Government of South Australia

Zero Waste SA

South Australia's Recycling Activity Survey

2013-14 Financial Year Report

February 2015

rawtec

Contents

About Data used in this Report

The resource recovery data presented in this report was collected from a survey sent to over 115 businesses or organizations in South Australia (SA) that are involved in collecting waste material for recycling.

This resource recovery data describes the quantity of waste resources collected in SA over the 2013-14 financial year for the purpose of recycling, excluding net losses of these materials arising from resource recovery and/or re-processing activities.

It is important to note that the resource recovery data reported by a survey respondent has not been adjusted or manipulated. Estimates of reporting accuracy have been used to ensure that resource recovery data is reported to an appropriate level of certainty.

This data provides a comprehensive and reliable account of SA's resource recovery. Combined with landfill disposal data collected by the South Australian Environment Protection Authority, it enables assessment of SA's resource recovery performance including diversion rate. This includes comparing SA's performance with the State's Waste Strategy targets as well as benchmarking this performance against other jurisdictions in Australia.

Further information about the Survey Methodology is included in Appendix 1 of this report. This information includes a description of how the survey data was compiled and analysed to produce the assessment results and findings presented in this report.

About this Report

This report has been prepared by Rawtec Pty Ltd (Rawtec) for Zero Waste SA to present the results and findings from the 2013-14 South Australian Recycling Activity Survey.

The information contained within this document is based upon sources, experimentation and methodology which at the time of preparing this document were believed to be reasonably reliable and the accuracy of this information subsequent to this date may not necessarily be valid. This information is not to be relied upon or extrapolated beyond its intended purpose by a third party unless it is confirmed in writing by Zero Waste SA that it is permissible and appropriate to do so.

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Executive Summary

Introduction

Each year since 2003-04, Zero Waste SA has measured recycling activity and waste disposal to landfill in South Australia (SA) to assess the State's performance against State Waste Strategy Targets. This report presents the results from the SA Recycling Activity Survey for 2013-14, which collected the State's recycling and landfill disposal data for this purpose. These results are presented in accordance with the National Guidelines for compiling waste and recycling data (the "National Waste Reporting Guidelines") (DSEWPC 2012a). This year's report as a consequence introduces separate reporting of resource recovery by 'material recovery' and 'energy recovery'.

Summary of 2013-14 results

Total resource recovery for SA was 3.59 million tonnes (Table 1 below). This total resource recovery comprised:

- 2.72 million tonnes of 'Standard Reporting Materials' – which includes traditionally reported material categories of metals, organics, cardboard & paper, glass, plastics, masonry, etc.;
- 0.87 million tonnes of 'Separately Reported Materials' & Clean Fill – includes data for soil, sand, rock, rubble and fly ash materials, which can fluctuate significantly across reporting years and between different States and Territories.

Total landfill disposal for SA was 0.91 million tonnes.

- Approximately 5.4% (49,000 tonnes) of this landfill disposal was contaminated soil from construction activities, which may also be categorised as a 'Separately Reported Material' under the National Waste Reporting Guidelines (DSEWPC 2012a).

SA therefore achieved a Total diversion rate of 79.7% (of waste material diverted to resource recovery).

Table 1 Summary of 2013-14 Recycling Activity results for resource recovery, landfill disposal, total waste generated, and total diversion (waste to resource recovery) achieved in SA.

	2013-14 Recycling Activity Data Account Summary		
	Standard Reporting Materials*	Separately Reported Materials & Clean Fill*	**TOTAL (All materials)**
Resource recovery, tonnes	2.720 million	0.870 million	**3.590 million**
Landfill disposal, tonnes	0.865 million	0.049 million	**0.914 million**
Total Waste generated**, tonnes	3.585 million	0.919 million	**4.504 million**
Diversion, % to resource recovery	75.9%	94.7%	**79.7%**

* *Standard Reporting Materials and Separately Reported Materials & Clean Fill – As specified by the National Waste Reporting Guidelines (DSEWPC 2012a)*

** *Total waste generated = Resource recovery + landfill disposal*

Resource recovery by material category

Approximately 1.85 million tonnes, or just over half (51%, by weight), of SA's resource recovery was made up of Masonry materials, Separately Reported Materials and Clean Fill (Figure 1 below). These materials were mainly generated by construction activities.

The next major contributor to SA's resource recovery was Organic materials (at just under 1 million tonnes or 28%). These Organic materials mainly arose from timber mills, regional processing of primary produce, and local government kerbside collections of organics.

Metal (10%) and Cardboard & Paper materials (7%), principally from Commercial & Industrial (C&I) activity and kerbside collections, were the other major contributors to SA's resource recovery.

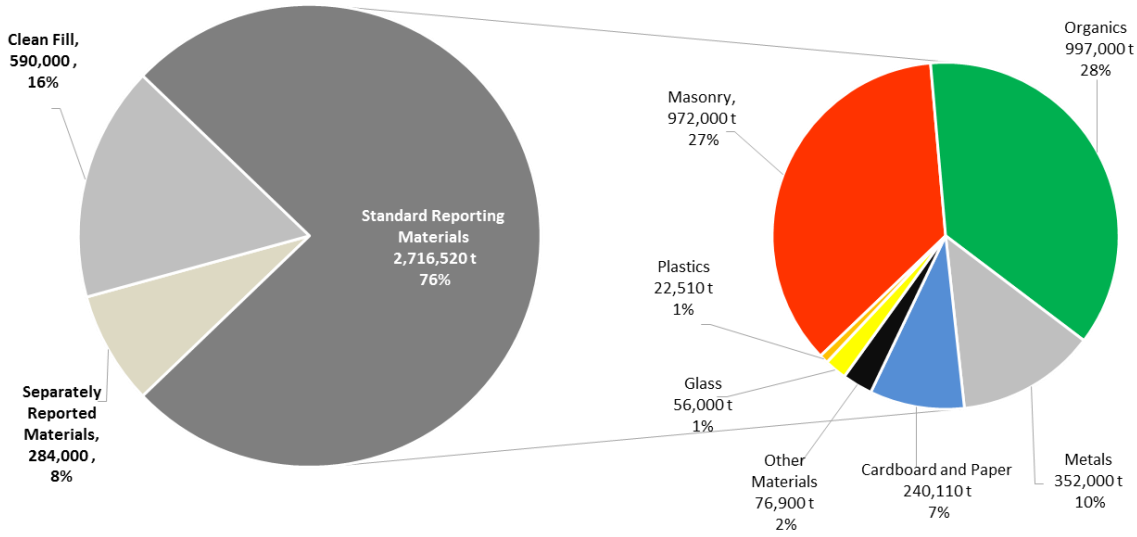

Figure 1 Contribution of different material categories to SA's resource recovery during 2013-14

Energy recovery

Interest is growing in SA towards energy recovery from waste not deemed suitable or cost-effective for material recovery. Some industries produce energy from waste by-products generated on their own sites, which is not reportable under the National Waste Reporting Guidelines (DSEWPC 2012a). Energy recovery identified by this report therefore considers where waste materials were separately and purposely recovered for local energy production, instead of being sent for landfill disposal.

During 2013-14, 75,900 tonnes of material, mainly timber and mixed plastics, were identified as being recovered for production of energy in SA. This quantity contributed 1.7% to the State's total diversion rate (*refer Table 2.6 on pg. 26 for additional detail*).

Energy recovery's contribution to the State's recycling performance is expected to grow over the next 5 to 10 yrs. This could include anaerobic digestion of organic wastes, pyrolysis of agricultural waste, and/or large-scale diversion of the municipal waste/C&I residuals away from landfill to waste-to-energy plants.

Resource recovery of imported waste material

Whilst not counted towards SA's recycling performance, a number of re-processors import waste materials into SA for resource recovery. In 2013-14, nearly 132,000 tonnes of waste material were imported into SA. This included Glass (53,400 tonnes), Foundry Waste (48,500 tonnes) and organic waste (17,000 tonnes), with lesser amounts of Metals and Plastics. About half this material was imported from Victoria and a third was sourced from overseas. *(Table 2.7 on pg. 27 of this report presents additional information on quantities and sources of these imported waste materials.)*

Market value of resource recovery

The estimated total direct market value of resource recovered materials for SA in 2013-14 was $270 million (Figure 2), or $75 per tonne of resource recovered on average. As usual, Metals, Cardboard & Paper and Organic materials were the main contributors to this resource market value.

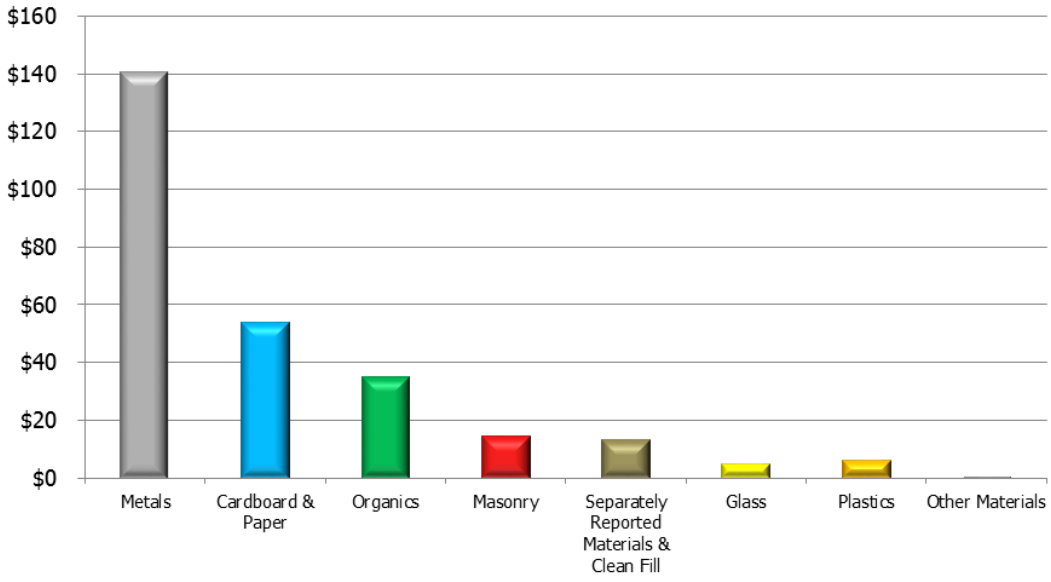

Figure 2 Estimated market value of resource recovered material in SA during 2013-14

Resource recovery trends

Total resource recovery (at 3.59 million tonnes) in 2013-14 rose by 4% (from 2012-13) (refer Figure 3 overleaf).

- Standard Reporting Materials increased, by 60,000 tonnes (or 2.3%) from 2012-13.
  - Masonry and Organic materials were the main contributors to this increase whereas Metals and Other Materials, specifically Foundry Waste, have declined (Figure 4 overleaf).

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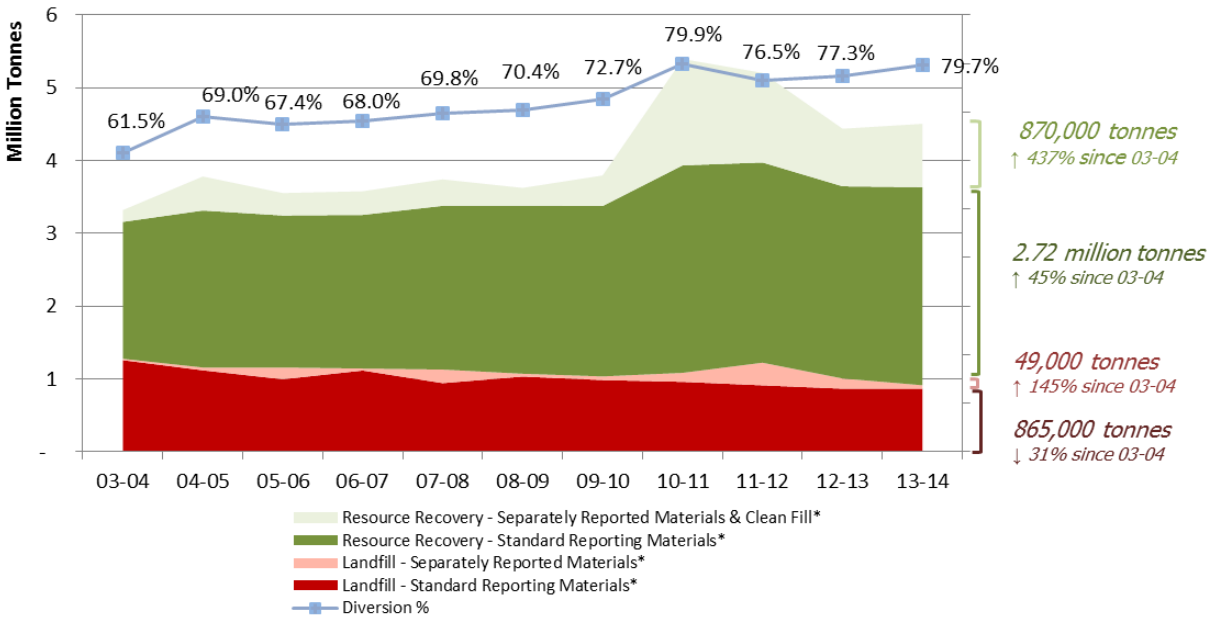

Figure 3 Trend in resource recovery and landfill disposal in SA since 2003-04. * *Reporting of both resource recovery and landfill disposal is divided into Standard Reporting Materials and Separately Reported Materials & Clean Fill categories (see page 2).*

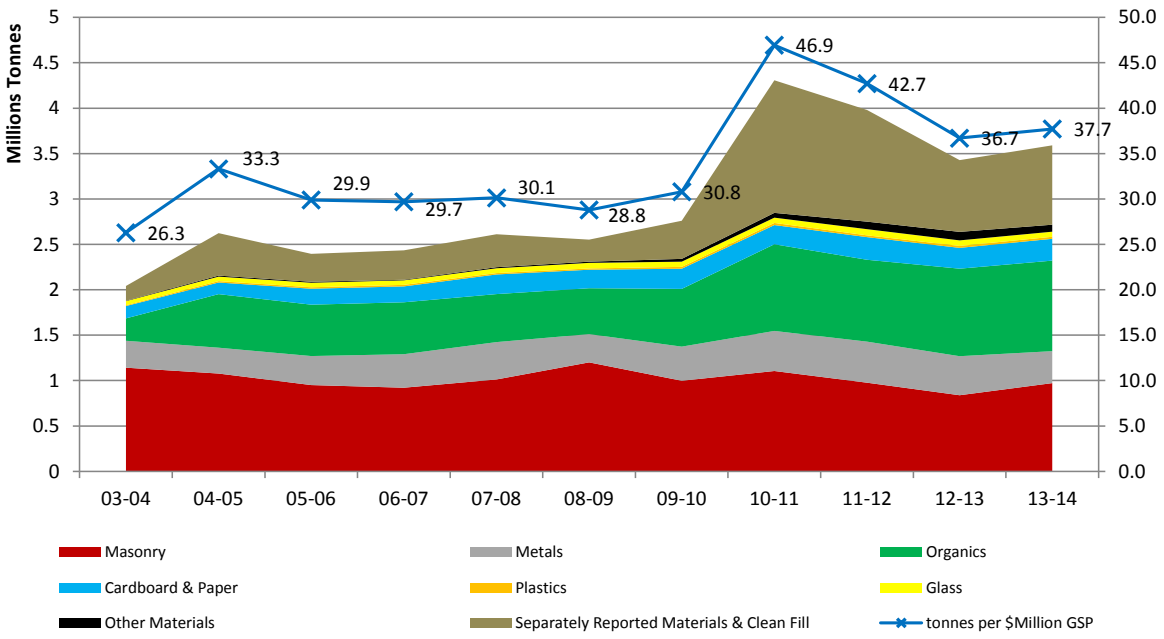

Figure 4 Trend in resource recovery for SA by material category since 2003-04, including tonnes per $m of Gross State Product (GSP).

{Continuation of Resource Recovery trends from two pages before}

- Separately Reported Materials & Clean Fill quantities were also up by 80,000 tonnes (or 10%) from 2012-13.
  - Fly Ash quantities declined (down 35,000 tonnes from 2012-13), but Clean Fill increased (up 110,000 tonnes from 2012-13).

Together with a significant drop in landfill disposal (down 9% from 2012-13), these changes contributed to an increase in SA's Total diversion rate of above 2% (from 77.4% in 2012-13 to 79.7% in 2013-14). This outcome consolidates on the long-term upward trend in resource recovery that SA has achieved since 2003-04:

- Total reported resource recovery has nearly doubled, from 2 million to above 3.5 million tonnes each year.
- Total diversion rate has steadily increased from just above 60% to towards 80%.

As noted in last year's report, there have been a number of large infrastructure projects occurring in SA since 2009-10, which had contributed substantially to resource recovery of Clean Fill material over this period. As these projects have completed or progressed past their major waste generation stages, new infrastructure projects have commenced (e.g. South Road upgrades in metropolitan Adelaide). We therefore expect to see Clean Fill volumes reported in SA remain at historically elevated levels (i.e. above those seen before 2009-10) over the next 1 to 2 years.

The decrease in Metals and Foundry Waste recovered during 2013-14 reflects the recent decline of manufacturing and industrial activity in SA. With the foreshadowed end of car manufacturing and allied industries in Adelaide occurring at some time over the next several years, this downward trend in resource recovery of these materials is expected to gather pace, and could also potentially flow through, albeit to a lesser extent, as reduced resource recovery in other Material categories (specifically Plastics and Glass).

Resource recovery by source sector

Construction & Demolition (C&D) was again the major source sector (at 1.81 million tonnes or 50% by weight) for SA's resource recovery (Figure 5 overleaf). Clean Fill provided approximately one third (33%) of this source sector contribution. The quantity of C&D sourced resource recovery rose from the previous reporting period (up by 216,000 tonnes).

Commercial and Industrial (C&I) sources contributed 1.32 million tonnes (or 37% by weight) to resource recovery, which was a decrease of nearly 100,000 tonnes on 2012-13.

The Municipal (MSW) source sector, at 463,000 tonnes (or 13% by weight), increased its contribution to resource recovery (by 20,000 tonnes) over the previous year.

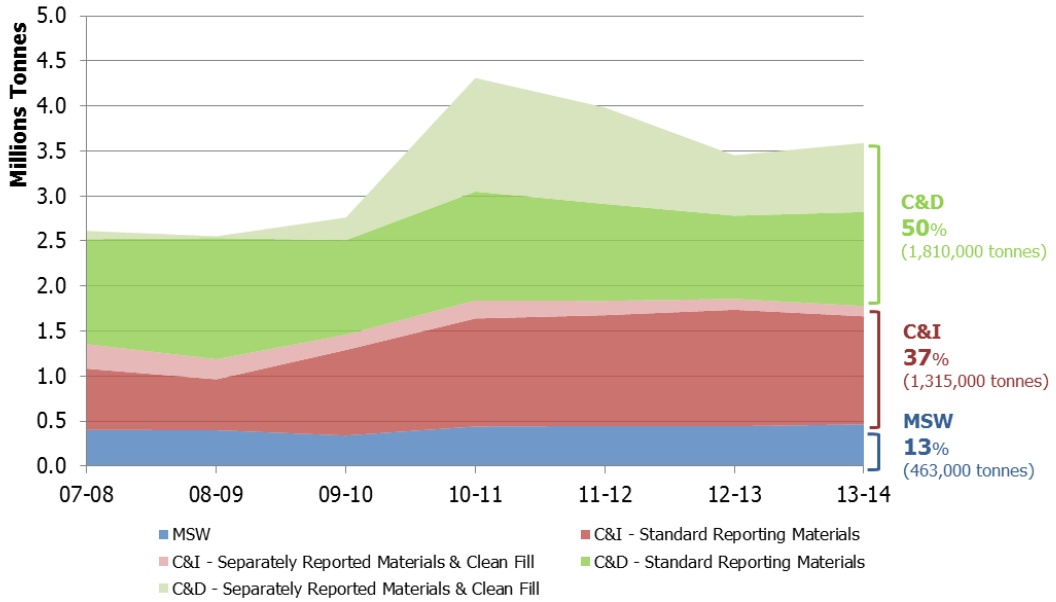

Figure 5 Contribution to resource recovery in SA by source sector for 2013-14 and trend since 2007-08

Landfill disposal

Total landfill disposal fell to 0.91 million tonnes, down by 9% from 1.01 million tonnes recorded in 2012-13 (Figure 3 on page 5 and Figure 6 below). This decrease in landfill disposal was mostly due to a fall in the volumes of contaminated soil to landfill from large infrastructure projects. As a consequence, C&D contribution to landfill disposal (at 29%) fell (by 93,000 tonnes). Waste to landfill from MSW and C&I sources, however, remained relatively stable, at similar levels to 2012-13.

Landfill disposal of Standard Reporting Materials across MSW, C&I and C&D source sectors has remained relatively steady over the past several years.

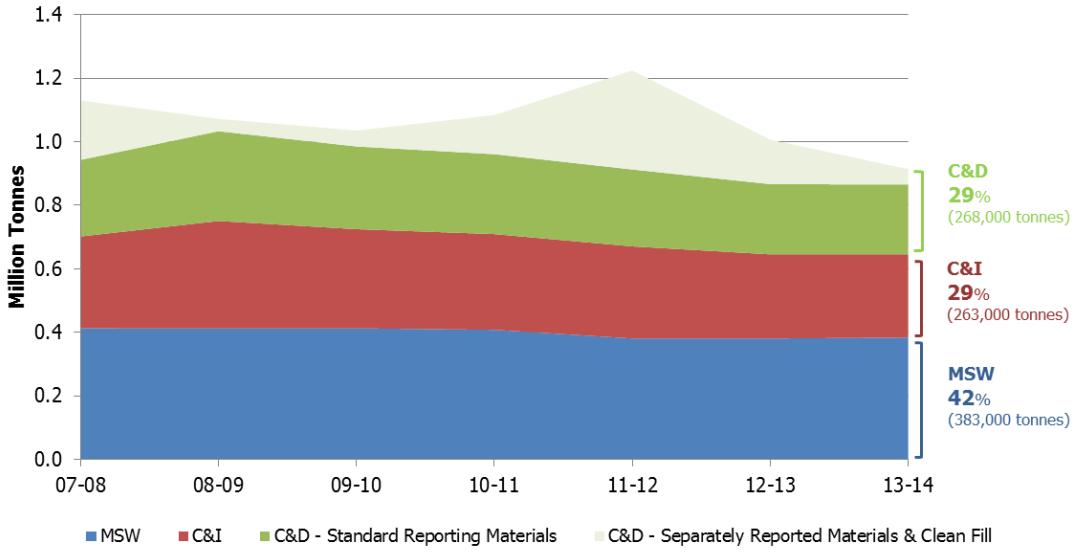

Figure 6 Contribution to landfill disposal in SA by source sector for 2013-14 and trend since 2007-08

South Australia's Strategic Plan – Landfill Reduction Target

Target 67 of South Australia's Strategic Plan (SA Government, 2011) sets the following landfill reduction goal for SA:

- ***Reduce waste to landfill by 35% by 2020 (baseline: 2002-03); Milestone of 25% by 2014.***

SA's disposal to landfill (at 914,000 tonnes) surpassed the 2014 Milestone (for the first time), achieving a greater than 25% reduction (since 2002-03) of waste disposal to landfill reduction (Figure 7 below). The decrease in contaminated soil disposal to landfill over the past year has been key to delivering this outcome. Based on the current trend, progress towards achieving the 2020 Target of a 35% reduction is on track, so long as there is on-going commitment to achieving further gains in diverting waste materials from landfill disposal to resource recovery.

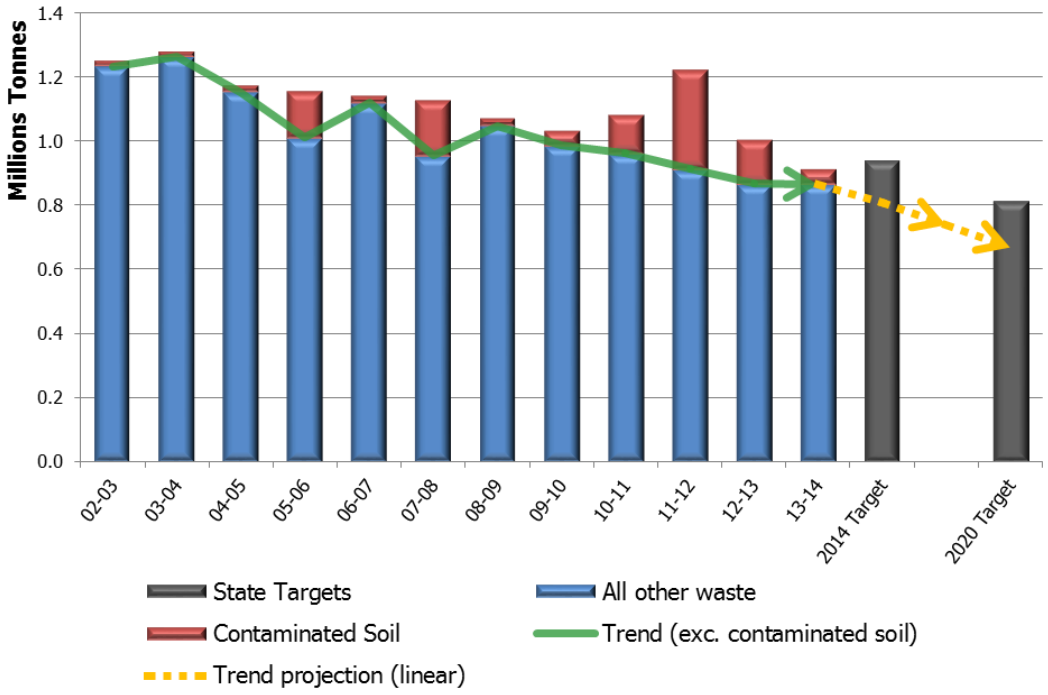

Figure 7 Landfill disposal trend in SA versus State Waste Strategy Target for landfill reduction

South Australia's Waste Strategy – Per Capita Waste Generation Reduction Target

South Australia's Waste Strategy (Zero Waste SA, 2012) sets a State-wide per capita waste generation target of:

- ***5% reduction in waste generation per capita by 2015 (baseline: 2010-11).***

Per capita waste generation in 2013-14 represents a reduction (from baseline year 2010-11) of 6.5% for Standard Reporting Materials, and by 16.9% overall (when including Separately Reported Materials & Clean Fill) (Table 2 overleaf). South Australia is therefore already achieving its 2015 Target for reduction in waste generation per capita.

Table 2 2013-14 Recycling Activity results for per capita waste generation vs. State Waste Strategy target

	Per capita Waste Generation (kg/person/yr)					2015 Target
	10-11	*11-12*	*12-13*	*13-14*	***% Change***	
Standard Reporting Materials	2,300	2,210	2,120	2,130	**-7.4%**	5% Reduction
Separately Reported Materials & Clean Fill	950	930	550	550		
TOTAL	3,250	3,140*	2,670	2,680	**-17%**	

* *Value for per capita total waste generation in 2011-12 is reported differently to that reported in Table 2.1 due to rounding.*

South Australia's Waste Strategy – Metropolitan Diversion Targets

South Australia's Waste Strategy (Zero Waste SA, 2012) includes targets for metropolitan diversion (to resource recovery) by source sector (Table 3 below).

SA has generally continued its steady improvements in Metropolitan Diversion rates during 2013-14:

- MSW – Diversion rate increased to 59.4% (from 57.5% in 2012-13), which is below the 2015 Target (of 70%).
- C&I – Diversion rate declined slightly to 76.6% (from 77.1% in 2012-13), but still achieves the 2015 Target (of 75%).
- C&D – The diversion rate rose:
  - *Excluding Separately Reported Materials & Clean Fill:* A diversion rate of 84.8% was achieved (up from 82.8% in 2012-13), which is below the 2015 Target (of 90%).
  - *Total C&D sector result:* The diversion rate was 88.4% (up from 82.2% in 2012-13), which exceeds the 2012 Target (at 85%) but is just below the 2015 Target.

Table 3 2013-14 Recycling Activity results for metropolitan diversion by source sector vs. State Waste Strategy targets

Source Sector	2013-14 Diversion Achieved	Metro Diversion Target	
		By 2012	*By 2015*
■ **MSW**	**59.4%**	60%	70%
■ **C&I**	**76.6%**	65%	75%
■ **C&D – *Excluding Separately Reported Materials & Clean Fill***	**84.8%**	85%	90%
■ **C&D – *Total***	**88.4%**		

South Australia's performance relative to other states & territories

South Australia continues to be a national leader in resource recovery and waste diversion. Performance comparisons with other states and territories are difficult however, because of irregular reporting and different reporting bases between jurisdictions. According to most recently reported and publicly available waste management data from across Australia (including Separately Reported Materials & Clean Fill), South Australia:

- Achieves the highest diversion rate (at 79.7%) and per capita resource recovery (at 2,134 kg/person/yr) in Australia;
- Has the lowest per capita landfill disposal rates (at 543 kg/person/yr);
- But has the highest per capita waste generation rate (at 2,677 kg/person/yr)

(Figure 2.6 on pg. 31 of this report presents further detail for the above comparison).

Environmental benefits of resource recovery

Resource recovery of waste materials delivers significant environmental benefits for SA, by avoiding resource consumption of virgin materials that would have otherwise occurred.

In 2013-14, SA's resource recovery activities led to estimated savings in:

- Greenhouse Gas emissions of 1.12 million tonnes of CO2-e;
- Energy savings of about 14,650 Terajoules (TJ[1]); and
- Water savings of about 12,310 Megalitres (ML[2]).

