strategic Plan's key objective is to provide a long term vision for the management and reduction of waste in metropolitan Melbourne. The Plan has three primary components: a strategic framework for the management of all solid waste in Melbourne, a schedule of current and future infrastructure needs and a land fill schedule setting out the permitted locations of Melbourne's landfill sites.¹⁰¹

Queensland

In May 2010, the Queensland Government agreed to a significant waste reform package to halve waste to landfill by 2020. A key element of the reform package is a new waste strategy, supported and implemented through a new legislative framework, a waste disposal levy and programs funded from the levy.

Queensland's Waste Reduction and Recycling Strategy 2010–2020 was released on 22 December 2010. It is designed to drive a decade of significant improvement in waste and resource management and move Queensland towards achieving this vision.

The strategy sets clear targets to be achieved over the next decade including:

- Reducing waste to landfill by 50%
- Reducing generation of waste by 15% per person
- Reducing landfill gas emissions by 50%
- Increasing recycling of commercial and industrial waste to 60%
- Increasing recycling of construction and demolition waste to 75%
- Increasing recycling of municipal solid waste to 65%.

Implementing the strategy will progressively shift emphasis up the waste and resource management hierarchy, from disposal, to reuse and recycling and towards a culture of waste avoidance and reduction.

The strategy will also help the state meet its obligations under the national waste policy and the Queensland Government's 'Toward Q2: Tomorrow's Queensland' target for reducing greenhouse gas emissions.

The strategy will be supported by a strengthened legislative framework and a levy price signal to discourage disposal and underpin the behavioral change required to reduce waste generation and disposal. The new legislative framework is established under the Waste Reduction and Recycling Act 2011 (WRR Act).

The WRR Act establishes a new framework to modernise and streamline waste management and resource recovery practices in Queensland. It focuses on reducing waste and promoting improved resource recovery. Disposal of waste to landfill will be the last resort.

The WRR Act will help identify priority wastes enabling Queensland to support national approaches or to adopt state based action. It provides for the preparation of a priority product statement which will identify priority

⁹⁹ Victorian Department of Sustainability and Environment, *Towards Zero Waste Strategy*, available at < <http://www.dse.vic.gov.au/conservation-and-environment/sustainability/waste-management-and-resource-efficiency/towards-zero-waste-strategy>>, accessed 6 July 2011.

¹⁰⁰ Victorian Department of Sustainability and Environment, *Metropolitan Waste and Recovery Strategic Plan*, available at <<http://www.dse.vic.gov.au/conservation-and-environment/sustainability/waste-management-and-resource-efficiency/metropolitan-waste-and-resource-recovery-strategic-plan>>, accessed 6 July 2011.

¹⁰¹ *Ibid.*

products and materials, preferred management options and performance measures. Possible actions may include:

- Product stewardship schemes
- Disposal bans
- Education and awareness campaigns.

The WRR Act introduces a waste disposal levy bringing Queensland into line with other Australian states where a levy already exists. From 1 December 2011 waste disposal site operators will be required to pay a levy in relation to commercial and industrial, construction and demolition and regulated wastes delivered to their waste disposal facility for disposal. The levy has been designed to:

- create a price signal to encourage waste generators to focus on waste avoidance and resource recovery, and to discourage unnecessary landfill disposal
- provide funding for programs that help establish better waste avoidance, resource recovery practices and overall waste management initiatives
- provide funding to help local governments undertake environmental projects, focusing on better waste management facilities and practices
- reduce the impact upon Queensland's carbon footprint caused by waste disposed to landfill.

Western Australia

There are three essential parts of waste management and environmental protection in Western Australia; the *Environmental Protection Act 1986*, the *Waste Avoidance and Resource Recovery Act 2007* and *Waste Avoidance and Resource Recovery Levy Act 2007*, and the Waste Avoidance and Resource Recovery Account.

In Western Australia, the *Environmental Protection Act 1986* provides a basis for the Environment Protection Authority to:

- prepare environmental protection policies
- undertake environmental impact assessment of proposals
- recommend the regulations that address the management of wastes and environmental impacts of wastes.¹⁰²

Under the *Environmental Protection Act 1986* the Department of Environment and Conservation delivers industry regulation services including licensing and registration of prescribed premises, licensing of controlled waste transporters, and administration of the Environmental Protection Regulations.

In 2007 the *Waste Avoidance and Recovery Act 2007* established the Waste Authority.¹⁰³ One of the major early tasks of the Authority is to develop a State-wide, long-term strategy for the continuous improvement of waste services, and waste avoidance, resource recovery benchmarked against best practice, and the development of targets for waste reduction, resource recovery and the diversion of waste from landfill.

The Waste Avoidance and Resource Recovery Account is funded by revenue from the landfill levy and is used to implement initiatives related to the management, reduction, reuse, recycling, monitoring or measurement of waste.¹⁰⁴ Grants are available for projects that reduce waste, through waste avoidance, re-use and recycling.

¹⁰² Environmental Protection Authority, *About the EPA*, available at <<http://www.epa.wa.gov.au/AbouttheEPA/abouttheEPA/Pages/default.aspx?cat=About%20the%20EPA&url=AbouttheEPA/abouttheEPA>> , accessed 7 July 2011.

¹⁰³ WA Department of Environment and Conservation, *Waste Management*, available at <<http://www.dec.wa.gov.au/content/category/32/758/1577/>>, accessed 6 July 2011.

¹⁰⁴ WA Department of Environment and Conservation, *Waste Management*, available at <<http://www.dec.wa.gov.au/content/category/32/758/1577/>>, accessed 6 July 2011.

South Australia

The South Australian *Environment Protection Act 1993* incorporates the principles of ecologically sustainable development, requiring that environmental considerations be integral to decision making, and addressing issues such as pollution, waste, contamination and environmental harm generally.

South Australia has a range of regulatory features in its environment protection initiatives that are unique in Australia.

Legislation was passed in 2008 to ban lightweight plastic shopping bags with phasing out beginning 1 January 2009 and the ban taking effect on 4 May 2009.¹⁰⁵ Additionally, since 1975 South Australia has had container deposit legislation (CDL).¹⁰⁶ The legislation was introduced to control litter and waste from beverage containers. Under sections 65-73 of the *Environment Protection Act 1993*, beverage containers (excluding ordinary milk containers, one litre or more of flavoured milk or pure juice, containers three litres or more of any type of beverage and some wine containers) sold in South Australia are required to carry both a refundable deposit and approved refund markings.¹⁰⁷ The legislation was amended in 2008 to address a number of systemic issues within the current beverage container deposit system to improve its functioning and increase the container deposit from five cents to ten cents.¹⁰⁸

In South Australia CDL is a successful environmental tool that provides a driver for recycling waste and reducing litter. The South Australian Environment Protection Authority states that 'approximately 619 million beverage containers were returned to collection depots during 2009-10'.¹⁰⁹ The return rate for beverage containers in 2009/10 was 80.1 %.¹¹⁰

The South Australian *Environment Protection Act 1993* incorporates the principles of ecologically sustainable development, requiring that environmental considerations be integral to decision making, and addressing issues such as pollution, waste, contamination and environmental harm generally.

Like many other jurisdictions, South Australia also has a Waste Strategy. The 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 electronic products
- Encourage cooperation.

A draft 'Waste Strategy 2010-2015' has been released for public comment.

The *Environment Protection (Waste to Resources) Policy 2010* was recently adopted. The policy provides for, amongst other things:

- the implementation of the waste management hierarchy

¹⁰⁵ Environmental Protection Authority, *Plastic Bag Ban*, available at http://www.epa.sa.gov.au/councils/resources_for_councils/plastic_bag_ban, accessed 7 July 2011.

¹⁰⁶ Environmental Protection Authority, *Container deposit legislation*, available at <
http://www.epa.sa.gov.au/xstd_files/Container%20deposit/Information%20sheet/info_cdl.pdf>.

¹⁰⁷ *Ibid.*

¹⁰⁸ *Ibid.*

¹⁰⁹ South Australian Environmental Protection Authority, *Annual Report 1 July 2009 to 30 June 2010*, p. 4.

¹¹⁰ *Ibid.*

- improved options for regulating illegal dumping and inappropriate stockpiling
- waste which are prohibited from disposal to landfill
- requirements that waste produced in Metropolitan Adelaide not be disposed of to landfill unless it has first been subject to resource recovery (subject to specific exemptions)
- standards required to be met by all waste transporters
- additional obligations relating to particular activities and wastes, including medical waste, the disposal of medical sharps, and the management of unlicensed activities involving listed wastes.

Tasmania

The *Environmental Management and Pollution Control Act 1994* provides an overarching framework for the objectives of the resource management and planning system of Tasmania, which include:

- prevention of environmental degradation and adverse risks to human and ecosystem health by promoting pollution prevention
- clean production technology
- reuse and recycling of materials
- waste minimisation programmes.¹¹¹

The Landfill Sustainability Guide 2004 contains best practice standards for landfill.¹¹² The standards cover siting, design, operation and after-care of landfills.

Tasmania's waste management seeks to achieve best practice standards through implementation of the Tasmanian Waste and Resource Management Strategy 2009.

The Strategy is based on the principles of waste reduction, sustainability and best practice in waste management and lays the foundations for longer term waste management planning.¹¹³ The Strategy provides a framework for the coordinated management and delivery of priority waste prevention, recycling and resource recovery initiatives and services.¹¹⁴

As an example, elements of the Strategy will complement work already underway towards a national waste policy and critical national issues such as product stewardship to manage end-of-life computers, televisions and tyres.¹¹⁵

One of the first actions arising from the Strategy was the establishment of a Waste Advisory Committee. The role of the Waste Advisory Committee is to oversee and guide the implementation of the Strategy and to strengthen links between all levels of government, regional authorities, business and the community. The Waste Advisory Committee was established under the Environment Protection Authority.¹¹⁶

¹¹¹ Environment Protection Authority Tasmania, *Environment Management and Pollution Control Act 1994*.

¹¹² Department of Primary Industries, Water and Environment, *Landfill Sustainability Guide 2004*, available at <<http://www.environment.tas.gov.au/file.aspx?id=1706>>, accessed 7 July 2009.

¹¹³ Tasmanian Department of Primary Industries, Parks, Water and Environment, *Tasmanian Waste and Resource Management Strategy 2009*, available at <<http://www.environment.tas.gov.au/index.aspx?base=379>>, accessed 6 July 2009.

¹¹⁴ *Ibid.*

¹¹⁵ *Ibid.*

¹¹⁶ *Ibid.*

Northern Territory

The Northern Territory implemented a *Waste Management and Pollution Control Act* in 1998. The objectives of the Act are, amongst other things, to protect and where practicable restore and enhance the Territory environment by: reducing the likelihood of and effectively responding to pollution; avoiding and reducing the generation of waste; increasing the reuse and recycling of waste; and effectively managing the disposal of waste.

The Northern Territory will introduce a Container Deposit Scheme in January 2012.¹¹⁷ The basic operating model will be similar to that in South Australia and will be called 'Cash for Containers'. From the start of 2012 a ten cent refund will be offered for the following beverage and container types:

Table 19 – Non-alcoholic beverages

Beverage type	Container type	Capacity
Carbonated soft drinks	All	<3 L
Non-carbonated soft drinks	All	<3 L
Pure fruit/vegetable juices	All	< 1 L
Flavoured milk	All	< 1 L
Water	All except aseptic packs	<3 L
Water	Aseptic packs/casks	< 1 L

Source: Provided by the Standing Council on Environment and Water

Table 20 – Alcoholic beverages

Beverage type	Container type	Capacity
Wine	Plastic/aluminium	<3 L
Wine	Aseptic packs/casks	< 1 L
Wine	Sachets (plastic/foil)	< 250 ml
Wine based beverages	All (accept aseptic packs)	<3 L
Wine based beverages	Aseptic packs/casks	< 1 L
Alcoholic beverages (beers/ciders etc)	All	<3 L
Spirituos liquor	Materials other than glass	<3 L
Spirit based beverages	All except aseptic packs	<3 L

Source: Provided by the Standing Council on Environment and Water

Major initiatives for waste management exist under both the Territory 2030 and Northern Territory Climate Change policy.

The major waste management objective in the Territory 2030 policy is to reduce the amount of waste going to landfill by 50 % by 2020 by:

- encouraging better packaging by Territory manufacturers
- encouraging a reduction in waste going to landfill from building and development sites

¹¹⁷ Northern Territory Department of Natural Resources, Environment, The Arts and Sport, *Container Deposit Scheme – Cash for Containers*.

