SOUTH AUSTRALIA'S RECYCLING ACTIVITY SURVEY 2019-20 REPORT

Government of South Australia
Green Industries SA

Contents

Acknowledgement of country

We acknowledge and respect the Traditional Custodians whose ancestral lands we live and work upon and we pay our respects to their Elders past and present. We acknowledge and respect their deep spiritual connection and the relationship that Aboriginal and Torres Strait Islanders people have to Country. We also pay our respects to the cultural authority of Aboriginal and Torres Strait Islander people and their nations in South Australia, as well as those across Australia.

About data used in this report

The resource recovery data presented in this report was collected from a survey sent to 143 organisations 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 2019-20 financial year for the purpose of recycling, excluding net losses of these materials arising from resource recovery and/or re-processing activities. Comparisons are made to the last reported financial year (2018-19).

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 Green Industries SA to present the results and findings from the 2019-20 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 after 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 Green Industries SA that it is permissible and appropriate to do so.

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Executive Summary

Introduction

Each year since 2003-04, Green Industries SA has measured recycling activity and waste disposal to landfill in South Australia (SA) to assess the State's performance against South Australia's Waste Strategy targets. This report presents the results from the SA Recycling Activity Survey for the 2019-20 financial year.

Summary of 2019-20 results

In 2019-20, the SA landfill diversion rate remained strong but decreased slightly from 2018-19. SA achieved a total diversion rate of 83.3% (of waste material diverted to resource recovery including separately reported materials), compared to 83.8% in 2018-19. The State's total recovered tonnes decreased by 4.7% from the 2018-19 financial year, as did the tonnes to landfill (1.5% decrease). This diversion rate remains above other states and territories[1].

The coronavirus (COVID-19) impacted business activity overseas and in Australia, particularly the last quarter of the 2019-20 financial year. This resulted in some slowing of business and therefore recovery of certain materials.

Another external factor impacting recycling is the ongoing impact of China's waste and recycling policy 'National Sword'. This came into effect early 2018, impacting plastics and fibre (Cardboard & Paper). In 2019-20 China further reduced its intake of recovered fibre from overseas, and the Indonesian Government put a temporary hold on all incoming recovered Cardboard & Paper products. Markets flooded, and the price decreased. Later, COVID-19 helped increase the demand for fibre due to purchasing of items such as toilet paper and tissues. Australia was well positioned to provide recovered fibre into Asia, and the price recovered somewhat. Price volatility, particularly for recyclers selling into overseas markets, continues to be a challenge for recovered Cardboard & Paper.

Australia faced some of the worst bushfires in recent history late 2019 and early 2020. This created additional waste and recycling tonnes, as trees, homes and other buildings were burnt. The waste industry collaborated successfully with the SA Government to efficiently clean up the damaged properties.

Businesses including government are continuing to support the recycling sector by purchasing products containing recycled material. Some manufacturers are also setting greenhouse gas emission reduction targets as well as recycled content in product targets. These initiatives are creating local demand for recycled products.

The continuation of major infrastructure projects in SA have helped the Masonry sector continue to recover high volumes of materials, although there was a slight decline in tonnes. Organics recovery had another strong year with farmers and households continuing to recognise the benefits (water retention, soil health, etc.) of these products. Glass increased for another year as bottle manufacturers increased the proportion of glass cullet in their products and trials of low grade/mixed glass to road base continue. Recovery of Other Materials increased as well, as did E-waste recovery with the continued success of the free drop offs.

Although recovery of Masonry, Plastics, Cardboard & Paper and Metals all decreased slightly from 2018-19 to 2019-20, the industry remains confident in the future recovery for these materials.

1 Note the SA 2019-20 data is compared to other states and territories' 2018-19 data, except for NSW, which is compared to data from the 2017-18 financial year.

By the numbers

The total resource recovery for SA in 2019-20 was 4.13 million tonnes (**Table 1**). This included:

- 2.99 million tonnes of 'Standard Reporting Materials' (including Metals, Organics, Cardboard & Paper, Plastics, Glass, Masonry (not including soil), Foundry Waste, Leather & Textiles and Tyres & Other rubber).
- 1.14 million tonnes of 'Separately Reported Materials & Clean Fill' (including soil, sand and rubble, which can fluctuate significantly across reporting years).

Total landfill disposal for SA was 0.83 million tonnes. This year the report includes a section on re-use. Our preliminary investigation into a subset of re-use data suggests SA re-used ~30,000 tonnes of items in 2019-20, which was valued at ~$270 million (limited to food rescue, home furnishings and goods from second-hand stores, electronic refurbishment, and clothing, and not including second hand items sold online).

Table 1 **Summary of 2019-20 Recycling Activity results for resource recovery, landfill disposal, total waste generated and total diversion (waste to resource recovery) achieved in SA.** Note that sums and percentages may not equate due to rounding.

2019-20 Recycling Activity Data Account Summary			
	Standard Reporting Materials*	Separately Reported Materials & Clean Fill	**TOTAL (All materials)**
Resource recovery, tonnes	2.99 million	1.14 million	4.13 million
Landfill disposal, tonnes	0.63 million	0.20 million	0.83 million
Waste generated, tonnes**	3.63 million	1.34 million	4.96 million
Diversion, % to resource recovery	82.6%	85.3%	**83.3%**

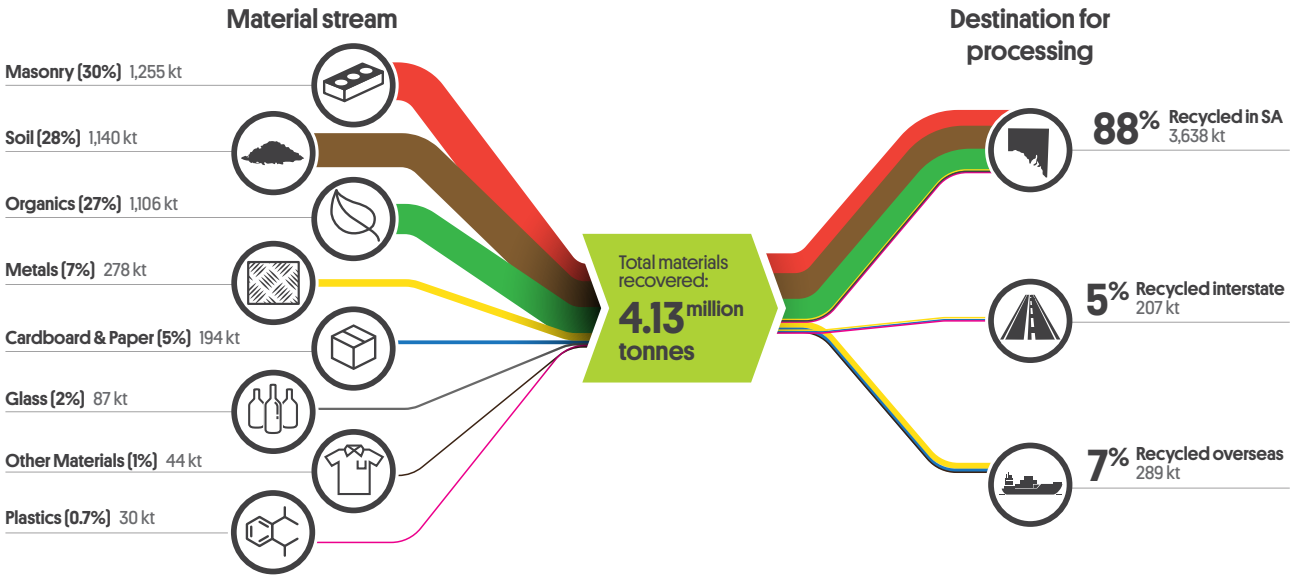
*Standard Reporting Materials and Separately Reported Materials & Clean Fill, as specified in Dept of Env and Energy (2015)

**Waste generated = Resource recovery + landfill disposal

Table 1 shows the diversion rate for Standard Reporting Materials, Separately Reported Materials & Clean Fill, and total diversion. The diversion rate for Standard Reporting Materials is 82.6%, which is higher than 2018-19 (82.2%).

The diversion rate of Separately Reported Materials decreased from 88.0% in 2018-19 to 85.3% in 2019-20. This is due to both a reduction in resource recovered tonnes and an increase in tonnes to landfill of separately reported materials.

Figure 1 **Contribution of different material categories to SA's resource recovery during 2019-20 and location sent for recycling.** Quantities are stated in kilotonnes (kt). The top three material streams contributing to SA's recycling activity are Masonry, Soil and Organics (85% of SA's resource recovery).



Resource recovery by material category

Figure 1 displays each material category and the tonnes recovered in the 2019-20 financial year. The top three materials made up 85% of all recovered tonnes in SA in 2019-20. This included Masonry (30%), Soil (28%) and Organics (27%). Almost all the recovered material from these three sectors is re-processed in SA, with Masonry and Soil sourced mostly from Construction and Demolition (C&D) activities, and Organics from the Commercial & Industrial (C&I) sector, for example Timber from sawmills.

Metals (7%) and Cardboard & Paper (5%) were the fourth and fifth highest contributors by weight, respectively. Most of these materials are sourced from the C&I sector and are reprocessed interstate or overseas.

Glass as an overall contributor to resource recovery increased by 0.4 percentage points (from 1.7% in 2018-19 to 2.1% in 2019-20), and around two thirds was processed locally in SA. Plastics was less than 1% of the total by weight.

Other key trends

When comparing 2018-19 to 2019-20, there were increases for:

- Organics (up 6% or 66,000 tonnes). There was a large increase in Timber recovery in 2019-20 compared to 2018-19 (30% increase in recovered tonnes of Timber), due to an increase in forestry activity as new houses were built in Victoria and South Australia.
- Glass (up 13,000 tonnes or 18%). The glass cullet to bottle manufacture remained strong, and more organisations are exploring the use of recovered glass as a sand replacement in road base both here and interstate. There was also an increase in C&I glass manufacturing which led to greater tonnes of glass off cuts being recovered.
- Other Materials increased 61% or 16,700 tonnes. This is predominately due to an increase in manufacturers using Foundry Sands in their processes and a marginal increase in tyre recovery as more South Australians replaced their tyres to travel by road (likely in response to COVID-19 restricting overseas travel[2]). Improved reporting also accounted for some of the increase in Other Materials.

In 2019-20 there were decreases for:

- Masonry recovery, from 1.39 million tonnes in 2018-19 to 1.26 million tonnes in 2019-20. There was a small decline in C&D activity due to COVID-19 and as some SA infrastructure projects neared completion.
- Metals decreased by 51,000 tonnes or 16%. A large regional C&D job finished during the 2019-20 financial year, and COVID-19 slowed industry activity slightly, reducing tonnes of Metals available. The recovery price remained strong for this material in 2019-20.
- Cardboard & Paper decreased 15%, due to slowing of business activity with COVID-19, and overseas government restrictions limiting tonnes of fibre export opportunities. The price of fibre decreased substantially for the 2019-20 financial year, with volatility still a major challenge.
- Plastics declined by 3%, due to some plastics decreasing in value (mixed plastics and some coloured single resin polymers) and an adjustment in how some recyclables are reported.

2 University of Queensland, 2020

Performance against State targets

In 2020 Green Industries SA released *SA's Waste Strategy 2020-25* (Green Industries SA 2020). This sets new waste targets for the State for 2023 and 2025 (see **Table 1.1**). The 2020 targets were set in *SA's Waste Strategy 2015-20* (Green Industries SA 2015). SA achieved its 2020 targets for:

- Metropolitan C&I and C&D diversion where the targets were 80% and 90% respectively. In 2019-20 SA achieved 92.4% diversion for C&I and 90.6% diversion for C&D.
- The 2020 landfill target is a 35% reduction in waste to landfill from the 2002-03 baseline. Not including contaminated soil, SA's 2019-20 landfill volumes were 49% lower than 2002-03. However, when including contaminated soil, SA fell just short at 34% reduction in tonnes to landfill from 2002-03.

SA fell short of the following targets:

- Municipal solid waste (MSW) metropolitan diversion from landfill. The metropolitan target for 2020 was 70% for all MSW waste and 60% at kerbside[3]. In 2019-20 metropolitan Adelaide achieved an MSW diversion rate of 56% and a kerbside diversion rate of 50.5%.
- Waste generation per capita for Standard Reporting Materials in 2019-20 was 1.4% lower than the 2015 baseline. Although this is an improvement on the 2018-19 result, it is still short of the target of 5% reduction from 2015 waste generation.

MSW and kerbside diversion, and waste generation remain key opportunities for the State.

The new targets for 2023 and 2025 are included in **Table 1.1**.

Kerbside performance

SA's kerbside recovery increased in 2019-20. An estimated 47.6% of materials by weight is collected for resource recovery via the comingled and organics bins. Performance is higher in metro councils (at 50.5%) compared to regional councils (at 37.7%).

Food waste continues to make up a significant proportion of material remaining in kerbside general waste bins (and in SA landfills), estimated at around 150,000 tonnes per year. Diverting more of this material via food and garden organic kerbside bins would lead to a large increase in kerbside performance and reduced costs for councils. Councils are exploring options to increase kerbside performance in this area. For example, three councils are trialling weekly food and garden organics bin collections.

3 Kerbside performance is a sub-set of MSW data. It only includes the three bins collected at kerbside and excludes non-kerbside container deposit legislation (CDL) returns, transfer stations, hard waste collection, E-waste, and street sweepings.

01 Introduction

At a glance:

- This report presents the findings from a survey of South Australian waste and recycling collectors, recyclers, and re-processors on resource recovery of waste materials during the 2019-20 financial year.
- This data measures South Australia's performance against waste diversion goals and targets in the State Waste Strategies, for 2015-2020 and 2020-2025. It also allows comparison to other states and jurisdictions and is used for national waste reporting.
- The data is compiled and reported in accordance with the National Guidelines for compiling waste and recycling data.

1.1 Background

South Australia (SA) has led the way in waste and recycling performance and initiatives for many years. As Australia pushes towards a more circular economy, understanding waste and recycling performance and opportunities remains important. The waste and recycling sector provides local jobs, gives waste another life, and can help retain value in our resources and improve soil health.

Green Industries SA recently released *SA's Waste Strategy 2020-25* (Green Industries SA, 2020) which sets new targets for 2023 and 2025. These targets again reflect the importance of diverting waste from landfill, reducing waste generation, and keeping resources circulating in the economy for as long as possible.

The release of the *SA's Waste Strategy 2020-25* provides the opportunity to reflect on our successes when comparing them to the targets of *SA's Waste Strategy 2015-20*. It also identifies areas of opportunity for the State for targets that were not achieved.

This report assesses the State's performance against these targets. Resource recovery and landfill disposal data are measured for a range of waste materials. Green Industries SA does an annual survey with SA waste collectors, recyclers, and re-processors on how they handle resources which would otherwise go to waste.

In 2019-20 Green Industries SA also surveyed selected organisations in the re-use economy. This included food rescue charities, second-hand stores and companies that refurbish electronics. The 2019-20 survey included a question about respondents' highest priority when identifying the reprocessing destination for sourced goods and materials in a circular economy. Results are provided in Section 2.6.1.

This report includes information about a range of waste streams. Information includes tonnes recycled, where this material is sourced (metropolitan versus regional SA, and if it is from municipal (MSW), commercial and industrial (C&I) or construction and demolition (C&D)). It also considers where the recyclables are reprocessed (in SA, interstate or overseas).

The survey asks respondents to report on key trends in resource recovery, market size and strength, barriers to increasing resource recovery and plans to expand or contract. Summarised findings from these comments are included within the report.

The results of the survey are prepared according to the guidelines for compiling waste and recycling data (Dept of the Environment and Energy 2015), with consideration to the guidance for improving national waste data and reporting (Dept of the Environment and Energy, 2018) and the National Waste Report 2020 (Department of Agriculture, Water and the Environment, Blue Environment, 2020). SA's recycling data can successfully contribute to national recycling surveys and assessments undertaken by the Australian Government.

Table 1.1 **Summary of South Australia's targets for diversion from landfill.** Based on SA's Waste Strategy 2015-2020 (Green Industries SA, 2015) and SA's Waste Strategy 2020-2025 (Green Industries SA, 2020). Overall targets are: Zero avoidable waste to landfill by 2030[4], and a 5% reduction in per capita waste generation from a 2020 baseline.

Year	Metropolitan Waste Targets			
	% diversion household bin system	% diversion all MSW waste[5]	% diversion C&I	% diversion C&D
2009	NA	55%	60%	80%
2012	NA	60%	65%	85%
2015	NA	70%	75%	90%
2020	60%	70%	80%	90%
2023	60%	65%	85%	90%
2025	70%	75%	90%	95%
Year	**Non-Metropolitan (all waste sectors) Waste Targets**			
2012	Maximise diversion to the extent practically and economically achievable			
2015				
2020				
2023	Regional Waste Management Plans are in place for all South Australian regional local government areas and/or regional city clusters and set regionally appropriate and progressive waste diversion targets			

4 Zero avoidable waste to landfill equates to the diversion of all waste from landfill where it is technologically, environmentally, and economically practicable to do so. 'Unavoidable' waste therefore refers to wastes for which no other current treatment is available including (but not limited to) asbestos, toxic and quarantine waste.

5 Quantities arising from total MSW waste comprising household bin systems, hard waste services, street sweepings, council-operated parks and gardens, public place locations, waste collected at drop-off facilities, and council-operated commercial services.

02 Overall 2019-20 Recycling Activity Statistics

At a glance:

- This section summarises the outcomes from the 2019-20 SA Recycling Activity Survey data. Data includes:
  - Resource recovery and landfill disposal, which includes the overall results and by type of material, source sector (including at kerbside), geographical origin, re-processing destination, material recovery versus energy production in SA and market value;
  - SA's performance against State goals and targets for waste management;
  - SA's resource recovery performance relative to other states and territories in Australia;
  - Full time equivalent (FTE) employment in the SA waste and resource recovery sector by employment classification;
  - Tonnes re-used and the value of these re-used tonnes (new to the 2019-20 report) and respondents' highest priorities when identifying the reprocessing destination for sourced goods and materials in a circular economy (new to the 2019-20 report);
  - Disaster waste generated from the 2019-20 bushfires (unique to the 2019-20 report).

2.1 Resource recovery and landfill disposal

2.1.1 Overview

SA diverted 4.13 million tonnes of material to resource recovery in 2019-20 (**Table 2.1**). This is 204,000 tonnes or 4.7% lower than material diverted in 2018-19.

Resource recovery in 2019-20 included:

- 2.99 million tonnes of 'Standard Reporting Materials'. These materials include Metals, Organics, Cardboard & Paper, Plastics, Glass, Masonry (not including soil), Foundry Waste, Leather & Textiles and Tyres & Other rubber.
- 1.14 million tonnes of 'Separately Reported Materials & Clean Fill'. This includes soil, sand, rock, and rubble[6]. Fly ash would fit in this category if SA recovered any of this material in 2019-20.

6 These materials are considered separately because they can fluctuate significantly across reporting years and between different States and Territories.

Standard Reporting Materials decreased by 4.1% (from 3.12 million tonnes in 2018-19 to 2.99 million tonnes in 2019-20). Separately Reported Materials & Clean Fill decreased by 6.2% (from 1.22 million tonnes in 2018-19 to 1.14 million tonnes in 2019-20).

Although recovery of both Standard Reporting Materials and Separately Reported Materials & Clean Fill decreased, landfill disposal tonnes also decreased (from 0.84 million tonnes in 2018-19 to 0.83 million tonnes in 2019-20). The net result was a slight decrease in overall recovery rate, from 83.8% in 2018-19 to 83.3% in 2019-20.

Waste generation per capita decreased for the second year in a row. This is a positive result, although is in part due to an overall slowing of activity in response to COVID-19. Recovered materials was 2,335 kg/person in 2019-20 compared to 2,475 kg/person in 2018-19. Overall waste generation per capita was 2,800 kg/person in 2019-20 compared to 2,960 kg/person in 2018-19.

Material recovered per dollar of Gross State Product (GSP) also decreased, by 3.4%. In 2019-20 SA generated 38.2 tonnes per $1 million of GSP (compared to 39.5 tonnes per $1 million of GSP in 2018-19).

Table 2.1 **Annual South Australian resource recovery and landfill disposal quantities diversion performance for 2019-20, 2003-04 (first survey year) and since 2015-16.** This table presents a breakdown of Standard Reporting Materials and Separately Reported Materials & Clean Fill in accordance with reporting guidelines (Dept of the Environment and Energy, 2015). Separately Reported Materials include Fly Ash & contaminated soil. Percentage changes in performance from 2003-04 and from 2018-19 are shown.

	2003-04	2015-16	2016-17	2017-18	2018-19	2019-20	Change	
							18-19 to 19-20	03-04 to 19-20
RESOURCE RECOVERY (TONNES)								
Standard Reporting Materials	1,880,000	2,950,000	2,880,000	3,143,000	3,123,000	2,994,000	-4.1%	59.3%
Separately Reported Materials & Clean Fill	162,000	960,000	1,521,000	1,346,000	1,215,000	1,140,000	-6.2%	603.7%
TOTAL (for SA)	**2,042,000**	**3,910,000**	**4,401,000**	**4,489,000**	**4,338,000**	**4,134,000**	**-4.7%**	**102.4%**
LANDFILL DISPOSAL (TONNES)								
Standard Reporting Materials	1,258,000	772,000	739,000	783,000	675,000	631,000	-6.5%	-49.8%
Separately Reported Materials & Clean Fill	20,000	118,000	134,000	98,000	165,000	196,000	18.8%	880.0%
TOTAL (for SA)	**1,278,000**	**890,000**	**873,000**	**881,000**	**840,000**	**827,000**	**-1.5%**	**-35.3%**
WASTE GENERATION (TONNES)								
Standard Reporting Materials	3,138,000	3,722,000	3,619,000	3,926,000	3,798,000	3,625,000	-4.6%	15.5%
Separately Reported Materials & Clean Fill	182,000	1,078,000	1,655,000	1,444,000	1,380,000	1,336,000	-3.2%	634.1%
TOTAL (for SA)	**3,320,000**	**4,800,000**	**5,274,000**	**5,370,000**	**5,178,000**	**4,961,000**	**-4.2%**	**49.4%**
DIVERSION/RECOVERY RATE (%)								
Standard Reporting Materials (ONLY)	59.9%	79.3%	79.6%	80.1%	82.2%	82.6%	0.4%	37.9%
TOTAL (for SA)	**61.5%**	**81.5%**	**83.4%**	**83.6%**	**83.8%**	**83.3%**	-0.5%	35.5%
SA Population (persons)	1,534,000	1,708,200	1,723,500	1,736,400	1,751,700	1,769,300	1.0%	15.3%
PER CAPITA DIVERSION/RESOURCE RECOVERY (KG/PERSON/YR)								
Standard Reporting Materials (ONLY)	1,230	1,730	1,670	1,810	1,780	1,690	-5.1%	37.4%
TOTAL (for SA)	**1,330**	**2,290**	**2,555**	**2,585**	**2,475**	**2,335**	**-5.7%**	**75.6%**
PER CAPITA LANDFILL DISPOSAL (KG/PERSON/YEAR)								
Standard Reporting Materials (ONLY)	820	450	430	450	390	360	-7.7%	-56.1%
TOTAL (for SA)	**830**	**520**	**505**	**505**	**480**	**465**	**-3.1%**	**-44.0%**
PER CAPITA WASTE GENERATION (KG/PERSON/YEAR)								
Standard Reporting Materials (ONLY)	2,050	2,180	2,100	2,260	2,170	2,050	-5.5%	0.0%
TOTAL (for SA)	**2,160**	**2,810**	**3,060**	**3,090**	**2,960**	2,800	**-5.4%**	**29.6%**
SA Gross State Product [a] (GSP) ($millions)	85,130	104,498	106,110	108,639	109,843	108,334	-1.4%	27.3%
PERFORMANCE METRICS PER $GSP (TONNES/$MILLION GSP)								
TOTAL SA Diversion/Resource Recovery [b]	24.0	37.4	41.5	41.3	39.5	38.2	-3.4%	59.1%
TOTAL SA Landfill Disposal [b]	15.0	8.5	8.2	8.1	7.6	7.6	-0.2%	-49.1%
TOTAL SA Waste Generation [b]	39.0	45.9	49.7	49.4	47.1	45.8	**-2.9%**	**17.4%**

Notes:

(a) Reference year for GSP chain volume measures (which removes the inflation effects on GSP values) is reported as 2019-20 (ABS 2020).

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

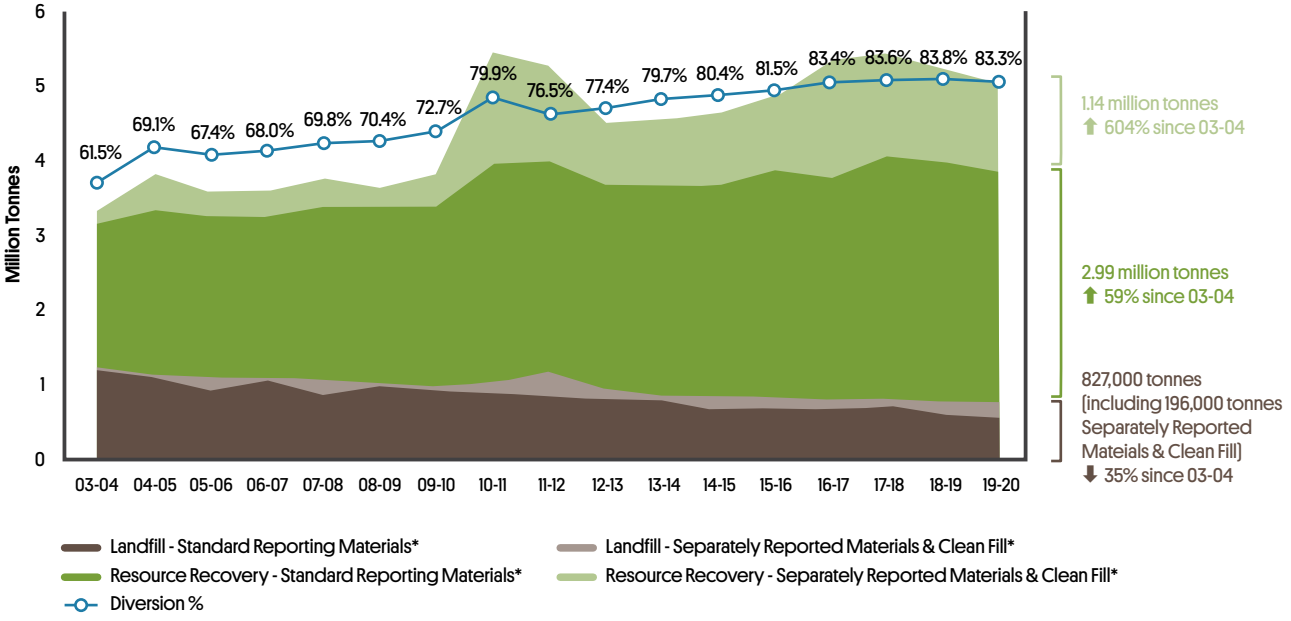
2.1.2 Comparison with 2003-04

Figure 2.1 displays the increase in diversion rate and materials recovered over time, as well as the change in landfill disposal (for Standard Reported Materials and Separately Reported Materials & Clean Fill).

The State's recovery of Standard Reporting Materials has increased 59.3% since 2003-04, while Separately Reported Materials has increased 603.7% since 2003-04 (**Figure 2.1**). Tonnes to landfill has also decreased since 2003-04, from 1.28 million tonnes to 0.83 million tonnes in 2019-20.

However, SA's results have remained relatively consistent over the past four years. SA's diversion rate has been between 83.3% and 83.8% during this time.

Figure 2.1 **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.



2.1.3 Recovery by material type

Detailed information about the recovery of materials by category can be found in Section 3 of this report and the trends in recovery of materials from 2003-04 to 2019-20 are summarised in **Table 2.2**. Some notable changes by waste stream from 2018-19 to 2019-20 include:

- Glass increased significantly by 13,000 tonnes or up 18% from last year. This increase is due to a combination of factors, including the increase in recycled content of bottles and the use of glass in road base becoming more common. The demand for recycled glass in asphalt and footpaths is increasing, as it can be used as a replacement for virgin sand.
- Masonry reduced by 10% from 2018-19, with 1.26 million tonnes recovered. The recovery of bricks fell by 45%, from 74,000 tonnes in 2018-19 down to 41,000 in 2019-20. Despite this reduction, major State Government projects continue to generate large volumes of Masonry reprocessing. Recovery of Masonry is expected to decline as civil projects are completed.
- Metals recovery was the lowest since 2015-16 and decreased by 16% from 2018-19 (down 51,000 tonnes). This was due to COVID-19 slowing industry activity and the completion of a large-scale regional demolition project.

- Organics remained strong in 2019-20 and this is likely to continue. Timber increased by 30% due to a growth in forestry activity with a strong building sector in SA and interstate in 2019-20. The demand for organics derived products is high. There remains a significant opportunity to recover food waste from landfill and reduce contamination in organics.
- Cardboard & Paper recovery was the lowest it has been since 2007-08. It decreased by 15% from 2018-19 to 2019-20, due to COVID-19 slowing industry activity and overseas governments' intake restrictions. Intake restrictions flooded other markets, drastically decreasing the price for this material. The future of recovered Cardboard & Paper is uncertain and hard to predict.
- Plastics recovery decreased by 3% in 2019-20. Mixed &/or Other Plastics (MIX) showed the biggest decline, due mostly to a decrease in value. This resulted in improved separation of Plastics into higher value grades such as PET, LDPE, and HDPE.
- Other Materials recovery increased by 61% due to improved reporting and the increased use of foundry waste that previously went to landfill. Tyre recovery increased marginally due to interstate and overseas travel bans, which increased tyre replacement as the public were more likely to travel by road. Leather & Textiles decreased due to COVID restrictions closing shops for part of 2019-20.

Overall resource recovery is at 38.2 tonnes per $1 million gross state product (**Figure 2.2**).

Source sector and destinations for each material stream are illustrated in **Figure 2.3**. The majority (61%) of recyclables arise in the C&D sector. The top three materials by weight were Masonry, Soil and Organics. Together, these materials comprise 85% of all materials recovered. Most (88%) materials are recovered in SA with the remainder sent interstate (5%) or overseas (7%).

Figure 2.2 Trend in resource recovery for SA by material category since 2003-04, including tonnes per $m of Gross State Product (GSP).

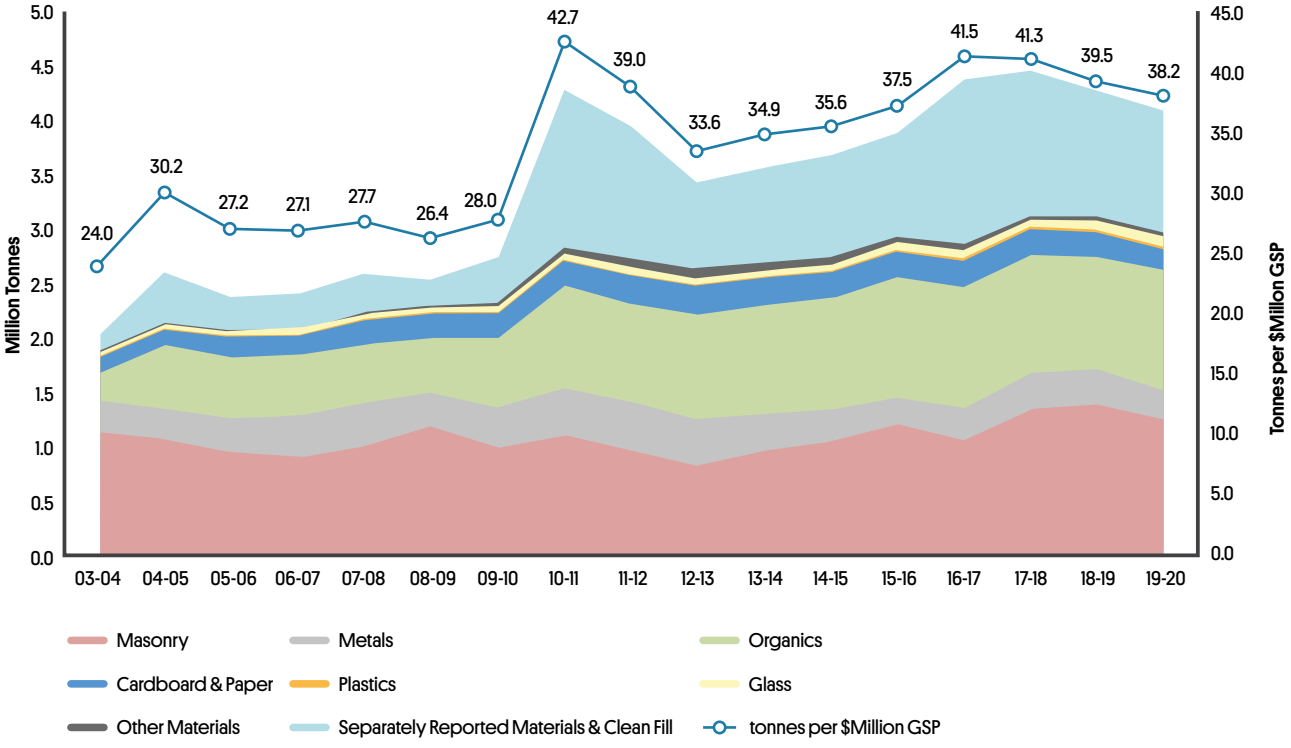


Figure 2.3 **2019-20 SA Recycling Activity materials, showing their source sector and destinations for recycling.** The most voluminous streams remain as Soil, Masonry and Organics. Most recovered resources are from the C&D sector (61%) and the majority recycled in SA (88%).