[1] 1 Terajoule or TJ = 10^{12} Joules = 1,000 Gigajoules (GJ)

[2] 1 Megalitre or ML = 10^{6} Litres = 1 million Litres

1 Introduction

At a glance:

- *This report presents and analyses data collected from South Australian recyclers and re-processors on resource recovery of waste materials during the 2013-14 financial year.*
- *This data enables us to measure the performance of South Australia against waste diversion goals and targets in the State Strategic Plan and South Australia's State Waste Strategy 2011-15.*
- *The data has been compiled and reported in accordance with the National Guidelines for compiling waste and recycling data (the "National Waste Reporting Guidelines") (DSEWPC 2012a).*

1.1 Background

"One of our greatest challenges in the coming years is to learn to enjoy and manage the quality of our lives by wasting less and caring more[3]."

Over the past decade South Australia (SA) has established itself as a leader in waste management reform and resource recovery in the nation. Significant initiatives have been implemented to divert and recycle waste materials instead of simply disposing of them to landfill. These actions are helping SA to become more resource efficient, recover and recycle more waste materials, and avoid damaging greenhouse gas emissions caused by waste disposal to landfill.

SA's improvement in waste management is underpinned by requirements set out in the State Strategic Plan (SA Government, 2011) and SA's State Waste Strategy 2011-2015 (Zero Waste SA, 2012). These requirements include targets for reducing waste generation and diverting waste materials from landfill (Figure 1.1 overleaf). Monitoring the State's performance against these targets requires measurement and collection of data for both resource recovery and landfill disposal of waste materials.

Zero Waste SA's annual survey of South Australian recyclers and re-processors collects data about SA's handling of resources which would otherwise go to waste. The report includes an analysis and evaluation of waste streams by waste type, including recycling tonnages as well as potential reductions achieved in greenhouse gas emissions. This year the report includes separate analysis of resource recovery for material recovery versus energy production in SA, as well as presenting data reported on waste materials imported into SA for resource recovery. Current market conditions for resource recovery and recycling are also discussed including market size and strength.

{Cont. overleaf}

[3] Minister for Sustainability, Environment and Conservation: Preface to South Australia's State Waste Strategy 2011-2015 (Zero Waste SA, 2012)

The annual survey data collected and presented in this report allows Zero Waste SA to measure progress towards meeting the waste reduction targets of SA's Waste Strategy and is an authoritative reference for industry, government and the community.

Importantly, the results of the survey are compiled according to the National Waste Reporting Guidelines (DSEWPC 2012a), which ensures that SA's recycling data can successfully contribute to national recycling surveys and assessments undertaken by the Australian Government.

***South Australia's Strategic Plan* (Department of Premier and Cabinet)**

> 35% reduction in landfill disposal from 2002-03 level by 2020
milestone of 25% by 2014

Per capita target

> 5% reduction in waste generation per capita by 2015

***South Australia's Waste Strategy 2011-2015* (Zero Waste SA)**

Year	Metropolitan (% diversion)	Non-metropolitan
Municipal solid waste (MSW) landfill diversion targets		
2009 (baseline)*	55	Not applicable
2012	60	Maximise diversion to the extent practically achievable
2015	70	Maximise diversion to the extent practically achievable
Commercial and industrial (C&I) landfill diversion targets		
2009 (baseline)**	60	Not applicable
2012	65	Maximise diversion to the extent practically achievable
2015	75	Maximise diversion to the extent practically achievable
Construction and demolition (C&D) landfill diversion targets		
2009 (baseline)***	80	Not applicable
2012	85	Maximise diversion to the extent practically achievable
2015	90	Maximise diversion to the extent practically achievable

* Estimated from *Recycling Activity Report 2008-09* and assumes 30% MSW disposed to landfill. The MSW baseline figure is also supported by Zero Waste SA funded kerbside audit data of three-bin system from 2008 and 2009 in which the collection frequency (all tenements) consisted of: weekly residual waste; with fortnightly co-mingled and fortnightly green organics. These audits typically find diversion in the mid 50% range.

** Estimated from *Recycling Activity Report 2008-09*. Assumes 43% C&I disposed to landfill.

*** Estimated from *Recycling Activity Report 2008-09*. Assumes 27% C&D disposed to landfill.

Figure 1.1 Summary of South Australia's goals and targets for diversion from landfill.
Reproduced from SA's State Waste Strategy 2011-2015 (Zero Waste SA, 2012).

1.2 The 2013-14 Recycling Activity Survey report

This report presents the results of Zero Waste SA's annual Recycling Activity Survey for the 2013-14 financial year (1 July 2013 – 30 June 2014). The following provides a guide to how this data and information is organised and presented in this report.

- **Section 2** – Provides an overview of key Recycling Activity statistics obtained for 2013-14.
- **Section 3** – Presents the 2013-14 Recycling Activity Survey data by material category, including reporting of resource recovery for material recovery and energy production.
- **Section 4** – Gives a separate analysis obtained for resource recovery of electrical and electronic (E-waste) materials.
- **Section 5** – Presents a separate analysis of packaging materials derived from the 2013-14 Recycling Activity Survey data.
- **Section 6** – Assesses the environmental benefits, including greenhouse gas emission savings, of recycling for SA achieved by its 2013-14 recycling performance.
- **Section 7** – Provides an estimated market value for SA resources recovered during 2013-14.
- **Section 8** – Lists a number of the participating organisations (which consented to their survey contributions being acknowledged in this report).
- **Section 9** – Provides a glossary of common terms used in this report which may aid the reader.
- **Section 10** – Indicates common sources and end uses for different types of waste materials.
- **Section 11** – Outlines key abbreviations used throughout the report.
- **Section 12** – Lists references and other sources of information used in compiling this report.
- **Appendices** –
  - *Appendix 1* – Describes the methodology that was used to undertake the 2013-14 Recycling Activity Survey.
  - *Appendix 2* – Summarises selected 2013-14 Recycling Activity Survey statistics relating to industry participation.
  - *Appendix 3* – Provides a copy of the questions used in the 2013-14 Recycling Activity Survey.
  - *Appendix 4* – Lists the emission and conversion factors that were adopted for the environmental benefits analysis of the 2013-14 Recycling Activity data.

2 Key 2013-14 Recycling Activity Statistics

At a glance:

- *This section summarises the key outcomes and statistics obtained from analysis of the 2013-14 SA Recycling Activity Survey data. This outcomes and statistics include:*
  - *Resource recovery and landfill disposal (Section 2.1) – Total and by type of material, source sector, geographical origin, destination for re-processing, and whether re-processed for material recovery or energy production in SA;*
  - *SA's performance against State goals and targets for waste management (Section 2.2); and*
  - *SA's resource recovery and performance relative to other states and territories in Australia (Section 2.3)*

2.1 Resource recovery & landfill disposal

2.1.1 Overview

In 2013-14 SA's recycling industries reported 3.59 million tonnes of material diverted to resource recovery (Table 2.1 overleaf). In accordance with new National Waste Reporting Guidelines (DSEWPC 2012a), this total resource recovery comprised:

- 2.72 million tonnes of 'Standard Reporting Materials' – which includes traditionally reported material categories of Metals, Organics, Cardboard & Paper, Glass, Plastics, Masonry, etc.;
- 0.87 million tonnes of 'Separately Reported Materials' & Clean Fill – reported data for soil, sand, rock, rubble and fly ash materials[4].

Total resource recovery volumes were up by 4.1% from the 3.45 million tonnes reported for 2012-13. As a consequence, SA's 2013-14 per capita diversion/recovery rate increased to 2,135 kg/p/yr (up from 2,070 kg/p/yr in 2012-13). Material recovered per $ Gross State Product (GSP) in 2013-14 also increased (from 36.7 tonnes in 2012-13) to 37.7 tonnes per $1 million.

Based on this total resource recovery, SA achieved a diversion rate of 79.7% (up from 77.4% in 2012-13). This outcome is close to the previously recorded maximum resource recovery rate of 79.9% achieved in 2010-11.

During 2013-14 the amount of waste accepted by landfills in SA decreased to 0.914 million tonnes (from 1.01 million tonnes in 2012-13). This represents a per capita waste-to-landfill rate of 545 kg/p/yr (down from 600 kg/p/yr in 2012-13). Waste to landfill in tonnes per $1 million GSP also decreased from 10.7 in 2012-13 to 9.6 in 2013-14.

[4] These materials are considered separately under the new National Guidelines for compiling waste and recycling data (DSEWPC 2012a) because they can fluctuate significantly across reporting years and between different States and Territories.

Table 2.1 Annual South Australian resource recovery and landfill disposal quantities diversion performance for 2013-14, 2003-04 (first survey year) and since 2009-10. *This table presents a breakdown of Standard Reporting Materials and Separately Reported Materials & Clean Fill in accordance with National Waste Reporting Guidelines (DSEWPC 2012a). Of 3.59 million tonnes of recycling reported in 2013-14, 0.87 million tonnes were recycled soil, sand, rock and fly ash materials, or Separately Reported Materials & Clean Fill. Changes in performance since 2003-04 and from 2012-13 are shown.*

	2003-04	2009-10	2010-11	2011-12	2012-13	2013-14	Change	
							12-13 to 13-14	03-04 to 113-14
RESOURCE RECOVERY (TONNES)								
Standard Reporting Materials	1,880,000	2,340,000	2,850,000	2,750,000	2,660,000	2,720,000	2.3%	45%
Separately Reported Materials & Clean Fill	162,000	420,000	1,460,000	1,230,000	790,000	870,000	10%	437%
TOTAL (for SA)	**2,042,000**	**2,760,000**	**4,310,000**	**3,980,000**	**3,450,000**	**3,590,000**	**4.1%**	**76%**
LANDFILL DISPOSAL (TONNES)								
Standard Reporting Materials	1,258,000	985,000	961,000	913,000	867,000	865,000	-0.2%	-31%
Separately Reported Materials & Clean Fill	20,000	50,000	123,000	311,000	140,000	49,000	-65%	145%
TOTAL (for SA)	**1,278,000**	**1,035,000**	**1,084,000**	**1,224,000**	**1,007,000**	**914,000**	**-9.2%**	**-28%**
WASTE GENERATION (TONNES)								
Standard Reporting Materials	3,138,000	3,325,000	3,811,000	3,663,000	3,527,000	3,585,000	1.6%	14%
Separately Reported Materials & Clean Fill	182,000	470,000	1,583,000	1,541,000	930,000	919,000	-1.2%	405%
TOTAL (for SA)	**3,320,000**	**3,795,000**	**5,394,000**	**5,204,000**	**4,457,000**	**4,504,000**	**1.1%**	**36%**
DIVERSION/RECOVERY RATE (%)								
Standard Reporting Materials (ONLY)	59.9%	70.4%	74.8%	75.1%	75.4%	75.87%	0.6%	27%
TOTAL (for SA)	**61.5%**	**72.7%**	**79.9%**	**76.5%**	**77.4%**	**79.7%**	3.0%	30%
SA population (persons)	**1,534,000**	**1,644,600**	**1,657,000**	**1,654,800**	**1,667,500**	**1,682,600**	**0.9%**	**9.7%**
PER CAPITA DIVERSION/RESOURCE RECOVERY (KG/PERSON/YR)								
Standard Reporting Materials (ONLY)	1,230	1,420	1,720	1,660	1,600	1,620	1.3%	32%
TOTAL (for SA)	**1,330**	**1,680**	**2,600**	**2,410**	**2,070**	**2,135**	**3.1%**	**61%**
PER CAPITA LANDFILL DISPOSAL (KG/PERSON/YR)								
Standard Reporting Materials (ONLY)	820	600	580	550	520	510	-1.9%	-38%
TOTAL (for SA)	**830**	**630**	**650**	**740**	**600**	**545**	**-9.2%**	**-34%**
PER CAPITA WASTE GENERATION (KG/PERSON/YR)								
Standard Reporting Materials (ONLY)	2,050	2,020	2,300	2,210	2,120	2,130	0.5%	3.9%
TOTAL (for SA)	**2,160**	**2,310**	**3,250**	**3,150**	**2,670**	**2,680**	**0.4%**	**24%**
SA Gross State Product[(a)] (GSP) ($millions)	**77,665**	**89,638**	**91,818**	**93,162**	**94,006**	**95,199**	**1.3%**	**23%**
PERFORMANCE METRICS PER $GSP (TONNES/$MILLION GSP)								
TOTAL SA Diversion/Resource Recovery (b)	26.3	30.8	46.9	42.7	36.7	37.7	2.8%	43%
TOTAL SA Landfill Disposal (b)	16.5	11.5	11.8	13.1	10.7	9.6	-10%	-42%
TOTAL SA Waste Generation (b)	42.7	42.3	58.7	55.9	47.4	47.3	**-0.2%**	**11%**

Notes:

(a) Reference year for GSP chain volume measures (which removes the inflation effects on GSP values) is reported as 2011-12 (ABS 2014b).

(b) Total tonnes of diversion, landfill and waste generation in per $GSP metrics include both Standard Reporting Materials and Separately Reported Materials & Clean Fill.

2.1.2 Recovery by material type

Resource recovery reported for various waste materials changed during 2013-14 (see Table 2.2 overleaf). These changes are described in more detail by material category in Section 3 of this report, but some important or interesting changes are highlighted below.

There was a significant increase in resource recovery reported for Masonry materials (up 16% overall from 2012-13), which suggests there was a resurgence in Construction and Demolition (C&D) activity across the SA economy.

Concrete contributed (at an increase 120,000 tonnes from 2012-13) to the majority of this gain.

At the same time, Clean Fill volumes also rose (by 110,000 tonnes from 2012-13). These volumes had been expected to decline as number of large infrastructure projects occurring in metropolitan Adelaide since 2009-10 (i.e. Royal Adelaide Hospital, Adelaide Oval Redevelopment, and Adelaide Desalination Plant) progressed past their major waste generating stages. However, commencement of new large infrastructure projects (e.g. South Road upgrades) has seen Clean Fill volumes remain at historically elevated levels (relative to those seen before 2009-10). We expect to see this situation continue over the next 1 to 2 years.

2013-14 saw a significant drop in Metals recovery (down nearly 80,000 tonnes or 18% from 2012-13), as well as Foundry Waste (down 26%). This reflects the on-going weakening of manufacturing and industrial activity in SA. With the foreshadowed end of car manufacturing and allied industries in Adelaide scheduled to occur in the next several years, this downward trend is expected to consolidate and could also affect other material categories (e.g. Plastics, Glass).

In Plastics, there were declines in resource recovery of single polymer materials, HDPE and LDPE (down 11% and 26%, respectively), but an increase in Mixed Plastics (up 50%). This may be due to the above-mentioned weakening of manufacturing and industrial activity, but could also be caused by commercial factors that make it more profitable to collect Mixed Plastics for energy recovery in SA or direct export overseas (instead of source separating and/or resource recovering it in SA).

Magazines and Newsprint in the Cardboard & Paper category continued their decline (down 15%), in line with growing popularity of on-line access using digital devices.

Fly ash also maintained its downward trend (down 5% from 2012-13), which is attributed to greater use of renewable energy for electricity supply in SA and less reliance on coal-fired power stations.

Table 2.2 Reported material quantities (tonnes) being diverted for resource recovery in SA for 2013-14, preceding 5 years, and first Survey year, 2003-04. *This table shows the changes in resource recovery of waste materials which have occurred in SA during these periods, including the percentage increase or decrease between 2012-13 and 2013-14. The data is presented in accordance with National Waste and Recycling Guidelines (DSEWPC 2012a).*

ID	Material	2003-04	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	Change (%) 12-13 to 13-14
	Masonry								
1	Asphalt	100,000	101,484	131,000	145,000	143,000	148,000	148,000	Nil
2	Bricks	165,000	113,993	77,000	100,000	73,000	50,000	63,000	26%
3	Concrete	877,000	984,735	790,000	860,000	760,000	640,000	760,000	19%
4	Plasterboard				300	600	600	1,000	67%
	Subtotal	*1,142,000*	*1,200,212*	*998,000*	*1,105,300*	*976,600*	*838,600*	*972,000*	16%
	Metals								
7	Steel	264,200	271,277	334,000	391,000	404,000	387,000	320,000	-17%
8	Aluminium	19,000	21,895	18,200	19,400	20,500	18,500	14,000	-24%
9	Non-ferrous metals	13,000	18,495	23,600	31,100	27,800	24,400	18,000	-26%
	Subtotal	*296,200*	*311,667*	*375,800*	*441,500*	*452,300*	*429,900*	*352,000*	-18%
	Organics								
10	Food Organics	0	4,820	5,800	4,400	5,600	7,900	7,000	-11%
11	Garden Organics	130,100	203,558	220,000	230,000	212,000	209,000	260,000	24%
12	Timber	116,700	254,866	262,000	280,000	281,000	237,000	180,000	-24%
13,14,15,16	Other Organics	0	41,666	148,000	440,000	403,000	510,000	550,000	8%
	Subtotal	*246,800*	*504,910*	*635,800*	*954,400*	*901,600*	*963,900*	*997,000*	3.4%
	Cardboard & Paper								
17	Cardboard & Waxed Cardboard	91,000	104,128	162,000	154,000	183,000	190,000	180,000	-5.3%
18	Liquid Paperboard	0	1,475	3,900	3,500	3,600	3,600	3,100	-14%
19, 20, 21	Magazines & Newsprint	32,701	52,583	40,000	40,200	39,500	38,800	33,000	-15%
22	Printing & Writing Paper	12,300	45,877	16,400	13,600	23,300	20,700	24,000	16%
	Subtotal	*136,001*	*204,063*	*222,300*	*211,300*	*249,400*	*253,100*	*240,100*	-5.1%
	Plastics								
23	Polyethylene Terephthalate	0	5,200	5,500	4,100	4,500	4,300	4,200	-2.3%
24	High Density Polyethylene	0	2,685	4,900	4,600	3,200	3,600	3,200	-11%
25	Polyvinyl Chloride	0	408	80	170	50	260	300	15%
26	Low Density Polyethylene	0	2,954	4,200	4,600	4,400	4,600	3,400	-26%
27	Polypropylene	0	1,529	4,000	4,000	2,100	2,200	2,000	-9%

ID	Material	2003-04	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	Change (%) 12-13 to 13-14
28	Polystyrene	0	540	200	430	270	410	410	Nil
29	Mixed &/or Other Plastics	8,607	462	1,600	5,800	5,100	6,000	9,000	50%
	Subtotal	*8,607*	*13,778*	*20,480*	*23,700*	*19,620*	*21,400*	*22,500*	5.1%
	Glass								
30	Glass	45,600	61,552	57,000	58,000	68,000	61,000	56,000	-8%
	Other Materials								
40	Foundry Waste	0	0	11,900	31,800	60,900	70,200	51,600	-26%
41	Leather & Textiles	4,080	3,052	3,900	3,900	4,500	3,900	4,000	2.6%
42	Tyres & Other Rubber	88	10,138	15,000	17,000	17,400	19,700	21,300	8.1%
	Subtotal	*4,168*	*13,190*	*30,800*	*52,700*	*82,800*	*93,800*	*76,900*	-18%
	Total of above materials	***1,879,376***	***2,309,372***	***2,340,180***	***2,846,900***	***2,750,320***	***2,661,700***	***2,716,500***	***2.1%***
39	Fly Ash	0	223,000	170,000	200,000	160,000	120,000	114,000	-5.0%
5	Clay, Fines, Rubble & Soil – Clean Fill	162,400	19,831	250,000	1,260,000	910,000	480,000	590,000	23%
6	Clay, Fines, Rubble & Soil – Intermediate Waste Soil[1]	NRS[2]	NRS[2]	NRS[2]	NRS[2]	160,000	190,000	170,000	-11%
	Total Clay, Fines, Rubble & Soil	162,400	19,831	250,000	1,260,000	1,070,000	*670,000*	760,000	13%
	Total Reported	***2,041,776***	***2,552,203***	***2,760,000***	***4,310,000***	***3,980,000***	***3,450,000***	***3,590,000***	***4.1%***

Notes:

1. *'Intermediate Waste Soil is a soil classification used in SA (South Australia EPA, 2009) (Draft Waste Classification Guidelines) which is indicative of 'minor contamination' (as opposed to major contamination), separating this type of soil from Waste Derived Fill (WDF) (or 'clean fill'). Intermediate Waste Soil can be used as WDF for construction fill or purposes without remediation or treatment but only when subject to a site-specific risk-based assessment verified by an independent auditor.*
2. *NRS – Not reported separately*
3. *Totals may not equate to sums due to rounding.*

2.1.3 Source sector outcomes

During 2013-14, Municipal (MSW) sources contributed 463,000 tonnes to resource recovery (Table 2.3 below), an increase of 4.5% on reported volumes in 2012-13. The estimated quantity of MSW volumes to landfill remained relatively constant at 383,000 tonnes (slightly up 0.5% from 2012-13 levels). This achieved a small increase in the MSW diversion rate for SA to 54.7% (against 53.8% in 2012-13).

The reported quantity of C&I resource recovery in 2013-14 (of 1.32 million tonnes) decreased by about 100,000 tonnes (from 2012-13). The volume of C&I waste to landfill, however, stayed relatively constant at 263,000 tonnes (slightly down by 0.7% from 2012-13). This led to a decrease in the C&I diversion rate for SA to 83.3% (from 84.2% in 2012-13).

Volumes of C&D recovery (at 1.81 million tonnes) rose substantially by (over 200,000 tonnes) from 2012-13, whereas C&D landfill disposal decreased significantly to 268,000 tonnes (down 93,000 tonnes from 2012-13). The overall impact of these changes in C&D volumes led to a significant increase in C&D diversion to 87.1% (from 81.5% in 2012-13).

C&I and C&D sources (at 37% and 50%, respectively) continued to constitute the main sources of resource-recovered material reported by SA recycling industries in 2013-14 (Table 2.3 and Figure 2.1 overleaf). Due to the increase in reported C&D recovered volumes, the proportion of this waste stream relative to C&I & MSW sources has expanded.

MSW sources made up the majority (at 42%) of waste disposed of to landfill. C&D and C&I sources (almost equally at 29%) comprised the balance of the landfill disposal volumes. The contribution of C&D to landfill disposal has fallen relative to the previous reporting period (from 36% in 2012-13). mainly due to a decrease in contaminated soil quantities. The proportions of waste to landfill from the MSW and C&I sectors increased (from 38% and 26%, respectively, in 2012-13) as a result.

Table 2.3 Source sector origins (by weight, tonnes and %) of SA recovered materials and waste to landfill, 2013-14, and diversion rates (%). *Source data for resource recovery by source sector was obtained from the 2013-14 Recycling Activity Survey data. Source data for landfill disposal by source sector during 2013-14 was obtained from Zero Waste SA.*

Sector Origin	Resource Recovery		Landfill		Diversion (%)
	tonnes	(%)	tonnes	(%)	
Municipal	463,000	13%	383,000	42%	54.7%
C&I	1,315,000	37%	263,000	29%	83.3%
C&D	1,810,000	50%	268,000	29%	87.1%
Total[1]	3,590,000	100%	914,000	100%	79.7%

1. Some totals may not equate precisely due to rounding.

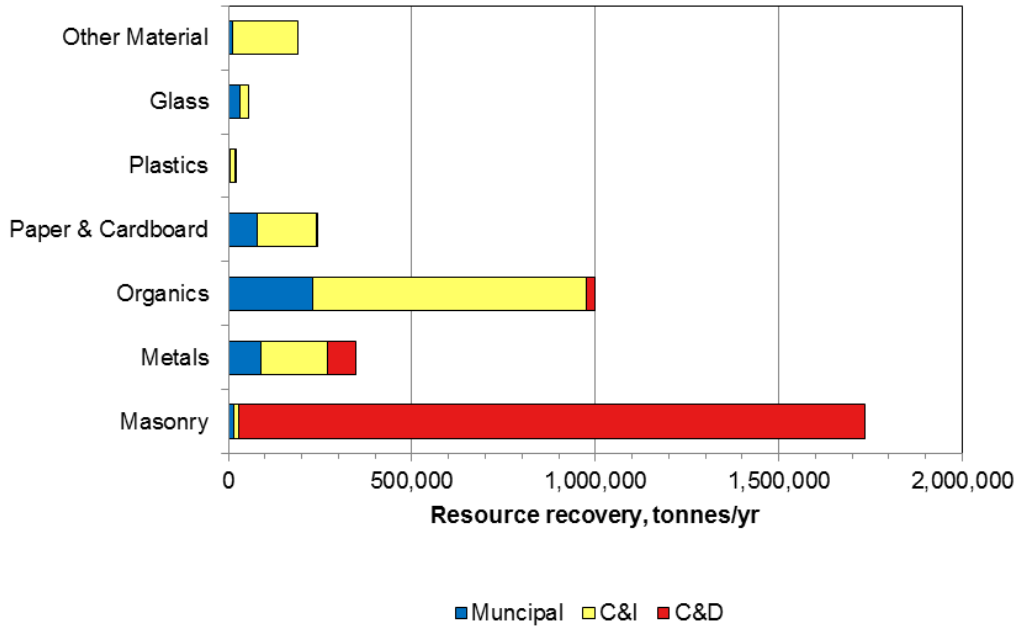

Figure 2.1 **Sector origin of SA recovered materials according to material category (by weight, tonnes), SA 2013-14.** *This figure shows the source sector splits for resource recovered materials by source sector (MSW, C&I and C&D).*

2.1.4 Geographical origin

Figures 2.2 and 2.3 overleaf show the indicative locations in SA of main sites for recyclers/re-processors reporting resource recovery data to the Zero Waste SA Recycling Activity Survey.

During 2013-14, metropolitan areas contributed to over three quarters (79% or 2.85 million tonnes) of resource recovery in SA and 77% (0.71 million tonnes) of waste sent to landfill (Table 2.4 below).

Regional areas once more contributed strongly to SA's recycling activity in 2013-14, providing the balance (at 0.74 million tonnes or 21%) of material being resource recovered. A significant proportion of this regional resource recovery arises from processing of primary products (e.g. wine, timber, meat) or energy production (i.e. fly ash). Regional areas were also responsible for 0.21 million tonnes (or 23%) of waste disposed of to landfill in SA.

Table 2.4 **Geographical origins (by weight, tonnes and %) of SA recovered materials and waste to landfill, 2013-14, and diversion rates (%).** *The separate contributions by metropolitan and regional areas to resource recovery and landfill disposal in SA are shown in this Table.*

Sector Origin	Resource Recovery		Landfill[1]		Diversion
	tonnes	(%)	tonnes	(%)	
Metro	2,850,000	79%	708,000	77%	80.1%
Regional	740,000	21%	206,000	23%	78.2%
Total	3,590,000	100%	914,000	100%	79.7%

1. Landfill data was provided by Zero Waste SA

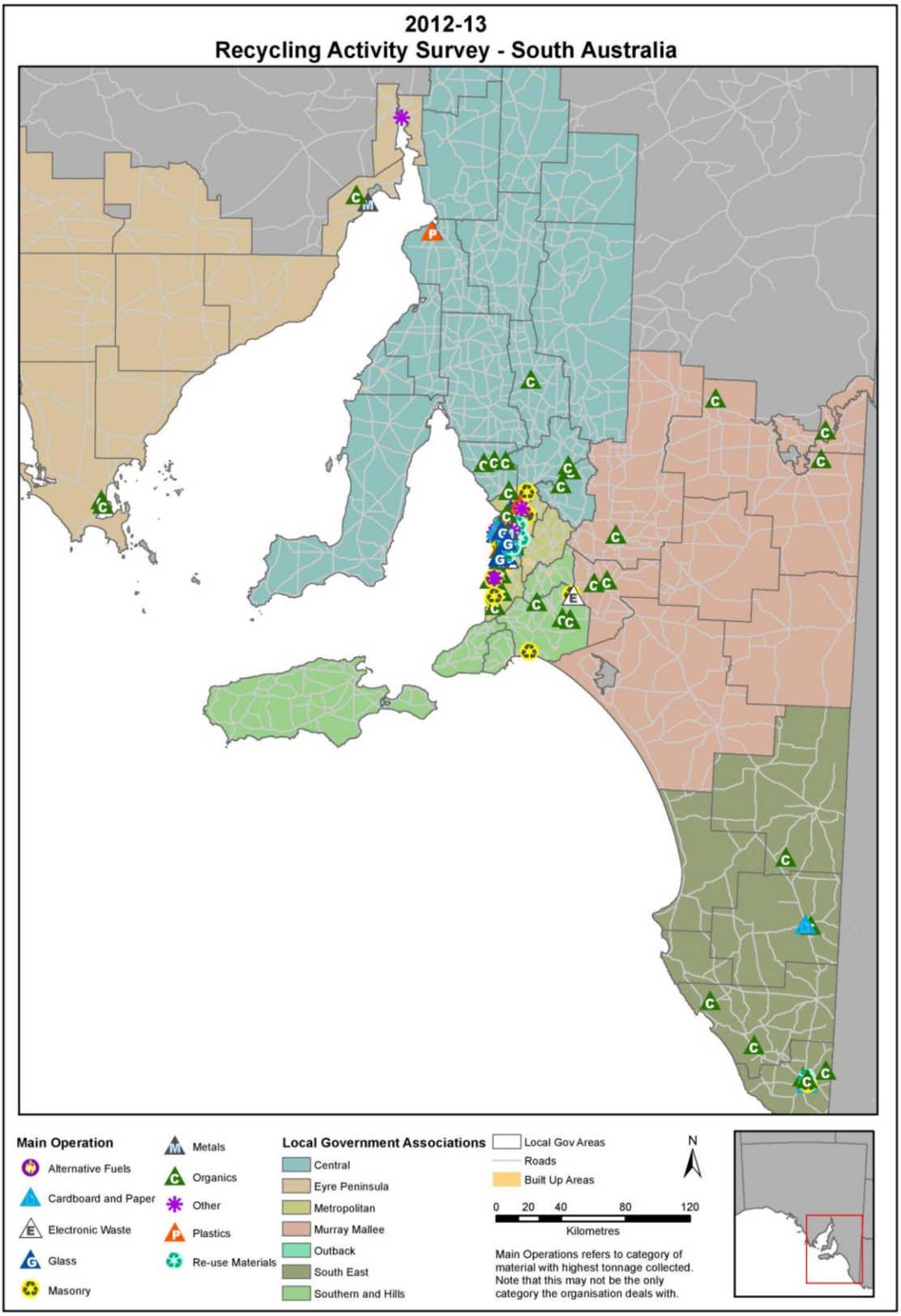

Figure 2.2 **Approximate geographical location of main sites for recyclers/re-processors in SA.**

This map was produced by Zero Waste SA during the 2012-13 Recycling Activity Survey Year. The map is based on data from the Zero Waste Environment User System (ZEUS) and collected during 2009-10 to 2012-13 Recycling Activity Surveys. Refer Figure 2.3 for enlargement showing metropolitan Adelaide area.