- working with Territorians to reduce the amount of general rubbish sent to landfill.

The Climate Change policy seeks to achieve a reduction in greenhouse gas emissions from landfills through a range of strategies:

- phasing out single use plastic bags and replacing them with reusable bags with a smaller carbon footprint
- introducing Cash for Containers to decrease litter and boost recycling and reduce waste
- analysing and developing recycling options for the Territory that improve recycling infrastructure and provide for efficient transportation and use of recycled material
- reducing the amount of waste going to landfill by 50 % by 2020.

ACT

Following from the *No Waste by 2010 Strategy*, introduced in December 1996, the ACT Government released the draft *ACT Sustainable Waste Strategy 2010-2025* in December 2010.¹¹⁸

The aim of the *No Waste by 2010 Strategy* was to eliminate waste going to landfill by encouraging producer responsibility, encouraging consumers to make sound purchasing decisions, promoting cost effective methods for recovering resources and facilitating the conversion of waste into commercially viable products.

The goal of the draft *Sustainable Waste Strategy 2010-2025* is to achieve full resource recovery and a carbon neutral waste sector. This goal is supported by a range of strategies to boost commercial waste recycling, adopt energy recovery technologies and seek to recover waste to its highest value use. The draft strategy retains the principles of the waste management hierarchy which is embedded in ACT legislation and seeks to increase resource recovery rates in the ACT to over 90 % by 2025.¹¹⁹

As part of the initiatives under the draft *Sustainable Waste Strategy 2010 -2025* the ACT Government has introduced a ban on single-use plastic bags of 35 microns or less. This ban will be implemented on November 1, 2011.

Litter

In addition, all jurisdictions have legislative or administrative frameworks, underpinned by enforcement activity, to manage litter. Littering offences are common across most jurisdictions. Across Australia littering offences are reasonably consistent, with the most common being:

- general littering
- littering from a vehicle
- illegal dumping
- insecure delivery of advertising material
- dangerous/aggravated littering.¹²⁰

Legislative tools

On a legislative basis, jurisdictions tackle litter in different ways. Some jurisdictions have specific litter legislation while others have repealed specific legislation and inserted clauses into other Acts e.g. local government Acts, and police Acts (for enforcement). The legislative and administrative frameworks of each state and territory are outlined below.

¹¹⁸ ACT Community Engagement, *Draft Waste Strategy*, available at <http://www.communityengagement.act.gov.au/engagements/decew/closed/draft_act_sustainable_waste_strategy>.

¹¹⁹ ACT Department of Environment, Climate Change and Water, *Media Release: Commercial and Organic Waste Key Targets of Draft Waste Strategy*, available at <http://www.environment.act.gov.au/__data/assets/pdf_file/0010/210520/MIN_185_1210_Waste_Strategy_MR.pdf>, accessed 6 July 2011.

¹²⁰ EPHC (2008) *Litter Management in Australia*, p 12.

Communication and awareness campaigns focused on behaviour change and litter reduction

Commonwealth, state and territory governments, as well as local governments, implement awareness campaigns and programs aimed at reducing litter.

Clean up activities

As part of their responsibilities, councils and state government agencies undertake clean up activities. A number of non-government agencies also undertake community based activities to reduce or clean up litter, which are described later in this report.¹²¹

New South Wales

The WARR Strategy includes a broad target to reduce the total amount of litter reported annually. A litter reduction target is also part of NSW 2021 A Plan to Make NSW Number One. The key regulatory mechanism for achieving litter reduction in NSW is through enforcement of anti-litter provisions.

The POEO Act was amended in July 2000 to allow for stronger but more flexible and enforceable provisions. Littering offences in NSW include:

- littering (including littering from vehicles) – depositing litter on land or waters in a public place or an open private place
- aggravated littering – littering which is reasonably likely to cause or contribute to appreciable danger or harm to any persons, animals, premises or property
- depositing, or causing someone to deposit, advertising material in a public place or open private place other than in a mail box or under a door, or on a vehicle.

Maximum penalties for prosecutions for littering range from \$2,200 to \$5,500. Different on-the-spot fines also apply, ranging from \$60 for littering with a small item to \$375 (individuals) or \$750 (corporations) for aggravated littering. Many government agencies have powers to enforce the litter laws and issue litter fines, including all 152 local councils, the NSW National Parks and Wildlife Service, NSW Police Service and the Department of Fisheries.

Changes to littering offences regulations have resulted in an increase in fines being issued, from fewer than 800 in 1999 to more than 7000 in 2007/08. In 2009/10 there were around 5,000 littering fines issued by the NSW Department of Environment, Climate Change and Water (DECCW) and local and State government authorised officers.¹²²

In addition to enforcement activity, NSW funds litter education materials, campaigns, research and data including work with local government and industry.

Victoria

The Victorian Litter Reduction Strategy released in 1995, was the first government strategy developed in Australia to provide a direction for the prevention and management of litter. In August 2009, the Victorian Government released an updated litter strategy - Creating Cleaner, Safer Places – to meet the Towards Zero Waste target to improve littering behaviours by 25 % by 2014, compared to 2003 levels. Both the 1995 and 2009 strategies emphasised the need for a coordinated, collaborative and multifaceted approach to litter prevention and management.

The Victorian Government supports the Victorian Litter Action Alliance (VLAA), which aims to provide a coordinated approach to preventing litter in Victoria across state and local government, industry and community sectors. VLAA has produced a range of best practice litter prevention kits incorporating education, infrastructure and enforcement activities.

¹²¹ EPHC (2008) *Litter Management in Australia*, pp 4-5.

¹²² NSW DECCW (2011) *Annual Report 2009-10*, p 262.

A key development has been the establishment in 2002 of a full-time VLAA 'Litter Champion', who has been able to serve as a focus point for information sharing and the development of best practice guidance for stakeholders. The Litter Champion position is funded by VLAA members and housed at Sustainability Victoria.

In 2002, Victoria's litter laws were strengthened by including enforcement provisions in the *Environment Protection Act 1970* for:

- offences relating to bill posting and unwanted advertising material
- prohibiting and regulating the deposit of litter in the environment
- littering from vehicles
- aggravated littering – which includes the intentional deposit of glass, metal, etc, or the intentional deposit of litter that poses a danger to any person, animals, land, water, or vehicle
- the removal of detrimental or disorderly objects and other things.

The Act provides for a shared responsibility for litter enforcement between litter authorities such as EPA Victoria, Victorian Police, local governments, VicRoads, Parks Victoria and Melbourne Water. Victorian residents can also report people who litter from a car to the EPA. Reporting has risen rapidly in recent years, supporting research findings that the community support fining those who litter.

On-the-spot fines range from \$122 for depositing a small item of litter, such as paper or an extinguished cigarette butt, to \$244 for placing advertising material on vehicles, depositing burning litter or throwing litter from vehicles. Offenders can be prosecuted in court up to \$4,885.60, or \$7,328.40 for aggravated littering. The level of fines is adjusted in line with inflation on 1 July each year. Over 14,000 fines were issued by EPA Victoria in 2010/11. Over 90% of these fines are for cigarette butt littering. Revenue from fines is generally retained by the litter authority which issues the fine.

Queensland

Queensland waste reforms will include amendments to the existing legislative framework under the *Environmental Protection Act 1994* (EP Act). Various provisions particularly in relation to litter were transferred from the EP Act and brought under the new WRR Act.

The WRR Act distinguishes littering from illegal dumping by including a distinct offence for illegal dumping and by applying more severe penalties to such a conduct. This recognises the significant issue that illegal dumping poses for local governments across the state.

The Act also strengthens littering and illegal dumping provisions by allowing members of the public to report vehicle-related littering and illegal dumping. Members of the public will be able to make reports through an online system or by posting in an incident report. This will give the public an effective and safe way of reporting offenders.

New offences will also be introduced for leaving unsolicited advertising material at premises with 'no junk mail' or similar signage, and for failing to secure unsolicited advertising material or community newspapers in a receptacle or under the door of premises so that it can become litter. The WRR Act makes it an offence if a responsible entity fails to take reasonable steps to ensure that advertising material delivered to premises does not become waste.

Local government will continue to have primary responsibility for litter enforcement and the ability to appoint staff as authorised officers for the purposes of litter enforcement. In addition, DERM has retained enforcement powers and currently has over 150 authorised officers.

Western Australia

Under the *Litter Act 1979*, littering is illegal. Fines range from \$75-\$200. Littering offences include:

- careless cigarette butt disposal
- discarding general litter
- dangerous litter
- illegal dumping

- advertising material and bill posting
- insecure and uncovered loads
- abandoning shopping trolleys
- fire in litter bins.

The Keep Australia Beautiful Council of Western Australia (KABCWA) is the statutory authority formed under the *Litter Act 1979*. The Act authorises KABCWA, local government, police and other specified state agencies to take action against those who litter. This action can be 'on-the-spot fines', or reports of littering from cars can be sent to the KABCWA which are followed up with fines. Reporting has risen rapidly in recent years, supporting research findings that the community support fining those who litter. Revenue from fines is generally retained by the litter authority which issues the fine.

The litter legislation will be amended in late 2011 to increase maximum fines from \$1000 to \$5000. A new offence of 'littering that creates a public risk' targeting those engaged in serious littering offences that pose a safety risk to people, property or animals will also be inserted into the *Litter Act 1979*. This includes such acts as the littering of lit cigarettes, syringes or broken glass.

A new offence for illegal dumping with substantial penalties was inserted into the *Environmental Protection Act 1986* in November 2010.

KABCWA operates under a five-year strategy (2009-2014) which sets out a framework for effective litter and illegal dumping prevention and management, and provides strategic direction for the combined and consistent efforts of community, industry and government throughout the state.

South Australia

Provisions for litter management and enforcement fines are contained in the *Local Government Act 1999*.¹²³ On-the-spot fines for general littering start at \$315. Confirmed statistics on litter fines are unavailable. However, Keep South Australia Beautiful has suggested that just under 200 fines are issued per year. Litter offences include:

- general littering
- abandonment of a vehicle
- littering from a vehicle.

Tasmania

The *Litter Act 2007* and Regulations includes enforceable anti-littering provisions, with a tiered range of penalties based on the type and amount of litter. Penalties for infringement notice offences vary according to whether the offender is an individual or a corporate body. There are also special provisions to address specific littering situations and management issues including:

- the tendency of certain materials to become litter through escape or likely escape from a private place to other places, for example unsecured loads on vehicles and unsecured waste on commercial premises and construction sites
- placing household and commercial rubbish in public litter bins
- insecure delivery of advertising materials, the placing of leaflets on motor vehicles and illegal bill posting
- public reporting of littering offences.

Members of the public can report littering that they have seen, especially littering associated with a motor vehicle. The report forms the basis for further enforcement action.

¹²³ Specific litter legislation has been repealed.

The litter laws are enforced primarily through the service of infringement notices and litter abatement notices. Prosecutions in court may also be initiated. Police officers and authorised officers appointed under the Act are empowered to take action against offenders.

Northern Territory

The Northern Territory undertakes a range of enforcement activities for litter and waste dumping, the *Litter Act* and the *Waste Management and Pollution Control Act* are the major legislative instruments used to address these issues.

The *Waste Management and Pollution Control Act* provisions have been applied to the litter issue through the nuisance provisions of the Act coupled with a determination of litter as a form of solid waste.

For many litter related issues the *Litter Act* is the primary legislative instrument. It only applies to vacant Crown land and public places, but may apply to municipal or freehold land upon request. Many by-laws under the *Local Government Act* as well as other Acts and Regulations in addition to the *Litter Act* have provisions related to littering.

It is an offence to leave, throw, deposit or abandon litter in, onto or from a public place or vacant Crown land. It is also an offence to not remove the body of an injured or dead animal from thoroughfares used by vehicular or pedestrian traffic. In addition to a penalty, a person is found guilty of an offence may be ordered to pay the reasonable costs of cleaning up the litter.

Various by-laws under the *Local Government Act* contain additional provisions regarding littering, providing for offences relating to handbills, glass breakage, and the offence of the owner or occupier of land allowing litter to remain on land or to allow litter to spread from land to a public place.

Penalties do not exceed \$2000 unless litter was liable to cause injury, danger or damage. Under local government by-laws and other Acts and Regulations, infringement notice penalties vary. Bodies with enforcement powers include: the police, local government, Parks and Wildlife Commission of the NT, Darwin Port Corporation, and the Health Surveyor.