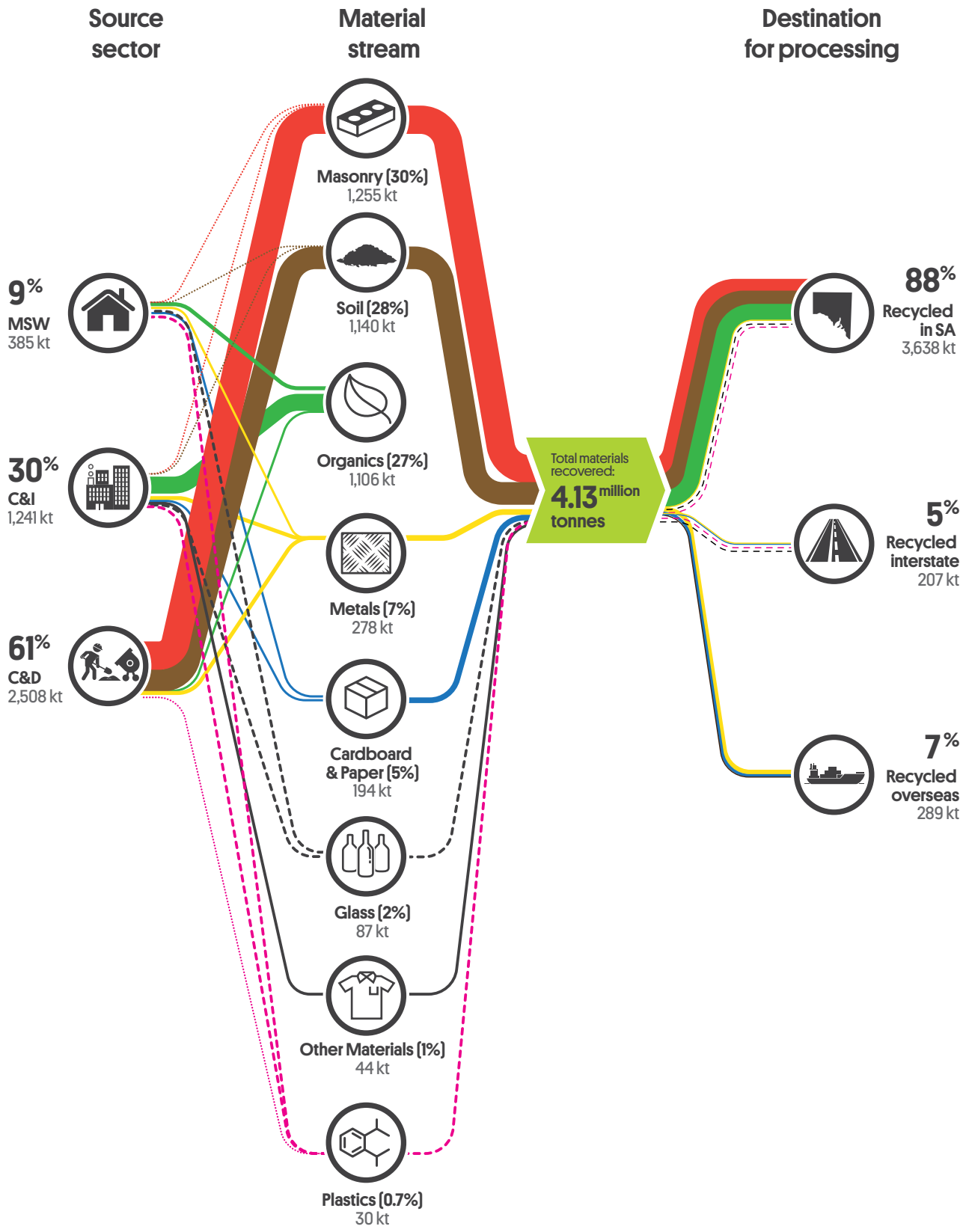


Table 2.2 **Reported material quantities (tonnes) being diverted for resource recovery in SA for 2019-20, preceding 5 years, and first Survey year, 2003-04.** This table shows the changes in resource recovery of waste materials which have occurred in SA during these periods, including the percentage increase or decrease between 2018-19 and 2019-20. The data is presented in accordance with national reporting guidelines (Dept Environment and Energy, 2015). Note that totals may not equate to sums due to rounding.

ID	Material	2003-04	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	Change (%) 18-19 to 19-20
	Masonry								
1	Asphalt	100,000	170,000	210,000	270,000	286,000	269,000	238,000	-12%
2	Bricks	165,000	55,000	53,000	42,000	102,000	74,000	41,000	-45%
3	Concrete	877,000	820,000	940,000	750,000	960,000	1,049,000	975,000	-7%
4	Plasterboard		1,100	1,400	1,400	1,500	1,100	1,000	-9%
	Subtotal	**1,142,000**	**1,046,100**	**1,204,400**	**1,063,400**	**1,349,500**	**1,393,100**	**1,255,000**	**-10%**
	Metals								
7	Steel	264,200	280,000	230,000	275,000	299,000	297,000	248,000	-16%
8	Aluminium	19,000	18,000	18,000	17,000	14,000	14,000	11,000	-21%
9	Non-ferrous metals	13,000	20,000	19,000	18,000	19,000	18,000	19,000	6%
	Subtotal	**296,200**	**318,000**	**267,000**	**310,000**	**332,000**	**329,000**	**278,000**	**-16%**
	Organics								
10	Food Organics	0	7,600	7,900	8,100	9,100	12,300	13,400	9%
11	Garden Organics	130,100	259,000	255,000	293,000	257,000	257,000	250,000	-3%
12	Timber	116,700	220,000	273,000	250,000	270,000	242,000	315,000	30%
13,14,15,16	Other Organics	0	530,000	570,000	562,000	563,000	529,000	528,000	0%
	Subtotal	**246,800**	**1,016,600**	**1,105,900**	**1,113,100**	**1,099,100**	**1,040,300**	**1,106,400**	**6%**
	Cardboard & Paper								
17	Cardboard & Waxed Cardboard	91,000	149,000	151,000	170,000	162,000	160,000	134,000	-16%
18	Liquid Paperboard	0	1,800	1,700	1,200	1,200	800	600	-25%
19, 20, 21	Magazines & Newsprint	32,701	62,000	61,000	69,000	62,000	54,100	47,400	-12%
22	Printing & Writing Paper	12,300	19,000	14,000	9,000	11,000	14,000	12,000	-14%
	Subtotal	**136,001**	**231,800**	**227,700**	**249,200**	**236,200**	**228,900**	**194,000**	**-15%**
	Plastics								
23	Polyethylene Terephthalate	0	4,400	4,200	4,200	4,800	4,900	4,700	-4%
24	High Density Polyethylene	0	4,500	4,800	4,500	6,100	5,900	6,000	2%
25	Polyvinyl Chloride	0	300	300	10	60	100	100	0%
26	Low Density Polyethylene	0	3,600	3,700	4,100	3,200	2,000	3,000	50%
27	Polypropylene	0	1,700	1,600	1,400	800	600	1,100	83%
28	Polystyrene	0	250	300	300	330	500	600	20%
29	Mixed &/or Other Plastics	8,607	12,000	13,000	14,000	15,800	16,600	14,200	-14%
	Subtotal	**8,607**	**26,800**	**27,900**	**28,500**	**31,100**	**30,600**[3]	**29,700**	**-3%**
	Glass								
30	Glass	45,600	61,000	64,000	67,000	60,000	74,000	87,000	18%
	Other Materials								
40	Foundry Waste	0	40,800	34,400	24,500	9,600	6,000	24,000	300%
41	Leather & Textiles	4,080	4,000	4,000	4,000	5,500	2,400	900	-65%
42	Tyres & Other Rubber	88	18,500	18,400	19,900	20,000	18,600	19,000	2%
	Subtotal	**4,168**	**63,300**	**56,800**	**48,400**	**35,100**	**27,000**	**43,900**	**61%**
	Total of above materials	**1,879,376**	**2,763,600**	**2,953,700**	**2,880,000**	**3,143,000**	**3,123,000**	2,994,000	**-4%**
39	Fly Ash	0	146,000	100,000	0	0	0	**0**	NA
5	Clay, Fines, Rubble & Soil – Clean Fill	162,400	660,000	760,000	1,307,000	1,052,000	937,000	**874,000**	-7%
6	Clay, Fines, Rubble & Soil – Intermediate Waste Soil[1]	NRS[2]	130,000	100,000	214,000	294,000	278,000	**266,000**	-4%
	Total Clay, Fines, Rubble & Soil	162,400	790,000	860,000	1,521,000	1,346,000	1,215,000	**1,140,000**	-6%
	Total Reported	**2,041,776**	**3,700,000**	**3,910,000**	**4,401,000**	**4,489,000**	**4,338,000**	4,134,000	**-5%**

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 The 2018-19 tonnes for MIX and LDPE, and therefore the total plastics, have changed slightly from what was reported in 2018-19 due to to more consistent rounding.

2.1.4 Source sector outcomes

The sector origin of waste and recyclables in 2019-20 for both recovered resources and resources sent to landfill can be seen in **Table 2.3** and graphically in **Figure 2.4**.

During 2019-20, Municipal (MSW) sources contributed 385,000 tonnes to resource recovery (see **Table 2.3** below and **Figure 2.4**). This is a slight decrease of 3.3% from 2018-19.

In line with the previous years, MSW contributes the least to the recovered resources, but the most to resources sent to landfill, with a diversion rate of 51.6%. MSW resource recovery decreased in all areas except Glass in 2019-20. Organics contributed the most to MSW recovered tonnes. The estimated quantity of MSW volumes to landfill also decreased marginally to 361,000 tonnes (down 600 tonnes from 2018-19). However, this represents 48.4% of the total waste generated in the MSW sector. The SA MSW diversion rate decreased to 51.6% (down from 52.4% in 2018-19).

The reported quantity of C&I resource recovery in 2019-20 (1.24 million tonnes) increased by 6.8% from the previous year (from 1.16 million tonnes). Like the MSW sector, Organics makes up the largest proportion of recovered tonnes for C&I, followed by Metals and Cardboard & Paper. The volume of C&I sent to landfill decreased by 14.0%, from 171,000 tonnes in 2018-19 to 147,000 tonnes in 2019-20. Consequently, the diversion rate increased to 89.4%, up 2.2 percentage points from the previous year.

C&D recovery constitutes the main source of resource recovered material reported by the SA recycling industry in 2019-20 (see **Table 2.3** and **Figures 2.4** and **2.5**). However, it decreased from 2.78 million tonnes in 2018-19 to 2.51 million tonnes in 2019-20. At the same time, C&D landfill disposal increased slightly to 319,000 tonnes. This is up from 307,000 tonnes in 2018-19. Waste from the bushfire recovery accounts for some of the additional C&D waste to landfill. This has led to a decrease in C&D diversion to 88.7% (down from 90.0% in 2018-19).

Table 2.3 **Source sector origins (by weight, tonnes and %) of SA recovered materials and waste to landfill, 2019-20, and diversion rates (%).** Source data for resource recovery by source sector was obtained from the 2019-20 Recycling Activity Survey data. Source data for landfill disposal by source sector during 2019-20 was obtained from Green Industries SA. Note that some totals may not equate precisely due to rounding.

Sector Origin	Resource Recovery		Landfill		Diversion (%)
	tonnes	(%)	tonnes	(%)	
Municipal	385,000	9%	361,000	44%	51.6%
C&I	1,241,000	30%	147,000	18%	89.4%
C&D	2,508,000	61%	319,000	39%	88.7%
Total	**4,134,000**	**100%**	**827,000**	**100%**	**83.3%**

Figure 2.4 **Contribution to resource recovery in SA by source sector for 2019-20 and trend since 2007-08**
(note percentages may not equate due to rounding).

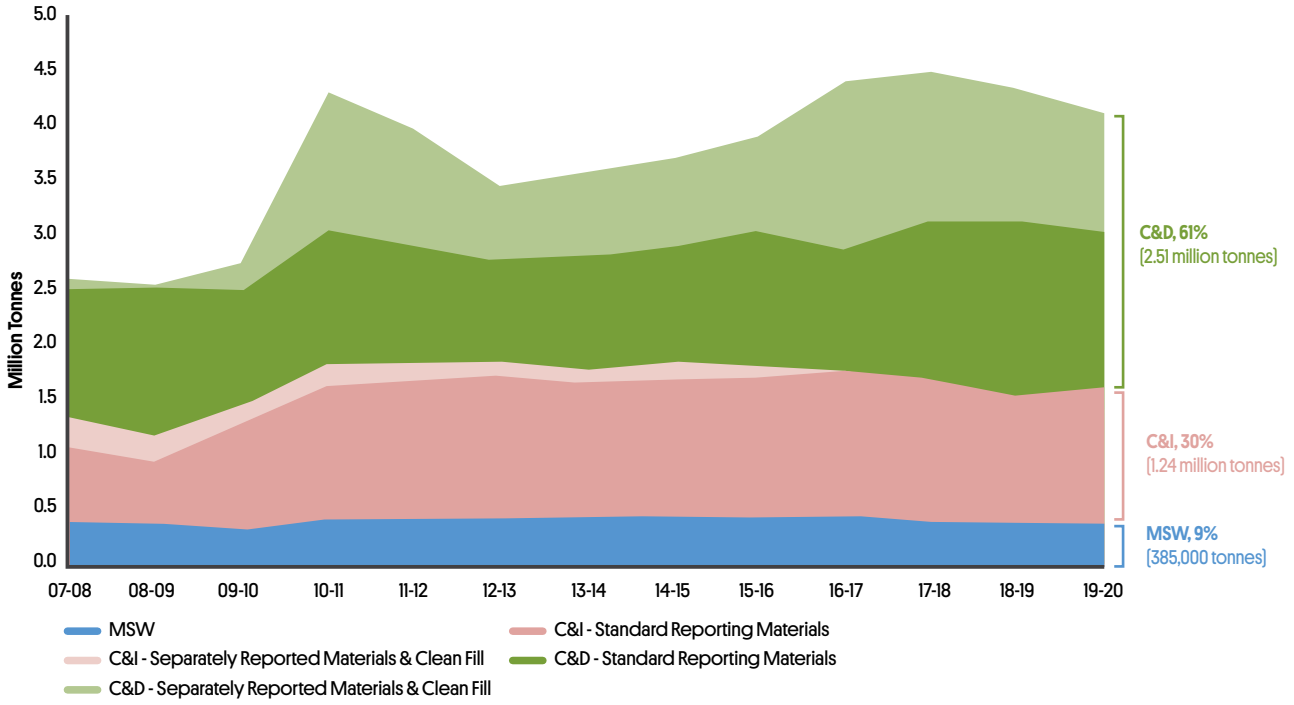
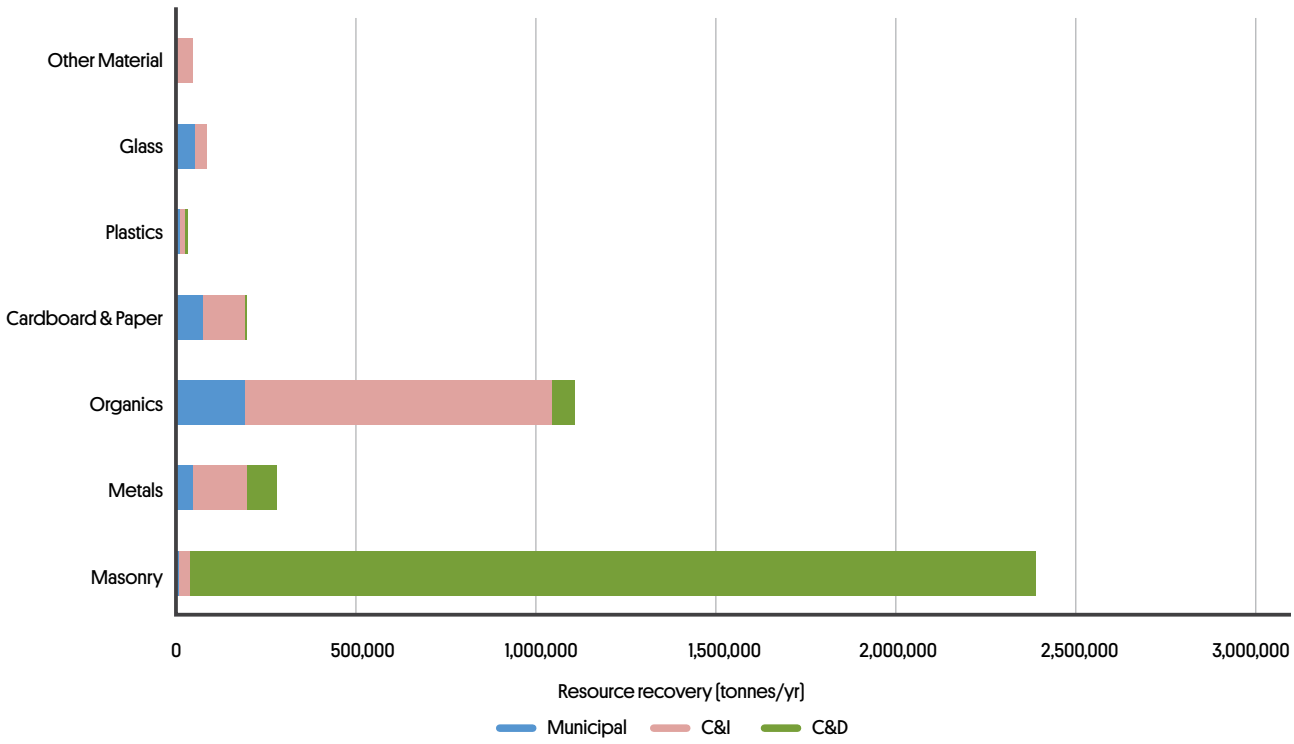


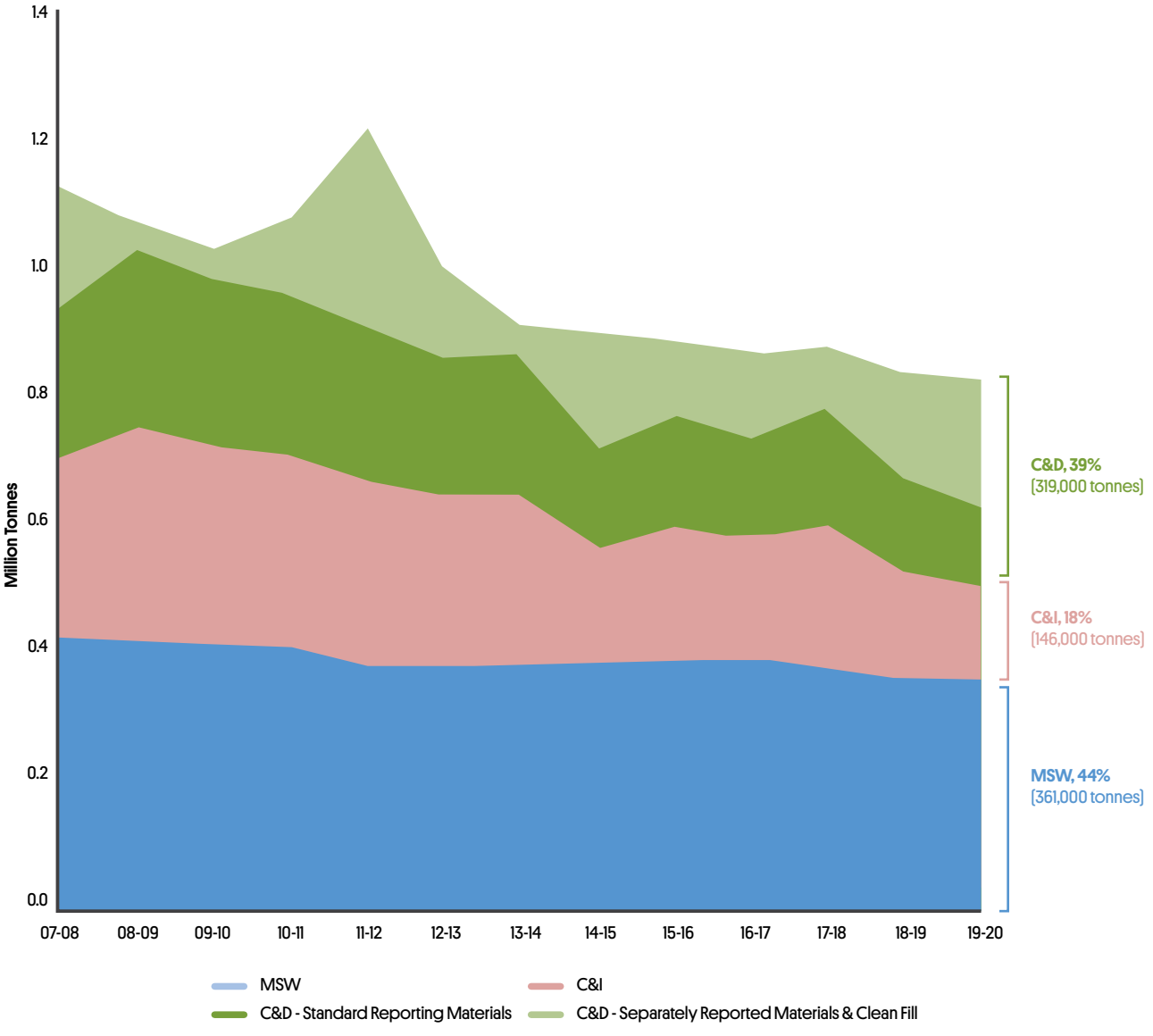
Figure 2.5 **Sector origin of SA recovered materials according to material category (by weight, tonnes), SA 2019-20.**
This figure shows the source sector splits for resource recovered materials by source sector (MSW, C&I and C&D).



2.1.5 Landfill Disposal

Landfill disposal in South Australia decreased from 840,000 tonnes in 2018-19 to 827,000 tonnes in 2019-20 (see **Figure 2.6**). This decrease was mostly due to a fall in the volumes of C&I materials and C&D Standard Reporting Materials to landfill (decrease of 23,500 tonnes and 19,600 tonnes respectively). The MSW sector decreased only marginally, by 600 tonnes, while overall C&D disposal to landfill including Separately Reported Materials increased by 10,800 tonnes.

Figure 2.6 **Contribution to landfill disposal in SA by source sector for 2019-20[7] and trend since 2007-08.**
This figure shows the tonnes of landfilled materials by source sector (MSW, C&I and C&D) over time.
Note percentages may not equate due to rounding.



7 Landfill figures based on what was known to be correct at time of compiling the report.

2.1.6 Geographical origin

Metropolitan areas contributed the highest proportion of recovered resources in SA (83.5% or 3.45 million tonnes, **Table 2.4**). Metropolitan areas also contributed the greatest proportion of waste to landfill (68.9% or 0.57 million tonnes).

Regional areas remain a strong contributor of recovered resources to SA's recycling activity in 2019-20, providing 0.68 million tonnes of recovered material or 16.5% of the total material being recovered in SA (**Table 2.4**). Regional areas were also responsible for 0.26 million tonnes (or 31.1%) of waste disposed to landfill in SA. In line with previous years, a significant proportion of this regional resource recovery arises from Organics – 71.3% (6.4% increase from last year), mainly from processing of primary products (e.g., wine, timber, meat).

Table 2.4 shows that the diversion rate for Metropolitan Adelaide is higher than the diversion rate for Regional areas (85.8% versus 72.6% respectively).

Comparing 2019-20 to 2018-19, resource recovered materials and tonnes sent to landfill decreased for Metropolitan Adelaide but increased for Regional South Australia. Resource recovery in metropolitan areas decreased 8.4% while tonnes to landfill from these areas decreased 6.5%. For regional areas, resource recovery increased 19.5% but tonnes to landfill also increased, by 11.4%. The net result is a slight decrease in diversion rate for metropolitan areas (from 86.1% in 2018-19 down to 85.8% in 2019-20) and an increase in regional areas (72.6% in 2019-20, up from 71.2% in 2018-19).

The indicative locations in SA of main sites for recyclers/reprocessors reporting resource recovery data to Green Industries SA Recycling Activity Survey are shown in **Figures 2.7** and **2.8**.

Table 2.4 **Geographical origins (by weight, tonnes and %) of SA recovered materials and waste to landfill, 2019-20, and diversion rates (%).** The separate contributions by metropolitan and regional areas to resource recovery and landfill disposal in SA are shown in this Table. Note sum may not equate due to rounding. Rounding also influences diversion rates.

Sector Origin	Resource Recovery		Landfill[1]		Diversion
	tonnes	(%)	tonnes	(%)	
Metro	3,451,900	84%	569,300	69%	85.8%
Regional	682,500	17%	257,300	31%	72.6%
Total	**4,134,000**	**100%**	**827,000**	**100%**	**83.3%**

1 Landfill data was provided by South Australian Environment Protection Authority (SA EPA) and is based on what was known to be correct at time of compiling the report.

Figure 2.7

Approximate geographical location of main sites for recyclers/re-processors in SA.
This map was produced by Green Industries SA during the 2016-17 Recycling Activity Survey year.
Refer Figure 2.8 for enlargement of metropolitan Adelaide area.

Waste and Resource Recovery Infrastructure in South Australia

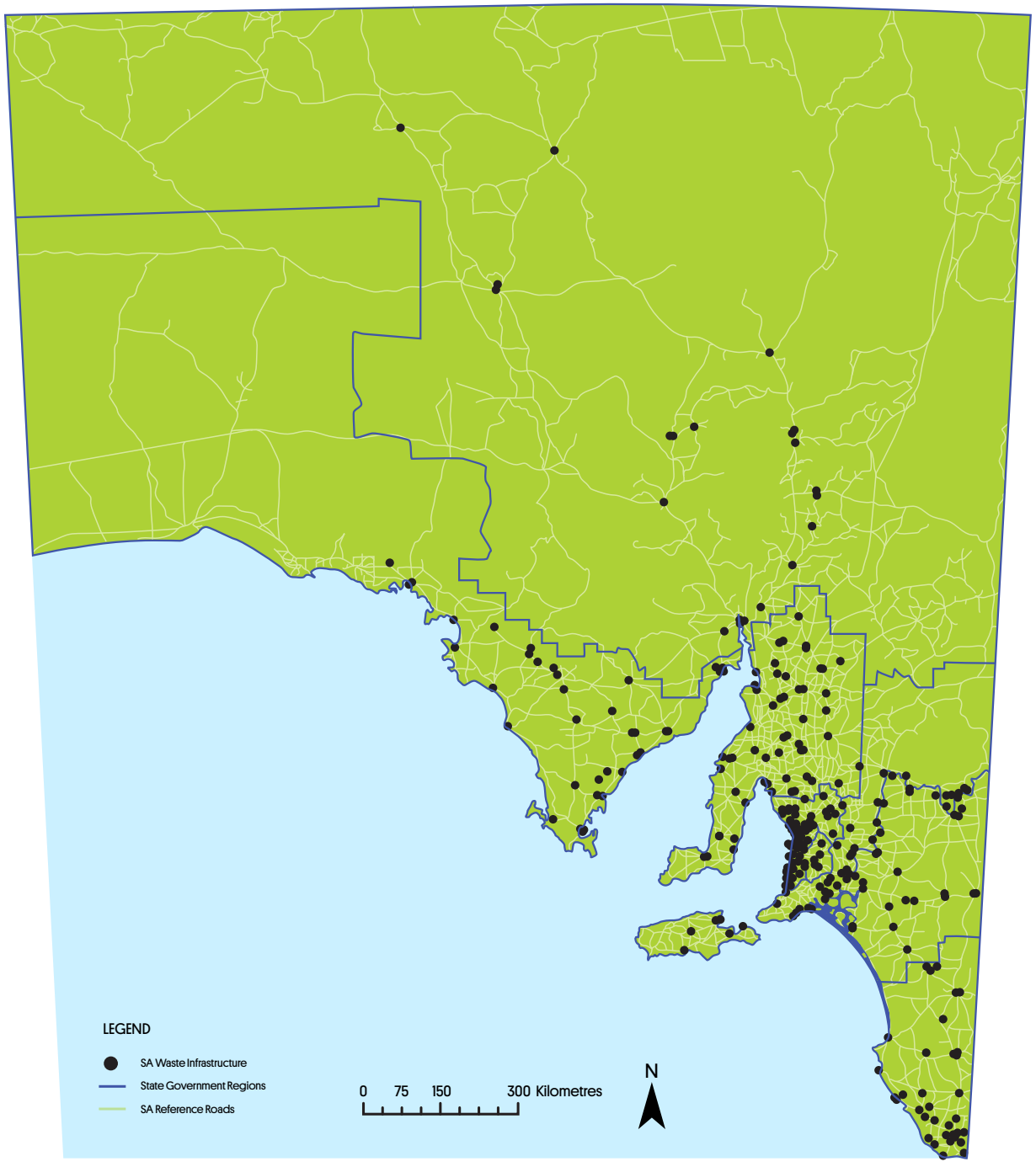
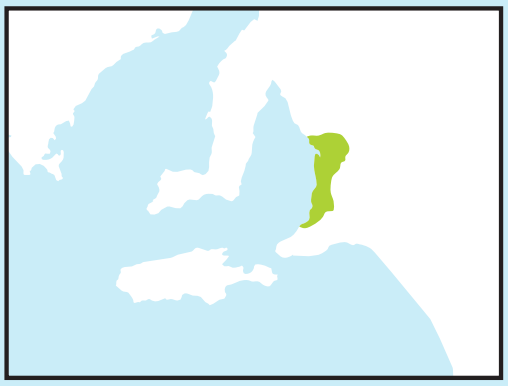


Figure 2.8

Approximate geographical location of main sites for recyclers/re-processors in Adelaide.
This map was produced by Green Industries SA during the 2016-17 Recycling Activity Survey year.

Waste and Resource Recovery Infrastructure in Metropolitan Adelaide Region



Northern Adelaide

Western Adelaide

Adelaide

Eastern Adelaide

Southern Adelaide

LEGEND

- Compositing Facility Open Windrow [7]
- Construction & Demolition Processing Facility [17]
- Drop off facility [27]
- E-Waste Processing Facility [4]
- Hazardous Waste Facility [11]
- Landfill [3]
- Material Recovery Facility [10]
- Medical Waste Disposal [3]
- Other [6]
- Other Processing Facility Medium Tech [33]
- Soil Storage and Remeddiation Facility [1]
- Transfer Station [69]
- CDL Depots [41]
- Local Government Areas
- State Government Regions
- SA Reference Roads

0 5 10 20 Kilometres

N

2.1.7 Destination for Recovered Materials

During 2019-20 the majority (88%) of recovered materials reported were re-processed in SA (**Table 2.5**).

The tonnes and proportion of materials sent interstate significantly decreased from 303,000 in 2018-19 to 222,000 tonnes in 2019-20 (down 26.7%). Quantities sent overseas also decreased, from 289,000 in 2018-19 to 285,000 in 2019-20 (down 1.4%).

All Masonry and almost all Organics are reprocessed locally (**Figure 2.9** and **Table 2.6**). A high proportion of recovered Glass (69%) and Other Materials (81%) are also re-processed in SA. Recovered Glass can be made into cullet locally, which is used for bottle manufacture, and foundry sands (in Other Materials) can be used in the cement manufacturing process. The proportion of Glass processed in SA decreased in 2019-20 due to additional tonnes sent interstate as a sand replacement in road base. This did not replace glass used for bottle remanufacture but is additional tonnes diverted from landfill.

All Cardboard & Paper and most Metals (90%) were sent interstate or overseas for re-processing. The proportion of Cardboard & Paper sent overseas increased from 49% in 2018-19 to 58% in 2019-20. An interstate paper facility that previously purchased SA recovered Cardboard & Paper changed ownership and stopped accepting SA product. This led to some SA recyclers sending materials to overseas markets instead.

Plastics sent overseas decreased from 27% to 17%, whilst plastics processed in SA increased by 6%. This is due to operation of a plastics recycling facility in SA for the entire financial year, and new plastics reprocessing infrastructure at other SA facilities.

Table 2.5 **Final reported destination (by weight, tonnes and %) of SA sourced materials, 2019-20.** The destination is where material is sent for re-processing. Most resource recovered material in SA is locally re-processed to use in the manufacture of new products. Note that sums and percentages may not equate due to rounding.

Destination	Quantity	
	tonnes	%
SA	3,627,000	88%
Interstate	222,000	5%
Overseas	285,000	7%
Total	**4,134,000**	**100%**

Figure 2.9

Destination of SA recovered materials according to material category (by weight, tonnes), 2019-20 compared with 2018-19.
Most materials are re-processed within SA, but significant quantities of some materials are exported interstate or overseas.

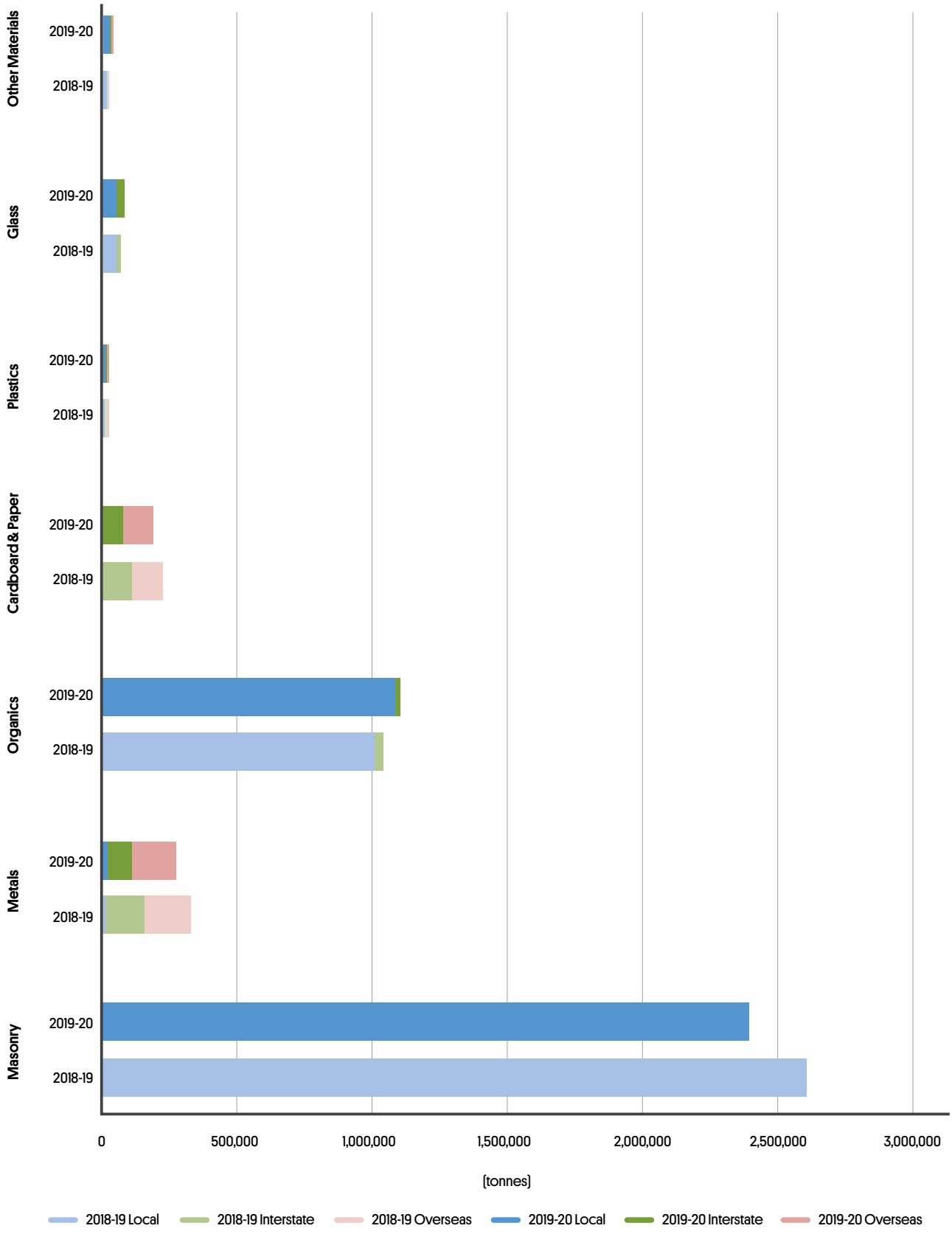


Table 2.6 **Destination (%) of SA sourced materials by stream, 2019-20. The order of materials is based on the proportion recovered in SA.** All Masonry and Separately Reported Materials & Clean Fill and most Organics, Other Materials and Glass is recovered here. Note percentages may not sum to 100% due to rounding.