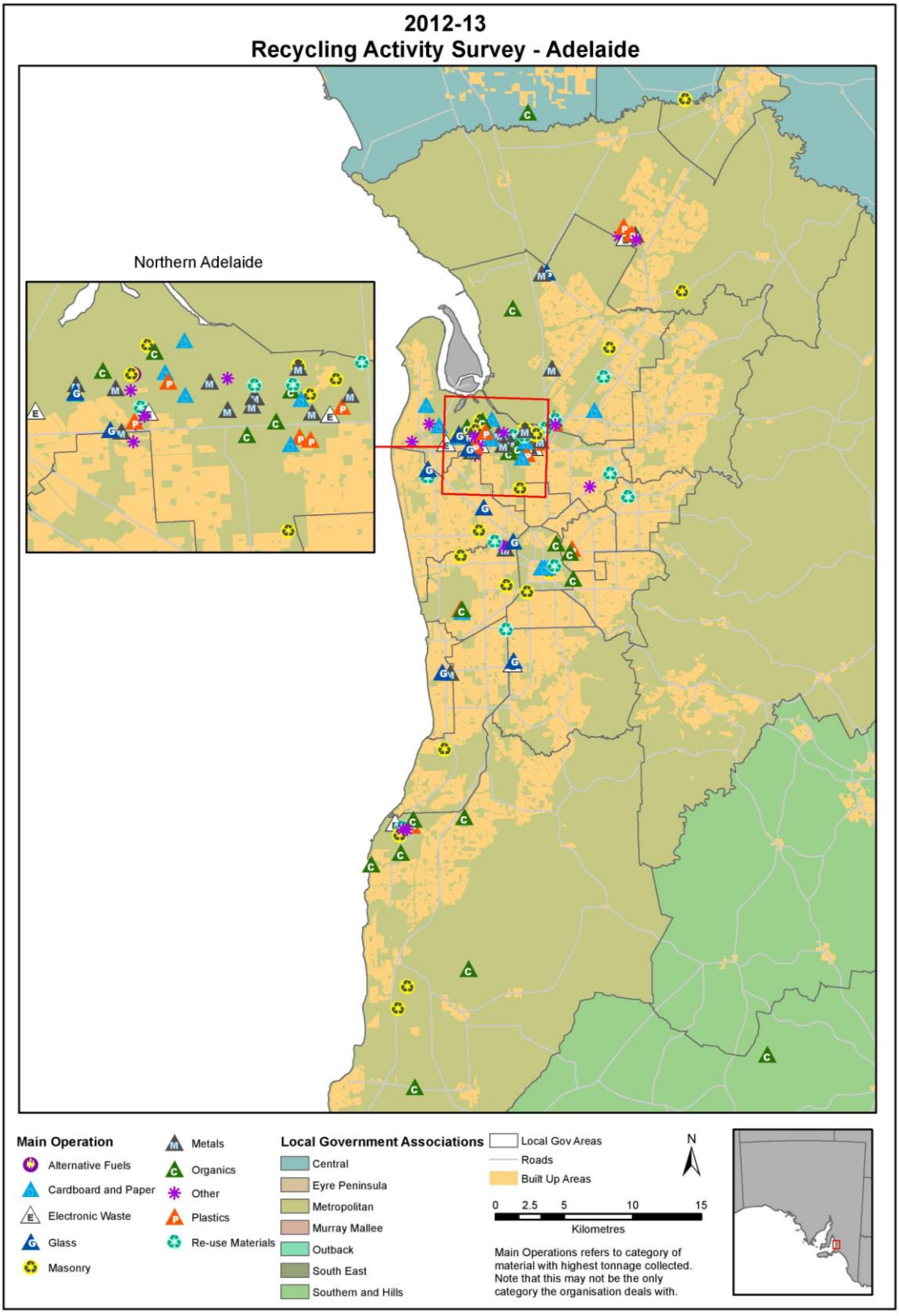

Figure 2.3 Approximate geographical location of main sites for recyclers/ re-processors in Adelaide. *This map was produced by Zero Waste SA during the 2012-13 Recycling Activity Survey Year. The map is based on data from the Zero Waste Environment User System (ZEUS) and collected during the 2009-10 to 2012-13 Recycling Activity Surveys.*

2.1.5 Destination for Recovered Materials

In 2013-14, an estimated 2.98 million tonnes or 83% of all recovered material reported was re-processed in SA (Table 2.5 below).

SA has well developed recycling industry capabilities in most material streams, and the quantities being re-processed locally rose by 150,000 tonnes (or 5%) from 2012-13.

Despite this, the quantity of materials reported as being exported overseas also increased to 480,000 tonnes (from 460,000 tonnes in 2012-13). Metals (at 64%) and Cardboard & Paper (34%) constitute the majority of this material sent overseas for re-processing (Figure 2.5 overleaf). Although relatively less in comparison, greater quantities of Plastics (about 6,300 tonnes) and Other Materials, specifically Tyres (nearly 18,000 tonnes), were being exported as well. For some of these materials, it has become more lucrative to export direct from SA to overseas for re-processing, instead of source separating and/or resource recovering these materials in SA or elsewhere in Australia.

Table 2.5 **Final reported destination (by weight, tonnes and %) of SA sourced materials, 2013-14.** *The destination is where material is sent for re-processing. The majority of resource recovered material in SA is locally re-processed to use in the manufacture of new products.*

Destination	Quantity	
	tonnes	%
SA	2,980,000	83%
Interstate	130,000	4%
Overseas	480,000	13%
Total	**3,590,000**	**100%**

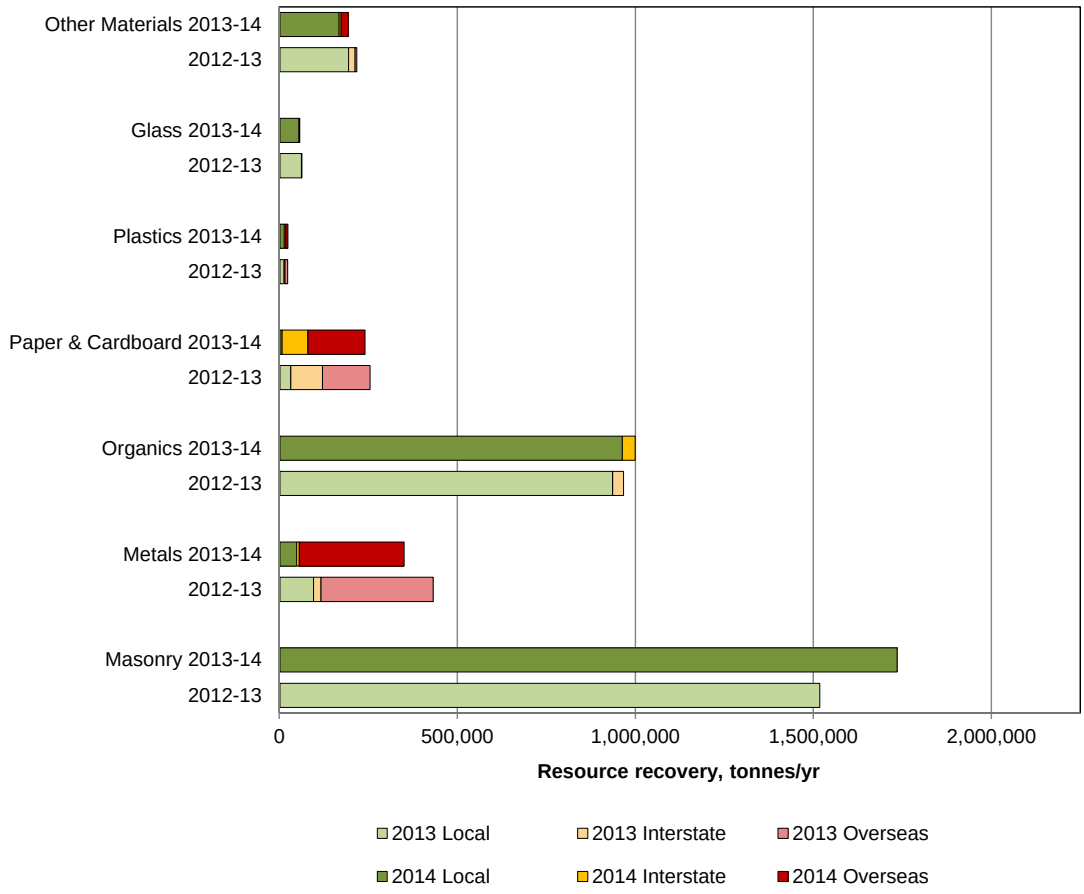

Figure 2.4 **Destination of SA recovered materials according to material category (by weight, tonnes), SA 2013-14 compared with 2012-13.** *This figure shows that the majority of materials are being re-processed within SA, but also significant quantities of some material being exported interstate or overseas.*

2.1.6 Energy recovery

Energy recovery is beginning to attract attention in SA as a potential alternative for waste not deemed suitable or cost-effective for material recovery. Some industries already produce energy from waste by-products they generate on their own sites, but this is not reportable under the National Waste Reporting Guidelines (DSEWPC 2012a). There are also several waste companies that collect and re-process waste materials, which are then sent overseas and/or interstate for energy recovery. This circumstance is still technically deemed as 'material recovery' as any potential energy recovery from the recovered waste material occurs later, once it is exported outside of SA. Resource recovery considered as 'energy recovery' in this report is therefore classified as: *SA-derived waste materials recovered and used for the purpose of energy production in SA, instead of being sent for landfill disposal*[5].

[5] This necessarily excludes energy recovery from landfill gas arising from waste already disposed to landfills.

During 2013-14, 75,900 tonnes of material were identified as being resource recovered for production of energy in SA. The majority of this material (>90%) was timber with the balance being plastic materials. This quantity contributed 1.7% to the State's total diversion rate (Table 2.6 below).

In addition to the above waste material used in SA, we estimate that 15,000 to 20,000 tonnes per year could be exported interstate or overseas for energy recovery.

Energy recovery's contribution to the State's recycling performance is anticipated to grow over the next 5 to 10 yrs. Potential energy recovery opportunities are considered to include anaerobic digestion of organic wastes, pyrolysis of agricultural waste, and/or large-scale diversion of MSW/C&I general waste residuals away from landfill to waste-to-energy plants.

Table 2.6 **Resource recovery (tonnes) for material recovery and energy production, from SA sourced materials reported during 2013-14.** *Reported tonnes are for energy recovery in SA from waste materials diverted from landfill. These 'energy recovery' tonnes do not include materials that are re-processed and sent interstate and/or overseas for energy recovery, which is still deemed as material recovery. The respective contributions of resource recovery for material recovery and energy production to SA's diversion rate is also shown.*

		Standard Reporting Materials	Separately Reported Materials & Clean Fill	**TOTAL (All materials)**
Material recovery	Quantity, tonnes	2.644 million	0.87 million	**3.514 million**
	Diversion rate*, %	73.8%	84.9%	**78.0%**
Energy recovery	Quantity, tonnes	75,900	Nil	**75,900**
	Diversion rate*, %	2.1%	0.0%	**1.7%**
Total (resource) recovery	**Quantity, tonnes**	**2.720 million**	**0.87 million**	**3.590 million**
	Diversion rate*, %	**75.9%**	**84.9%**	**79.7%**

** Diversion rate = Resource recovery/Total waste generated. (Refer Table 1 for Total Waste generated)*

2.1.7 Imported materials

Imported waste materials brought into SA for resource recovery and/or re-processing are separately identified during the SA's Recycling Activity survey, to ensure that they are not counted towards SA's recycling performance. This does not include already re-processed materials imported for manufacturing.

Table 2.7 overleaf summarises these imported waste materials identified in reported data for 2013-14. Nearly 132,000 tonnes of imported waste materials for resource recovery were recorded. This included significant quantities of Glass (at 53,400 tonnes or 40% of the total), Other Materials (predominantly Foundry Waste material) (49,000 tonnes or 37%) and Organics (17,000 tonnes or 13%), as well as lesser amounts of Metals and Plastics. Victoria was the major interstate source for this imported material (61,600 tonnes or 47% of the total) and a substantial quantity (40,000 tonnes) was sourced from overseas.

Table 2.7 **Waste materials reported as imported to SA for resource recovery in 2013-14, including estimated accuracy of data.** *Significant quantities of Glass, Other Materials (mainly Foundry Waste), and Organics, as well as Metals and Plastics, were imported for resource recovery. The origin of some imported waste materials from interstate could not be identified.*

	Interstate								***Overseas***	***TOTAL***	**Est. accuracy (%)**
Material sector	VIC	*NT*	*QLD*	*WA*	*NSW*	*ACT*	*TAS*	*State not identified*			
Masonry	-	-	-	-	-	-	-	-	-	**-**	N/A
Metals	-	5,100	-	100	-	-	-	-	-	**5,200**	10%
Organics	12,000	-	-	-	5,000	-	-	-	-	**17,000**	9%
Cardboard and Paper	-	-	-	-	-	-	-	-	-	**-**	N/A
Plastics	1,100	20	300	1,700	3,900	-	-	-	-	**7,020**	30%
Glass	42,500	100	-	9,000	-	-	-	1,800	-	**53,400**	11%
Other Materials	6,000	-	-	-	3,000	-	-	-	40,000	**49,000**	30%
Total	**61,600**	**5,220**	**300**	**10,800**	**11,900**	**-**	**-**	**1,800**	**40,000**	**131,620**	19%

2.2 Performance against State Waste Strategy Targets

2.2.1 Landfill Reduction Target

Target 67 of SA's Strategic Plan (SA Government, 2011) sets the following landfill reduction goal for SA:

- ***Reduce waste to landfill by 35% by 2020 (baseline: 2002-03); Milestone of 25% by 2014.***

SA's total landfill disposal during 2013-14 was 0.914 million tonnes, which is a reduction of over 25% on the landfill disposal rate in 2002-03 (1.25 million tonnes) – Figure 2.5 below. SA has therefore achieved its 2014 Target. The reduction in contaminated soil disposal to landfill over the past year has been key to delivering this outcome. The current trend rate suggests that progress towards achieving the 2020 target of a 35% reduction is on track, so long as there is on-going commitment to achieving further gains in diverting waste materials from landfill disposal to resource recovery, including contaminated soil.

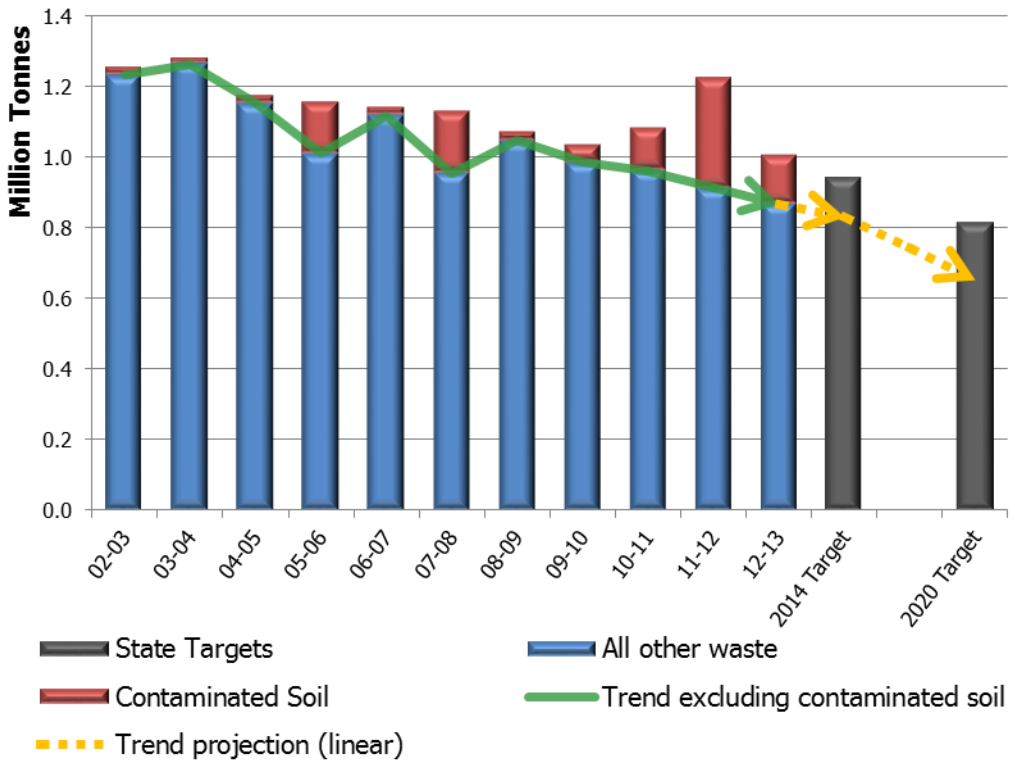

Figure 2.5 **Landfill disposal: Trend in SA since 2002-03 and State Waste Strategy Targets.** *This figure shows how landfill disposal in SA has changed since 2002-03 relative to SA's Strategic Plan (SA Government, 2011) landfill reduction targets. The separate contribution to landfill disposal of contaminated soil is also identified and the historical trend of landfill disposal excluding contaminated soil is illustrated.*

2.2.2 Per capita Waste Generation Reduction Target

SA's Waste Strategy 2011-2015 (Zero Waste SA, 2012) has a per capita waste generation target of:

- ***5% reduction in waste generation per capita by 2015 (baseline: 2010-11).***

In 2013-14, per capita waste generation for Standard Reporting Materials was 2,130 kg/person/yr which was 7.4% less than that recorded in 2010-11 (Table 2.8 below). The reduction per capita since 2010-11 with Separately Reported Materials & Clean Fill included in the total is even greater at 17%. SA is therefore on track to achieve the 2015 Target for reduction in per capita waste generation, providing waste generation does not increase dramatically over the next reporting year.

Table 2.8 **Per capita waste generation 2013-14: Recycling Activity results and State Waste Strategy target.** *This table gives values for per capita waste generation from 2010-11 to 2013-14 and compares the change achieved between 2013-14 and 2010-11 with the 2015 Target from the SA's State Waste Strategy 2011-2015 (Zero Waste SA, 2012).*

	Per capita Waste Generation (kg/person/yr)					2015 Target
	10-11	*11-12*	*12-13*	*13-14*	***% Change***	
Standard Reporting Materials	2,300	2,210	2,120	2,130	**-7.4%**	5% Reduction
Separately Reported Materials & Clean Fill	950	930	550	550		
TOTAL	3,250	3,140*	2,670	2,680	**-17%**	

2.2.3 Metropolitan Diversion Targets

SA's Waste Strategy 2011-2015 (Zero Waste SA, 2012) includes targets for metropolitan diversion (to resource recovery) by source sector (Table 2.7 overleaf).

During 201314, SA generally achieved continued improvements in Metropolitan Diversion during 2013-14:

- MSW – Diversion rate increased to 59.4% (from 57.5% in 2012-13), which is below the 2015 Target (of 70%).
- C&I – Diversion rate declined slightly to 76.6% (from 77.1% in 2012-13), but still achieves the 2015 Target (of 75%).
- C&D – The diversion rate rose:
  - *Excluding Separately Reported Materials & Clean Fill:* A diversion rate of 84.8% was achieved (up from 82.8% in 2012-13), which is below the 2015 Target (of 90%).
  - *Total C&D sector result:* The diversion rate was 88.4% (up from 82.2% in 2012-13), which exceeds the 2012 Target (at 85%) but is just below the 2015 Target.

Table 2.9 **Metropolitan diversion by source sector: 2013-14 Recycling Activity results and State Waste Strategy targets.** *This table compares the metropolitan diversion outcomes achieved for MSW, C&I and C&D sectors with diversion targets in SA's Waste Strategy 2011-2015 (Zero Waste SA, 2012).*

Source Sector	2013-14 Diversion Achieved	Metro Diversion Target	
		By 2012	*By 2015*
■ **MSW**	**59.4%**	60%	70%
■ **C&I**	**76.6%**	65%	75%
■ **C&D – *excluding Separately Reported Materials & Clean Fill***	**84.8%**	85%	90%
■ **C&D – *Total***	**88.4%**		

2.3 Comparative performance (with other jurisdictions)

Based on resource recovery and landfill data for 2013-14, SA currently achieves both the highest publicly reported diversion (at 79.7%) and per capita resource recovery (2,134 kg/p/yr) of any state or territory in Australia[6] (Figure 2.6 overleaf).

SA also has the lowest per capita landfill disposal rate at 543 kg per person per year.

However, SA reported the highest overall per capita waste generation rate (2,677 kg/p/yr).

[6] Note: Not all recycling data needed for this comparison could be obtained for 2013-14. Furthermore, not all Australian states and territories collect and report this data in conformance with the National Waste and Recycling Reporting Guidelines (DSEWPC 2012a). Estimated waste generation, recycling and landfill disposal were based on most current and best available data for each State/Territory. Further details explaining how SA data was benchmarked against recycling data reported by other states and territories are provided in the Methodology section of this report.

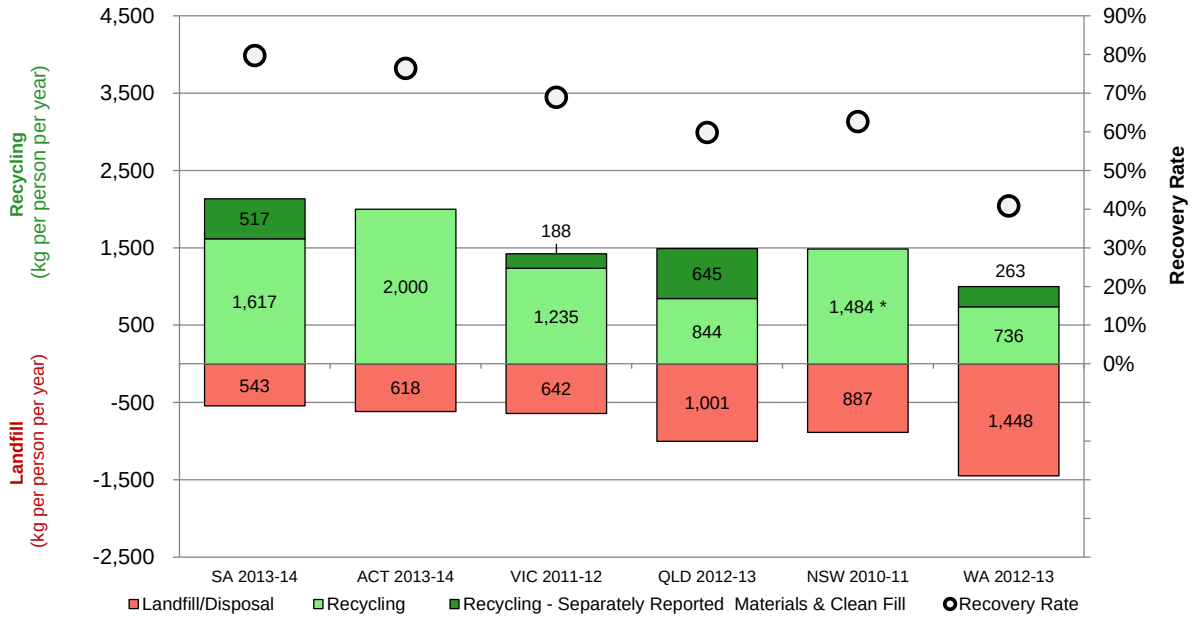

Figure 2.6 Comparison of reported per capita (kg/person/yr) resource recovery and landfill disposal and recovery (%) by state or territory. *This figure illustrates the per capita resource recovery and landfill disposal for different states and territories in Australia based on latest and currently available data (not all of which are for 2013-14). The per capita data for resource recovery is differentiated according to Standard Reporting Materials and Separately Reported Materials & Clean Fill scopes in line with the National Waste Reporting Guidelines (DSEWPC 2012a). Note: Reported recovery for some states and territories (e.g. NSW, ACT) do not show a breakdown between Standard Reporting Materials and Separately Reported Materials & Clean Fill, and thus, these quantities are aggregated in the Recycling category of reported per capita data.*

3 Material Resource Recovery (Activity) Reports

At a glance:

- *This section presents the key findings from analysis of 2013-14 Recycling Activity Survey data by material type. These resource recovery reports are presented according to traditionally accepted material sectors as listed below, which align with National Waste Reporting Guidelines (DSEWPC 2012a). Where relevant, the reports differentiate between resource recovery for material recovery and energy recovery.*
  1. ***Masonry [refer pg. 33 of this report]***
     - *Asphalt*
     - *Bricks*
     - *Concrete*
     - *Plasterboard*
     - *Clay, Fines, Rubble & Soil*
     - *Clay, Fines, Rubble & Soil- Intermediate Waste Soil*
  2. ***Metals [refer pg. 37]***
     - *Steel or Ferrous Metals*
     - *Aluminium*
     - *Non-ferrous Metals (exc. Aluminium)*
  3. ***Organics [refer pg. 41]***
     - *Food Organics*
     - *Garden Organics*
     - *Timber*
     - *Other Organics*
  4. ***Cardboard & Paper [refer pg. 45]***
     - *Cardboard and Waxed Cardboard*
     - *Liquid Paperboard*
     - *Magazines & Newsprint*
     - *Printing & Writing Paper*
  5. ***Plastics [refer pg. 49]***
     - *Polyethylene Terephthalate (PET)*
     - *High Density Polyethylene (HDPE)*
     - *Polyvinyl Chloride (PVC)*
     - *Low Density Polyethylene (LDPE)*
     - *Polypropylene (PP)*
     - *Polystyrene (PS)*
     - *Mixed &/or Other Plastics (MIX)*
  6. ***Glass [refer pg. 53]***
  7. ***Other Materials [refer pg. 55]***
     - *Fly Ash*
     - *Foundry Sands*
     - *Leather & Textiles*
     - *Tyres & Rubber*
- *This data enables us to measure the performance of South Australia (SA) against waste diversion goals and targets in South Australia's State Waste Strategy 2011-15.*

3.1 Masonry

Highlights:

- *In 2013-14 the quantity of recovered Masonry materials, including Clean Fill and Intermediate Waste Soil, increased, suggesting a resurgence in C&D activity occurred during the year.*
- *Concrete rose significantly, by 120,000 tonnes (or 19%), Clean Fill also leapt by 110,000 tonnes (or 13%), and Brick also increased by 26%.*
- *The outlook for resource recovery of Masonry over the next 1 to 2 years is considered stable as new Government funded infrastructure projects proceed despite on-going depressed private sector C&D activity.*

The total quantity of recovered Masonry materials reported for SA during 2013-14 was 1.73 million tonnes (Table 3.1 below), which is up by 15% from 2012-13 (1.51 million tonnes). Concrete (at 44% of total Masonry quantities) and Total Clay, Fines, Rubble & Soil (Clean Fill and Intermediate Waste Soil[7]) (at 44%) again provided the majority of this resource recovery (Figure 3.1 overleaf). Concrete rose 120,000 tonnes from last year, and Clean Fill increased by 110,000 tonnes or 23% (from 2012-13) (Figure 3.2 overleaf). Bricks also improved by 13,000 tonnes or 26% (from 2012-13), but Asphalt was unchanged (Figure 3.3 two pages over).

Table 3.1 Quantity (tonnes) of Masonry material recovered in SA during 2013-14, including estimated reporting error (in tonnes & %). *This table includes separate reporting of Clean Fill and Intermediate Waste Soil in the total Clay, Fines, Rubble & Soils.*

Item	Net Recovery[1]	Reporting Error	
	tonnes	tonnes	%
Asphalt	148,000	24,000	16%
Bricks	63,000	12,000	19%
Concrete	760,000	105,000	14%
Plasterboard	1,000	120	12%
Total Clay, Fines, Rubble & Soil [2]	760,000	128,000	17%
■ Clay, Fines, Rubble & Soil – Clean Fill[2]	590,000	91,000	15%
■ Clay, Fines, Rubble & Soil – Intermediate Waste Soil[3]	170,000	37,000	22%
Total	**1,732,000**	**270,000**	16%

1. Net recovery excludes re-processing losses.
2. The 'Clay, Fines, Rubble & Soil' material category does not include stockpiled material where reuse may not occur and also only relates to material that has been diverted from landfill
3. Intermediate Waste Soil[7] is a new material category, reported for the first time in 2011-12.

[7] Intermediate Waste Soil (IWS) is a soil classification used in SA (South Australia EPA, 2009) (Draft Waste Classification Guidelines) to indicate 'minor contamination' (as opposed to major contamination), which separates this soil type from Waste Derived Fill (WDF) (commonly known as 'Clean Fill').