ACT

The *Litter Act 2004* is the primary legislative instrument. Infringement notices are enacted by the Magistrates Court (Litter Infringement Notices) Regulations 2004. Offences include:

- depositing of litter in or on a public place
- aggravated littering that is likely to cause an injury to persons or damage to property in or on a public place
- littering from a vehicle
- uncovered vehicle loads
- depositing of commercial and garden waste in or on a public place
- occupier of commercial premises failing to take reasonable steps to prevent litter from the premises being deposited in or on a public place
- depositing or abandoning a dangerous container in a public place or public tip
- placing advertising leaflets etc. in or on a motor vehicle in a public place.

Penalties under the Act vary between \$1,000 and \$5,000 depending on the category of the offence. Infringement Notice penalties for individuals vary from \$60 to \$1,000 and for corporations from \$300 to \$5,000.

The police and city rangers and any public servant authorised by the Chief Executive are authorised to issue fines.

Local Government

Waste

The 'at-home' consumption sector¹²⁴ is largely catered for with organised recovery systems in the form of municipal kerbside recycling collections run by local government and depot drop-off services in more remote/lower density areas (run by a mix of local government and industry). This form of recycling targets the materials which constitute packaging, rather than packaging itself (for example, newspapers will also be accepted).

The Australian Bureau of Statistics conducted a household survey in March 2009 which estimated household recycling and use of municipal kerbside recycling in Australian households by state and territory. ABS estimates that 97.9% of households recycle and 91.4% of households use municipal kerbside recycling.¹²⁵ Results from the survey are presented in Table 19 below.

Municipal recycling coverage

Around Australia, households are offered different kerbside recycling services, covering particular configurations of materials, depending on which local government area they are in. Figure 6, Figure 7, Figure 8, Figure 9, Figure 10, Figure 11, Figure 12, Figure 13, Figure 14, Figure 15, Figure 16, Figure 17 and Figure 18 below show what municipal wastes can be recycled, and where.¹²⁶

Where available, data are presented for the whole state or territory. Because the largest flows of municipal waste and recycling are generated and handled in metropolitan areas, this information is also presented.

¹²⁴ The 'at home' consumption' covers products consumed in the home only. All products consumed outside the home, for example, in public places such as parks, at organised events, at work or commercial premises are considered to be part of the 'away-from-home' consumption' sector. It should be noted that municipal garbage collection covers parks, but not shopping centres and not typically events. However, this waste is sent to landfill, although consumption and disposal of packaging in parks is a relatively small fraction of the total.

¹²⁵ ABS (2009) *Environmental Issues: Waste Management and Transport Use*, Mar 2009.

¹²⁶ These are based on data entered by local councils into Planet Ark's 'Recycling Near You' service. Sourced from DEWHA and the EPHC (2010) National Waste Report 2010, Chapters 2, pp 19-148.

Table 21 – Household use of municipal kerbside recycling in Australia by state and territory (March 2009)

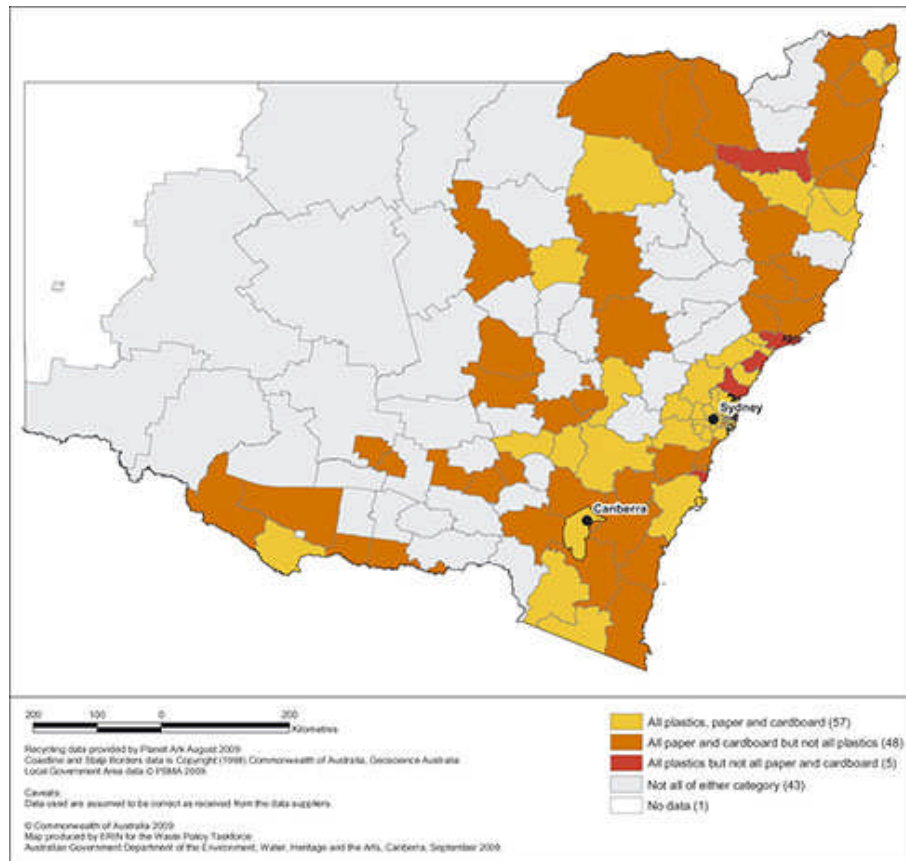
	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	AUS
Households that recycle ('000s) ¹	2,588.2	2,041.6	1,569.1	646.9	808.3	199.2	61.7	132.7	8,047.6
Total households ('000s)	2,644.1	2,059.8	1,624.2	651.4	843.0	202.5	62.5	133.4	8,220.9
Proportion of households that recycle (%)	97.9	99.1	96.6	99.3	95.9	98.4	98.7	99.5	97.9
Households that use municipal kerbside recycling (%) ²	92.4	97.4	85.4	88.3	89.0	84.5	82.5	96.8	91.4

Source: ABS (2009) Environmental Issues: Waste Management and Transport Use, Mar 2009, additional datacube, Tables 2 and 5.

Note:

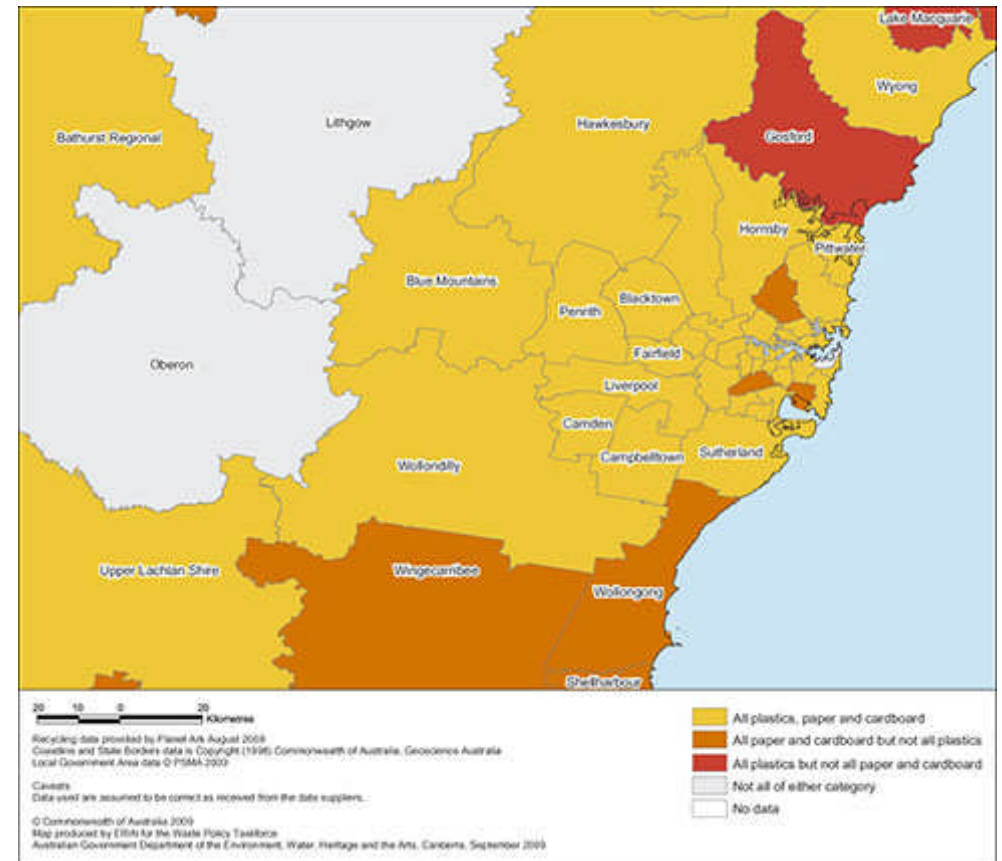
- Households were asked whether they recycled any of the following items at least once in the 12 months prior to the survey in March 2009: paper, glass, newspapers, glass, cans (steel and aluminium), plastic bottles, plastic bags, motor oil, kitchen or food waste and garden waste.
- Those households that recycled were asked whether they used municipal kerbside recycling at least once in the 12 months prior to the survey.

Figure 6 – NSW—municipal recycling of plastics, paper and cardboard, by Local Government Area (LGA)



Source: Provided by the Working Group.

Figure 7 – Greater Sydney—municipal recycling of plastics, paper and cardboard, by LGA



Source: Provided by the Working Group.

Figure 8 – Victoria—municipal recycling of plastics, paper and cardboard, by LGA

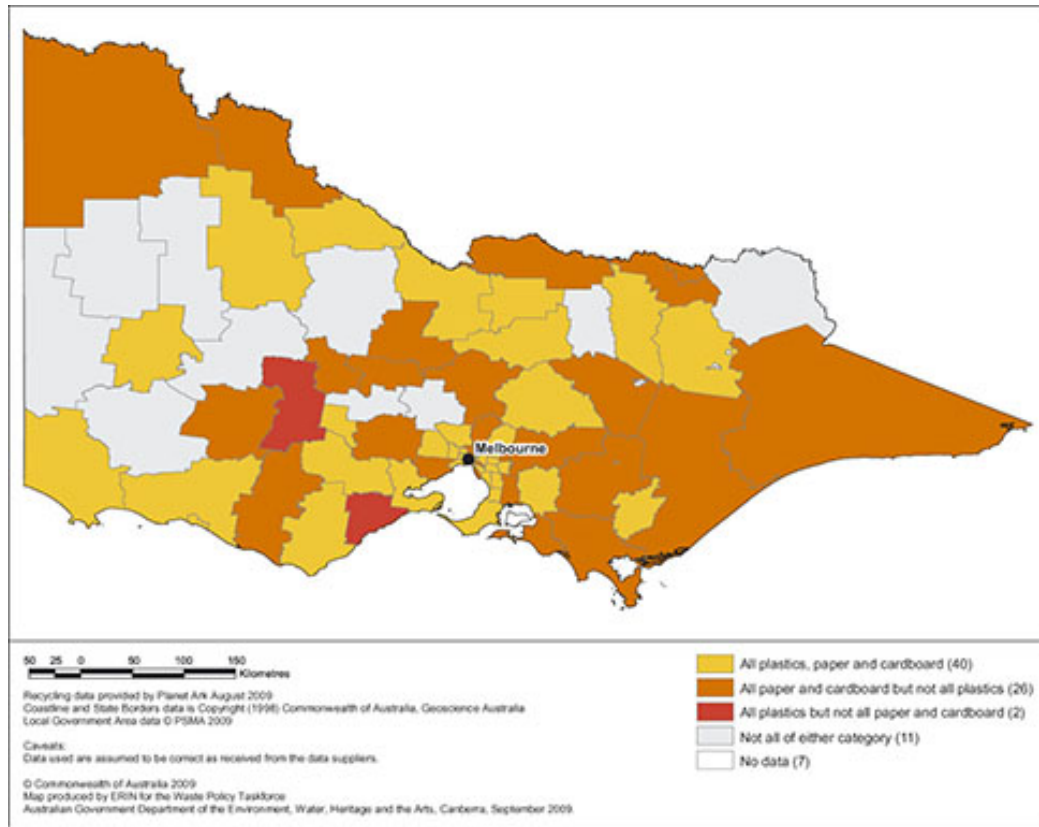
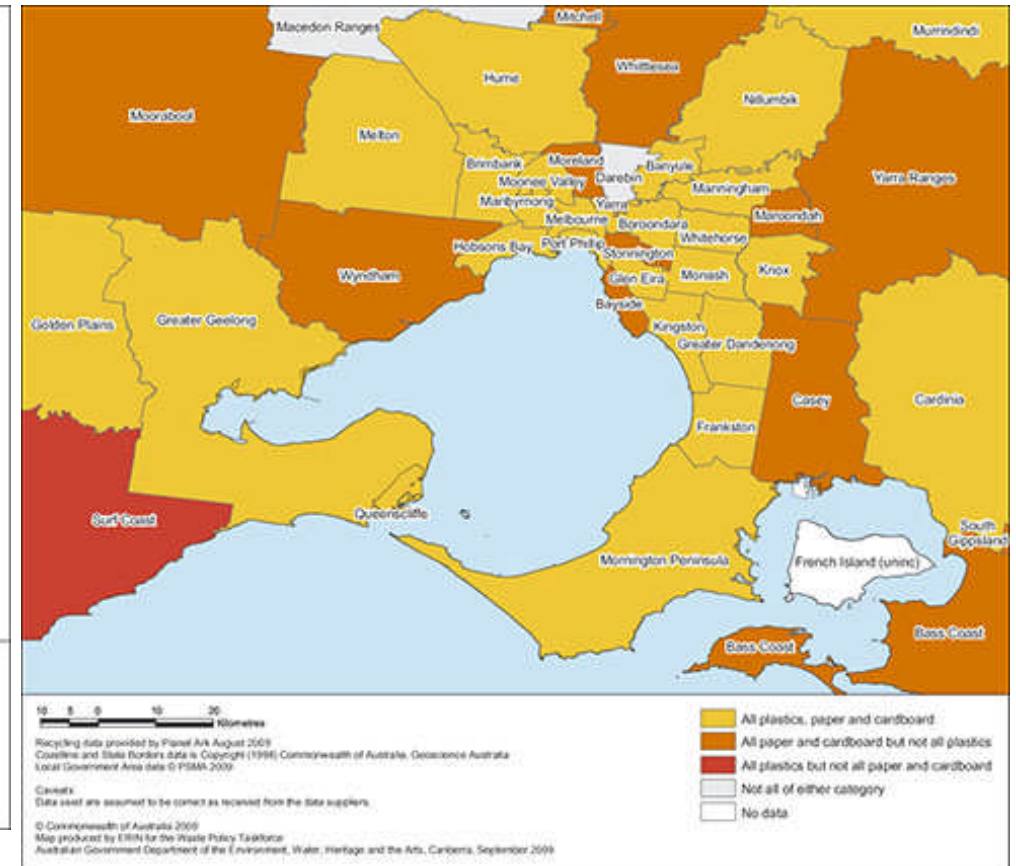