	% of material recovered		
Material	**SA**	**Interstate**	**Overseas**
Masonry	100%	0%	0%
Separately Reported Materials & Clean Fill	100%	0%	0%
Organics	99%	1%	0%
Other Materials	81%	9%	10%
Glass	69%	31%	0%
Plastics	57%	26%	17%
Metals	10%	32%	59%
Cardboard & Paper	0%	42%	58%
Total	**88%**	**5%**	**7%**

2.1.8 Energy recovery[8]

SA increased its energy recovery from waste materials in 2019-20 compared to 2018-19. In 2019-20 the total tonnes recovered via refuse derived fuel/processed engineered fuel, anaerobic digestion and pyrolysis was 139,000 (**Table 2.7**). Comparisons to the previous two years were 125,000 tonnes in 2018-19 and 112,000 tonnes in 2017-18.

Energy recovery contributed a small amount (2.8 percentage points) to the state's total diversion rate of 83.3% (**Table 2.7**). This contribution is an increase from 2018-19 (2.4 percentage points) and 2017-18 (2.1 percentage points). No Separately Reported Materials & Clean Fill are recovered via energy, hence all energy recovery fits into Standard Reporting Materials. Materials used for energy recovery are predominately Timber, Mixed Plastics and Other Organics. Energy recovery contributed 3.8 percentage points of the overall diversion rate for Standard Reporting Materials (82.6%), with the remaining 78.8 percentage points from material recovery.

Energy recovery is anticipated to continue to grow over the next 5 to 10 years, from sources such as additional anaerobic digestion facilities, pyrolysis of agricultural waste, and/or diversion of the municipal waste/C&I residuals away from landfill to energy from waste plants.

Table 2.7 **Resource recovery (tonnes) for material recovery and energy production, from SA sourced materials reported during 2019-20.** 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.

		Standard Reporting Materials	Separately Reported Materials & Clean Fill	TOTAL (All materials)
Material recovery	Quantity, tonnes	2.86 million	1.14 million	4.00 million
	Diversion rate, %	78.8%	85.3%	80.5%
Energy recovery	Quantity, tonnes	138,992	0	138,992
	Diversion rate, %	3.8%	0.0%	2.8%
Total (resource) recovery	**Quantity, tonnes**	2.99 million	1.14 million	4.13 million
	Diversion rate, %	82.6%	85.3%	83.3%

8 Energy recovery is useful for waste that is deemed unsuitable or not cost-effective for material recovery. Some industries produce energy from waste by-products generated on their own sites, which is not reportable under national reporting guidelines (Dept Environment and Energy, 2015). There are also several waste companies that collect and re-process waste materials, which are then sent overseas and/or interstate for energy recovery. For example, tyres are often shredded and sent overseas as a replacement for coal in cement kilns. 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*. This necessarily excludes energy recovery from landfill gas arising from waste already disposed to landfills.

2.1.9 Imported materials

The SA Recycling Activity survey also asks respondents to identify recyclables brought in from interstate or overseas. These do not count towards SA's recycling performance, and do not include already re-processed materials imported into SA for manufacturing.

Imported materials increased in 2019-20 (349,100 tonnes) compared to 2018-19 (172,500 tonnes). This increase is predominately due to improved reporting for Other Materials imported from overseas. There was also an increase in Timber imported (increase of 4,000 tonnes) from Victoria due to more forestry activity in 2019-20 to meet demand from additional housing projects.

Imports of Plastics from interstate and overseas increased (increase of 16,000 tonnes) due in part to a plastics recycling facility operating for the full financial year. Additional Glass (increase of 30,000 tonnes) was imported from interstate due to a NSW glass reprocessing plant shutting down for a period and the cullet was subsequently sent to SA instead. SA imported a small volume of Cardboard & Paper (200 tonnes), with SA companies accepting disposed office paper from Victoria. Tonnes of Metals imported from interstate decreased slightly (decrease of 1,900 tonnes). This is due to decreases in scrap steel imports, from a slight slowing of industry activity nationally in 2019-20 due to COVID-19.

Table 2.8 **Waste materials reported as imported to SA for resource recovery in 2019-20, including estimated accuracy of data.** The highest quantities came from overseas and Victoria.

Material Stream	Interstate								Overseas	TOTAL	Est Accuracy (%)
	VIC	NSW	ACT	QLD	NT	WA	TAS	State not identified			
Masonry	-	-	-	-	-	-	-	-	-	-	
Metals	8,900	6,400	-	2,500	7,500	-	-	-	-	25,300	1%
Organics	72,100	-	-	-	-	-	-	-	-	72,100	10%
Cardboard & Paper	200	-	-	-	-	-	-	-	-	200	11%
Plastics	2,700	13,100	-	300	200	1,300	-	-	300	17,900	5%
Glass	-	49,500	-	-	-	-	-	38,700	-	88,200	12%
Other materials	7,100	-	-	-	600	-	-	200	137,500	145,400	1%
Total	**91,100**	**69,000**	**-**	**2,800**	**8,300**	**1,400**	**-**	**38,800**	**137,800**	**349,100**	**6%**

2.1.10 Market value of resource recovery

As part of the 2019-20 survey, participants were asked to provide the value per tonne for each material stream that was re-processed within their respective organisations. This data was used to estimate the market value of resource recovery in SA (see **Figure 2.10**).

Despite an overall decrease in recovered tonnes, the value of Metals remained high. Strong demand for recovered metals coupled with a drop in availability from inactivity has driven up the price of Metals. Metals continue to remain the greatest contributor to the market value of resource recovery in SA at $183 million. Organics is the second greatest contributor, estimated at $100 million. This is a slight increase since 2018-19 ($96 million). The price for Meat Rendering outputs (tallow, meal) remained strong in 2019-20, with a high value and a total contribution of $85.6 million for 2019-20.

The price for Cardboard & Paper remains volatile and decreased from $165 per tonne in 2018-19 to $109 per tonne in 2019-20. With China continuing to reduce intake of recovered cardboard and Indonesia temporarily ceasing any imports of fibre and other markets flooded, reducing the price for this material. Cardboard & Paper contributed $21 million to the resource recovery sector.

Masonry's value remained relatively constant and its overall contribution was $13 million. The Glass price per tonne decreased due to an increase in Glass to road base, which is a lower value option compared to Glass to bottle remanufacture. However, the overall value of glass remained around $7 million, due to capturing additional tonnes.

Overall, the resource recovery sector in SA has an estimated worth of $342 million. This is a slight decrease since 2018-19 due to an overall reduction in recovered tonnes, mainly from COVID-19 slowing industry activity. Further details on the value of each of these streams is included in **Table 2.9**. A comparison with previous years can be found in Section 6.

Figure 2.10 **Estimated market value of resource recovered material in SA during 2019-20.**
Organics continues to contribute the second greatest proportion of all materials behind Metals.

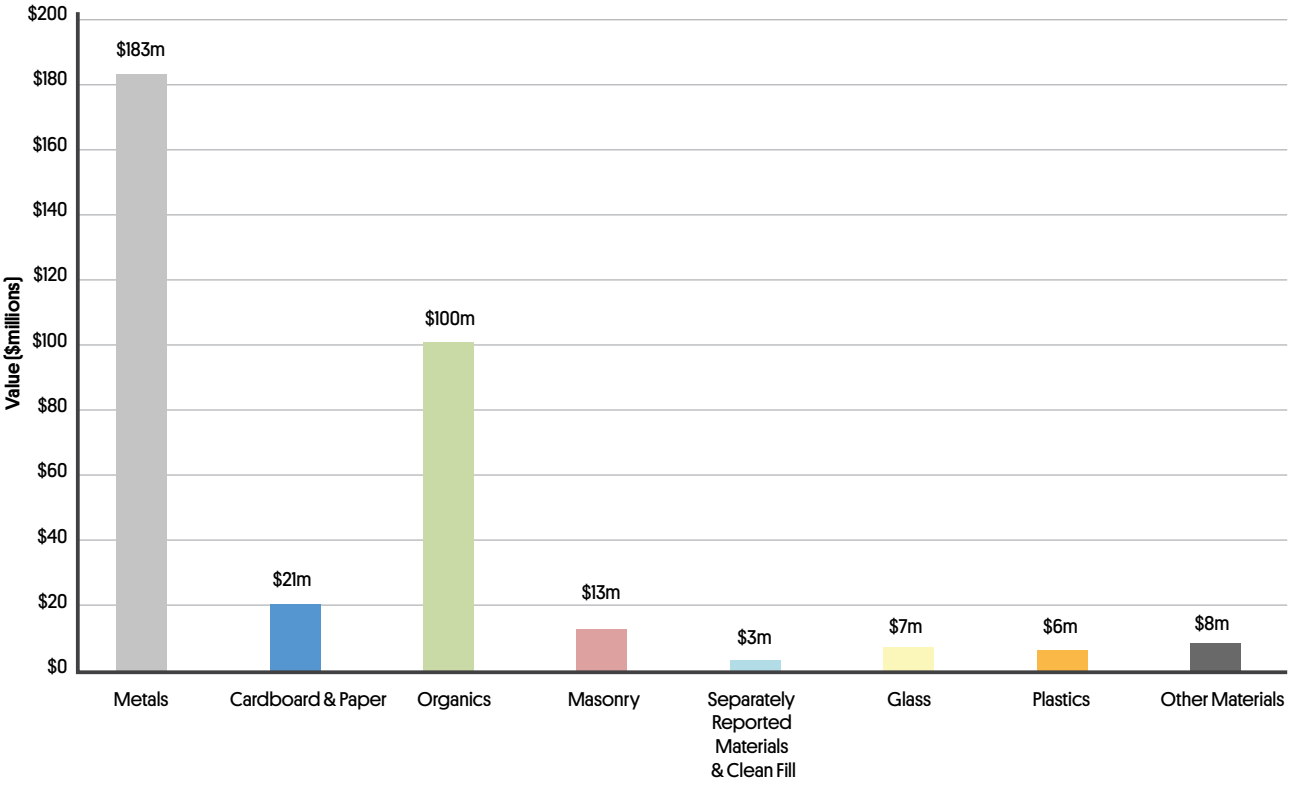


Table 2.9 **Assumed values for recovered materials in SA during 2019-20 used to estimate resource market value.**

Material category	Estimated on-sale price ($/tonne)	Price data source
Masonry	$10	Based on RAS survey results
Metals – Steel	$400	Based on RAS survey results
Metals – Non-ferrous including Aluminium	$2,788	Based on RAS survey results
Organics – Meat Rendering	$888	Based on RAS survey results
Organics – Garden, Food and Timber	$35	Based on RAS survey results
Cardboard & Paper	$109	Based on RAS survey results and SV Market Bulletins from 2019-20
Plastics	$206	Based on RAS survey results and SV Market Bulletins from 2019-20
Glass	$81	Based on RAS survey results
Other Materials (including Tyres & Other Rubber, Leather & Textiles and Foundry Sands)	$191	Based on RAS survey results
Separately Reported Materials & Clean Fill	$3	Based on RAS survey results

Please note these values are based on a range of sources including:

- Consultations with industry in October and November 2020
- 2019-20 survey responses (the survey asked participants to provide a price per tonne for each material recovered, reflecting the commodity price or market value for that material), and
- Publicly available information on market values of recovered materials.

In some cases, the weighted average of all streams within a material category was used to estimate the on-sale price. For example, Plastics and Cardboard & Paper.

2.2 Performance against State Waste Strategy Targets

2.2.1 Landfill Reduction Target

SA has a goal of reducing waste to landfill by 35% by 2020 (baseline: 2002-03). SA's performance against its target of reducing waste depends on whether contaminated soil is included in landfill volumes.

When including contaminated soil:

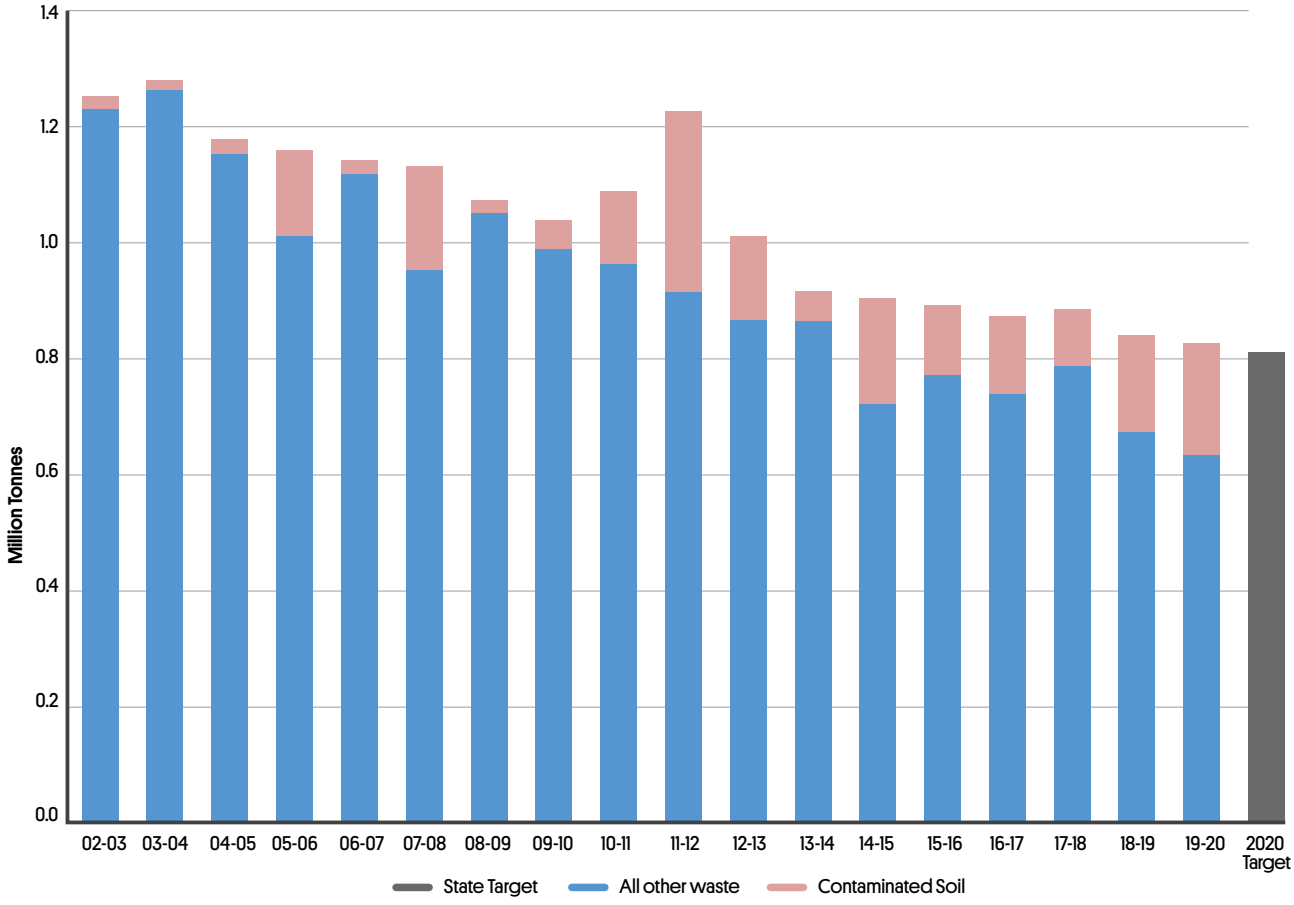
- SA's landfill volumes (at 827,000 tonnes) are 34% lower than the baseline year (2002-03). This means the state has fallen short by just 1 percentage point of the financial year milestone of a 35% reduction from 2002-03 landfill volumes by 2020.

When excluding contaminated soil:

- SA's landfill volumes (at 631,000 tonnes) are 49% lower than the baseline year (2002-03). This means SA has surpassed its 2020 target of a 35% reduction in landfill by 2020.

The SA Government set a new landfill target in its 2020-25 Waste Strategy (Green Industries SA, 2020). The new target is zero avoidable waste to landfill by 2030.

Figure 2.11 **Landfill disposal[9]: Trend in SA since 2002-03 and the State Waste Strategy Target.** This figure shows how landfill disposal in SA has changed since 2002-03 relative to SA's landfill reduction target. The separate contribution to landfill disposal of contaminated soil is also identified and the historical trend of landfill disposal excluding contaminated soil is illustrated.



9 Landfill figures based on what was known to be correct at time of compiling the report.

2.2.2 Per capita Waste Generation and Reduction Target

SA's Waste Strategy 2015-2020 set a state-wide per capita waste generation target of:

- 5% reduction in waste generation per capita by 2020 (baseline: 2015, Green Industries SA, 2015).

Waste generation decreased for the second year in a row. This is a positive result for the state. However, SA did not meet the 2020 target of a 5% reduction in waste generation from 2015. In 2019-20 SA's per capita waste generation increased from 2014-15 (1.4% decrease for Standard Reporting Materials, but 2.2% increase when including Separately Reported Materials & Clean Fill, **Table 2.10**).

SA's Waste Strategy 2020-2025 sets a new target of a 5% reduction in waste generation from the 2020 baseline. The 2020 baselines are provided in **Table 2.10**. In 2019-20, SA generated 2,050 kilograms per person per year for Standard Reporting Materials and 2,800 kilograms per person per year when including Separately Reported Materials & Clean Fill (**Table 2.10**). Reducing waste generation is a challenging area to address and an opportunity for the state.

Table 2.10 **Recycling Activity results per capita waste generation from 2012-13 to 2019-20 vs. State Waste Strategy target.**

Per capita Waste Generation (kg/person/yr)	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	% Change	2020 Target	2025 Target
Standard Reporting Materials	2,120	2,130	2,080	2,180	2,100	2,260	2,170	2,050	**1.4%** Decrease from 2014-15	5% Reduction from 2014-15	5% Reduction from 2020 baseline
Separately Reported Materials & Clean Fill	550	550	660	630	960	830	790	750			
TOTAL	2,670	2,680	2,740	2,810	3,060	3,090	2,960	2,800	**2.2%** Increase from 2014-15		

2.2.3 Metropolitan Diversion Targets

SA's Waste Strategy 2015-2020 (Green Industries SA, 2015) includes targets for metropolitan diversion (for resource recovery) by source sector. The recently published SA Waste Strategy 2020-2025 (Green Industries SA, 2020) includes targets for 2025. **Table 2.11** includes 2015, 2020 and 2025 targets for metropolitan diversion (for resource recovery) by source sector.

In 2019-20, SA achieved the 2020 diversion rate targets for the C&I and C&D sectors:

- MSW – Diversion rate remained steady but well below the 2020 Target, at 56.0% (down from 57.0% in 2018-19).
- C&I – Diversion rate increased to 92.4% (from 88.2% in 2018-19) and is above the 2020 and 2025 State Targets of 80% and 90%, respectively.
- The diversion rate increased for C&D when excluding Separately Reported Materials & Clean Fill. From a diversion rate of 93.4% in 2018-19 to 95.6% in 2019-20. This remains above the 2020 target of 90%.
- For C&D overall the diversion rate was 90.6% (down from 91.4% in 2018-19). This is above the 2020 target of 90%.

In 2019-20, the diversion rate for MSW and C&D sectors is below the 2025 targets. The greatest opportunity for improvement is the MSW sector, which has not met the previous two targets set by the state government.

Table 2.11 **Metropolitan diversion by source sector: 2019-20 Recycling Activity results and metropolitan diversion targets in SA's Waste Strategy 2015-2020 (Green Industries SA, 2015) and SA's Waste Strategy 2020-2025 (Green Industries SA, 2020).**

Source Sector	2019-20 Diversion Achieved	Metro Diversion Target		
		By 2015	By 2020	By 2025
MSW	56.0%	70%	70%	75%
C&I	92.4%	75%	80%	90%
C&D – Excluding Separately Reported Materials & Clean Fill	95.6%	90%	90%	95%
C&D – Total	90.6%			

2.3 Local Government Recovery

Local Government recovery is included to provide information on the recycling performance of South Australian households based on what is disposed in kerbside bins.

Local Government data reported here is different to MSW data included elsewhere in this report, as it only includes the three bins collected at kerbside and excludes non-kerbside container deposit legislation (CDL) returns, transfer stations, hard waste collection, E-waste, street sweepings and textiles. This section may be expanded in future Recycling Activity Surveys.

2.3.1 Overall volumes collected through kerbside

Table 2.12 includes the quantities collected from kerbside across South Australia by waste streams and the breakdown between metro and regional SA. The overall tonnes collected at kerbside in South Australia in 2019-20 was 671,800, an increase of 3.7% from 2018-19. This includes 517,800 tonnes from metro and 154,000 tonnes from regional households. The increase is likely due to COVID-19 leading people to spend more time at home. Comingled recyclables (133,400 tonnes) increased slightly from the previous year (132,400 tonnes). Despite 2019-20 being a drier year than 2018-19[10], Organics increased in 2019-20 by more than 20,000 tonnes, or 13.0%. COVID-19 may have also played a role with more people at home and in the garden, and one large metropolitan council moving from monthly organics collection to fortnightly. These factors drove up the recovery rate by almost 2 percentage points to 47.6%.

Performance is higher in metro councils (at 50.5%) compared to regional councils (at 37.7%). This is an increase from the previous year for both areas (48.7% and 37.0%, respectively).

Food waste makes up a significant proportion of material remaining in kerbside residual waste bins (and in SA landfills), estimated at around 150,000 tonnes per year. Diverting more of this material via the green kerbside organics bins would lead to a large increase in household kerbside performance.

Table 2.12 **Tonnes collected at kerbside in South Australia, 2019-20[1].**

Collection	SA Overall		Metro		Regional	
	2019-20 overall (tonnes)	Proportion of total	2019-20 Metro (tonnes)	Proportion of total	2019-20 Regional (tonnes)	Proportion of total
Residual Waste	352,300	52.4%	256,300	49.5%	96,000	62.3%
Organic	186,100	27.7%	158,100	30.5%	28,000	18.2%
Recyclables	133,400	19.9%	103,400	20.0%	30,000	19.5%
Total Materials	**671,800**	**100%**	**517,800**	**100%**	**154,000**	**100%**
Recovery Rate	47.6%		50.5%		37.7%	

1 Rounded figures only. Regional figures are estimations based on population proportions. This rate does not include other aspects of MSW such as resident waste drop-offs, non-kerbside CDL returns, hard waste, or street sweepings.

10 See Bureau of Meteorology, 2020

2.3.2 Waste and resource recovery per capita and household

Waste generation at a sub-region level is included in **Table 2.13**. Regional SA generated the lowest kilograms of waste per capita, at 349 kg/capita. The recovery rate for Councils in the Central Eastern region was highest (54.3%), followed by Councils in the Western region (52.0%). Diversion rates in all regions increased from 2018-19 to 2019-20. The Regional Councils and Councils in the Northern sub-region had the lowest diversion rates (37.7% and 45.7% respectively). Some Councils within these regions only offer opt-in organics services and some do not offer this service at all, which may lower recovery rate at kerbside.

Table 2.13 **Population, waste generation by tonnes and kg per capita per year and recovery rate data, by region.**

Sub-region	Population[11]	Total kerbside waste generated 2019-20, tonnes	Kg/capita waste (all three streams) 2019-20	Recovery rate
Central Eastern[1]	269,225	104,098	387	54.3%
Northern[2]	363,085	136,800	377	45.7%
Southern[3]	333,860	135,826	407	50.8%
Western[4]	344,960	141,077	409	52.0%
Total, Metro	**1,311,130**	**517,801**	**395**	**50.5%**
Total, Regional[5]	440,833	154,000	349	37.7%
Total, South Australia	**1,751,963**	**671,801**	**383**	**47.6%**

1 Central Eastern = Adelaide, Adelaide Hills, Burnside, Campbelltown, Norwood Payneham and St Peters, Prospect, Unley, Walkerville
2 Northern = Gawler, Playford, Salisbury, Tea Tree Gully
3 Southern = Marion, Mitcham, Onkaparinga
4 Western = Charles Sturt, Holdfast Bay, Port Adelaide Enfield, West Torrens
5 Regional data is an estimation only

2.3.3 Coverage

The coverage[12] of kerbside collections is summarised in **Table 2.14** below and is based on figures used in the 2017-18 report:

- 98.7% of SA households have a residual waste service.
- 96.5% have a comingled recycling service, and
- 91.1% have access to an organics recycling service. Some of these households have a food and garden organics service, whereas others have a garden waste only service. Some areas have opt-in organics services and take up rates vary.

Table 2.14 **Kerbside bin coverage across South Australia.**

Stream	Number of services in SA	Coverage (%)
Residual	708,486	98.7%
Recycling	693,195	96.5%
Organics	654,394	91.1%
Total households in SA	**718,023**[1]	**100.0%**

1 As of June 2018, Series II (ABS, 2018) see http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPawge/3236.02011%20to%202036?OpenDocument

11 ABS (2019)
12 Coverage is the proportion of households across the state that have that particular kerbside bin service

2.4 Comparative performance with other jurisdictions

SA's waste and resource recovery performance was compared with other States and Territories in Australia (see **Figure 2.12**).

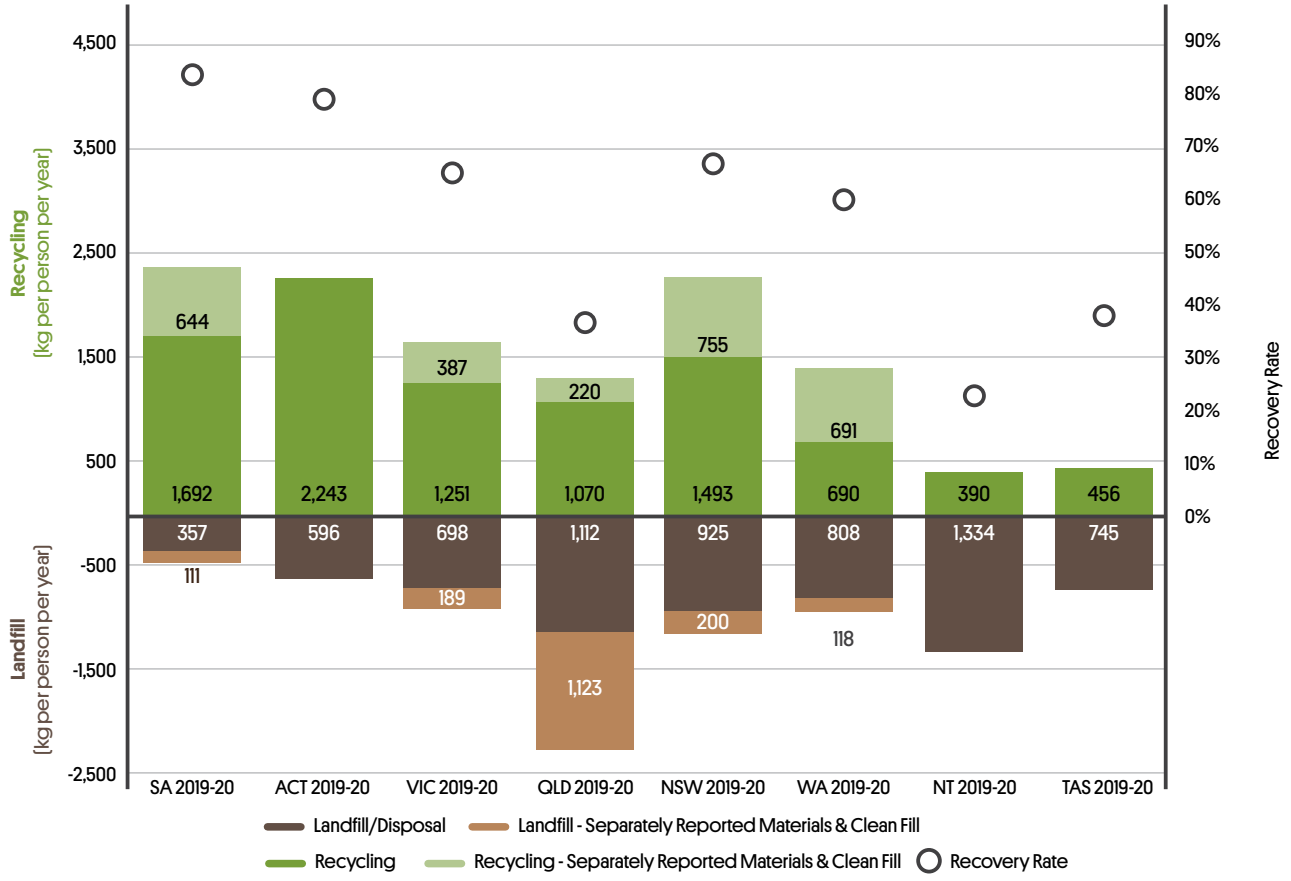
Positive findings include that SA had:

- The highest reported diversion (at 83.3%), with ACT not far behind at 79%
- The highest per capita resource recovery (2,335 kilograms per person (kg/p))
- The highest per capita resource recovery for Standard Reporting Materials only (compared to states that report this figure), at 1,692 kg/p, and
- The lowest per capita landfill disposal rate at 467 kg/p.

SA previously had the highest overall per capita waste generation rate. In 2019-20 SA generated 2,800 kg/p of waste overall. This remains high but now sits fourth when compared to other states and territories.

Note that comparisons with other states should be interpreted with caution given the data is from different years and there are various methods for reporting the results depending on the state[13].

Figure 2.12 **Comparison of reported per capita (kg/person/yr) resource recovery and landfill disposal and recovery rate (%) by state or territory.** These figures are based on the latest currently available data. 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 reporting guidelines (Dept Environment and Energy, 2015).



13 To make the most accurate comparison between the jurisdictions, Separately Reported Materials and Clean Fill including rubble, soil and ash were added to both recycling and landfill data for each state where data was available (not available for ACT, TAS and NT). This may mean that some of the numbers may not align with the numbers reported in the state waste reports.

2.5 Employment in the SA Resource Recovery Sector

Table 2.15 summarises SA employment figures overall based on data captured in the 2019-20 survey[14].

The number of full-time employees (FTEs) has increased since 2017-18, mostly due to additional companies reporting their number of FTEs. There has been a big shift towards casual/ part time/ contract work, from 212 in 2018-19 to 407 in 2019-20. Please note employment figures are a sub-set of total employment in SA's waste and resource recovery industry which is estimated at 4,800 people across a wide spectrum of jobs (direct and indirect).

Survey respondents were also asked to provide data on annual sales revenue for the 2019-20 financial year. In total, the annual revenue for SA recyclers is estimated at $536 million. This is likely to be an underestimation of the value of the industry due to the limited number of responses[15].

Table 2.15 **2019-20 Recycling Activity results of FTEs in SA associated with material collection, resource recovery and/or recycling (including comparison with 2017-18 and 2018-19).** Note that this is a sub-set of employment in the SA industry, with data from 84 organisations used in the 2019-20 results (37 of these were from 2017-18 and 2018-19). It also does not include indirect employment.

Year	2019-20	2018-19	2017-18
Employment type	Number	Number	Number
Full time Equivalent (FTE)	1,691	1,638	1,657
Other (casual/part time/ contractor), full time equivalent (FTE)	407	212	174
Total FTEs	**2,098**	**1,850**	**1,831**

Participants were also asked to report on employment classifications. These are included in **Table 2.16**. Most FTEs in the resource recovery sector reported by respondents were machine operators (26%), followed by unskilled employees and drivers (both 17%). The number of unskilled employees decreased from 24% in 2018-19 to 17% in 2019-20. This could be due to the extension of the employment type in the 2019-20 recycling activity survey to include the employment type 'sorting'.

Table 2.16 **2019-20 Recycling Activity results of FTEs by employment classification in SA associated with material collection, resource recovery and/or recycling (including comparison with proportions in 2018-19).** Note that this is based on a sub-set of employment in the SA industry and a subset of the total number in Table 2.15, as not all organisations answered both sections of the questionnaire.

Year	2019-20	2018-19
Employment type	%	%
Unskilled	17%	24%
Administration	15%	14%
Construction/design	0.5%	0.4%
Driver	17%	13%
Machinery operator	26%	28%
Sorting	4%	Not measured
Technical support	4%	3%
Sales/marketing	4%	4%
Supervisor	5%	9%
Other	**7%**	**4%**
Total	**100%**	**100%**

14 Not all participating organisations provided a response to this question. For Table 2.15, 47 responses were received, and an additional 37 responses used from 2017-18 and 2018-19. This figure is an underestimate of the entire industry in South Australia, as not all waste, recycling and resource recovery organisations were surveyed and of those that were, not all provided a response. In addition, the data was obtained through survey responses only, and more comprehensive figures could be found through further investigations by Green Industries SA.

15 In total, data from 42 organisations was used. Of these, 26 organisations provided data in 2019-20 and the remaining 16 were from organisations that provided data in previous years.

2.6 Reuse and circular economy

2.6.1 Reuse

The 2019-20 recycling activity survey is the first survey to consider reuse and the circular economy. Reuse is a higher priority on the waste hierarchy[16] and is therefore an important metric to consider.

Only a small selection of reuse items was considered – food products, home furnishing and goods (not including online sales), clothes and electronic items (**Table 2.17**). It does not include a range of other reuse items such as vehicles, pallets, data from online second-hand platforms etc.

Based on the data provided the authors estimated what proportion of the market these tonnes represented. This provided an estimated tonnage of reuse across SA for each category, and with an estimated value per tonne, the authors were able to estimate the reuse value across SA.

The subset of reuse data indicates SA reuses an estimated 30,000 tonnes per annum of these items with an overall value about $270 million. The value per tonne for reuse items is much higher than recycling. Some of this is avoidance of loss of revenue. For example, food products rescued by charities may be provided for free but have a value of $6,000 per tonne.

Although there is no comparative data, respondents reported increased volumes of food products rescued in 2019-20 due to COVID-19. The hospitality sector could not use this food due to lockdowns. Food donations also come from supermarkets, food manufacturing and farmers.

Table 2.17 **South Australia's reuse in 2019-20.** SA is estimated to reuse 27,800 tonnes of various products at a value of $270 million.

Material/item	Tonnes	Estimated proportion of the SA market that the tonnes represent (%)	Estimated tonnes reused across SA in 19-20	Estimated value of reuse item ($/tonne)	Subsequent overall value of reuse items for SA ($/year)
Food products	4,200	80%	5,300	$6,000	$31,800,000
Home furnishing and goods	1,400	10%	14,000	$15,000	$210,000,000
Clothes resold as clothes locally and overseas	3,400	50%	6,800	$3,575	$24,312,000
Electrical/electronic items (refurbished)	200	70%	300	$11,800[1]	$3,540,000
Total	**8,600**[2]		**27,800**		**$269,652,000**

1 Assumes computers are re-sold for $200 on average and each weighs 16.93kg.

2 Note this figure has a margin of error of + or - 7%

16 The waste hierarchy is an internationally recognised aspirational framework for managing waste generation and disposal that is a guiding principle of the Green Industries SA Act 2004 and South Australia's Waste Strategy (Green Industries SA 2020).