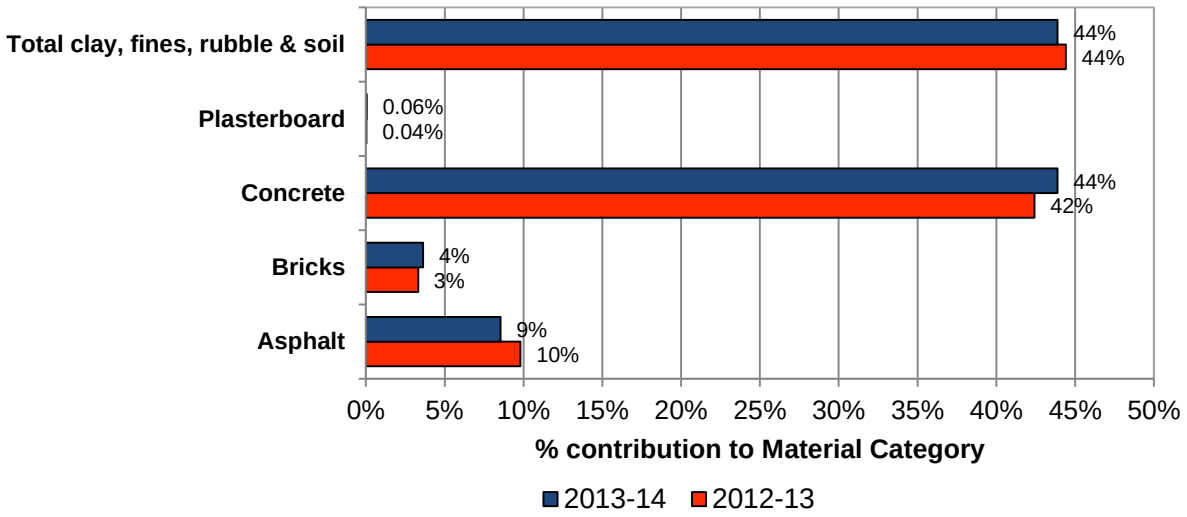

Figure 3.1 Changes in percent composition of recovered Masonry (by weight), SA, between 2012-13 and 2013-14.

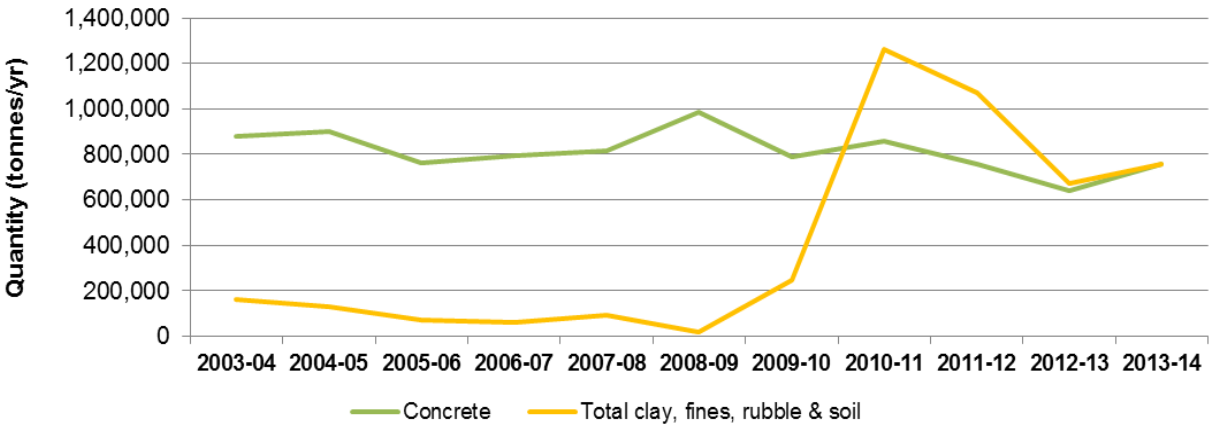

Figure 3.2 Changes in reported Masonry quantities since 2003-04 – Concrete and Total Clay, Fines, Rubble & Soil. *Concrete was up significantly in 2013-14 and Total Clay, Fines, Rubble & Soil stabilised.*

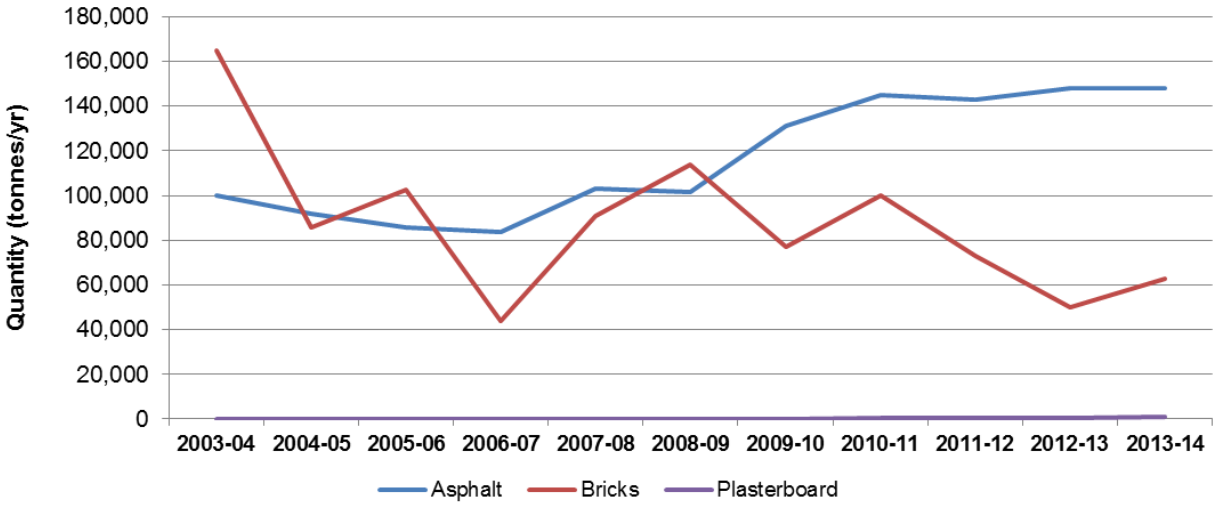

Figure 3.3 **Changes in reported Masonry quantities since 2003-04 – Asphalt, Bricks and Plasterboard.** *There was no change in Asphalt but Bricks increased in 2013-14. Plasterboard experienced a rise of its low base.*

As would be expected, the majority (98%) of recovered Masonry materials arose from C&D sources (Table 3.2 below) with only small quantities reported from C&I (1%) and Municipal (1%) sources. Most of these Masonry materials (97%) were sourced from Metropolitan SA (Table 3.2), and all of the materials were re-processed locally in SA (Table 3.2).

None of the resource recovery for waste masonry materials was used for energy production in SA. No waste masonry materials were reported as being imported into SA for resource recovery.

Table 3.2 **Sector and geographical origins and re-processing locations for recovered Masonry in SA in 2013-14.** *The metropolitan region and C&D sector provided the source of most recovered Masonry for SA, which was locally re-processed.*

Item	Sector Origin (%)			Geographical Origin (%)		Re-processing Location (%)		
	Municipal	C&I	C&D	Metro	Regional	SA	Interstate	Overseas
Asphalt	0%	0%	100%	99%	1%	100%	0%	0%
Bricks	1.0%	0.3%	99%	95%	5%	100%	0%	0%
Concrete	1.8%	0.8%	97.5%	97%	3%	100%	0%	0%
Plasterboard	8%	41%	51%	89%	11%	100%	0%	0%
Total Clay, Fines Rubble & Soil	0.2%	0.8%	99%	98%	2%	100%	0%	0%
Total	**1%**	**1%**	**98%**	**97%**	**3%**	**100%**	**0%**	**0%**

The volumes of Masonry materials recovered in SA are affected by fluctuations in building C&D activity that occur from year to year (Figures 3.2 and 3.3).

- In the past five years since 2009-10, Clay, Fines, Rubble & Soil have risen to historically high levels on the back of several major infrastructure projects.
  - These high levels have gradually abated over the past two years as these projects progressed past their major waste generating phases, but appear to have now stabilised and even risen slightly as new Government funded infrastructure projects (e.g. South Road upgrades) in SA commence.
- In the other material categories, the trend has remained relatively stable, despite the increases this year, which reflect few major changes in the other C&D activity taking place.
- Plasterboard, which was introduced as its own category to the SA Recycling Activity Report in 2010-11, remains a minor quantity, but appears to be growing gradually as more people start separately identifying and reporting its resource recovery.

In terms of outlook by the industry for Masonry materials:

- New Government funded infrastructure projects should mean that volumes of Clay, Fines, Rubble & Soil, will continue at current levels over the next 1 to 2 years.
  - The new South Road upgrade projects should also see increased resource recovery of Asphalt, which will be supported by recent State Government changes to increase allowable recycled content for asphalt roads.
- There are still concerns in the industry, however, about waste soil finding its way to landfill rather than to beneficial reuse as the industry transitions to new regulatory requirements for managing waste derived fill.
- Despite on-going stagnant levels of private sector C&D activity, several major building projects are taking place as part of the new medical research precinct surrounding the new Royal Adelaide Hospital development.
  - This should sustain current levels of resource recovery for Concrete materials into the next financial year.
- Market prices for end products of re-processed materials have generally stabilised, and the perception is of a consistent future market for recycled masonry materials.
- Despite this, the industry is well served by existing resource recovery and re-processing infrastructure.

3.2 Metals

Highlights:

- *In 2013-14 the quantity of recovered Metals decreased significantly for all material streams.*
- *The recent decline and closures in manufacturing industries across SA are starting to substantially affect waste Metal volumes available for resource recovery.*
- *The immediate and longer-term outlook for Metals recovery is expected to be difficult as pressures on local manufacturing continue leading up to foreshadowed closure of car manufacturing in the State.*
- *The above could affect the on-going viability of some local metals re-processors.*

The total quantity of recovered Metals reported for SA during 2013-14 was approximately 350,000 tonnes (Table 3.3 below), which is down substantially by nearly 20% (or 77,900 tonnes) from 2012-13. This decrease occurred across all of the Metals categories:

- Steel decreased by 17% (or nearly 70,000 tonnes);
- Aluminium decreased by 26% (or 6,400 tonnes); and
- Non-ferrous Metals were down by 24% (or 3,500 tonnes).

These trends reflect a sudden hastening of recent declines seen over the past two years (Figures 3.4 and 3.5 overleaf). The major deterioration in scrap metal resource recovery (by over 100,000 tonnes) occurred in the C&I sector, which is attributed to a decline in manufacturing activity. This reduction in C&I scrap metal volumes has placed significant pressure on SA's metal re-processors. There is greater competition to secure the remaining local sources of scrap metal, increasing prices they need to pay to obtain this material. Lower volumes mean higher re-processing costs due to reduced economies of scale from their fixed capital investments in equipment and plant. At the same time, contracting local markets for scrap metal expose re-processors to greater price volatility by having to increasingly sell into the international market.

Table 3.3 **Quantity of Metals (tonnes) recovered in SA during 2013-14, including estimated reporting error (tonnes & %).** *Steel remained the dominant contributor to recovered Metals in SA.*

Item	Net Recovery[1]	Reporting Error	
	tonnes	tonnes	%
Steel	320,000	20,000	6%
Aluminium	14,500	2,200	15%
Non-ferrous Metals	18,000	2,500	14%
Total	**352,000**	**25,000**	7%

1. Net recovery excludes re-processing losses

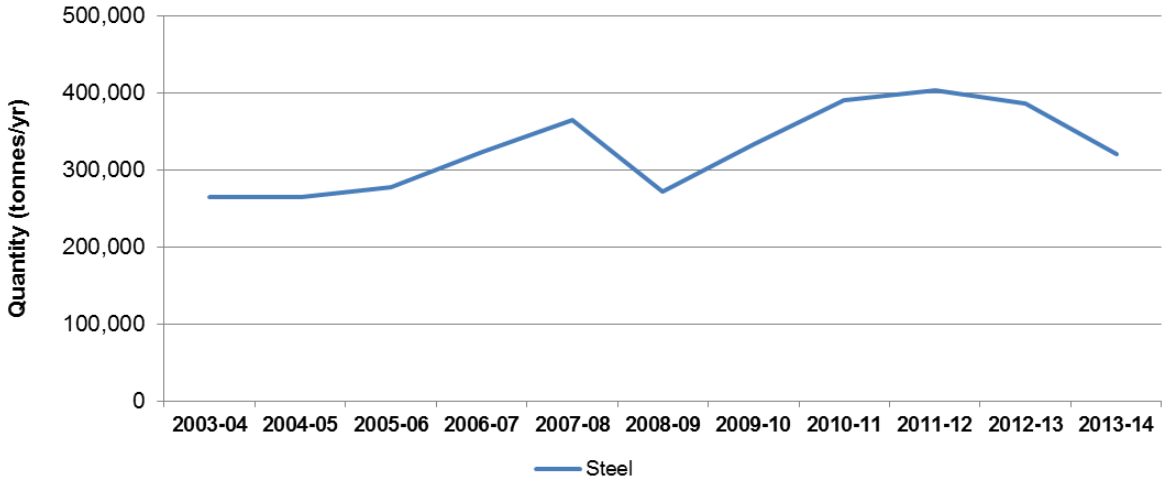

Figure 3.4 **Changes in reported metal quantities since 2003-04 – Steel.** *The decline since 2011-12 appears to have deepened in 2013-14.*

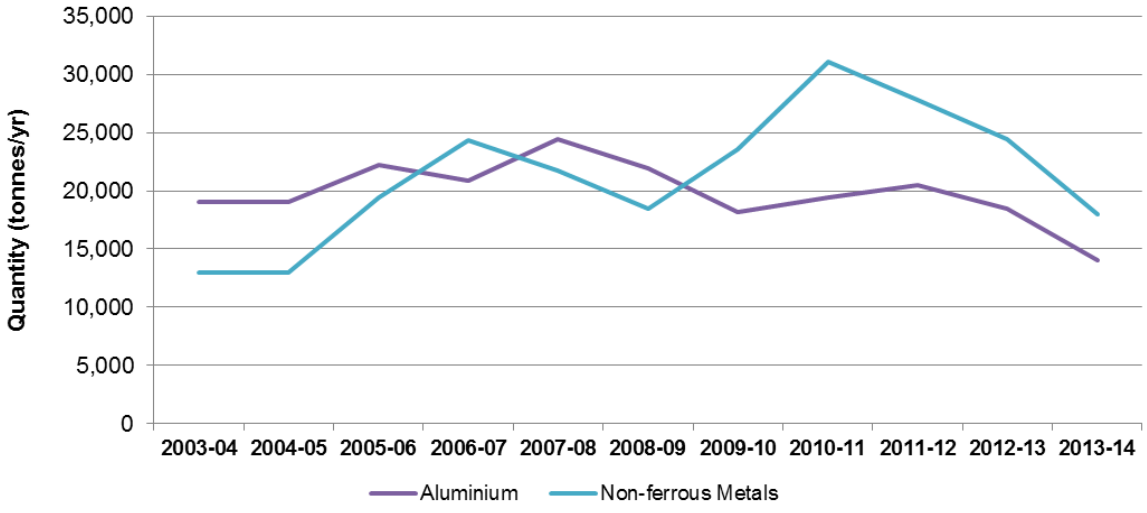

Figure 3.5 **Changes in reported metal quantities since 2003-04 – Aluminium and Non-ferrous Metals.** *Recovery of Non-ferrous continued to decrease in 2012-13 from the 2010-11 high.*

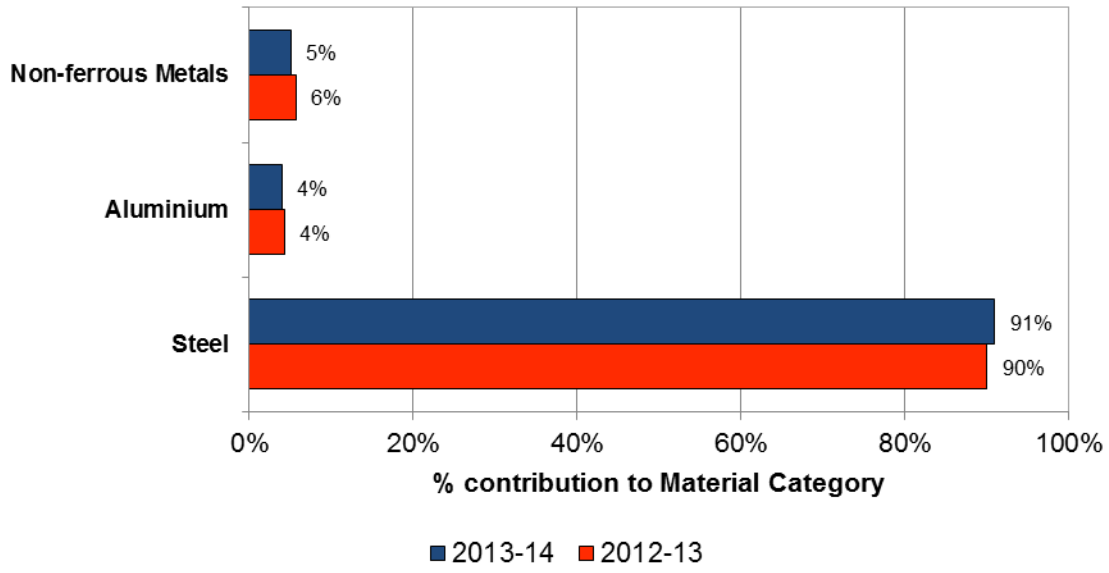

Figure 3.6 **Changes in percent composition of recovered Metals (by weight), SA, between 2012-13 and 2013-14.** *There was little change in the relative contributions of the different metal types to overall recovered Metals.*

All scrap metal recovered in SA 2013-14 was sent for material recovery; none was used for energy recovery. There were 5,200 tonnes of scrap metals imported into SA during 2013-14 for resource recovery or re-processing (which is additional to tonnes reported for SA in Table 3.3). The majority (98%) of this scrap metal arrived from the Northern Territory, with the balance sourced from Western Australia.

Steel continued to constitute the majority (90%) of Metal recovery (Figure 3.4 above). Non-ferrous Metals and Aluminium made up 5% and 4% of reported Metal recovery respectively.

During 2013-14, C&I sector recovery of scrap metal dropped to 52% (from 69% in 2012-13) (Table 3.4 overleaf). On the back of this decline in scrap metal recovery from the C&I sector, the relative contributions from C&D and MSW sectors rose to 22% and 26%, respectively.

Exports as the final destination for recycling of Metals increased to 85% in 2013-14 (from 74% in 2012-13). As a consequence, less recovered metal is being sent for recycling in SA and interstate.

The recycling of Steel in SA occurs at a local steelworks and metals foundries that previously accepted substantial amounts of scrap steel for recycling. During 2013-14, these local industries reduced their activity or demand for local scrap metals and/or some businesses have closed down.

Almost all of recovered Aluminium (98%) and virtually all (99%) of the Non-ferrous Metals was sent interstate or overseas for recycling.

{Cont. overleaf below Table 3.4}

Table 3.4 **Sector and geographical origins and re-processing locations for recovered Metals in SA during 2013-14.** *C&I was the major sector origin for recovered Metals. There is some re-processing of recovered Steel in SA but most recovered Metals are sent interstate or overseas.*

Item	Sector Origin (%)			Geographical Origin (%)		Re-processing Location (%)		
	Municipal	C&I	C&D	Metro	Regional	SA	Interstate	Overseas
Steel	25%	52%	23%	87%	13%	14%	0%	86%
Aluminium	39%	48%	13%	82%	18%	2%	17%	81%
Non-ferrous Metals	24%	58%	18%	89%	11%	6%	26%	67%
Total	26%	52%	22%	86%	14%	13%	2%	85%

The outlook for Metals recovery for the next period is (again) expected to be poor, with further falls anticipated for quantities recovered in SA.

- Recent declines in scrap metal from the manufacturing sector are expected to continue, particularly as the foreshadowed closure in 2017 of car manufacturing in SA draws closer.
- As a consequence there will be even more intense competition for the scrap metal left in the market.
  - The decline in scrap metal volumes during 2012-13 precipitated the closure of one metal collector/re-processor.
  - The on-going challenges in this sector could lead to further consolidation of local metals re-processors.
- There was growing concern that it may become too expensive to operate local re-processing plants for metals due to lower volumes, and rising labour and energy costs.
  - Many of this local re-processing plants are 20+ years old and reaching the end of their scheduled operating life.
  - Instead of upgrading and/or replacing their re-processing plants, local re-processors might consider 'port-based' compacting and baling of recovered metals for direct export to overseas for re-processing.
- Whilst the high Australian dollar has declined recently, increased shipping costs and reduced demand from China for scrap metal are still causing depressed commodity values in export markets.
  - This issue could be exacerbated if the major world economies dip back into recession.

For the second year running, another factor reported to be impacting on the Metals recovery sector is the increasing Solid Waste Levy. This acts to increases operating costs involved with disposing the 'flock' residual from re-processing to landfill. As a consequence, there are efforts being made to investigate recovery of more metals from the flock residual and/or its disposal via material recycling or energy recovery (instead of to landfill) to reduce this impact.

3.3 Organics

Highlights:

- *In 2013-14 overall quantities of Organic material recovery increased.*
- *This increase was driven by a rise in Garden Organics and Other Organics despite a decline in Timber.*
- *The cause of these fluctuations in volumes of different organic materials from last year is not completely clear, and may have simply been a result of different reporting practices by survey respondents.*

The total quantity of recovered Organics reported for SA during 2013-14 was approximately 1 million tonnes (Table 3.5 below), which is up by 3.4% (or 33,100 tonnes) from 2012-13.

During 2013-14 the major movers in this sector (Figures 3.7 and 3.8 overleaf) were Garden Organics (up 25% or 51,000 tonnes from 2012-13), Other Organics (up 7.8% or 40,000 tonnes), and Timber (which dropped 24% or 57,000 tonnes). Food Organics remained relatively stable at 7,000 tonnes (slightly down from 7,900 tonnes in 2012-13).

The reasons for some of the reported movements in this category during 2013-14 are not completely clear. Part of the drop in Timber could be attributed to reduced volumes taken in by regional composters receiving waste material from timber mills. However, some of these changes may have resulted from different reporting practices by survey respondents.

All recovered Organics materials except Timber were sent for material recovery. For Timber, 67,000 tonnes (or 37%) of this material was used for energy recovery in SA. Table 3.5 includes which quantities for resource recovery were destined for material recovery or energy recovery (in SA).

Table 3.5 **Quantity of Organics (tonnes) recovered in SA during 2013-14, including estimated reporting error (tonnes & %).** *The use of Timber for energy production in SA is presented in this Table by two new columns to show separate resource recovery for material recovery and energy recovery.*

Item	Material Recovery[1] tonnes	Energy Recovery[1] tonnes	Net Recovery[1,2] tonnes	Reporting Error tonnes	Reporting Error %
Food Organics	7,000	-	7,000	1,200	17%
Garden Organics	260,000	-	260,000	43,000	16%
Timber	113,000	67,000	180,000	55,000	31%
Other Organics	550,000	-	550,000	41,000	7%
- Meat Rendering	215,000	-	215,000	7,000	3%
- Waste Grease & Fat	120,000	-	120,000	13,300	11%
- Waste Sludge & Bio-solids	45,000	-	45,000	8,800	19%
- Miscellaneous Organics	170,000	-	170,000	12,000	7%
Total	**930,000**	**67,000**	**997,000**	**140,200**	**14%**

1. Net recovery excludes re-processing losses
2. Net recovery = Material Recovery + Energy Recovery

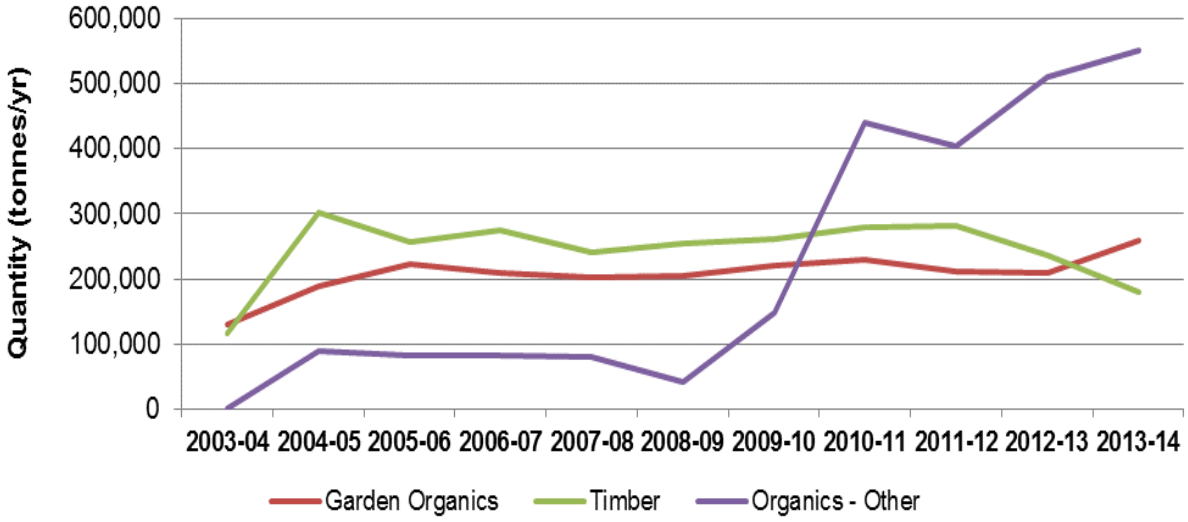

Figure 3.7 **Changes in reported organics quantities since 2003-04 – Garden Organics, Timber and Other Organics.** *Organics – Other has continued its rise seen over the past several years, but Timber experienced a significant drop in 2013-14. Garden Organics rose during 2013-14.*

Figure 3.8 **Changes in reported organics quantities since 2003-04 – Food Organics.** *There was a decline in Food Organics during 2013-14.*

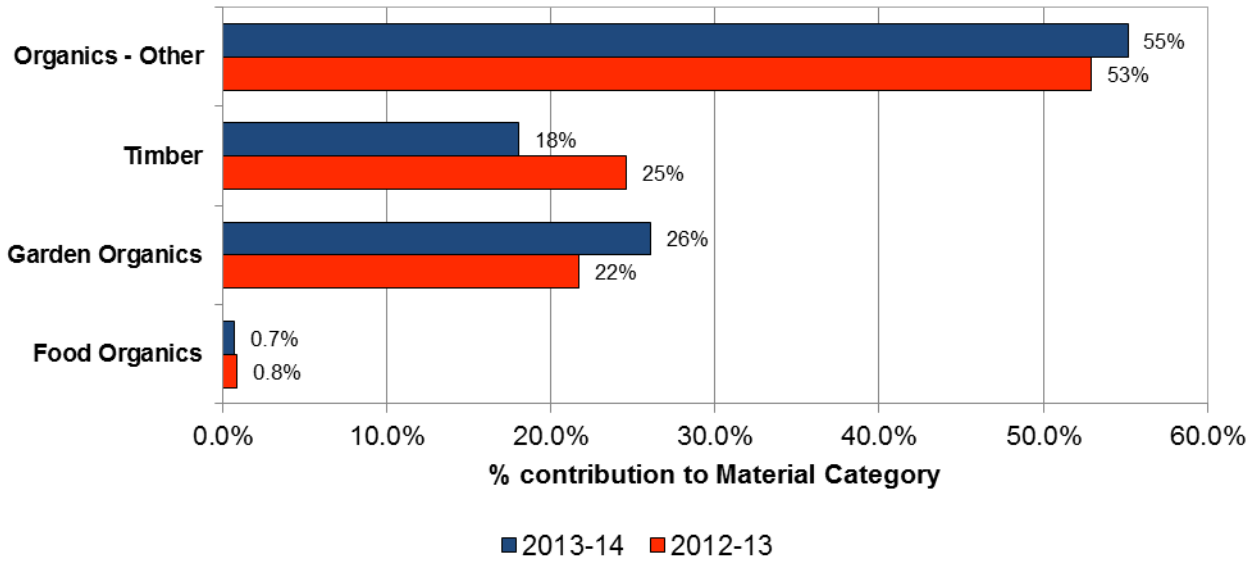

Figure 3.9 **Changes in percent composition of recovered Organics (by weight), SA, between 2012-13 and 2013-14.** *Organics – Other and Garden Organics increased their contribution to this material sector, with Timber declining.*

During 2013-14, 17,000 tonnes of organic waste material was imported to SA for resource recovery (which is additional to tonnes reported for SA in Table 3.5). About 70% of this material (mostly C&D timber waste) originated from Victoria with the balance (mainly grape marc) arriving from NSW.

Other Organics continued to constitute the majority (55%) of Organics recovery (Figure 3.7 above). Timber and Garden Organics made up 18% and 26%, respectively, of reported Organics recovery respectively.

It had been expected that reported resource recovery in Food Organics during 2013-14 would increase from 2012-13, given on-going expansion across metropolitan Adelaide of food organic collection services to the commercial sector and by councils to residents. However, much of this material may not be separately identified during collection, and therefore could have been reported as Garden Organics.

In 2013-14, the majority (75%) of recovered Organics originated from C&I sources including material from the timber, meat rendering and wine production industries (Table 3.6 overleaf). Approximately 23% of recovered Organic materials originated from municipal sources, which was dominated by a large amount of Garden Organics. Small quantities (2%) were sourced from the C&D sector, which were Timber and Garden Organics.

Table 3.6 **Sector and geographical origins and re-processing locations for recovered organics in SA during 2013-14.** *C&I is still the major source sector for waste organics and regional areas make a substantial contribution to resource recovery. Nearly all re-processing of waste organics occurs in SA.*

Item	Sector Origin (%)			Geographical Origin (%)		Re-processing Location (%)		
	MSW	C&I	C&D	Metro	Regional	SA	Interstate	Overseas
Food Organics	0%	100%	0%	90%	10%	100%	0%	0%
Garden Organics	74%	21%	5%	89%	11%	100%	0%	0%
Timber	0.3%	94.3%	5.4%	67%	33%	100%	0%	0%
Other Organics	6.5%	93.4%	0.1%	35%	65%	93%	7%	0%
Total	**23%**	**75%**	**2%**	**55%**	**45%**	**96%**	**4%**	**0%**

Due to the significant contribution by regional industries to Other Organics and Timber, nearly half (45%) of recovered Organics was sourced from SA's regional areas (Table 3.6 above).

Most Organic materials (96%) were re-processed locally but a small quantity of Other Organics is being sent interstate for recovery (Table 3.6).