Figure 9 – Melbourne—municipal recycling of plastics, paper and cardboard, by LGA



Source: Provided by the Working Group.

Figure 10 – Queensland—municipal recycling of plastics, paper and cardboard, by LGA

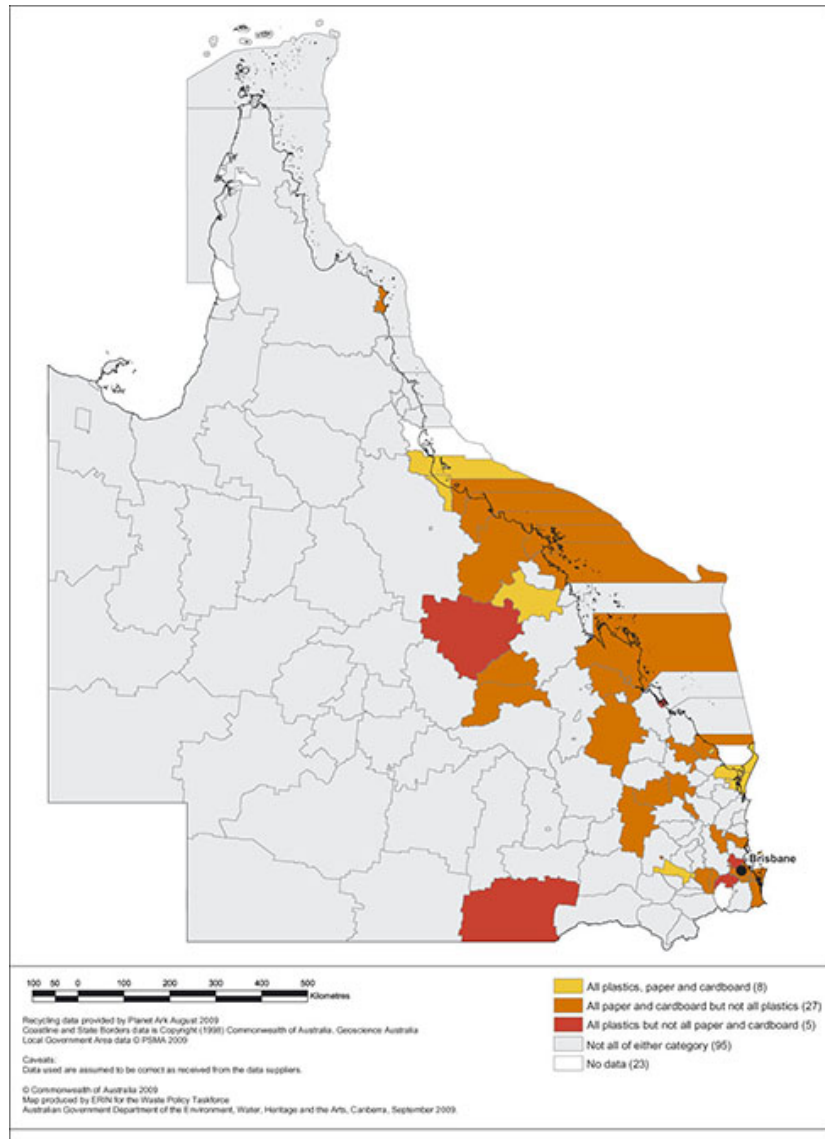
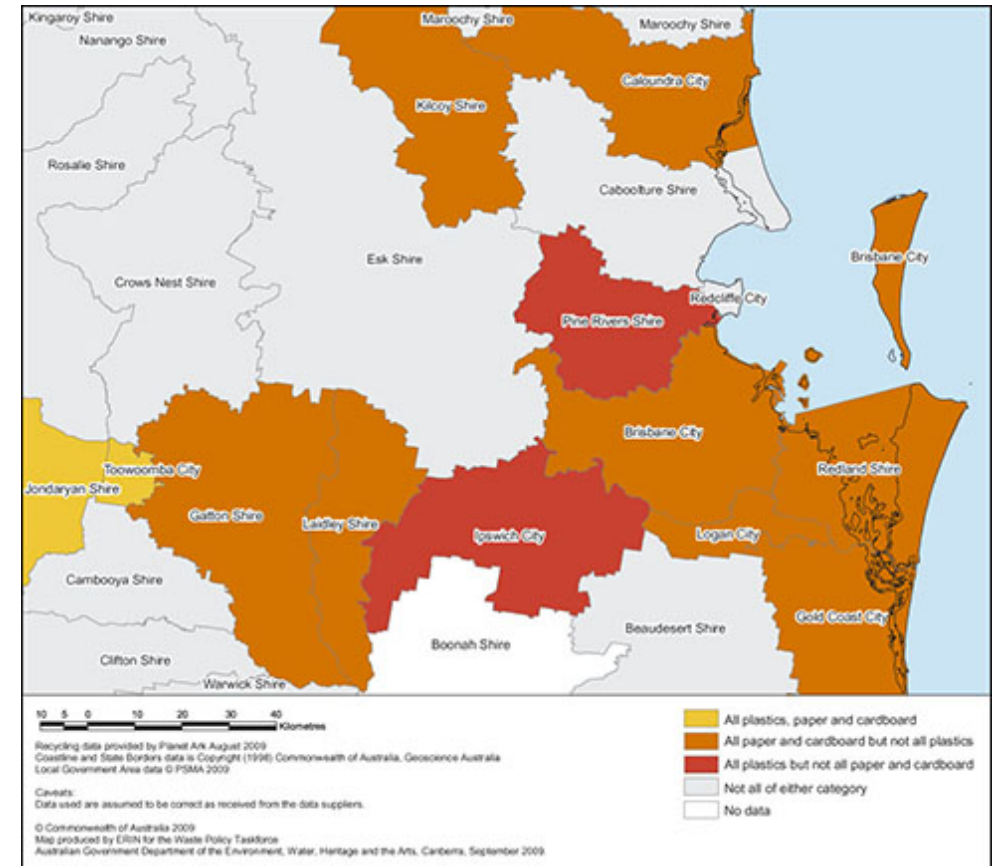


Figure 11 – Greater Brisbane—municipal recycling of plastics, paper and cardboard, by LGA



Source: Provided by the Working Group.

Figure 12 – WA—municipal recycling of plastics, paper and cardboard, by LGA

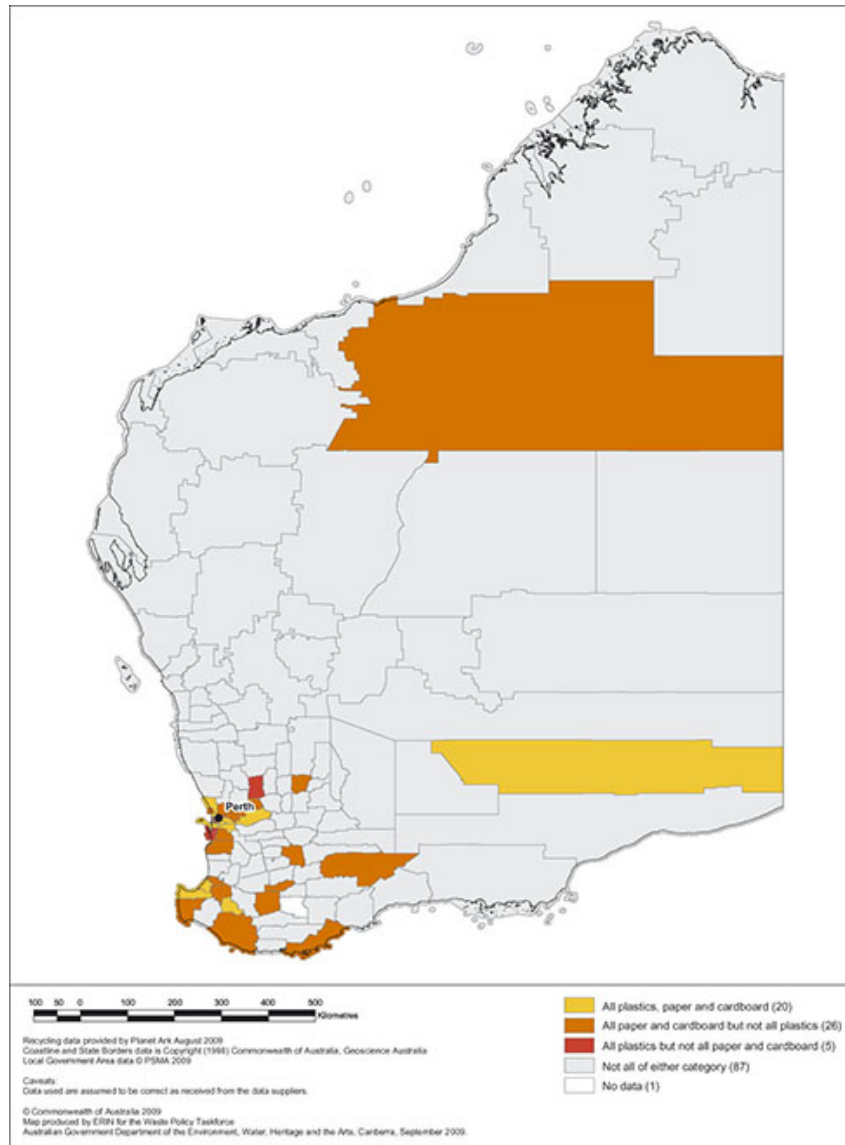
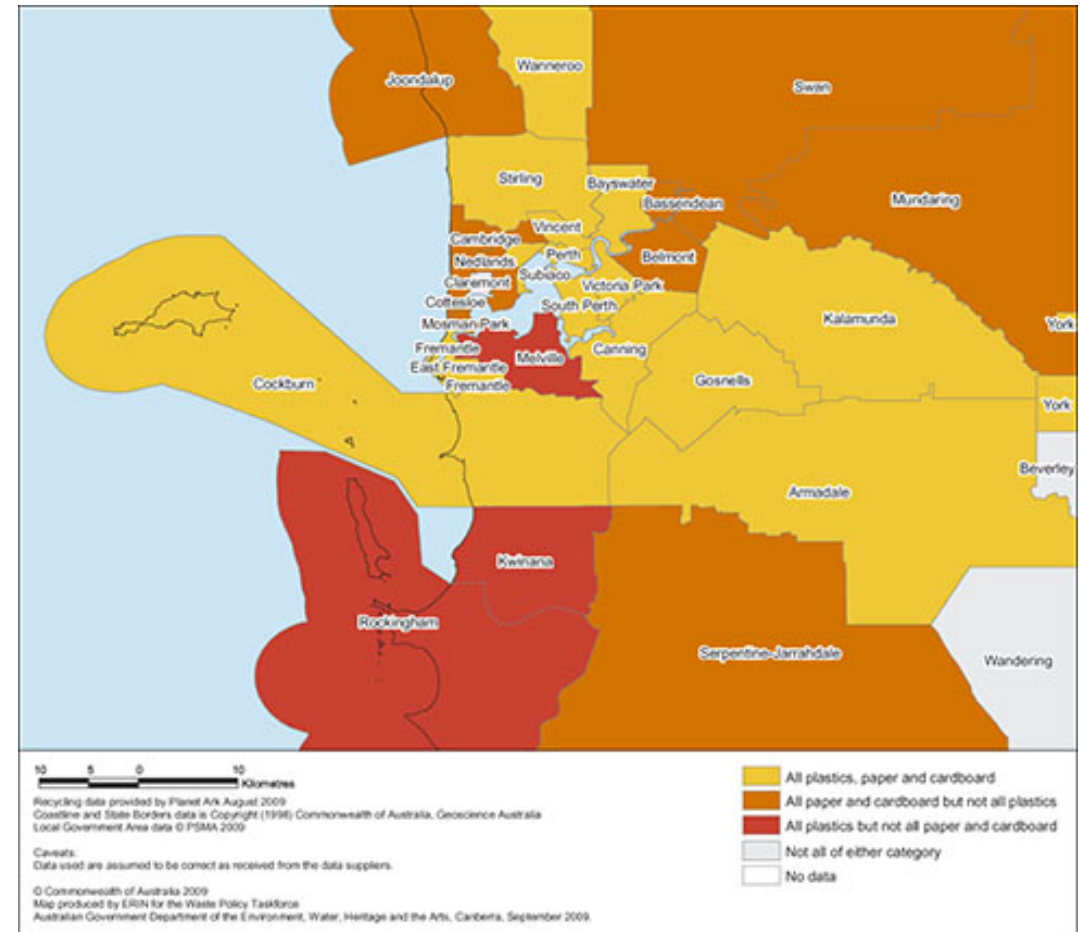