2.6.2 Priority in the circular economy

The 2019-20 survey asked respondents to indicate which was their highest priority when identifying the reprocessing destination for sourced goods and materials in a circular economy. The options presented are not mutually exclusive (**Table 2.18**). Economic and avoiding landfill were the two options that respondents selected most often. 'Other' included reducing carbon emissions, quality, health and safety, prioritising local markets, education/promotion of the sector, and food relief.

Table 2.18 **Responses to the question "which of the following factors is your highest priority when identifying the reprocessing destination for sourced goods and materials in a circular economy?".** Economic and avoiding landfill were the options respondents selected most frequently. Note responses were not mutually exclusive.

Option	Number of times option was selected by respondents
Economic	28
Avoiding landfill	28
Good or materials being able to be recycled	21
Goods or materials being able to be repaired or reused	10
Other (please specify)	8
Total	**95**

2.7 Disaster Waste

South Australia endured some of its worst bushfires in the summer of 2019-20. Bushfires devastated parts of South Australia, particularly Adelaide Hills, Kangaroo Island, Yorke Peninsula, and the South East. The waste from 541 properties had to be cleaned up after the bushfires[17]. Some of these properties were damaged beyond repair and had to be demolished. This resulted in an increase in C&D materials going to landfill, due to many of these properties containing asbestos. Bushfires in Kangaroo Island and Adelaide Hills contributed most to waste generation, almost 50,000 tonnes combined (**Table 2.19**). Bushfire waste generated in Yorke Peninsula and South East was not fully captured. However, it is estimated to be approximately less than 2,000 tonnes for both regions.

Most of Kangaroo Island's dwellings damaged in the bushfires were identified as containing asbestos. Therefore, most of the debris from these dwellings was sent to landfill.

Table 2.19 **Disaster waste sent to landfill in 2019-20.** Most of Kangaroo Island's waste to landfill was asbestos containing material. Note that sums may not equate due to rounding.

Material	Adelaide Hills	Kangaroo Island
Asbestos Containing Material	5,100	24,000
Other Waste Volumes	1,600	290
C&D Materials	7,800	3,100
Scrap Metal	2,800*	4,600
CCA Posts	150*	-
Total Tonnes[18]	**17,300**	**31,900**

* These figures are missing some tonnes and the totals are anticipated to be higher than the figures provided.

17 Green Industries SA 2020, The South Australian Bushfires 2019/20

18 Bushfire waste generated in Yorke Peninsula and South East was not fully captured, however it is estimated to be less than 2,000 tonnes for both regions.

03 Material Resource Recovery (Activity) Reports

At a glance:

- This section presents the key findings from analysis of 2019-20 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 the national reporting guidelines (Dept Environment and Energy, 2015). Where relevant, the reports differentiate between resource recovery for material recovery and energy recovery.

1. **Masonry [refer p. 40 of this report]**
   - » Asphalt
   - » Bricks
   - » Concrete
   - » Plasterboard
   - » Clay, Fines, Rubble & Soil
   - » Clay, Fines, Rubble & Soil - Intermediate Waste Soil
2. **Metals [refer p. 44]**
   - » Steel or Ferrous Metals
   - » Aluminium
   - » Non-ferrous Metals (exc. Aluminium)
3. **Organics [refer p. 48]**
   - » Food Organics
   - » Garden Organics
   - » Timber
   - » Other Organics
4. **Cardboard & Paper [refer p. 52]**
   - » Cardboard and Waxed Cardboard
   - » Liquid Paperboard
   - » Magazines & Newsprint
   - » Printing & Writing Paper
5. **Plastics [refer p. 56]**
   - » 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 p. 60]**
7. **Other Materials [refer p. 62]**
   - » Fly Ash
   - » Foundry Sands
   - » Leather & Textiles
   - » Tyres & Rubber

3.1 Masonry

Highlights:

- At 2.40 million tonnes, Masonry materials decreased by 8% in 2019-20 compared to 2018-19 (2.61 million tonnes recovered).
- The construction and demolition market slowed slightly for a short period of time due to COVID. However, the sector remained strong for the 2019-20 financial year, with large state government infrastructure projects continuing to generate high volumes of recovered asphalt, concrete and soil.
- Demand for recycled aggregates and recycled materials in roads and footpaths continues to build. However, some companies are more accepting of use of recycled materials than others.
- Volumes of Masonry recycled remain project dependent. If large infrastructure projects reduce, then Masonry volumes recovered will reduce.
- All recovered Masonry was re-processed in SA.

Masonry recovery in South Australia remained strong in the 2019-20 financial year. Overall, 2.40 million tonnes recovered. This is an 8% decrease from 2018-19 (2.61 million tonnes). Reports from industry indicated COVID-19 slowed activity and therefore Masonry recovery in 2019-20. Major State Government projects continue to generate large volumes of Masonry reprocessing, for example the Darlington Upgrade Project.

Total Clay, Fines, Rubble & Soil (Clean Fill and Intermediate Waste Soil)[19] made up the greatest proportion of Masonry materials recovered in SA in 2019-20 (48%), followed by Concrete (41%, **Figure 3.1**). The tonnage of Bricks decreased for a second year (from 74,000 tonnes in 2018-19 to 41,000 tonnes in 2019-20). The price for recycled bricks decreased in 2019-20, in part due to reduced demand for the product lowering the sale price of the recovered item.

Industry reported that recovered materials such as reclaimed asphalt pavement (RAP), recycled concrete and recycled glass (see Glass section) were used in infrastructure projects and small-scale trials. However, many organisations remain concerned about using recycled product to replace virgin products in infrastructure projects or did not have systems to encourage or allow the use of recycled material. There was a slight slowing in the purchase of recycled aggregates as confidence decreased in 2019-20, but also a slight slowing of construction projects, putting a downward pressure on price.

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

Table 3.1 **Quantity (tonnes) of Masonry material recovered in SA during 2019-20, 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	238,000	32,000	13%
Bricks	41,000	6,000	15%
Concrete	975,000	93,000	10%
Plasterboard	1,000	50	5%
Total Clay, Fines, Rubble & Soil[2]	1,140,000	189,000	17%
Clay, Fines, Rubble & Soil – Clean Fill[2]	874,000	141,000	16%
Clay, Fines, Rubble & Soil – Intermediate Waste Soil[2]	266,000	48,000	18%
Total	**2,395,000**	**320,000**	**13%**

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 only relates to material that has been diverted from landfill.

Figure 3.1 **Changes in percent composition of recovered Masonry (by weight), SA, between 2018-19 and 2019-20.**

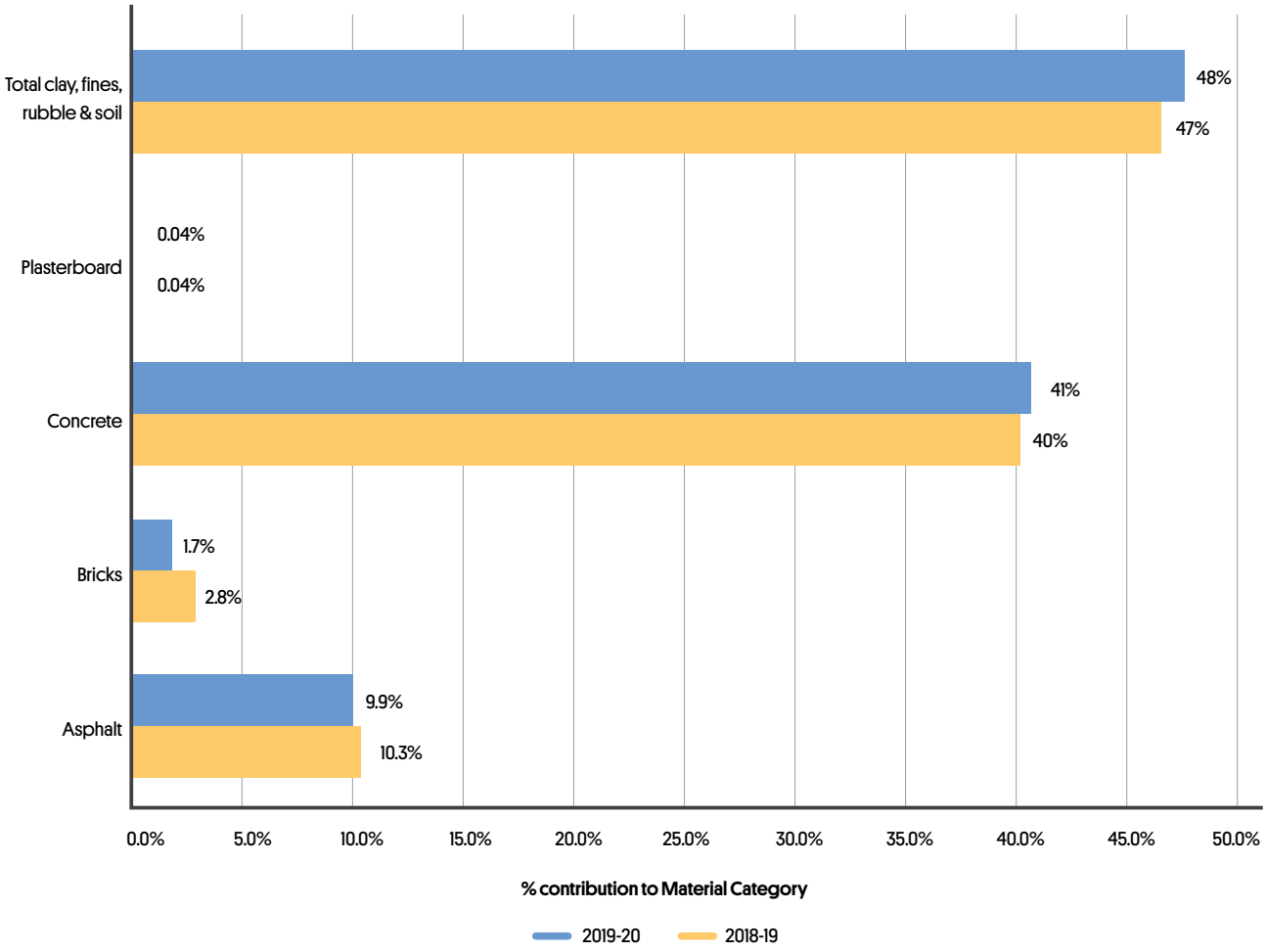


Figure 3.2 **Changes in reported recovered Masonry quantities since 2003-04 – Concrete and Total Clay, Fines, Rubble & Soil.**
Concrete and Clay, Fines, Rubble & Soil both decreased in 2019-20 compared to 2018-19.

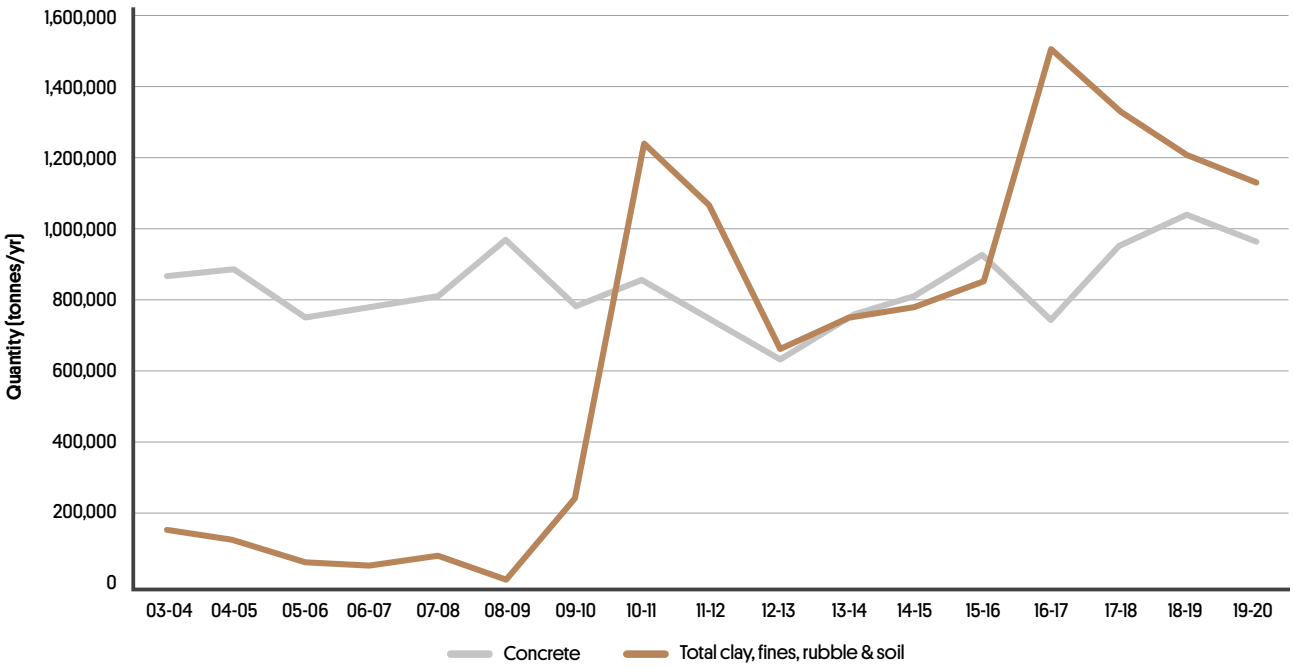
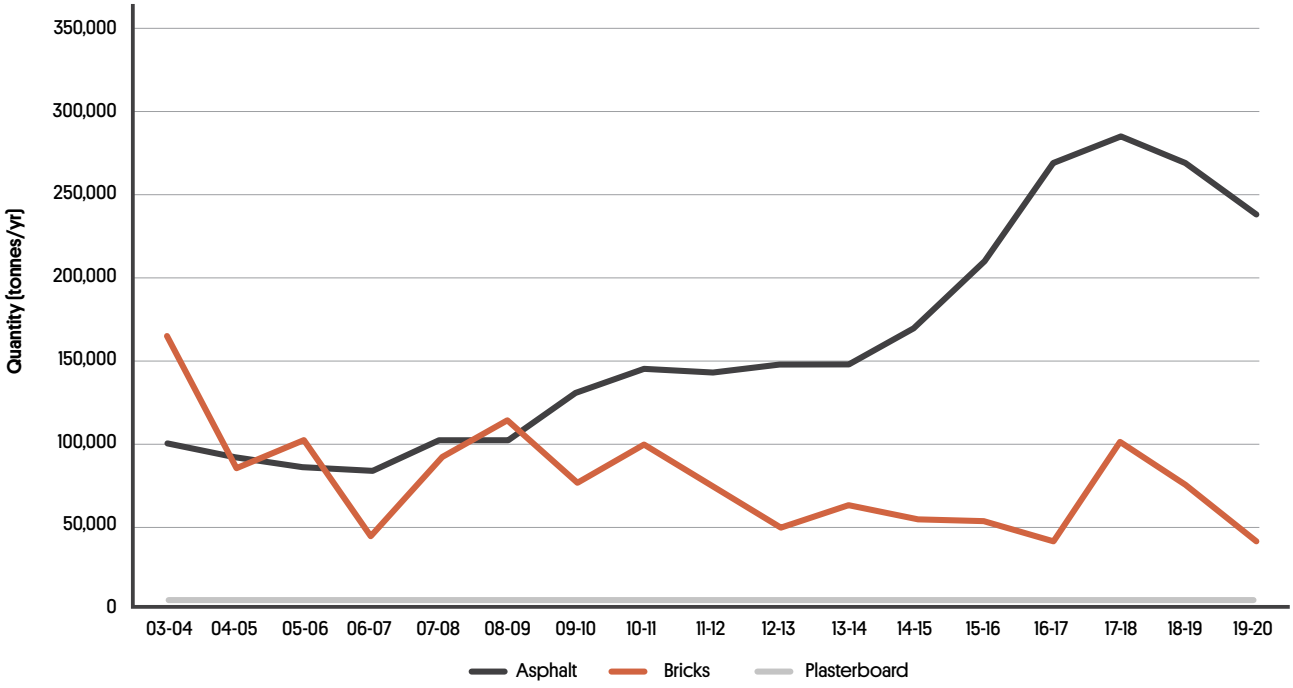


Figure 3.3 **Changes in reported recovered Masonry quantities since 2003-04 – Asphalt, Bricks and Plasterboard.**
Asphalt, Bricks and Plasterboard decreased in the 2019-20 financial year.



C&D projects in Metro Adelaide continue to generate most of the recovered Masonry materials in SA, with only small quantities reported from Municipal and C&I sources and from regional areas. All tonnes generated in SA are reprocessed here (**Table 3.2**). This is all in line with the previous year.

Table 3.2 **Sector and geographical origins and re-processing locations for recovered Masonry in SA in 2019-20.**
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%	0.7%	99.1%	92%	8%	100%	0%	0%
Bricks	0.8%	7.8%	91.4%	88%	12%	100%	0%	0%
Concrete	0.6%	1.8%	97.6%	96%	4%	100%	0%	0%
Plasterboard	5.3%	1%	93.5%	87%	13%	100%	0%	0%
Total Clay, Fines Rubble & Soil	0.2%	1%	98.7%	99%	1%	100%	0%	0%
Clay, fines, rubble & soil - IWS (separately reported)	0.0%	0.0%	100.0%	99.7%	0.3%	100%	0%	0%
Total clay, fines, rubble & soil	0.2%	0.8%	99.0%	99%	1%	100%	0%	0%
Total	**0.4%**	**1.3%**	**98.3%**	**97%**	**3%**	**100%**	**0%**	**0%**

The outlook for Masonry recovery remains positive, although it is dependent on infrastructure projects and business confidence. Business confidence is improving, and infrastructure projects are ongoing, which is positive for the Masonry recovery sector. However, recovery of this material is expected to decline as civil projects are completed.

There is an opportunity for the private sector and government to purchase materials containing recycled content. This could be achieved by changing procurement policies, specifications and evaluating tender responses based on recycled content.

The commercial viability of Masonry reprocessing continues to improve as the SA Solid Waste levy increases. The Metropolitan Levy increased from $100/tonne in June 2018, to $110/tonne in July 2019, to $140/tonne in January 2020. This increase makes the recovery of C&D materials more cost-effective than sending them to landfill.

3.2 Metals

Highlights:

- Metals recovery decreased to 278,000 tonnes in 2019-20, from 329,000 tonnes in 2018-19.
- This is the lowest tonnes of Metals recovered in SA since 2015-16.
- COVID slowed industry activity and a large-scale construction and demolition job finished up in regional SA, leading to a reduction in recovered scrap metal.
- Despite the reduction, the value of Metals remained high with strong demand for recovered scrap metal interstate and overseas.
- Metals manufacturers are recognising the benefits of using recovered scrap to make new metal as it is cheaper, and the net emissions are lower than using virgin materials.

Metals recovery declined in the 2019-20 financial year. A total of 278,000 tonnes of Metals were recovered in 2019-20, with an estimated of 248,000 tonnes of Steel (89% of total Metals, **Figure 3.6**), 11,000 tonnes of Aluminium and 19,000 tonnes of Non-ferrous Metals (**Table 3.3**).

Steel fell 16% (or 49,000 tonnes) from 2018-19. This was driven by COVID-19 closing or slowing business operations for a three-month period, and a regional demolition job neared completion during the financial year. Demand for scrap steel remained strong in 2019-20 as steel manufacturers set targets for lowering emissions through inclusion of scrap metal. Price for recovered Steel subsequently increased in 2019-20 (approximately $400 per tonne) compared to 2018-19 (approximately $330 per tonne).

Aluminium recovery decreased by 3,000 tonnes (21%), also due to slowing of the industry and market fluctuations that can occur. Ongoing international trade tensions in 2019-20 led to some countries imposing tariffs for scrap metal imports, also affecting metals trading.

Despite a reduction in Steel and Aluminium, Non-ferrous Metals increased in 2019-20 by 6% (or 1,000 tonnes) compared to 2018-19. This stream can also historically fluctuate slightly year on year.

Table 3.3 **Quantity of Metals (tonnes) recovered in SA during 2019-20, including estimated reporting error (tonnes & %).** Steel remained the dominant contributor to recovered Metals in SA.

Item	Net Recovery[1]	Reporting Error	
	tonnes	tonnes	%
Steel	248,000	20,000	8%
Aluminium	11,000	1,000	9%
Non-ferrous Metals	19,000	3,000	16%
Total	**278,000**	**24,000**	**9%**

1 Net recovery excludes re-processing losses

Figure 3.4

Changes in reported recovered metal quantities since 2003-04 – Steel.
Steel recovery declined from 2018-19 to just below 250,000 tonnes in the 2019-20 financial year.

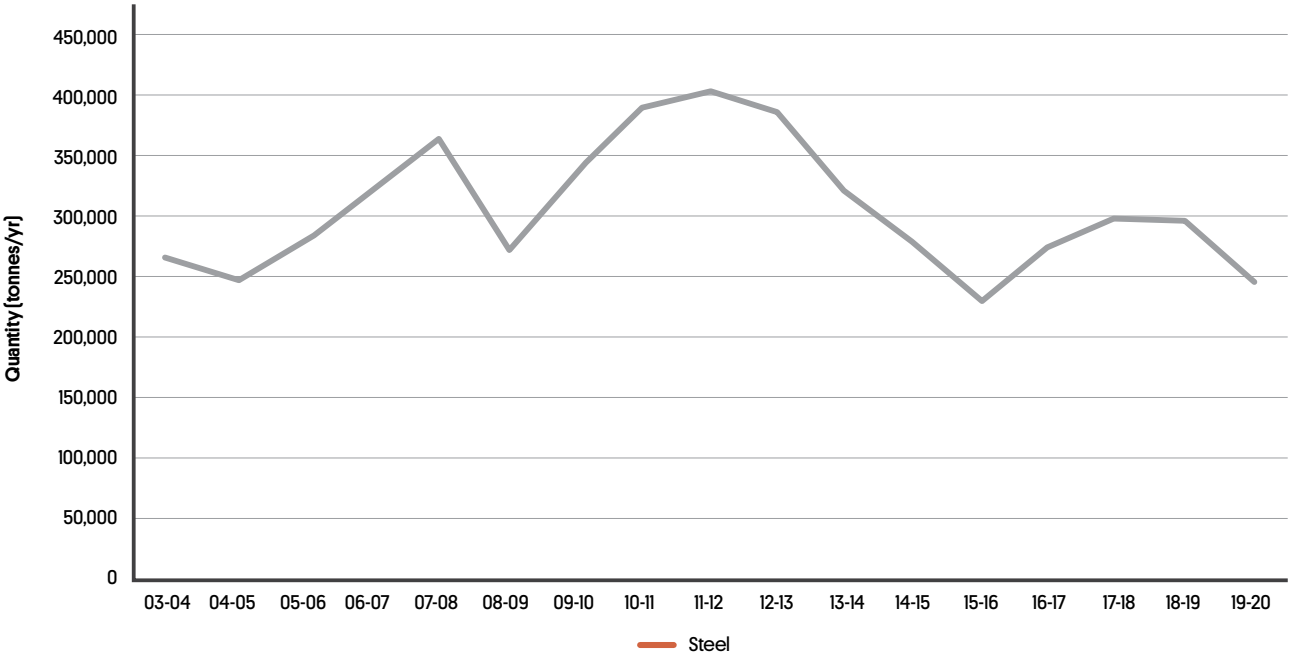


Figure 3.5

Changes in reported recovered metal quantities since 2003-04 – Aluminium and Non-ferrous Metals.
Aluminium decreased from 2018-19 to 2019-20 while Non-ferrous Metals increased slightly.

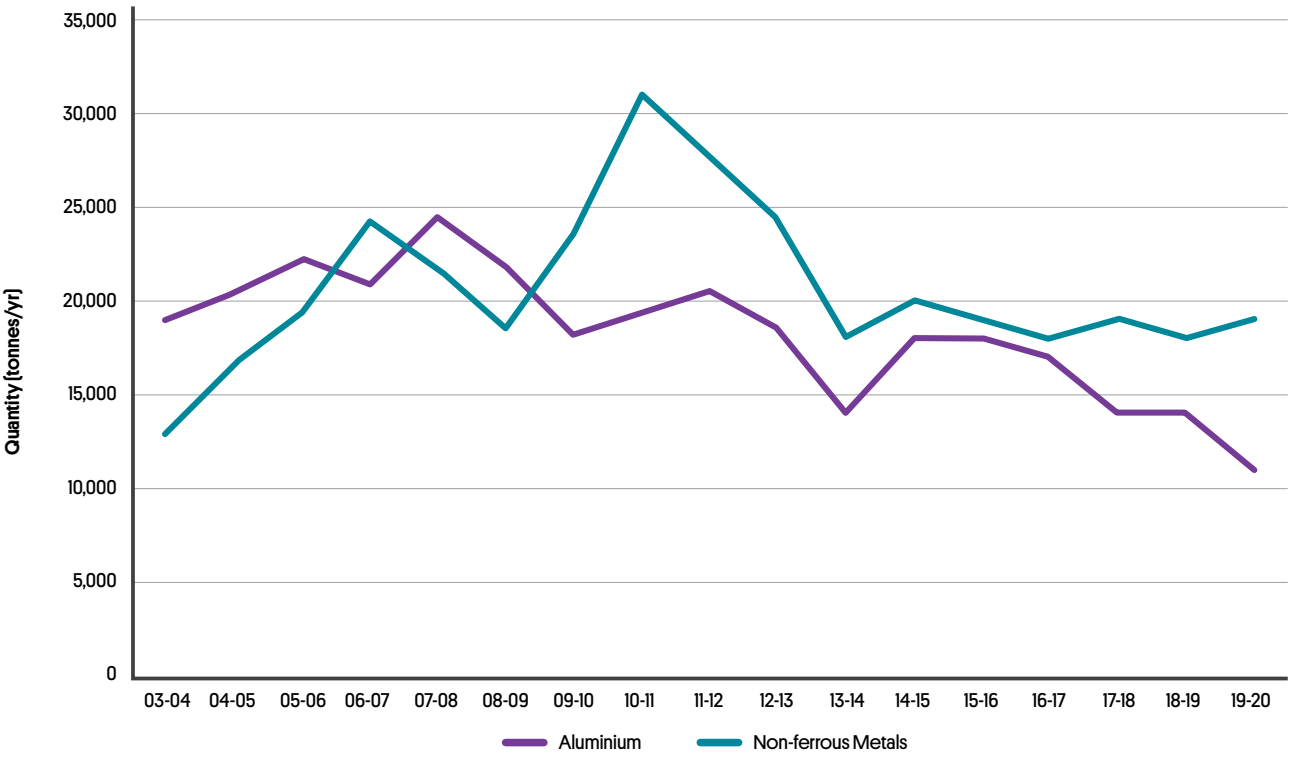
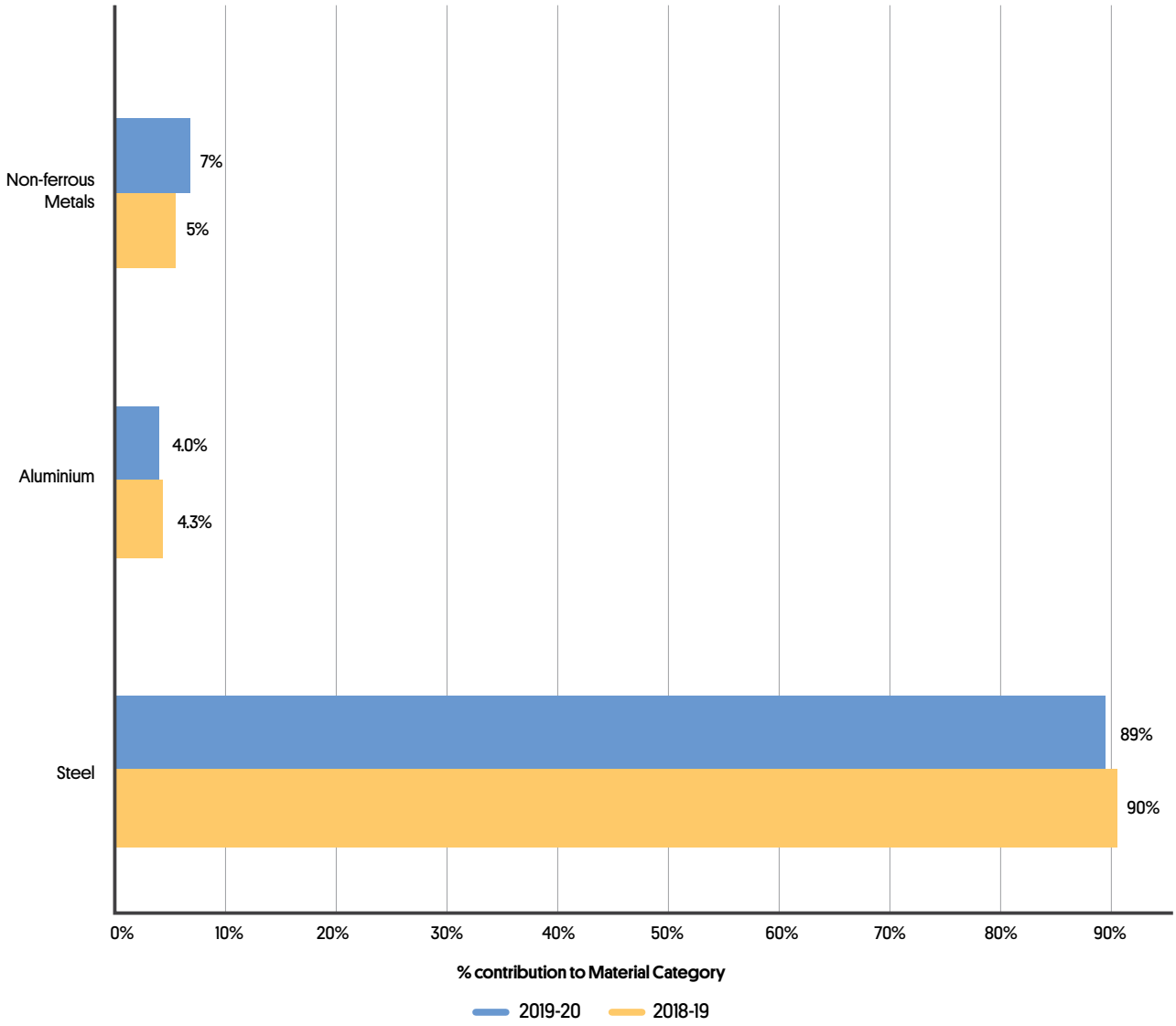


Figure 3.6 **Changes in percent composition of recovered Metals (by weight), SA, between 2018-19 and 2019-20.**
Steel has reduced slightly but still constitutes 89% of all metal recovered in SA. Non-ferrous Metals has increased to 7% of all metal recovery.



Steel makes up almost 90% of all the recovered metal in SA (**Figure 3.6**). The remaining tonnes is split between Aluminium (4%) and Non-ferrous Metals (7%, up from 5% in 2018-19). Most Metals was sourced from the C&I sector, with an estimated 53% of Metal volumes (**Table 3.4**), whilst the remaining volumes were sourced from the MSW sector (17%) and C&D sector (30%).

There was a slight decrease in C&D sourced metals from regional SA due to the completion of a regional demolition project (**Table 3.4**). The 2019-20 data indicated 30% of Metals was sourced from C&D sector (32% was reported in 2018-19) and 22% from Regional sources (27% was reported in 2018-19).

Additional Steel is reprocessed in SA due to a local foundry accepting more tonnes. The proportion of locally processed Steel is anticipated to rise in 2020-21. A higher proportion of Steel (56% in 2019-20 compared to 49% in 2018-19) was sent overseas due to demand in SE Asia. Demand for recovered Non-ferrous Metals overseas was also high, leading to an increase in the proportion sent overseas (80% in 2019-20 compared to 71% in 2018-19).

Table 3.4 **Sector and geographical origins and re-processing locations for recovered Metals in SA during 2019-20.** C&I was the major sector origin for recovered Metals. Reprocessing in SA has reduced with most recovered Metals sent interstate or overseas. Note that sums may not equate due to rounding.

Item	Sector Origin (%)			Geographical Origin (%)		Re-processing Location (%)		
	Municipal	C&I	C&D	Metro	Regional	SA	Interstate	Overseas
Steel	16%	52%	33%	77%	23%	10%	34%	56%
Aluminium	39%	55%	5%	78%	22%	1%	13%	86%
Non-ferrous Metals	27%	63%	10%	84%	16%	4%	16%	80%
Total	**17%**	**53%**	**30%**	**78%**	**22%**	**10%**	**32%**	**59%**

The 2018-19 recycling activity report anticipated a reduction in scrap metal recovery, and this is what we have seen in 2019-20. Part of this is due to COVID-19 slowing industry broadly, and part of it is due to cessation of major demolition jobs. The price for recovered metal increased due to limited supply and significant demand for the product. It is anticipated that demand for recovered metal will remain steady as metals manufacturers set emissions reductions targets and recognise that recycled metal plays an important role in reducing emissions. This is positive for the Metals recovery industry, and it will be important to continue to source more scrap metal. An increase in business activity and the manufacturing sector would assist.

Steel recyclers continue to look for opportunities for the floc component of the Steel (the non-steel materials such as glass, textiles, rubber, liquids, and plastics) that remains after cars and other metals are shredded, in place of landfill.

3.3 Organics

Highlights:

- Organics recovery increased from 1.04 million tonnes in 2018-19 to 1.11 million tonnes in 2019-20.
- Timber recovery increased 30% due to an increase in forestry activity with a strong building sector in 2019-20.
- Food organics collections from businesses continue to increase in 2019-20 (9% increase from 2018-19).
- Most recovered Organics is re-processed in SA (99%) and is sourced from the C&I sector (77%).
- The outlook for recovered Organics processing remains positive. Demand for recovered organics products are anticipated to remain strong.
- The challenge for organics processors is finding enough material to meet demand for products and minimise contamination of incoming material.

Organics recovery remained strong in 2019-20. Overall, 1.11 million tonnes of organic materials were captured for reprocessing in 2019-20 (**Table 3.5**), a 6% increase from 2018-19.

The net increase in Organics recovery was mainly driven by an increase in Timber recovery (30% increase from 2018-19 to 2019-20). This can change year by year based on forestry activity. A strong year in the building sector drove up timber demand in 2019-20, increasing forestry activity and therefore the tonnes of recovered Timber. This is the highest Timber recovery tonnes reported since the survey began. Tonnes of Timber imported from Victoria (not included in **Table 3.5**) also increased due to more forestry activity and an increase in Victoria's landfill levy.

Food Organics recovery from the C&I sector increased again, this time by 9%, from 12,300 tonnes in 2018-19 to 13,400 in 2019-20. Businesses are increasingly contracting segregated organics services to divert organics from the residual waste stream. Food waste recovered from municipal sources is included within the Garden Organics volumes. Garden Organics decreased 3% from 2018-19. The drier year for SA may have contributed to the overall decrease of this stream[20].