The outlook for Organics recovery for the next period generally remains positive:

- On-going growth in Food Organics recovery is expected, through an increased number of councils accepting food in kerbside green organic collections and increased commercial food organics collections;
- The industry is continuing to develop innovative products to suit new and existing markets such as for broad acre agriculture and horticulture;
- There is strengthening demand from these markets as some continue their recovery from the Millennium drought and recognise the value of organic derived compost products for improving soil quality and conditioning;
- Waste to energy is being investigated by some market participants for residuals from organics processing, not only to provide new organics-derived products but as a cheaper energy source for their re-processing equipment;
- The market demand for compost and mulch is more broadly growing, and also increasing for other organics end-products such as those from Meat Rendering;
- The uncertainty around timber industry related recovery in the South East of SA has resolved and the composting industry in this area is experiencing an up-swing in availability and supply of these materials.

Reported barriers for re-processors in the organics sector remained the: on-going high cost of electricity; and significant cost to upgrade their processing equipment to improve quality and diversify their products to meet new market demands.

3.4 Cardboard & Paper

Highlights:

- *In 2013-14 overall quantities of recovered Cardboard & Paper declined (by 5% from 2012-13).*
- *The trend towards exporting of Cardboard & Paper overseas for re-processing, rather than interstate or in SA, has continued.*
- *The regional contribution to recovered Cardboard & Paper appeared to decrease significantly.*

The total quantity of recovered Cardboard & Paper materials reported for SA during 2013-14 was approximately 240,000 tonnes (Table 3.7 below), which was a decrease of 5% (or about 13,000 tonnes) from 2012-13 figures.

There was a slight decrease in Cardboard & Waxed Cardboard (down 5%), more significant reductions in Liquid Paperboard (down 14%) and Magazines & Newsprint (down 15%), but an increase in Printing & Writing Paper (up 16%) (Figures 3.10 and 3.11 overleaf).

The decrease in Magazines and Newsprint (which includes phone books) is a continuation of a decline that started several years ago, when quantities of this material peaked at around 40,000 tonnes per year in SA. This decline is attributed to the on-going changes in the news and print industries where digital is replacing printed media.

The drop in Liquid Paperboard is chiefly due to lower reported quantities from SA's material recovery facilities (MRFs) in metropolitan Adelaide for kerbside-collected comingled recycling from households.

During 2013-13 no Cardboard & Paper was reported as being collected for energy production in SA, nor were any of these waste materials imported into SA for resource recovery.

Table 3.7 **Quantity of Cardboard & Paper (tonnes) recovered in SA during 2013-14, including estimated reporting error (tonnes & %).** *Cardboard & Waxed Paper and Magazines & Newsprint, were the dominant contributors in this sector.*

Item	Net Recovery [1]	Reporting Error	
	tonnes	tonnes	%
Cardboard & Waxed Cardboard	180,000	36,000	20%
Liquid Paperboard	3,100	800	26%
Magazines & Newsprint[2]	33,000	7,500	23%
Printing & Writing Paper	24,000	5,000	21%
Total	**240,100**	**49,300**	21%

1. Net recovery excludes re-processing losses
2. Magazines & Newsprint includes Phone Books. All three material streams were reported together for the first time in 2012-13.

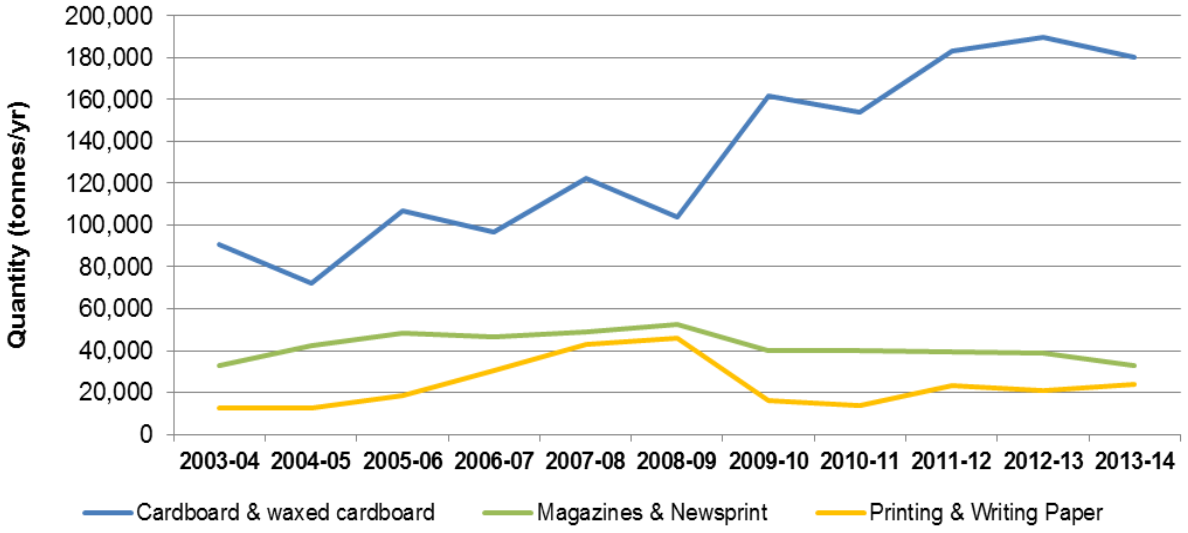

Figure 3.10 **Changes in reported Cardboard & Paper quantities since 2003-04 – Cardboard & Waxed Cardboard, Magazines & Newsprint and Printing & Writing Paper.** *There was a decline in Cardboard & Waxed Cardboard, a drop in Magazines & Newsprint, but Printing & Writing Paper was up.*

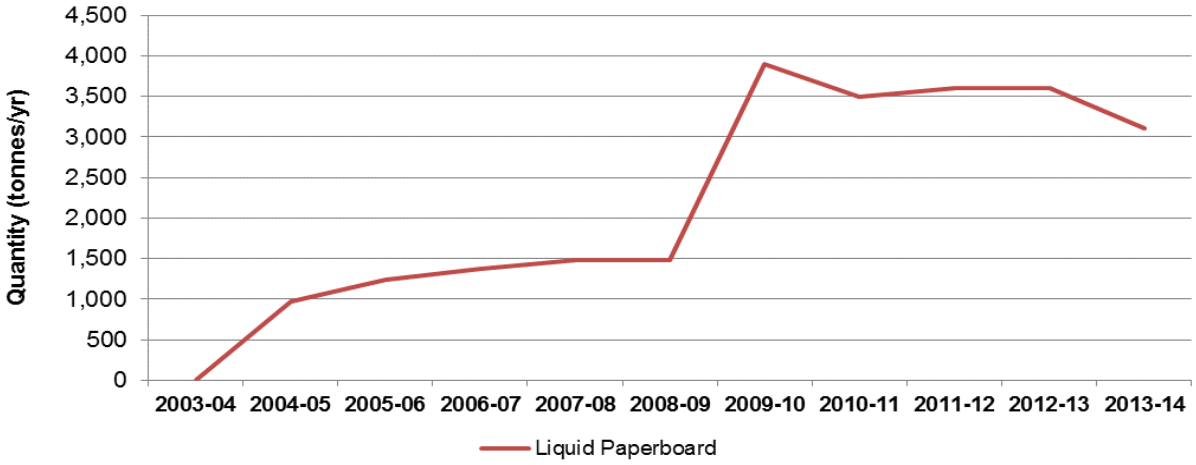

Figure 3.11 **Changes in reported Cardboard & Paper quantities since 2003-04 – Liquid Paperboard.** *Liquid Paperboard decreased, mainly due to lower reported quantities from SA's municipal MRFs taking kerbside collected comingled recycling.*

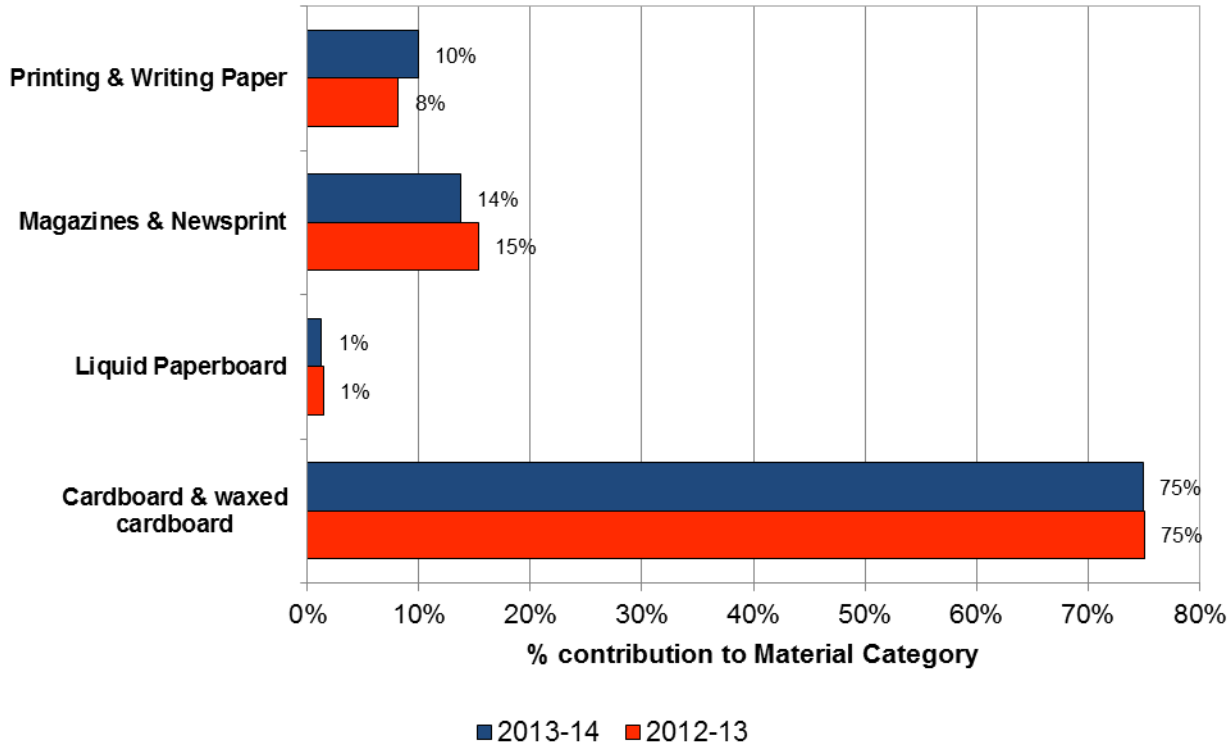

Figure 3.12 **Changes in percent composition of recovered Cardboard & Paper (by weight), SA, between 2012-13 and 2013-14.** *Relative contributions by the different material types have remained relatively similar to 2012-13 proportions.*

The relative contributions of each material to the Cardboard & Paper sector remained similar to that in 2012-13 (Figure 3.12 above). Cardboard & Waxed Cardboard contributed 75% of the resource recovery, Magazines & Newsprint provided 14%, Printing & Writing Paper delivered 10%, with Liquid Paperboard at only 1%.

In 2013-14:

- C&I and Municipal sources made up 67% and 33% of reported recovered Cardboard & Paper materials respectively (Table 3.8 overleaf).
- An even greater proportion of Cardboard & Paper was sent overseas for re-processing (67% in 2013-14, compared with 53% in 2012-13) (Table 3.8)
  - Changes in supply chain logistics for paper mills interstate now favour direct exporting overseas of Cardboard & Paper recovered in SA.
  - Less Cardboard & Paper was reported as re-processed in SA (3% for 2013-14 versus 12% in 2012-13)
- The majority of Cardboard & Paper (87%) was sourced from Metropolitan SA (Table 3.8), which was an increase on the 2012-13 figure (of 77%).

{Cont. overleaf below Table 3.8}

Table 3.8 **Sector and geographical origins and re-processing locations for recovered Cardboard & Paper in SA during 2013-14.** *C&I and MSW were the main source sectors, most recovery occurred from metropolitan Adelaide, and most of the recovered materials is sent interstate and overseas for re-processing.*

Item	Sector Origin (%)			Geographical Origin (%)		Re-processing Location (%)		
	MSW	C&I	C&D	Metro	Regional	SA	Interstate	Overseas
Cardboard & Waxed Cardboard	27%	73%	0%	86%	14%	0.3%	26.4%	73.4%
Liquid Paperboard	99%	1%	0%	76%	24%	0%	34%	66%
Magazines & Newsprint	73%	27%	0%	95%	5%	0%	54%	46%
Printing & Writing Paper	11%	89%	0%	67%	33%	24%	26%	50%
Total	33%	67%	0%	86%	14%	3%	30%	67%

The outlook for recovery of Cardboard & Paper is expected to remain relatively stable:

- The Cardboard & Paper recycling industry has coped well with the introduction of the Chinese 'Green Fence' Policy in February 2013, which has enabled continuation and further growth in exports.
- The lower Australian dollar is favouring the viability of exporting product, despite weakness in global markets.
- Magazines & Newspapers, however, are expected to continue in steady decline as digital consumption of news and print media rises.

With significant fixed costs and rises in transport and labour costs, but no growth in material prices, the industry again reported that on-going increases in the Solid Waste Levy remains as a barrier to being able to invest back into their businesses.

3.5 Plastics

Highlights:

- *2013-14 saw a slight increase in reported quantities of recovered Plastics increased.*
- *Most of this increase, however, was driven by Mixed Plastics, with recovery of individual polymers dropping.*
- *In particular both HDPE and LDPE appeared to decrease significantly.*
- *These changes reflect a commercial change in industry practices away from encouraging or practising source separation of polymers towards collection of mixed plastics, which are being used for energy recovery (in SA) or baled and exported overseas for re-processing.*
- *Some local reprocessors may be looking to relocate interstate, which could significantly impact on SA's capabilities in plastics recycling.*

The total quantity of recovered Plastics reported for SA during 2013-14 was 22,500 tonnes (Table 3.9 below), which is up by 5% (or 1,100 tonnes) from 2012-13. Mixed &/or Other Plastics constituted the majority (40%) of reported Plastics recovery followed by PET (19%), LDPE (15%), and HDPE (14%) (Figure 3.13 overleaf).

All plastics recovered as individual polymers were sent for material recovery. However, two thirds (or 6,000 tonnes) of the Mixed Plastics recovered during 2013-14 was re-processed for energy recovery in SA (Table 3.9).

In 2013-14, local re-processors imported nearly 7,000 tonnes of Plastics into SA for resource recovery (which is additional to tonnes reported for SA in Table 3.9). All of this imported waste plastic material was in the form of already source separated polymers. The majority (over 50%) of this imported waste plastic was sourced from NSW. Waste plastic material was also obtained from Victoria, WA, Queensland and the Northern Territory.

Table 3.9 **Quantity of Plastics recovered (tonnes) in SA during 2013-14, including estimated reporting error (tonnes & %).** *There was an increase in resource recovery this year, but a significant transition away from individual polymers to mixed plastics.*

Item	Material Recovery[1]	Energy Recovery[1]	Net Recovery[1,2]	Reporting Error	
	tonnes	tonnes	tonnes	tonnes	%
Polyethylene Terephthalate (PET)	4,200	-	4,200	870	21%
High density Polyethylene (HDPE)	3,200	-	3,200	990	31%
Polyvinyl Chloride (PVC)	300	-	300	4	1%
Low density Polyethylene (LDPE)	3,400	-	3,400	550	16%
Polypropylene (PP)	2,000	-	2,000	360	18%
Polystyrene (PS)	400	-	400	30	7%
Mixed &/or Other Plastics (MIX)	3,000	6,000	9,000	4,160	47%
Total	**16,500**	**6,000**	**22,500**	**7,000**	**31%**

1. Net recovery excludes re-processing losses
2. Net recovery = Material Recovery + Energy Recovery

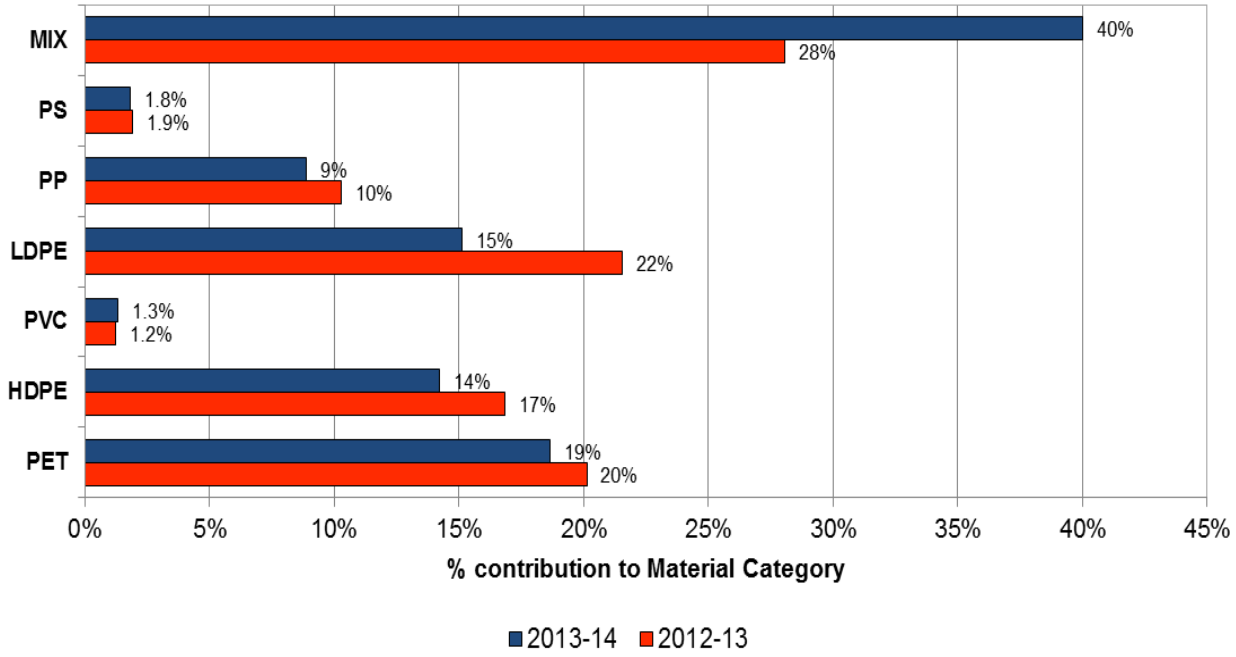

Figure 3.13 **Changes in percent composition of recovered Plastics (by weight), SA, between 2012-13 and 2013-14.** *Mixed plastics significantly increased its contribution to resource recovery, leading to a decline in nearly all individual polymers.*

The increase in Plastics recovery during 2013-14 was dominated by a significant increase in Mixed Plastics, with a decline seen across nearly all of the individual polymers (Figures 3.14 and 3.15 overleaf):

- Mixed &/or Other Plastics was up by 50% (or 3,000 tonnes); and
- LDPE dropped by 26% (or 1,200 tonnes);
- HDPE decreased by 11% (or 400 tonnes);
- PP was down by 9% (or 200 tonnes);
- PET experienced a slight reduction of 2% (or 100 tonnes);
- PS remained stable (at 410 tonnes);
- PVC increased by 40 tonnes (from 260 tonnes in 2012-13)

There are several factors that have contributed to the above growth in Mixed Plastics during 2013-14:

- A decline in SA's manufacturing and industrial activity is contracting local markets for recovered and/or re-processed plastics in polymer form;
- There is a growing demand for mixed plastics to use for energy recovery in SA; and/or
- Commercial factors can make it more profitable to collect as mixed plastics and simply bale and export it in this form directly interstate and/or overseas for re-processing (instead of in SA or interstate).

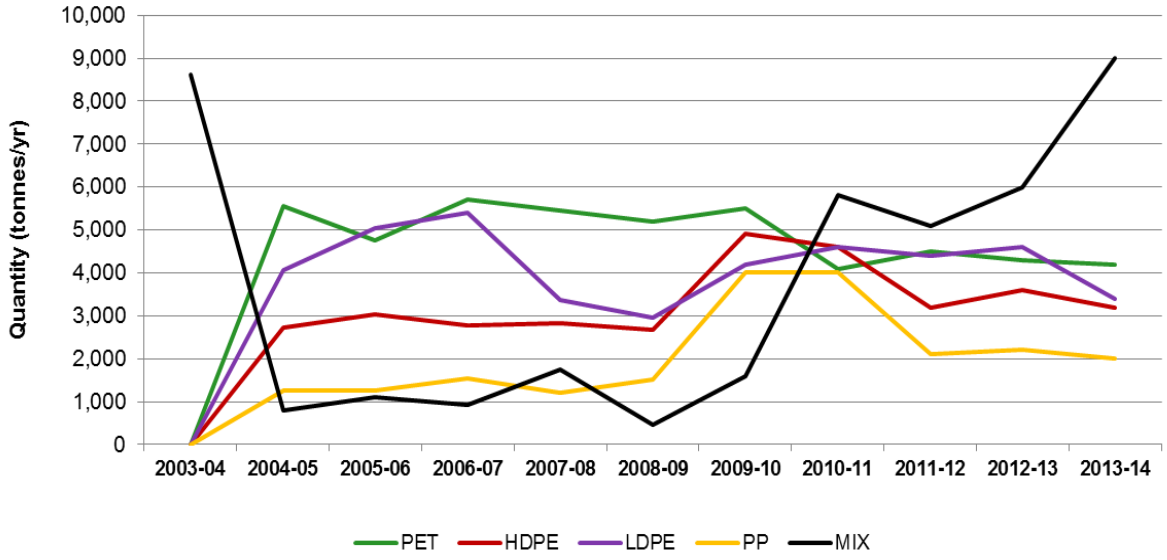

Figure 3.14 **Changes in reported Plastics quantities since 2003-04 – PET, HDPE, LDPE, PP and MIX.** *Mixed plastics rose substantially but recovery of individual polymers declined.*

Figure 3.15 **Changes in reported Plastics quantities since 2003-04 – PVC and PS.** *Polystyrene recovery remained stable, PVC quantities rose again.*

In 2013-14, C&I sources of reported recovered Plastics grew slightly (to 60% compared with 56% in 2012-13) and Municipal sources decreased (22% in 2013-14, down from 29% in 2012-13) (Table 3.10 below). Material sourced from C&D increased to 18% (from 15% in 2013-14).

A substantial amount (54%) of Plastics re-processing continued to occur in SA (see Table 3.10). SA re-processors continue to take all types of recovered plastic materials, excepting PET and PS to a lesser extent. Whilst this included re-processing for material recovery, a significant quantity (6,000 tonnes) was sent for re-processing into a form suitable for energy recovery in SA.

The outlook for recovery of Plastics materials in SA is expected to remain stable but with slight potential downward pressures possible over the coming years:

- The C&I market is expected to see a decline as the foreshadowed closure of the car manufacturing industry in SA draws closer over the next several years;
- This could significantly impact on local demand for re-processed polymer plastics in SA;
- The expansion of a local facility to re-process mixed plastics into fuel for energy recovery may see greater volumes of waste plastics re-processed in SA for this purpose;
- As result of the above, less plastics may be recovered in polymer form and instead collected as mixed plastics for energy recovery or export interstate and/or overseas for re-processing.

Local re-processors reported that high electricity and utility costs and labour issues in SA were affecting the viability of their operations. There was feedback that unless this situation changed, there could be consideration given to re-locating interstate where more favourable business conditions might exist.

Table 3.10 **Sector and geographical origins and re-processing locations for recovered plastics in SA in 2013-14.** *The majority of plastic is recovered from the C&I and MSW sectors. Metropolitan Adelaide is the source of most plastics. There is still substantial re-processing of plastics in SA.*

Item	Sector Origin (%)			Geographical Origin (%)		Re-processing Location (%)		
	MSW	C&I	C&D	Metro	Regional	SA	Interstate	Overseas
Polyethylene Terephthalate (PET)	66%	34%	0%	77%	23%	0%	78%	22%
High density Polyethylene (HDPE)	33%	67%	0%	87%	13%	73%	6%	21%
Polyvinyl Chloride (PVC)	0%	100%	0%	100%	0%	95%	0%	5%
Low density Polyethylene (LDPE)	0.4%	71.6%	28%	62%	38%	48%	0%	52%
Polypropylene (PP)	1%	99%	0%	82%	18%	91%	2%	7%
Polystyrene (PS)	0.4%	92.3%	7.3%	99%	1%	42%	0%	58%
Mixed &/or Other Plastics (MIX)	13%	54%	33%	97%	3%	66%	7%	27%
Total	22%	60%	18%	85%	15%	54%	18%	28%

3.6 Glass

Highlights:

- *In 2013-14 the total quantity of recovered Glass decreased by 8%, although this change is within the 'recent range of variability' seen since 2008-09.*
- *The majority of Glass was re-processed locally.*
- *The trend towards bulk export of locally made commodity products and foods (including wine), as well as more pre-packaged food imports, is reducing demand for glass packaging in Australia, which may reduce the viability of re-processing glass within Australia.*

The total quantity of recovered Glass reported for SA during 2013-14 was 56,000 tonnes (Table 3.11 overleaf). This is a decrease of 8% from 2012-13, but is still within the 'recent range of variability' seen since 2008-09 (Figure 3.16 overleaf). All of this recovered glass was packaging, including glass bottles and jars (see Section 5 for additional information on packaging).

In addition, 53,400 tonnes were imported to SA in 2013-14 for re-processing. Victoria was the major source (at 80%), with WA and Northern Territory also providing some of this waste glass material.

During 2013-14, most Glass (59%) was recovered from Municipal sources and the remainder was from C&I (41%) (Table 3.12 overleaf). The majority (76%) of Glass was from metropolitan sources (Table 3.12). Nearly all Glass was re-processed in SA (98 %), with the balance (2%) sent interstate (Table 3.12). No Glass was used for energy recovery in SA.

Between 2003-04 and 2008-09, there had been a strong upward trend for recovered Glass in SA (Figure 3.16). This trend, whilst still slightly upwards, now appears to have reached a steady band (or range of variability) within which it appears to fluctuate up and down from year to year.

The outlook for recovery of Glass is expected to remain steady:

- A significant part of the Glass recovery arises from glass bottles returned as part of SA's recycled deposit container (or CDL) scheme.
  - This source of glass is of high quality and highly prized by re-processors and glass bottle manufacturers as a source for recycled glass content.
- Local demand for glass packaging is very important to this market's stability, but this is being affected by two key factors:
  - There is a trend away from packaging in Australia for export, towards bulk export to and packaging in international markets instead. This is particularly strong in the wine industry, which is a major customer for glass packaging made in SA.
  - At the same time, more pre-packaged food is being imported instead of manufactured locally, which decreases demand for SA made glass packaging.

Table 3.11 Quantity of Glass recovered (tonnes) in SA during 2013-14, including estimated reporting error (tonnes & %).

Item	Net Recovery [1]	Reporting Error	
	tonnes	tonnes	%
Glass	**56,000**	**14,000**	25%

1. Net recovery excludes re-processing losses

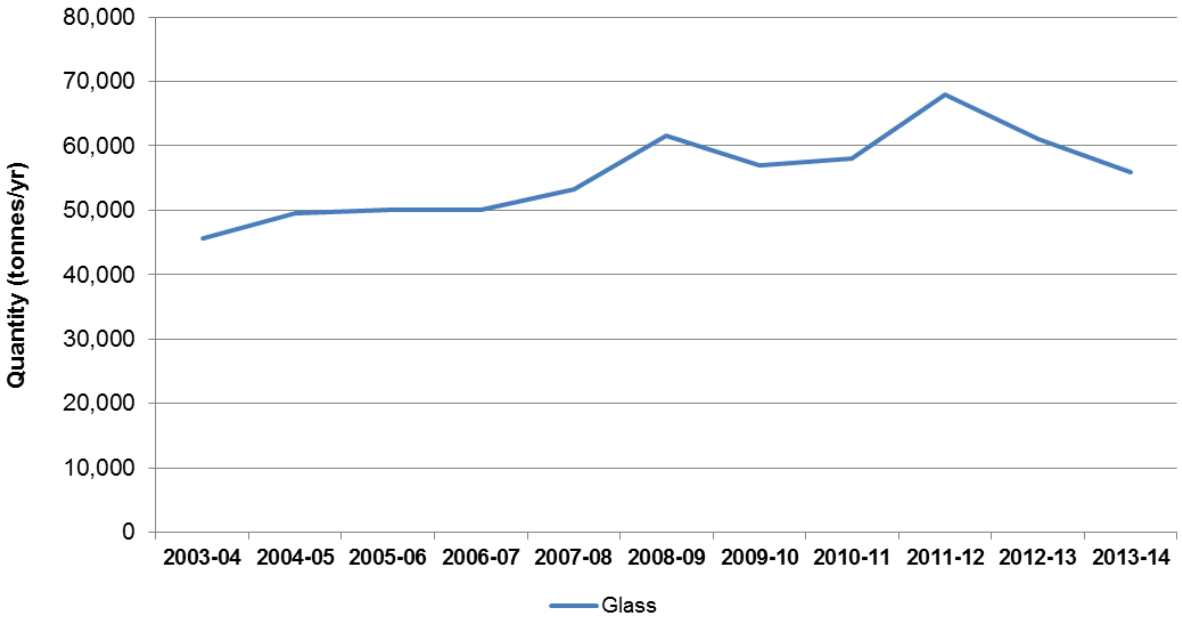

Figure 3.16 Changes in reported Glass quantities since 2003-04 – Glass. *Glass quantities dropped again in 2013-14, but are still within the recent range of variability seen since 2008-09.*

Table 3.12 Sector and geographical origins and re-processing locations for recovered Glass in SA in 2013-14. *All resource recovery occurs from Municipal and C&I sources, most of which is re-processed locally.*

Item	Sector Origin (%)			Geographical Origin (%)		Re-processing Location (%)		
	MSW	C&I	C&D	Metro	Regional	SA	Interstate	Overseas
Glass	59%	41%	0%	76%	24%	97%	3%	0%

3.7 Other Materials

Highlights:

- *In 2013-14 the overall quantity of recovered Other Materials declined, which was largely driven by a drop in Fly Ash and Foundry Waste.*
- *Recovery of Fly Ash is continuing its downward trend, reflecting less reliance in SA on coal-fired power generation.*
- *The reduction in Foundry Waste is following the decline in SA's manufacturing and industrial activity.*

The total quantity of recovered Other Materials reported for SA during 2013-14 was approximately 190,900 tonnes (Table 3.13 below), which is down by nearly 11% (almost 23,000 tonnes) from 2012-13. This decrease was principally driven by:

- A decrease in Foundry Waste by 26% (or 18,600 tonnes from 2012-13) (Figure 3.17 overleaf).
- A reduced quantity of recovered Fly Ash materials (down 5% or 6,000 tonnes from 2012-13) (Figure 3.18 overleaf).