Figure 13 – Perth area—municipal recycling of plastics, paper and cardboard, by LGA



Source: Provided by the Working Group.

Figure 14 – SA—municipal recycling of plastics, paper and cardboard, by LGA

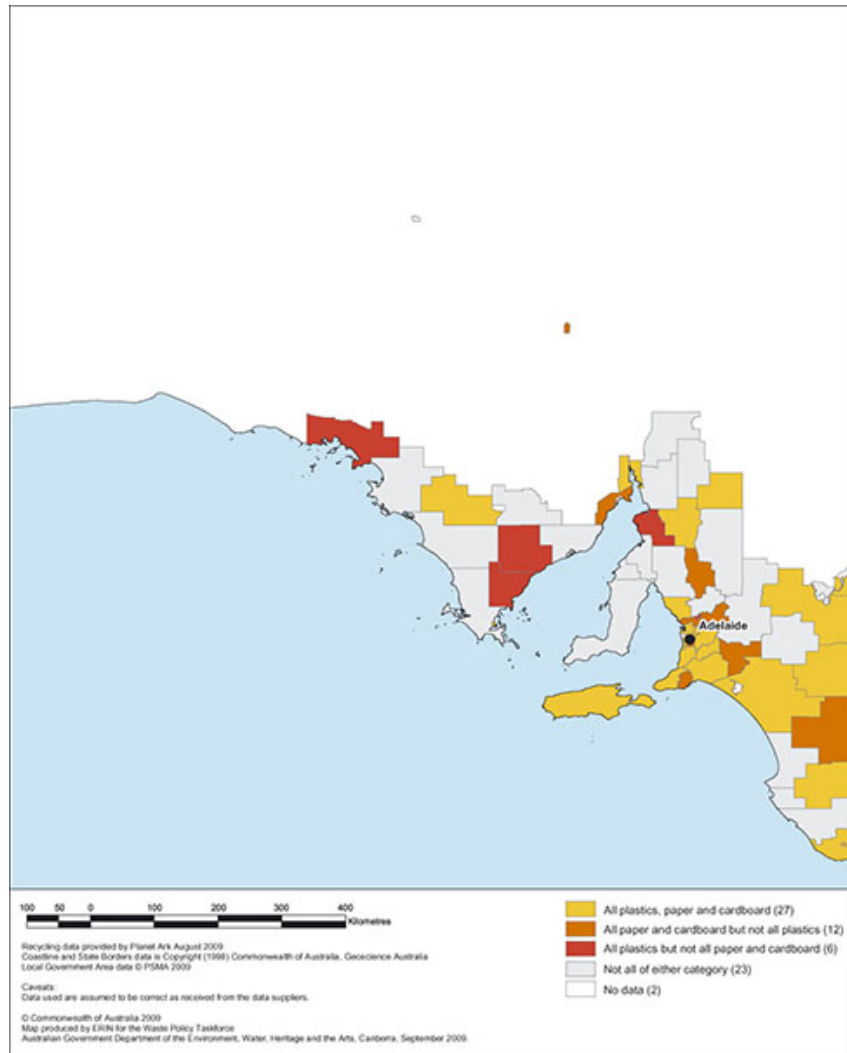
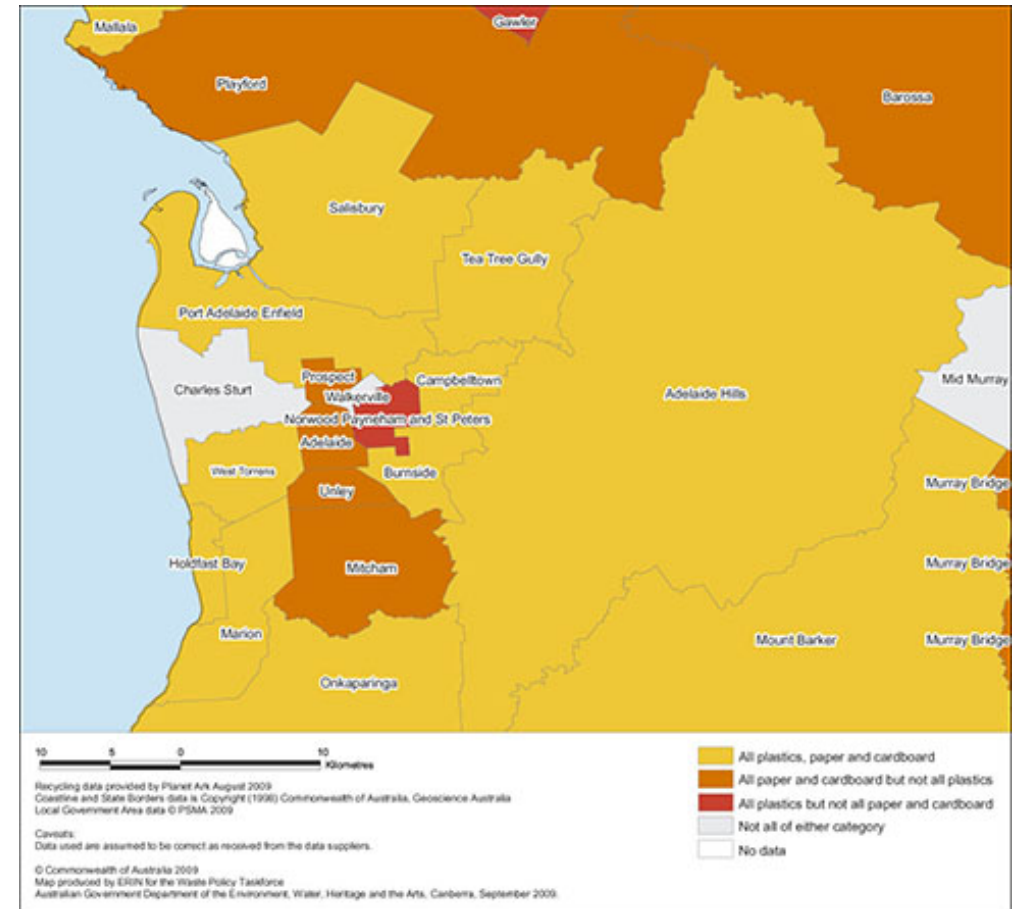


Figure 15 – Greater Adelaide—municipal recycling of plastics, paper and cardboard, by LGA



Source: Provided by the Working Group.

Figure 16 – Tasmania—municipal recycling of plastics, paper and cardboard, by Local Government Area (LGA)