The recovery of Other Organics remained similar to the 2018-19 volumes. This included Meat Rendering, Waste Grease & Fat, Waste Sludge & Bio-Solids, and Miscellaneous Organics. Miscellaneous Organics increased by 9,000 tonnes or 5% and Waste Sludge & Bio Solids increased 1,000 tonnes or 2% from 2018-19 to 2019-20. There was a slight decrease in Meat Rendering (2% decrease from 2018-19) due to dryer conditions in South Australia which reduced animal stock production and availability. A decline in Waste Grease & Fat was also reported (9% decrease from 2018-19).

20 Bureau of Meteorology, 2020

Table 3.5 **Quantity of Net Organics (tonnes) recovered in SA during 2019-20, including estimated reporting error (tonnes & %).** Use of Timber and Miscellaneous Organics for energy production in SA is presented in this table by columns to show recovery for material and energy recovery.

Item	Material Recovery	Energy Recovery	Net Recovery[1,2]	Reporting Error	
	tonnes	tonnes	tonnes	tonnes	%
Food Organics	13,400	-	13,400	1,000	7%
Garden Organics	250,000	-	250,000	29,000	12%
Timber	221,000	94,000	315,000	30,000	10%
Other Organics	495,000	33,000	528,000	90,000	17%
Meat Rendering	193,000	-	193,000	34,000	18%
Waste Grease & Fat	82,000	-	82,000	8,000	10%
Waste Sludge & Bio-solids	52,000	-	52,000	11,000	21%
Miscellaneous Organics	168,000	33,000	201,000	38,000	19%
Total	**979,400**	**127,000**	**1,106,400**	**150,000**	**14%**

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

Figure 3.7 **Changes in reported recovered organics quantities since 2003-04, not including Food Organics.**

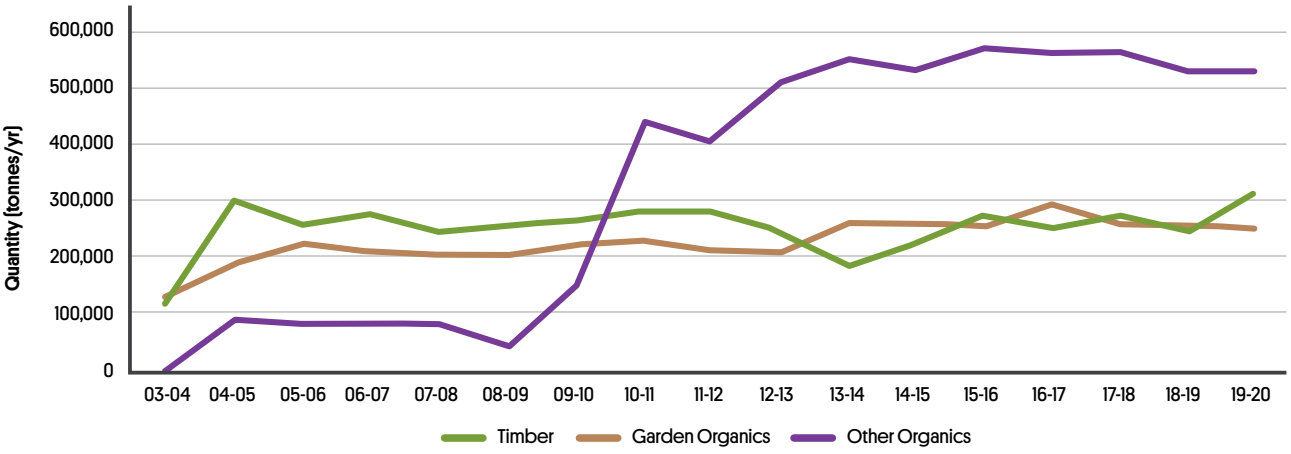


Figure 3.8 **Changes in reported recovered organics quantities since 2003-04 – Food Organics.** Food Organics recovery in the C&I sector continues to increase and has done since 2013-14.

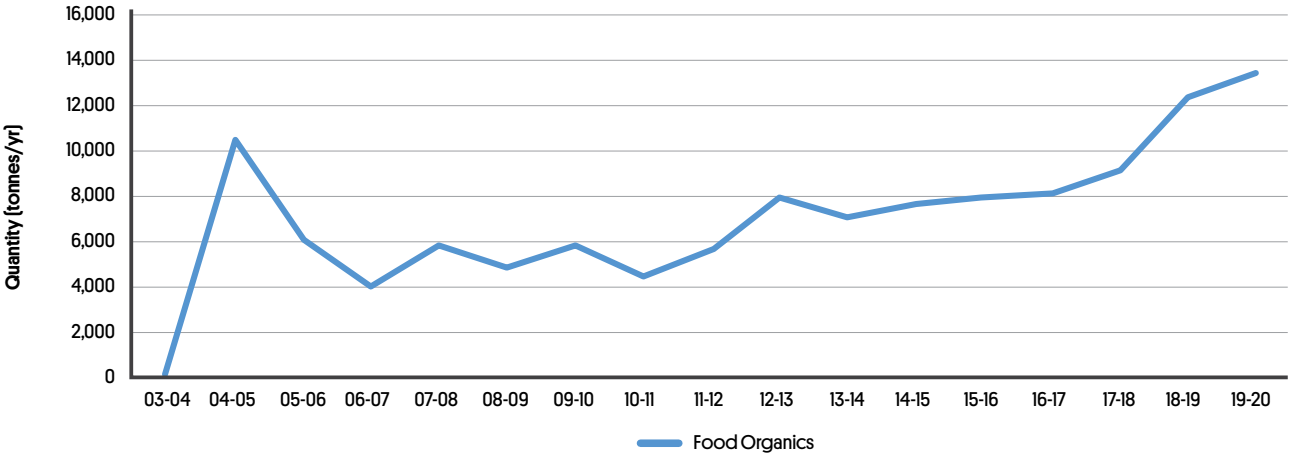


Figure 3.9 **Changes in reported recovered Other Organics quantities since this data became available (2009-10).** Meat Rendering and Waste Grease & Fat reduced, while Waste Sludge & Biosolids and Miscellaneous Organics increased slightly. Tonnes of Miscellaneous Organics recovered in 2019-20 were the highest since the survey began (data from 2009-10 captured in this Figure).

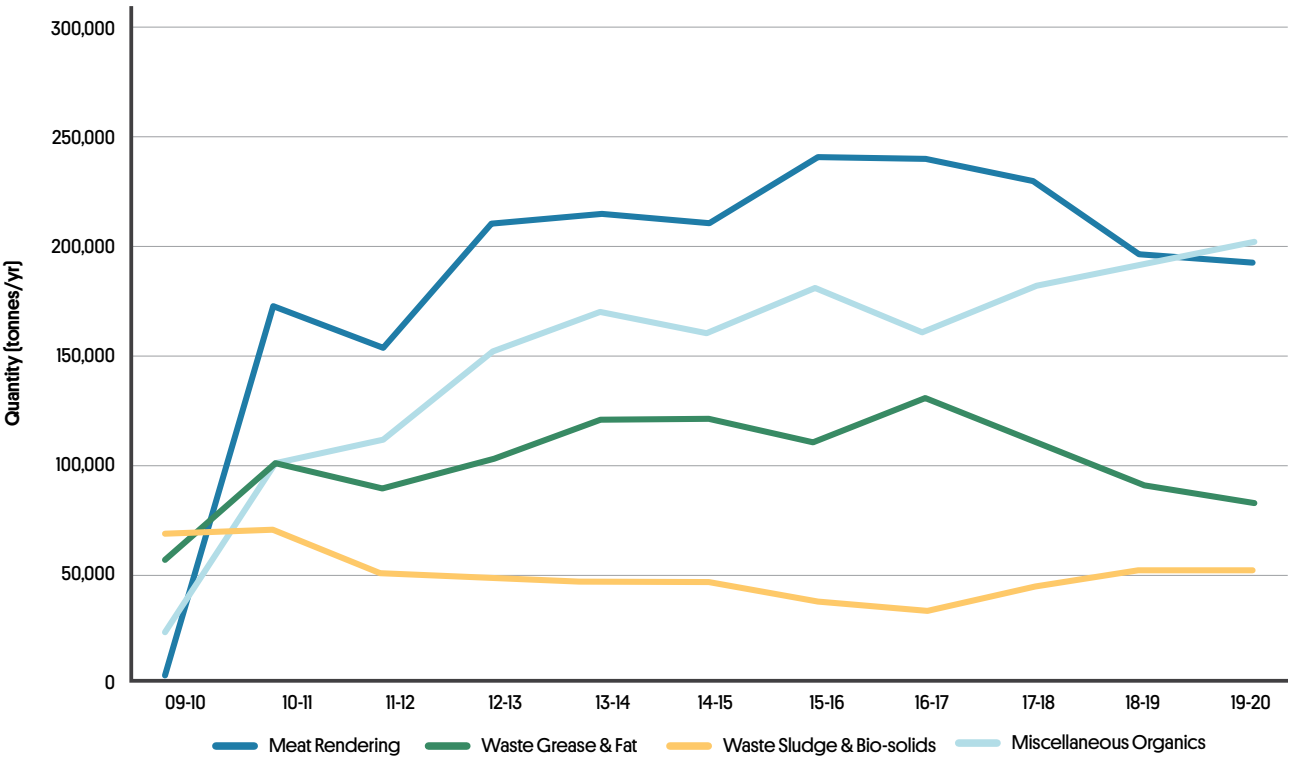
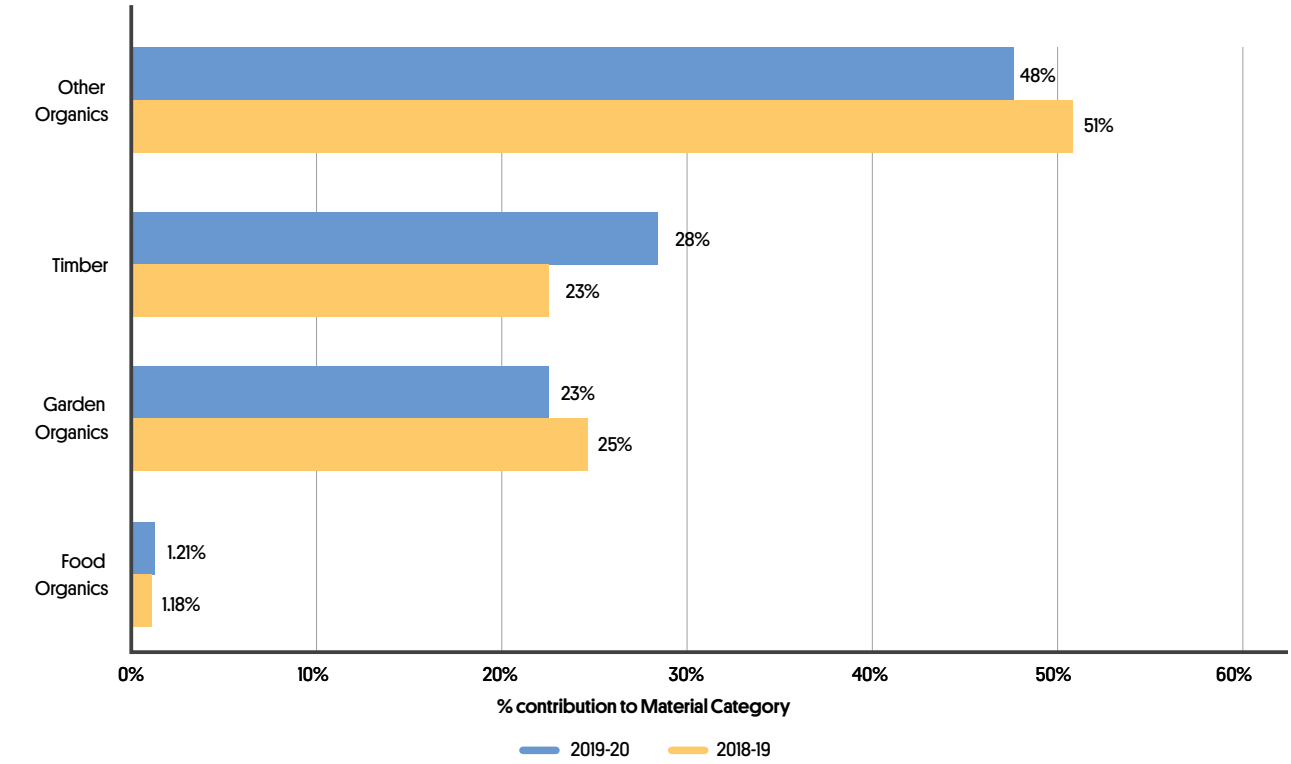


Figure 3.10 **Changes in percent composition of recovered Organics (by weight), SA, between 2018-19 and 2019-20.** Timber increased its contribution to Organics as well as Food Organics, while Garden Organics and Other Organics reduced.



Most Organics continues to come from the C&I sector (77%, **Table 3.6**) and is recovered in SA (99%). There was a slight increase in Organics from the C&I sector overall, due to Timber where more volumes were generated by the forestry industry. This also increased the proportion of Timber from regional sources and therefore the net regional tonnes of Organics have increased (36% in 2018-19, 44% in 2019-20). Despite 2019-20 being a drier year than 2018-19[21], the amount of Garden Organics from the MSW sector was similar (down 3%).

It is assumed that the likely decrease due to drier weather was balanced out by COVID-19 gardening activities as a result of the increased time people spent at home. In addition, one large council moved from monthly to fortnightly organic waste collection which may be another reason for an increase in Garden Organics captured at kerbside.

Table 3.6 **Sector and geographical origins and re-processing locations for recovered organics in SA during 2019-20.**
C&I is still the major source sector for organics and regional areas contribute substantially to resource recovery. Nearly all re-processing of waste organics occurs in SA. Note percentages may not sum to 100% due to rounding.

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	76%	20%	4%	89%	11%	100%	0%	0%
Timber	0.3%	83.1%	16.6%	38%	62%	100%	0%	0%
Other Organics	0%	100%	0%	50%	50%	97%	3%	0%
Total	**17%**	**77%**	**6%**	**56%**	**44%**	**99%**	**1%**	**0%**

Organics recovery is likely to remain strong in South Australia. Farmers and other end users of recovered organics products continue to see the benefits of compost and other organics products. Meeting this demand remains the challenge, with significant volumes of organics, particularly food organics, continuing to be disposed to landfill. There are initiatives at a municipal level exploring increasing organics recovery through changing kerbside bin systems (for example, the City of Holdfast Bay is trialling weekly organics bin collection and fortnightly general waste collection). These types of initiatives are expected to assist in increasing organics available to organics recyclers.

Other organics processing technologies continue to be trialled and improved, such as organics de-packaging equipment, granulators, and pyrolysis reactors.

Other challenges include minimising contamination and, for some re-processors, finding staff. Contamination in organics such as plastics reduces product quality and is a substantial cost to remove. Staff can be hard to find and retain for tasks such as bagging material.

21 Bureau of Meteorology, 2020

3.4 Cardboard & Paper

Highlights:

- Cardboard & Paper recovery decreased by 15% for the 2019-20 financial year.
- Industry activity slowed slightly due to COVID, reducing tonnes of disposed Cardboard & Paper.
- Overseas government restrictions impacted Cardboard & Paper recovery. For example, the Chinese Ministry of Ecology and Environment limited the amount of recovered fibre that China can import, and the Indonesian government had a period where no recovered fibre from overseas was accepted.
- This flooded other overseas markets temporarily, decreasing the commodity price.
- However, for most of 2019-20 overseas demand for recovered fibre continued. SA's exports of recovered Cardboard & Paper increased from 49% in 2018-19 to 58% in 2019-20.
- Exports of recovered fibre to China will cease in December 2020 due to China import restrictions. Demand for recovered fibre will likely shift to other Asian countries as new pulping mills are built.
- Price volatility continues to be a challenge for this material.

Cardboard & Paper recovered in SA in 2019-20 reduced 15% (34,900 tonnes) from 2018-19. Recovery for all materials streams decreased.

Cardboard & Waxed Cardboard fell by 26,000 tonnes or 16% from 2018-19 (160,000 tonnes to 134,000 tonnes, **Figure 3.11**). The decrease in C&I activity due to COVID-19 lowered the available tonnes (**Table 3.8**). The proportion and tonnes of Cardboard & Waxed Cardboard recovered through the MSW stream increased, as online ordering went up and more people spent time at home in response to COVID-19.

Liquid Paperboard (LPB) declined in value again, and the tonnes of recovered LPB decreased for another year, from 800 tonnes in 2018-19 to 600 tonnes in 2019-20. With such low value, the interest in recovering this material has declined.

Magazines & Newsprint decreased by 12% from 2018-19 to 2019-20. Consumer behaviour continues to shift online, reducing tonnes available for recycling. Demand for this material from SA recyclers decreased in early 2020 as local manufacturers sought to be paid to take the material, reducing tonnes recovered in SA as collectors and separators sent the material interstate or overseas instead.

Printing & Writing Paper decreased by 2,000 tonnes (14%) from 2018-19. An overall slowing of activity due to COVID-19 resulted in fewer tonnes available for recovery.

Table 3.7 **Quantity of Cardboard & Paper (tonnes) recovered in SA during 2019-20, including estimated reporting error (tonnes & %).** Cardboard & Waxed Paper is the dominant contributor in this sector, followed by Magazines & Newsprint.

Item	Net Recovery[1]	Reporting Error	
	tonnes	tonnes	%
Cardboard & Waxed Cardboard	134,000	5,340	4%
Liquid Paperboard	600	210	35%
Magazines & Newsprint[2]	47,400	2,720	6%
Printing & Writing Paper	12,000	1,870	16%
Total	**194,000**	**10,140**	**5%**

1 Net recovery excludes re-processing losses

2 Magazines & Newsprint includes Phone Books.

Figure 3.11 **Changes in reported recovered Cardboard & Paper quantities since 2003-04 – Cardboard & Waxed Cardboard, Magazines & Newsprint and Printing & Writing Paper.** All materials decreased from 2018-19 to 2019-20.

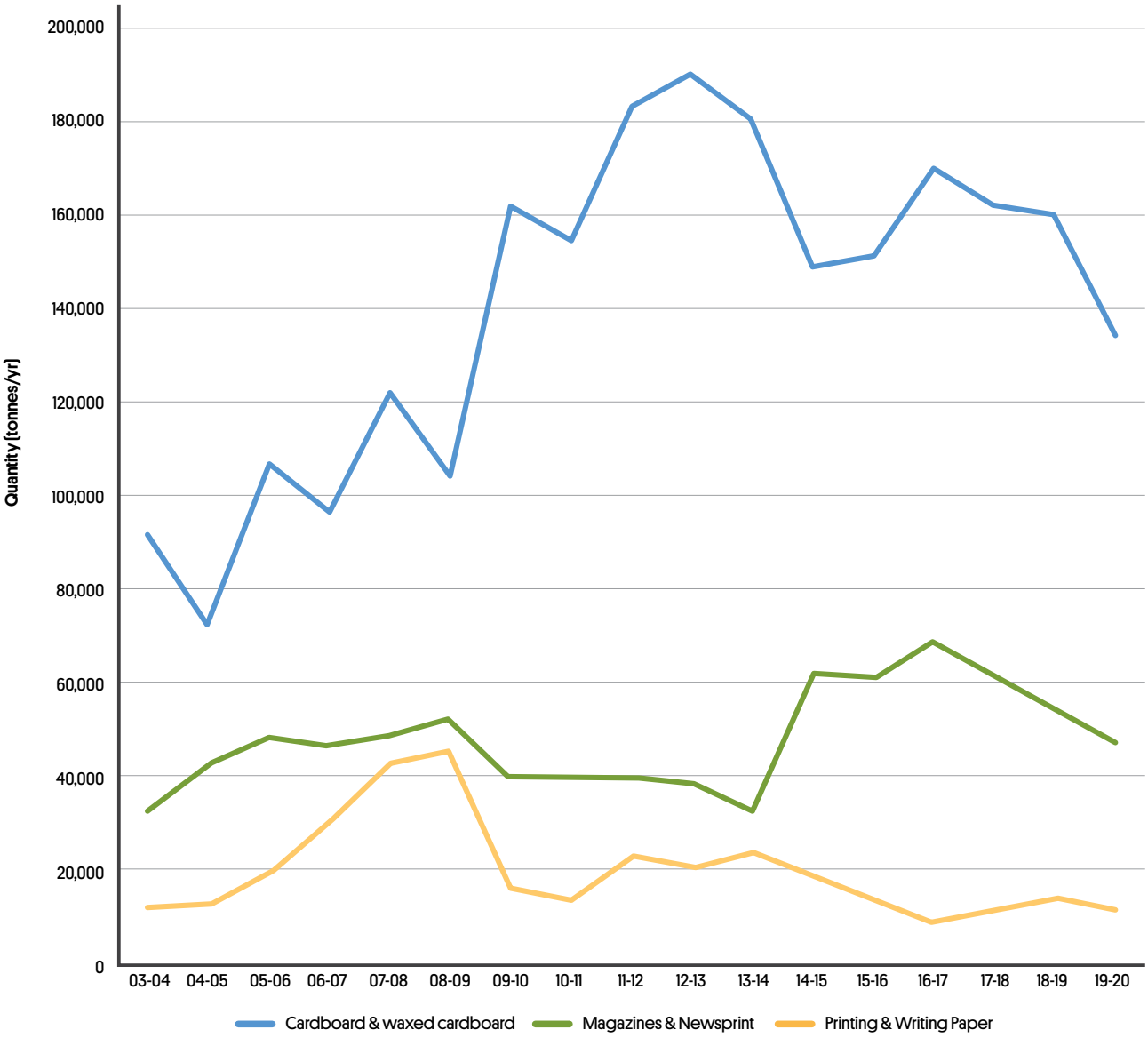
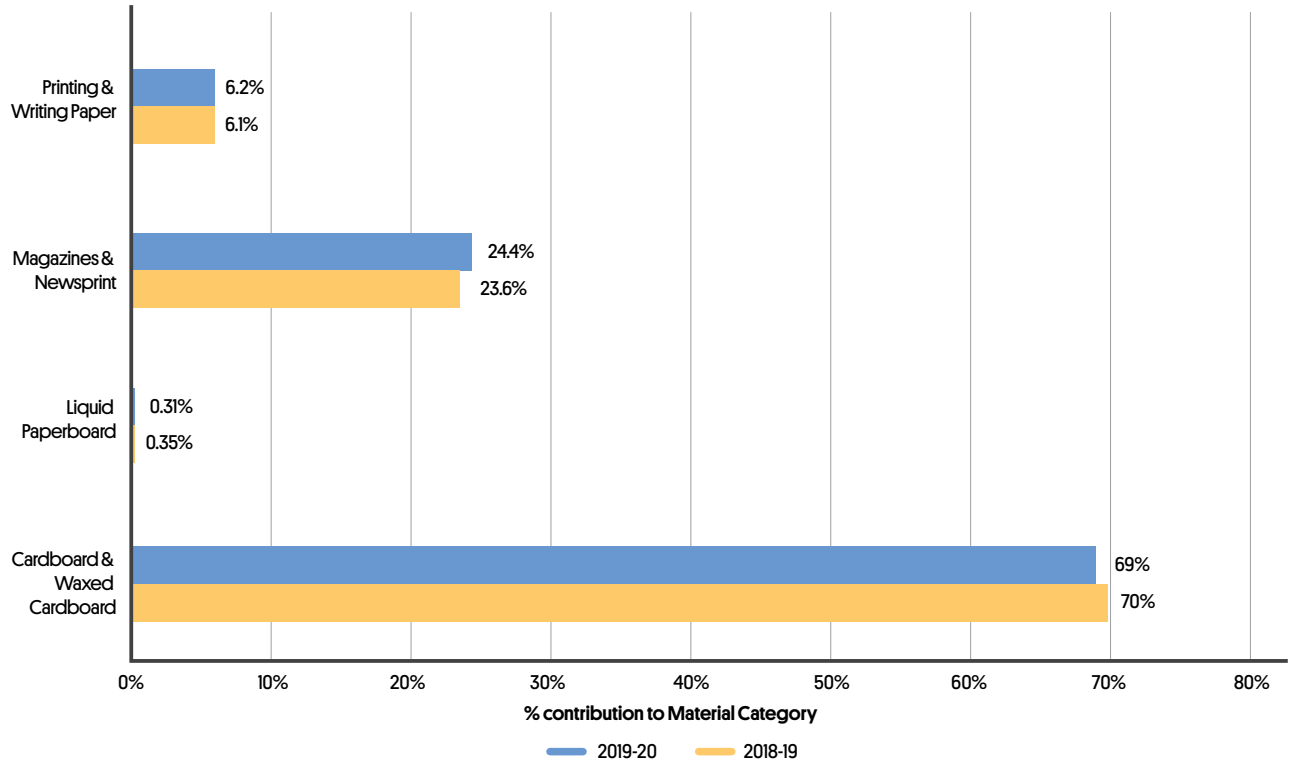


Figure 3.12

Changes in reported recovered Cardboard & Paper quantities since 2003-04 – Liquid Paperboard.
Liquid Paperboard continues to decrease as the commodity value for this material declines.

Figure 3.13

Changes in percent composition of recovered Cardboard & Paper (by weight), SA, between 2018-19 and 2019-20.
Despite a reduction in tonnes there were slight increases in the percentage contribution of Printing & Writing Paper and Magazines & Newsprint. The percentage contributions from others decreased.



The percentage contributions of each stream remained largely similar in 2019-20 compared to 2018-19 (**Figure 3.13**). Of the total recovered tonnes of Cardboard & Paper, the proportion that is Magazines & Newsprint and Printing & Writing Paper increased, while proportions of LPB and Cardboard & Waxed Cardboard decreased. There was a slight increase in Cardboard & Waxed Cardboard from MSW sources, due to a decrease in C&I activity and an increase in home purchases with people staying at home in response to COVID-19 restrictions. Overall, most Cardboard & Paper is from C&I sources (63%), which is slightly down from 2018-19 (65%). The geographical origin of recovered fibre remained largely like 2018-19, with 87% of Cardboard & Paper from Metro sources.

Almost all (99.6%) Cardboard & Paper is reprocessed interstate or overseas. This is consistent with 2018-19, with small volumes sent to recyclers in SA for compost or for kitty litter.

There was a slight increase in overseas re-processing of recovered Cardboard & Paper. One interstate facility changed ownership and reduced the amount of SA recovered Cardboard & Paper tonnes it accepted. This resulted in some of the recovered fibre being sent overseas instead.

Some overseas governments restricted intake of recovered Cardboard & Paper, such as China and Indonesia, resulting in recovered tonnes being sent to other countries. China continued to decrease accepted tonnes of recovered fibre from overseas sources, and the Indonesian government put a temporary hold on accepting recovered fibre from overseas. These government decisions flooded other overseas markets, decreasing the price of recovered Cardboard & Paper. China will stop accepting overseas recovered fibre in December 2020 and processing facilities will likely be built in other countries to accept recovered fibre that previously went to China.

Table 3.8 **Sector and geographical origins and re-processing locations for recovered Cardboard & Paper in SA during 2019-20.** C&I generated slightly less than 2018-19 (from 65% to 63%) but still creates the major component of Cardboard & Paper. Most (87%) is from Metro sources and 99.6% of materials are sent interstate and overseas for re-processing. Note that percentages may not equate to 100% due to rounding.

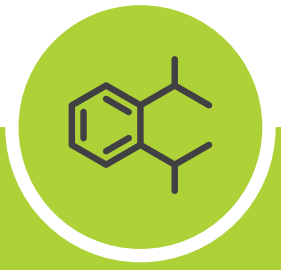
Item	Sector Origin (%)			Geographical Origin (%)		Re-processing Location (%)		
	MSW	C&I	C&D	Metro	Regional	SA	Interstate	Overseas
Cardboard & Waxed Cardboard	22%	78%	0.4%	89%	11%	0.16%	30%	70%
Liquid Paperboard	70%	30%	0%	72%	28%	0%	0%	100%
Magazines & Newsprint	85%	15%	0%	81%	19%	1%	65%	34%
Printing & Writing Paper	18%	82%	0%	83%	17%	0%	85%	15%
Total	**37%**	**63%**	**0.3%**	**87%**	**13%**	**0.4%**	**42%**	**58%**

Demand for recovered Cardboard & Paper remained steady in 2019-20. Items such as toilet paper and cardboard boxes, which use recovered fibre, continued to be in demand globally.

The Australian Federal Government's ban on the export of non-sorted paper and cardboard is still planned. Certain companies have explored building new infrastructure that may enable the ongoing sale of recovered fibre overseas. However, industry has also reported that this would be challenging given SA's wages and the cost to set up and run such facilities compared to overseas.

The future of recovered Cardboard & Paper is uncertain and hard to predict. Price volatility remains a challenge with the dollar per tonne for fibre fluctuating substantially in recent years. While China will stop accepting recovered Cardboard & Paper, other SE Asian countries are setting up processing plants. Online purchases continue to increase, meaning the supply and demand for recovered Cardboard & Waxed Cardboard should remain. Declines in print media and at office printing suggest recovery of Magazines & Newsprint and Printing & Writing Paper is likely to decline to some extent.

3.5 Plastics



Highlights:

- In 2019-20 Plastics recovery was 29,700 tonnes, a 3% decrease from 2018-19.
- The greatest decline was Mixed &/or Other Plastics (MIX), which fell 14% from 2018-19. The value of MIX has further reduced. Recyclers are either not collecting this material or installing infrastructure and processes to separate out MIX into individual polymers. Improved reporting also accounted for a proportion of this decrease.
- Non-recyclable plastics have been introduced into the market. For example, white PET and laminated sachets.
- Local reprocessing of plastics increased with the operation of re-opened local plastics reprocessing facility for the full financial year, and new plastics re-processing infrastructure at another facility.

South Australia recovered 29,700 tonnes of recovered plastics in 2019-20. This is a 3% decrease from 2018-19. Most of the decrease was from Mixed &/or Other Plastics (MIX), which decreased 14%, due to the decline in value of MIX. SA has a local facility that can separate the material into higher value grades such as PET, LDPE, and HDPE. Improved reporting also accounted for a proportion of the decrease in MIX. The COAG ban will impact MIX, with mixed waste plastics banned from export in July 2021. This is another motivating factor for recyclers to separate the plastic into single resin types. New infrastructure and the operation of a re-opened facility for a full financial year helped with this separation process. It also increased the tonnes recovered locally and imported from interstate and overseas (see **Table 2.8** earlier).

PET recovery decreased slightly as some lower grade PET materials, such as coloured strapping, reduced in value and were not collected for recycling. There were significant increases in PP and PS recovery, with more of the public and businesses looking to increase plastics recycling. The price of LDPE recovered in 2019-20, increasing tonnes collected and reprocessed (note some of this increase is also due to improved reporting).

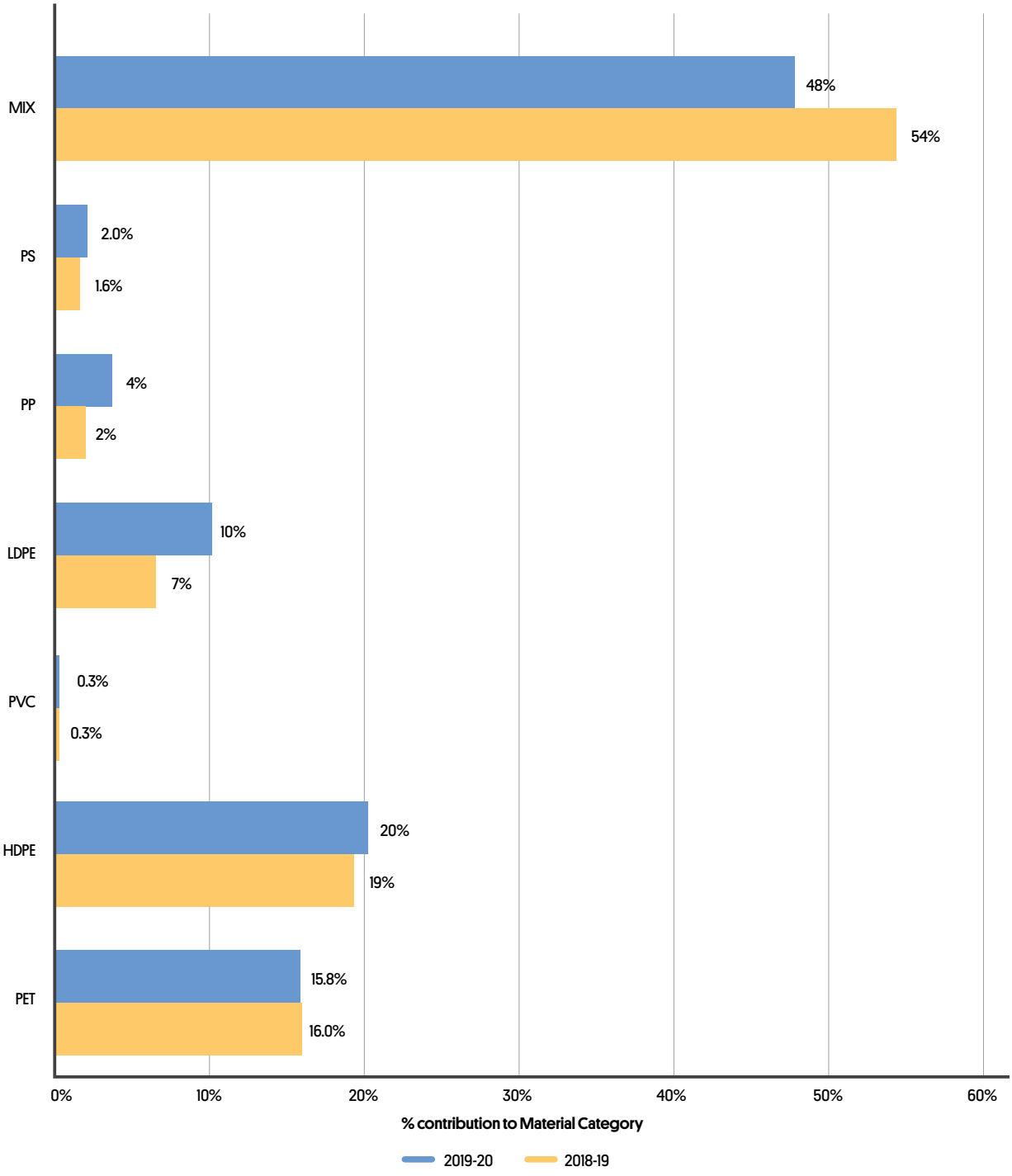
Table 3.9 **Quantity of Plastics recovered (tonnes) in SA during 2019-20, including estimated reporting error (tonnes & %).** Net resource recovery in 2019-20 decreased slightly from 2018-19.