Tyres & Other Rubber, however, reported an increase of 8% (or 1,600 tonnes) which continues its upward trend since 2006-07 (Figure 3.17). This upward trend has been driven by introduction of a landfill ban in SA (SA Government, 2010) and increasing investment by industry in resource recovery options for this waste material.

None of the waste material from this sector was used for energy production in SA, but 15,000-20,000 tonnes (predominantly tyres) is believed to be exported overseas for energy recovery.

During 2013-14, up to 48,000 tonnes of Other Materials were imported into SA for resource recovery. These waste materials were smelter or foundry waste by-products imported from overseas, Victoria and NSW.

Table 3.13 Quantity of Other Materials (tonnes) recovered in SA during 2013-14, including estimated reporting error (tonnes & %). Fly ash has decreased

Item	Net recovery [1]	Reporting Error	
	tonnes	tonnes	%
Fly ash	114,000	6,000	5%
Foundry Waste	51,600	900	2%
Leather & textiles	4,000	1,200	31%
Tyres & other rubber	21,300	4,800	23%
Total	**190,900**	8,900	5%

1. Net recovery excludes re-processing losses

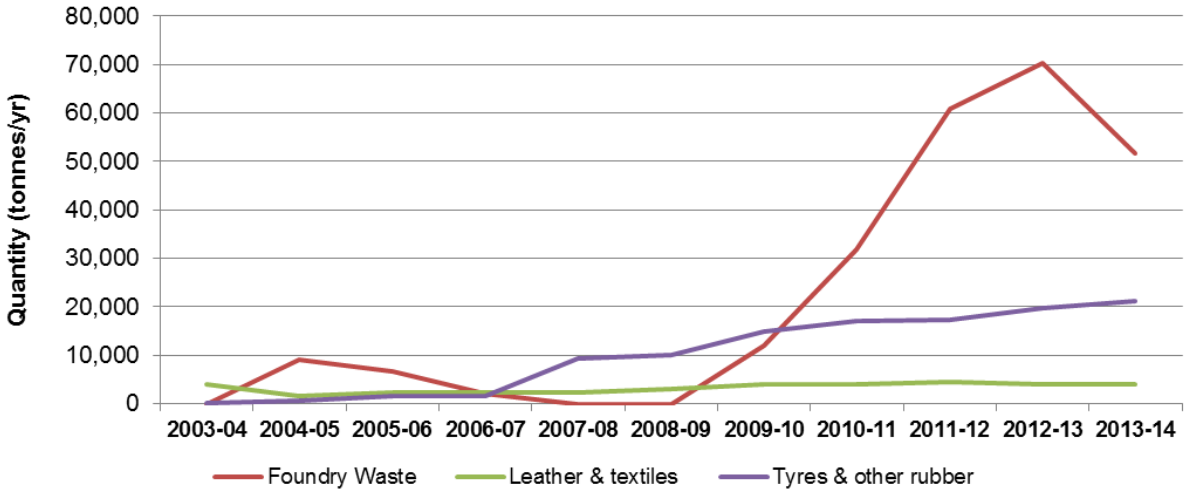

Figure 3.17 **Changes in reported Other Materials quantities since 2003-04 – Foundry Waste, Leather & Textiles, and Tyres & Other Rubber.** Foundry Waste dropped significantly, while Leather & Textiles and Tyres & Rubber increased.

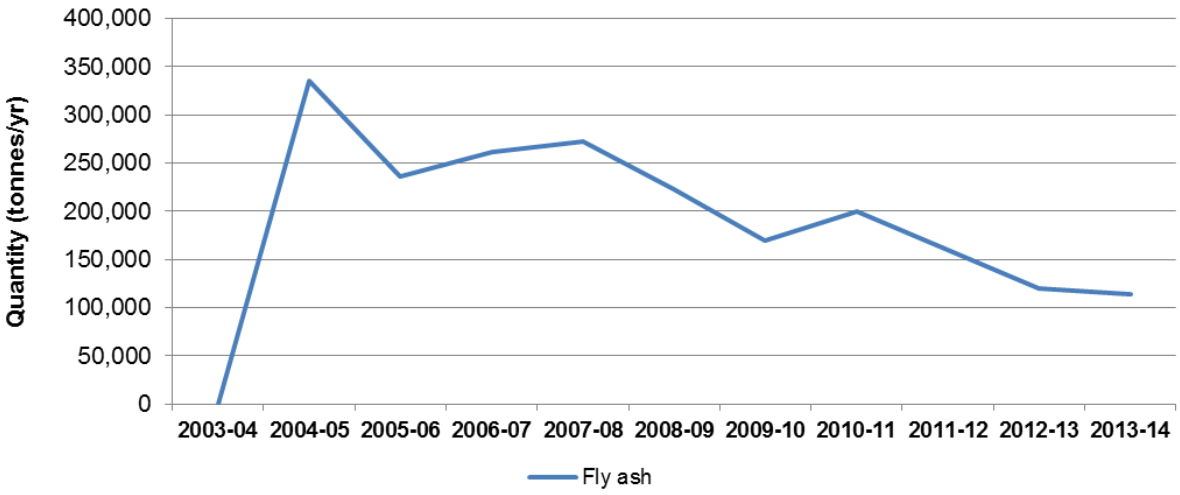

Figure 3.18 **Changes in reported Other Materials quantities since 2003-04 – Fly Ash.** *Fly Ash continued its downward trend.*

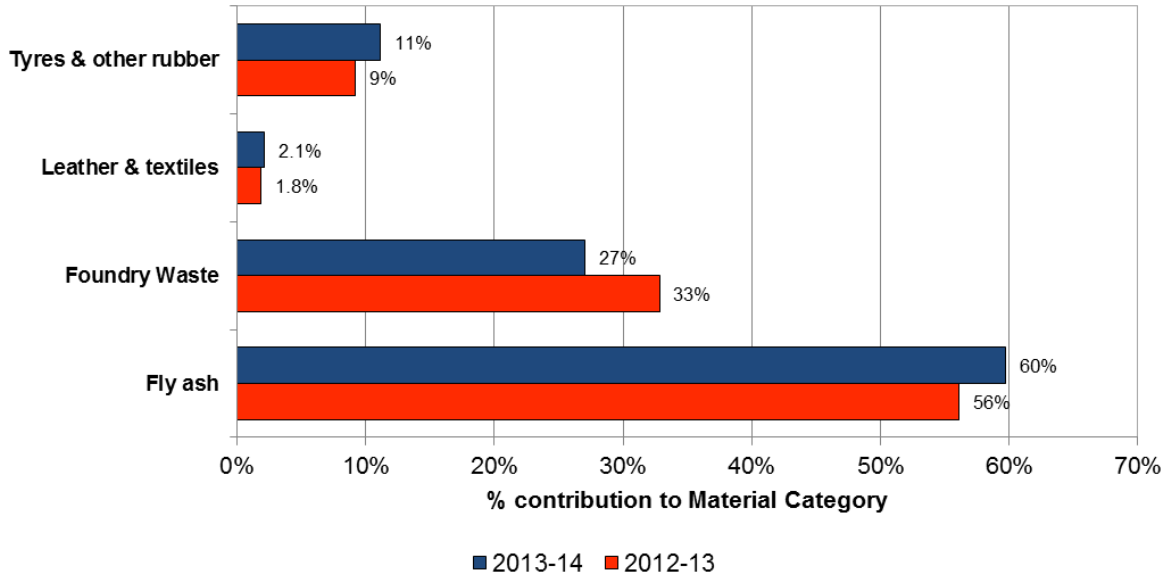

Figure 3.19 **Changes in percent composition of recovered Other Materials (by weight), SA, between 2012-13 and 2013-14.** *The relative contribution of Foundry Waste decreased during 2013-14.*

Fly Ash continued to constitute the majority (60%) of reported Other Materials recovery followed by Foundry Waste (27%) (Figure 3.19 above).

Nearly all (94%) of the Other Materials in 2012-13 were collected from C&I sources (Table 3.14 below).

The majority (91%) of the Other Materials were sourced from regional SA (Table 3.14), which was mostly Fly Ash from coal-fired power stations in Port Augusta, and significant quantities of Foundry Waste materials recovered from smelters in Whyalla and Port Pirie.

Table 3.14 **Sector and geographical origins and re-processing locations for recovered Other Materials in SA in 2013-14.** *Most Other Materials are produced by the C&I Sector and originate in regional SA. Nearly all materials were re-processed in SA, except for Tyres & Rubber.*

Item	Sector Origin (%)			Geographical Origin (%)		Re-processing Location (%)		
	MSW	C&I	C&D	Metro	Regional	SA	Interstate	Overseas
Fly Ash	0%	100%	0%	0%	100%	100%	0%	0%
Foundry Waste	0%	100%	0%	30%	70%	100%	0%	0%
Leather & Textiles	18%	82%	0%	91%	9%	0%	80%	20%
Tyres & Other Rubber	54%	46%	0%	82%	18%	0%	13%	87%
Total	**6%**	**94%**	**0%**	**19%**	**81%**	**87%**	**4%**	**10%**

All reported Fly Ash and Foundry Waste was re-processed in SA for cement production (Table 3.14 on previous page). Most of the Leather & Textiles were sent interstate (80%) for processing into cleaning cloths.

In 2013-14, nearly two thirds of Tyres & Rubber was pre-shredded in SA, which was a significant change from 2012-13 when nearly all of this material was sent interstate or overseas as whole tyres. None of this pre-shredded waste material, however, was further re-processed locally, with final destinations reported as interstate for material recovery (13%) as rubber mats or export overseas for energy recovery (87%).

The outlook for future resource recovery in the Other Materials sector is expected to be one of decline, which will be affected by on-going reductions in two key material categories:

- The recovery of Foundry Waste is expected to decrease in line with reduced manufacturing and industrial activity in SA in the lead up to the foreshadowed closure of car manufacturing in the next several years.
  - One major foundry operator has recently announced closure of its SA operations, with local production to be relocated to China.
- Fly Ash is expected to continue reducing in line with decreased use of coal-fired power generation in the State, until the expected and planned closure of the Port Augusta Power Station happens.
- As a consequence of the above, local manufacturers that have traditionally recycled these waste materials as part of their products are now importing substitute waste materials from interstate and/or overseas for this purpose.

4 Electronic & Electrical Waste

At a glance:

- *This section of the report assesses the newly emerging area of resource recovery for Electronic and Electrical waste (E-waste) in SA.*
- *In 2013-14 the total quantity of recovered E-waste continued to rise on the back of SA landfill bans and the new End-Of-Life (EOL) TV/Computer National Product Stewardship scheme.*
- *Computers and Televisions / Monitors experienced significant increases in volumes.*
- *Municipal (or household) sources dominated E-waste recovery.*

The total quantity of recovered E-waste reported for SA during 2013-14 was approximately 7,600 tonnes (Table 4.1 below), which is up by 52% from 2012-13 (5,520 tonnes). The major contributor to this rise was the End-Of-Life (EOL) National TV/Computer Recycling (or Product Stewardship) Scheme (NTCRS), which is supported by recently introduced landfill bans on E-Waste in SA. A large proportion of this increase in recovery was comprised of Televisions (up by 1,150 tonnes or 32%) and Computers (up 44% or by 1,610 tonnes). Increases in recovery were also reported across a number of other E-waste streams:

- Other E-waste up 233% (or 350 tonnes);
- Batteries up 789% (or by 17.7 tonnes); and
- Mobile Phones up 20% (or by 1 tonne).

However, Compact Fluorescent Lamps fell (down 34% or 24 tonnes) and Printer Cartridges also decreased (down 8% or 20 tonnes).

Table 4.1 Changes in reported quantities of E-waste between 2012-13 and 2013-14.
TVs/Monitors and Computers were major contributors to E-waste recovery in SA.

Item	2013-14	2012-13	% change 12-13 to 13-14
Printer Cartridges	230	250	-8%
Compact Fluorescent Lamps	50	76	-34%
Batteries	20.0	2.3	789%
Computers	2,000	1,390	44%
Televisions / Monitors	4,800	3,650	32%
Mobile Phones	6	5	20%
Other E-waste	500	150	233%
Total	**7,610[2]**	**5,520**	**52%**

1. Net recovery excludes re-processing losses
2. This value has a reporting error of 820 tonnes (+/-11%).

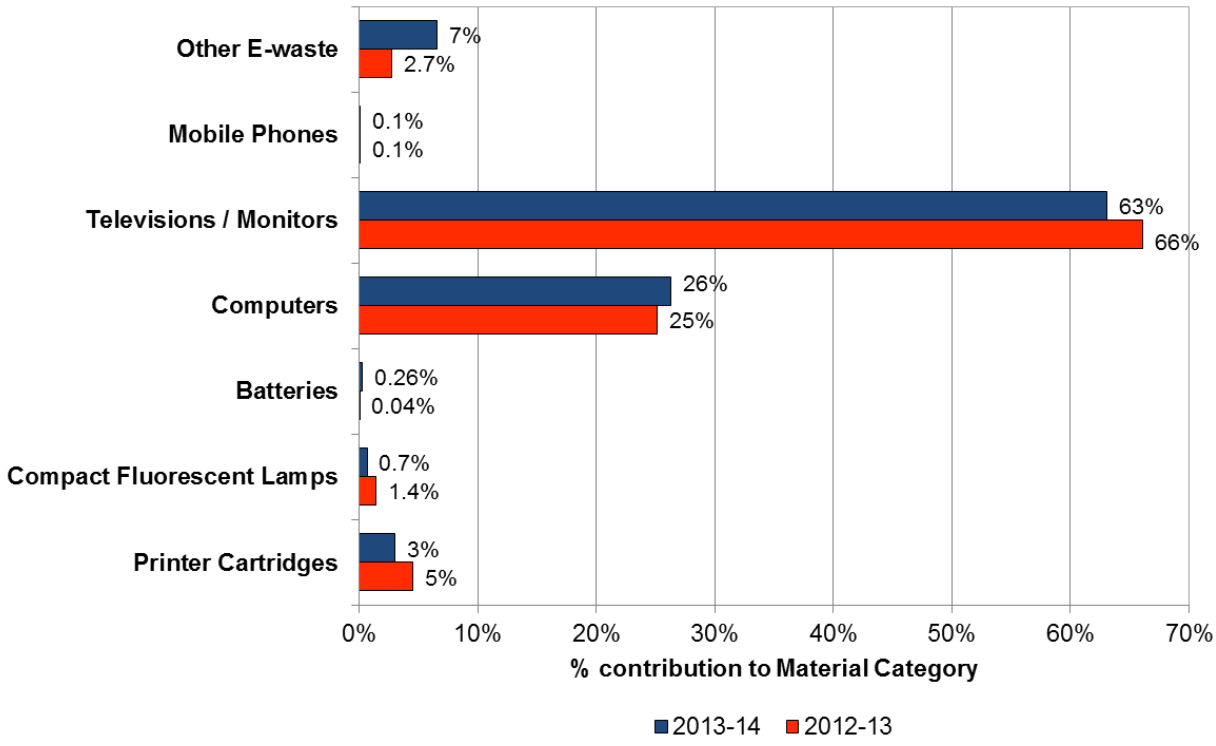

Figure 4.1 **Changes in percent composition of recovered E-waste (by weight), SA, between 2012-13 and 2013-14.** *TVs/Monitors and Computers are the major contributors to E-waste in SA.*

In 2013-14, the major E-waste constituents by weight were Televisions & Monitors (63%) and Computers (26%) (Figure 4.1 above). Other E-Waste's contribution rose to 7% (from 2.7% in 2012-13).

Most E-waste (83%) during 2013-14 was sourced from Municipal sources, which was a significant change in reporting from 2012-13 (when it was 53%). As a consequence, the C&I contribution reduced to 17% (from 47% in 2012-13).

This year the regional contribution decreased to 16% (from 40% in 2012-13). This lower value is more in line with SA's population split between metropolitan and regional areas (Table 4.2 two pages over). The regional contribution in 2012-13 was higher as these were the first locations in SA for Australia's free-to-air television broadcasting digital switchover, which would have generated significant volumes of e-waste.

The destination for 83% of E-waste materials was reported as SA (Table 4.2). This does not necessarily involve re-processing of the materials as it mainly reflects the location where the E-waste is dissembled or separated into its metal, plastic and other material constituents, which are disposed

to local aggregators/merchants. These local aggregators/merchants then determine where the constituent materials will be re-processed. It was not possible to accurately discern the ultimate re-processing destination for all of these materials.

Table 4.2 **Sector and geographical origins and re-processing locations for recovered E-waste in SA in 2013-14.** *MSW has become the dominant source sector, the majority of the E-Waste was recovered from metropolitan areas, and most E-waste waste was initially re-processed in SA.*

Item	Sector Origin (%)			Geographical Origin (%)		Re-processing Location (%)		
	MSW	C&I	C&D	Metro	Regional	SA	Interstate	Overseas
Total E-waste	83%	17%	0%	84%	16%	83%	17%	0%

The recovery of E-waste is anticipated to further increase in 2014-15 as additional computers and televisions are recovered through the new End-Of-Life (EOL) National TV/Computer Recycling Scheme.

Under this scheme, industry is responsible for recycling EOL TV/Computer E-waste up to a recycling target set according to co-regulatory arrangements established with the Australian Government (Australian Department of Environment, 2014). In 2013-14, this recycling target for industry was 33% (which will rise to 35% in 2014-15 and to 80% by 2021-22). State, territory and/or local governments are responsible for the remainder of the waste (e.g. 67% in 2013-14).

Presently, there is no requirement for how governments should deal with the remainder of the EOL TV/Computer E-waste (not handled by industry under the scheme) and it may be dealt with as deemed appropriate in each jurisdiction. For SA, a landfill ban has been implemented on E-Waste. Consequently, there needs to be alternative disposal options made available to the community for EOL TV/Computer E-waste disposal falling outside the industry recycling target, otherwise there could be risks of incorrect or inappropriate disposal taking place. An ongoing challenge for future E-waste recovery is therefore to ensure that these alternative options exist and that the general public is educated about these options and is encouraged to use them.

5 Packaging Materials

At a glance:

- *This report section specifically assesses resource recovery of packaging waste materials in SA, including for SA's Container Deposit scheme.*
- *2013-14 saw a slight decrease in the recovery of packaging materials in SA.*
- *The major contributors to this decline were reductions in steel cans, cardboard, HDPE, LDPE and glass packaging.*
- *SA's Container Deposit scheme continues to make a substantial contribution to the recovery of packaging*

5.1 Total Packaging

Total packaging recovery was estimated at 239,995 tonnes, of which 45,000 tonnes (18.8%) was recovered through SA's container deposit scheme, and 194,995 tonnes (83%) was recovered from other sources (Table 5.1 overleaf).

This outcome is a decrease from 2012-13's reported packaging recovery (down by 5.4% or 13,800 tonnes. A number of packaging material streams recorded reductions from 2012-13 to 2012-14:

- Cardboard decreased by 5.3% (or 9,000 tonnes);
- Glass bottles & Jars reduced by 8.2% (or 5,000 tonnes);
- LDPE was down by 21% (or 900 tonnes);
- Liquid paperboard decreased by 18% (or 600 tonnes);
- Steel cans decreased by nearly 14% (or 220 tonnes).

The only packaging materials to experience increases were: HDPE (up 326% or 590 tonnes), Other Plastics Packaging (up 28% or 1,200 tonnes) and Polystyrene (up 215% or 80 tonnes).

The quantities of other packaging materials generally remained steady.

These packaging quantities are a subset of the individual material data presented in Section 3. Packaging materials therefore constitute an important proportion of the total amount of recycling activity reported in SA for some of these individual materials. For example in 2013-14:

- Glass packaging was 100% of total glass recycling activity reported;
- PET packaging was 97% of total PET recycling activity;
- LDPE packaging was 100% of all recovered LDPE;
- Cardboard packaging was 90% of the total amount of cardboard recycling activity; and
- Liquid Paperboard packaging was 90% of total Liquid Paperboard recycling activity.

Table 5.1 **Estimated packaging recovery, SA 2013-14.** *Cardboard and glass are dominant contributors to packaging recovery. Packaging constitutes significant proportions of resource recovery for some materials.*

Packaging Material	Origin (tonnes)		Total packaging (tonnes)	Packaging as a proportion of total material recovered
	CDL [1]	Other		
Steel Cans		1,380	1,380	<1%
Aluminium Cans	3,800	30	3,830	27%
Cardboard Packaging		162,000	162,000	90%
Liquid Paperboard Cartons	700	2,100	2,800	90%
PET Packaging	3,800	270	4,070	97%
HDPE Packaging	200	650	850	27%
PVC Packaging		15	15	5%
LDPE Packaging		3,400	3,400	100%
Polypropylene Packaging		0	0	0%
Polystyrene Packaging		150	150	37%
Other Plastics Packaging		5,500	5,500	61%
Glass bottles & Jars	36,500	19,500	56,000	100%
Total	**45,000**	**194,995**	**239,995**	

1. Data provided by the South Australian Environmental Protection Authority.

5.2 Container Deposits

SA is one of two Australian states or territories to currently have a container deposit system for return of recyclable bottles and cans.

In 2013-14, glass containers represented 81% (by weight) of returned recycled deposit containers in SA (see Figure 5.1). The average return rate for container deposits was 84% (by weight) from approximately 712 million containers (estimated as used in SA during 2013-14). This return rate is essentially the same as reported in 2012-13 (84% from 719 million containers used).

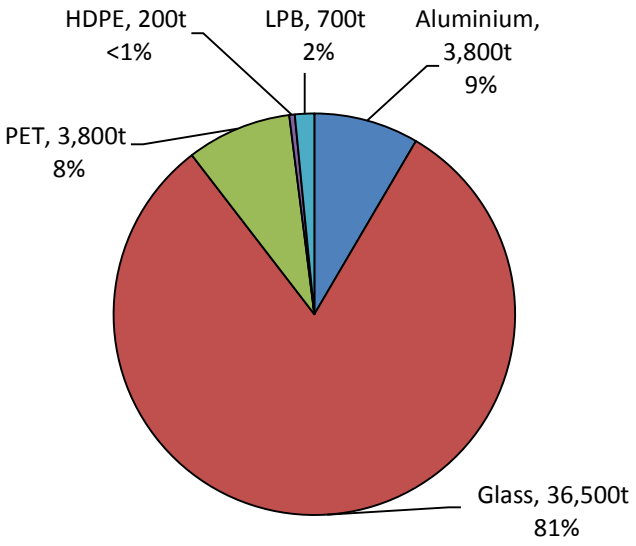

Figure 5.1 **Relative proportions of returned recycled deposit containers (by weight), SA 2013-14.** *Glass is the major contributor by weight.*

Table 5.2 **Return rates for recycled deposit containers, SA 2013-14.** *SA achieves high return rates of recycled deposit containers.*

Material	Recovered (tonnes)	Return rate (%)
Aluminium	3,800	84%
Glass	36,500	86%
PET	3,800	71%
HDPE	200	56%
LPB	700	62%
Total	**45,000**	**84%**

5.3 Other Packaging Materials

Other packaging material is collected through routes such as kerbside recycling and commercial collections.

Cardboard (83%) and Glass (10%) materials were the dominant contributors to resource recovery of other packaging materials, but plastic packaging materials, which includes film wrap-type packaging, also make an important contribution (at *ca.* 14,000 tonnes or 9% for all types).

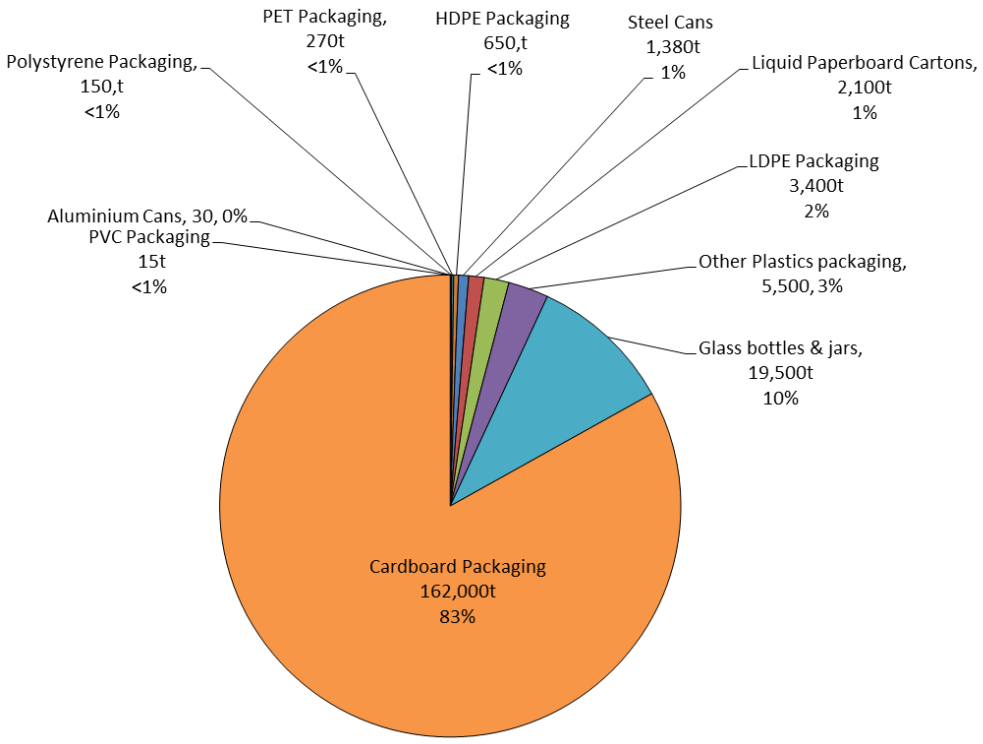

Figure 5.2 **Relative proportions of recovered other packaging materials by weight, SA 2013-14.** *Cardboard, Glass and Plastic materials are the major contributors to recovery for other packaging materials.*

6 Resource Recovery Value

At a glance:

- *This section quantifies the resource value of recovered materials reported in 2013-14.*
- *The resource value of recovered materials in 2013-14 was estimated at $270 million.*
- *Metals were the major contributor to this value comprising 52% or $141 million.*
- *The average resource value for recovered materials was $75 per tonne.*

Based on the quantities reported during this year's Recycling Activity survey, the estimated value of resource recovery for SA during 2013-14 was $270 million, or $75 for each tonne of resource recovered on average (Table 6.1 overleaf).

The major contributor to this resource recovery valuation (at 52%) was Metals (Figure 6.2 overleaf). The next most significant contributors to resource recovery value were Cardboard & Paper (at 20%) and Organics (at 13%).

It is important to recognise that the value of waste materials recovered for recycling can vary significantly from year to year and between jurisdictions depending on a range of factors. These factors can include:

- The type of waste material and industrial product for which it can be recycled or reused;
- The commodity market prices for virgin material that they replace;
- Whether the material will be re-processed locally or exported overseas;
- The quality of this material, including the extent of source separation and/or pre-processing which might have already occurred;
- Regulatory environment; and
- Local waste management and resource recovery practices.

Price and/or value assumptions are therefore usually based on highly aggregated average prices to take into account all of these factors. The resource value estimate presented in this report is therefore an approximation only.

Table 6.1 Assumed market values, quantities and estimated resource value for resource recovered material, 2013-14 [(a)].

Material category	Resource recovery (tonnes)	Estimated on-sale price[(a)] ($/tonne)	Estimated Resource Value ($ millions)	Price data source[(a)]:
Masonry	972,000	$15	$14.6	WME (2011)
Metals	352,000	$400	$140.8	WME (2011)
Organics	997,000	$35	$34.9	WME (2011)
Cardboard & Paper	240,100	$225	$54.0	WME (2011)
Plastics	22,500	$280	$6.3	WME (2014)
Glass	56,000	$90	$5.0	Authors' estimate
Other Materials	76,900	$10	$0.8	Authors' estimate
Separately Reported Materials & Clean Fill	874,000	$15	$13.1	Authors' estimate
TOTAL ALL Materials	3,590,000	$75	$269.5	

Notes:

(a) Refer to Survey Methodology in Appendix 1 for additional information on resource recovery value assumptions and methodology.