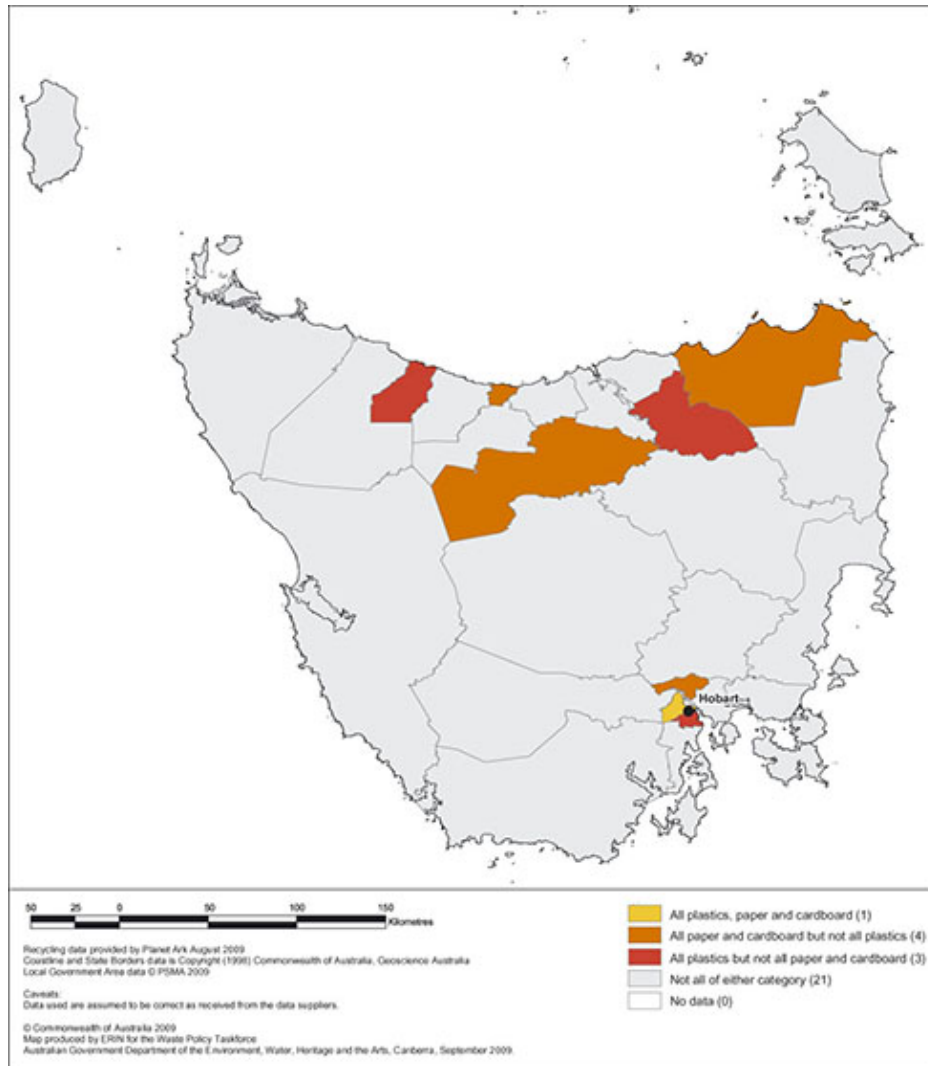
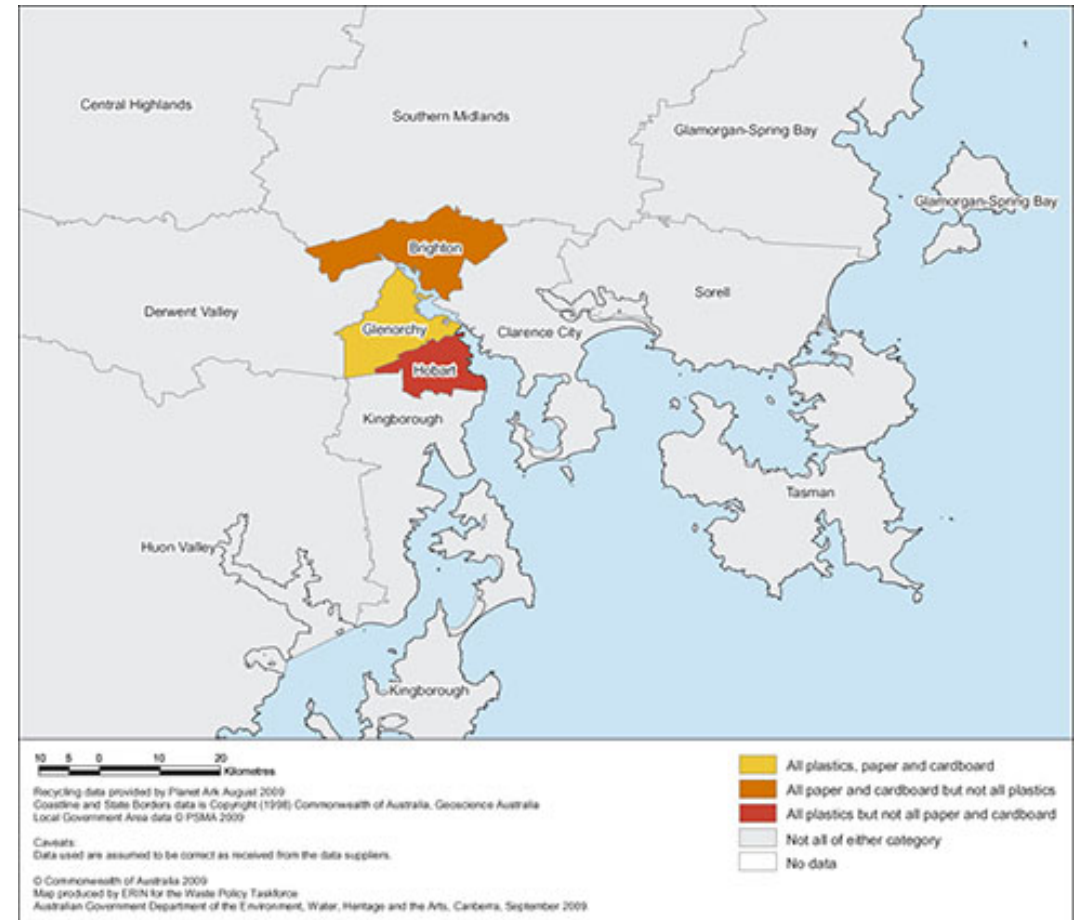
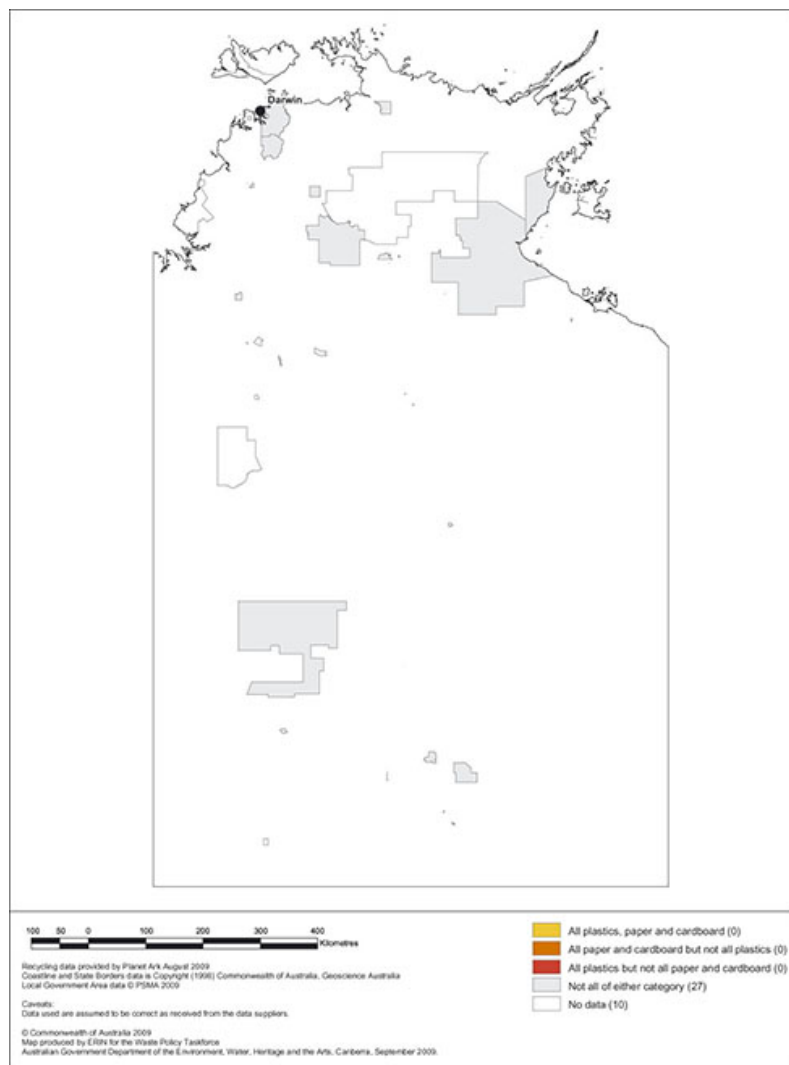


Figure 17 – Hobart area—municipal recycling of plastics, paper and cardboard, by LGA



Source: Provided by the Working Group.

Figure 18 – NT—municipal recycling of plastics, paper and cardboard, by Local Government Area (LGA)



Source: Provided by the Working Group.

Of the 1.2 million tonnes collected at municipal kerbside and drop-off facilities, around 1.1 million tonnes (90%) is recycled, with the remainder being disposed of in landfill due to contamination or lack of end markets.

Table 22 - Municipal recycling: Kerbside and drop-off volumes (2009/10)

Material	Kerbside Collection & Drop-off (tonnes)	Recyclate Production (tonnes)	Residue for Disposal (tonnes)	Residue Proportion of Collection
Paper/cardboard	461,985	399,631	62,354	13.5%
Glass	548,274	502,824	45,450	8.3%
Plastics	131,294	120,202	11,092	8.4%
Steel cans	64,908	61,669	3,239	5.0%
Aluminium cans	21,329	19,987	1,342	6.3%
Totals	1,227,790	1,104,313	123,477	10.1%

Source: EPHC (2010) *2009/10 Annual Report – Jurisdictional Reports on Implementation and Effectiveness of NEPMs*

Kerbside recycling services are usually not provided by local governments at work locations (such as offices or factories) or commercial premises (such as hotels, cafes, restaurants, institutional settings and shopping centres). Although drop off bins are provided at some public places (such as parks and beaches) and organised events. Waste and recycling services at these locations are provided by private C&I waste companies.

Municipal collections cover parks, but not shopping centres and not usually events or C&I businesses. The waste collection is sent to landfill. This waste is recorded as disposal and any packaging is lost to the system. Consumption and disposal of packaging in parks is a tiny fraction of the whole consumption.¹²⁷

Litter

Local governments are involved in the clean up and prevention of litter. In most states, local government officers have the power to issue fines for litter. Some local governments, such as the City of Melbourne, have introduced bylaws or permits to control common litter items such as cigarette butts. Typical local government litter management initiatives and activities include:

- issuing of fines
- bin placement and emptying
- litter patrols
- street sweeping and manual clean ups
- installation of butt bins
- litter prevention education campaigns
- public place and major event recycling.

The cost of many of these activities is fixed, regardless of the rate of littering.

Local governments also conduct education programs or partner with local businesses to prevent litter.¹²⁸

¹²⁷ WCS communication to PwC, based on consideration that around 70% of beverages are consumed at home and the remaining 30% is spread between restaurants/cafes, events, work locations, hotels, travel terminals and parks (with parks likely to be relatively minor), 18 November 2011.

¹²⁸ EPHC (2008) *Litter Management in Australia*, p 17.

Appendix B Derivation of data tables

Data sources and key assumptions

Main sources of packaging consumption and recycling data

The main sources of packaging consumption and recycling data used in this report are:

- Australian Packaging Covenant *2010 Covenant Performance Data*
- Based on Hyder Consulting, *Australian Beverage Packaging Consumption, Recovery and Recycling Quantification Study*, 2008
- NEPC Report on the *Used Packaging Materials NEPM* 2009/10

In addition to the main sources above, the following other sources of packaging consumption and recycling data were used:

- Hyder Consulting, *2010 National Plastics Recycling Survey* 2009/2010
- Australian Packaging Covenant Annual Report 2010
- Australian Packaging Covenant Strategic Plan July 2010- June 2015
- National Packaging Covenant Mid-Term Review 2006-07
- EPHC Data on Packaging and Litter in Australia. November 2010
- Personal communication with packaging industry representatives.

Key assumptions used in data analysis

The assumptions used in the analysis of 2010 packaging consumption and recycling in this report have been referenced in the relevant sections. The major assumptions and their bases are detailed below.

As part of the development of projections, these assumptions will be examined in further detail as part of the cost benefit analysis to be presented Attachment C.

It should be noted that the numbers presented may not total due to rounding.

Key assumption 1: the overall at-home recycling rate is 60%

This assumption is based on the Hyder Consulting *Australian Beverage Packaging Consumption, Recovery and Recycling Quantification Study*, 2008 (p2) which showed residential beverage packaging recycling of 392,173 tonnes out of a residential beverage packaging consumption of 674,469 tonnes, i.e. 58%. As the Hyder report is based largely on 2007 data, this report assumes the percentage will have risen slightly since the Hyder report, hence the figure of 60% has been used. The Hyder report does not include HDPE beverage containers, e.g. some milk and juice containers, which are anecdotally known to be recycled very well in the home.

Key assumption 2: 70% of rigid packaging consumption occurs at home and 30% occurs away from home

This assumption is based on the Hyder Consulting *Australian Beverage Packaging Consumption, Recovery and Recycling Quantification Study*, 2008 (p2) which shows a residential glass, aluminium and PET beverage container consumption of 674,469 tonnes and an away-from-home consumption of 248,326 tonnes, i.e. a split of 73% home and 27% away-from-home consumption split. This data has been simplified to a 70/30 split for this report. The exception is aluminium cans, where a 50% at-home and 50% away-from-home consumption split has been assumed.

The above two assumptions affect many of the calculations made in the data analysis. Other less significant assumptions and their sources are referenced in the relevant sections of the report.

Key assumption 3: 50% away-from-home recycling rate for non-beverage containers

This assumption is based on the high recycling of commercial glass containers, which make up a high percentage of overall non-beverage container consumption. Note: steel can away from home recycling for non-beverage containers assumed to be less effective (10%), as these are assumed to be food cans which probably have food left in them and are not well recycled.

Materials

Paper/Cardboard

Table 23 – Paper/cardboard: Estimated Recycling from Consumption Location (2010)

	Consumption (tonnes)	Recyclate Production (tonnes)	Recycling Performance (tonnes)
Overall	2,680,000 ¹	2,024,000 ¹	75.5% ¹
Away-from-home	2,151,000 ¹	1,624,000	75.5%
At-home	529,000	400,000 ²	75.6%

Source: WCS (2011)

Notes

1. Australian Packaging Covenant *2010 Covenant Performance Data*
2. Estimate based on NEPC Used Packaging Materials NEPM Reports 2009/10.