Item	Material Recovery	Energy Recovery	Net Recovery [1,2]	Reporting Error	
	tonnes	tonnes	tonnes	tonnes	%
Polyethylene Terephthalate (PET)	4,700		4,700	824	18%
High density Polyethylene (HDPE)	6,000		6,000	574	10%
Polyvinyl Chloride (PVC)	100		100	7	7%
Low density Polyethylene (LDPE)	3,000		3,000	700	23%
Polypropylene (PP)	1,100		1,100	81	7%
Polystyrene (PS)	600		600	41	7%
Mixed &/or Other Plastics (MIX)	1,500	12,700	14,200	438	3%
Total	**17,000**	**12,700**	**29,700**	**2,700**	**9%**

1 Net recovery excludes re-processing losses

2 Net recovery = Material Recovery + Energy Recovery

Figure 3.14 **Changes in percent composition of recovered Plastics (by weight), SA, between 2018-19 and 2019-20.**
Mixed Plastics decreased but remained a significant contributor to resource recovery, attributing just under half of all recovered plastics in SA.



MIX remained the greatest contributor to Plastics recovery in 2019-20. Although this decreased from 54% in 2018-19 to 48% in 2019-20, it is still almost half of all recovered SA plastics.

HDPE is the next greatest contributor at 20%, followed by PET at 16%. There were increases in contributions of PS, PP and LDPE.

This is the second year in a row that there has been a decrease in the overall recovery of Plastics (**Figure 3.17**).

Figure 3.15

Changes in reported recovered Plastics quantities since 2003-04 – PET, HDPE, LDPE, PP and MIX.
Mixed plastics remains a significant contributor to plastics recovery by weight, although this material decreased in 2019-20 when compared to 2018-19.

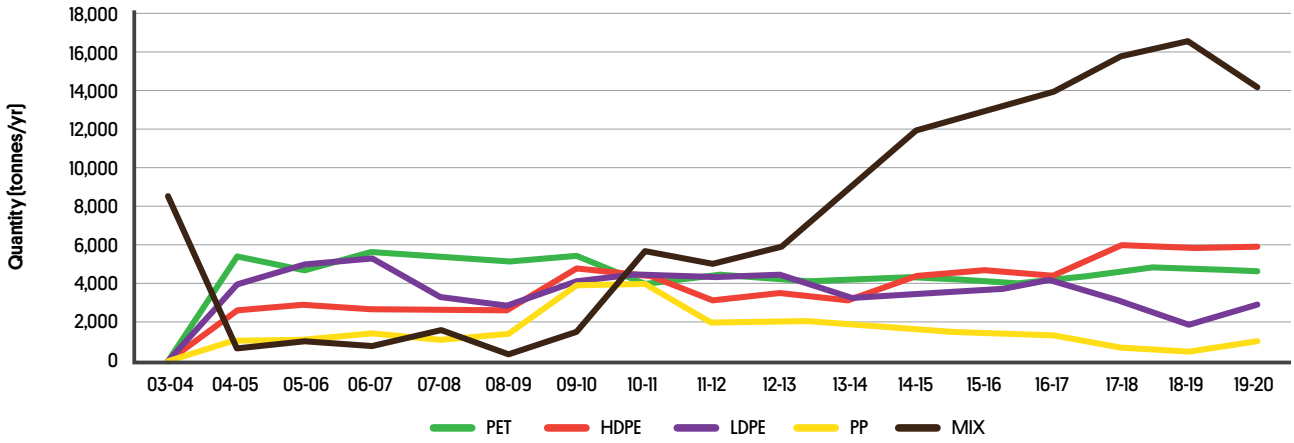


Figure 3.16

Changes in reported recovered Plastics quantities since 2003-04 – PVC and PS.
PVC remained the same in 2019-20 while PS increased.

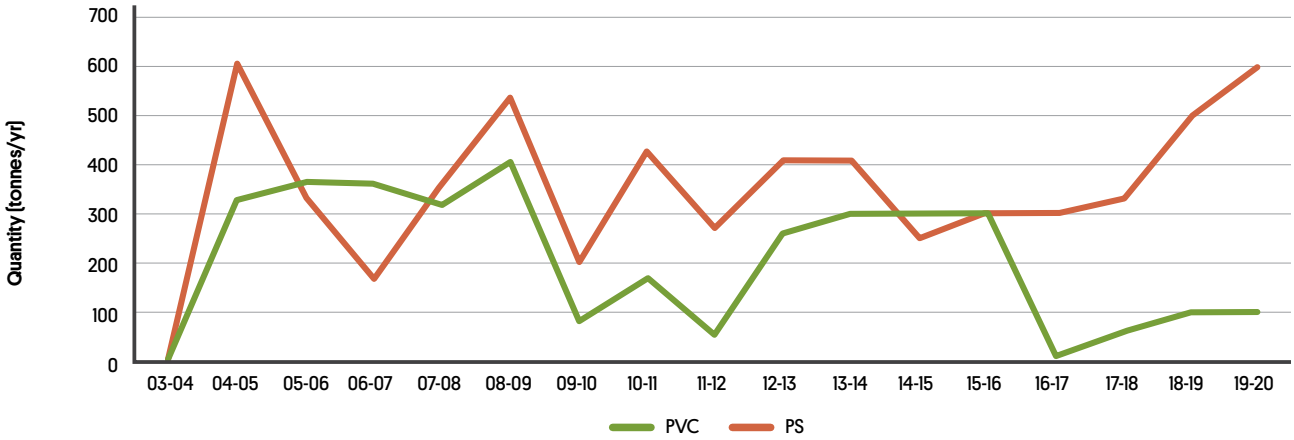
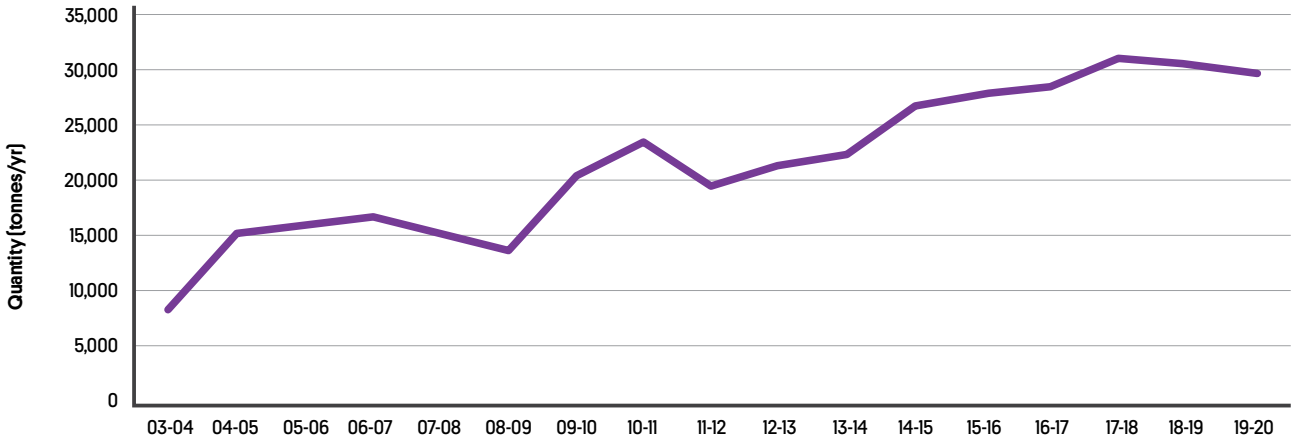


Figure 3.17

Changes in reported recovered Plastics quantities since 2003-04 – all Plastics.
Overall quantity of recovered plastics decreased slightly from 2018-19.



The sources of the recovered Plastics in 2019-20 are similar to 2018-19. More than a third is from MSW sources (37%), 41% is from the C&I sector and 22% from the C&D sector (**Table 3.10**). There was a slight increase in PET from the MSW sector as the value of some of the coloured PET from C&I sources declined and recyclers stopped collecting this material. There were also increases in PVC, LDPE, PP and PS from the MSW sector as the public start bringing in more materials to recyclers and resource recovery centres. Recyclers also improved Plastics separation from comingled recycling bins.

The proportion of Plastics from Regional sources increased from 9% in 2018-19 to 13% in 2019-20. This is due to the C&I sector in regional areas increasing their recycling (for example, plastic packaging and pipes).

There was an increase in locally re-processed Plastics, with a re-opened plastics recycling facility operating for the entire financial year, and new plastics reprocessing infrastructure at other facilities.

Table 3.10 **Sector and geographical origins and re-processing locations for recovered plastics in SA in 2019-20.**
There was a slight increase in locally re-processed Plastics in 2019-20.

Item	Sector Origin (%)			Geographical Origin (%)		Re-processing Location (%)		
	MSW	C&I	C&D	Metro	Regional	SA	Interstate	Overseas
Polyethylene Terephthalate (PET)	66%	34%	0%	72%	28%	7%	85%	9%
High density Polyethylene (HDPE)	60%	40%	0%	82%	18%	39%	37%	24%
Polyvinyl Chloride (PVC)	58%	42%	0%	92%	8%	56%	0%	44%
Low density Polyethylene (LDPE)	4%	96%	0%	83%	17%	3%	32%	65%
Polypropylene (PP)	55%	45%	0%	92%	8%	90%	5%	4%
Polystyrene (PS)	11%	62%	27%	91%	9%	23%	7%	71%
Mixed &/or Other Plastics (MIX)	24%	31%	45%	95%	5%	92%	3%	5%
Total	**37%**	**41%**	**22%**	**87%**	**13%**	**57%**	**26%**	**17%**

In 2019-20 Plastics recovery decreased slightly. This is due to a slight slowing of the industry (from COVID-19) but also a decrease in the value of plastics such as MIX and certain grades of PET. The imported tonnes of Plastics increased substantially, and local re-processing continues to increase due to new infrastructure and re-opened facilities.

Plastics recovery is expected to remain consistent, subject to demand remaining high as government and the private sector purchase back or make materials containing recycled content, and pricing remaining steady. PS may be a challenging stream as industry have reported significant declines in the price of this recovered material.

One of the challenges for the sector will be new plastics. There are reports of non-recyclable plastics being introduced into the market. For example, white PET and laminated sachets. Current infrastructure may not be able to identify this material and recycle it, and there may be no markets for the recovered material. Another challenge is the cost to recover plastics locally. Local employment and utility costs can be higher than overseas recycling competitors.

Energy recovery of Plastics is also anticipated to increase in SA as licenced acceptable volumes increase for a local consumer of MIX. An increase in the landfill levy may also motivate companies to dispose MIX plastics to energy recovery rather than landfill.

Recyclers continue to explore ways to improve the value of recovered Plastics. For example, washing and granulating plastics in SA to enable direct sale to the manufacturing sector, or focusing on recyclable plastics that can be sold to higher grade (e.g., food grade) manufacturing.

3.6 Glass

Highlights:

- Glass recovery increased for the second consecutive year in SA.
- In 2019-20 SA recovered 87,000 tonnes of Glass compared to 74,000 in 2018-19.
- SA also imported higher volumes of Glass from interstate.
- The strong demand for recovered Glass for bottle re-manufacturing and glass to road base for the lower grade/mixed glass has continued.
- Recovered Glass is anticipated to remain in high demand.

SA recovered 87,000 tonnes of Glass in 2019-20. This is an 18% increase from 2018-19 (74,000 tonnes). A further 88,700 tonnes of Glass was imported from interstate. Glass bottle manufacturers continue to set targets for recycled glass content in their bottles, increasing demand for this product. Glass to road base is also more common, and companies are investing in waste glass into asphalt and footpaths as a replacement for natural sand.

Table 3.11 **Quantity of Glass recovered (tonnes) in SA during 2019-20, including estimated reporting error (tonnes & %).**

Item	Net Recovery [1]	Reporting Error	
	tonnes	tonnes	%
Glass	**87,000**	**16,200**	**19%**

1 Net recovery excludes re-processing losses

Figure 3.18

Changes in reported recovered Glass quantities since 2003-04.
Glass quantities increased for another year and are at their highest levels since 2003-04.

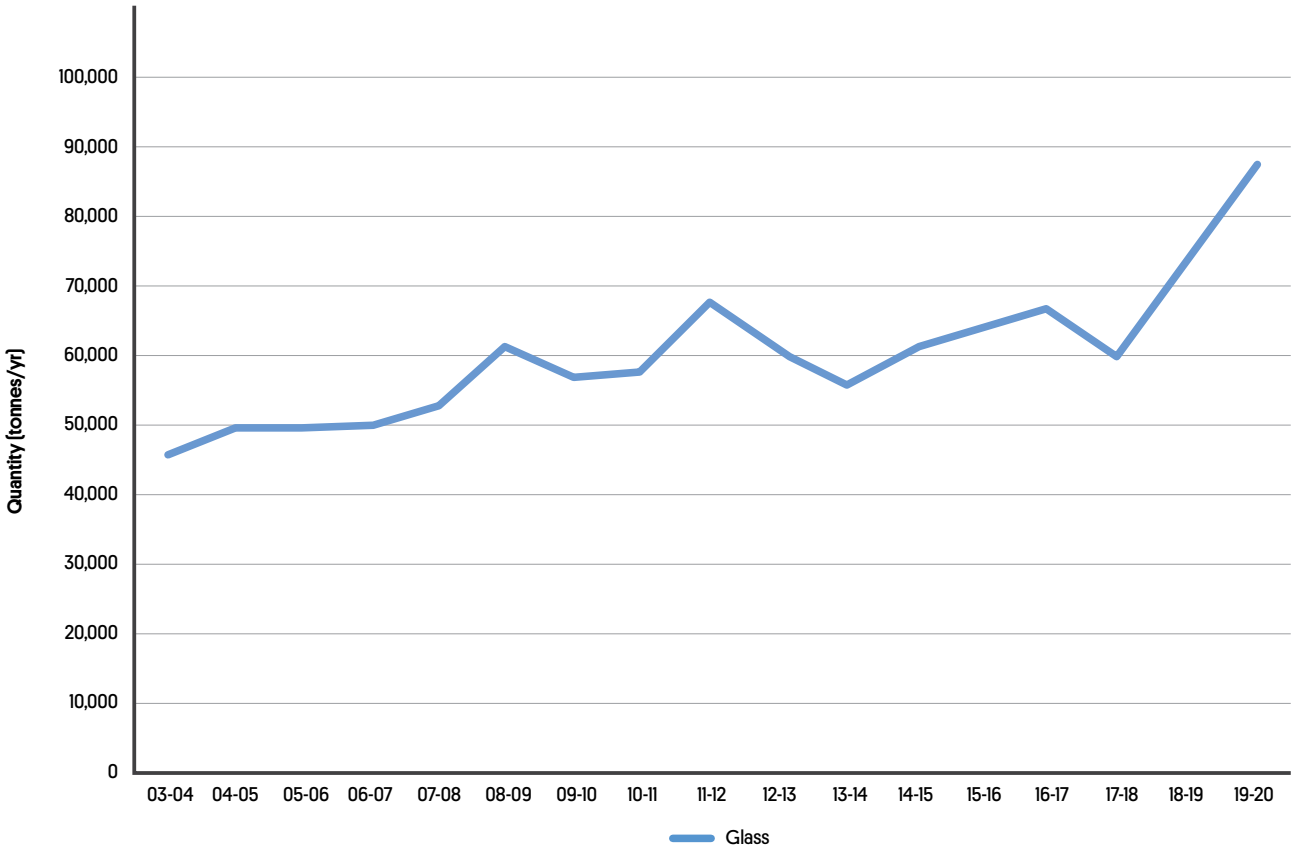


Table 3.12

Sector and geographical origins and re-processing locations for recovered Glass in SA in 2019-20.
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	61%	39%	0%	86%	14%	69%	31%	0%

Most Glass continues to be sourced from the MSW sector (61%) and Metropolitan Adelaide (86%). There was a slight increase in the proportion of Glass from the C&I sector and Glass reprocessed interstate. A local glass manufacturer increased its business activity in 2019-20, resulting in more offcuts of glass being recovered interstate. In addition, more interstate companies are using recovered Glass in road base. SA sent additional tonnes of lower grade/mixed glass to these sites in 2019-20.

Local companies are trialling recycled Glass in roads and footpaths and this is likely to lead to an increase in Glass recovery in SA. These projects focus on lower grade/mixed glass rather than bottle to bottle glass manufacturing.

Bottling companies are setting recycled content targets, meaning new bottles are manufactured with higher proportions of recovered Glass. This re-emphasises the importance of SA's CDL system as the Glass remains in its respective colour, which is required for use in bottle manufacturing.

3.7 Other Materials

Highlights:

- There was a net increase in the recovery of Other Materials in SA, from 27,200 tonnes in 2018-19 to 43,900 tonnes in 2019-20.
- This was mostly due to manufacturers increasing their use of recovered Foundry Waste that previously went to landfill. There was also some improved reporting by industry.
- There was a slight increase for recovered tyres. COVID restrictions on interstate and overseas travel increased tyre replacement as the public were more likely to travel by road.
- Leather & Textiles slowed significantly, predominately due to COVID restrictions for the last quarter of the 2019-20 financial year.
- The outlook for resource recovery of Other Materials is expected to remain stable.

The total quantity of Other Materials recovered in 2019-20 was 43,900 tonnes. This is a 61% increase from 2018-19 (27,200 tonnes). This increase was mostly due to recovered Foundry Waste, which increased by 300% (from 6,000 tonnes in 2018-19 to 24,000 tonnes in 2019-20, **Figure 3.19**). Manufacturers that use Foundry Waste changed their processes to accept more of this product, with companies looking to decrease waste to landfill and increase recycled product in their processes. Some of this increase is also due to improved reporting. Foundry Waste is now the highest contributor to Other Materials (**Figure 3.21**).

Recovered Tyres & Other Rubber was 19,000 tonnes in the 2019-20 financial year. This is a small improvement from 2018-19. COVID-19 increased intrastate and interstate road-based travel and therefore more of the public brought in old tyres to be replaced by new tyres.

Leather & Textiles decreased, predominately due to COVID-19, from 2,600 tonnes in 2018-19 to 900 tonnes in 2019-20. This decrease was due to charity shops closing in response to COVID-19, and some improved reporting.

Table 3.13 **Quantity of Other Materials (tonnes) Net recovered in SA during 2019-20, including estimated reporting error (tonnes & %).** Foundry Waste and Tyres & Other Rubber were the greatest contributors to Other Materials.

Item	Net Recovery [1]	Reporting Error	
	tonnes	tonnes	%
Fly ash	0	0	NA
Foundry Waste	24,000	900	4%
Leather & Textiles	900	200	22%
Tyres & Other Rubber	19,000	800	4%
Total	**43,900**	**1,900**	**4%**

1 Net recovery excludes re-processing losses

Figure 3.19 **Changes in reported recovered Other Materials quantities since 2003-04 – Foundry Waste, Leather & Textiles, and Tyres & Other Rubber.**
Foundry Waste and Tyres & Other Rubber increased while Leather & Textiles decreased.

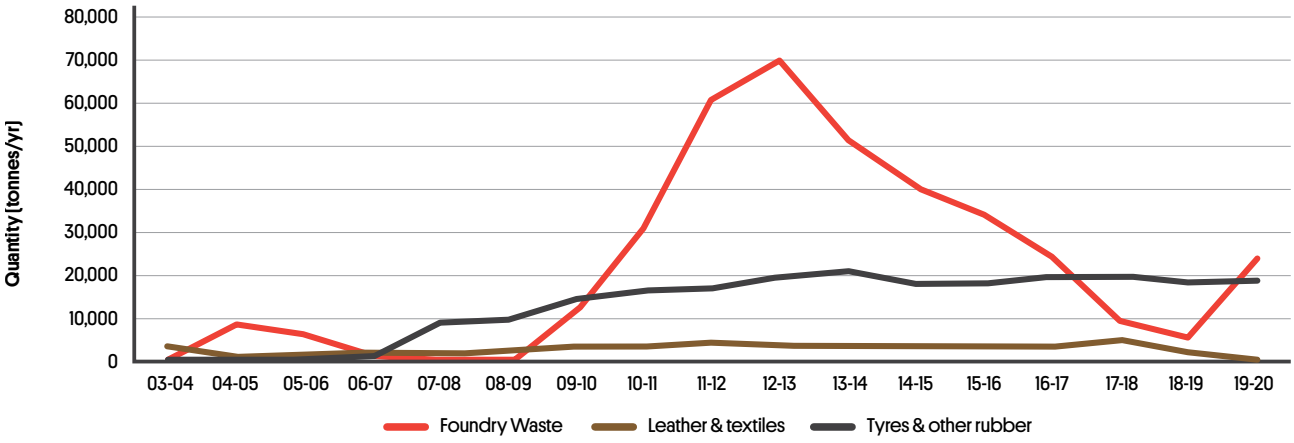


Figure 3.20 **Changes in reported recovered Other Materials quantities since 2003-04 – Fly Ash.**
No Fly Ash has been recovered since the closure of the Port Augusta Power Station.

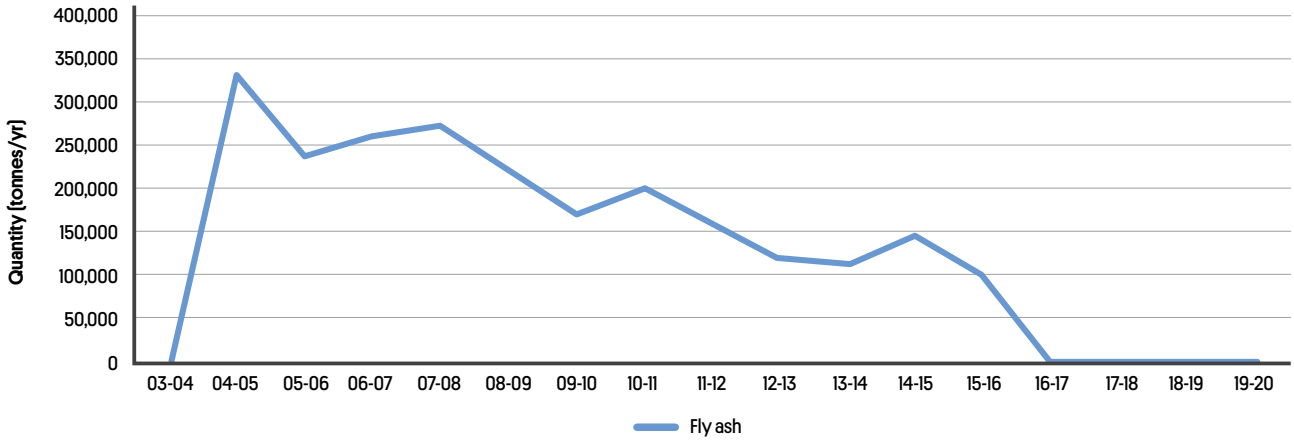
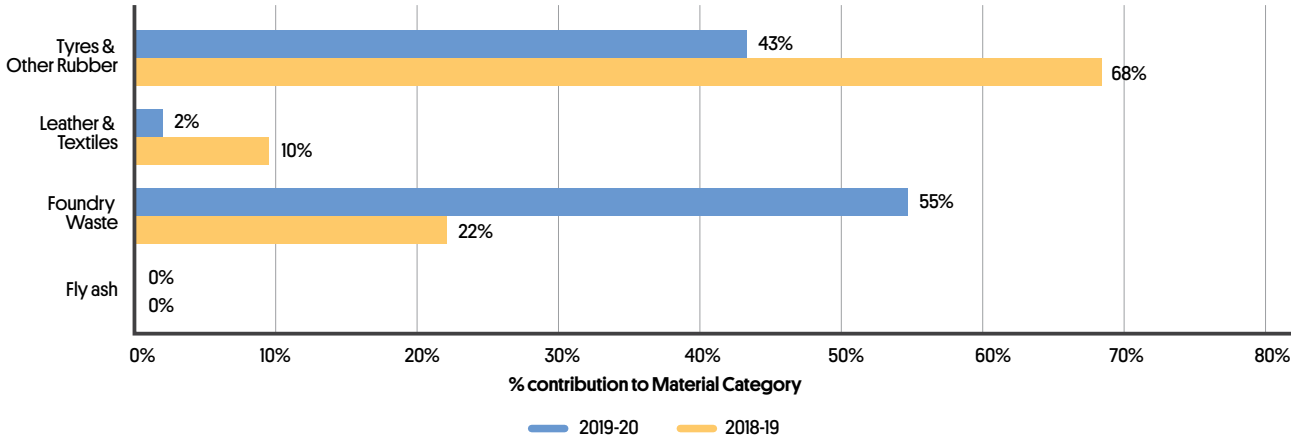


Figure 3.21 **Changes in percent composition of recovered Other Materials (by weight), SA, between 2018-19 and 2019-20.**
With the large increase in recovered Foundry Waste, proportions of Leather & Textiles and Tyres & Other Rubber decreased.



The large increase in Foundry Waste meant its contribution to Other Materials increased from 22% in 2018-19 to 55% in 2019-20 (**Figure 3.21**). This is now the greatest contributor to the Other Materials category. This meant the proportion of Tyres & Other Rubber, and Leather & Textiles decreased. Tyres & Other Rubber constituted 43% of the Other Materials, and Leather & Textiles 2%.

The C&I sector remains the greatest contributor to Other Materials. This increased from 91% in 2018-19 to 98% in 2019-20 (**Table 3.14**), due to the decrease in Leather & Textiles which are mostly from the MSW sector, and an increase in Foundry Waste which is from the C&I sector. There was a slight increase in Other Materials from Regional sources, due to Foundry Waste, where a regional manufacturing facility disposes this material.

Most Other Materials are reprocessed in SA (81%). Foundry Waste is re-processed in SA for cement production, and Leather & Textiles are turned to rags, sometimes after clothing is sent overseas (it is then returned here). Tyres & Other Rubber are either shredded in SA (57%) before they are sent elsewhere or sent directly interstate (20%) or overseas (23%) for reprocessing (e.g., crumbing or for energy recovery). A higher proportion of Tyres & Other Rubber was sent overseas in 2019-20 due to changes in tyre recycler contracts with tyre retailers. Tyre derived products include crumb rubber, tyre derived fuel (TDF) and tyre to pyrolysis.

Table 3.14 **Sector and geographical origins and re-processing locations for recovered Other Materials in SA in 2019-20.**
Most Other Materials are produced by the C&I Metropolitan Sector and are re-processed here in SA.

Item	Sector Origin (%)			Geographical Origin (%)		Re-processing Location (%)		
	MSW	C&I	C&D	Metro	Regional	SA	Interstate	Overseas
Fly Ash	NA	NA	NA	NA	NA	NA	NA	NA
Foundry Waste	0%	100%	0%	69%	31%	100%	0%	0%
Leather & Textiles	99%	1%	0%	93%	7%	100%	0%	0%
Tyres & Other Rubber	0%	100%	0%	73%	27%	57%	20%	23%
Total	**2%**	**98%**	**0%**	**71%**	**29%**	**81%**	**9%**	**10%**

The outlook for Other Materials is expected to remain steady. Fly Ash is anticipated to remain at zero tonnes per annum. Tyres & Other Rubber is likely to remain around 19,000 tonnes per annum. Leather & Textiles recovery is expected to moderately increase as COVID-19 restrictions on businesses ease and opportunity shops reopen at the end of the financial year. Foundry Waste could also increase slightly if manufacturing businesses continue increase use of recycled product in their processes.

The destination of Tyres & Other Rubber may change as local projects that use tyre derived products, such as crumb rubber to road base, increase. The COAG ban on whole tyre exports may reduce the tonnes of tyres exported directly.

04 Electronic and Electrical Waste

At a glance:

- Recovered Electronic and Electrical Waste continues to increase with the success of the local drop off points and as more electronic items are purchased and used.
- Total tonnes of E-waste in 2019-20 was 5,400, a 4% increase from 5,200 tonnes in 2018-19.
- The outlook for E-waste is anticipated to remain steady. Light weighting of E-waste and a push towards refurbishment point to reduced tonnes of recovered E-waste. However, an increase in individuals and businesses using E-waste and built-in obsolescence (intentionally designing a product to have a limited useful life, after which it suddenly ceases to function), indicates the potential for increased disposal and recycling rates.

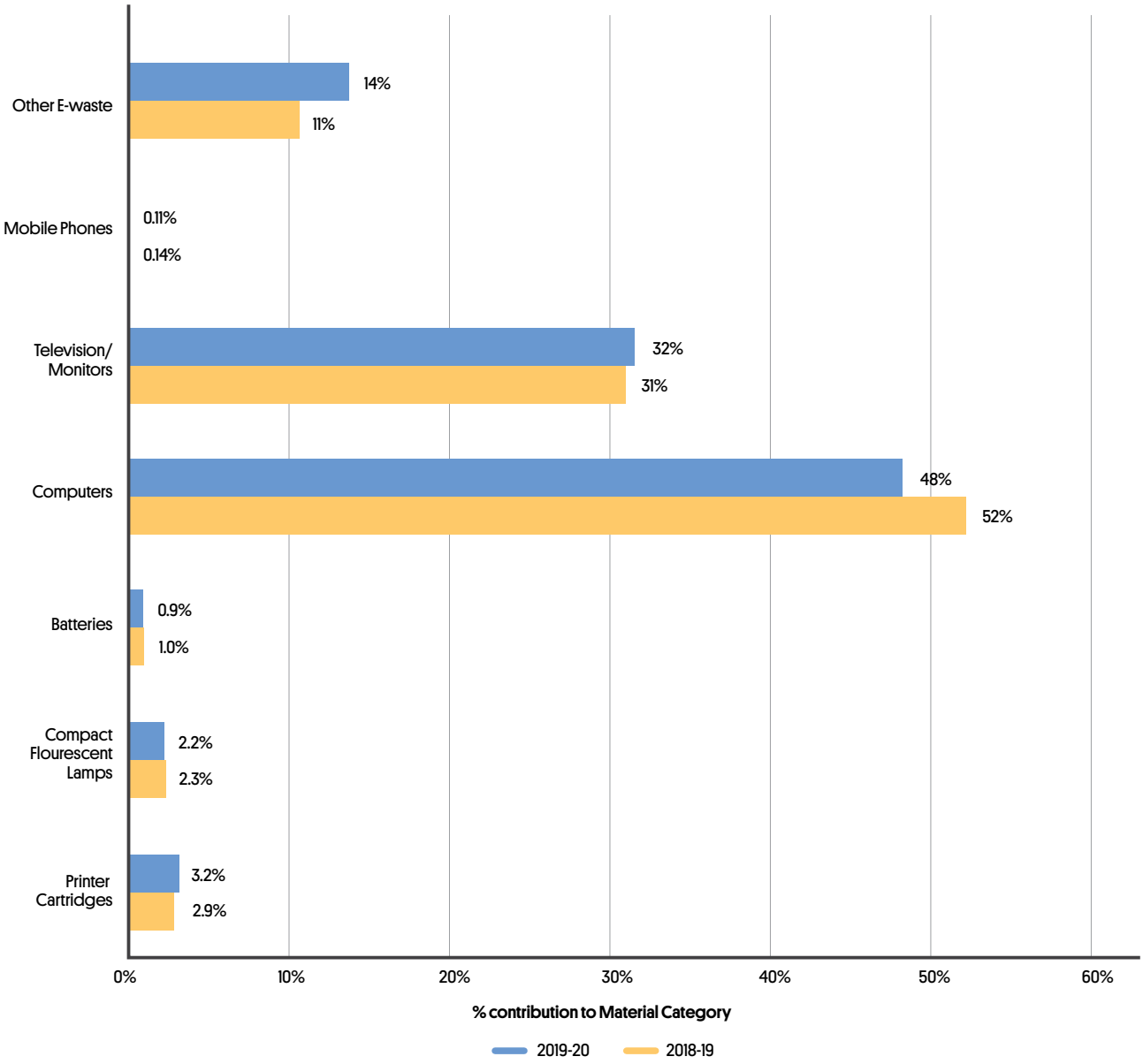
Electronic and Electrical Waste (E-waste) quantities are a subset of the individual material data presented in Section 3. E-waste recovered in SA increased slightly (4%) from 2018-19 (5,200 tonnes) to 2019-20 (5,400 tonnes, **Table 4.1**). The Unplug and Drop facilities continue to provide an easy pathway for the public to recycle E-waste. There were marginal increases in recovered Printer Cartridges as businesses continue to recycle this stream, and tonnes of Televisions / Monitors recovered. Other E-waste increased more substantially, by 35%, from 550 tonnes in 2018-19 to 740 tonnes in 2019-20. The slight reduction in Computers (4%) is attributed to light weighting of this product and a shift to smaller devices such as tablets.

Table 4.1 **Changes in reported quantities of E-waste between 2018-19 and 2019-20.**
Printer Cartridges, Televisions/Monitors and Other E-waste all increased. Note that tonnes recovered excludes re-processing losses.

Item	2018-19 tonnes	2019-20 tonnes	% change 2018-19 to 2019-20
Printer Cartridges	150	170	13%
Compact Fluorescent Lamps	120	120	0%
Batteries	50	50	0%
Computers	2,700	2,600	-4%
Televisions / Monitors	1,600	1,700	6%
Mobile Phones	7	6	-14%
Other E-waste	550	740	35%
Total	**5,200**	**5,400**[1]	**4%**

1 This value has a reporting error of 1,674 tonnes (+/-31%).

Figure 4.1 **Changes in percent composition of recovered E-waste (by weight), SA, between 2018-19 and 2019-20.**



The proportion of E-waste that is Computers decreased slightly, from 52% in 2018-19 to 48% in 2019-20. Despite this decline, Computers make up almost half of all E-waste recovered in SA (**Figure 4.1**). Televisions/ Monitors is the next largest contributor and is around a third of all E-waste captured in SA for recycling. Other E-waste follows Computers and Televisions/Monitors, and this increased from 11% in 2018-19 to 14% of all E-waste in 2019-20.

Almost 60% of E-waste recovered in SA was from the MSW sector, with the remainder from the C&I sector. The majority (86%) was from Metro sources, and almost two thirds was dismantled in SA before being sent interstate or overseas for recycling. These proportions show similar makeup to 2018-19.

Table 4.2 **Sector and geographical origins and re-processing locations for recovered E-waste in SA in 2019-20.**
Most E-waste is from the MSW sector in Metro Adelaide. Most E-waste is dismantled in SA before the parts are sent to various recyclers.