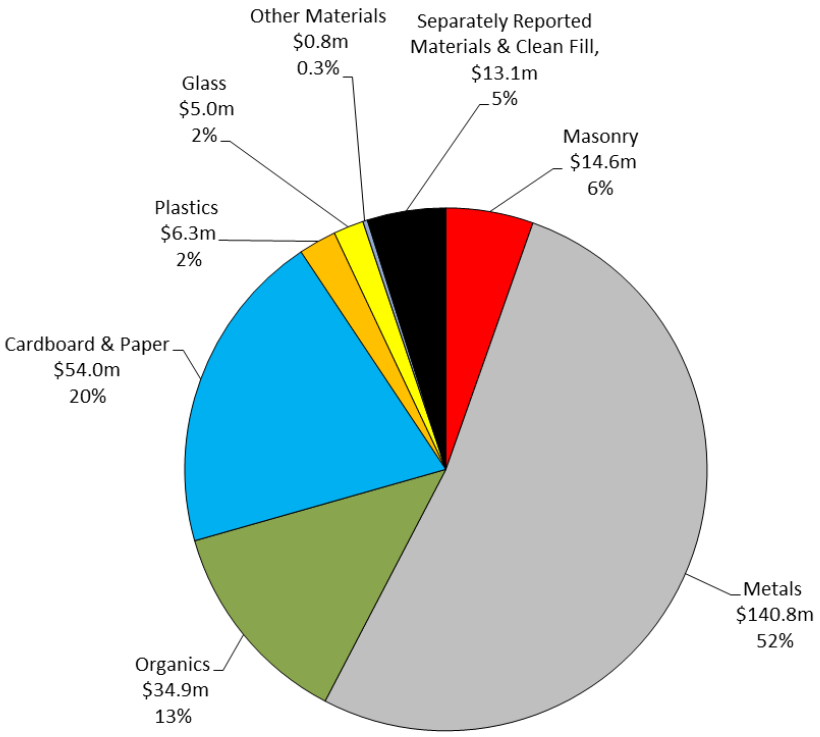

Figure 6.2 Estimated market value of resource recovered materials in SA from the 2013-14 Recycling Activity Survey

7 Environmental Benefits of Recycling

At a glance:

- *This section quantifies the following environmental benefits of recycling based on the material data collected for the 2013-14 recycling activity survey using the conversion and emission factors given in Appendix 4.*
- *The environmental benefits have been calculated for each material except E-waste and reuse items.*
- *The resource recovery in this year's recycling activity survey was projected to achieve the following environmental benefits from recycling of these materials.*
  - ***Greenhouse Gas Savings** – 1.12 million tonnes of CO2-e*
  - ***Cumulative Energy Demand saved** – 14,650 TeraJoules (TJ)*
  - ***Water Savings** – 12,310 Megalitres (ML)*

7.1 Greenhouse gas savings (or avoided emissions)

Recycling reduces Greenhouse Gas (GHG) emissions primarily by:

- Decreasing the amount of energy, particularly fossil fuels, used by industry to make products compared with using virgin raw materials.
- Reduced emissions of greenhouse gases achieved from diverting recovered materials from landfills which biologically decompose in landfills and generate methane.

The total estimated greenhouse gas savings from recycling in SA during 2013-14 is about 1.12 million tonnes of CO_2-e (Tables 7.1 and 7.2 and Figure 7.1 on following pages).

- This is a decrease of about 5% on the value reported for 2012-13.
- This decrease was principally driven by a fall in material recovery for metals
  - Greenhouse gas savings per unit tonne delivered by recycling metals far outstrip savings made by other materials because 'virgin' metals are energy intensive to manufacture.
- Metals (at 40%), however, still generated the substantive part of the estimated greenhouse gas savings, followed by Organics (at 33%), Masonry (8%) and Cardboard & paper (7%).
- These greenhouse gas savings are considered approximately equivalent to:
  - About 1.7 million trees that would have to be planted to absorb the same amount of CO_2.
  - The greenhouse gas emissions that 256,900 cars would produce in a single year[8].
- The greenhouse gas savings from SA recycling, 2013-14 equate to:
  - Approximately 16% of SA's total Community sector GHG emissions in 2011[9].

[8] Average car GHG emissions value ≈ 4.25 tonnes CO_2-e/yr; Source: SA 2008-09 Recycling Activity report (Zero Waste SA, 2010)

[9] The Community sector includes GHG emissions associated with residential stationary energy use and passenger vehicle use; Source: Report on the operation on the 'Climate Change and Greenhouse Gas Emissions Reduction Act' 2007 (SA DEWNR 2011).

Table 7.1 Estimated environmental benefits as a result of recycling in SA, 2013-14[(a)]

	Material	Material Quantity tonnes	GHG Emissions Saved[(a)] tonnes CO2-e	Energy Saved[(a)] TJ LHV	Water Saved[(a)] ML
	Masonry				
1	Asphalt	148,000	2,400	300	130
2	Bricks	63,000	600	10	80
3	Concrete	760,000	22,000	420	970
4	Plasterboard	1,000	47	230	-30
5, 6	Clay, fines, rubble & soil	760,000	65,700	510	330
	Metals				
7	Steel	320,000	196,800	2,540	-760
8	Aluminium	14,000	206,800	2,400	2,540
9	Non-ferrous metals	18,000	61,100	650	110
	Organics				
10	Food Organics	7,000	3,600	10	5
11	Garden Organics	260,000	59,900	120	120
12	Timber	180,000	59,100	240	100
13, 14, 15, 16	Organics - Other	550,000	264,600	1,190	130
	Cardboard & paper				
17	Cardboard & waxed cardboard	180,000	54,800	2,260	5,950
18	Liquid Paperboard	3,100	2,000	30	50
19, 20, 21	Magazines & Newspaper	33,000	15,300	300	730
22	Printing & Writing Paper	24,000	13,900	310	750
	Plastics				
23	Polyethylene terephthalate	4,200	4,300	210	-90
24	High density polyethylene	3,200	2,200	180	-10
25	Polyvinyl chloride	300	500	10	20
26	Low density polyethylene	3,400	2,400	190	-10
27	Polypropylene	2,000	3,300	120	-30
28	Polystyrene	410	600	20	-10
29	Mixed &/or Other plastics	9,000	12,300	550	-160
	Glass				
30	Glass	56,000	33,400	360	140
	Other Materials				
39	Fly Ash	114,000	3,300	60	140
40	Foundry Waste	51,600			
41	Leather & Textiles	4,000			
42	Tyres & Other Rubber	21,300	25,200	1,430	1,120
	Total	**3,590,000**	**1,116,100**	**14,650**	**12,315**

Notes:

(a) Refer to Survey Methodology in Appendix 1 for additional information on environmental benefits analysis assumptions and methodology.

Table 7.2 Estimated greenhouse gas savings as a result of recycling in SA, 2013-14[(a)]

Sector Origin	GHG Emissions Saved[(a)] tonnes CO2-e	Equivalent trees planted required for carbon absorption[(a)]	Equivalent cars off the road (1 year) [(a)]
Masonry	90,700	136,000	20,900
Metals	464,700	695,000	106,900
Organics	387,200	579,000	89,100
Cardboard & paper	86,000	129,000	19,800
Plastics	25,600	38,000	5,900
Glass	33,400	50,000	7,700
Other Material	28,500	43,000	6,600
Total	1,116,000	1,670,000	256,900

Notes:

(a) Refer to Survey Methodology in Appendix 1 for additional information on environmental benefits analysis assumptions and methodology.

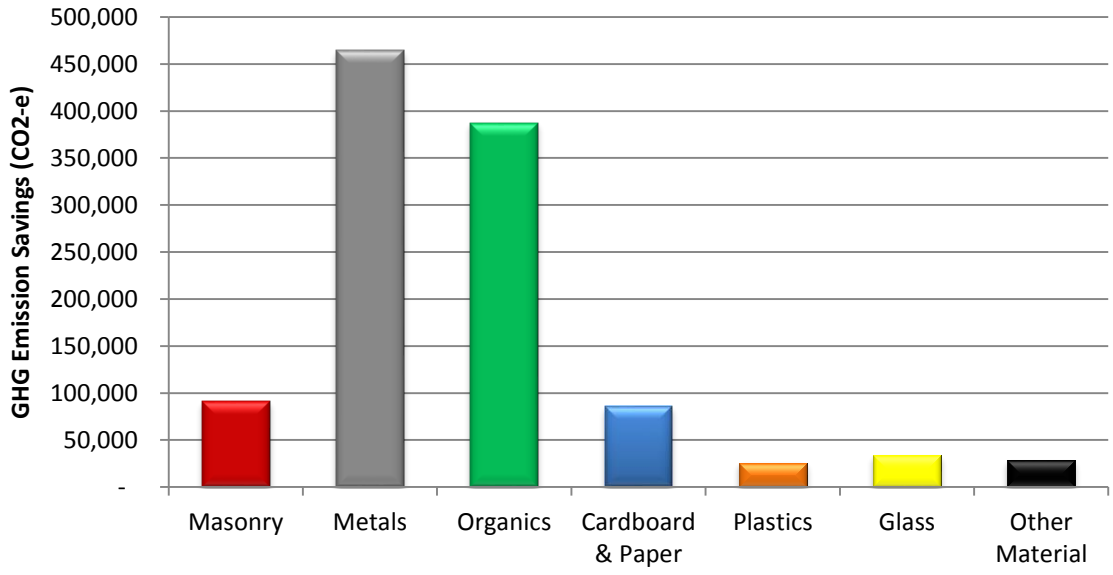

Figure 7.1 Avoided greenhouse gas emissions (by material category), as a result of recycling in SA 2013-14

7.2 Energy savings

The total projected energy savings (in Terajoules or TJ[10]) from recycling in SA during 2013-14 was about 14,650 TJ (Table 7.1 above and Table 7.3 below & Figure 7.2 overleaf).

- Metals contribute 38% of projected energy savings, even though it represents only 10% of material being recovered in SA. This is because less energy is required to recover metals than to manufacture it from raw materials.
- Similarly, plastics contribute to nearly 8% of energy savings even though it is only 0.6% of total resource recovery.
- After Metals, Cardboard & Paper (at 20%) is the next most significant contributor to energy savings.
- These energy savings are considered approximately equivalent to:
  - Energy use by 285,100 average households in one year[11].
  - The energy supplied by 2.6 million barrels of oil.
- The energy savings from SA's recycling activity during 2013-14 equate to:
  - Approximately 4.4% of SA's total energy consumption reported for 2013-14[12].

Table 7.3 Estimated energy savings as a result of recycling in SA, 2013-14(a)

Sector Origin	Energy Saved TJ LHV	Equivalent households (1 year) (a)	Barrel of Oil Equivalents (BOE) (a)
Masonry	1,470	28,600	258,000
Metals	5,590	108,800	981,000
Organics	1,560	30,400	274,000
Cardboard & paper	2,900	56,400	509,000
Plastics	1,280	24,900	225,000
Glass	360	7,000	63,000
Other Material	1,490	29,000	261,000
Total	14,650	285,100	2,571,000

Notes:

(a) Refer to Survey Methodology in Appendix 1 for additional information on environmental benefits analysis assumptions and methodology.

[10] 1 Terajoule or TJ = 10^{12} Joules (J) = 1,000 Gigajoules (GJ)

[11] Average household energy use value ≈ 51.4 GJ/yr; Source: National Appliance and Equipment Energy Efficiency Committee (1998)

[12] Source: 2014 Australian Energy Update (Australian Government Bureau of Resources and Energy Economics, 2014).

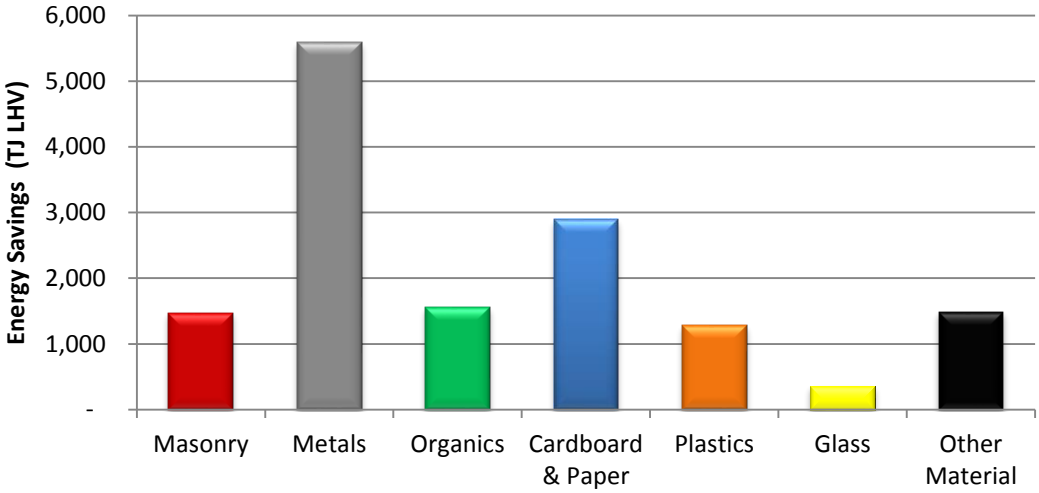

Figure 7.2 Avoided energy consumption (by material category) as a result of recycling in SA, 2013-14

7.3 Water savings

The total projected water savings (in Megalitres or ML[13]) from recycling in SA during 2013-14 was approximately 12,315 ML (Table 7.1 and Table 7.4 and Figure 7.3 overleaf).

- Cardboard & Paper contributes most significantly (at 61%) to water savings achieved from recycling (see Figure 7.3 overleaf) as manufacture of virgin cardboard and paper materials consumes large volumes of water.
- Metals are also a significant contributor at 15%. These water savings principally result from recycling of aluminium which consumes substantial quantities of water in its manufacturing process.
- Recycling of some plastics actually consume more water than they save.
- The overall water savings for SA's recycling activity during 2013-14 are considered approximately equivalent to:
  - Water use by about 64,790 average Adelaide households in one year[14].
  - The water contained in about 4,920 Olympic-sized swimming pools[15].
- The water savings from SA's recycling activity in 2013-14 equate to:
  - Nearly 9% of Metropolitan Adelaide's total water consumption reported for 2013-14[16].

[13] 1 Megalitre or ML = 10^6 Litres (J) = 1,000 kilolitres (kL)

[14] Average household water consumption value ≈ 190 kL/yr; Source: SA Government (2009)

[15] Olympic-sized pool value ≈ 2,500 kL/yr

[16] Source: South Australian Water Corporation Annual Report: For the year ending 30 June 2014 (SA Water (2014).

Table 7.4 Estimated water savings as a result of recycling in SA, 2013-14[(a)]

Sector Origin	Water saved ML	Equivalent households (1 year) [(a)]	Olympic Swimming Pools[(a)]
Masonry	1,480	7,790	590
Metals	1,890	9,950	760
Organics	350	1,840	140
Cardboard & paper	7,480	39,370	2,990
Plastics	-290	-1,530	-120
Glass	140	740	60
Other Material	1,260	6,630	500
Total	12,310	64,790	4,920

Notes:

(a) Refer to Survey Methodology in Appendix 1 for additional information on environmental benefits analysis assumptions and methodology.

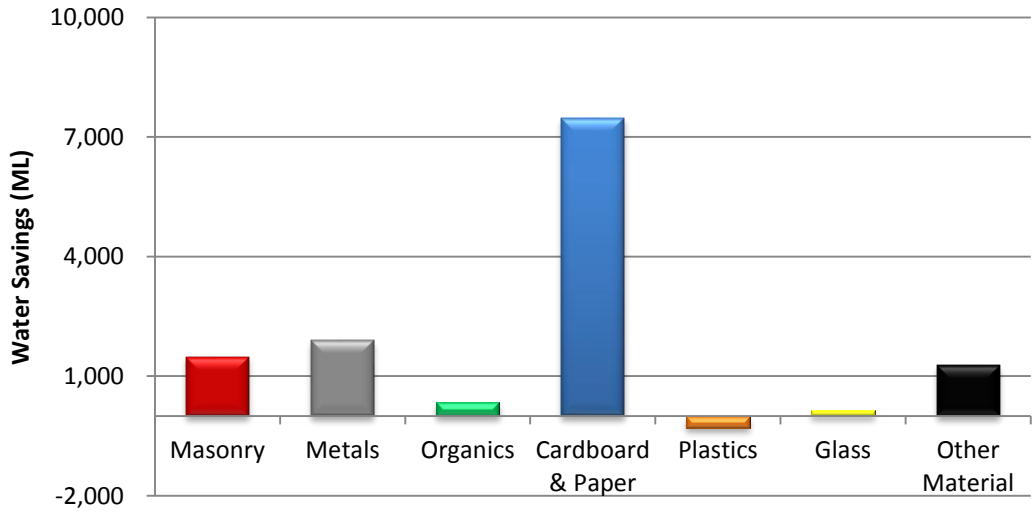

Figure 7.3 Avoided water consumption (by material category) as a result of recycling in SA, 2013-14

8 Acknowledgements

Zero Waste SA and Rawtec would like to recognise and thank the following participants in the 2013-14 SA Recycling Activity Survey. The list below does not indicate all organisations who participated in the survey but those that agreed to be recognised.

- *A&V Contractors*
- *Advanced Recycling Technologies*
- *Accolade Wines*
- *Adelaide Brighton Cement*
- *Adelaide City Council Greenwaste Recycling Facility*
- *Adelaide Granulation Industries*
- *Adelaide Hills Recycling*
- *Adelaide Hills Region Waste Management Authority*
- *Adelaide Pallet Recycling*
- *Alinta Energy – Flinders Power Partnership*
- *Aspitech*
- *Bin-It Waste Transport & Recycling*
- *Bio Gro*
- *Boral Resources (SA)*
- *Close the Loop*
- *CMA Ecocycle*
- *Coolfoam*
- *Department of Education and Child Development, Computer Recycling Scheme*
- *Department of Planning, Transport and Infrastructure*
- *DHL Supply Chain(Australia)*
- *Downer Group*
- *E-Cycle Recovery*
- *Exide Batteries*
- *Foamex*
- *Foodbank SA*
- *Green Triangle Recyclers*
- *Intercast & Forge*
- *J.A Braun Investments*
- *Jeffries*
- *Kuchel Contractors*
- *Master Butchers Co-operative*
- *MobileMuster*
- *MRI (Aust)*
- *Naracoorte Recyclables*
- Natures Fertilizer
- *Normetals*
- *Norske Skog Paper Mills (Australia)*
- *Nyrstar*
- *O-I Asia Pacific*
- *Old Red Brick Co*
- *Orora Recycling*
- *Peats Soil & Garden Supplies*
- *Phillip Charles Giles*
- *Plastics Granulating Services*
- *Plastic Recyclers International*
- *Potters Industries*
- *Recall*
- *ResourceCo*
- *RMAX*
- *Salvo Stores (Salvation Army)*
- *SA Composters*
- *SA Drum Recyclers*
- *SA Water*
- *SITA Australia*
- *SITA ResourceCo*
- *Solo Resource Recovery*
- *Southern Region Waste Resource Authority*
- *St Vincent de Paul Society (SA)*
- *Statewide Recycling*
- *Tarac Technologies*
- *The Corporation of the City of Whyalla*
- *Thomas Foods International*
- *Toxfree Solutions*
- *Transpacific Cleanaway*
- *YCA Recycling*

9 Glossary[17]

Alternative fuel	A fuel usually derived from renewable sources, used as an alternative to fossil fuels.
Bio-solids	Waste organic solids derived from biological wastewater treatment plants.
Clean fill (also known as Waste Fill)	Reported in the survey as Clay, Fines, Rubble & Soil. Waste fill is defined in the Environment Protection (Fees and Levy) Regulations 1994 as: waste consisting of clay, concrete, rock, sand, soil or other inert mineralogical matter in pieces not exceeding 100 millimetres in length and containing chemical substances in concentrations (calculated in a manner determined by the Authority) less than the concentrations for those substances set out in Schedule 6 [of the Regulations], but does not include waste consisting of or containing asbestos or bitumen.
Container deposit	Sometimes referred to as container deposit legislation or CDL. A refundable charge imposed on a range of recyclable beverage containers. The deposit is included in the retail price and refunded when the container is returned to a collection point.
Commercial and Industrial waste (C&I)	Comprises solid waste generated by the business sector as well as solid wastes created by state and federal government entities, schools and tertiary institutions. Unless otherwise noted, C&I waste does not include waste from the Construction and Demolition (C&D) sector.
Construction and Demolition waste (C&D)	Includes waste from residential, civil and commercial Construction and Demolition activities, such as fill material (e.g. soil), asphalt, bricks and timber. C&D waste excludes construction waste from owner/occupier renovations, which are included in the municipal waste stream. Unless otherwise noted, C&D waste does not include waste from the commercial and industrial waste stream.
E-waste	End-of-life electrical and electronic equipment, including computers, televisions, monitors, household electrical appliances, batteries (but not automotive), etc.
Ferrous metals	Metals with iron as the major constituent.
Fly ash	Inorganic residue of coal combustion in power stations.
Food organics	Organic waste derived from food preparation and/or surplus food.
Garden organics	Organics derived from garden sources e.g. grass clippings, tree prunings.
Greenhouse gasses (GHGs)	For the purposes of this report GHGs are the six gases listed in the Kyoto Protocol: carbon dioxide (CO2), methane (CH4), nitrous oxide (NO), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF6).
High density polyethylene (HDPE)	A member of the polyethylene family of plastics and is used to make products such as milk bottles, pipes and shopping bags. HDPE may be coloured or opaque.
Industry organics	Organic materials recovered as a waste by-product of industrial processing of organically materials, e.g. Wine, meat, dairy, etc.
Kerbside collection	Collection of household waste, recyclable materials (separated or co-mingled), and organic waste that are left at the kerbside for collection by local council collection services.
Liquid paperboard	Liquid paperboard is made from cardboard or paperboard with a liquid-proof wax, plastic or foil coating on one or both sides. It is commonly used for packaging of liquid materials, such as milk, fruit juice, cream and/or detergents or providing water resistance to other types of packaging.
Low density polyethylene (LDPE)	A member of the polyolefin family of plastics. It is a flexible material and usually used as film for packaging or as bags.
Municipal waste	Solid waste generated from domestic (household) premises and council activities such as street sweeping, litter and street tree lopping. May also includes waste dropped off at recycling centres, transfer stations and construction waste from owner/occupier renovations.
National Waste Reporting Guidelines	National Guidelines for compiling waste and recycling data (the "National Waste Reporting Guidelines") (DSEWPC 2012a).
Non-ferrous metals	Those metals that contain very little or no iron, e.g. copper, brass, bronze, lead, etc.
Packaging	Material used for the containment, protection, marketing or handling of product.
Polyethylene terephthalate (PET)	A clear, tough, light and shatterproof type of plastic, used to make products such as soft drink bottles, film packaging and fabrics.
Polypropylene (PP)	A member of the polyolefin family of plastics. PP is light, rigid and glossy and is used to make products such as washing machine agitators, clear film.
Polystyrene (PS)	A member of the styrene family of plastics. PS is easy to mould and is used to make refrigerator and washing machine components. It can be foamed to make single use packaging, such as cups, meat and produce trays.

[17] A number of the definitions in this Glossary were re-produced from the SA 2008-09 Recycling Activity survey (Zero Waste SA, 2010)

Polyvinyl chloride (PVC)	A member of the vinyl family of plastics. PVC can be clear, flexible or rigid and is used to make products such as fruit juice bottles, credit cards, pipes and hoses.
Post-consumer material	Material generated by households or by commercial, industrial and institutional facilities in their role as end-users of the product which can no longer be used for its intended purpose. This includes returns of material from the distribution chain.
Pre-consumer material	Material diverted from the waste stream during a manufacturing processes for re-processing at a different site. Excluded are waste materials that are reclaimed and reutilised within the same manufacturing processes that generated it as a matter of course to the efficient operation of the site (i.e. process scrap).
Recovered material	Material that would have otherwise been disposed of as waste, but has instead been collected and reclaimed as a material input, in lieu of a new primary material, for a recycling or manufacturing process.
Recycling	Material that has been re-processed from recovered (reclaimed) material by means of a manufacturing process and made into a final product or into a component for incorporation into a product. The term recycling is used to cover a wide range of activities, including collection, sorting, re-processing and manufacture into new products. Waste materials that are reclaimed and reutilised within the same manufacturing processes that generated it as a matter of course to the efficient operation of the site (i.e. process scrap) are not defined as recycling for the purpose of this study.
Re-processing	Changing the physical structure and properties of a waste material that would otherwise have been sent to landfill, in order to allow it to be reused or re-incorporated into manufactured products.
Reuse	Reuse involves recovering value from a discarded resource in its original state without re-processing or remanufacture.
Solid waste	Waste materials ranging from municipal garbage to industrial waste, but excluding gaseous, liquid, hazardous, clinical and intractable wastes.
Waste Hierarchy	An internationally recognised aspirational framework for managing waste generation and disposal that is a guiding principle of South Australia's Waste Strategy. Levels in order of precedence in the hierarchy include: Avoid, Reduce, Reuse, Recycle, Recover, Treat, Disposal.

10 Typical Sources & End Uses for Recovered Materials

Material	Source products	End Products
Alternative fuel	Plastic & timber C&D-derived material, Dry comingled recyclables, Cardboard & paper, Tyres & rubber	Energy production for power & industrial heating
Auto-parts	Auto-parts salvaged from end-of-life motor vehicles	Auto-parts
Aluminium	Windows and doors, automotive engines, assorted industrial scrap and production scrap, aluminium cans, electrical cable, electronic and electrical waste	Valves and extrusions, consumer products, automotive parts, building industry and aluminium cans.
Asphalt	Roads, footpaths, car parks and kerbing	Road base, quarry rehabilitation material
Batteries	End-of-life lighting primary & secondary consumer batteries. Excludes automotive batteries	Shredding and/or disassembly to plastic, metal and other constituents for re-processing
Bricks	Mainly walls and other general C&D activity	Primarily crushed for road base and drainage, but also directly reused
Cardboard & Waxed Cardboard	Mostly corrugated cardboard use for the packaging of industrial and consumer goods	Packaging
Clays, Fines, Rubble & Soil	General C&D, Earthworks for site preparation	Road base, batters/bunds, compost (bulking agent), quarry rehabilitation material
Clothes	Clothes donated to charities by the public or business	Clothes
Compact Fluorescent Lamps	End-of-life lighting	Disassembly to various material constituents for re-processing
Computers	End-of-life computer equipment, accessories and peripherals	Salvage and/or refurbishment for reuse of components, Shredding and/or disassembly to plastic, metal and other constituents for re-processing
Concrete	Slabs, footings, kerbing, channel and walls	Crushed as aggregate for road base and drainage, construction fill
Fly Ash	Residue from coal-fired power generation	Cement manufacture, fill , soil stabilisation, fertiliser production
Food	Surplus or out-of-date food donated to charities and sold, reused or supplied to the community	Food
Food Organics	Kerbside collected and commercial food wastes	Composted soil conditioners, potting mixes and mulches
Foundry Waste	Foundry waste materials including sands, dusts, slag and refractory ceramics	Cement manufacture, fill , manufactured soils, blending with composts
Garden Organics	Kerbside collected, other municipal, commercial garden organics	Composted soil conditioners, potting mixes and mulches
Glass	Building glass, Packaging – beer, wine, food	Bottle manufacture, reflective beads for road marking, aggregate for road base
High Density Polyethylene (HDPE)	Milk bottles, sheet liners and covers, manufacturing scrap, other packaging bottles, mobile garbage bins, drums, pipes, crates and pallets	Pallets, agricultural pipes, bins, industrial film, water tanks, crates and mixed polymer timber replacement products
Leather & Textiles	Clothes, other textiles	Cleaning clothes
Liquid Paperboard	Liquid paperboard LPB packaging, both container deposit (CD) and non-CD. CD LPB packaging (includes flavoured milk beverages and fruit juice flavoured beverages). Non-CD packaging includes milk and fruit juice packaging.	Printing and writing paper

Typical Sources & End Uses for Recovered Materials

Material	Source products	End Products
Low Density Polyethylene (LDPE)	Flexible film used as distribution packaging, packaging bottles and manufacturing scrap	Builders film, damp course linings, garbage bags, retail carry bags, mixed polymer timber replacement products, irrigation piping, timber replacement products and garden furniture
Magazines	Magazines Pre-consumer waste and post-consumer magazine material	Composted soil conditioners, potting mixes and mulches
Mixed &/or Other Plastics (MIX)	Manufacturing scrap and domestic durables	Various, including composite materials for bollards and posts
Mobile Phones	End-of-life mobile phones, including accessories and batteries	Shredding and/or disassembly to plastic, metal and other constituents for re-processing
Newsprint	Both pre- and post-consumer newsprint and some magazine material. Includes magazines and TV guides printed on newsprint or improved newsprint.	Newsprint, packaging, cat litter, insulation, building products and composting
Non-ferrous Metals	Copper pipe, automotive batteries and cable, general industrial and production scrap, electrical cable	Many, including batteries, cables, valves and extrusions.
Other E-waste	All other end-of-life electrical and electronic equipment, including whitegoods	Shredding and/or disassembly to plastic, metal and other constituents for re-processing
Phonebooks	Phone books	Newsprint and packaging
Polyethylene Terephthalate (PET)	Soft drink bottles, fruit juice bottles	Soft drink bottles, other packaging applications, fibre applications
Polypropylene (PP)	Manufacturing scrap, rigid packaging applications, pallet strapping and automotive parts	Crates, boxes, plant pots, building materials, electrical cable cover, automotive parts, irrigation fittings and mixed polymer timber replacement products
Polystyrene (PS)	Manufacturing scrap, pipe supports, EPS freight packaging and rigid food packaging	Waffle pods, produce boxes, building materials, concrete reinforcement stools, extruded polystyrene and mixed polymer timber replacement products
Polyvinyl Chloride (PVC)	Manufacturing scrap	Floor coverings, pipes, electrical conduit, clothing, shoes, hose fitting and garden hoses
Printer Cartridges	Empty or redundant ink-jet or laser printers	Re-filled cartridges, disassembly to material constituents for re-processing
Printing & Writing Paper	Office paper and a small amount of packaging paper from office sources	Packaging and writing paper
Timber	Timber Barks, sawdust, wood/timber packaging, general wood/timber	Composted soil conditioners, potting mixes and mulches; Alternative fuel source
Tyres & Rubber	Tyres, other rubber products	New tyres, industrial adhesives and non-slip paints, road surfacing, brake pads, sporting and playground surfaces, alternative fuel for energy production
Televisions/Monitors	End-of-life CRT, LCD or LED televisions or computer monitors	Shredding and/or disassembly to plastic, metal and other constituents for re-processing

11 Abbreviations

C&D	Construction & Demolition
C&I	Commercial & Industrial
CO_2-e	Carbon dioxide equivalent
EOL	End of Life
GHG	Green House Gas
GSP	Gross State Product
HDPE	High Density Polyethylene
kg/p/yr	Kilograms per person, per year
kL	Kilolitre
LDPE	Low Density Polyethylene
ML	Megalitre
MSW	Municipal Solid Waste
PET	Polyethylene Terephthalate
PP	Polypropylene
PS	Polystyrene
PVC	Polyvinyl Chloride
t	Tonnes
TJ	Terajoule

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13 Document Status

Revision	Date	Prepared by	Checked by	Approved by
Draft	23/12/14	K. Heinrich, M. Wheeler, C. Colby	C. Colby	C. Colby
Final Draft	13/02/15	K. Heinrich, C. Colby	C. Colby	C. Colby
Final Report	27/02/15	C. Colby	C. Colby	C. Colby
Issue Report				

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Appendix 1: Survey Methodology

Rawtec was engaged by Zero Waste SA to undertake the Recycling Activity (survey) in South Australia (SA) for the financial year 2013-14. This section summarises the approach and methodology used to conducting the 2013-14 recycling activity survey.