Glass

Table 24 - Paper/cardboard: Estimated Recycling by Consumption Location (2010)

	Consumption (tonnes)	Recyclate Production (tonnes)	Recycling Performance (tonnes)
Overall	991,000 ¹	466,000	47.0% ¹
Away-from-home	248,000 ³	66,000	26.6%
At-home	743,000	400,000 ²	53.8%

Source: WCS (2011)

Notes:

1. Australian Packaging Covenant *2010 Covenant Performance Data*
2. Estimate based on NEPC Used Packaging Materials NEPM Reports 2009/10.
3. Estimate based on 75%/25% at-home/away-from-home split

Table 25 - Paper/cardboard: Estimated Recycling by Container Type (2010)

	Consumption (tonnes)	Recyclate Production (tonnes)	Recycling Performance (tonnes)
Overall	991,000	466,000	47.0%
Beverage containers	786,000	362,000	46.0%
Non-beverage containers	205,000	104,000	50.7%

Source: WCS (2011)

Table 26 - Paper/cardboard: Estimated Consumption by Container Type and Consumption Location (2010)

	Consumption (tonnes)	At-home Consumption (tonnes)	Away-from-home Consumption (tonnes)
Overall Consumption	991,000	743,000	248,000
Beverage containers	786,000	590,000	196,000
Non-beverage containers	205,000	153,000	52,000

Source: WCS (2011)

Table 27 - Paper/cardboard: Estimated Recycling Rates by Container Type and Consumption Location (2010)

	At-home Recycling (%/tonnes)	Away-from-home Recycling (%/tonnes)	Total (%/tonnes)
Beverage containers	55.6% ¹ /328,000	16.8%/33,000	46.0%/362,000
Non-beverage containers	47.0%/72,000	63.4%/33,000	50.7%/104,000
Total	400,000	66,000	466,000

Source: WCS (2011)

Notes:

1. Based on Hyder Consulting, *Australian Beverage Packaging, Consumption, Recovery and Recycling Quantification Study* 2008.

Plastics

Table 28 – Plastics: Estimated Recycling by Consumption Location (2010)

	Consumption (tonnes)	Recyclate Production (tonnes)	Recycling Performance (tonnes)
Overall	565,000 ¹	197,000 ¹	34.8% ¹
Away-from-home	333,000	77,000	23.1%
At-home	232,000	120,000	51.7%

Source: WCS (2011)

Notes:

1. Australian Packaging Covenant 2010 Covenant Performance Data
2. Estimates in this table are based on discussions with industry.

Table 29 - Plastics: Estimated Recycling by Packaging Type (2010)

	Consumption (tonnes)	Recyclate Production (tonnes)	Recycling Performance (tonnes)
Overall	565,000	197,000	34.8%
Beverage containers	170,000	93,000	54.7%
Non-beverage rigid containers	85,000	25,000	29.4%
Flexible packaging	284,000	58,000	20.2%
Other plastic packaging materials	26,000	20,000	76.9%

Source: WCS (2011)

Table 30 - Plastics: Estimated Consumption by Container Type and Consumption Location (2010)

	Consumption (tonnes)	At-home Consumption (tonnes)	Away-from-home Consumption (tonnes)
Overall Consumption	565,000	232,000	333,000
Beverage containers	170,000	110,000	60,000
Non-beverage containers	85,000	60,000	25,000
Flexible packaging	284,000	57,000	227,000
Other plastic packaging materials	26,000	5,000	21,000

Source: WCS (2011).

Table 31 - Plastics: Estimated Recycling Rates by Container Type and Consumption Location (2010)

	At-home Recycling (%/tonnes)	Away-from-home Recycling (%/tonnes)	Total (%/tonnes)
Beverage containers	75.5% ¹ /83,000	17.0% /10,000	54.7%/93,000
Non-beverage containers	30.0%/18,000	28.0%/7,000	29.4%/25,000
Flexible packaging	14.1%/8,000	22.1%/50,000	20.2%/58,000
Other plastic packaging materials	20.0%/1,000	88.3%/19,000	76.9%/20,000

Source: WCS (2011).

Notes:

1. WCS analysis based on range of sources including Hyder Consulting, Australian Beverage Packaging, Consumption, Recovery and Recycling Quantification Study 2008.
2. Estimates in this table are based on discussions with industry.

Steel Cans

Table 32 – Steel Cans: Estimated Recycling by Consumption Location (2010)

	Consumption (tonnes)	Recyclate Production (tonnes)	Recycling Performance (tonnes)
Overall	136,000 ¹	41,000 ¹	30.3% ¹
Away-from-home	41,000 ²	6,000	14.6%
At-home	95,000	35,000	37.0%

Source: WCS (2011).

Notes:

1. Australian Packaging Covenant 2010 Covenant Performance Data.
2. Based on estimated 75%/25% at-home/away-from-home split.

Table 33 - Steel Cans: Estimated Recycling by Container Type (2010)

	Consumption (tonnes)	Recyclate Production (tonnes)	Recycling Performance (tonnes)
Overall	136,000	41,000	30.3%
Beverage containers	68,000	27,000	40.1%
Non-beverage containers	68,000	14,000	20.2%

Source: WCS (2011).

Table 34 - Steel Cans: Estimated Consumption by Container Type and Consumption Location (2010)

	Consumption (tonnes)	At-home Consumption (tonnes)	Away-from-home Consumption (tonnes)
Overall Consumption	136,000	95,000	41,000
Beverage containers	68,000	51,000	17,000
Non-beverage containers	68,000	44,000	24,000

Source: WCS (2011).

Table 35 - Steel Cans: Estimated Recycling Rates by Container Type and Consumption Location (2010)

	At-home Recycling (%/tonnes)	Away-from-home Recycling (%/tonnes)	Total (tonnes)
Beverage containers	46.0%/23,400	21.2% /3,600	27,000
Non-beverage containers	26.3%/11,600	10.0% /2,400	14,000
Total	36.8%/35,000	14.6%/6,000	41,000

Source: WCS (2011).

Aluminium Cans

Table 36 – Aluminium Cans: Estimated Recycling by Consumption Location (2010)

	Consumption (tonnes)	Recyclate Production (tonnes)	Recycling Performance (tonnes)
Overall	51,600 ¹	35,000 ¹	67.4% ¹
Away-from-home	25,800	15,000	57.3%
At-home	25,800 ²	20,000	77.5%

Source: WCS (2011).

Notes:

1. Australian Packaging Covenant 2010 Covenant Performance Data.
2. Based on estimated 50%/50% at-home/away-from-home split.

Table 37 - Aluminium Cans: Recycling by Container Type (2010)

	Consumption (tonnes)	Recyclate Production (tonnes)	Recycling Performance (tonnes)
Beverage containers	51,600	34,800	67.4%

Source: WCS (2011).

Table 38 - Aluminium Cans: Consumption by Container Type and Consumption Location (2010)

	Consumption (tonnes)	At-home Consumption (tonnes)	Away-from-home Consumption (tonnes)
Beverage containers	51,600	36,000	15,480

Source: WCS (2011).

Table 39 - Aluminium Cans: Recycling Rates by Container Type and Consumption Location (2010)

	At-home Recycling (%/tonnes)	Away-from-home Recycling (%/tonnes)	Total (%/tonnes)
Beverage containers	83.0% /30,000	30.9% / 4,8000	34,800

Source: WCS (2011).

Data by location of packaging consumption

Comparison of APC data and NEPC data

The APC packaging data comprise both at-home and away-from-home consumption (without any data on each set). However, it should be possible to detect away-from-home consumption by deducting the NEPC recycling data from the APC recycling data.

Table 40 - Comparison of APC and NEPC Packaging Materials Recycling Data 2010 & 2009/10

Material	APC overall packaging recyrate (2009, tonnes)	NEPC kerbside or at-home recyrate (2009/10, tonnes)	Estimated away-from-home packaging recyrate (tonnes)
Paper/cardboard	2,024,000	399,600	1,624,400
Glass	466,200	502,800	(36,600)
Plastics	196,900	120,200	76,700
Steel cans	41,200	61,700	(20,400)
Aluminium cans	34,800	20,000	14,800
Total	2,763,000	1,104,300	

Sources: WCS (2011) estimate based on APC 2010 data and NEPC Report on the Packaging Materials NEPM 2009/10.

The at-home/away-from-home split looks appropriate for paper/cardboard, plastics and aluminium cans. However, the glass and steel can data sets indicate that there has been either double counting or discounting of some commodities¹²⁹

In the case of glass there are known stockpiles of MRF-sorted glass in a number of locations, and the data for the above table is sourced from two completely separate sources where:

- The at-home data from NEPC reporting will include all glass sent from kerbside and drop-off to MRF and processed, whether stockpiled or on-sold

¹²⁹ EPHC Data on Packaging and Litter in Australia, November 2010.

- However, the APC glass packaging recyclate data specifically excluded stockpiled glass that has been processed through MRFs but not re-sold into the reprocessing sector.¹³⁰

On this basis, such a discrepancy is to be reasonably expected. Local government has paid for this glass to be collected and sorted in the MRF – thereby fulfilling the first level requirement of recycling this material, but the packaging industry discounts the material as having been recycled since it has not been on-sold to reprocessors.

The conservative APC reporting policy results in the glass recycling rates reported by APC appear to be somewhat lower than recycling rate reported by local government, though it is in line with the 46% recycling level reported in the Australian Beverage Packaging, Consumption, Recovery and Recycling Quantification Study¹³¹

In the case of steel cans, there is no such simple answer, and even the APC is somewhat at a loss to explain the discrepancy noted in Table 40. The anomaly in steel recycling data was not present in the NEPC 2007 reports used in the Beverage Container Investigation and cannot be explained.

On balance, the APC data are preferred because of the rigorous collection procedures and the articulation to other data needed for the analysis. The information in Table 40 is repeated below with adjustments to the glass and steel at-home recyclate to reflect a reasonable at-home recycling rate in the context of the APC overall recyclate count. The adjustments were based on an assumed 70%/30% at-home/away-from-home split for consumption and lower recycling rates for away-from-home consumption of the packaging materials.

Table 41 - Comparison of APC and NEPC Packaging Materials Recycling Data 2010 & 2009/10

Material	APC Overall Packaging Recyclate (2010, tonnes)	NEPC Kerbside or at-home Recyclate (2009/10, tonnes)	Estimated away-from-home Packaging Recyclate (tonnes)
Paper/cardboard	2,024,000	399,600	1,624,400
Glass	466,200	400,000 ¹	66,200
Plastics	196,900	120,200	76,700
Steel cans	41,200	35,000 ¹	6,200
Aluminium cans	34,800	19,987	14,800
Total	2,763,000	974,800	1,788,300

Sources: WCS (2011) estimate based on APC 2010 data and NEPC Report on the Packaging Materials NEPM 2009/10. Adjusted from Table 40 based on assumption of 70%/30% at-home/away-from-home split for consumption.

Following the procedure used by BDA/Wright Corporate Strategy in the Beverage Container Investigation, it is possible to estimate both the at-home and away-from-home recycling. Assuming an at-home recycling rate of 60% (up slightly on the 55% based on 2007 data) the estimates below can be constructed commencing with calculation of at-home consumption based on the NEPC recycling data. This procedure was also followed in the EPHC report.¹³²

¹³⁰ Personal communication with Russ Martin (MS2) and Stan Moore (CEO APCIA), June 2011.

¹³¹ Australian Beverage Packaging, Consumption, Recovery and Recycling Quantification Study, September 2008, p 22.

¹³² EPHC Data on Packaging and Litter in Australia. November 2010.

Table 42 - Estimated Consumption Locations and Recycling of Packaging Materials (2010)

Consumption Location	Consumption (tonnes)	Recyclate (tonnes)	Disposal (tonnes)	Recycling Performance
At-Home	1,624,700 ⁴	974,800 ²	649,900 ⁷	60.0%
Away-From-Home	2,799,400 ⁵	1,788,300 ⁶	1,011,100	63.9%
Totals	4,424,000¹	2,763,100³	1,661,000	62.5%

Sources: WCS (2011) estimates, drawing on Australian Packaging Covenant, 2010 Covenant Performance Data and NEPC Report on the Packaging Materials NEPM 2009/10.

Notes:

1. Australian Packaging Covenant, 2010 Covenant Performance Data.
2. From Table 41.
3. From Table 2.
4. Calculated based on assumed recycling rate of 60%.
5. By deduction.
6. By deduction.
7. From Table 39.

Using the data derived in the above table it is possible to simply calculate an estimated at-home/away-from-home consumption and recycling splits. This shows that the source of 60% of packaging material recyclate produced is from the away-from-home consumption sector, heavily weighted to cardboard packaging. This is shown in the table below.

Table 43 - Estimated Sources of Packaging Materials Recyclate (2010)

Consumption Location	Consumption (tonnes)	Consumption Split (percent)	Recyclate (tonnes)	Recyclate Split (percent)
At-Home	1,625,000	36.7%	975,000	35.3%
Away-From-Home	2,799,400	63.3%	1,788,300	64.7%
Totals	4,424,000	100.0%	2,763,100	100%

Sources: WCS (2011) estimate, drawing on Australian Packaging Covenant, 2010 Covenant Performance data and information at Table 42.