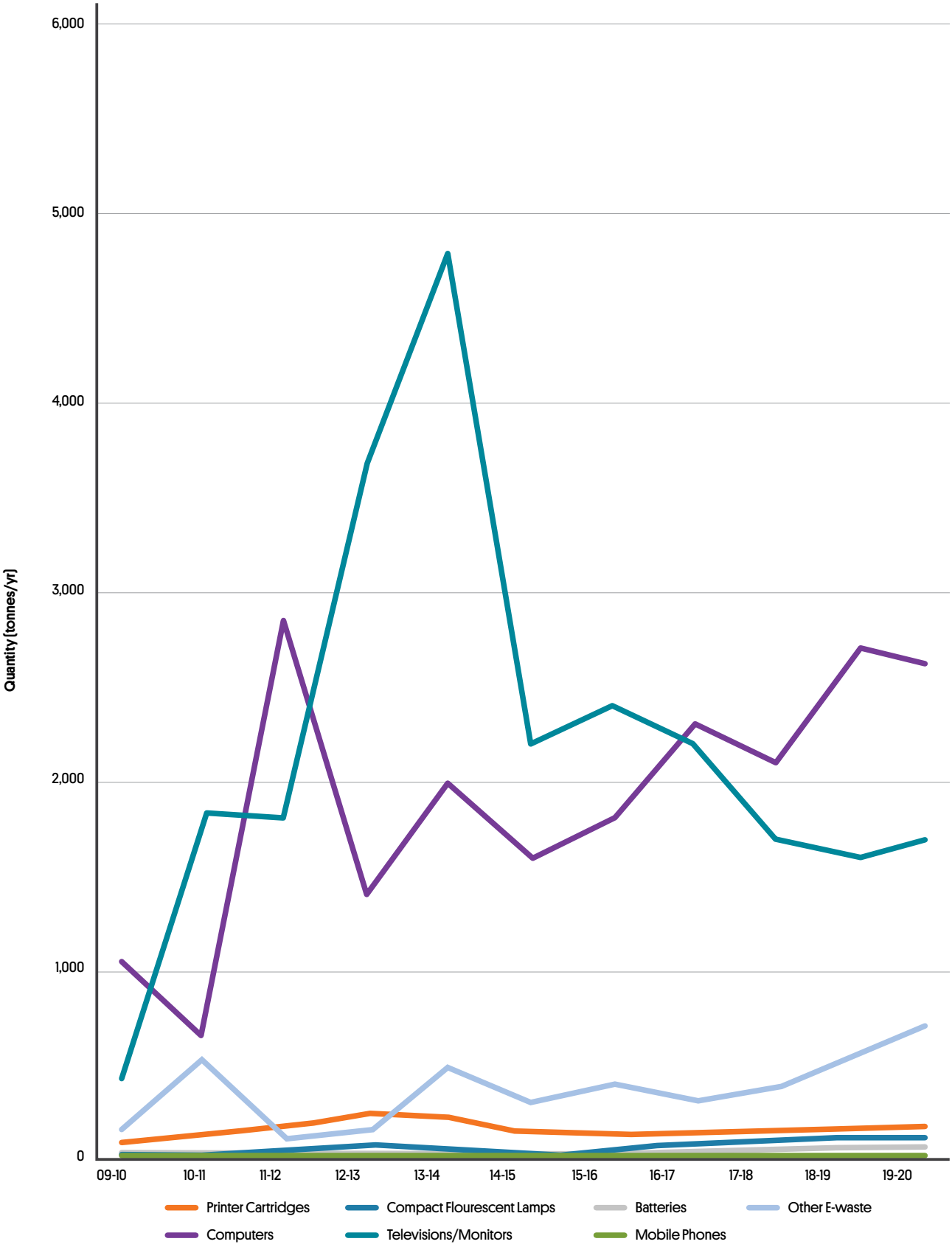
Item	Sector Origin (%)			Geographical Origin (%)		Re-processing Location (%)		
	MSW	C&I	C&D	Metro	Regional	SA	Interstate	Overseas
Total E-waste	59%	41%	0%	86%	14%	62%	38%	0%

The National Television and Computer Recycling Scheme (NTCRS) commenced in 2011 and stabilised the recovery of E-Waste. This steady trend is anticipated to remain. The number of items recovered is expected to increase with recycling targets for the industry increasing to 80% by 2026-27[22]. However, the tonnes recovered is likely to remain consistent as electronic items continue to decrease in size and weight. There is also interest in increasing repair and refurbishment, particularly for Computers, which may decrease recycling volumes.

22 See ANZRP, 2017

Figure 4.2

Changes in quantities of recovered E-waste (by weight), SA, between 2009-10 and 2019-20.
Computers makes up the highest proportion of E-waste and has done since 2016-17.
Televisions/ Monitors is the second highest contributor to SA's E-waste recovery.



05 Packaging Materials

At a glance:

- An estimated 225,900 tonnes of packaging were recovered in 2019-20. This is an 8% decrease from 2018-19, due to the decrease in recovered Cardboard.
- SA's Container Deposit scheme makes a substantial contribution to the recovery of packaging materials in SA (18% of all packaging). This may increase as the SA Government reviews the CDL scheme.
- The Federal Government Plastics Packaging Bill includes packaging targets which may impact recovered packaging in SA.

5.1 Total Packaging

Packaging quantities are a subset of the individual material data presented in Section 3. SA recovered 225,900 tonnes of packaging in 2019-20. 40,400 tonnes or 18% of this were recovered through SA's container deposit scheme, and 185,500 tonnes (82%) were recovered from other sources (**Table 5.1**).

Packaging materials constitute an important proportion of the total amount of recycling activity reported in SA for some of these individual materials. For example, in 2019-20 all recovered LPB and PET was packaging, 97% of LDPE and 90% of Cardboard and Glass were packaging.

The tonnes of packaging recovered in 2019-20 decreased 8% from 2018-19, mainly due to lower Cardboard recovery volumes with COVID-19 adversely affecting the commodity prices.

The Federal Government Plastics Packaging Bill may impact the volume of packaging recovered for recycling by industry. Packaging targets include[23]:

- All packaging used in Australia will be reusable, recyclable, or compostable by 2025.
- 70% of packaging used in Australia will be recycled or composted by 2025.
- 50% of average recycled content included in packaging (revised from 30% in 2020).

Table 5.1 **Estimated packaging recovery, SA 2019-20.** Cardboard and glass remain dominant contributors to packaging recovery. Packaging decreased in 2019-20 due to decreased Cardboard recovery. Packaging constitutes significant proportions of resource recovery for some materials, such as PET, LDPE, PP, PVC, glass, cardboard and LPB. Note some numbers may not equate due to rounding.

Packaging Material	Origin (tonnes)		Total packaging (tonnes)	Packaging as a proportion of total material recovered
	CDL[1]	Other		
Steel Cans		2500	2,500	1.0%
Aluminium Cans	3,800	80	3,900	35%
Cardboard Packaging		120,600	120,600	90%
Liquid Paperboard Cartons	480	120	600	100%
PET Packaging	3,500	1,200	4,700	100%
HDPE Packaging	250	4,300	4,650	77%
PVC Packaging		80	80	76%
LDPE Packaging		2,900	2,900	97%
Polypropylene Packaging		935	935	85%
Polystyrene Packaging		400	400	67%
Other Plastics Packaging		6,700	6,700	47%
Glass bottles & Jars	32,300	45,700	78,000	90%
Total	**40,400**	**185,500**	**225,900**	

1 Data provided by the South Australian Environmental Protection Authority.

23 See Allens (2019).

5.2 Container Deposits

The number of states and territories with a container deposit system for return of recyclable beverage bottles and cans continues to rise. These include:

- SA (introduced in 1977)
- NT (introduced in 2012)
- NSW (introduced in 2017)
- ACT (introduced in 2018)
- Qld (introduced in 2018)
- WA (introduced 2020).

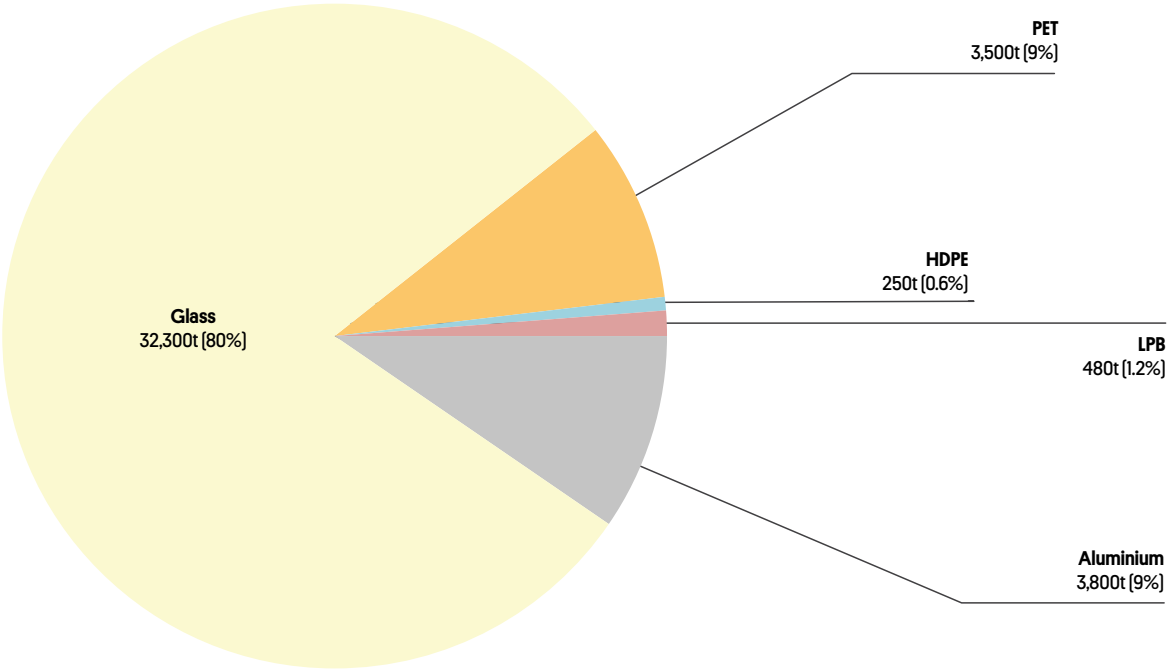
Victoria is likely to roll out a container deposit system in 2022/2023, and Tasmania late 2022.

Glass containers continue to represent the highest proportion (by weight) of container deposit items (80%, **Figure 5.1**). The SA Government is considering expanding the CDL to include items such as wine and spirit bottles. This would impact the proportion of all returns that is glass, which would likely be higher than 80% (by weight). Glass also had the highest return rate of all container deposit items in 2019-20 (88%, **Table 5.2**).

Aluminium and PET both represented 9% of the returned deposit containers by weight, and LPB 1%. HDPE represented the lowest proportion of returned deposit containers (by weight), at 0.6%.

The average return rate for container deposits increased by 3 percentage points to 84% (by weight) in 2019-20 (**Table 5.2**). This increase is driven by a higher return rate for glass and LPB container deposits. Overall, SA returned approximately 531 million of the 632 million registered containers sold in 2019-20[24].

Figure 5.1 **Relative proportions of returned recycled deposit containers (by weight), SA 2019-20.**
Glass remains the major contributor by weight.



24 Based on return rates from the South Australian Environment Protection Authority, and assumes aluminium CDL is 15 grams per unit, Glass CDL is 210 grams per unit, PET is 37.5 grams per unit, HDPE is 40 grams per unit and LPB is 20 grams per unit on average.

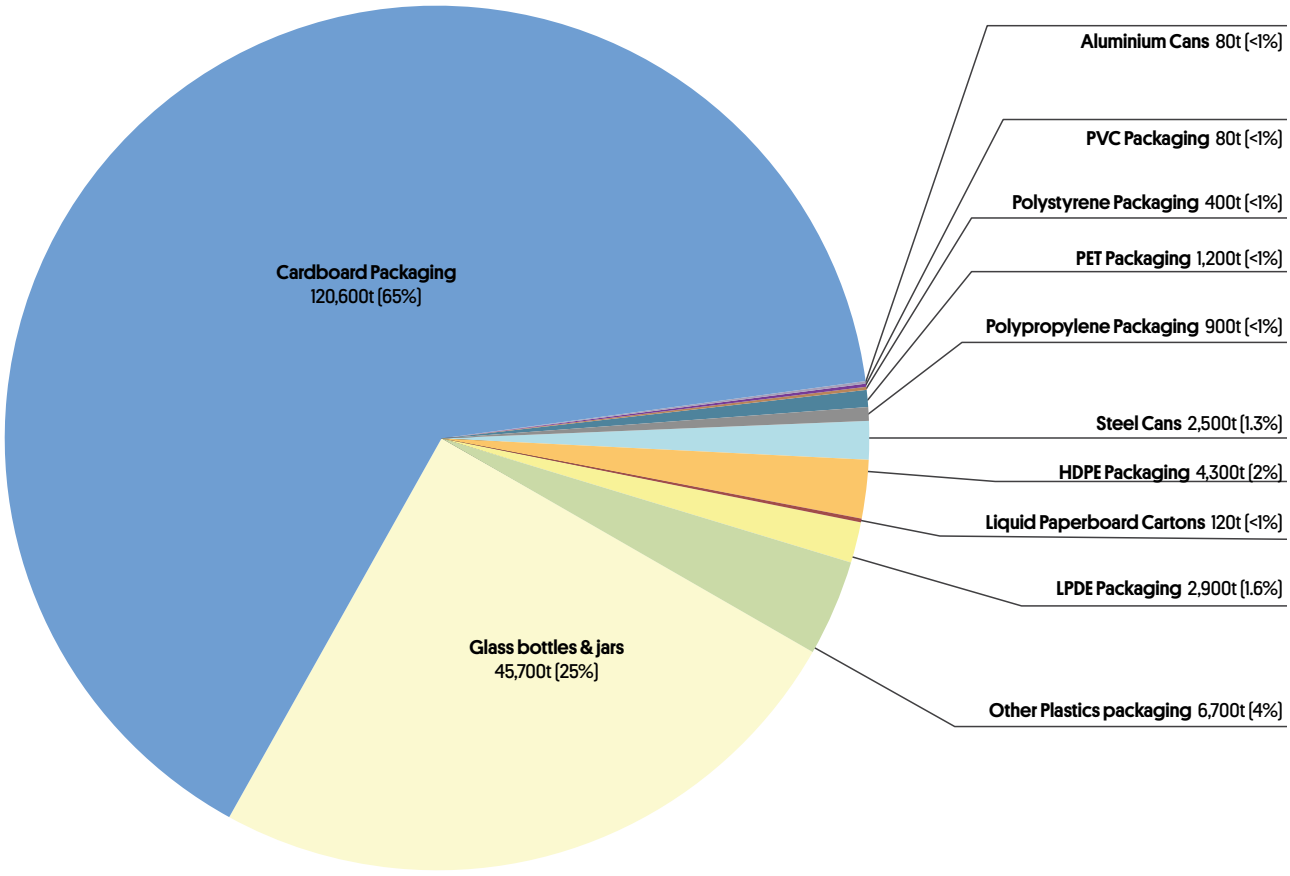
Table 5.2 **Return rates for recycled deposit containers, SA 2019-20.**
SA continues to achieve high return rates of recycled deposit containers, with an overall increase in return rate compared to 2018-19.

Material	Recovered (tonnes)	Return rate (%)
Aluminium	3,800	82%
Glass	32,300	88%
PET	3,500	65%
HDPE	250	62%
LPB	480	53%
Total	**40,330**	**84%**

5.3 Other Packaging Materials

Figure 5.2 presents the tonnes and proportions of non-CDL recovered packaging material. Cardboard remains the highest contributor (65%), which decreased from 2018-19 (70%) due to COVID-19 adversely affecting the commodity prices. Cardboard was followed by Glass Bottles & Jars, which increased to 25% (up from 20% in 2018-19), due to improved recovery of this stream. Other Plastics and HDPE packaging are the next greatest contributors at 3.6% and 2.3% respectively.

Figure 5.2 **Relative proportions of recovered other packaging materials by weight, SA 2019-20.**
Cardboard and Glass materials are the major contributors to recovery for other packaging materials.
The contribution of Glass has increased from 20% to 25% in one year due to improved recovery of this stream.



06 Resource Recovery Value

At a glance:

- Resource recovery value in 2019-20 was estimated at $342 million, a decrease of 2% from 2018-19.
- This decrease is due to fewer tonnes recovered in 2019-20 compared to 2018-19, and a reduction in value of Cardboard & Paper, Masonry, Glass and Other Materials.
- There were increases in the dollar per tonne rate for Metals, Meat Rendering and Plastics.
- The net effect on the average dollar per tonne for all materials was an increase, from $93 per tonne in 2018-19 to $97 per tonne in 2019-20.
- Metals is the largest contributor to the overall resource recovery value in SA.

The value of resource recovery in SA in 2019-20 is estimated at $342 million (**Table 6.1**, **Figure 6.1**). This is a decrease from 2018-19 ($348 million tonnes) due to a decrease in the total tonnes recovered and the per tonne value for some materials (Cardboard & Paper, Masonry, Glass and Other Materials). This resulted in a lower overall value of SA's resource recovery for a second year in a row. However, there was a per tonne increase for Metals, Meat Rendering and Plastics. The average value per tonne of resource recovery in SA therefore increased from $93 in 2018-19 to $97 in 2019-20.

Steel was the greatest contributor to resource recovery value in 2019-20 ($99.2 million) followed by Meat Rendering ($85.6 million) and Other Metals ($83.6 million). Steel and Other Metals combined make up 53% of the total resource recovery value. Cardboard & Paper was the next greatest contributor, with the food, garden and other organics materials following.

The value of materials recovered for recycling can vary from year to year and between jurisdictions. Some materials are more likely to vary in price compared to others. Factors affecting the value of materials include:

- commodity market prices for virgin material the recyclables replace,
- whether the material is reprocessed locally or exported,
- the quality of the recovered material,
- demand for the product; and
- the regulatory environment

In 2019-20, Cardboard & Paper dropped for another year. China continues to reduce tonnes of recovered Cardboard & Waxed Cardboard it will accept from overseas, flooding other markets and dropping the price. Indonesia also temporarily banned the acceptance of Cardboard & Paper for a small part of the 2019-20 financial year, exacerbating the price fall.

The average dollar per tonne of Glass dropped due to increased use of this material in road base. This lower priced glass did not replace Glass to bottle recovery (a higher value option) but added to it and the net dollar per tonne for this material decreased. Foundry Waste increased significantly in 2019-20. As this has a lower value than Tyres & Other Rubber and Leather & Textiles, the average value of Other Materials dropped to $191 per tonne (from $312 in 2018-19).

Table 6.1 **Assumed market values, quantities and estimated resource value for resource recovered material, 2019-20[a].**

Material category	Resource recovery (tonnes)	Estimated on-sale price[a] ($/tonne)	Estimated Resource Value ($ millions)[c]	Price data source[a]
Masonry	1,255,000	$10	$12.9	Based on RAS survey results
Metals – Steel	248,000	$400	$99.2	Based on RAS survey results
Metals – Other (non-ferrous including Aluminium)	30,000	$2,788	$83.6	Based on RAS survey results
Organics – Meat Rendering[b]	96,500	$888	$85.6	Based on RAS survey results
Organics – Garden, Food and Timber[b]	415,200	$35	$14.5	Based on RAS survey results
Cardboard & Paper	194,000	$109	$21.2	Based on RAS survey results and SV Market Bulletins in 2019-2020
Plastics	29,700	$206	$6.1	Based on RAS survey results and SV Market Bulletins in 2019-2020
Glass	87,000	$81	$7.0	Based on RAS survey results
Other Materials[d]	43,900	$191	$8.4	Based on RAS survey results
Separately Reported Materials & Clean Fill	1,140,000	$3	$3.2	Based on RAS survey results
TOTAL ALL Materials	**3,539,300**	**$97**	**$342**	

Notes:

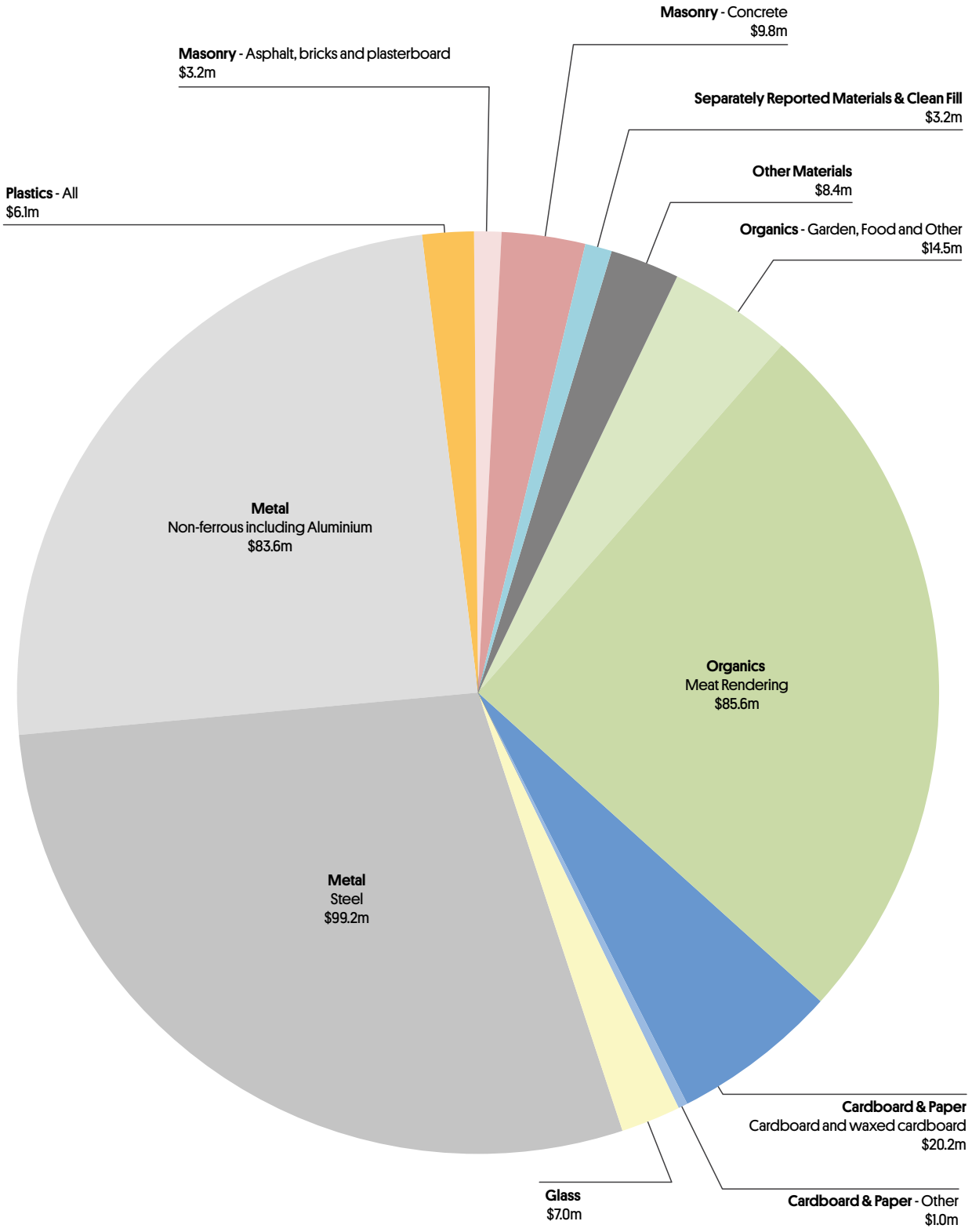
(a) Refer to Survey Methodology in Appendix 1 for additional information on resource recovery value assumptions and methodology. Note that 2016-17 was the first year that participants were asked to provide information on the commodity price or value of each material. This provided more accurate estimations for the on-sale price that are provided here. The on-sale price is calculated based on the price of each stream under the broader material categories.

(b) Note that the resource recovery tonnes for organics is reduced due to loss of weight during the re-processing phase resulting in the volumes that can be sold. Tonnes of resource recovered waste grease and fat, waste sludge and biosolids, and miscellaneous organics were not included in the total.

(c) Note that sums may not equate due to rounding. Also note in some cases, the weighted average of all streams within a material category was used to esti mate the on-sale price. For example, Plastics and Cardboard & Paper.

(d) Other Materials includes Foundry Sands, Tyres & Other Rubber and Leather & Textiles. The estimated on-sale price is based on the weighted average price of all materials within this category (on-sale price per tonne and tonnes), which varies depending on the material.

Figure 6.1 Estimated market value of resource recovered materials in SA from the 2019-20 Recycling Activity Survey[25].

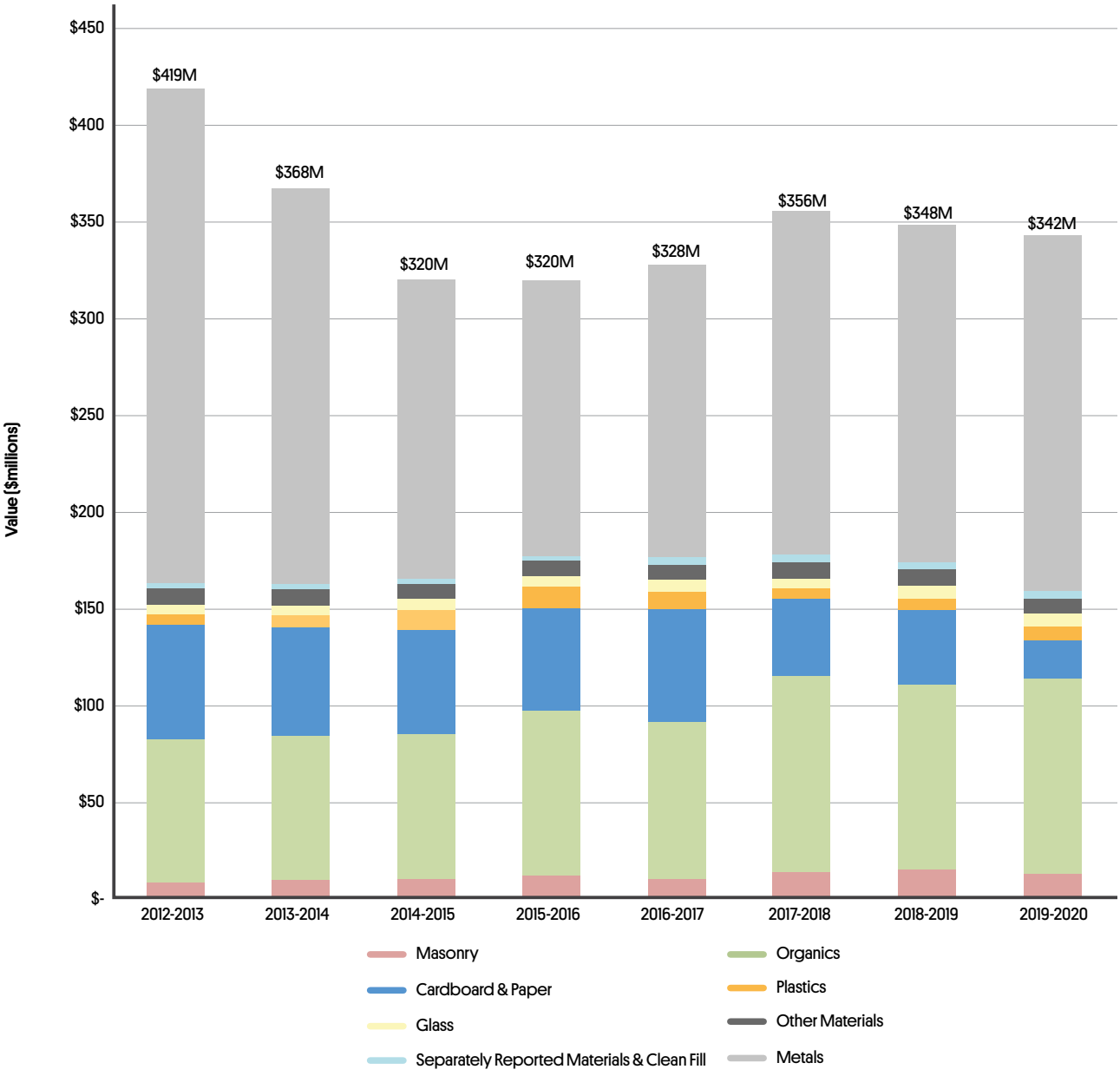


25 Plastics is presented as one category in 2019-20, as mixed plastics is a low (or can be a negative) number (a cost to recover). The combined value is based on a weighted average of the value of each plastic stream and the proportion of this stream of total plastics.

The estimated market value of SA resource recovered materials from 2012-13 to 2019-20 is captured in **Figure 6.2**. The overall value in 2019-20 decreased slightly from 2018-19, predominately due to a reduction in the value of Cardboard & Paper and an overall reduction in materials captured for recycling. Cardboard & Paper represented 18% of SA's market value in 2016-17 but the commodity price dropped significantly with China's National Sword Policy coming into effect early 2018. In 2019-20 this material only represented 6% of SA's resource recovery market value.

The market value of Metals was strong in 2012-13 and 2013-14 but dropped significantly in 2014-15. It has since recovered somewhat, and the last three financial years have been strong for the sector. Organics has also had three strong years with meat rendering being a high value commodity and customers recognising the benefits (and therefore the value) that compost and other recovered organic products can bring to soil and land health.

Figure 6.2 **Estimated market value of resource recovered materials in SA, 2012-13 to 2019-20.**



07 Environmental Benefits of Recycling

At a glance:

- Resource recovery in 2019-20 was projected to achieve the following environmental benefits from recycling of these materials.
  - » Greenhouse Gas Savings – 1.32 million tonnes of CO_2-e.
  - » Cumulative Energy Demand saved – 14,800 TeraJoules (TJ).
  - » Water Savings – 7,500 Megalitres (ML).
- The environmental benefits accrued in 2019-20 were slightly reduced compared to 2018-19 due to recovering less materials.

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 materials.
- Reduced emissions of greenhouse gases achieved from diverting recovered materials from landfills which biologically decompose in landfills and generate methane.

SA saved approximately 1.32 million tonnes of CO_2-e (**Tables 7.1** and **7.2** and **Figure 7.1**) in 2019-20 from recycling. This is a slight increase from the 1.31 million tonnes of GHG savings in 2018-19. Higher Timber recovery in 2019-20 was the main reason for this increase, as recycling this stream significantly saves on CO_2 emissions and recovery of almost all other materials decreased when compared to 2018-19.

Organics recycling contributed the greatest proportion of GHG savings at 56%, despite representing 27% of all recovered material. Every tonne of Timber recycled saves more than a tonne of CO_2 emissions. Food, Garden and Other Organics save a quarter to a half a tonne of CO_2 emissions for every tonne recovered (**Table A5.1**).

Metals was the next greatest contributor to GHG savings, at 23% of all GHG savings from recycling. Despite only recycling 11,000 tonnes of Aluminium, this contributed to the greatest GHG savings of all the Metals. Every tonne of Aluminium recycled saves over 16 tonnes of CO_2 emissions (**Table A5.1**), the highest GHG savings per tonne of recycling of all materials.

Total GHG savings from recycling in 2019-20 are considered equivalent to approximately:

- 1.97 million trees would have to be planted to absorb the same amount of CO_2[26].
- The greenhouse gas emissions that 304,800 cars would produce in a year[27].
- Approximately 5% of SA's total GHG emissions in 2018[28].

Table 7.1 **Estimated environmental benefits because of recycling in SA, 2019-20[a].**

	Material	Material Quantity	GHG Emissions Saved[a]	Energy Saved[a]	Water Saved[a]
		tonnes	tonnes CO_2-e	TJ LHV	ML
	Masonry				
1	Asphalt	238,000	7,100	570	210
2	Bricks	41,000	800	10	50
3	Concrete	975,000	19,500	340	1,250
4	Plasterboard	1,000	0	0	0
5, 6	Clay, fines, rubble & soil	1,140,000	100,300	1,620	500
	Metals				
7	Steel	248,000	109,100	1,970	-590
8	Aluminium	11,000	183,300	2,270	320
9	Non-ferrous metals	19,000	16,700	690	110
	Organics				
10	Food Organics	13,400	3,400	0	10
11	Garden Organics	250,000	55,900	-80	1,400
12	Timber	315,000	425,300	3,380	-10
13, 14, 15, 16	Organics - Other	528,000	254,000	1,140	120
	Cardboard & Paper				
17	Cardboard & Waxed Cardboard	134,000	22,600	60	1,490
18	Liquid Paperboard	600	100	0	10
19, 20, 21	Magazines & Newspaper	47,400	21,500	20	520
22	Printing & Writing Paper	12,000	15,600	-10	130
	Plastics				
23	Polyethylene terephthalate	4,700	5,600	260	320
24	High density polyethylene	6,000	5,000	300	140
25	Polyvinyl chloride	100	0	0	0
26	Low density polyethylene	3,000	2,500	150	70
27	Polypropylene	1,100	300	30	30
28	Polystyrene	600	200	20	20
29	Mixed &/or Other plastics	14,200	4,400	430	370
	Glass				
30	Glass	87,000	45,900	390	80
	Other Materials				
39	Fly Ash				
40	Foundry Waste	24,000	0	0	0
41	Leather & Textiles	900	0	0	0
42	Tyres & Other Rubber	19,000	20,300	1,220	990
	Total[b]	**4,134,000**	**1,319,400**	**14,780**	**7,540**

Notes:

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

(b) Note numbers may not equate due to rounding.

26 Ave car GHG emissions value = 5 tonnes CO_2-e/yr, one tonne of recycled material = 1.49 trees
Source: SA 2008-09 Recycling Activity report (Zero Waste SA, 2010)

27 Ave car GHG emissions value = 5 tonnes CO_2-e/yr, one tonne of recycled material = 1.49 trees
Source: SA 2008-09 Recycling Activity report (Zero Waste SA, 2010)

28 From Climate Smart South Australia, www.environment.sa.gov.au

Table 7.2 Estimated greenhouse gas savings because of recycling in SA, 2019-20[a].