- *This approach and methodology was similar to that used for the 2009-10, 2010-11, 2011-12 and 2012-13 recycling activity surveys, which were also undertaken by Rawtec.*

A1.1 Selection of Materials

The materials to be surveyed for recycling activity was agreed with Zero Waste SA – see Appendix 3 for a complete list.

- *This list was considered to include the majority (at least >95%) of the material types recovered in SA for re-processing.*

A1.2 Survey Design & Delivery

A1.2.1 Survey Respondents

All known local (SA based) and interstate companies or organisations involved with recycling were identified.

- *The final list included 115 companies or organisations, which included survey respondents from 2012-13 and any newly identified companies involved with recycling activity in SA.*

In broad terms, these companies and organisations could be classified as follows.

1. ***Industry-based Recycled Material Collectors, Aggregators and/or Re-processors***
   Companies or organisations in SA or interstate involved with collecting, aggregating, transporting, exporting and/or re-processing materials recovered in SA.

2. ***Representative or Industry Bodies***
   Representative organisations for industry or material sectors involved with resource recovery or recycling that conduct their own surveys or collect data on recycling performance of these sectors.

3. Government agencies/bodies

Commonwealth or South Australian government agencies concerned with collecting data or other statistics on recycling activity in SA.

- Zero Waste SA –
  - During 2010-11 Zero Waste SA commenced collection of resource recovery data for organic material from SA composters through its Zero Waste SA Environment Users System (ZEUS)[18]
- South Australian Government Environment Protection Authority (EPA) –
  - Data for recycled deposit containers and bottles collected in SA; and
  - Landfill disposal data.
- Australian Department of Foreign Affairs & Trade (DFAT) Statistical Information Service – Australian Customs Export Data.

A1.2.2 Confidentiality

It was agreed with Zero Waste SA that the names of, and data provided by industry-based recycling companies or organisations would be kept confidential in the public reporting of data except where the survey respondent indicated otherwise.

- *Providing this assurance of confidentiality was deemed important to encouraging survey participation by the recycling industry.*

A1.2.3 Survey Questionnaire

A survey questionnaire was developed and agreed with Zero Waste SA. This survey questionnaire was in line with the 2012-13 questionnaire, with one additional question to identify waste material imported into SA for resource recovery.

A1.2.4 Survey Deployment

The survey was deployed to the survey respondents during September 2014.

- *The deployment method was by email*
- *An additional option of filling-out the survey online was also offered to respondents.*
- *Following survey deployment, respondents were also contacted to confirm receipt of the survey and determine if they had any queries or required assistance with completing the survey. In a number of instances it was discovered that the relevant company or organisation no longer existed or recycling activity had not occurred during 2013-14.*

Each respondent was given several weeks to complete and return the survey.

- *Outstanding survey returns were followed up by email and/or phone at least once, to encourage completion and submission by the respondent of the survey.*

The collection of survey data was closed in mid-November 2014.

[18] ZEUS is a web-based system that has been purpose developed by Zero Waste SA to collect data from local government and industry on waste disposal and resource recovery within South Australia.

A1.2.5 Consultation

A selected number of recycling industry companies were given the opportunity to participate in direct face-to-face consultation as part of the 2013-14 Recycling Activity survey.

- *These companies were usually key players in specific material categories. The more detailed information obtained from these consultations were used to guide survey data analysis and interpretation.*

A1.3 Data Analysis

A1.3.1 Materials Analysis & Reporting

Data collected by the survey was analysed to determine the following for each material. This analysis was conducted according to the National Guidelines for compiling waste and recycling data (the "National Waste Reporting Guidelines") (DSEWPC 2012a).

- ***Quantity*** – The total reported quantity of that material recovered in SA for recycling or reuse.
- ***Imported Waste Material*** – Separate identification of waste material imported from interstate and overseas, which is excluded from measuring SA's recycling performance.
- ***Energy Recovery*** – Separate identification of waste materials recovered and used for energy production in SA[19].
- ***Destination*** – Where the material was sent for recycling:
    - SA – Including what degree of re-processing occurred:
        - Manufactured Product – Incorporated into a final consumer or market product.
        - Recycled Product – Re-processed to a feedstock material to replace a virgin material used for manufacture.
    - Interstate – Where the material might be re-processed or exported overseas.
    - Export – Where the material was directly exported from SA to an overseas destination for re-processing.
- ***Sector Origin*** –The reported sector origin from where the material was recovered:
    - Municipal (MSW) – From kerbside collection, general public and/or via Council or other Municipal authority.
    - Commercial & Industrial (C&I) – Collected from business or industrial activities (but excluding C&D).
    - Construction & Demolition (C&D) – Collected from construction or demolition activities involved with building and/or infrastructure construction.
- ***Geographical Origin*** – The reported geographical origin for recovered materials:
    - Metropolitan area – From the metropolitan Adelaide area.
    - Regional – From other areas outside the metropolitan Adelaide area.

{Cont. overleaf}

[19] Resource recovery considered as 'energy recovery' in this report is therefore classified as: where waste materials are recovered and used for the purpose of energy production in SA, instead of being sent for landfill disposal. Some industries already produce energy from waste by-products they generate on their own sites, but this is excluded under the under the National Waste Reporting Guidelines (DSEWPC 2012a). There are also several waste companies that collect and re-process waste materials, which are then sent overseas and/or interstate for energy recovery. This circumstance is still classified 'material recovery' as any potential energy recovery from the waste material occurs outside of SA. This definition also necessarily excludes energy recovery from landfill gas arising from waste disposed to landfills.

In conducting the above analysis, the following principles were applied.

- Any materials imported into SA from other states and territories or overseas for re-processing were excluded.
- Great care was taken to avoid double counting of recovered materials which can occur where same material is handled multiple times by different parties before reaching its eventual destination.
- In almost all cases, direct industry estimates were relied upon to estimate the splits where reported data for materials were aggregated.
- In occasional instances where a survey respondent did not report data for the current year:
    - Third party estimates of the respondent's recycling activity were identified from industry or other published sources; and/or
    - The respondent's previous years' data, if available, were used to reasonably estimate recycling activity (but only where such data was considered a reliable indication of the respondent's current recycling activity).

A1.3.2 Accuracy of Reported Data

Survey respondents were asked to report on the accuracy of the data they were providing (e.g. could be accurate to, or have error of, ±2%). This accuracy data was used to determine an estimated reporting accuracy for each material[20].

- *The estimated reporting accuracy for each material was used to select an appropriate number of significant figures that should reasonably apply to presentation of the reported data.*

Where third party estimates and/or previous years' data were adopted for recycling activity, a greater error of appropriate value (i.e. usually between ±10-30%) was applied to reflect the greater uncertainty in the accuracy of this data.

A1.3.3 Per Capita Analysis & National Benchmarking

Metrics for per capita waste and recycling by SA and benchmarking of these metrics against similar data were calculated using the following data and assumptions.

- Population statistics were sourced from the Australian Bureau of Statistics (ABS) (2014a).
- The relevant reporting periods and sources of recycling activity data were:
    - SA: 2013-14, as reported in this survey;
    - ACT: 2013-14, as reported by: Territory and Municipal Services Annual Report 2013-14, (ACT Territory and Municipal Services, 2014);
    - VIC: 2011-12, as reported by: Annual Report 2012-13 (Sustainability Victoria, 2013) and through email communications with Sustainability Victoria;
    - WA: 2012-13, as reported by: Recycling Activity in Western Australia, 2012-13 (WA Waste Authority, 2014);
    - NSW: 2010-11, as reported by: NSW Waste Avoidance and Resource Recovery Strategy 2013-21 (NSW EPA, 2013);
    - QLD: 2012-13, as reported by: The State of Waste and Recycling in Queensland 2012 (QLD DEHP, 2014).

[20] Standard error propagation techniques were applied for calculating errors when adding or subtracting data for reported resource recovery of materials

- Adjustments were made to the above data to present recycling data in accordance with the National Waste and Recycling Guidelines (DSEWPC, 2012a).

It should be noted that some of the interstate resource recovery data employed for benchmarking in 2013-14 is the same as that for 2012-13; more recent resource recovery data in these instances has either not been compiled or released publicly including in sufficient detail to enable proper analysis (at the time this analysis was undertaken).

A1.3.4 Packaging Recovery Analysis & Reporting

Packaging data was taken directly from Recycling Activity Survey data:

- Container deposit bottle and can packaging:
  - From 2013-14 CDL data reported by industry to the South Australian EPA.
- Cardboard packaging:
  - Derived from cardboard material recovery data which was adjusted to account for pre-consumer material.
- Other plastic packaging:
  - Derived from industry data for plastic packaging materials recovered by Adelaide MRFs and other sources.
- Other glass packaging:
  - Determined from balance between CDL data and industry-reported glass recovery and re-processing data.

A1.3.5 Environmental Benefits Analysis

A1.3.5.1 General Approach

The methodology for this analysis was aligned as much as possible to the approach applied in previous recycling activity surveys developed for SA and was essentially the same as that developed for the 2009-10 SA Recycling Activity Survey. The scope of environmental benefits analysis included the following metrics.

- ***Greenhouse Gas Savings*** (quantified as tonnes of CO_2-e) – The reduction in greenhouse gas emissions achieved by replacing virgin materials with recycled materials.
- ***Cumulative Energy Demand Savings*** (as Terajoules (TJ) – The amount of energy saved, including all fossil, renewable, electrical and embodied energy, by using recycled materials.
- ***Water Savings*** (as Megalitres (ML) H_2O) **–** The reduction in water consumption by substituting recycled materials that would otherwise be required if virgin materials had been used.

A1.3.5.2 Assumptions & Data Sources

The conversion and emission factors used to assess the benefits of recycling materials have been widely studied and established methods are developed to calculate them. These methods are based on Life Cycle Analysis (LCA) techniques. Figure A1.1 overleaf gives a useful illustration of how LCA techniques approach the assessment of resource recovery and recycling activities in order to calculate the benefits that can be achieved.

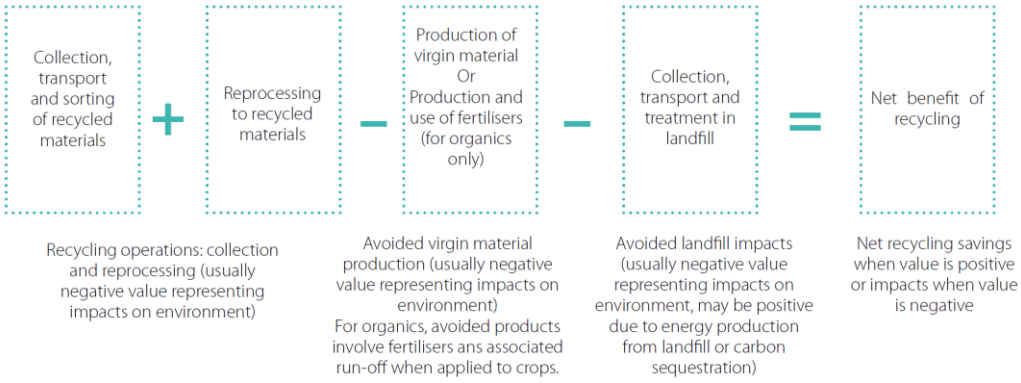

Figure A1.1 Method for calculating the net environmental impacts in the recycling process. Source: NSW DECCW (2010)

LCA techniques have previously been used to estimate conversion and emission factors for Australian situations including for SA. For the purpose of this study, the following sources were used to infer or obtain relevant conversion and emission factors for environmental benefits of recycling in SA:

- Benefits of Recycling in South Australia study (Zero Waste SA, 2009);
- Life Cycle Impact Data for Resource Recovery for Commercial and Industrial and Construction and Demolition Waste in Victoria (EcoRecycle Victoria 2005);
- Environmental benefits study of recycling for NSW (NSW DECCW, 2010); and
- SA Recycling Activity survey, 2008-09 (Zero Waste SA, 2010).

These sources often provided or suggested separate conversion and emission factors relevant to materials recovered for recycling from Municipal, C&I and C&D sectors. The conversion and emission factors between these different sectors were generally found to be similar.

In view of this, a single material conversion and emission factor for each material was usually adopted. SA specific or source values were adopted first. Otherwise, conversion or emission factors from another source were used. In this situation, where there were multiple values available, the lower value was normally adopted in order to be conservative in the estimate of environmental benefits.

Sufficiently comprehensive and/or reliable conversion or emission factors data could not be identified for the following materials:

- Foundry Waste; and
- Leather & Textiles.

As a consequence, these materials were not included in the environmental benefits analysis.

The 2013-14 environmental benefits analysis adopted the same conversion and emission factors that were developed from the above sources and used for the 2009-10 SA recycling activity report (Zero Waste SA 2011). These conversion and emission factors are listed in Appendix 4. Some brief notes on the sources and key assumptions made in deriving these conversion and emission factors are included in Appendix 4.

{Cont. overleaf}

A1.3.5.3 Qualifications & Limitations

The following qualifications and limitations should be recognised about the environmental benefits analysis presented in this report. These qualifications and limitations are not unique to the 2013-14 Recycling Activity survey and would also have applied to similar assessments conducted in previous Recycling Activity surveys.

1. Many of the conversion and emission factors adopted are not specifically calculated for SA, and in most cases, are derived from interstate studies, i.e. Victoria, NSW.
2. It is important to recognise that not all environmental benefits reported directly accrue to SA, because:
    - Some of the virgin materials that are replaced by recycling are not manufactured in SA, e.g. metals, plastics, cardboard & paper; and/or
    - The material recovered from SA for recycling is used to manufacture products that end up being consumed outside of the State, e.g. metals, plastics, cardboard & paper.

In view of the above, the assessment in this study represents a generalised estimate of the life cycle benefits involved with recycling of these materials and does not precisely depict the environmental benefits of recycling activity in SA.

A1.3.6 Resource Recovery Value

The value of waste materials recovered for recycling is influenced by:

- The type of waste material and industrial product in which it can be recycled or reused;
- The commodity market prices for virgin material that they replace;
- Whether the material will be re-processed locally or exported overseas;
- The quality of this material, including the extent of source separation and/or pre-processing which might have already occurred.

A number of recovered materials in SA are exported to international markets; particularly metals and plastics. In these markets, prices can be highly volatile and may fluctuate by up to ±60-80% from year to year (DSEWPC 2012b).

Pricing for recovered materials re-processed locally, such as masonry, glass and organics, are usually more stable. But these prices too can vary considerably depending on local economic outlook and/or activity and between jurisdictions.

Plastics already source separated by polymer will have greater market value than mixed plastics. Glass recovered in SA from container deposit depots is more highly prized and valued than glass recovered from material recovery facilities interstate due to lower contamination. In the case of organics, which are putrescible, most recovered material must be composted before it realises a market value.

As a consequence, the value of recovered material can vary over time, between jurisdictions, and depending on local waste management and resource recovery practices. Price and/or value estimates are therefore usually based on highly aggregated average prices to take into account all of these factors.

For the purpose of this study, the assumed values of various recovered materials obtained in SA during 2013-14 are given in Table A1.1 overleaf. These assumed values are based on:

- Estimated market values for recovered materials for SA presented in Waste Management & Environment Media's Inside Waste Industry Report 2011-12 (WME Magazine 2012);
- Estimated market values for recovered plastics presented in Waste Management & Environment February 2014 (WME Magazine 2014);

- Where such market values for a recovered material were not presented above, the consultants' own estimate were used based on our knowledge and insight of the South Australian waste management industry and local markets for recycled materials.

Table A1.1 Assumed values for recovered materials in SA during 2013-14 used to estimate resource market value. *(For references in the Table below, refer to Section 12)*

Material category	***Estimated on-sale price ($/tonne)***	***Price data source:***
Masonry	$15	WME Magazine (2011)
Metals	$400	WME Magazine (2011)
Organics	$35	WME Magazine (2011)
Paper & cardboard	$225	WME Magazine (2011)
Plastics	$280	WME Magazine (2014)
Glass	$90	Consultants' estimate
Other materials	$10	Consultants' estimate
Separately Reported Materials & Clean Fill	$15	Consultants' estimate

Appendix 2: Survey Participation

The following presents some survey statistics that may provide a useful insight into the recycling activity occurring in South Australia (SA) and the types of data and information sets that were returned and analysed in 2013-14.

A2.1 Survey Participation & Reported data

Table A2.1 below summarises the survey participation and reported data points for 2013-14.

- The survey questionnaire was successfully deployed to 114 or 99% of the initial list of 115 organisations identified as potentially involved with recycling activity in SA.
- The survey returns produced recycling activity data or information sets for 91 of these companies or organisations.
- Of these 91 data or information sets, the following types of activity were classified. Note: the activity type classifications are not mutually exclusive as many companies or organisations reporting data were involved with multiple activities and/or aspects of the resource recovery and/or recycling industry.
    - 4 were reference &/or aggregated data sets from industry bodies or government agencies.
    - 22 data sets came from companies or organisations that generated the material that was being recovered for recycling.
    - 68 data sets were companies or organisations involved in collection or aggregation of recovered material.
    - 55 data sets were for companies or organisations undertaking re-processing activities.
    - 40 of these companies or organisations were also involved in manufacturing products from the recovered or re-processed material.

Table A2.1 Overall Survey Statistics

Statistic		No.	(%)	% Basis
Sample Size		115		
Surveys Deployed*		114	99%	of Sample Size
Survey Data Points		91	80%	of Surveys Deployed
Activity Type	Industry Reference Data	4	4%	of Survey Data Points
	Source	22	24%	of Survey Data Points
	Aggregator/Collector	68	75%	of Survey Data Points
	Recycler	55	60%	of Survey Data Points
	Manufacturer	40	44%	of Survey Data Points

A2.2 Industry Data Segmentation

Table A2.2 below summarises the reported industry data (excluding reference data) points or sets from companies or organisations by the following classifications. Again, these classifications are not mutually exclusive.

- Material Activity – The materials and/or industry sector the company or organisation was handling.
- Material Destination – Where were recovered materials sent?
- Waste Hierarchy[21] – At what level of the waste hierarchy were materials being handled?

Table A2.2 Industry Sourced Data Statistics

Statistic		No.	(%)
No. Industry-Sourced Data Points		91	100%
Material Activity	Masonry	21	23%
	Metals	37	41%
	Organics	32	35%
	Cardboard & paper	28	31%
	Plastics	29	32%
	Glass	15	16%
	Other Materials	9	10%
	E-waste	15	16%
	Reuse Materials	13	14%
Material Destination	SA	76	84%
	Interstate	34	37%
	Export	19	21%
Waste Hierarchy	Reuse	7	8%
	Recycle	61	67%
	Material Recovery	70	77%
	Energy Recovery	2	2%

[21] The waste hierarchy is an internationally recognised aspirational framework for managing waste generation and disposal that is a guiding principle of South Australia's Waste Strategy (ZWSA 2012). The levels presented here are not necessarily given in any particular order of preference but it is widely accepted that the precedence should be: Reuse > Recycling > Material or Energy Recovery.

Appendix 3: 2013-14 Recycling Activity Survey Questionnaire

Survey Form – Recycling Activity in SA, 2013-14

Issued: 4 September 2014

1. Survey Company & Contact Details

Rawtec Pty Ltd (www.rawtec.com.au)

- Chris Colby, Principal Consultant, p: (08) 8294 5571, e: chris.colby@rawtec.com.au
- Kat Heinrich, Senior Consultant, p: (08) 8294 5571, e: kat.heinrich@rawtec.com.au
- Meagan Wheeler, Consultant, p: (08) 8294 5571, e: meagan.wheeler@rawtec.com.au

2. Survey Questions for Period 1 July 2013 - 30 June 2014

1.	Your company or organisation's contact address and details. Please also include the location(s) of your main facility(ies) for re-processing or handling of materials *Company/Organisation's Name:* *Contact Address:* *Location(s) of your main facility(ies) for re-processing or handling of materials:*
2.	Are you happy for your company to be recognised in the report as participating in the 2013-14 SA Recycling Activity survey? (*Please Circle/Highlight)* *[Yes / No]*
3.	Would you like to be invited to an industry seminar by Zero Waste SA summarising the findings of this 2013-14 SA Recycling Activity survey? (*Please Circle/Highlight)* *[Yes / No]*
4.	Please fill in Table 1 (overleaf) for each relevant material listed in Table 2 (page 3). ***This is the critical information required for the survey. All data will be kept confidential and anonymised for reporting purposes.***
5.	What is the estimated accuracy of the data provided in Table 1, **e.g. ±5%** *For example, if you measure waste using a weighbridge an accuracy of **±1%**may be suitable.*

13.1 Table 1: Data entry of estimated quantities of recycling for 2013-14 for each relevant material from Table 2 (overleaf)

		MATERIAL SOURCE/INPUT					MATERIAL DESTINATION/OUTPUT				RESIDUAL
ID	Material	Materials received for recycling (in tonnes):		Source of material (in tonnes or %)			Destination of material for re-processing (in tonnes or as %)				% residual (if any) generated from recovery or re-processing to landfill
		SA-Metro	SA-Regional	Municipal	Commercial & Industrial	Construction & Demolition	Your SA facility(ies)	Elsewhere in SA	Sent Interstate	Sent Overseas	
	EXAMPLE	23,000	30	25%	70%	5%	10,000	530	10,000	2,500	10%

Note: please state all quantities in metric tonnes (1000kg = 1 tonne)

Definitions:

Municipal- Domestic household sourced waste

Commercial and Industrial- Industry and business sourced waste

Construction and Demolition- Building, construction and demolition waste

Table 2: List of Materials 2013-14 Recycling Activity Survey

Category	ID	Material
A	***Masonry***	
	1	Asphalt
	2	Bricks
	3	Concrete
	4	Plasterboard
	5	Waste Fill (or "clean" fill) – **Clay, fines, rubble & soil (**which meets EPA's WDF criteria)
	6	Intermediate Waste Soil (or "contaminated" fill) – **Clay, fines, rubble & soil** (which meets EPA's Intermediate Soil criteria)
B	***Metals***	
	7	Steel
	8	Aluminium
	9	Non-ferrous metals
C	***Organics***	
	10	Food Organics
	11	Garden Organics
	12	Timber
	13	Meat Rendering
	14	Waste Grease & Fat
	15	Waste Sludge & Bio-solids
	16	Organics - Other
D	***Cardboard & paper***	
	17	Cardboard & waxed cardboard
	18	Liquid Paperboard
	19	Magazines
	20	Newsprint
	21	Phonebooks
	22	Printing & Writing Paper
E	***Plastics***	
	23	Polyethylene terephthalate [PIC 1]
	24	High density polyethylene [PIC 2]
	25	Polyvinyl chloride [PIC 3]
	26	Low density polyethylene [PIC 4]
	27	Polypropylene [PIC 5]
	28	Polystyrene [PIC 6]
	29	Mixed &/or Other plastics [PIC 7]
F	***Glass***	
	30	Glass
G	***Electronic Waste***	
	31	Printer cartridges
	32	Compact fluorescent lamps
	33	Batteries
	34	Computers
	35	Televisions / Monitors
	36	Mobile phones
	37	Other e-waste (not classified above)
H	***Alternative Fuels***	
	38	Alternative Fuel
I	***Other Materials (exc. e-waste)***	
	39	Fly ash
	40	Foundry sands
	41	Leather & textiles
	42	Tyres & other rubber
J	***Re-use Materials***	
	43	Auto-Parts
	44	Home Furnishings & Goods
	45	Clothes
	46	Food Products

2. Continued Survey Questions for Period 1 July 2013 - 30 June 2014

	For the following questions, please enter responses directly into the table below.
6.	In addition to the volumes reported in Table 1, did you receive any waste from interstate or overseas sources that was reprocessed at your site? If so, please list materials received (see Table 2) and state volumes and sources. If you received any plastics, please provide this information in the plastics recyclers survey form. *Material* *Tonnes received* *Source location* • •
7.	Were any of the reported materials derived from packaging? If yes, (for each material) approximately what proportion (as % of total)? If you received any plastics, please provide this information in the plastics recyclers survey form. *Material* *Proportion* • • • •
8.	Have there been any significant changes in quantities, stockpiles, sources or destinations from last financial year?
9.	Where do you receive most of your material from, e.g. Councils, manufacturing, retail, hospitality, etc.?
10.	Where do you send most of recovered or re-processed materials and how are they recycled, e.g. compostors, building construction, plastics re-processor, material aggregator, e-waste recycler, quarry, etc.?
11.	What is your opinion about the market strength/prospects for recycled materials?

12.	Does your company or organisation intend to expand or contract its SA facilities or make new investments in recycling activity? If yes, what will this involve?
13.	Are there any significant barriers, e.g. market, regulatory, technology, for your SA operations?
14.	How many people (FTE's) are directly employed by your company/organisation's site(s) or operations(s) associated with material collection, resource recovery and/or recycling, i.e. permanent or casual staff, individual contractors?
15.	What is your organisation's approximate Annual Sales Revenue (Turnover) from material collection, resource recovery and/or recycling activities.
16.	What are the names of other recyclers in your area of the SA recycling industry?

Appendix 4: 2013-14 Environmental Benefits Conversion & Emission Factors

Table A4.1 Emission and conversion factors adopted for estimation of environmental benefits of recycling, SA 2013-14. (For references in the Table notes, refer to Section 12)

	Material	GHG Emissions Saved		Energy Saved		Water Saved	
		Emission factor (t CO2-e/t)	*Note*	*Conversion factor (GJ LHV/t)*	*Note*	*Conversion factor (kL/t)*	*Note*
	Masonry						
1	Asphalt	0.016	(1)	2.037	(1)	0.880	(9)
2	Bricks	0.009	(1)	0.117	(1)	1.260	(9)
3	Concrete	0.029	(1)	0.552	(1)	1.280	(9)
4	Plasterboard	0.047	(1)	0.227	(1)	-0.030	(9)
5	Clay, fines, rubble & soil	0.087	(1)	0.675	(1)	0.440	(1)
	Metals						
6	Steel	0.615	(2)	7.940	(9)	-2.360	(9)
7	Aluminium	14.773	(2)	171.100	(8)	181.770	(8)
8	Non-ferrous metals	3.395	(3)	36.090	(9)	5.970	(9)
	Organics						
9	Food Organics	0.518	(3)	1.608	(1)	0.700	(1)
10	Garden Organics	0.230	(3)	0.470	(8)	0.480	(8)
11	Timber	0.328	(3)	1.318	(10)	0.540	(10)
12	Organics - Other	0.481	(3)	2.165	(1)	0.230	(1)
	Cardboard & paper						
13	Cardboard & waxed cardboard	0.304	(1)	12.532	(1)	33.040	(1)
14	Liquid Paperboard	0.641	(1)	9.191	(1)	16.220	(1)
15	Magazines	0.464	(1)	9.065	(1)	22.160	(1)
16	Newsprint	0.464	(1)	9.065	(1)	22.160	(1)
17	Phonebooks	0.243	(1)	12.306	(1)	33.120	(1)
18	Printing & Writing Paper	0.579	(1)	12.989	(1)	31.110	(1)
	Plastics						
19	Polyethylene terephthalate	1.032	(2)	50.703	(4)	-21.078	(4)
20	High density polyethylene	0.692	(2)	55.952	(4)	-3.510	(4)
21	Polyvinyl chloride	1.568	(4)	42.146	(4)	66.406	(4)
22	Low density polyethylene	0.692	(5)	55.952	(5)	-3.510	(5)
23	Polypropylene	1.644	(1)	58.632	(1)	-12.980	(1)
24	Polystyrene	1.365	(6)	60.663	(6)	-17.631	(6)
25	Mixed &/or Other plastics	1.365	(3)	60.663	(4)	-17.631	(4)
	Glass						
26	Glass	0.597	(1)	6.417	(1)	2.420	(1)
	Other Materials						
27	Fly ash	0.029	(7)	0.552	(7)	1.260	(7)
28	Foundry sands	NS		NS		NS	
29	Leather & textiles	NS		NS		NS	
30	Tyres & other rubber	1.185	(3)	67.162	(1)	52.430	(1)

Notes:

(1) Source: EcoRecycle Victoria (2005)
(2) Source: Zero Waste SA (2009); Municipal, C&I & C&D emission factors weighted by 2009-10 Sector Origin
(3) Source: Zero Waste SA (2010); 2008-09 Recycling Activity emission factor
(4) Source: NSW DECCW (2010); Kerbside and C&I/C&D emission factors weighted by 2009-10 Sector Origin
(5) HDPE value adopted per Zero Waste SA (2010)
(6) Mixed/Other plastics value adopted per Zero Waste SA (2010)
(7) Concrete value adopted per Zero Waste SA (2010)
(8) Source: NSW DECCW (2010); Kerbside value
(9) Source: NSW DECCW (2010); C&I/C&D value
(10) Source: EcoRecycle Victoria (2005); Saw dust value
(11) Organics - Other value adopted
NS Not specified as insufficient reference data identified