Beverage containers, non-beverage containers and flexible packaging

Beverage Container Recycling At-home/Away-from-home

In the 2008 report for the Packaging Stewardship Forum of the Australian food and Grocery Council, the away-from-home consumption of glass and aluminium beverage containers was estimated at 25%¹³³, while the PET away-from-home consumption level was estimated at 45%. In the 2001 report for the NSW Government, Stuart White indicated that away-from-home consumption might be as high as 50%.¹³⁴

If away-from-home beverage consumption is assumed to be 30% of the total, then around 331,000 tonnes per annum (of the total beverage estimated container consumption shown at Table 52) would be consumed in the away-from-home sector. This estimate broadly aligns with the updated 2007 data from the (then) National Packaging Council which estimates that the away-from-home consumption rate for beverage containers was 346,167 tonnes in the 2007 financial year.

¹³³ Australian Beverage Packaging, Consumption, Recovery and Recycling Quantification Study, September 2008, p 2.

¹³⁴ White 2001 Independent Review of Container Deposit Legislation in NSW, Report to the Minister for the Environment prepared by the Institute for Sustainable Futures UTS, November 2011.

Recovery drivers and systems are not well organised for recycling of beverage containers discarded away from home, with the exception of South Australia where the CDS system is in place. National recycling performance for the away-from-home sector is likely to be considerably less than the estimated 48.7% recycling performance developed above for beverage containers overall (Table 52).

It is unlikely however that recovery performance away-from-home is any better than between 15% and 25% of consumption. The Australian Beverage Packaging, Consumption, Recovery and Recycling Quantification Study found the away-from-home recycling rate was 17% for glass and PET and 31% for aluminium – an overall away-from-home recycling rate of 18% or 63,000 tonnes. This would leave possibly a further 285,000 tonnes per annum potentially available recycle.

This information was used to derive the recycling performance for the at-home consumption and recycling position. The results are summarised in the table below. The key message is the divergence between at-home recycling and away-from-home recycling.

Table 44 - Summary of Estimates of Scale and Recycling of Beverage Containers (2010)

Sector	Estimated Consumption (tonnes)	Estimated Recyclate		Estimated Potential Further Recyclate (tonnes)
		Performance (tonnes)	Recycling Performance (percent)	
At-home consumption	771,400	462,800	60.0% ¹	308,600
Away-from-home consumption	330,600 ²	74,200	22.3%	256,800
Total	1,102,000⁴	537,000	48.7%³	565,000

Source: WCS (2011) estimate.

Notes:

1. Key estimate based on findings reported in the Australian Beverage Packaging, Consumption, Recovery and Recycling Quantification Study.
2. Calculated from estimated beverage container consumption at Table 50 and based on assumed 30% consumption away-from-home.
3. From Table 50.
4. From Table 50.

Overall beverage container consumption is just 25% of total packaging consumption and beverage container recycling is nearly 14 percentage points behind overall packaging recycling which is dominated by the high performance of paper/cardboard packaging recycling.

Non-Beverage Containers Packaging

Non-Beverage Rigid Containers are used for food packed in glass, steel, and plastic containers; household and commercial liquids and powders, mostly packaged in plastic and glass. There are no data on the municipal/C&I split (or *at-home/away-from-home*) but the consumption quantity is small relative to beverage containers. A 70/30 *at-home/away-from-home* consumption split has been assumed and it has been assumed that little recycling takes place in the workplace. The table below sets out the estimated *at-home/away-from-home* split.

Table 45 - Summary of Estimates of Scale and Recycling of Non-beverage Containers (2010)

Sector	Estimated Consumption (tonnes)	Estimated Recyclate Performance (tonnes)	Recycling Performance (percent)	Estimated Potential Further Recyclate (tonnes)
At-home consumption	250,600	89,900	35.9%	160,774
Away-from-home consumption	107,400 ²	53,800	50.1% ¹	53,596
Total	358,000	143,700	40.1%	214,370

Source: WCS (2011) estimate.

Notes:

1. Key estimate based on findings reported in the Australian Beverage Packaging, Consumption, Recovery and Recycling Quantification Study.
2. Calculated from estimated non-beverage container consumption at Table 52 and based on assumed 30% consumption away-from-home.

Flexible Packaging (Mainly Paper/Cardboard and Film Plastics)

The major set of packaging is non-rigid paper/cardboard and film plastics. These materials are predominantly used in commercial applications as grouped packaging and transport packaging. The table below sets out estimates of the *at-home/away-from-home* split.

Table 46 - Summary of Estimates of Scale and Recycling of Flexible Packaging (2010)

Sector	Estimated Consumption (tonnes)	Estimated Recyclate Performance (tonnes)	Recycling Performance (percent)	Estimated Potential Further Recyclate (tonnes)
At-home consumption	603,000 ²	422,100 ⁴	70.0%	180,400
Away-from-home consumption	2,361,000	1,660,700	70.3%	700,400
Total	2,964,100¹	2,082,400	70.2%	881,000

Source: WCS (2001) estimate.

Notes:

1. Calculated by deduction of estimated consumption of beverage and non-beverage containers from all packaging consumption.
2. Calculated by deduction of estimated at-home consumption of beverage and non-beverage containers from all at-home packaging consumption.
3. Calculated by deduction of estimated recycling of beverage and non-beverage containers from all packaging recycling.
4. Calculated by deduction of estimated at-home recycling of beverage and non-beverage containers from all at-home packaging recycling.

The table below examines the main types of flexible packaging and the level of consumption and recycling of both paper/cardboard and film plastics.

Table 47 - Estimates of Flexible Packaging Consumption and Recycling (2010)

Sector	Estimated Consumption (tonnes)	Estimated Recyclate Performance (tonnes)	Recycling Performance (percent)	Estimated Potential Further Recyclate (tonnes)
Paper/Cardboard	2,680,000 ¹	2,024,000 ²	75.5%	656,000
Film Plastic	284,100	58,400	20.6%	225,700
Total	2,964,100³	2,082,400	70.2%	881,700

Source: WCS estimate.

Notes:

1. From Table 2
2. From Table 2
3. From Table 46.
4. From Table 46.

Types of Packaging Products

The APC data report on the full set of each packaging material. The two chief subsets of interest are:

- All beverage containers (including wine and milk)
- All containers (including beverage containers food containers and liquid product containers).

However, APC provides no sub-classification by broad product type. The table below reports an estimate of the consumption split by package material type in percentage terms while Table 49 provides estimated tonnes. The estimates were made by drawing on reports and discussions with industry.

Table 48 - Indicative Classification of Packaging Materials by Broad Product Type (%) (2010)

Material	Consumption (tonnes)	Estimated Consumption as all Containers (including Beverage Containers)	Estimated Consumption as Beverage Containers	Estimated Consumption as (non-Beverage) Containers
Paper/cardboard	2,680,000	1%	1% ³	0%
Glass	991,000	100%	79% ²	21%
Plastics	565,300	45% ¹	30%	15%
Steel cans	136,200	100%	50% ³	50%
Aluminium cans	51,600	100%	100% ²	0%
Totals	4,424,000			

Sources: WCS (2011) estimate based on consumption data from Australian Packaging Covenant, 2010 Covenant Performance Data. Consumption estimates by product type from discussions with industry sources.

Notes:

1. Based on Hyder Consulting, 2010 National Plastics Recycling Survey 2009/2010.
2. Based on Hyder Consulting, Australian Beverage Packaging Consumption, Recovery and Recycling Quantification Study, 2008.
3. Estimate based on discussions with industry.

Table 49 - Indicative Classification of Packaging Materials by Broad Product Type (tonnes) (2010)

Material	Consumption (tonnes)	Estimated Consumption as all Containers (including Beverage Containers) (tonnes)	Estimated Consumption as Beverage Containers (tonnes)	Estimated Consumption as (non-Beverage) Containers (tonnes)
Paper/cardboard ¹	2,680,000	26,800	26,800	0
Glass	991,000	991,000	785,900 ²	205,100
Plastics ¹	565,300	254,400	169,600 ²	84,800
Steel cans ¹	136,200	136,200	68,100	68,100
Aluminium cans	51,600	51,600	51,600 ²	0
Totals	4,424,000	1,460,000	1,102,000	358,000

Sources: WCS (2011) estimate based on consumption data from Australian Packaging Covenant, 2010 Covenant Performance Data. Consumption estimates by product type from discussions with industry sources.

Notes:

1. Based on Hyder Consulting, 2010 National Plastics Recycling Survey 2009/10.
2. Based on Hyder Consulting, Australian Beverage Packaging Consumption, Recovery and Recycling Quantification Study, 2008.
3. Estimate based on discussions with industry.

Recycling by Product Type

Beverage containers are a substantial sub-set of the full scope of packaging materials, though it is difficult to specify with precision the proportion of the total packaging segment occupied by beverage containers – as discussed above, data are usually collected for the entire packaging materials segment and not classified by sub-set. In any case, there is no broadly agreed definition of just what is regarded as a beverage container, at least at the edges of what is/is not included.

Beverage container discards are a targeted resource in municipal kerbside recycling collections. As a result, they are now a small proportion of the municipal residual waste stream (generally regarded as less than 10% of the municipal residual waste stream). However, bin audits show that recyclables generally are not fully captured in municipal kerbside recycling collections. They remain a substantial proportion of the municipal residual waste haul (generally in the range 20% to 30%)¹³⁵. Only about 20% of these potentially recyclable materials are CDL type packaging¹³⁶. The presence of general containers (such as shampoo bottles) may push the total container fraction to 25%-30%.

Data from various sources indicate that the national beverage container recycling rate is now around 55-60% of consumption and that the recycling rate for non-beverage containers, such as shampoo bottles and pet food cans, is around 30-40%. These assertions are tested below.

Recycling rates vary between container materials. Using data developed at earlier tables (modified for plastics to reflect the diversity of plastic packaging) it is possible to build up a picture of the estimated volume of recycling, as shown at Table 50.

¹³⁵ The above estimates are based on work undertaken by WCS for various State and Local Government entities and are provided for information only.

¹³⁶ Personal communications with NSW OEH officers.

Table 50 - Indicative Recycling of Beverage Containers (2010)

Material	Consumption (tonnes)	Estimated consumption of Beverage Containers ¹ (tonnes)	Estimated Beverage Container Recycling Rate	Estimated Recyclate from Beverage Containers (tonnes)
Paper/cardboard	2,680,000	26,800	75.5% ³	20,234
Glass	991,000	786,000 ²	45.9% ²	361,000
Plastics	565,000	170,000	55.0% ²	93,000
Steel cans	136,000	68,000	40.1% ⁴	27,000
Aluminium cans	51,600	51,600	67.4% ⁵	35,000
Totals	4,424,000	1,102,000	48.7%	537,000

Sources: WCS (2011) estimate base on consumption data from Australian Packaging Covenant, 2010 Covenant Performance Data. Consumption estimates by product type from discussions with industry sources.

Notes:

1. From Table 49.
1. From Hyder Consulting, Australian Beverage Packaging Consumption, Recovery and Recycling Quantification Study, 2008.
2. Estimate coinciding with overall paper/cardboard recycling rate.
3. Estimate based on overall Steel can recycling rate of 30.3%.
4. From Table 2.

Table 51 -Indicative Recycling of Non-Beverage Containers (2010)

Material	Consumption (tonnes)	Estimated consumption of Non-Beverage Containers ¹ (tonnes)	Estimated Non-Beverage Container Recycling Rate	Estimated Recyclate from Non-Beverage Containers (tonnes)
Paper/cardboard	2,680,000	0	N/A	0
Glass	991,000	205,000	51.0% ²	104,617
Plastics	565,000	85,000	30.0% ²	25,000
Steel cans	136,000	68,000	20.2% ²	14,000
Aluminium cans	51,600	0	N/A	0
Totals	4,424,000	358,000	40.1%	144,000

Sources: WCS (2011) estimate based on consumption data from Australian Packaging Covenant, 2010 Covenant Performance Data. Consumption estimates by product type from discussions with industry sources.

Notes:

1. From Table 49.
2. Estimates based on discussion with industry.

Table 52 - Summary Table – Recycling by Product Type (2010)

Material	Consumption (tonnes)	Recyclate (tonnes)	Recyclate Performance
Non-Beverage Containers	358,000	144,000	40.1%
Beverage Containers	1,102,000	537,000	48.7%
All Containers	1,460,000	680,700	46.6%
All Packaging	4,424,000	2,763,000	62.5%

Source: WCS (2011) estimate derived from previous tables.

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