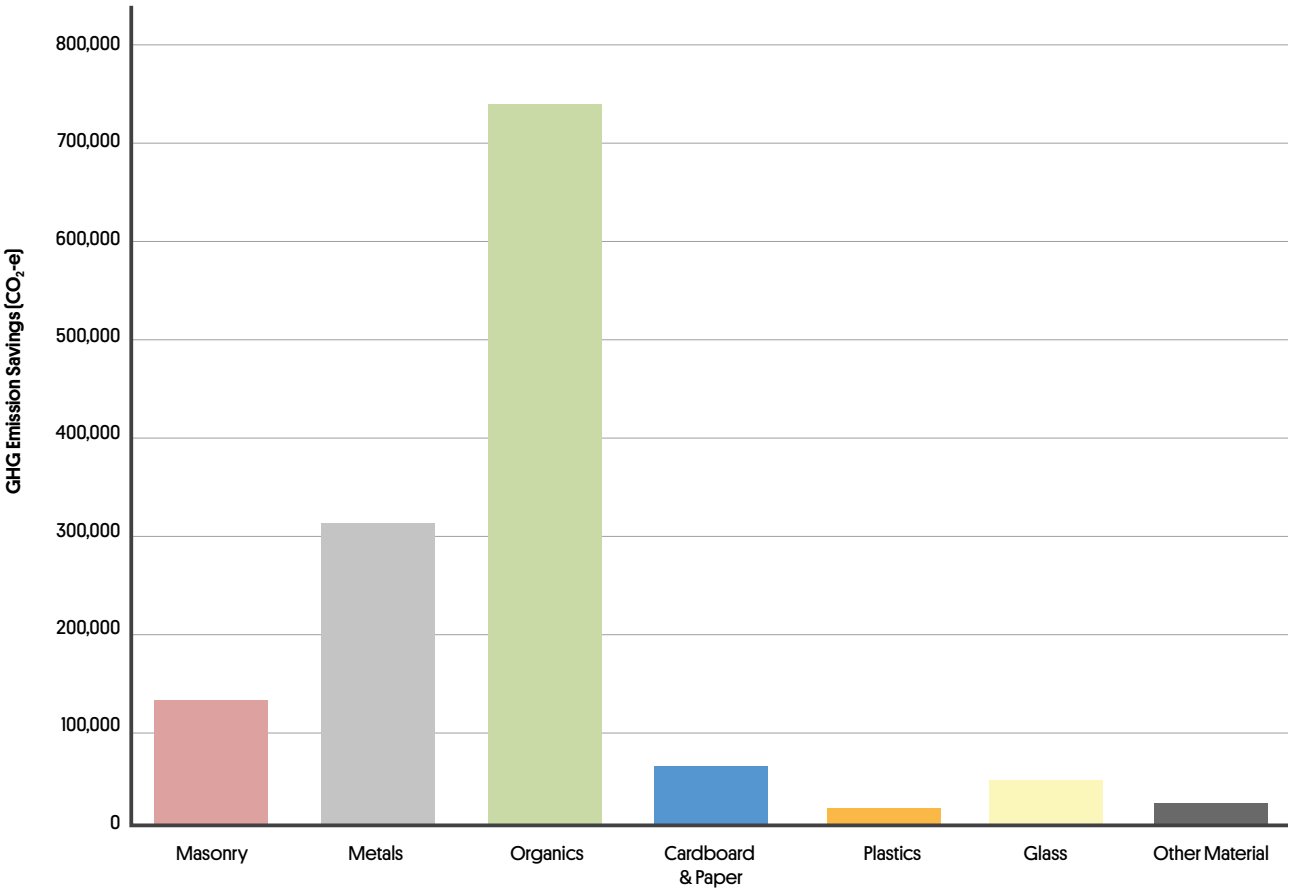
Sector Origin	GHG Emissions Saved[a]	Equivalent trees planted required for carbon absorption[a]	Equivalent cars off the road (1 year)[a]
	tonnes CO_2-e		
Masonry	127,700	191,000	29,500
Metals	309,100	462,000	71,400
Organics	738,600	1,104,000	170,600
Cardboard & Paper	59,800	89,000	13,800
Plastics	18,000	27,000	4,200
Glass	45,900	69,000	10,600
Other Material	20,300	30,000	4,700
Total [b]	**1,319,400**	**1,972,000**	**304,800**

Notes:

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

[b] Note numbers may not sum due to rounding.

Figure 7.1 Avoided greenhouse gas emissions (by material category), because of recycling in SA 2019-20.



7.2 Energy Savings

Energy savings (in Terajoules or TJ[29]) from recycling in SA during 2019-20 was about 14,800 TJ (**Table 7.1** and **Table 7.3** and **Figure 7.2**). This is slightly lower than 2018-19 where recycling contributed to approximately 15,200 TJ of energy savings. This reduction is due to less recyclables recovered in 2019-20.

The main contributors to the energy savings in 2019-20 were:

- Metals, at 33%. Metals require far less energy to recover than to manufacture from raw materials, particularly Aluminium. Metals are only 7% of the total tonnes recovered by weight.
- Organics (30%). The main contributor within the Organics streams was Timber (high energy is required to create timber from virgin products/ trees), followed by Other Organics (**Table 7.1**).
- Masonry (17%). This is driven by Clay, Fines, Rubble & Soil which saved around 1.4 GJ per tonne recycled.
- Plastics is only 0.7% of the total tonnes recovered, by weight, but contributes 8% of the total energy savings from recycling. Making plastics from virgin products consumes substantial amounts of energy.

The energy savings from SA's recycling activity during 2019-20 equate to:

- Energy use by 292,400 average households in one year[30].
- The energy supplied by 2.42 million barrels of oil.
- Approximately 4.6% of SA's total energy consumption reported for 2018-19[31].

Table 7.3 **Estimated energy savings because of recycling in SA, 2019-20[(a)].**

Sector Origin	Energy Saved	Equivalent households (1 year) [(a)]	Barrel of Oil Equivalents (BOE) [(a)]
	TJ LHV		
Masonry	2,540	50,200	415,000
Metals	4,930	97,500	805,600
Organics	4,440	87,800	725,500
Cardboard & Paper	70	1,400	11,400
Plastics	1,190	23,500	194,400
Glass	390	7,700	63,700
Other Material	1,220	24,100	199,300
Total [(b)]	**14,780**	**292,200**	**2,414,900**

Notes:

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

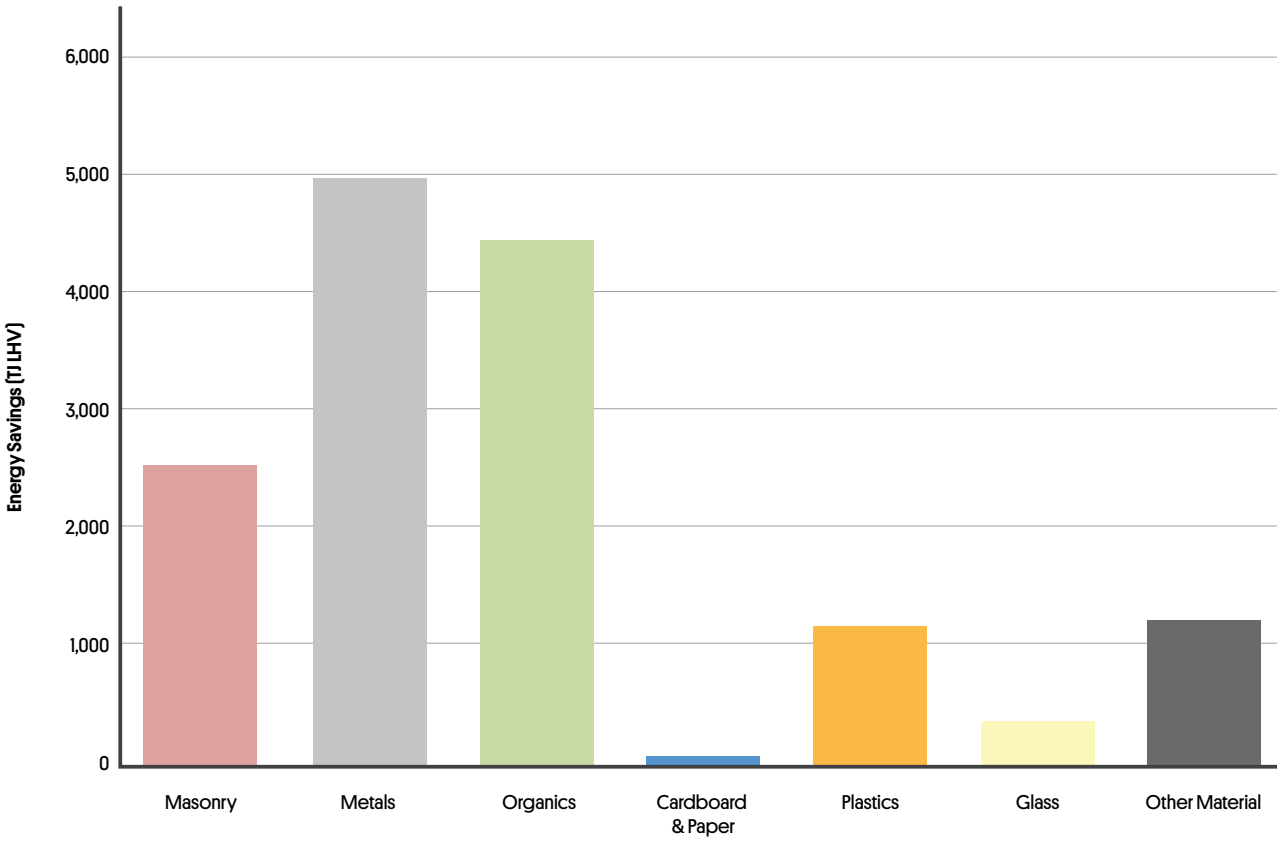
(b) Note numbers may not sum due to rounding

29 1 Terajoule or TJ = 10^{12} Joules (J) = 1,000 Gigajoules (GJ)

30 Average household energy use value ≈ 51 GJ/yr; Source: 2020 Australian Energy Update (Australian Government Department of the Environment and Energy, 2020)

31 Source: 2020 Australian Energy Update (Australian Government Department of Environment and Energy, 2020).

Figure 7.2 Avoided energy consumption (by material category) because of recycling in SA, 2019-20.



7.3 Water savings

The total projected water savings (in Megalitres or ML[32]) from recycling in SA during 2019-20 was approximately 7,500 ML **(Table 7.1**, **Table 7.4**, and **Figure 7.3**). This is a slight reduction from 2018-19 where recycling contributed water savings of 8,200 ML.

Cardboard & Paper contributed 29% of projected water savings, followed closely by Masonry. Recycling each of the Cardboard & Paper streams saves over 10kL of water per tonne recycled. Recycled Concrete contributed the greatest water savings of all the Masonry materials given the high kilolitres saved per tonne recycled and number of tonnes recovered.

Organics contributed 20% of all water savings. Garden Organics is the greatest contributor to water savings within the Organics stream. After Organics, both Plastics and Other Materials contributed 13% each to total water savings from recycling in SA in 2019-20.

The overall water savings for SA's recycling activity during 2019-20 are considered approximately equivalent to:

- Water use by about 38,600 average Adelaide households in one year[33].
- The water contained in about 3,020 Olympic sized swimming pools[34].
- 3% of SA's total water consumption reported for 2019-20[35].

32 1 Megalitre or ML = 10^6 Litres (L) = 1,000 kilolitres (kL)
33 Average household water consumption value ≈ 195 kL/yr; Source: South Australian Water Corporation Annual Report 2019-20 SA Water (2020)
34 Olympic-sized pool value = 2,500 kL/yr
35 Average household water consumption value ≈ 195 kL/yr; Source: South Australian Water Corporation Annual Report 2019-20 SA Water (2020)

Table 7.4 Estimated water savings because of recycling in SA, 2019-20[a].

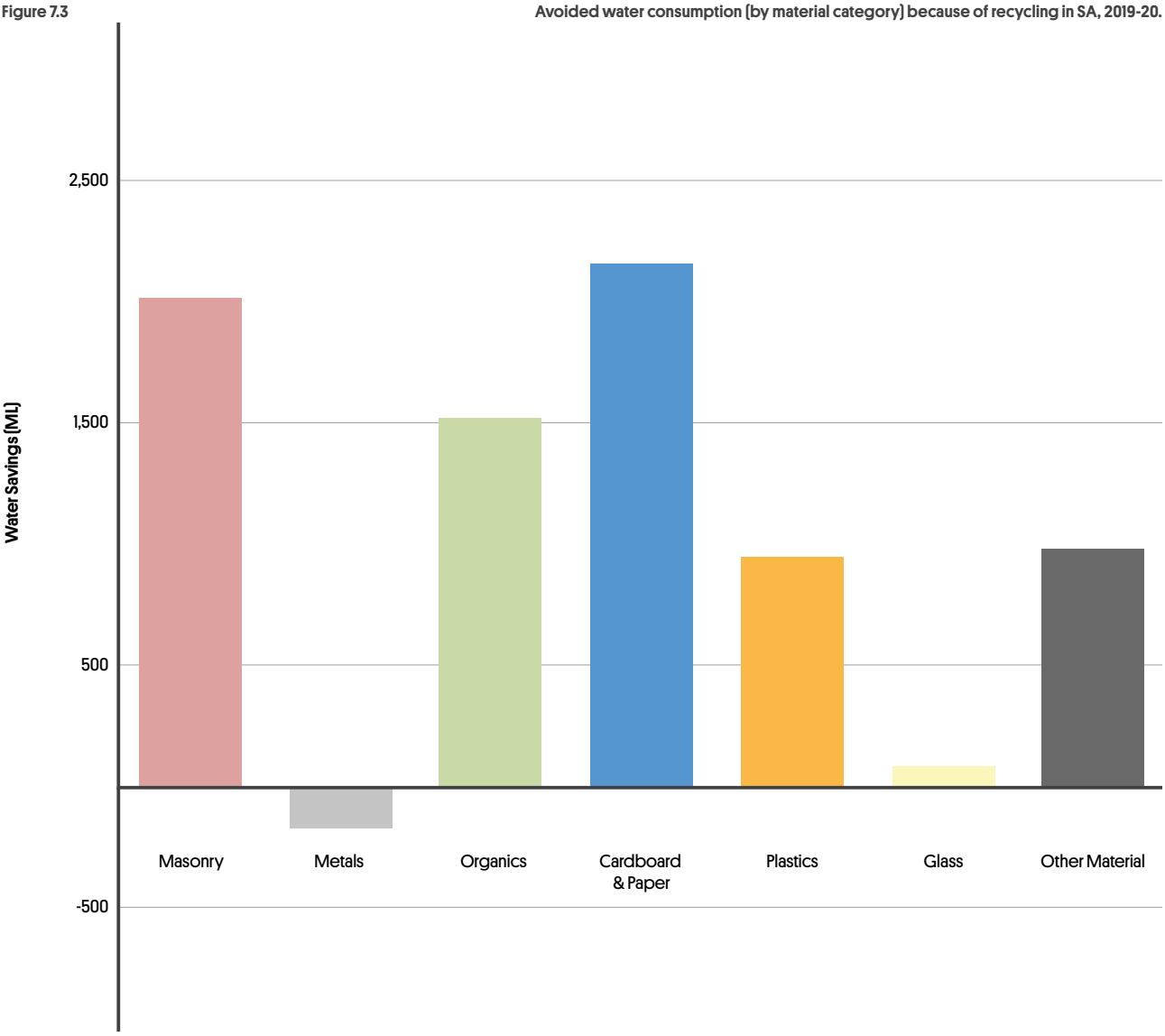
Sector Origin	Water saved	Equivalent households (1 year) [a]	Olympic Swimming Pools [a]
	ML		
Masonry	2,010	10,290	800
Metals	-160	-820	-60
Organics	1,520	7,780	610
Cardboard & Paper	2,150	11,010	860
Plastics	950	4,860	380
Glass	80	410	30
Other Material	990	5,070	400
Total [b]	**7,540**	**38,600**	**3,020**

Notes:

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

(b) Note numbers may not sum due to rounding.

Figure 7.3 Avoided water consumption (by material category) because of recycling in SA, 2019-20.



08 Acknowledgements

Green Industries SA and Rawtec would like to recognise and thank the following participants in the 2019-20 SA Recycling Activity Survey. The list below does not indicate all organisations who participated in the survey but those that agreed to be recognised.

- Adelaide Brighton Cement
- Adelaide City Council
- Adelaide Hills Region Waste Management Authority
- Advanced Plastic Recycling
- Agricycling
- Alexandrina Council / Fleurieu Regional Waste Authority
- Australian & New Zealand Recycling Platform Limited / Techcollect
- Boral
- Ceduna Recycling
- Chevron Glass
- Clare Valley Waste
- Cleanaway
- Computer Recycling Services (SA Govt. Public Service)
- Downer EDI Works
- Electronic Recycling Australia
- Foamex SA
- Foodbank SA
- Green Triangle Recycling
- Integrated Waste Solutions
- Intercast & Forge Pty Ltd
- J Mathews
- Jeffries
- Kangaroo Island Council
- McMahons
- MobileMuster
- Mobius Farms
- Normetals Pty Ltd
- Northern Adelaide Waste Management Authority (NAWMA)
- OneFortyOne Plantations
- InfraBuild Recycling
- Opal Paper and Recycling
- Oz Harvest Food Rescue
- Peats Soils
- Recall Information Management
- Recycling Plastics Australia (RPA)
- Renewal SA
- ResourceCo
- SA Composters
- SA Drum Recyclers
- SA Water
- Salvation Army
- Shred-X Secure Destruction
- Sims Metal Management
- SUEZ Recycling and Recovery
- SUEZ-Resource Co
- Southern Region Waste Resource Authority
- Statewide Cleaning Cloths
- Statewide Recycling
- Tarac Technologies Pty Ltd
- Thomas Foods International
- Tyrecycle
- Van Schaiks Bio Gro Pty Ltd
- Whyalla Waste Resources and Recovery Centre
- YCA Recycling

09

Glossary[36]

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.

36 Several definitions in this Glossary were re-produced from the SA 2008-09 Recycling Activity survey (Zero Waste SA, 2010)

Energy recovery

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 reporting guidelines (Dept Environment and Energy, 2015). 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. Energy recovery also necessarily excludes energy recovery from landfill gas arising from waste disposed to landfills

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. Includes white goods.

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 (CO_2), methane (CH_4), nitrous oxide (NO), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF_6).

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 include waste dropped off at recycling centres, transfer stations and construction waste from owner/occupier renovations.

National Guidelines for compiling waste and recycling data

National Guidelines for compiling waste and recycling data (NWDCRS Supporting documentation: SOPs, reporting tool user guide and reporting guidance. Department of the Environment and Energy 2015).

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.

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, 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

Material	Source Products	End Products
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
Ferrous Metals	Automotive gears, shafts and engine parts, car cylinder blocks, machine tool parts, gear wheels, plumbing fitments, kitchen draining boards, beams/structural building support, pipes, cutlery, and appliances	Melted and mixed with virgin steel in steel manufacturing to make the same products.
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 cloths
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.	New paper and cardboard products and packaging

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	Newsprint, paperboard, tissue, stationery and copy and printer paper
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 inkjet 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
LPB	Liquid Paper Board
ML	Megalitre
MRF	Material Recovery Facility
MSW	Municipal Solid Waste
PET	Polyethylene Terephthalate
PP	Polypropylene
PS	Polystyrene
PVC	Polyvinyl Chloride
SA	South Australia
t	Tonnes
TJ	Terajoule

12 References

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13 Document status

Revision	Date	Prepared by	Checked by	Approved by
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V2 – Updated Draft	19/03/21	M Allan, B Stefanovska	K Heinrich M Rawson	K Heinrich M Rawson
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A1 Appendix 1: Survey Methodology

Rawtec was engaged by Green Industries SA to undertake the Recycling Activity (survey) in South Australia (SA) for the 2019-20 financial year. This section summarises the approach and methodology used to conducting the survey.

- Rawtec was engaged to conduct the survey for 2019-20.
- This approach and methodology was similar to that used for the 2009-10, 2010-11, 2011-12, 2012-13, 2013-14, 2015-16, 2016-17, 2017-18, 2018-19 recycling activity surveys, which were also undertaken by Rawtec.

A1.1 Selection of Materials

The materials to be surveyed for recycling activity were agreed with Green Industries 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 139 organisations, which included survey respondents from 2018-19 and any newly identified companies involved with recycling activity in SA.

In broad terms, these 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.

   » Green Industries SA –

   - During 2010-11 Green Industries SA (previously Zero Waste SA) commenced collection of resource recovery data for organic material from SA composters through its Zero Waste SA Environment Users System (ZEUS)[37]

   » 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 Green Industries 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 Green Industries SA. This survey questionnaire was in line with the 2018-19 questionnaire, except:

- it asked for respondents to provide total goods and materials received for recycling (rather than just materials)
- Question 11b had one additional option ('Sorting')
- Question 17 was added in 2019-20. This question asked respondents to indicate which of the following factors is their highest priority when identifying the reprocessing destination for sourced goods and materials in a circular economy? The options were Economic, Avoiding landfill, Goods or materials being able to be recycled, Goods or materials being able to be repaired or reused, or Other (please specify).

A1.2.4 Survey Deployment

The survey was deployed to survey respondents in September 2020.

- The deployment method was by email
- 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 some instances, it was discovered that the relevant company or organisation no longer existed, or recycling activity had not occurred during 2019-20.

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 2020, although some data was received in December 2020 and early 2021.

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 2019-20 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.

37 ZEUS is a web-based system that has been purpose developed by Green Industries SA to collect data from local government and industry on waste disposal and resource recovery within South Australia.

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 guidelines for national reporting (Dept Environment and Energy, 2015).

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[38].

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, 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.

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, was used to reasonably estimate recycling activity (only when such data was considered a reliable indication of current recycling activity).

38 See Glossary for further details.

A1.3.2 Methodology and Assumptions for the Reuse and Circular Economy

The 2019-20 survey is the first attempt to measure some aspects of the reuse and circular economy in SA. It is a starting point only and not an exhaustive list of all reused items in SA. It includes items that are re-sold or redistributed to another party (not reused by an individual, e.g., a reusable coffee cup) and can be expanded to other items such as cars, pallets, houses, etc.

Survey participants were asked to indicate the tonnes of material reused and their estimation of the proportion of the reuse market this accounts for. The proportion of the SA market for each of the materials/items listed in **Table 2.17** is one best estimate using the limited information sources from survey participants or that the industry provided. These figures will be adjusted over time as more data is obtained about these materials and the market representation of those that provide data.

The estimated tonnes reused across SA in 19-20 listed in **Table 2.17** are based on tonnages provided by industry and the estimated proportion of the SA market that these tonnages represent for each material/item. As this is new to this report, these percentages may change as we learn more about the re-use industry.

The estimated value of reused items in **Table 2.17** is based on dollar values provided by industry. For clothes, this is the weighted average of clothes sold overseas (~$350 per tonne) and clothes sold here (~$25,000 per tonne). For electronic waste this is based on selling a computer for $200 and assumes the computer weighs 17 kilograms.

Electrical/electronic items include goods and materials sold at charity and second-hand stores. Not included are online sale of second-hand items, for example through Gumtree, Facebook Marketplace, or E-bay.

A1.3.3 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[39].

- 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.

A1.3.4 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) (2020, 2019 and 2018).
- The relevant reporting periods and sources of recycling activity data were:
  - » SA: 2019-20, as reported in this survey.
  - » ACT: 2018-19, as reported by: Transport Canberra and City Services Directorate Annual Report 2018-19 (ACT Government, 2019).
  - » VIC: 2018-19, as reported by: Victorian Recycling Industry Annual Report 2018-19 (Sustainability Victoria, 2020).
  - » WA: 2018-19, as reported by: Recycling Activity in Western Australia, 2018-19 (WA Waste Authority, 2020).

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

- NSW: 2017-18, as reported by: NSW Waste Avoidance and Resource Recovery Strategy: Progress Report 2017-18 (NSW EPA, 2019).
- QLD: 2018-19, as reported by: Recycling and Waste in Queensland 2019 (QLD Government, 2020).
- TAS 2018-19, as reported by: Waste Data (EPA Tasmania)
- NT 2018-19, as reported by: National Waste Report 2020 (Department of Agriculture, Water and the Environment and Blue Environment, 2020)

Adjustments were made to the above data to present recycling data in accordance with the national reporting guidelines (Dept Environment and Energy, 2015).

A1.3.5 Packaging Recovery Analysis & Reporting

Packaging data was taken directly from Recycling Activity survey data:

- Container deposit bottle and can packaging:
  - From 2019-20 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.

A1.3.6 Environmental Benefits Analysis

A1.3.6.1 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. 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.

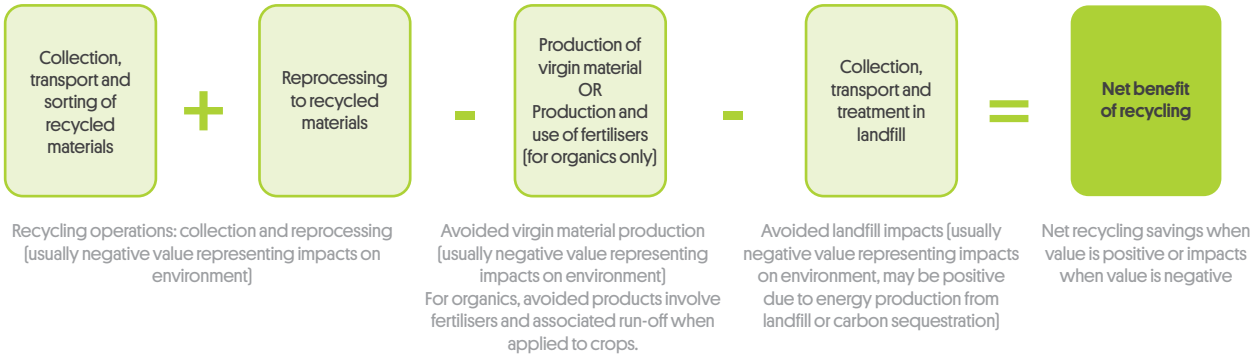
Cumulative Energy Demand Savings (as Terajoules (TJ)) – The amount of energy saved, including all fossil, renewable, electrical, and embodied energy, by using recycled materials.

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.

A1.3.6.2 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** gives a useful illustration of how LCA techniques approach the assessment of resource recovery and recycling activities 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. 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 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.

Therefore, these materials were not included in the environmental benefits analysis.

A1.3.6.3 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 2019-20 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.

A1.3.7 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.

Several recovered materials in SA are exported to international markets. In these markets, prices can be highly volatile and may fluctuate by up to ±60-80% from year to year (Dept Environment and Energy, 2015).

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.

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 consider all these factors.

For this study, the assumed values of various recovered materials obtained in SA during 2019-20 are given in **Table 2.9**. These assumed values are based on:

- Consultations with industry in October and November 2020.
- 2019-20 survey responses.
- Publicly available information on market values of recovered materials.
- 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.

A2 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 2019-20.

A2.1 Survey Participation & Reported data

Table A2.1 below summarises the survey participation and reported data points for 2019-20.

- The survey questionnaire was successfully deployed to 143 or 100% of the initial list of 143 organisations identified as potentially involved with recycling activity in SA.
- The survey returns produced recycling activity data or information sets for 105 of these companies or organisations.
- Of these 105 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.
  - » Three reference &/or aggregated data sets from industry bodies or government agencies.
  - » 13 data sets came from companies or organisations that generated the material that was being recovered for recycling.
  - » 50 data sets were companies or organisations involved in collection or aggregation of recovered material.
  - » 41 data sets were for companies or organisations undertaking re-processing activities.
  - » 24 of these companies or organisations were also involved in manufacturing products from the recovered or re-processed material (either in SA or interstate).

Table A2.1 **Overall Survey Statistics.**

Statistic		No.	(%)	% Basis
Sample Size		143	100%	
Surveys Deployed*		143	100%	of Sample Size
Survey Data Points		105	73%	of Surveys Deployed
Activity Type	Industry Reference Data	3	3%	of Survey Data Points
	Source	13	12%	of Survey Data Points
	Aggregator/Collector	50	48%	of Survey Data Points
	Recycler	41	39%	of Survey Data Points
	Manufacturer	24	23%	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[40] – 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		105	100%
Material Activity	Masonry	21	20%
	Metals	27	26%
	Organics	28	27%
	Cardboard & Paper	26	25%
	Plastics	24	23%
	Glass	15	14%
	Other Materials	13	12%
	E-waste	14	13%
	Reuse Materials	10	10%
Material Destination	SA	78	74%
	Interstate	23	22%
	Export	17	16%
Waste Hierarchy	Reuse	22	21%
	Recycle	92	88%
	Energy Recovery	4	4%

40 The waste hierarchy is an internationally recognised aspirational framework for managing waste generation and disposal that is a guiding principle of Green Industries SA Act 2004 and South Australia's Waste Strategy (Green Industries SA 2020). The levels presented here are not necessarily given in any order of preference, but it is widely accepted that the precedence should be: Reuse > Recycling > Energy Recovery.

A3 Appendix 3: Weighbridge data

Respondents were asked to indicate whether tonnes reported were measured by weighbridge[41] or another method. In addition, when previous survey responses were used in the 2019-20 analysis, the researchers determined whether the tonnes were measured by weighbridge based on information provided in the earlier survey responses.

This data was analysed by material stream and it is summarised in the table below[42]. As can be seen in the table, the overall percentage of waste measured via weighbridge is 77%. This is 1 percentage point higher than 2018-19. The streams with the highest proportion of weighbridge data were the same as last year; Glass at 99%, and Cardboard & Paper at 99% (driven by high proportion of Cardboard & Waxed Cardboard, which is the largest proportion of this stream and was found to be almost 100% measured by weighbridge). Metals is now 97%, due to clarification from a recycler that a weighbridge is used for their estimated tonnes. Plastics is now estimated to be 92% with the inclusion of floor scales for CDL now included as weighbridge, followed by Organics, estimated at 88%. Other materials, which included Foundry Sands, Leather & Textiles and Tyres & Other Rubber, had the lowest proportion measured by weighbridge. However, the percentage of Other Materials measured by weighbridge increased to 55% in 2019-20. This is an increase from 23% in 2018-19 due to an increase in Foundry Sands tonnes (all Foundry Sands are measured via weighbridge).

It is important to note that if data is measured by weighbridge it does not indicate accuracy, as it includes data from previous years. Although these previous datasets may be known to be measured by weighbridge, they are lower in accuracy, to account for uncertainty in the organisation's actual figures.

Table A3.1 **Proportion of tonnes reported measured by weighbridge.**

Stream	% weighbridge out of reported tonnes, by weight
Masonry overall	69%
Metals overall	97%
Organics overall	88%
Cardboard & Paper overall	99%
Plastics overall	92%
Glass overall	99%
Other materials overall	55%
Total proportion of recycled materials measured via weighbridge	**77%**

41 Note weighbridge includes floor scales
42 Weighted averages are provided

A4 Appendix 4: 2019-20 Recycling Activity Survey Questionnaire

Survey Form – Recycling Activity in SA, 2019-20

Issued: 21 September 2020

1. Survey Company & Contact Details

Rawtec Pty Ltd (www.rawtec.com.au)
• Matt Allan, Senior Consultant, p: (08) 8294 5571, e: matt.allan@rawtec.com.au
• Bojana Stefanovska, Graduate Consultant, p: (08) 8294 5571, e: bojana.stefanovska@rawtec.com.au

2. Survey Questions for Period 1 July 2019 - 30 June 2020

1.	Please provide 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 2019-20 SA Recycling Activity survey? **(Please Circle/Highlight)** **[Yes / No]**
3.	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.**
4.	What is method for measuring of the data provided in Table 1 **O** Weighbridge **O** Other please specify
5.	What is the estimated accuracy of the data provided in Table 1, **e.g. ±5%** **E.g. if weighbridge, a suitable accuracy may be ±1%**

Table 1 **Goods and materials and tonnage data requested from industry.**

ID	Goods and materials	**Data for 2019-20 Financial Year** (1 July 2019 – 30 June 2020)											**Approx. goods and material value (2019-20)**
		MATERIAL SOURCE/INPUT						**GOODS AND MATERIAL DESTINATION/OUTPUT**				**RESIDUAL**	
		Total goods and materials received for recycling in 2019-20 (in tonnes)	Goods and materials received for recycling metro vs regional (in tonnes or %)		Source of goods and material (in tonnes or %)			Destination of goods and material for re-processing or reuse (in tonnes or as %)				% residual (if any) generated from recovery or re-processing to landfill	Approx. commodity price (if sold as a commodity) or approx. retail market price per tonne in 2019-20
			SA-Metro	SA-Regional	MSW	C&I	C&D	Your SA facility (ies)	Elsewhere in SA	Sent Interstate	Sent Overseas		
	EXAMPLE: Steel	*23,100*	*20,100*	*3,000*	*25%*	*70%*	*5%*	-	-	*23,100*	-	*10%*	*$200 per tonne*

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

Definitions:

MSW - Municipal - Domestic household sourced waste

C&I - Commercial and Industrial - Industry and business sourced waste

C&D - Construction and Demolition - Building, construction and demolition

Table 2 **List of Materials 2017-18 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
	47	Books
	48	Other donations (toys etc)

2. Continued Survey Questions for Period 1 July 2019 - 30 June 2020

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. If there have been any significant changes in quantities, stockpiles, sources or destinations from the 2018-19 financial year, what was the reason for this?

9. Where do you receive most of your material from, e.g. Councils, manufacturing, retail, hospitality, donations, etc.?

10. Which organisation(s) did you send each of your recovered or re-processed materials (e.g. Company X for organics and Company Y for plastics)?

11. a How many people (FTEs) 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?

11. b What are the main employment classifications in your company/organisation? Please complete the table below:

Classification		No. FTE
O	Unskilled	
O	Administration	
O	Construction/design	
O	Driver	
O	Machinery operator	
O	Sorting	
O	Technical support	
O	Sales/marketing	
O	Supervisor	
O	**Other (list)**	

12. What is your opinion about the market strength/prospects for recycled goods and materials?

13. 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?

14. Are there any significant barriers, e.g. market, regulatory, technology, for your SA operations?

15. What is your organisation's approximate Annual Sales Revenue (Turnover) from goods and material collection, resource recovery and/or recycling activities?

16. What are the names of other recyclers in your area of the SA recycling industry? (this helps us ensure that we have captured all recyclers in the industry)

17. Which of the following factors is your highest priority when identifying the reprocessing destina-tion for sourced goods and materials in a circular economy?

- Economic
- Avoiding landfill
- Good or materials being able to be recycled
- Goods or materials being able to be repaired or reused
- Other (please specify)

18. Would you like to be invited to an industry seminar by Green Industries SA (GISA) summarising the findings of this 2019-20 **SA Recycling Activity survey? (Please Circle/Highlight)**
[Yes / No]

A5 Appendix 5: 2019-20 Environmental Benefits Conversion & Emission Factors

Table A5.1 **Emission and conversion factors adopted for estimation of environmental benefits of recycling, SA 2019-20** [Trellis Technologies, 2019].

	Material	GHG Emissions Saved	Energy Saved	Water Saved
		Emissions factor (t CO_2-e/t)	Conversion Factor (GJ LHV/t)	Conversion Factor (kL/t)
	Masonry			
1	Asphalt	0.030	2.380	0.880
2	Bricks	0.020	0.280	1.260
3	Concrete	0.020	0.350	1.280
4	Plasterboard	0.030	0.550	-0.030
5	Clay, fines, rubble & soil	0.088	1.420	0.440
	Metals			
6	Steel	0.440	7.940	-2.360
7	Aluminium	16.667	206.667	29.333
8	Non-ferrous metals	0.880	36.090	5.970
	Organics			
9	Food Organics	0.250	0.180	0.440
10	Garden Organics	0.224	-0.309	5.592
11	Timber	1.350	10.730	-0.040
12	Organics - Other	0.481	2.165	0.230
	Cardboard & Paper			
13	Cardboard & Waxed Cardboard	0.169	0.467	11.111
14	Liquid Paperboard	0.169	0.467	11.111
15	Magazines	0.455	0.364	10.909
16	Newsprint	0.455	0.364	10.909
17	Phonebooks	0.455	0.364	10.909
18	Printing & Writing Paper	1.300	-0.680	11.000
	Plastics			
19	Polyethylene terephthalate	1.200	55.000	68.750
20	High density polyethylene	0.825	50.000	22.750
21	Polyvinyl chloride	0.313	30.000	26.250
22	Low density polyethylene	0.825	50.000	22.750
23	Polypropylene	0.313	30.000	26.250
24	Polystyrene	0.313	30.000	26.250
25	Mixed &/or Other plastics	0.313	30.000	26.250
	Glass			
26	Glass	0.528	4.444	0.931
	Other Materials			
27	Fly ash	0.029	0.552	1.260
28	Foundry sands	NS	NS	NS
29	Leather & textiles	NS	NS	NS
30	Tyres & Other Rubber	1.070	64.080	52.250

NS = Not specified as insufficient reference data identified

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